



Title 9 Master Plan Permit No: 107-03-10

Date of Issue: December 9, 2009
Permit Expires: December 31, 2031

APPROVED

Permit Issued By:

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Project Description:

Teck Alaska, Inc. (Teck) is updating the Northwest Arctic Borough Title 9 master plan for the Red Dog mine to include the mining of the Aqqaluk Deposit adjacent to the existing Main Pit.

Specific details of the project are contained in the permit application (10-02-112) and documents submitted by Teck to the Borough Planning Department. These documents are incorporated into the Borough's administrative record. Project activities are summarized below.



RESOURCE EXTRACTION AND MINING ACTIVITIES/USES

RESOURCE EXTRACTION, ROCK REMOVAL AND WASTE ROCK

The Red Dog Mine is an open pit mine, located in northwestern Alaska on private land owned by NANA Regional Corporation with some support facilities located on State of Alaska lands. The Mine is situated in the DeLong Mountains of the Western Brooks Range, near Middle Fork Red Dog Creek.

As background, Teck has been mining ore from the Red Dog Mine Main Deposit since 1989, and Teck operates the mine under a 1982 Operating Agreement with NANA. The mine currently consists of an open pit mine, a mill for processing ore, a tailings impoundment, waste rock storage areas, and support facilities. Teck proposes to extend their open pit mining operations through the development of the adjacent Aqqaluk Deposit during 2010 through 2031. In 2010, Teck proposes to start initial stages of development of the Aqqaluk Deposit while finishing the mining operations in the Main Pit. The Main Pit is expected to be mined out by 2012, and waste rock removed from the Aqqaluk Deposit would be disposed in the mined out Main Pit. Ore storage, milling of the ore, and tailings disposal would continue to occur consistent with the current mining operations.

MINING METHODS

Currently, the Main Pit is an open pit mine where ore and waste rock are removed by a typical blast-loader-truck operation. The pit is developed as a series of benches where waste material is removed to access the ore. Diesel-powered drills are used to drill a series of holes in either waste rock or ore. Depending on the objective, blasts may range from just a few drill holes to 350 holes. Blasting is carried out by filling the drill holes with a mixture of ammonium nitrate/fuel oil and emulsion blasting agents. The subsequent blast loosens the material, which is then loaded by a front-end loader into a haul truck. The current mining fleet consists of two drills, three 12-yard loaders, and seven 100-ton haul trucks. Ore is initially hauled to ore stockpiles within the Main Pit.

Stockpiles of mining material allow the ore from different parts of the pit to be blended prior to being fed into the milling process. From the stockpile, haul trucks carry ore to a gyratory crusher, which is connected to the coarse-ore stockpile building via an enclosed conveyor. At the end of 2007, the Main Pit was approximately 5,200 feet long and 3,000 feet wide, extending to a depth of 220 feet below Middle Fork Red Dog Creek. At the end of mining for the Main Pit in 2011 or 2012, it will cover approximately the same area; however, the Main Pit will be deepened to 400 feet below Middle Fork Red Dog Creek.

The Aqqaluk Deposit would be mined using the same approach as used in the Main Pit. Stripping waste material would begin in early 2010, after which an initial pit would be developed within an area containing a high-grade zinc ore. Mining operations would use existing facilities



and equipment with the exception of the addition of one drill, one loader, and two haul trucks that would be necessary to handle the increase in waste rock production. Ultimately, the Aqqaluk Pit would be approximately 3,400 feet wide by 2,950 feet long and 435 feet below Middle Fork Red Dog Creek. The projected total tonnage of ore mined from the Aqqaluk Deposit is 61.4 million short tons (tons). The project would result in the production of approximately 94.7 million tons of waste rock.

Waste material is defined as rock with sub-economic value, meaning that it may contain lead and zinc minerals but the concentrations are too low to be processed economically. The Current Mine Plan calls for five (5) stockpiles as follows:

1. Main waste stockpile

The Main Waste stockpile currently covers roughly 190 acres and contains 33,000,000 tons of waste rock. By 2031, the Main Waste stockpile is predicted to cover 275 acres and contain 62,000,000 tons of waste rock. Waste rock deposition on the southern half of the Main Waste stockpile is expected to be completed by 2008. Progressive reclamation of that area will be initiated in 2009, and will consist of local re-grading, construction of a two-layer soil cover, and re-vegetation. Waste rock deposition on the northern half of the Main Waste stockpile will cease by 2012, and progressive reclamation could begin thereafter.

2. Main pit stockpile

The backfilling of the Main Pit is expected to cover approximately 150 acres and contain 104,000,000 tons of waste rock. The majority of the rock in the Main Pit stockpile will come from Aqqaluk Pit. The Aqqaluk waste will be segregated and about 26,000,000 tons of the most strongly acid generating rock (as defined by a sulfide sulfur content of greater than 6% in blast holes) will be placed in the base of the Main Pit, below elevation 850 feet, where it will eventually be flooded by groundwater. Units of un-reactive or less reactive rock will also be identified and segregated for use in tailings dam raises and cover construction. The remainder of the Main Pit stockpile will consist of approximately 63,000,000 tons of Aqqaluk waste and 13,000,000 tons of Qanaiyaq deposit waste.

3. Oxide stockpile

The Oxide stockpile contains approximately 2,200,000 cubic yards or 4,200,000 tons of material, and covers about 30 acres. The oxide material is sometimes referred to as oxide ore, because it has a high metal content. However, it cannot be processed in the current sulfide flotation system. The Oxide stockpile is now largely surrounded by other waste rock and is not expected to receive any further material. The stockpile was reclaimed in 2009.



4. Low Grade Ore stockpile

Currently, the Low Grade Ore stockpile contains approximately 950,000 tons of material, and covers about 16 acres. The mine plan predicts that an additional 7,700,000 tons of low grade ore will be mined from the Aqqaluk deposit, and 660,000 tons from Qanaiyaq, for a total of about 9,400,000 tons.

5. Overburden stockpile

The Overburden stockpile has a plan area of 60 acres and a volume of 6,600,000 cubic yards. The tonnage of material deposited there was not recorded, but can be estimated from the volume to be somewhere between 10,000,000 and 11,000,000 tons. The material in the Overburden stockpile consists of highly weathered but relatively non-mineralized waste rock, stripped organic materials, and materials excavated from the tailings and mill site areas during construction. Material from the Overburden Stockpile may be used for initial cover material on the Main Waste Stockpile. No additional material is expected to be added to the Overburden stockpile.

MILL/ORE PROCESSING

Initially, ore from the Aqqaluk Deposit would be blended with ore from the Main Deposit for processing until the Main Deposit will be depleted in 2012. From that point until mine closure, all ore would be from the Aqqaluk Deposit. Processing ore from the Aqqaluk Deposit is proposed to be the same as in current operations. Ore would continue to be hauled from stockpiles to the gyratory crusher. The gyratory crusher is fit with an apron feeder and a conveyor belt to transport the crushed ore to the coarse ore stockpile building, where the crushed ore is stored until milling. The crushed ore is processed at the mill, which uses grinding and conventional froth flotation to recover sphalerite (zinc sulfide) and galena (lead sulfide) that contains silver.

In the primary grinding circuit, the crushed ore is mixed with process water and wet ground in semi-autogenous mills or ball mills to particles less than 65 microns in size (220 mesh). Several stages of froth flotation are employed to maximize recovery and allow efficient separation of the silver, lead and zinc minerals. Chemicals are added during the froth flotation process to enhance recovery of minerals. The undesired minerals, or tailings, are discharged as a slurry to the tailings impoundment for permanent disposal.

The resulting mineral concentrates are thickened and filtered to a moisture content of about 9 percent, then moved to the mill site concentrate storage building (CSB) by an enclosed conveyor belt. The mill site CSB has a capacity to hold 32,000 tons of the concentrate. Concentrates are loaded onto concentrate trucks in a structure adjacent to the CSB. The trucks enter and exit the building through doors that are closed when not in use. About 120 tons of concentrate is loaded onto the truck by a front-end loader. The trucks deliver the concentrate to



the port site where it is stored in two large CSBs until shipment. Currently, mineral concentrates are shipped to markets outside the State of Alaska. It is expected that the Aqqaluk ore hardness will increase after the first several years of mining, such that two of the semi-autogenous grinding mills would require upgrading to increase the motor size from 2000 horsepower (hp) to 2750 hp.

WATER MANAGEMENT: TALINGS POND, DAM AND DISCHARGE

Tailings disposal would continue to occur consistent with the current operations. Currently, tailings are pumped from the mill to the tailings impoundment via a 6,500-foot pipeline. The tailings impoundment is located in South Fork Red Dog Creek, and is bordered on the north end by the main dam and on the south end by the overburden stockpile. A concrete curtain, which will function as a back dam, is under construction as of summer 2008; final construction to an elevation of 970 feet is anticipated in 2010.

Wastewater treatment would include the existing high density sludge process supplemented with additional treatment, for example barium hydroxide precipitation to reduce metals and total dissolved solids (TDS) levels in the discharge.

The dam for the tailings impoundment is currently in the process of being raised from an elevation of 960 feet to 970 feet / dam height of 182 feet to 192 feet. To accommodate tailings from the milling of the Aqqaluk ore, the dam would be raised to an elevation of 986 feet / dam height of 208 feet with tailings deposited to the 976-foot elevation.

The upstream face of the dam is covered with 100-mil high-density polyethylene geomembrane to minimize seepage loss. An engineered gravel under-drain that follows a former stream channel lies beneath the dam. The tailings disposal pipeline follows along the dam from the east to the west. The location of the tailings deposition is changed frequently to allow for the uniform subaqueous filling of the impoundment. A seepage collection and pump-back system is located about 250 feet downstream from the main dam. The system is an impoundment created by a small lined dam and three pumps connected in parallel to a 14-inch high-density polyethylene pipe that discharges to the tailings impoundment. Any water from the dam under-drain and precipitation that collects in the seepage collection system is pumped back to the tailings impoundment. A secondary pump-back system composed of a sump and a well is situated downstream from the seepage collection system and pumps water from the well back to the seepage collection system.

Tailings created from mining of the Aqqaluk Deposit would be placed in the existing tailings impoundment. To accommodate the additional tailings volume, and a freeboard requirement of five feet, the main dam would need to be raised 16 feet to an elevation of 986 feet (208 feet tall at its maximum). The maximum water level in the impoundment would reach an elevation of 978 feet with the final tailings level ("struck level") reaching an elevation of 976 feet. The mine access/haul road and the access road around the tailings impoundment would also need to be raised to accommodate the higher water levels in the impoundment.



Wastewater and stormwater management practices include diversion of clean runoff and drainage areas to natural water courses to prevent contamination. The Red Dog Creek Diversion diverts Middle Fork Red Dog Creek (the main drainage in the mine area) and tributary creeks around the mine area. The diversion consists of three sections. The first section channels clean water from Middle Fork Red Dog Creek and Rachel Creek around the east and northeast sides of the Main Pit in a 72-inch culvert that extends to the confluence with Connie Creek. A 96-inch culvert extends from that point to the confluence with Shelly Creek between the Main Pit and the Aqqaluk Deposit. The third diversion section is a lined channel that runs from the mouth of the 96-inch culvert to the Red Dog Creek Diversion dam, where it re-enters the original streambed. Sulfur Creek enters the diversion within the third section. The Red Dog Creek Diversion can accommodate in excess of 100-year flows.

Any contaminated or potentially contaminated water from the mine is directed to the tailings impoundment, which is currently holding approximately 4.2 billion gallons of water. Sources of water that are directed to the impoundment include mine drainage from the Main Pit, runoff from the waste rock dump, and process water entrained in the tailings slurry. Water that enters the Main Pit becomes contaminated with suspended solids, dissolved solids, and metals via contact with mined materials and surfaces. The water collects in low areas of the pit, or sumps, and is pumped to the mine water sump, from which it is pumped to the tailings impoundment. The mine water sump contains eight pumps to pump water to the tailings impoundment.

The mine water collection system also collects water from Hilltop Creek, which drains the east side of the ridge below the oxide ore stockpile and drains to the mine water sump by a ditch. Leakage from the Red Dog Creek Diversion and areas downstream of the diversion intake points for Connie Creek and Shelly Creek are directed to the collection system either by gravity flow, or by French drains under the diversions that direct the water that is not captured to the mine water sump. Stormwater that drains from the exploration areas associated with the Aqqaluk Deposit is collected by French drains that pass underneath the Red Dog Creek Diversion and is directed to the mine water sump. Runoff from stockpile areas originates from the area of the waste rock dump, the low-grade ore stockpile, the oxide-ore stockpile, and portions of the Qanaiyaq Deposit. The runoff contains elevated levels of TDS, sulfate, and metals. The majority of this runoff is directed to the tailings impoundment, but during the summer months, a portion is collected and treated at Water Treatment Plant 3 prior to discharge to the tailings impoundment.

Three water treatment plants treat contaminated water at the mine site.

1. Water Treatment Plant 1 treats water reclaimed from the tailings impoundment for use in the mill. At the treatment plant, lime (alkaline) is added to reclaimed water to elevate the pH levels and precipitate out metal hydroxides and gypsum. Sludge from the treatment plant is disposed in the tailings impoundment.



2. Water Treatment Plant 2 treats water from the tailings impoundment prior to discharge to Red Dog Creek at Outfall 001 during the summer months. Metals are removed using a high density sludge system. Sodium sulfide is first added to the feed water to enhance cadmium precipitation. The feed water is mixed with flocculant in agitator tanks and the precipitate is separated from the treated water in a clarifier. Lime is added to raise the pH and precipitate metal hydroxides. Most of the clarifier sludge is recycled back to the inlet, although a small portion of the sludge is discharged to the tailings impoundment. The treated water is passed through sand filters for further removal of zinc hydroxide and other suspended solids prior to discharge.
3. Water Treatment Plant 3 treats runoff and seepage from the waste rock dump and mine sump before discharge to the tailings impoundment during the summer months. Treatment of the runoff is expected to reduce TDS and sulfate levels in the tailings impoundment, and improve the performance of the first two treatment plants. Lime is added to raise pH and precipitate metal hydroxides and gypsum (sulfate). Treatment plant sludge is disposed in the tailings impoundment.

Teck has been collecting the stormwater runoff associated with the Aqqaluk Pit since 1991. During development at the Aqqaluk Pit, stormwater and seepage from the area would be collected and pumped to the tailings impoundment. As the depth of the pit descends below the permafrost level, there is potential for seepage of the underlying groundwater. Water that enters the pit and contacts pit walls is expected to have high concentrations of dissolved salts and metals. The infiltrating groundwater will be collected and pumped to the tailings impoundment for treatment. A diversion of Sulfur Creek would be necessary at some point in the process of developing the Aqqaluk Deposit. Partial covering of the waste rock dump would occur during mining of the Aqqaluk Deposit, which would reduce the amount of contaminated mine water needing to be managed. Water management for all other areas of the site would continue as currently practiced.

With the development of the Aqqaluk deposit and the pending reissue of the NPDES permit requires compliance with in-stream TDS limits of 1,500 mg/L in Main Stem Red Dog Creek, 1,000 mg/L in Ikalukrok Creek immediately downstream of the confluence with Red Dog Creek and, after July 25 of each discharge season, 500 mg/L approximately 10 miles downstream of the confluence. The water treatment facilities would be unchanged from the current system. However, Teck has proposed to use additional treatment using barium hydroxide, in place of calcium hydroxide, as needed throughout the discharge season to lower TDS levels and ensure that there is no excess water accumulating in the impoundment.

Both calcium and barium hydroxide are added as reagents to produce insoluble calcium and barium sulfate; the precipitation of which reduces TDS. Because barium sulfate is more insoluble than calcium sulfate, it is more easily removed from the wastewater and therefore more effective in TDS removal. Use of barium hydroxide would reduce sulfate levels in the Outfall 001 discharge from 2,500 mg/L to approximately 800 mg/L with a corresponding decrease in TDS concentrations. Barium precipitation would increase the sludge volume requiring disposal



by as much as 50 to 100 tons per day. Barium sludges are generally stable and would be placed in the tailings impoundment during operations and the pits after closure for the reasonably foreseeable future without a concern about metals release. The Main Pit would have the capacity to store 50 years of sludge generated at a rate of 100 – 200 tons per day after mine closure. Beyond this time, the Aqqaluk Pit would also provide long-term capacity.

For the past 10 years, Teck has investigated a range of different operational and water treatment measures to reduce TDS levels in the tailings impoundment and the discharge from Outfall 001. These studies led to the design and installation of Water Treatment Plant 3 to pre-treat waste rock dump seepage that has the highest TDS concentrations. During 2007, Teck changed the intake location from the surface of the pond to the bottom of the pond. This resulted in a higher TDS feed to the water treatment plant and a higher amount of TDS discharged from the tailings impoundment. Other ongoing studies include ways to optimize the volume of effluent that is discharged during high-flow periods (when the highest dilution is available) and measures to reduce gypsum saturation in the impoundment.

In the near term, the use of barium hydroxide treatment provides a proven approach to increase discharge volumes and reduce water levels in the impoundment. The reissue of the NPDES permit for this alternative includes a special condition that requires Teck to develop and implement a plan to permanently ensure compliance with TDS limits while maintaining a positive water balance, i.e., the annual discharge from the impoundment is at least as great as the inflows to the impoundment. The US EPA will review the plan prior to implementation. EPA anticipates that the plan will include a combination of source control and water treatment measures, including barium hydroxide addition. Per current operations, the treated wastewater would be discharged to Red Dog Creek when there is flow in the Creek.

MONITORING

Teck currently undertakes a complex monitoring program in support of its existing permits and authorizations. Teck is also in the process of finalizing a fugitive dust risk management plan, as an outcome of their ecological and human health risk assessment (DMTS risk assessment) completed in 2008, to address issues related to fugitive dust. Once completed, the plan may include additional monitoring objectives, some of which would be applicable to monitoring needs identified in the US EPA's Supplemental Environmental Impact Statement (SEIS).

CLOSURE AND RECLAMATION

Reclamation of the existing waste rock dump would occur throughout the life of the operation and final closure would occur after mining of the Aqqaluk Deposit is finished in 2031. Closure of the waste rock dump would involve re-grading the waste rock dump to a slope of 3:1 (horizontal: vertical) and covering the waste rock with an engineered soil cover.



Tailings impoundment closure includes maintaining a shallow (2-foot) water cover. After closure, the Aqqaluk Pit would be filled with water and also be used to manage other impacted water from the site. Water would be pumped from both the Aqqaluk Pit and the tailings impoundment to the wastewater treatment system and discharged to Red Dog Creek as permitted by the US Environmental Protection Agency (EPA). Water treatment is projected to be necessary as long as can be predicted.

Teck has developed a draft reclamation and closure plan that is being reviewed for approval by the State of Alaska that includes the reclamation and closure of the Aqqaluk Deposit. The plan describes closure procedures for the waste material dumps, tailings impoundment, and water management systems. The State of Alaska currently holds a \$154.6 million financial assurance to ensure reclamation and post-closure activities, including long-term water treatment. The State is proposing to increase the financial assurance amount to \$304.5 million.

MINE SUPPORT ACTIVITIES/USES

CAMP AND WAREHOUSES

The mine site personnel accommodations complex (PAC) can accommodate up to 365 employees. The complex includes kitchen, laundry, and recreation facilities. It is located next to the mill and connects to the mill by an elevated enclosed walkway. Another PAC (contractor PAC) is available for construction contractors, and is operated when construction and exploration activity is ongoing. The contractor PAC was decommissioned in 2001, but was reopened in 2007 and is used for housing in the summer season.

The mine currently employs approximately 570 people, including employment provided Teck and jobs associated with NANA Management and NANA/Lynden. With the Aqqaluk Deposit development, employment would be extended with approximately the same number of employees for an additional 20 years.

Potable water is provided by a potable water treatment plant. Raw water is provided from the Bons Creek Reservoir near the contractor PAC. The reservoir was created by building a small dam across Bons Creek; water is replenished in the reservoir each spring by snow melt and precipitation. Water is pumped to the potable treatment plant through insulated, heat-traced pipes and treated with a polymer addition for flocculation, a two-stage sand filter, and calcium hypochlorite for disinfection. The treated water is pumped from a holding tank within the treatment plant to the mine site PAC, mill complex, services complex, and to other small buildings on the mill site.

At the port site, there is another PAC and drinking water is generated using a desalinization unit consisting of a filter, reverse osmosis, and chemical treatment. The demand for fresh water at both locations would decrease following mine closure.



BULK FUEL STORAGE

Diesel fuel is used daily for power generation, equipment operation, and vehicle use. Jet A fuel is used for air transportation services. Diesel fuel is shipped to the port facility each summer by barges directly and by tanker with lightering to the port by barge. Fuel is pumped from the barge to the storage tanks and transported daily from the tanks to the mine site by a 25,000-gallon tanker truck. Approximately 46,000 gallons of diesel fuel are used daily, and 60,000 gallons of jet fuel are used annually. Fuel is stored as follows:

1. Diesel fuel is stored at the mine site in two (2) single-walled tanks, with a combined holding capacity of 2.3 million gallons, set within a lined basin for secondary containment.
2. Diesel fuel is stored at the port site in six (6) tanks: four (4) double-walled tanks and two (2) single walled tanks that are set within a lined containment structure. The combined holding capacity is 14.04 million gallons.
3. Diesel fuel is also stored on-site in two (2) double-walled tanks, which have a storage capacity of 200,000 gallons each.
4. Jet A fuel is stored in up to ten (10) ISO tanks (total capacity of 60,000 gallons) which are stored in the lined oil storage area on the Cold Storage Pad. This fuel is generally used for helicopters to support exploration drilling.
5. 9,200 gallon doubled walled vehicle fueling tank stored at the mine at the Cold Storage Pad.
6. Methanol is stored in portable ISO tanks with a 6,000 gallon capacity. The methanol is mixed with water and used in the winter months to prevent the freezing of water used for dust control during drilling operations (not as fuel).

With development of the Aqqaluk Deposit, an increase in the mining equipment due to the increase in waste rock generation would correspond to an increase of fuel required, at least for the two years when the Main Pit and the Aqqaluk Pit would be mined concurrently. Daily fuel use would then be similar to current fuel consumption.

LANDFILL AND HUMAN WASTE MANAGEMENT

Three on-site landfills are used for solid waste disposal: (a) one landfill is near the Mine incinerator; (b) the second landfill is in the Mine waste rock dump; and (c) the third landfill is at the Port located at Material Site 2.

Solid waste is initially segregated between putrescible waste, such as kitchen wastes, and other waste. Putrescible waste is collected in closed dumpsters and incinerated. Oil contaminated solid waste is collected separately and incinerated. Ash from the incinerators, other solid waste, construction waste, and burn pit ash are disposed of in the three permitted landfills on-site as applicable.



Domestic wastewater from the mill, mine site PAC, and the services complex is currently collected and treated at the sewage treatment plant by solids/liquids separation and disinfection prior to discharge to the tailings impoundment. The average annual flow is approximately 17 millions gallons (47,000 gallons per day).

A similar water treatment plant is located at the port site which treats domestic wastewater from the port site PAC. The port site water treatment plant discharges between 6,000 to 7,500 gallons per day to the Chukchi Sea during the shipping season and averages about 2,500 gallons per day during the winter. The design capacity is 12,000 gallons per day (approximately 4.4 million gallons per year). The port site domestic wastewater treatment system operates under a separate NPDES permit. The volume of discharge at both locations would decrease dramatically following mine closure.

HAZARDOUS MATERIAL MANAGEMENT

The majority of chemicals used on the site are required for the froth flotation process, and to a lesser degree water treatment. The reagents used in the froth flotation and water treatment processes as follows.

1. Lime – use pH modifier, water treatment
2. Copper Sulfate (CuSO₄) – use activator in the zinc circuit
3. Sodium Isobutyl Xanthate (SIBX) – use collector in the zinc circuit
4. Potassium Ethyl Xanthate (PEX) – use collector in lead circuit
5. Zinc Sulfate (ZnSO₄) – use depressant in the lead circuit
6. Sodium Meta Bi-Sulfite (SMBS) – use scavenger
7. Sodium Sulfide (Na₂S) – use precipitation agent
8. Sodium Cyanide (NaCN) – use depressant
9. Dextrin – use organic depressor
10. Methyl Isobutyl Carbinol (MIBC) – use frother
11. Magnafloc – use clarification in water treatment and thickening
12. Antiscalent – use dispersant for process water

The reagents are stored onsite in bulk shipping containers, then mixed in the reagent building (located west of the mill) prior to use. The mill and reagent building are connected by an enclosed walkway. The reagent building provides temporary storage of reagents and facilities to mix the reagents. The reagents are mixed with water in mixing tanks, and transferred to day tanks, where they flow to holding tanks in the mill. The reagents are transferred to the mill by pipeline through the enclosed walkway. No changes in reagent use are expected.



With the Aqqaluk Deposit development, assuming treatment of 30 percent of water using barium hydroxide, lime usage would be reduced by about 600 tons per year. This corresponds to the amount of barium hydroxide that would be used.

Hazardous wastes are shipped offsite for disposal at a permitted treatment, storage and disposal facility. Glycols are either cleaned or recycled when possible, and used oil is mixed with diesel fuel and burned on-site for energy recovery. Byproducts of the used oil recovery process are stored in shipping containers prior to shipping off site as used oil.

TRANSPORTATION: PORT, AIR, HELICOPTER, ROAD AND ATV-SNOWMACHINE

Year-round transportation to and from the mine site for personnel, equipment, supplies, and perishables is provided by an airstrip with capabilities to handle commercial jet aircraft. The paved airstrip is located approximately three miles south-southwest of the mill. An emergency airstrip is located at the DTMS port/road. Unpaved roads provide access to each of the major facilities on-site.

General average weekly airport traffic includes: (a) commercial regional small planes with an estimated 7 to 8 flights per week; and (b) commercial jet service 3 to 4 flights per week that includes cargo service (every Tuesday) and passenger service (every Wednesday and combined passenger/cargo every Saturday). The schedule does change depending on the needs of the operation.

Process ore (lead and zinc concentrates) are transported by trucks from the mine facilities via the 52-mile DeLong Mountain Regional Transportation System (DMTS) to a port facility located on the Chukchi Sea and owned by the Alaska Industrial Development and Export Authority (AIDEA). From the port facility, ore concentrates are seasonally shipped to markets in North America, Europe and Asia.

Congress granted to NANA, a 100-year easement through Cape Krusenstern National Monument to make land available for the DMTS to be sufficient to secure financing to construct, operate, maintain and expand the transportation system by the State of Alaska and AIDEA (reference public law 99-96).

Concentrate is moved from the mine site to the port site in 130-ton concentrate trucks. The trucks consist of tandem self-rotating trailers equipped with hydraulically operated covers. Unloading of the trailers is accomplished by opening the cover and rotating the trailer sideways on its long axis. A fleet of 11 trucks operates at the mine although only seven or eight trucks are active at any one time. On average, the eight trucks complete a total of 36 round trips per day. Trucking is scheduled 24 hours a day, 365 days a year, although weather conditions occasionally close the DMTS road for varying periods of time. The DMTS road may also be closed for caribou crossings.



The loading process consists of trucks entering and exiting a separate loading area attached to the mill site CSB. Trucks pass into the loading area through doors that are closed while the loading process is underway. A front-end loader loads the concentrate into each trailer. During the summer, trucks exit the CSB and drive through a truck wash that sprays water on the top and sides of the truck and trailer. Washing is not used in the winter because of safety concerns associated with freezing brakes and hydraulics. The concentrate is then hauled down the DMTS road to the port site where the trailers are emptied one at a time in the truck unloading building. The truck unloading building is designed to minimize the escape of concentrate during the unloading process. The unloading building includes an enclosed dumping area where a bag house and a negative air system create enough negative air pressure to ensure that airborne particles are deposited within the building. The hopper receiving the concentrate is connected to the port site CSBs through an enclosed conveyor system. Concentrate trucks operating along the haul road would continue to be used to transport concentrates from the mill area to the port.

Internal roads provide access to all major facilities on the site. The DMTS road is a 52-mile long, gravel surfaced access road from the mine site to the port facility for the transportation of concentrates, fuel, and supplies. It was built over geo-textile material covered by a minimum of five feet of fill plus an additional 12 inches of 1-inch minus surface material. The DMTS road is treated annually with calcium chloride to reduce the amount of traffic-generated fugitive dust. Teck conducts ongoing testing with different dust control agents in an effort to minimize both dust generation and road maintenance. The road includes nine bridges, four major culvert crossings and 451 minor culvert crossings. The road to the tailings impoundment and the DMTS road between the mine and the airstrip would be slightly realigned to accommodate the higher water level of the tailings impoundment associated with raises of the tailings dam that would occur to develop the Aqqaluk deposit.

The DeLong Mountain Terminal (port site) is located on the Chukchi Sea, nearly 52 miles from the mine site. The facility, owned by AIDEA and managed by Teck, consists of a housing unit (PAC), six diesel storage tanks, two CSBs, a lay-down area, and a concentrate conveyor/ship loading system. Shipping of the concentrate is only possible for a few months when the waters are not ice-covered (generally July through October). The concentrate is transported year-round from the mine site to the CSBs, which can store up to nine months of concentrate production.

The concentrate conveyor system that transfers the concentrates from the CSBs to the barge loader is fully enclosed. The canvas tube that directs concentrate from the conveyor to the barge, combined with curtains and bag houses on the barges limit the amount of fugitive dust released during loading operations. Once filled, tug boats tow the barge from the shallow water of the port to deep sea cargo ships anchored approximately three miles offshore. Barges use a built in conveyor (also equipped with a bag house) to transfer the concentrates to the cargo ships. Up to 1.5 million tons of concentrate are shipped from the port site annually. With development of the Aqqaluk deposit, operations at the port site would remain the same as under current conditions and concentrate shipments would continue through 2031.



Tundra travel for environmental sampling is necessary. Low ground pressure vehicles will be used to reduce impact to tundra.

GRAVEL EXTRACTION

The borrow areas (material sites) used to raise the tailings impoundment dam and build the DMTS road and conduct ongoing maintenance activities were assessed in the 1984 EIS. Currently Teck estimates that cover material for reclamation and closure can be obtained from material stripped in developing the Aqqaluk Pit. Therefore no additional borrow areas are expected to be developed for this project.

UTILITIES

Electric power to the site is provided with eight 5-megawatt diesel-powered generators that are housed within two power houses. The power houses are located next to the mill. The generators use No. 1 and No. 2 diesel fuel, and small quantities of used oil. Three 650-kW diesel generators supply emergency power. The power generators are equipped with air pollution control measures to reduce emissions of nitrogen oxides.

Heat for mine site buildings is generated by heating a glycol/water mixture with recovered diesel engine heat and circulating the mixture by pumps to mine site buildings. Emergency heat is provided by three standby glycol/water heaters rated at 8,000,000 British Thermal Units (BTUs).

With the Aqqaluk Deposit development, power requirements are similar to current conditions and would continue through mining of the Aqqaluk Deposit. Power would be required after closure for the wastewater treatment system. The amount of generation capacity needed at that point would be substantially less than during operations.

Permit Authorization and Documentation:

Teck submitted a Title 9 Zoning Permit application (10-02-112) for a Master Plan Update to conduct resource extraction and supporting activities in Resource Development and Transportation Corridor Zones on September 28, 2009. On October 9, 2009, Borough planning department staff requested additional information to complete the application. On November 12, 2009, the Borough planning director deemed the application was complete. Permit fees due totaled to \$10,000.00 plus additional fees to convene a special meeting of the planning commission, and were paid by the applicant.

On November 12, 2009, the Borough approved a draft permit and posted it for public review for 18 calendar days (or ending November 30, 2009). One public comment was received from Teck regarding the permit draft. On December 8, 2009, the planning commission held a public hearing on the permit for additional public comments and approval.



The Planning Commission has the authority to update master plan permits in Resource Development and Transportation Corridor Zones, pursuant to Northwest Arctic Borough Code (NABC) 09.20.080.

Master Plan Permit Terms and Conditions:

The Northwest Arctic Borough Planning Commission approval is hereby **GRANTED** through resolution PC-09-13 to permit master plan activities described, subject to the permit terms and conditions stated herein.

A. GENERAL TERMS AND CONDITIONS

- A.1. Teck shall comply with the terms of the permission/permits agreements granted by the federal government, State of Alaska, local governments and/or NANA.
- A.2. Teck shall comply with any and all applicable local, borough, state and federal laws. Failure to abide by any part of this permit, or violations of any pertinent borough ordinances or state or federal law or regulation, will be considered grounds for revocation of the permit or denial of future permit requests and may result in issuance of fines or other penalties. This provision applies to all persons working under the authority of this permit.
- A.3. The Permittee is responsible for ensuring that all employees, contractors, sub-contractors, and any other persons working for the permittee and conducting activities allowed by this permit are familiar with and adhere to the conditions of this permit.
- A.4. Teck shall notify the borough within seven (7) calendar days of any damage to the tundra due to project activities that are inconsistent with state and federal permits and in excess of those identified in or different from those noted in the Borough title 9 permit application (10-02-112) and/or accepted as part of the annual master plan update process associated with this permit. This includes, but is not limited to, the scraping of vegetation and spill of oil or other chemicals.

For oil spills or other chemical spills, Teck shall notify the borough (the local emergency planning committee) of any spill that must be reported under any State of Alaska or federal law or regulation.
- A.5. Teck shall annually update the borough planning commission of changes in the project plans and seek modification of the master plan permit through the update process identified in NAB code 9.20.080. Teck shall make reasonable efforts to conduct modified uses in a manner that avoids or minimizes significant harm to the environment, consistent with the need to protect property and human life.
- A.6. Teck is subject to all penalties and civil actions pursuant to section 9.08.240 for violation of the permit conditions and stipulations prescribed herein.



- A.7. Teck or any project contractors shall not, during the migration of caribou, locate any operation and/or equipment so as to block or cause diversion of the migration of caribou. Teck or any operators shall operate in accordance with existing protocols and operating procedures for caribou migration. Moreover, Teck or any project contractors shall cease any activity that may interfere with the seasonal fall caribou migration and/or caribou summer movements, such as ground and airborne transports, ground and airborne surveys or movement of equipment, until such time as the migration or summer movements have cleared $\frac{3}{4}$ of a mile from the area where the activity had occurred. Concern for human safety will be given special consideration when applying this policy.

As a general guideline, caribou migration means an area where 500 or more caribou are travelling or congregating. However, during the seasonal fall period of mid-August through mid-November, Teck shall take extra precautions to avoid deflecting even small numbers (e.g. group sizes of 5-10) of the first caribou moving through the area as these groups/bands set trails as “lead caribou” that subsequent caribou later follow during the migration. The intent of these guidelines are to ensure free passage of caribou through the area between the Red Dog Mine, DMTS Road and Port Site to avoid impacting caribou and the communities that historically and currently depend upon it as well as preserving existing and important adjacent land uses. These guidelines may be revised based upon updated information and research (including local traditional knowledge) which is approved by the borough planning commission.

Summer (late June through late July) caribou movements are common as the herd moves eastward through the DeLong Mountains area.

- A.8. Consistent with an approved mine plan and relevant State and federal permits, during and after project activities, the permittee must conduct activities in a manner to maintain natural drainage patterns, watershed protection, and permafrost stability, to prevent runoff and erosion into water supplies and/or to minimize alteration of vegetation.
- A.9. Uses permitted shall cease upon the discovery of archaeological, prehistoric, historic or cultural resources during the construction activities, and Teck shall immediately contact both the Land Specialist at the NAB Planning Department and Alaska State Historic Preservation Office to determine the conditions to continue.
- A.10. Any development by the project in floodplains and shoreline areas are to be constructed to minimize loss of life or property due to riverine flooding, icing, and stream bank erosion.
- A.11. All project activities shall utilize measures to avoid or minimize disrupting wildlife and bird migration, or subsistence activities including fishing, trapping, waterfowl hunting, egg gathering and hunting. The permittee will ensure reasonable access to subsistence users to subsistence resources, excluding the areas within the (a) DeLong Mountain Regional Transportation System (DMTS) Port Facility operating boundary (as defined in the Clean Air Act Title V permit) and (b) Red Dog Mine Facility Operating Boundary



which are both zoned Resource Development Districts and designated industrial areas that are closed to public use.

- A.12. Project equipment/vehicle servicing and fueling operations are prohibited within 100 feet of any surface waterbody, including any rivers, drainage channels, sloughs and lakes.

Equipment and vehicles are to be maintained to eliminate or minimize any fuel spills and fluid leaks. Equipment and vehicles must be monitored prior to use for hydraulic leaks. If equipment is in continuous use, it shall be inspected daily for hydraulic leaks.

Project equipment shall not be abandoned.

- A.13. This permit shall expire December 31, 2031, unless modified by Teck with concurrence by the Northwest Arctic Borough Planning Commission as provided in NABC 9.20.080.

B. RESOURCE EXTRACTION AND MINING TERMS AND CONDITIONS

- B.1. Uses shall comply with state and federal land, air and water quality standards, regulations, and permitting requirements, including those listed below, but this standard does not require the borough to enforce such standards, and failure to do so shall not impose any liability on the borough.
- a. Uses resulting in waterborne or airborne emissions must comply with all state and federal regulations.
 - b. This industrial and commercial development must be served by solid waste disposal facilities which meet state and federal regulations.
 - c. The mine and port site are required to impound and/or process effluent to state and federal quality standards.
- B.2. Mining and/or other extraction of resources must be conducted in accordance with reclamation plans that minimize adverse environmental effects as may be required by the administrator and/or the borough planning commission. Reclamation of all upland and floodplain mined sites shall be required, unless such reclamation would cause greater adverse effects to the environment than leaving the area un-reclaimed. Excavated areas should be converted to wildlife, fish, or waterfowl habitat whenever feasible, prudent, and consistent with future land use plans.
- B.3. Mining development is required to be sited, designed, constructed and maintained in a manner that prevents significant adverse effects on fish and wildlife and their habitat, including water circulation and drainage patterns and coastal processes.
- B.4. Resource extraction support facilities, including administration offices, operations, residence and other uses not absolutely required in the field, must be located in a



designated service base which is sited, designed, constructed and maintained to be as compact as possible and to share facilities to the maximum extent possible.

- B.5. Mining development is required to be designed, constructed and maintained in a manner that does not substantially interfere with the use of a site that is important for significant cultural uses or essential for transportation to subsistence use areas.

C. MILL TERMS AND CONDITIONS

- C.1. At a minimum, hazardous substances, products disposal and storage shall comply with state regulations, and/or federal regulations in the absence of state regulations.

D. WATER MANAGEMENT, TAILINGS POND, DAM AND DISCHARGE TERMS AND CONDITIONS

- D.1. The cumulative impact on water quality due to the proposed uses shall be minimized, and shall meet all applicable requirements of state and federal laws and regulations.
- D.2. Consistent with the approved mine plan and relevant State and federal permits, proposed uses shall provide for the conservation of natural features such as drainage basins and watersheds, permafrost stability and the general environment of the area. The proposed use shall provide for the protection of watershed areas during and after construction. Conditions of approval shall be designed to minimize or eliminate siltation, road and surface runoff, and pollution of any water supplies.
- D.3. When adverse effects to a subsistence resource are likely and cannot be avoided, the borough planning director/title 9 administrator may require Teck to prepare and submit a mitigation plan to minimize the impact on subsistence resources with the goal that uses/activities shall not deplete subsistence resources below subsistence needs. The effects addressed in this standard may result from a single project or from a series of projects. The mitigation plan, if required, shall be approved by the borough planning commission according to NABC 9.20.080.
- D.4. Uses, except for the mining areas identified in the Borough title 9 permit application (10-02-112) and/or accepted annual master plan updates associated with this permit, are required to maintain the natural permafrost insulation quality of existing soils and vegetation.
- D.5. The project activities are near and/or potentially impact a Borough identified Priority Subsistence Use Area which is in the Wulik River Area. Uses and activities shall not have a significant adverse impact on fish, including fish in their juvenile and larval stages, and their use of the priority subsistence use area, including spawning, anadromous fish migration and overwintering fish populations, or significantly interfere with the subsistence harvest of fish. Permits may be denied by the borough planning commission



if there is reliable information that local subsistence practices may be significantly and adversely affected by the proposed use.

E. MONITORING TERMS AND CONDITIONS

E.1. Annually by March 1st and at the overall completion of the project, the permittee shall file an annual written report (period of January 1 to December 31 of the previous year) with the NWAB Planning Department describing the following:

- a. Copies of renewed permits from federal, state and local agencies.
- b. Cultural and archaeological sites discovered, disturbed and/or disposition of any objects from those sites.
- c. Report of all State and/or Federal reportable fuel or other hazardous substances discharges and clean-up activities completed and/or ongoing.
- d. Report the incidents of caribou migration and dates/times of ceased operations for allowing migration and/or movement of caribou.
- e. Report of fish and other wildlife studies and results.
- f. Report of reclamation completed and amendments to reclamation plans.
- g. Report of air emissions and/or water discharge violations including corrective actions and/or plans.
- h. Other matters as reasonably required by the Administrator/NWAB Planning Director and/or Borough Planning Commission.

The first written report shall be due March 1, 2011, and annually thereafter.

E.2. Access by Borough personnel and their agents. Authorized personnel and/or their agents of the Northwest Arctic Borough when on official business and displaying proper identification shall be allowed access to the sites without interference. Borough personnel and/or agents may conduct scheduled or unscheduled inspections or tests to determine compliance with this permit or respond to emergency situations.

F. CLOSURE AND RECLAMATION TERMS AND CONDITIONS

F.1. Teck plans to complete open pit mining by December 31, 2031. At the completion of the mining project, or should Teck not return or otherwise discontinue this project, Teck shall fully reclaim the mine site and associated ancillary facilities consistent with the State of Alaska approved Closure and Reclamation Plan, any relevant State and federal permits, and any relevant borough title 9 standards. Teck shall not abandon any structures, supplies and/or equipment ; however, as the landowner, NANA may contract for future transfer and use of such structures and equipment.



- F.2. Surety. Prior to the commencement of mine closure in 2031, the title 9 administrator and/or borough planning commission may require surety. The form and amount of surety shall be set based upon the magnitude, type and costs of the activities planned and the nature, extent and duration of the operations. The amount and form of surety shall be reasonably related thereto, calculated to protect the borough and insure compliance with the requirements of the approval; however, the total amount of the surety shall not exceed 100 percent of the estimated cost of reclamation or mitigation. The liability under the surety provisions shall continue until such time as released in part, or in its entirety, by the title 9 administrator.

G. CAMP AND WAREHOUSES TERMS AND CONDITIONS

- G.1. Resource extraction support facilities, including administration offices, operations, residence and other uses not absolutely required in the field, must be located in a designated service base which is sited, designed, constructed and maintained to be as compact as possible and to share facilities to the maximum extent possible.

H. BULK FUEL STORAGE TERMS AND CONDITIONS

- H.1. Bulk fuel and petroleum storage (onshore and offshore) are required to have an oil spill control and clean-up plan. The plan must contain a risk analysis indicating where oil spills are likely to flow under various sets of local meteorological, oceanographic, hydrologic or soil conditions.

Impact areas must be identified and strategies fully developed to protect environmentally sensitive areas; the spill control and clean-up equipment which is available to the operator and the response time required to deploy this equipment under the various scenarios must be contained in the risk analysis.

Depending on the nature of the activity, adequate spill response equipment may be required to be kept on-site. Duplicative borough oil spill and clean-up plans will not be required where a state or federally approved plan meeting these criteria is in effect.

- H.2. Impermeable lining and diking or other satisfactory secondary containment is required for fuel storage facilities with a capacity greater than 660 gallons.

I. LANDFILL AND HUMAN WASTE MANAGEMENT TERMS AND CONDITIONS

- I.1. All trash and human waste generated at the property must be properly disposed of in accordance with Northwest Arctic Borough (NAB) Ordinance 9.30.200 - .250, establishing standards for disposal of refuse, human body waste, and chemicals.

J. TRANSPORTATION TERMS AND CONDITIONS



- J.1. Transportation and utility corridor areas shall be sited, designed and operated so that:
- a. Adverse impacts on biological resources, subsistence use areas and local community way of life will be minimized;
 - b. Duplication of corridors and facilities will be minimized.
- J.2. Highway/road, airport, port and utility design, construction and maintenance must minimize alteration of water courses, wetlands and intertidal marshes, and visual degradation.
- J.3. Tundra Travel. Vehicles shall be operated in a manner such that the vegetative mat of the tundra is not disturbed. Snow ramps, snow and ice bridges or cribbing shall be used to cross frozen water bodies to preclude cutting, eroding or degrading of their banks. Snow ramps and ice bridges shall be substantially free of soil and debris and of sufficient thickness to support vehicles. Snow and ice bridges must be removed or breached, and cribbing removed after final use or prior to breakup, whichever occurs first. Frozen water courses shall be crossed at shallow riffle areas, if such areas exist. Where such areas do not exist, an environmentally preferred location will be identified. Vehicles shall not be abandoned.
- J.4. A means of providing for unimpeded wildlife crossing shall be included in the design and construction of structures such as roads and pipelines that are located in areas used by wildlife. Pipeline, railroad, road or other transportation facility designs shall be based on the best available information and include adequate pipeline elevation, ramping or burial to minimize disruptions of migratory patterns and other major movements of wildlife. Best available information will be evaluated during project review to determine if pipeline burial, ramping, elevation or a combination thereof, will be employed.
- J.5. Vehicles, vessels and aircraft that are likely to cause significant disturbance must avoid areas where species that are sensitive to noise or movement are concentrated. Concentrations may be seasonal or year-round and may be due to behavior (e.g., flocks or herds) or limited habitat (e.g., polar bear denning, seal haul-outs). Horizontal and vertical buffers will be required where appropriate. Concern for human safety will be given special consideration when applying this policy.
- When adverse effects are likely and cannot be avoided, the borough planning director/title 9 administrator may require Teck to prepare and submit a mitigation plan to minimize impacts. The effects addressed in this standard may result from a single project or from a series of projects. The mitigation plan, if required, shall be approved by the borough planning commission according to NABC 9.20.080.
- J.6. Stream banks and lake shores of fish-bearing waters and drinking water supplies shall be protected by providing an adequate buffer strip of undisturbed vegetation to mitigate



adverse impacts. This standard does not prohibit bridge abutments on or adjacent to stream banks where necessary.

J.7. The construction of additional landing strips or helicopter pads shall be properly permitted by the NAB under Title 9 (as a master plan update) and other appropriate agencies. Incidental removal of rocks and other minor obstructions may be permitted for existing landing areas with landowner permission.

J.8. It is recommended that all air transports (including helicopter) and other permitted transportation activities utilize measures to minimize noise, nuisance, safety, health and user conflicts affecting surrounding residential camp and seasonal camp properties, including but not limited to minimizing excessive noise, fumes, odors, glare, smoke, vibration, dust, litter, sewage, interference with any telephone, radio or television receivers, and/or significant line voltage fluctuation.

To minimize transport disturbance to surrounding properties, it is recommended that aircraft maintain a minimum altitude of five hundred (500) feet in the vicinity of such properties unless required by weather, emergencies, or if taking off or landing.

J.9. It is recommended that the permittee also utilize measures during transports that avoid or minimize disrupting caribou, bird and other wildlife and their migration, including but not limited to, as safety permits, driving or flying around herds or flocks, driving or flying at distances or altitudes high enough to reduce noise and disturbances, limiting the number of trips or flights per day, parking or landing away from migration routes, or temporarily suspending transport operations.

To minimize disturbance to wildlife during air transport, it is recommended that all aircraft maintain a minimum altitude of two thousand (2,000) feet above ground level except as required for takeoff, landing, emergency and/or weather. Take off, landing and transport drop offs should avoid proximity to a migrating caribou herd and especially to avoid interdicting the lead of a caribou herd.

J.10. Port and Road Effects on Migration. Offshore and onshore uses within the areas of beluga, bowhead whale, or bearded seal, caribou or other species migration shall not significantly interfere with subsistence activities nor jeopardize the continued availability of migratory animals for subsistence purposes during the migration seasons.

When adverse effects are likely and cannot be avoided, the borough planning director/title 9 administrator may require Teck to prepare and submit a mitigation plan to minimize impacts. The effects addressed in this standard may result from a single project or from a series of projects. The mitigation plan, if required, shall be approved by the borough planning commission according to NABC 9.20.080.

J.11. Port Effects on Whaling. Uses of lands in marine and estuarine waters significant for taking of beluga or bowhead whales shall not significantly interfere with subsistence use of beluga or bowhead whales, shall not cause the whales to be displaced from such water areas, and shall not jeopardize the continued use of such waters by beluga or bowhead



whales. The waters intensively used by bowhead whales are offshore in the vicinity of the village of Kivalina, north and west to the borough boundaries.

When adverse effects are likely and cannot be avoided, the borough planning director/title 9 administrator may require Teck to prepare and submit a mitigation plan to minimize impacts. The effects addressed in this standard may result from a single project or from a series of projects. The mitigation plan, if required, shall be approved by the borough planning commission according to NABC 9.20.080.

- J.12. Offshore structures must be able to withstand geophysical hazards and forces which may occur while at the site. Design criteria must be based on actual measurements or conservative estimates of geophysical forces. In addition, structures must have monitoring programs and safety systems capable of securing such structures in case unexpected geophysical hazards or forces are encountered.
- J.13. All causeways are required to be sited and designed to allow free passage of fish, marine mammals and molting birds with due consideration for migration patterns, prevent changes in water circulation patterns that would have significant adverse effects on fish and wildlife, and ensure adequate sediment transport.
- J.14. Transportation facilities and utilities must be consolidated to the maximum extent possible.

K. GRAVEL EXTRACTION TERMS AND CONDITIONS

- K.1. Sand and gravel extraction shall be evaluated with respect to type of extraction operation, location, possible mitigation measures and season so as to lessen, to the maximum extent practicable, environmental degradation of coastal lands and waters (e.g., siltation of anadromous rivers and streams).
- K.2. Gravel extraction activities within floodplains shall maintain buffers between active channels and the work area, avoid in-stream work, permanent channel shifts and ponding of water, clearing of riparian vegetation, and disturbance to natural banks.

L. UTILITIES TERMS AND CONDITIONS

- L.1. The siting and approval of energy utilities and facilities shall be based on the following standards:
 - a. Site facilities so as to minimize adverse environmental and social effects while satisfying industrial requirements;
 - b. Site facilities so as to be compatible with existing and subsequent adjacent uses and projected community needs;
 - c. Consolidate facilities, including use of waste heat;



- d. Consider the concurrent use of facilities for public or economic reasons;
- e. Cooperate with private landowners, local governments, developers, and state and federal agencies in the development of facilities;
- f. Select sites with sufficient acreage to allow for reasonable expansion of facilities;
- g. Site facilities where existing infrastructure, including roads, docks and airstrips, is capable of satisfying industrial requirements;
- h. Select harbors and shipping routes with least exposure to reefs, shoals, drift ice and other obstructions;
- i. Encourage the use of vessel traffic control and collision avoidance systems;
- j. Select sites where development will require minimal site clearing, dredging and construction in productive habitats;
- k. Site facilities so as to minimize the probability, along shipping routes, of spills or other forms of contamination which affect subsistence use areas, commercial fishing grounds, spawning grounds, and other biologically productive or vulnerable habitats, including marine mammal rookeries and hauling out grounds and waterfowl nesting areas;
- l. Site facilities so that the design and construction of those facilities and support infrastructures in coastal areas of Alaska will allow for the free passage and movement of fish and wildlife with due consideration for historic migratory patterns and so that areas of particular scenic, recreational, environmental or cultural value will be protected;
- m. Select sites where development will require minimal site clearing, dredging and construction in productive habitats;
- n. Site facilities in areas of least biological productivity, diversity, and vulnerability and where effluents and spills can be controlled or contained;
- o. Site facilities where winds and air currents maximize dispersal of airborne emissions which cannot be captured before escape into the atmosphere; and
- p. Select sites in areas which are designated for industrial purposes and where industrial traffic is minimized through population centers.



Permit Approval

NORTHWEST ARCTIC BOROUGH

Master Plan Update and Permit Approved by the Northwest Arctic Borough Planning Commission through resolution PC-09-13.
Ukallaysaq Thomas R. Okleasik, Authorized Signatory
Planning Director/Title 9 Administrator

December 9, 2009

Date

CC:

State of Alaska – DNR Large Mine Division
NANA – Kotzebue Office
National Park Service – Kotzebue Office
US EPA Region X
Native Village of Kivalina

Maniilaq Association
AIDEA
US COE
City of Kivalina
Native Village of Noatak

Posted at: NWAB