Chapter 2
Proposed Action and Alternatives

The resulting zinc and lead mineral concentrates are thickened and filtered to a moisture content of about 9 percent, then moved to the mill site 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. Under Alternative C, the concentrates would not be thickened and filtered for hauling to the port; instead the concentrate slurry would be piped to the port where filter presses would remove excess water prior to storage. This process is described in more detail in Section 2.3.9.

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.

2.3.5 Tailings Disposal

Tailings are currently 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. The main dam is currently being raised to an elevation of 970 feet, which corresponds to a total height of 192 feet. The upstream face of the dam is covered with 100-mil high-density polyethylene geomembrane to minimize seepage loss. A gravel 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 pumpback 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 underdrain and precipitation that collects in the seepage collection system is pumped back to the tailings impoundment. A secondary pumpback 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.

Under alternatives B through D, 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.

2.3.6 Wastewater and Storm Water Management

Water 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 (see Figure 2.3). 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 stream bed. 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. Storm water 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 (see description below) prior to discharge to the tailings impoundment.

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

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.

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.

The Applicant has been collecting the storm water runoff associated with the Aqqaluk Pit since 1991. During development at the Aqqaluk Pit, storm water and seepage from the area would be collected and