

History and Environmental Impacts of DeLong Mountain Transportation System Port Site, Red Dog Operations, Alaska

Executive Summary

Red Dog is the largest zinc mine in the world, producing approximately 1.2 million tons of lead and zinc ore concentrates per year. Operated by Teck Cominco, the mine is located approximately 50 miles east of the Chukchi Sea in the DeLong Mountains, at the western end of the Brooks Range of northern Alaska. Red Dog is located within an area of local government known as the Northwest Arctic Borough, on land owned by NANA Regional Corporation (NANA).

The Red Dog Mine is linked to a port facility by a 52-mile long, 30-ft wide all-weather gravel-surface overland haul road. The road and the port facility together make up the DeLong Mountain Transportation System (DMTS). The DMTS is owned by Alaska Industrial Development and Export Authority (AIDEA), a public agency that has contracted with Cominco for its use, operation, and maintenance. The port facility is on property owned by NANA, which is leased by AIDEA, and is operated by Teck Cominco.

Ore containing lead and zinc is milled at the Red Dog mine to produce lead and zinc concentrates in a powder form. The lead concentrate is 59 percent lead, and the zinc concentrate is 55 percent zinc. These concentrates are hauled year-round from the mine via the DMTS haul road to two concentrate storage buildings (CSBs) at the Port Site, where they are stored for later loading onto barges during the summer months. Concentrate is moved from the CSBs to barges by conveyors. A surge bin at the dock area provides storage capacity and a steady flow rate for the shiploader boom conveyor. The barges transport the concentrate to deepwater ships anchored offshore.

Initial development of the DMTS began in 1986 with construction of a shallow water dock and staging area at the Port Site. With these facilities in place, road and mine site construction began in July 1987, and was completed by November 1989. Concentrate storage in the CSBs began in November 1989, and barge loading and shipping of concentrate began in July 1990. The second CSB was added as part of a production rate increase between 1996 and 1998.

Teck Cominco contracted for the performance of an environmental baseline study in June 1990, as part of a proactive program developed to minimize operational impacts through early identification of fugitive emissions and implementation of mitigative measures. The study occurred prior to the beginning of shipping of concentrate, but after concentrate transport and storage in the CSBs had begun. The baseline study showed that losses of concentrate had occurred in several areas around the port facility. As a result, a number of engineered improvements and operational practices were implemented to minimize concentrate loss and control fugitive dust. The environmental sampling approach that had begun with the baseline study was continued and converted into an ongoing Port Site Monitoring Program (PSMP).

The objectives of the PSMP were to better identify areas of concentrate loss and sources of fugitive dust; to better understand environmental impacts to the Port Site area; and to track the performance of dust control measures over time. The PSMP included sampling of soil; lagoon and marine sediment; and water from tundra, lagoon, and marine environments in the Port Site area. The areas of primary concern identified by the PSMP were the truck unloading area, the doors at the ends of the CSBs, the conveyor that runs from the CSBs to the dock area, and the surge bin at the dock end of that conveyor. The PSMP also showed that metals concentrations were much lower in samples from outlying areas of the Port Site. Although the PSMP provided valuable baseline data and indicated where the early problem areas were, it was ultimately ineffective as a means of tracking the performance of the various fugitive dust control measures. Teck Cominco wanted to be able to monitor the effectiveness of the improvements it was continuing to make to control fugitive emissions. Therefore, the PSMP program was ended in 1996, and replaced with an air monitoring program, which has continued to the present.

The objectives of the current air monitoring program are to improve the understanding of fugitive dust sources and impacts, and to quantify the effectiveness (year-to-year) of dust

control measures implemented at the port facility over time. This program would thereby reduce impacts during operations as well as minimize the cleanup efforts required during the closure and reclamation process in the future. The air monitoring results indicate that the primary remaining sources of fugitive dust are the ends of the CSBs, the road where the trucks exit the CSBs after unloading, and the surge bin in the dock area. No detectable trends in fugitive dust emissions have been identified from the data; however, review of the data is ongoing. Tapered element oscillating microbalance (TEOM) samplers have been installed recently, and are expected to provide hourly air concentration data for comparison with meteorological data and port operations data.

The Port Site has received continuous upgrades since operations began, in an ongoing effort to minimize fugitive metals from the facilities. These improvements include enclosure of all of the conveyors and transfer points, modification and enclosure of buildings, upgrades and additions of baghouses, truck modifications, truck washing procedures, enhanced road management practices, and expanded surface water capture and treatment facilities.

Teck Cominco developed the environmental monitoring, dust control, and surface water control efforts as part of a program to identify sources of concentrate loss and fugitive emissions and to implement mitigative measures, with the objective of minimizing operational impacts. The primary impacts from Port Site operations are contained within localized areas of the facility, and are being addressed on an ongoing basis.