

July/89

THE SAMATOSUM MILL PROJECT

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The cover photograph of the concentrator and office buildings of the Samatosum Project was taken in the late stages of construction in May 1989. The project is being developed by operator Minnova Inc and joint venture partner Rea Gold.

Engineering, procurement and construction management services for Samatosum surface facilities have been provided by Proton Systems Ltd of Vancouver. Project scope includes the mill, offices and associated facilities, access road, power line and water supply. Surface facilities comprise two buildings — the larger housing the mill process equipment and offices for supervision, the adjacent ancillary building housing administrative offices for property management personnel — as well as dry, warehouse and laboratory for the mill.

The Samatosum deposit is small but rich in silver, with additional values in gold, zinc, lead and copper. While concentrates of copper, lead and zinc are produced, it is the silver and gold which justify development of the mine. The deposit is located at approximately 1300 m elevation on Samatosum mountain, 25 km east of Barriere and approximately 60 km north of Kamloops BC. The mill is located about 1 km from the mine, at 1150 m elevation.

Situated in the Adams River drainage system, the project is subject to strict environmental limits, and significant efforts have been made in both design and site enhancement to ensure that the project does not unduly disrupt the environment.

Water supply for the project is pumped from nearby Johnson Lake, a distance of 2.4 km. The highest level of Johnson Lake normally occurs with spring runoff, but without controls this water flows into Johnson creek during only a few weeks. A control dam, designed by Sigma Engineering and C K Dahl Engineering of Vancouver, was built to reduce the rate of passage of spring runoff. Weir level control will extend elevated spring water levels on Johnson Lake for several months, thereby ensuring not only a source of water for the Samatosum Mill, but also a more consistent supply of water to farmers in the Agate Bay area downstream on Johnson Creek.

In determination of a water management scheme for Johnson Lake, the concerns of local cottagers as well as those of Fisheries and the local fishing lodge operator were considered. The dam was built immediately upstream of spawning beds for the rainbow trout population of Johnson Lake.

Dam construction using sheet piling was accomplished with the use of a temporary earth fill dam and bypass pumping of normal creek flow to avoid silt contamination of spawning beds. At the conclusion of dam construction, spawning beds were enhanced with natural gravels and the normal spawning run has been observed in progress in May 1989. Dam construction included the installation of a fry fishway to ensure unhampered passage of small fish back into Johnson Lake.

Mill process design includes provision for a minimum of 60 percent recycle of tailings pond water to the process. Tailings water discharged to the environment, approximating 40 percent of process requirements, must meet strict effluent discharge limits. Discharge enters Johnson Creek downstream from the lake. Further

downstream, Johnson Creek flows through ranching country and eventually into Adams Lake, world famous for the Adams River sockeye salmon spawning run.

In order to comply with the strict limits imposed on concentration of dissolved heavy metals and suspended solids, water treatment may be necessary and is currently being examined by Minnova Inc and Proton Systems.

In consideration of the appearance of the mill site, Minnova has selected building colours that will blend into rather than contrast with the natural surroundings. To further reduce the visual impact of construction, fresh cut and fill slopes at the plantsite and along the access road are being graded and hydromulched to provide a cover of grasses, selected in consultation with local ranchers.

During exploration, access to the site was achieved via existing forestry and logging roads. A 14 km road was constructed to provide more direct access, via the Agate Bay road from the Yellowhead Highway at Louis Creek. Road design was done by Hugh Hamilton Ltd of Vancouver. A 10 km, 25 kV power transmission line was also constructed, following approximately the route of the new road.

Development of the Samatosum Project has had a major impact on the economy of the Barriere area. To date, Minnova has hired a total of 50 employees, of whom 37 now reside in the Barriere area. This is expected to result in 23 house purchases by mid-summer 1989, and annual salaries are expected to total \$2.1 million. These figures exclude mining contractor statistics.

The Samatosum Mill is designed to operate at 500 tonnes of ore per day. Conventional crushing, grinding and multistage differential flotation are employed to produce concentrates of copper, lead and zinc. Silver values are contained in copper concentrate. Metallurgy is comparatively complex, although a relatively coarse grind is sufficient to achieve the required degree of liberation of minerals. The three concentrates are filtered sequentially in a single pressure filter. Copper/silver concentrate is bagged for shipment while other concentrates are to be shipped in bulk.

Mill tailings are deposited in an impoundment area approximately 600 m from the mill created by construction of an earth fill dam 200 m long and 18 m high to an elevation of 1,133 m. Engineering design and technical services during construction of this dam were provided by Piteau Associates of Vancouver.

Project EPCM services were provided by Proton Systems utilizing a fast track approach. Engineering began August 23, 1988. Project permits were received by Minnova September 30, 1988 and site preparation was initiated in the first week of October. First concentrate was produced May 21, 1989, 39 weeks after the beginning of engineering, and 31 weeks after the beginning of construction. Commissioning was 3 weeks ahead of schedule. Fast track development of the project was facilitated in part by the decision to utilize used equipment for crushing and grinding in the mill.

Construction involved a total of 24 on-site contractors. The total budget value of Proton Systems' scope of work was approximately \$24.7 million, compared to which actual cost will be significantly under budget.