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Mr Jones

GENERAL HEADQUARTERS
SUPREME COMMANDER FOR THE ALLIED POWERS
Natural Resources Section

NR 609 (13 Feb 51)MG

HQS/RYG/JFH/CEP/to
13 February 1951

4174

MEMORANDUM FOR: Record

SUBJECT: Technical Examination of Exploration and Mining Practices at Hitachi Mine, Ibaraki Prefecture

1. Authorization: GHQ, FEC, ~~AG 33-2~~, 2 Feb 51

2. Mission: To examine exploration methods and mining practices at the Hitachi Mine.

3. Personnel: Dr C. F. Park, Visiting Expert Consultant, and Messrs B. M. Page and J. F. Harrington, NR/MG, scientific consultants.

4. Summary of Results:

a. Production and Reserves

(1) The Hitachi mine produces 20,000 tons of crude ore monthly. An increase of 10,000 tons is planned for 1951, but it may be possible to double present production when new flotation cells are installed in the mill. A new shaft will facilitate transportation. The average grade of the ore is 1.3 percent copper and 16 percent sulfur. Copper concentrates from the mill contain 16 percent copper, the pyrite concentrates average 48 percent sulfur. Proved and probable ore reserves are estimated at seven million tons of crude ore. There is an excellent chance of finding additional ore.

b. Geology

(1) Ore bodies: Cupriferous pyrite and locally, pyrrhotite, is in steeply dipping lenses, ranging from small uneconomic bodies to bodies several hundred meters long and up to more than five meters wide. The ore is semiconcordant with the enclosing schist. It is imperfectly arranged in two zones (see sketch, Incl 1). The deepest ore developed is on the 600-meter level.

KANTO 042

(2) The country rock is mostly fine-grained amphibole schist. The ore lenses are enveloped in sericite schist, biotite schist, and chlorite schist. The entire zone is thought to represent an extensive sheared zone. The sericite schist is clearly an alteration product and is not a stratigraphic unit. Both the biotite and chlorite schists are also likely to be alteration materials. Some of the ore follows the borders of "epidiabase" dikes (?), which lie in general between the two ore zones. The ore is cut by many post-mineral (?) faults. The ore zone does not extend into the granodiorite mass at the northeast end of the sheared zone.

(3) A surface map was made mainly by the Geological Survey. It is probably a fair representation, but lacks structural features such as faults and fold axes. All of the underground levels have been mapped, but work prior to 1950 is poor. Parts of three levels were mapped in detail during 1950. Maps are good. The staff is eager and able. Results are definitely encouraging. A good model of the mine has been made and is useful. Current geologic mapping is good, and, if continued, will help solve many mining and exploration problems. Such mapping already indicates that ore is enveloped in sericite schist, biotite schist, and chlorite schist. These rocks are valuable indicators.

c. Milling

(1) The flotation mill is a modern efficient plant. The only serious deficiency noted was the transportation and dumping system over the coarse ore bin. Small one-ton cars are detached and routed one at a time over a complicated switch system and dumped by hand in a rotary dump. Primary crushing by gyratory is followed by short-head cone crushers, but only half the crushing equipment is utilized. The pulp from the ball mill is conditioned and chalcopyrite floated first. Tailings from the copper circuit go to the pyrite section and the pyrite floated after conditioning with copper sulphate and hydrochloric acid. The copper concentrates are briqueted and sent to

copper blast furnaces; pyrite concentrates go to the sulfuric acid plant. Pyrite cinder may be used for iron blast furnace feed.

d. Mining

(1) Stopes are between two and five meters in width. The cut and fill method of mining is used with sink and float tailings utilized as filling, small cars distribute the fill from the waste, raise and also move the ore to chutes that are spaced at 20-meter intervals. Workings in the sericite zones are held open with difficulty and heavy timbering is necessary.

e. Smelting and Refining

(1) The first process in smelting is a vertical blast furnace, fired by coal and tapped from a Beehive annex. The matte may be moved in a ladle to the converters, or poured in molds when converter capacity is insufficient. The refinery treats blister copper in the conventional manner used by electrolytic refineries in the States.

5. Recommendations made to mine manager and mine technical personnel:

a. Existing maps showing that the ore in part follows 'epidiabase' dikes along their contacts with schist, 'epidiabase' should be sought in exploration.

b. Ore is in two zones of shearing, along the 'epidiabase' zone. There are indications of other favorable zones. The ore seems in part to be localized in the shearing along cross folds. The axial planes of these cross folds should be projected to intersect other zones of shearing. Structural studies should be stressed a bit more.

c. The surface should be remapped to locate favorable folds and possible continuations of the mineralized zone.

d. Cross sections should be made.

e. Scrapers, instead of cars, should be installed in the stopes.

f. Larger (4 ton) cars, similar to the 'Granby type', should be installed in order to eliminate a transportation bottleneck that will develop when production is increased.

g. Density in the flotation circuit should be increased from 22 percent solids to 35 percent solids.

h. Precious metal losses in cupellation should be investigated.

i. The possibility of replacing the copper blast furnaces with reverbatory furnaces should be studied.

C F Park jr

C. F. PARK
Visiting Expert Consultant
Mining and Geology Division

2 Incls
1. Sketch, as indic para 4b(1)
2. Itinerary and Personnel Interviewed

Copies furnished:
CAS

Generalized sketch Hitachi ore zone.

ITINERARY

Feb 4	0930	Lv	Tokyo
	1200	Ar	Hitachi
Feb 5-6			Hitachi
Feb 7	0845	Lv	Hitachi
	1120	Ar	Tokyo

PERSONNEL INTERVIEWED

Messrs Yanase, manager; Yokota, chief smelting; Tsukamoto, chief, mining and milling, Fujii, acid plant; Komatani, mining engineering; Sasakura, geologist, Hitachi mine