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JHC

FINAL

ENVIRONMENTAL IMPACT STATEMENT

VEKOL HILLS PROJECT

PAPAGO INDIAN RESERVATION

PINAL COUNTY, ARIZONA

Prepared by

U. S. Department of the Interior

Bureau of Indian Affairs

Phoenix Area Office

MAY 1978

Date

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66.3 million pounds of copper per year and 1.2 million pounds of molybdenum per year over a 15-year period. Mining will be by the open-pit method. The metals will be produced in the form of concentrates from a mill feed of approximately 20,000 tons per day of sulfide and mixed sulfide-oxide ore. Plate 3 shows a general arrangement of the Vekol Hills complex.

2. The Ore-body

The subsurface orebodies in this region require removal of large quantities of overburden before sulfide ore zones can be mined by open-pit methods. The Vekol Hills Project will require the removal of 62 million tons before pit operations can mine the sulfide ore zones. The pre-production removal of overburden will primarily commence at approximately the 1900-foot mean sea level (msl) elevation with a minor amount of removal originating in the northeast section at the 2050-foot msl elevation. This will eventually establish pit levels every 50 feet vertically to the 1550-foot msl elevation. The overburden removed during the pre-production stage will be approximately one-half alluvial materials and one-half in-place rock. In addition, approximately 16 million tons of copper oxide ore will be removed and stockpiled separate from other overburden. This oxide material occurs from elevation 1,700 to 1,500 feet. The pre-production overburden removal operation will require approximately two years. The excavated overburden will be placed on the surface within the waste disposal areas delineated on Plate 3. Exploration drilling in these areas indicates that no significant ore deposits underlie the proposed waste dumps. The first sulfide ore production will be from the 1,550-foot level. Initially, a total of approximately 100,000 tons per day of ore and waste will be mined from the pit. As the operations progress, the annual tonnages will decrease as a result of reduced stripping demands. The open-pit mine will provide crude ore feed for the sulfide flotation plant, (Table 1).

TABLE 1: VEKOL HILLS PROJECT MINING PLAN (Tonnages in Thousands)

Year(s)	Daily Mining Rate	Sulfide Ore Tonnage	Waste Tonnage*	Total Tons Mined
1 - 2	99.1	0	62,000	62,000
3	99.1	7,100	26,400	33,500
4	99.1	7,100	26,400	33,500
5	99.1	7,100	26,400	33,500
6	71.0	7,100	16,900	24,000
7	71.0	7,100	16,900	24,000
8	65.4	7,100	9,900	17,000
9	60.0	7,100	8,400	15,500
10	50.0	7,100	5,900	13,000
11	45.4	7,100	4,700	11,800
12	40.4	7,100	3,400	10,500
13	38.1	7,100	2,800	9,900
14	36.5	7,100	2,400	9,500
15	35.8	7,100	2,200	9,300
16	35.3	7,100	1,768	8,868
17	29.6	5,251	200	5,451
Total		104,651	216,668	321,319

*Includes pre-production overburden removed during years 1 and 2 plus alluvial material during years 3 through 8 and copper oxide ore.

16 million tons

Average grade:
Cu = 0.54% in ore
Mo = 0.014% in ore

After five years of sulfide ore production, the pit floor will be at the 1,250 foot elevation. The pit floor will be excavated to the 1,050 foot level after ten years of ore production. Plate 4 shows the locations of planned pit levels for the five and ten-year periods after the start of sulfide ore production.

Preliminary pit studies indicate that the final pit will reach the 700-foot level and will have a depth of approximately 1,200 feet. The ultimate pit scarp will be approximately 3,700 feet long and 2,200 feet wide. This pit will yield 104.7 million tons of ore at a stripping ratio of 2.07:1, inclusive of the pre-production overburden removed.

3. Water Supply

The proposed Business Lease (Water Well Sites) will give Vekol the right to pump water from three wells already drilled by Vekol under the former lease. The three lease parcels each consist of plots of land 100 feet square located on tribal land in the Santa Rosa Wash, about three miles east of the mineral lease area. Water from these wells is to be used only for the purpose of, or incidental to, Vekol's exploration for, development, mining, production, processing or marketing of minerals from the premises covered by the proposed Mineral Lease, or for domestic uses in connection therewith. Vekol will apply for a right-of-way to construct, use, and maintain a pipeline between the well sites and the mining area.

Vekol will agree to conserve water used by it in its construction and operations upon the leased premises by all practicable means, including the reclamation of water from mill tailings. Vekol will also provide for the protection of the water supply of Kohatk village. If the Kohatk well becomes dry or otherwise unuseable due to Vekol's water pumping, Vekol

b. Mine Equipment

Mine equipment will be selected according to standard proven designs. Equipment guards, catwalks, etc. will be maintained in proper condition throughout the life of the equipment.

c. Dust Suppression

Dust suppression methods will be employed against sources yielding high concentrations of particulate matter. Water sprinkler trucks and impulse sprayers will be used to control dust sources at drilling areas, the shovel face, and main haulage routes. Revegetation is the only practical means of controlling wind-carried dust in the overburden and waste disposal areas. Adequate time for air dilution will be allowed following all primary blasts before personnel are permitted to enter the area.

d. Pit Design

Standard engineering procedures will determine the operating pit slopes, and latest technology stress-strain instrumentation will be used to monitor the slopes. Optimum haulage road widths will be maintained on all permanent and temporary haul routes. Additionally, safety berms will be maintained on the outside edges of all elevated haulage roads. Loose material from primary blasting will be "scaled" from pit faces by the electric shovels.

E. Processing Operations

Only the copper sulfide ore will be processed immediately and this will be by flotation. The ore will undergo several stages of crushing, grinding, and flotation to produce a concentrate (see Plate 6). The copper (Cu) content will be increased from 0.54 percent in ore to 28.3 percent in the concentrate. Molybdenum (Mo) will be concentrated from 0.014 percent in ore

to 54.0 percent in a separate concentrate. Approximately 85 percent of the copper content of the ore will be recovered by flotation. About 60 percent of the molybdenum will be contained in the final concentrate of that mineral.

1. Primary Crushing, Conveying and Coarse-Ore Storage

Ore will be delivered from the pit to the primary crushing plant in 120-ton, rear-dump trucks. Arrangements have been made to dump into the gyratory crusher from two sides. The ore will be reduced to minus nine inches by the gyratory crusher and discharged into a surge pocket underneath the crusher. A conveyor belt will draw the ore from the surge bin and deposit it on a stacker conveyor which will transport the ore to a coarse-ore stockpile. Approximately 7.1 million tons will be crushed annually throughout the production life of the project.

2. Secondary and Tertiary Crushing and Fine-Ore Storage

The plant will consist of two standard, secondary cone crushers and two short-head cone tertiary crushers. Each secondary crusher will be fed by a separate feeder and conveyor system from the coarse-ore stockpile. Feeders will draw the ore from the stockpile and deposit it onto the two conveyors feeding the stardard crushers. These crushers will reduce the ore to minus $1\frac{1}{2}$ inches in size. A conveyor will collect the discharge from the two standard crushers and two short-head tertiary crushers, and deliver it to a screening tower where five screens will remove the fine material which will then be conveyed by conveyor to a fine-ore storage. The over-sized material from the screens will be collected and conveyed to a surge bin over the tertiary crushers. Variable-speed belt feeders will draw the ore from the surge bin and feed the two tertiary crushers. All fine-crushed ore will be less than $\frac{1}{2}$ inch in size.

Primary mineralization occurs as pyrite, chalcopyrite and molybdenite disseminated throughout the host rock, as fracture filling in a typical crackle breccia, and within fracture filling quartz veinlets. Molybdenite particularly tends to be concentrated along the interlacing quartz veinlets. Zinc occurrence are known near the Vekol copper orebody but do not constitute a recoverable product within the mineable deposit. Oxidation has affected the deposit in varying degrees. The upper 100 to 150 feet of the deposit is largely oxidized with some remnants of sulfide ore remaining. Copper values in the oxide zone are contained in native copper, copper oxides, carbonates, and silicates, and hydrous iron oxides. The depth and degree of oxidation are dependent upon the lithology of the mineralized rock; the Dripping Springs quartzite, because it is highly fractured, contains more oxide mineralization than do the other formations. The oxide zone grades downward to a mixed oxide-sulfide mineral assemblage and then into a zone of supergene, or enriched, copper sulfides. Bornite and chalcocite are the principal copper minerals in the supergene zone. Primary sulfides underlie the supergene zone.

No distinct pattern of primary alteration zoning has been recognized. Calcareous rocks have been altered by contact metamorphism to skarn. Some of the skarn in the Mescal limestone was formed by thermal metamorphism due to the diabase sills. Hydrothermal alteration associated with the porphyry has produced quartz veining, silication, argillization, and calcite veining in the host rock.

g. Other Mineral Resources

Except for the copper, molybdenum, gold and silver production from the proposed Vekol Hills mine, no other metallic resources will

VII. IRREVERSIBLE AND IRRETRIEVABLE COMMITMENTS OF RESOURCES

A. Mineral Resources

1. Committed Minerals

Current mining plans call for an annual production of 66.5 million pounds of copper per year and 1.2 million pounds of molybdenum per year. Over the 15 years of productive mine life, 500,000 tons of copper and 9,000 tons of molybdenum will be produced from the Vekol Hills orebody. Minor amounts of gold and silver will also be recovered in subsequent off-site treatment of the copper concentrate.

2. Irretrievable Minerals

Some low grade copper values will be lost in the waste dumps. Metallurgical tests on the mill feed indicate expected copper recoveries of 85-87 percent and molybedenum recoveries in molybdenum concentrate of 60 percent. Thus, 13-15 percent of the copper content and 40 percent of the molybdenum content in the ore will be unrecovered.

The surface plant, dumps, and tailings area will be more than 1,500 feet from the proposed open pit but will not be over any potentially economically mineralized rock. Vekol Copper Mining Company has sufficient data to confirm that no economically recoverable mineralized rocks underlie those areas to be covered by waste disposal or tailings storage.

B. Biological Resources

1. Biotic Habitats

Irreversible and irretrievable commitments of biotic habitats will include the loss of the pit area to suitable wildlife habitat and/or range. Loss of vegetation unique to the Sonoran Desert will depend upon methods of