UNITED STATES
DEPARTMENT OF THE INTERIOR
OSCAR L. CHAPMAN, SECRETARY

DEFENSE MINERALS EXPLORATION ADMINISTRATION

REPORT OF EXAMINATION BY FIELD TEAM
REGION V

DMA-1334

John Ross Operation

Custer County, South Dakota

Glen Walker, Mining Engineer
U. S. Bureau of Mines

J. A. Redden, Geologist
U. S. Geological Survey

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by

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Docket No.: DMA-1334
Property: John Rees Holdings
Applicant: John Rees
Commodity: Beryl, columbite, mica

The Warren Brew mine, on which 80 percent of the proposed operation is based, is 7½ miles west of Custer, S. Dak., rail head. The remainder of the work will be carried on at the Highland mine, which is 4 miles northeast of Custer, S. Dak. Both plant locations are readily accessible by all-weather roads.

It is expected that 100 tons of beryl, 2,000 pounds of columbite, and 3,000 pounds of sheet mica will be produced annually from the proposed operation.

From a technical point of view the proposal appears to have considerable merit. It is certainly an innovation in the right direction. There are apparently no insurmountable difficulties in the application of mechanical handling methods to pegmatite deposits. The very nature of the deposits (zonal mineralogical arrangement) lend themselves to selective mining methods. A point in favor of this proposal is that the only other extensive application in this district of machinery to this type deposit was an economic success. The case referred to is that of the Lee Mining Company operation on the White Cap pegmatite near Keystone, S. Dak. in 1944, in which 31,000 tons of material was moved in 11 months with a 60 percent recovery in marketable minerals and an indicated profit of about $6.50 per ton of rock excavated. The proposal under consideration is identical to the Lee operation with the important exception that it is on a 72 percent larger scale.

All of the equipment required in the proposed operation is that commonly used by general heavy construction contractors and should be readily available. Manpower is also easily obtained at the prices quoted.

The loan is to be repaid during a 5-year period by semi-annual payments that include both principal and interest.

The applicant has a number of qualifications that, it is felt, make him competent to manage the project to a successful conclusion.

It is recommended that a loan of $44,545 be granted the applicant. The money will be used to purchase new equipment for use in the operation of quarrying and beneficiating pegmatite minerals.

The applicant's proposal includes rock breaking and moving equipment with crusher screen and steel storage bins. All the machinery will be powered with gasoline motors of various horsepower ratings. The more important part of the proposal is the arrangement of the equipment so that a continuous flow of pegmatite material passes before sorters who remove the valuable products to storage bins. From the bins the salable products are drawn into a dump truck and hauled to market. The plant is so constructed that it can be disassembled, moved, and re-erected on a different deposit in a comparatively short time. The request for $44,545 is directed to the R.F.C.

This project proposes to handle an amount of material comparable to the present production of all pegmatite operations in the county; therefore, it is probable that a considerable increase in the production of the strategic minerals, beryl, columbite, and mica, will result.

The applicant has five pegmatite deposits that will be involved in the project, as follows;

The Highland has been mapped in detail by the Geological Survey, which showed a calculated reserve of 40,000 tons that contain 50 to 75 tons of coarse-grained and 50 tons of fine-grained beryl, 400 tons of mica (predominantly scrap), and 8,000 tons of potash feldspar. In addition, the mine dump is estimated by 20,000 tons of which 60 tons is beryl, 80 tons scrap mica, and 1,600 tons feldspar.

The Eldorado has 4,000 tons of indicated rock that is composed of about 30 percent feldspar, less than 0.4 percent beryl, and a small amount of scrap mica.

The Wiederhold shows 13,000 tons of indicated material containing 30 percent feldspar, less than 0.4 percent beryl, and some scrap mica.

The Willden indicates 3,000 tons of pegmatite that contains 30 to 40 percent feldspar and some scrap mica and beryl.

The Merrem Draw deposit has been mapped in detail by the Geological Survey on a scale of 1 inch to 40 feet. It is a large, apparently flat-lying pegmatite. Most of the deposit as exposed consists of the hanging wall wall zone, but the inner zone, or possible core, is exposed in the four open cuts. The following computed tonnage is based largely on geologic evidence. The minable pegmatite was projected to depths ranging from 24 to 48 feet. The 48-foot depth is the minimum exposed thickness of feldspar-rich material in the largest open cut. Indicated ore tonnage is based on thicknesses of feldspar-rich inner zone exposed in the open cuts and on the outcrop. Inferred ore is based on promising surface exposures of the wall zone without having any nearby exposure of the inner perthite-rich zone. The indicated reserves are 100,000 tons that contain

an estimated 40 percent or more of potash feldspar, and considerable amounts of beryl and scrap mica. The past beryl production from this zone has been limited, but it is anticipated that larger quantities will be discovered in the larger scale operation. The inferred ore reserve amounts to 285,000 tons that should contain 30 percent or more feldspar, 1 percent scrap mica, and 0.1 percent beryl. Amblygonite and spodumene are also present in this zone but the combined percentage would probably be less than 0.2 percent of the total minable rock. The reserve figures quoted are based upon the rock available to an open-cut or quarry method of extraction and do not represent the maximum tonnage in the deposits.

On the basis of reserve data, it is recommended that the application be approved. This recommendation is based solely on reserves and does not consider the feasibility of the mining and beneficiating method proposed by the applicant.

The geologic data are summarized to 405,000 tons of available pegmatite from which it is estimated 108,388 tons can be marketed for $714,950. The average value of the material mined is $1.76 per ton. This evaluation does not consider columbite or strategic mica because the recoverable quantities of these high-priced minerals are impossible of estimation.

It is proposed to operate a single shift 250 days per year at a rate of 200 tons daily or 50,000 tons annually.

The mining will be conducted as an open pit or quarry by use of two portable compressors, jack hammers, and a 1½-cubic yard Krough, rubber-tired loader or mucking machine. The loader will also be used to convey the rock to the crusher feeder. After the muck is crushed to minus ½-inch, it will be conveyed to a 3- by 6-foot vibrating 1-inch screen from which the minus product will be stockpiled for later treatment. The plus material will go to a storage bin from which it feeds on to a 30-inch flat conveyer belt traveling at about 30 feet per minute. This is the picking or sorting belt and will be placed above two bins that receive the salable products. The rejected material on this belt will go to waste. The salable products will be drawn into a dump truck and hauled to market in Custer.

The costs, as indicated in the revised application, have been analyzed and appear reasonable and applicable to the scale of operation proposed. A profit of $0.30 per ton of rock moved is indicated.

Markets for feldspar, scrap mica, and beryl are available in Custer. The applicant has included copies of letters received from these buyers indicating their anticipated continuity in business. It is proposed to sell the strategic mica and columbite to the Federal government's buying agency. The variation in the selling prices of the recovered products will be a vital consideration in the operation of this project. For example, the value of beryl is about 18 percent of the total; a decrease

of $100 per ton in its price will reduce the indicated profit 20 percent. Likewise, feldspar represents 76 percent of the total value; a decrease of 20 percent in its selling price would depress the profit 87 percent. It should also be pointed out that the project is expected to produce an average of 12,850 tons of crude feldspar annually, which will increase the South Dakota production 25 percent and the national about 3 percent. In summary, it is anticipated the project will operate 8 years on 40,000 tons of pegmatite worth $1.76 per ton at a cost of $1.46, thereby indicating a profit of $123,050 or $15,381 annually. Details of the proposed operation are shown in Tables 1 and 2.

Immediately after the loan is granted the applicant intends to begin purchasing and assembling the equipment at the Warren Draw deposit. It is estimated 3 months will be consumed in this work, then the plant will be placed in operation.

The applicant is considered highly competent to manage this project. His background of experience with heavy construction and mining equipment is entirely adequate for the day-to-day operation and maintenance of the proposed plant. He has a mining engineer for a son-in-law who has been importantly involved in the construction of this proposal, and is presently devising a cost keeping method for the project. Rees has lived in Custer County from 12 to 14 years, during which he has contributed considerably to the civic, social, and economic welfare of the community. Everyone contacted regarding Rees spoke highly of his integrity, initiative, and perseverance.

Table 1 - Valuation of Deposits

Property Name & Mine Tonnage	Tons of Mineral	Recovery Percent	Tons of Product	Selling Price, Dollars per ton	Total Value	Value Per Ton Mined
Highland	8,000 - feldspar	80	6,400	5.50	$ 35,200	
	400 - scrap mica	50	200	25.00	5,000	
	60 - beryl (coarse)	50	30	500.00	15,000	
	50 - beryl (fine)	25	12.5	500.00	6,250	
40,000	8,510		6,642.5		$ 61,450	$1.54
Highland Dump	2,000 - feldspar	50	1,000	5.50	5,500	
	80 - scrap mica	50	40	25.00	1,000	
	60 - beryl	25	15	500.00	7,500	
20,000	2,140		1,055		$ 14,000	$0.70
Eldorado	4,000 - feldspar	27	1,080	5.50	5,940	
	40 - scrap mica	50	20	25.00	500	
	4 - beryl	50	2	500.00	1,000	
[illegible]	4,044		1,102		$ 7,440	$1.86
Wiederhold	3,900 - feldspar	80	3,120	5.50	17,160	
	130 - scrap mica	50	65	25.00	1,625	
	52 - beryl	50	26	500.00	13,000	
13,000	4,082		3,211		$ 31,785	$2.44
Willdom	1,200 - feldspar	50	600	5.50	3,300	
	30 - scrap mica	50	15	25.00	375	
	5 - beryl	100	5	500.00	2,500	
3,000	1,235		620		6,175	$2.06
Warren Draw	40,000 - feldspar	80	32,000	5.50	176,000	
	1,000 - scrap mica	40	400	25.00	10,000	
	100 - beryl	50	50	500.00	25,000	
100,000 (indicated)	41,100		32,450		$ 211,000	$2.11
	67,500 - feldspar	80	54,000	5.50	$ 297,000	
	2,250 - scrap mica	40	9,000	25.00	22,500	
	225 - beryl	50	112.5	500.00	56,250	
	450 - lithia	30	135	50.00	6,750	
225,000 (inferred)	70,425		63,247.5		$ 382,500	$1.70
405,000			108,328		$ 714,350	$1.76

Table 2 - Estimated Costs

	Per Day	Per Ton
Labor and Supervision		
2 - Miners @ $11.00	$ 22.00	
1 - Shovel operator @ $12.00	12.00	
1 - Crusher operator @ $10.00	10.00	
7 - Sorters @ $8.00	56.00	
1 - Truck Driver @ $10.00	10.00	
1 - Part-time Bookkeeper @ $3.00	3.00	
1 - Foreman @ $4 0.00 per month	20.00	
Total 14	$133.00	$ 0.665
Supplies:		
Gasoline - 100 gal. @ $0.22	22.00	
Explosives	20.00	
Drill bits and steel	10.00	
Total	$ 52.00	0.260
Repairs and Maintenance	8.00	0.040
General Expense and Overhead:		
Social Security, Workman's Compensation Insurance, 6% of payroll	7.83	
Royalty, 10% gross sales	35.20	
Contingency	10.00	
Amortization	37.12	
Interest @ 5%	8.17	
Total	98.32	0.486
Grand Total	$ 291.32	1.457
Average value per ton of rock processed	$ 1.76	
Average cost per ton of rock processed	1.457	
Estimated profit per ton processed	$ 0.303	