PE-049-10

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TERRITORY OF ALASKA

DEPARTMENT OF MINES

COLLEGE, ALASKA
May 8, 1954

DEPARTMENT OF MINES
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MEMORANDUM REPORT

TO: Phil R. Holdsworth, Commissioner of Mines

FROM: Robert H. Saunders, Associate Mining Engineer

SUBJECT: ELECTRICAL RESISTIVITY SURVEY AT THE CREIGHTON MINE, PEDRO DOME, 1952. KK49-135

The Creighton Mine (sometimes called the Franklin Mine) is located at the head of Last Chance Creek on the north side of Pedro Dome in the Fairbanks District. The mine is being operated by Charles Lazeration and Vern Jokela, who are purchasing the property from the estate of Duane Franklin. The vein being mined varies in width from about 8 to 30 inches. It is a quartz vein carrying free gold and negligible amounts of metallic sulfides. It strikes about northeast-southwest and dips 65 to 70 degrees northwest.

An inclined shaft follows the vein about 100 feet down the dip. About 400 feet of drifts and crosscuts have been driven from the bottom of the shaft, and two short drifts have been driven about 60 feet down from the shaft collar. There is a vertical shaft which is now unsafe for any use other than ventilation.

About 90 feet southwest of the inclined shaft the vein is cut by a fault, and the segment of the vein on the southwest side of the fault has not been located. The two shafts, the apex of the vein, and the fault are shown on the accompanying map.

During August 22 to 25, 1952, J. A. Williams and R. H. Saunders conducted a resistivity survey at the Creighton Mine in order to locate the offset segment of the vein. An Oldach and Prow geoscope owned by the Territorial Department of Mines was used for the survey. The Wenner configuration for spacing electrodes was used; four electrodes were placed in a straight line; the two current electrodes were 75 feet apart and the potential electrodes equi-distant between them, so that there was a 25 foot space between adjacent electrodes. The electrodes were set along the line being run, and, after each
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set of readings, the electrodes were moved so that the center of the configuration moved 25 feet along the line. Lines 1, 2, and 3 were run across the vein northeast of the shaft where the vein was exposed by bulldozer trenches; Line 4 was run on the southwest side of the fault.

For the Wenner configuration, the theoretical resistivity may be calculated from the formula:

$$\text{Resistivity (ohm-cms.)} = \frac{2\pi aV}{I};$$

where "a" is the distance between adjacent electrodes in centimeters, "V" is the voltage between the potential electrodes, and "I" is the current through the current electrodes. The distance "a" and current "I" were constant so that the resistivity was directly proportional to the voltage. It was therefore unneccessary to calculate the resistivity for each station, and on the accompanying map the voltages are plotted directly.

In Lines 2 and 3, there was a drop in potential over the apex of the vein, but in Line 4 there was no significant drop in potential although there is a vein exposed about 30 feet southwest of Line 4. All of the readings on Line 4 were in the range of the lower readings taken on Lines 2 and 3.

Apparently the low potential readings were not caused by a vein. Probably the differences in potential were caused by differences in the depth of thawing at the top of permafrost. Near Lines 2 and 3, thawing near the vein could have been aided by the trenching that uncovered the vein. Near the south end of Line 4, the moss cover has been disturbed by roadwork, and, in the area around Line 4, the cover of brush and moss is perceptibly lighter than in the area around the other lines.

Respectfully submitted,

Robert H. Saunders

Robert H. Saunders
Associate Mining Engineer