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SURVEYS
GENERAL and STRUCTURAL

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SEATTLE

Illinois River
Josephine

July 24, 1944

Mr. Edward Cox
Grants Pass, Oregon

and

Dr. E. L. Thompson
Glendale, California

Gentlemen:

Pursuant to your request, I have made a geophysical survey of your chrome property located on Dailey Creek, a tributary to the Illinois River, Josephine County, Oregon, and more particularly described as on the Chrome King Mining Claim, Sec. 36, T. 37, R. 10 W.

As you know, the development work consists of three shallow shafts, Number 1, 2, and 3, as shown on the accompanying map, along the strike of a body of chromite, together with a number of long shallow bulldozer cuts in the overburden. Most of these cuts did not reach solid formation.

Before reaching the property, I asked Mr. Cox not to give me any information about the orebody, other than to show me one section of chrome ore actually in place, so that I might get acquainted with the physical and electrical characteristics of both ore and country rock. This was done at a point between shafts No. 1 and 2 where a narrow section of chromite 8" wide was seen in place in an open cut for about six feet in depth. This ore came nearly to the surface, and widened slightly at 6 feet in depth.

Resistivity and other tests were made on the exposed ore and the surrounding serpentine rocks.

Methods:

The method used was the well known "Resistivity" method, where an electric current is passed through the ground, and the resistance offered to this current by the different formations encountered, is determined at different depths along any desired traverse.

A series of traverses across the formation, and later following the strike of the mineralized zones, will give much valuable information as to the strike and dip of the ore body, and the location of shoots or lenses along the line of strike. Under certain conditions, depths from the surface to the ore shoots and an idea of the approximate size of the shoot may be estimated.

These depth measurements are definitely limited, each depending on the individual conditions encountered, and can seldom determine more than from 100 to 200 feet in depth. However, the presence of mineralized areas can be detected and much valuable information learned at greater depths.

Every rock or mineral has a definite specific resistivity just as it has a definite specific density, depending upon its purity, moisture content, and other factors, and in order to obtain definite results, there must be a good differential between the ore and the surrounding rocks.

Most copper, lead, iron, manganese and other minerals are good electrical conductors and therefore have a much lower specific resistivity than the surrounding rocks. For instance, a copper-iron sulphide ore occuring in granite might have a specific resistivity of $1/500^{th}$ of that of the granite. A survey under these conditions should be very satisfactory.

Unfortunately, the reverse is the case with chrome deposits. In every chrome deposit I have examined, the chromite is of greater resistivity than the surrounding rocks, and the "spread" or ratio of resistance of the ore to wall rock is from 2 to 1, up to 3 to 1. This is so small that in order to distinguish between the orebody and the wall rock, the orebody must be larger than for other ores, and accurate depth measurements will necessarily be limited.

In your deepest workings which at the time of the survey was but 37 feet deep, the ore while clean and well separated from the serpentine wall, was still broken and wet (as was the wall), consequently both ore and wall rock were about $1/10^{th}$ of the usual resistivity; but fortunately with the same ratio of 2 ore to 1 serpentine.

Survey: (See Map)

The survey covered an area of 300'x200' which included the present workings. Traverses were run North and South across the formation through the known orebody, and also parallel to the orebody to a depth of 100 feet with reading at 10 foot intervals. The position of these traverses is shown in red. These included the Wenner and Lee applications, as well as many "single electrode" soundings or "probings", as a check. No profiles are given as it would only result in confusion. It is not the individual profile or curve that counts - it is the interpretation of the associated or adjoining profiles that give results, and these will be shown on the map and discussed later.

In addition to these resistivity measurements, a series of electrical profiles running across the area were made, determining the position of the apex of the ore structure by its electrical characteristics, and these were a further check on the resistivity findings. These profiles are shown in black and are numbered on the map margin.

Discussion of Results:

Apparently there are two orebodies A and B, separated as shown by a barren zone or fault. It was impossible to determine whether the separation was due to a fault or if there were two separate lenses - their characteristics are practically identical. A possible third zone (C) will be discussed later.

"A" includes the ore shown in the three shafts and has a possible length of 85 feet. How much of this length will be commercial ore can only be determined on development. Electrically it has much promise. Resistivity measurements showed definitely that the body as a whole dipped sharply to the North at between 30 and 40 feet, and continued to do so. This fact was borne out perfectly in the development work which showed at 37 feet four feet in width of good ore dipping to the North. Resistivity measurements from this point seem to show the continuation of this condition to close to 100' in depth, with the dip still North. Also that the "rake" of the ore tended to be stronger to the West. This was apparently checked by the electrical survey which gave indications of a possible ore "zone" extending some 50 feet North of No. 1 shaft.

This section "C" is most interesting and should have been carefully checked, but by the time the balance of the information given in this report was obtained, the writer was in a bad condition due to several days of intense heat and sun, from which he has not yet recovered; and in the mix-up forgot to finish that section.

The indications of ore in this area, due to the erratic occurrence of chrome ore, might be a number of small lenses, reactions from the dipping of "A", ore under this area - or even a totally different large lens, separate from "A". A short detailed survey at this point, followed by a few test pits, will tell the story.

"B" Ore Zone

As previously stated, this section as shown gave the same resistivity readings as in "A" Zone, and the same electrical characteristics, and therefore may carry commercial ore as indicated. You have good reason to expect ore here because every occurrence of ore known by Mr. Cox was picked up by these methods, without the operators knowledge of its location.

This zone does not give any apparent dip from the vertical. The width or quality of course cannot be estimated other than by development work, which should not be expensive. I do not think that the length will exceed over 70 feet.

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Conclusion:

You have a most promising property with plenty of opportunity to develop a good tonnage of exceptionally high quality chrome ore, and at a low development cost.

I have never seen as much worthwhile results for the small amount spent on development as you have shown on this property, and you are to be congratulated upon the showings.

Respectfully submitted,

P. H. Holdsworth

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