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Preliminary Report on the Jo Reynolds Area, Lawson-Dumont District, Clear Creek County, Colorado

Trace Elements Memorandum Report 153

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UNITED STATES DEPARTMENT OF THE INTERIOR
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PRELIMINARY REPORT ON THE JO REYNOLDS AREA,
LAWSON-DUMONT DISTRICT, CLEAR CREEK COUNTY, COLORADO*

By

J. E. Harrison and B. F. Leonard

March 1952

Trace Elements Memorandum Report 153

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*This report concerns work done on behalf of the Division of Raw Materials of the U. S. Atomic Energy Commission

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PRELIMINARY REPORT ON THE JO REYNOLDS AREA,
LAWSON-DUMONT DISTRICT, CLEAR CREEK COUNTY, COLORADO

By J. E. Harrison and B. F. Leonard

ABSTRACT

Pitchblende is known to occur in the Jo Reynolds deposit, which was primarily a lead-zinc-silver ore body. The reported production in 1919 of 8 tons of high-grade uranium ore, presumably from the lowest workings of the mine, is still unconfirmed but has a fair degree of credibility. The deposit consists of 3 (possibly 4) veins, but the ore was concentrated principally along the No. 2 vein. Detailed mapping along the No. 2 vein indicates that the vein is localized along a fault, which is independent of the structure in the pre-Cambrian bedrock. The age of the mineralization is inferred to be Tertiary.

The ore body appears to be a raking shoot with a trend of N. 17° E., a plunge of 60° NE., and a rake of 70° NE. Localization of the ore body in a shoot, or possibly shoots, is attributed either to intersection of the main shear with a transverse set of joints or to movement along a curved fault surface.

INTRODUCTION

Location of the area

The Jo Reynolds area, as designated here, includes the Jo Reynolds and American Sisters groups of claims. The area is in Clear Creek County, Colo., about three-fourths of a mile south of the town of Lawson (fig. 1). The general surface geology has been described by Spurr, Garrey, and Ball (1908), Bastin and Hill (1917), and Lovering and Goddard (1950, pl. 2).

FIGURE 1.—INDEX MAP OF JO REYNOLDS AREA, LAWSON-DUMONT DISTRICT,
CLEAR CREEK COUNTY, COLORADO.

Purpose and scope of study

The Jo Reynolds group of claims was mined extensively for lead, zinc, and silver from 1877 through 1907. Since 1907 the claims have been worked only intermittently, the last operation having been about 1946. Pitchblende in the Jo Reynolds mine has been reported in newspapers, in publications of the Geological Survey, in unpublished reports of the Union Mines Development Corporation and of the Survey, and by word of mouth. Of these accounts, the most significant has it that 8 tons of high-grade uranium ore (pitchblende) was shipped from the mine in 1919.

Because of the potential importance of the area it was selected for detailed study, together with other areas in the Lawson-Dumont district. This report, a preliminary summary of the geology of the Jo Reynolds area (fig. 2), is based upon surface mapping, on a scale of 1/1,200, during September and October 1951. This work was done on behalf of the U. S. Atomic Energy Commission. Harrison is responsible for the geologic mapping and for the preparation of most of the report; Leonard is largely responsible for the section on economic geology. A more comprehensive report on the Jo Reynolds area is in preparation.

Mine workings

The Jo Reynolds mine consists of a surface stope above the Daily tunnel, drifts and extensive stopes along 10 levels, the Elida tunnel which forms the 11th level, and a sublevel below the Elida tunnel (fig. 3). As of November 1951, the Daily tunnel is caved at the portal, the Moore shaft to the surface stope is caved, No. 6 shaft to the 4th level is not safe, and the Elida tunnel has recently caved at a point 745 feet from the portal.

ROCK UNITS

The mapped area consists predominantly of igneous rocks, some of which have been metamorphosed, and metasedimentary rocks. The bedrock is mostly pre-Cambrian in age (fig. 2). The metasedimentary rocks have been invaded and migmatized by quartz diorite, gneissic granite, Silver Plume granite, and finally pegmatite. One large bostonite dike of Tertiary age cuts the pre-Cambrian rocks. The eastern part of the area mapped is mostly covered by Quaternary glacial debris and alluvium.

Field relations of the pre-Cambrian rock units suggest the following age sequence: biotite-quartz-plagioclase gneiss and **granodiorite gneiss**, quartz diorite, gneissic granite, Silver Plume granite, pegmatite.

Idaho Springs formation

Biotite-quartz-plagioclase gneiss

Three distinct members of the Idaho Springs formation (as defined by Lovering and Goddard, 1950, pp. 19-20) are recognizable in the Jo Reynolds area. The oldest member is a fine- to medium-grained biotite-quartz-plagioclase gneiss which ranges in composition from a highly quartzose rock to a biotite schist locally containing sillimanite. The gneiss is migmatitic, due to introduction of white granitic material along the foliation. Where the white granitic material forms over 40 percent of the rock, the rock has been mapped as migmatite on figure 2.

The biotite-quartz-plagioclase gneiss has well-developed foliation due to a mineral layering. Alignment of biotite flakes forms a strong lineation in the gneiss. In places fracture cleavage is common and is revealed by thin layers of recrystallized (?) quartz along fractures.

The biotite-quartz-plagioclase gneiss grades into granodiorite gneiss, and both of these rock types occur as inclusions in quartz diorite.

Granodiorite gneiss

The granodiorite gneiss is a brownish-gray porphyroblastic gneiss whose main constituents are plagioclase, biotite, and quartz. Small feldspar porphyroblasts give a distinctive "knotty" appearance to the rock in outcrop.

The gneiss has a weak foliation given by small, subrounded feldspar porphyroblasts in planar arrangement. Lineation due to mineral alignment is usually lacking.

The granodiorite gneiss is cut by small, white granitic layers similar to those forming migmatite from the biotite-quartz-plagioclase gneiss.

Migmatite

Several stages of migmatization are indicated by the field relations of the rock units in the Jo Reynolds area. The bulk of the migmatite appears to belong to an early phase which was formed by the introduction of white granitic material into biotite-quartz-plagioclase gneiss and granodiorite gneiss. Small veins of granitic material were introduced principally along foliation of the older gneisses, though locally the veins transect the foliation. Further migmatization occurred with the emplacement of the later granitic rocks (quartz diorite, gneissic granite, Silver Plume granite, and pegmatite). The migmatite has been assigned to the Idaho Springs formation with the realization that it actually is a combination of older Idaho Springs metasedimentary rocks with later introduced material of younger pre-Cambrian age.

Quartz diorite

Two small irregular bodies of quartz diorite are present in the southwestern part of the mapped area (fig. 2). The quartz diorite is principally a coarse-grained, massive rock consisting of biotite, hornblende, and plagioclase with noticeable amounts of quartz. Locally a meta-quartz diorite facies has been developed by shearing of the quartz diorite. Variable amounts of granitic material have been added to the meta-quartz diorite.

Foliation, apparently due to local shearing of the quartz diorite, is present in the meta-quartz diorite facies. The foliation direction is immediately related to the direction of the shearing.

Locally, the quartz diorite is cut by stringers of gneissic granite and occurs as inclusions in Silver Plume granite.

Gneissic granite

The gneissic granite is a white medium-grained foliated rock that consists essentially of potash feldspar, plagioclase, and quartz. It contains as much as 30 percent of schist inclusions. Locally a coarse-grained, pegmatitic facies occurs as irregular masses in the granite.

The gneissic structure of the granite is given by thin wisps of biotite schist and one- to two-inch layers of biotite-quartz-plagioclase gneiss. In places a weak mineral layering is present in the contaminated parts of the granite. The degree of development of gneissic structure depends principally upon the abundance of inclusions. More inclusions are present in the granite near its contact with migmatite or biotite-quartz-plagioclase gneiss than in the central part of the granite. Gneissic granite grades into migmatite and biotite-quartz-plagioclase gneiss. The younger gneissic granite apparently has inherited its foliation from the older rocks.

Gneissic granite is cut by veins of Silver Plume granite and pink pegmatite.

Silver Plume granite

A gray to pink, fine- to coarse-grained biotite granite is exposed in approximately 40 percent of the outcrop area shown on figure 2. The granite consists of potash feldspar, plagioclase, quartz, and biotite and is similar in mineralogy and aspect to Silver Plume granite at the type locality. Most of this granite in the Jo Reynolds area belongs to the medium-grained facies; a few outcrops of the fine- and coarse-grained facies occur around and within the larger medium-grained masses.

All facies of Silver Plume granite have a weak foliation. Subparallel, tabular potash feldspar crystals in planar arrangement give foliation to the medium- and coarse-grained facies; alignment of biotite flakes forms the foliation in the fine-grained facies.

The Silver Plume granite contains inclusions of quartz diorite and the Idaho Springs formation. Veins of Silver Plume granite cut through gneissic granite. Silver Plume granite is cut by veins and dikes of pink pegmatite.

Pegmatite

Dikes or veins of pink granite pegmatite occur in most of the outcrops of this area. Most of the dikes, however, are too small to be shown on figure 2. Small pegmatite masses occur at most contacts between Silver Plume granite and older rocks. The pegmatite consists of perthitic microcline, plagioclase, and quartz with small amounts of biotite and muscovite. Locally the dikes contain magnetite, which may form as much as 35 percent of a 2-foot square section of an outcrop.

Pink pegmatite veins and dikes cut all other pre-Cambrian rocks. Field

relations suggest that the pink granite pegmatite is not related to the white granitic material which caused the bulk of the migmatization in the Idaho Springs formation. A close field association between the pink pegmatite and Silver Plume granite suggests that the pegmatite may be a late phase of Silver Plume granite.

Bostonite dike

One bostonite dike is exposed in the area mapped. The dike crops out in the extreme northern part of the mapped area and extends several hundred feet northward beyond the limit of the map (fig. 2). The southward extension of the dike is covered by a thick deposit of glacial debris. Excellent exposures of the dike occur in the road cut and in several of the prospect pits.

The dike is essentially fine-grained, though locally there may be a dozen small feldspar phenocrysts per square foot. Trachytic texture is well developed in the dike and is brought out by weathering. Chilled margins are present at contacts between the dike and older rocks. Alteration along fractures has bleached parts of the normally light lavender dike to light buff.

The bostonite dike cuts pre-Cambrian rocks. Similar bostonite dikes in other parts of the Front Range are considered by Lovering and Goddard (1950, p. 47) to be early Tertiary in age.

Glacial debris and alluvium

Much of the northern part of the area mapped (fig. 2) is covered by Quaternary glacial debris deposited by alpine-type glaciers which moved easterly down Clear Creek valley.

The eastern part of the area mapped along Silver Creek is covered by alluvium.

STRUCTURE

Folds

The folds in the area are outlined by gneissic structures which have been previously described with each rock unit. The mapped area contains a series of slightly overturned synclinal and anticlinal folds a few hundred feet across. The folds generally plunge 20° to 80° NE. The flanks of the larger folds have been crumpled into small rolls and warps, in places several feet across. The small warps plunge down the flanks of the larger folds and are approximately perpendicular to the axes of the larger folds. Crinkles and drag folds are present on both of these fold systems, and other linear features are developed in the rocks through streaking and mineral alignment.

Joints

Joints are well developed in all the outcrops present in the area mapped. The most prominent joint set strikes N. 65° E. and dips 80° NW.; this attitude is approximately parallel to the Jo Reynolds fault. A minor set of joints is approximately conjugate and has the attitude of N. 35° W., steep NE. and NW.

Faults

Normal faulting has occurred in this region along a general N. 65° E. trend. The faults are indicated on the map (fig. 2) by the veins that occupy them. Surface exposures of the faults are easily recognized because

of the presence of siderite, sphalerite, and hematite along them.

Two faults are exposed on the surface: the main Jo Reynolds fault, which strikes N. 60-80° E. and dips 58-82° NW., and a minor subparallel fault 150 feet southeast of it. Each fault has a 20- to 30-foot sheared zone adjacent to it.

The Jo Reynolds fault and the minor fault southeast of it are curved surfaces and in general take the form of flat cymoid curves. Surface data gained from associated fractures and shingle structures indicate that the southeast blocks have moved up and to the southwest relative to the northwest blocks. Underground mapping of the accessible part of the Elida tunnel (fig. 4) confirms this apparent movement along the Jo Reynolds fault and suggests that the apparent horizontal offset is 20 to 30 feet.

At least two other faults are reported in this area - one contains the Jo Reynolds No. 1 vein, the other is presumed to follow the general line of the American Sisters group of dumps. Bastin and Hill (1917, p. 339) give the general trend of the American Sisters vein (fault) as parallel to the Jo Reynolds main vein (fault).

So far as can be determined in this limited area, the faults are independent of the bedrock structure.

ECONOMIC GEOLOGY

The Jo Reynolds No. 2 vein, or main vein, is exposed at the surface in 12 places over a strike length of several hundred feet. The same (?) vein crops out in the saddle on the prominent rock knob N. 46° E., 1,250 feet, from the portal of the Daily tunnel. The No. 2 vein, where exposed, strikes N. 60-80° E. and dips 58-82° NW., generally flattening from southwest to northeast along the strike. The exposed "vein" is a 20- to

30-foot shear zone in which sphalerite, siderite, and local hematite are the usual evidences of mineralization. From the plan of the drifts, it is inferred that the No. 2 vein has an average strike of N. 63° E. and dip of 67° NW.

The No. 3 vein crops out in 4 places. It strikes N. $55-68^{\circ}$ E.; it dips $55-70^{\circ}$ NW. where the No. 2 vein dips $75-82^{\circ}$ NW. Underground, the No. 3 vein appears to strike N. 80° E.; its dip is not known.

The No. 1 vein is not exposed, and the No. 4 "lode" (mentioned by Morton, 1905) cannot now be identified.

Bastin and Hill (1917, p. 340) give the mineralogy of the vein as follows:

"The vein is similar in mineral characters to the neighboring American Sisters vein. The primary metallic minerals are galena, sphalerite, pyrite, chalcopyrite, and gray copper; and the secondary minerals polybasite, pearcrite, proustite, argentite (original?), native silver, chalcopyrite, and galena."

Bastin and Hill (1917, p. 124) examined polished surfaces of pitchblende ore from the Jo Reynolds mine. They concluded that deposition of the pitchblende was early and was followed by deposition of the sulfides.

Though a radiometric survey of the dumps in the area failed to show significant anomalies (King, 1951, p. 6), outcrops of the veins show anomalous radioactivity on the order of two times background on the 0.2 mr/hr scale of a Nuclear counter, Model 2610a.

The only mine workings accessible at the time of the mapping were 745 feet of the Elida tunnel. This part of the tunnel (fig. 4), together with the short drifts near its portal, shows several minor shear zones with oxidized sulfides but no detectable concentrations of radioactive material. A cave 745 feet from the portal blocks access to the

main Jo Reynolds vein and the area from which pitchblende has been reported.

Occurrences of pitchblende and anomalous radioactivity

Eight occurrences of pitchblende have been reported at this deposit. /.

/In addition, Guillotte (1944, p. 13) reports the presence of torbernite in the Jo Reynolds mine.

They are tabulated below, beginning with the upper workings.

1. A pocket of pitchblende at a point on the 100-foot level (R. B. Morton, 1885, photostat of notebook). The 100-foot level might be either Level 3 or the Fourth level (fig. 3, B).
2. Abeel crosscut to No. 4 lode, and 100-foot and 200-foot levels from Herrick shaft--places not further identifiable (R. B. Morton, 1885, photostat of notebook).
3. "Quite a large pocket" of uranium ore encountered in 1886 on the Second or Third level (Georgetown Courier, February 28, 1914).
4. Pitchblende high in radium from an 18-inch vein--location unspecified (Denver Post, November 10, 1914; Rocky Mountain News, November 11, 1914; _____? Herald, with Idaho Springs November 10 dateline).
5. Tunnel level (Elida?), near the bottom of the old shaft, about 1,000 feet below the surface (Bastin and Hill, 1917, p. 124).
6. Sooty pitchblende (?), Elida tunnel, 100-150 feet southwest of the main shaft (King, 1951, p. 6). This might be virtually the same occurrence as that noted by Bastin and Hill (1917, p. 124).
7. A 76-foot raise in 1 to 3 percent ore over 3 feet wide; raise made from the tunnel (Elida?) level (Georgetown Courier, January 12, 1916).
8. Eight tons of pitchblende--location unknown but inferred to have

been the lowest workings of the Jo Reynolds mine (King, 1951, p.2)/.

/There is some uncertainty about the date of driving of the sublevel below the Elida level. Part of the sublevel is more than 30 years old; part of it may be 15-20 years old. The term "lowest workings" as used by King is deliberately noncommittal (King, oral communication). It refers to the Elida level and workings immediately above and below that level.

On this reported production of high-grade ore hangs most of the current significance of the Jo Reynolds property. Because of the importance of the discovery and the divergence of opinion on its credibility, the matter is discussed below.

Guillotte (1944, p. 6) states that in 1919 the Jo Reynolds mine produced 8 tons of pitchblende that assayed 72 percent U_3O_8 . The ore was sold in France by R. B. Morton, owner in 1919, for \$80,000. Both bits of information were contributed to Guillotte by E. H. Geary, 1350 Grant Street, Denver--the owner in 1944, now deceased--, and reportedly confirmed by Mrs. Morton. Guillotte (1944, p.6), apparently finding it impossible to authenticate the information, felt that the production figure for the Jo Reynolds mine might be erroneous.

King (1951) found no significant quantities of uranium ore in the Elida tunnel but concluded, after re-assessing all the available information, that the ore body reported to have yielded 8 tons of high-grade ore was probably cut in the lowest workings of the mine.

Anomalous radioactivity in the vein exposed in the Elida tunnel has been reported by King (1951, p. 6) in the ground 100 to 200 feet southwest of the main shaft. Local areas in the first 745 feet of the Elida tunnel show very slight anomalous radioactivity.

Other anomalous radioactivity near the area

King and Granger (1950) report the occurrence of torbernite at the Robineau claims about three-fourths of a mile southwest of the portal of the Daily tunnel. This group of claims was located by triangulation and their position plotted with reference to the Daily tunnel portal. The Jo Reynolds No. 2 vein, when projected, passes about 1,200 feet north of the Robineau claims. The Nabob vein, which is reported to be essentially parallel to the Jo Reynolds and American Sisters veins, had the correct geographic position and attitude to project through the Robineau claims. The question of whether or not it does can be settled only by detailed study, however.

Shoot structure

The writers believe that the lead-zinc-silver ore body in the Jo Reynolds mine had a pronounced shoot structure. This raking ore shoot with a height of about 500 feet is shown on the vertical longitudinal section (fig. 3, B). The original stope section bore tonnage and grade estimates for all the unstoped ground. These estimates were an extrapolation of data from adjacent stoped areas, so that Morton clearly reckoned--on that stope section, at least--that the ore body was a uniform tabular deposit. However, the writers doubt that an ore body then mined for more than 30 years would have been stoped obliquely down the vein unless that was truly the most favorable ground.

The "apparent rake" of the ore shoot in the vertical longitudinal section is $45-65^{\circ}$ NE. (probably close to 60° NE.). This inclination is approximately equivalent to the true plunge of the shoot. The trend, or direction of elongation of the shoot, is close to N. 17° E. The true rake, measured in the plane of the vein, is about 70° NE.

The structural control for the now unobservable ore shoot is, of course, a matter of conjecture. However, the meager structural information that is available suggests two explanations for localization of an ore body along the direction N. 17° E., 60° NE.

1. A plan map of the Elida tunnel lent by C. L. Harrington shows the strike and dip of the main mineralized fractures in the tunnel and adjoining workings. A schematic plot of these fractures and their relation to the trend of the ore shoot is shown in figure 5. The main vein (A) appears to have the attitude N. 65° E., 65° NW. Two essentially symmetrically arranged surfaces (B and C) have attitudes of N. 88° E., 65° NW., and N. 46° E., 71° NW., respectively. A transverse joint (D) strikes N. 35° W., and dips 65° NE. The traces (lines of intersection) AD, BD, and CD lie within a few degrees of N. 17° E., 60° NE. The trace AC has a similar plunge but trends roughly north, instead of north-northeast. A statistical study of joints in outcrops in the Jo Reynolds area shows maxima for surfaces having attitudes of N. 65° E., 80° NW., and N. 35° W., steep NE. and SW. These data agree well with Harrington's plot of mineralized fractures on the Elida level. Perhaps we may cautiously infer, then, that the structure of the ore body was controlled by the intersection of a main fracture zone with a transverse set of joints (?); surfaces symmetrical about the main zone may also have exerted considerable control.

In the fracture pattern of the area the transverse set of joints bears the relation of a tension fracture to the main faults. Everhart and Wright (1951), and Buffam (1951) have recently suggested that pitchblende occurs in tension fractures that are commonly minor fractures which are associated with large-scale structures. The writers do not wish to imply that they believe that pitchblende necessarily should, or should not, be found on the transverse joints of the Jo Reynolds mine. However, the hypothesis should

FIGURE 5.- SCHEMATIC PLOT OF FRACTURE SURFACES
AND TREND OF ORE SHOOT, ELIDA TUNNEL
LEVEL, JO REYNOLDS MINE.

be borne in mind when further study of the deposit is undertaken.

2. Data from surface geologic mapping show that the Jo Reynolds No. 2 vein is on a somewhat curving surface. The apparent movement along this curved surface has been discussed under the topic of faults. The data are too few to define the directions or amounts of relative movement with precision, but they suggest movement roughly along the NNE. direction at a high angle, with consequent horizontal displacement of 20 to 30 feet. This movement would serve to develop openings along the curved shear surface favorable for the development of an ore shoot.

A multiple shoot structure may be present in the Jo Reynolds mine. Slight variations in strike and dip along the high-angle fault, such as appear on the surface map, could serve to develop a series of openings favorable for the formation of ore shoots. At least three veins have been mined on the Jo Reynolds property, and the intersection of each of the veins with a transverse set of joints could also serve to localize ore in shoots.

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RECOMMENDATIONS

It seems clear from Morton's vertical longitudinal section that the lead-zinc-silver ore body was a raking shoot. Whether bodies of pitchblende will show a similar distribution, we do not know. Pitchblende in the Central City district seems to occur in relatively small pockets that are not necessarily closely associated with concentrations of the metallic minerals. However, one might expect a dominant structure to exert some influence on the distribution of all the apparently related phases of an epoch of mineralization. Therefore, in prospecting for uranium in the Jo Reynolds mine it might be well to keep in mind the hypothesis of raking pitchblende shoots, at least until the usefulness of the hypothesis can be confirmed or denied.

The 8 reported occurrences of pitchblende in the mine do not show a definite pattern, perhaps because of the limited number of occurrences and the difficulty of locating even these with accuracy. However, there is a faint suggestion that radioactive material is more likely to occur along the margins of the lead-zinc-silver ore shoot.

Certainly nothing more can be learned about the supposed 8-ton body of uranium ore until the mine is opened. C. M. Harrer and B. F. Leonard of the Geological Survey, who made up the DMEA inspection of the Elida tunnel, have recommended that a loan be granted to permit rehabilitation of the Elida tunnel followed by exploration work in favorable areas.

PLANS FOR FUTURE WORK

The Survey plans to revisit the Jo Reynolds mine when rehabilitation work is in progress and after it has been completed. The Survey will attempt to record all information made available through rehabilitation and exploration of the mine.

EXPLANATION

SEDIMENTARY ROCKS

Glacial debris and alluvium

QUATERNARY
AND RECENT

IGNEOUS and METAMORPHIC ROCKS

Bostonite dikes

TERTIARY

Pegmatite

Silver Plume type granite

Gneissic granite and pegmatite,
low in mafic minerals

Quartz diorite

Migmatite

Granodiorite gneiss

Biotite-quartz-plagioclase gneiss

PRE-CAMBRIAN

Idaho Springs
formation

Plunge of fold

Strike and dip of foliation
and plunge of lineation

Strike of vertical foliation

Strike and dip of vein, dashed where
approximately located

Trail

Road

Impassable road

Observed contact

Inferred contact

Approximate outline
of outcrop

Topography by E. B. Gross, W. E. Bales,
and A. R. McReel, 1951.

100 0 100 200 300 FEET
SCALE

Geology by J. E. Harrison, 1951.

FIGURE 2.—GEOLOGIC MAP OF THE JO REYNOLDS AREA, LAWSON-DUMONT
DISTRICT, CLEAR CREEK COUNTY, COLORADO.

A. SECTION THROUGH JO REYNOLDS MAIN SHAFT

Section prepared by C.M.Harrar
from level maps.

B. VERTICAL LONGITUDINAL SECTION THROUGH JO REYNOLDS VEIN

Stope section prepared by
R.B. Morton in 1905.

C. PLAN

Taken from company map made
by C.L. Harrington — March 1926.

FIGURE 3.-PLAN AND SECTIONS OF JO REYNOLDS MINE, LAWSON-DUMONT DISTRICT, CLEAR CREEK COUNTY, COLORADO.

Base from map made by
C. L. Harrington

40 0 40 80 120 160 FEET

SCALE

Geology by J. E. Harrison
and A. R. McReel, Oct. 1951

FIGURE 4.- GEOLOGIC MAP OF NORTHEAST PART OF
ELIDA TUNNEL, JO REYNOLDS MINE.