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Item 8

GEOLOGY AND MINERAL RESOURCES

OF

TOWNSHIP 25 NORTH

RANGES 29 AND 30 EAST

MOUNT DIABLO MERIDIAN

PERSHING AND CHURCHILL COUNTIES, NEVADA

Geology and Report by:

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Date: July 26, 1957

INTRODUCTION

These townships are located between 12 and 18 miles southwest of Lovelock, Nevada, in southern Pershing County and northern Churchill County. The county line runs east-west one mile north of the south edge of the townships. Main line of the Southern Pacific railroad and U.S. Highway 40 run north-south generally along the boundary between the two townships. Twp. 25N., Rge. 30E. is located entirely within the Humboldt Basin. The southern portion of the Trinity Range crosses the northwest corner of Twp. 25N., Rge. 29E.

CONCLUSIONS

Twp. 25N., Rge. 29E.

Sections 3, 5, 7, 17, 19 and 27 . . . . . Nonmineral.

Section 1 . . . Sand and gravel covers most of this section.

Section 9 (NE¼ofSE¼) . . . Narrow quartz vein with silver content.

Section 11 (W½) . . . . . Sand and gravel.

Section 13 . . . Sand and gravel covers most of this section.

Section 15 (SE¼ofSE¼) . . . Rhyolite breccia zone contains small amount of silver.

Section 21 (S½) . . . Tungsten occurrence along tactite zone. Some production.

Section 23 (SW¼ofSW¼) . . . Tungsten occurrence in tactite zone.

Section 25 (W½) . . . . . Lahontan sand and gravel.

Section 29 (SE¼ofSE¼) . . . Tungsten occurrence. Some production.

Section 31 (NE¼ofSE¼ofSE¼) . . . . . Limestone body.

Section 33 (NE¼) . . . Tungsten mineralization with small production.

Section 35 (SW¼) . . . . . Tungsten occurrence.

Twp. 25N., Rge. 30E.

None of the land owned by Southern Pacific Company in this township should be classified as nonmineral without a prior investigation to determine the mineral possibilities at depth.

Section 7 (W½) . . . . . Sand and gravel.

Mineral Potential at Depth on Southern Pacific Land: All of the company-owned land in this township potentially may contain deposits of evaporites, potash, clay, oil and gas at depth. Company ownership includes Secs. 3, 5 (except SW¼), 7, 9, 15, 17, 19, 21, 27, 29, 31, 33 and 35.

TOPOGRAPHY AND ACCESSIBILITY

The topography, road system, trails and accessibility are shown on the geologic map, No. R-2930-25 , which covers this area. The regional setting may be ascertained by inspecting the U.S. Geological Survey topographic sheet of the Lovelock Quadrangle published in 1931 and the Carson Sink Quadrangle published in 1908.

MINERAL RESOURCES-EXAMINED

Twp. 25N., Rge. 29E.

Metallic Deposits

Tungsten - (St. Anthony District)

In the foothills of the Trinity Range, west and southwest of Toy, Nevada (station on Southern Pacific main line), is located the St. Anthony Mining district which has been known since 1908. The district lies along the border between Churchill and Pershing Counties, and is between one and three miles from U.S. Highway 40 and the Southern Pacific railroad.

A roughly elliptical granodiorite stock 3-3/4 miles long by 2-1/8 miles wide has intruded a series of slates, shales, quartzites and lime-

stones. Contact metamorphism has produced tungsten bearing tactite in the form of the mineral scheelite along the contact between the limestone and the granodiorite intrusive stock. The scheelite occurs with garnet, quartz, hornblende, epidote and biotite.

In Sec. 21 (N½ofNE¼ofSW¼), an open cut about 50' by 40' has been dug 20 feet deep in a tactite zone which traverses the central part of this section from east to west. There are several small prospect trenches in this area.

In Sec. 23 (SW¼ofSW¼), two shallow shafts have been sunk in scheelite bearing tactite.

In Sec. 29 (SE¼ofSE¼), several small tunnels have been driven into the tactite zone from the granodiorite and a number of bulldozed trenches crosscut the contact zone.

In Sec. 33 (NE¼), several vertical shafts have been sunk on the limestone-granodiorite contact in the search for scheelite in commercial quantities. This section may offer the best possibilities for tungsten in this township because of the abundance of limestone in contact with the granodiorite.

In Sec. 35 (SW¼), a small amount of disseminated scheelite was found by ultraviolet light examination of bulldozed trenches in the limestone-granodiorite contact. This area is about 1,000 feet east of the St. Anthony mine. In the NE¼ of Sec. 35 a number of bulldozed trenches apparently failed to locate scheelite in commercial quantity. Just across the north sideline of Sec. 35 (in the extreme southern part of the SW¼ofSW¼ofSE¼ of Sec. 26), several small shafts and adits were driven in a tactite zone where highly selective operations were apparently carried on. Small cuts immediately south of this area (in Sec. 35) expose tactite which does not bear scheelite.

Silver prospects (little if any production)

Near the center of the SE¼ of Sec. 9, a vertical shaft has sunk on a narrow quartz vein to an estimated depth of 40 feet. quartz contains visible crystals of a metallic silver mineral. crystals were found in some of the quartz chunks by the shaft. Sample No. R-09-25-29-0s50a assayed 11.6 oz. of silver/ton and a of gold (Union Assay, 1957). The quartz vein near the top of th varies from 2 inches to 1 foot wide and is in fractured muscovit lite near the contact of the aplite with metamorphic slate and m The vein strikes N 20° E and dips about 60 degrees southeast.

Near the east quarter corner (not located) of Sec. 10 just the east side of Sec. 11, an inclined shaft has been sunk an esti 100 feet at 58 degrees to the southeast, apparently following the of a very narrow quartz vein in the Tertiary volcanics. Grab Sam No. R-10-25-29-0s49a was taken from vein material found near the and assayed 0.1 oz. of silver/ton and a trace of gold. The trend this vein is not apparently from surface examination but is proba easterly or northeasterly and would cross into Sec. 11 if extende short distance in this direction. However, the vein at the surfa only a very few inches wide and is not commercially feasible to m even though it contained relatively high values.

A tectonic breccia zone striking generally north-south and at 1,000 feet wide is present in the SE¼ofSE¼ of Sec. 15 in Tertiary lite. Chip samples taken across an eight foot zone of this brecc assayed 0.10 oz. of silver/ton and no gold (Sample No. R-15-25-29- Union Assay, 1957).

Grab Sample No. 09-25-29-0s51a was taken from quartz vein fl

100 feet west of the vertical shaft in Sec. 19 and assayed 0.10 oz. of silver/ton and no gold (Union Assay 1957).

Nonmetallic Deposits

A limestone outcrop in the NE¼ofSE¼ofSE¼ of Sec. 31 is composed of white, coarse grained limestone. This deposit extends into Sec. 32 and is a maximum of 1,000 feet long and 450 feet wide. Using a factor of 16 cubic feet per short ton, there are an estimated 550,000 tons above ground in Sec. 31 and an additional 725,000 tons in Sec. 32. This deposit is readily accessible as it occurs at the level of the dry wash which can be traversed by vehicle. Grab Sample No. R-31-25-29-La61a assayed 3.16% silica, 0.14% ferric oxide, 0.15% aluminum oxide, 53.79% calcium oxide, 0.02% titanium oxide, 0.015% manganese oxide, 0.21% magnesium oxide. This limestone is high enough in calcium carbonate (96.3%) and low in impurities (ferric oxide, titanium oxide) to be good cement rock (Abbot A. Hank's assay, 1957).

A black limestone is adjacent to the white limestone on the south and is approximately 200' x 500' and extends about 40' above ground. An estimated 250,000 tons ofthis material is present above ground. Grab Sample No. R-31-25-29-La62a assayed 13.70% silica, 0.41% ferric oxide, 0.63% aluminum oxide, 46.22% calcium oxide, 0.07% titanium oxide, 0.021% manganese oxide and 0.67% magnesium oxide (Abbot A. Hanks, 1957). This limestone is too low in calcium carbonate (79%) and too high in silica to be a good cement rock.

Construction Materials

Sand and Gravel

Extensive sand and gravel of unknown thickness and quality cover most of Sections 1, 12, 13 and 24, E½ of Sections 2, 11, 14 and 23 and the W½ of Sections 25 and 36. Much sand and gravel is also present along

the major drainage systems of the township. These latter deposits are locally up to 300 feet wide.

Twp. 25N., Rge. 30E.

Metallic Deposits

No metallic deposits were observed in this township.

Nonmetallic Deposits

No nonmetallic deposits were observed in this township.

Construction Materials

Sand and Gravel

Nearly all of Sections 6 and 7 are surfaced with sand and gravel deposited on the floor of ancient Lake Lahontan. The W½ of Sec. 18 is also covered with sand and gravel.

MINERAL RESOURCES-COMPILED

Twp. 25N., Rge. 29E.

Nearly all of the mineral production from this township has been from contact metamorphic scheelite bodies occurring in places on the periphery of the St. Anthony granodiorite stock in the south-central portion of the township. Southern Pacific Company files for Twp. 25N., Rge. 29E. contain excellent and detailed reports by John P. Simons (December 15, 1951), who examined the surface and underground workings in the St. Anthony district. Simons estimates production from the St. Anthony district to be 10,000 to 15,000 tons of approximately 1% WO_3 (tungsten-oxide). Most of this production was from the St. Anthony mine, from which the first contact-metamorphic scheelite in the United States was mined shortly after the initial discovery in 1908. A summary of production, other than at the St. Anthony mine, as given by Simons is as follows:

Section 21 - approximately 1,500 tons of unknown grade from the "Glory Hole".

Section 22 - several hundred tons of approximately 1.0% WO_3.

Section 26 - several thousand tons mined during World War I.

Simons estimates 3,000 to 4,000 tons of tungsten ore have been removed from Southern Pacific Company land in this township, primarily from Sections 21 and 29.

The only operation observed in the two townships of this report was a 2-man crew mining scheelite ore in the SW¼ of Sec. 22 during the spring of 1957.

The meager production in the St. Anthony district over the past 49 years does not speak well for possible future production of substantial tonnages. Kerr (1946) describes two types of tactite: garnet-rich and epidote-rich. He indicates the garnet-rich type to be of lower grade than the epidote-rich type. At the St. Anthony district, the tactite observed was garnet-rich.

The silver occurrences in Secs. 9, 10 and 15 are not economically feasible to mine because of low values and narrow veins. No record of production is available for the operations here but there has been little, if any, actual ore mined.

Potentially, the surface sand and gravel deposits along the eastern 1½ miles of this township may have commercial value, especially in view of the new highway construction to be commenced in the near future. Nothing is known regarding depth or quality of these estensive deposits.

Victory Uranium, A. Leingang Enterprise, Gazette Bldg., Reno, has staked many claims in the north-central portion of the township. No radiometric anomaly was found in this township (Dorsey, 1955).

Twp. 25N., Rge. 30E.

With the exception of a small quantity of sand and gravel taken from Sec. 6, there is no indication on the ground, in S.P. Co. files or in the literature of any mineral production from this township.

This entire township is surfaced with quaternary deposits with no apparent commercial value except for the sand and gravel in the W½ of Sec. 7. Potentially, commercial deposits of evaporites, potash, clay, water, oil and gas are present at depth.

Two water samples from Twp. 25N., Rge. 30E. were analyzed by the Southern Pacific Laboratory in Sacramento. Sample R-05-25-30-La 50 wa-1 was taken from the new well at the Toulon Mill. This sample contained 3,528 ppm of total dissolved solids, primarily as sodium chloride, and including 0.5 ppm arsenic and 11 ppm boron. Sample R-19-25-30-La 61 wa-1 was from Toulon Lake east of Toy. This sample contained 4,956 ppm of total dissolved solids, primarily as sodium chloride, and including 25 ppm boron.

Results of the analyses show neither of these waters to be useful for domestic, livestock or irrigation purposes because of excessive sodium chloride, boron and arsenic content as well as excessive total dissolved solids.

GENERAL GEOLOGIC SETTING

Past investigations. Although several papers have been published on the geology of the Humboldt Range to the east, practically nothing is to be found in the literature regarding the geology of the Trinity Range. Southern Pacific Company files contain brief reports pertaining to the general geology of these two townships, and a detailed description of the St. Anython intrusive in the south-central part of Twp. 25N., Rge. 29E. (Simons, 1951).

General distribution of surface formations. Rocks of Triassic (?) Jurassic, Tertiary and Quaternary age crop out in the two townships. The south half of Twp. 25N., Rge. 29E. is characterized by Triassic (?) metasediments intruded by Jurassic granodiorite. The north half of the township is largely covered with Tertiary volcanic flows which thicken westerly toward the crest of the Trinity Range in the northwest corner of the township and thin to the south where they overlap the older Triassic (?) and Jurassic rocks. Limited exposures of the Tertiary Truckee formation are present in the northeast portion of Twp. 25N., Rge. 29E. The eastern 1 to 1½ miles of Twp. 25N., Rge. 29E. and the northwest corner of Twp. 25N., Rge. 30E. are surfaced with Quaternary sand and gravel deposited on the floor of ancient Lake Lahontan. Low hills in the east-central portion of Twp. 25N., Rge. 29E. are composed of Tertiary volcanic rocks. The extreme southeast corner of Twp. 25N., Rge. 29E. is covered with Recent playa deposits. The entire area of Twp. 25N., Rge. 30E. is covered with Quaternary deposits. Lake Lahontan sand and gravel is present in the extreme northwest corner, and Recent playa deposits and dune sand cover the remainder of the township.

Triassic (?) Rocks

Triassic (?) Metasediments (TRu on map)

Triassic (?) sediments, in part metamorphic, almost completely ring the St. Anthony granodiorite stock in Twp. 25N., Rge. 29E. Inliers occur in Secs. 9, 10, 16 and 17 to the north and northwest of the main body of Triassic (?) metasediment outcrop. The sediments and metasediments consist of intercalated dark gray, thinly laminated slaes; siliceous and calcareous shales which are generally dark gray to black; light gray crystalline limestone, locally marmorized; dark gray, silty lime-

stone, and gray quartzite which weathers tan.

The Triassic (?) rocks have been intruded by Jurassic granodiorite and are overlain by Tertiary volcanics. These sediments and metasediments are tentatively regarded as Triassic in age on the basis of investigations by Louderback (1904) in the Humboldt Range to the east and communications with Sieberling (1957) regarding the age of fossils from Muttleberry Canyon in the Humboldt Range. The outcrops on either side of Humboldt Basin appear similar lithologically.

Generally the contact between the St. Anthony stock and the Triassic (?) rocks is parallel to the strike of the Triassic (?) strata. Furthermore, the Triassic (?) beds generally dip away from the stock, indicating doming of the Triassic (?) strata.

Jurassic Intrusives

Granodiorite and Aplite (Jgd and Jap on map)

Granodiorite and aplite intrusives are present in Twp. 25N., Rge. 29E. In the south-central portion of the township, an extensive granodiorite body (St. Anthony stock) is exposed in a crude lens shaped mass covering nearly 6 square miles. The stock is intruded into Triassic (?) metasediments and is medium gray and medium to coarsely crystalline, weathering readily to tan, sandy soil. The granodiorite stock forms rounded hills without bold outcrops and is less resistant to erosion than the surrounding metamorphic sediments which form the higher land on the north and south sides of the intrusive. The stock has a maximum length of 3-3/4 miles in a northwesterly direction and a maximum width of 2-1/8 miles in a northeasterly direction. Contact with the Triassic (?) slate, shale, quartzite and limestone is generally discernible in most places due to the great difference in color between the light granodiorite and the darker Triassic (?) metasediments. In some places

however, a darker facies of the granodiorite is present along the periphery of the stock as a huge "reaction rim" due to assimilation of the darker sediments by the granodiorite magma. The shale adjacent to the intrusive stock has been metamorphosed to hornfels.

In the center of the SE¼ of Sec. 9, a small outcrop or muscovite aplite is in contact with an inlier of Triassic (?) metasediments. The aplite is light gray, medium crystalline, sugary textured, containing abundant amounts of muscovite.

These intrusives are considered Jurassic in age on the basis of relationships with similar intrusives studied elsewhere in the region by other investigators (Muller, Ferguson and Roberts, 1951).

Oligocene (?) - Miocene Rocks

Rhyolite (Tr on map)

Thick and extensive pre-Truckee Tertiary rhyolite had its source in the area of the higher portions of the Trinity Range and has covered most of the north half of Twp. 25N., Rge. 29E. except for the eastern-most two miles. The rhyolite in the north-central part of Twp. 25N., Rge. 29E. is at least 600 feet thick and undoubtedly a great deal more. In this area the rhyolite is generally light gray to light tan, weathering light brown to lavender; is dense with a few phenocrysts of quartz and feldspar. Weathered surfaces are usually rough and hackly. In some places, as in Secs. 4 and 9, the rhyolite exhibits striking color changes from vivid lavendar to bright green, and from orange to tan. The rhyolite forms bold outcrops in the northwestern part of Twp. 25N., Rge. 29E. and in Secs. 3, 4, 9, 10 and 15.

Andesite Breccia Flow (Tabf on map)

In Sec. 8 a hard, dark andesite flow-breccia caps some of the higher portions ofthe section. This rock is medium gray, weathering

dark chocolate brown, is dense, porphyritic, and contains numerous volcanic breccia pebbles.

Rhyolite and Andesite (Tra on map)

Andesite occurs as interflows in the thicker rhyolite and is found in poor exposures in Secs. 5 and 8. Andesite (?), not mapped, crops out along the east face of the foothills of the Trinity Mountains in the E½ofE½ of Sec. 10 and the northwest corner of Sec. 11. The andesite is dark gray-tan, weathering darker tan to brownish, and is softer than the rhyolite with which it is associated.

Studies of Tertiary floras (Axelrod, 1957) indicate pre-Truckee Tertiary volcanics to be of Oligocene to Miocene age.

Miocene - Pliocene Rocks

Truckee Formation (Ttu, Tttu and Ttr on map)

The Truckee was first described by the 40th Parallel Survey at "Kawsoh Mountain" which, according to Larsen (1954) is "west ofHumboldt Sink". Actual location of the type section as described by King, et al. (1876) is in considerable doubt.

Mid-Miocene to early Pliocene lake beds and volcanics of similar lithology as the Truckee have been termed "Esmeralda" and "Humboldt" formations elsewhere in western Nevada (Larsen, 1954). The Truckee and equivalent formations contain conspicuous vitreous tuff beds and water-lain sands which distinguish them from earlier and later Tertiary volcanics.

In Twp. 25N., Rge. 29E. limited exposures of middle Truckee tuff and rhyolite are present in the northeast corner of the township on the east side (downthrown) of the Toulon Peak fault. The tuff varies from gray-white to greenish yellow and is pumiceous, commonly containing biotite.

The rhyolite is porphyritic, light gray to tan, weathering light brown. In addition to the Truckee rhyolite and tuff, dark colored basic to intermediate volcanic flows are poorly exposed in the NW¼ of Sec. 2 and in the NE¼ of Sec. 3. These flows were not differentiated in the mapping.

Quaternary - Tertiary Rocks

Basalt and Rhyolite (Qtb and Qtr on map)

There are scattered intrusive dikes and plugs in Twp. 25N., Rge. 29E., especially prominent in the northwest corner of the township near the crest of the Trinity Range. The most common are the rhyolite dikes which were intruded along faults and deep-seated fractures trending northwest in the northeastern part of Twp. 25N., Rge. 29E. and northeast in the northwest corner of the township. The rhyolite in the eastern outcrop area is typically light gray, weathering light orange-buff to rusty brown, aphanitic with scattered quartz and feldspar phenocrysts. In the northwestern outcrop area the rhyolite is light gray, weathering tan to brown, columnar in places, aphanitic with phaneritic biotite phenocrysts. Most of the dikes have been faulted by post-intrusive movements along the same faults and fractures responsible for their intrusion. The faulting is evidenced by brecciation, drag and rare slickensides. A film of black manganese dioxide commonly coats the fractures and fault surfaces.

Basalt plugs and limited flows occur in the northeast and southwest portions of Twp. 25N., Rge. 29E. The basalt is steel gray, dark gray or black, weathering dark brown, and is columnar. Olivine phenocrysts are common.

Quaternary Rocks

Lake Lahontan Sediments (Q1g on map)

Pleistocene Lake Lahontan at its maximum development attained the 4400 foot elevation (see map) as evidenced by beach-cut terraces and sand and gravel deposits up to this level. Calcareous tufa, not mapped, was deposited by Lake Lahontan waters between approximately 4080 and 4130 feet in the north-central part of the mapped area. This deposit is more resistant to erosion than the surrounding silt, sand and gravel and forms a band of pinnacles rising above the otherwise even topography.

Alluvial Sand and Gravel (Qal on map)

Stream valley alluvium composed of silt, sand and gravel with some cobbles has been, and is being, deposited along the channels of the "dry washes" in the mapped area.

Landslide and Talus Material (Q1s on map)

In Twp. 26N., Rge. 29E. on the lower portions of the hill slopes in some areas is material consisting of a heterogeneous mass of loose sand, silt, cobbles and boulders which has moved downhill mainly by gravity methods from source bedrock exposures on the upper slopes.

Playa Lake Sediments (Qp on map)

Fine detrital material deposited in the bottom of former and present playa lakes in Twp. 25N., Rge. 30E. is composed of clay, silt and fine sand. Thin crusts of saline evaporite are present in some areas.

Dune Sand (Qd on map)

Windblown accumulations of fine sand have been built up in extensive areas in Twp. 25N., Rge. 30E. on the floor of Humboldt Basin.

STRUCTURAL FEATURES

Summary of Structural History of Western Nevada

The structural history of western Nevada may be briefly described

as follows (Lintz, 1957):

Paleozoic folding and thrusting began in late Mississippian time and continued intermittently until at least Jurassic. The folds strike northeast-southwest parallel to the strike of the major thrusts. Eight major thrusts have been found in western Nevada with eastward displacement of from 10's of miles to possibly as much as 110 miles. Basin-Range faulting commenced early in the Tertiary with maximum displacements of 10,000 to 12,000 feet and has continued to the present, as evidenced by recent earthquakes.

Evidence of Mesozoic Folding

In Twp. 25N., Rge. 29E. the Triassic (?) metasediments exhibit strong evidence of post-Triassic (?) to pre-Tertiary compression. Wherever exposed, the Triassic (?) rocks are steeply inclined and close folds of various magnitudes are present.

In the south-central portion of Twp. 25N., Rge. 29E., the Triassic (?) metasediments exhibit doming around the St. Anthony stock. This doming was probably responsible for the lessening of vertical pressure in this area which permitted intrusion of the granodiorite stock.

Other results of compression in Twp. 25N., Rge. 29E. are a minor, recumbent fold in metamorphic limestone and slate in the NE¼ofSW¼ of Sec. 22 and a tight anticline striking approximately N40°W close to the southeast corner of Sec. 31. The anticline is probably faulted along its axis.

Evidence of Basin-Range Faulting

The Humboldt Basin, which includes all of Twp. 25N., Rge. 30E., was probably the result of basin-range faulting. However, the exact means by which the Humboldt Basin was formed in this area is not alto-

gether clear due to complications involving normal faulting which is transverse to the major trend of the basin and the Trinity Range. The Trinity Range was built up by thick accumulations of volcanic rock in the form of Tertiary flows and Quaternary-Tertiary dikes.

Toulon Peak Fault

This normal fault is termed "Toulon Peak fault" in this report because it crosses the Trinity Range within one-half mile north of Toulon Peak in Twp. 26N., Rge. 29E. (see 7001 elevation on map). The southern extension of this fault crosses Secs. 2, 3, 10, 11, 14, 22, 23 and 24 in Twp. 25N., Rge. 29E., where it splits into several faults, each with downthrow on the east side toward Humboldt Basin. One of the splits enters the St. Anthony granodiorite stock near the southeast corner of Sec. 22 and curves to the southwest, forming en echelon fractures in the granodiorite as it dies out. These fractures have been intruded by basalt dikes. Other splits from the Toulon Peak fault are buried beneath Quaternary lake sediments at the western edge of the Humboldt Basin in Twp. 25N., Rge. 29E.

There is stratigraphic evidence of considerable displacement along the easternmost fault of the Toulon Peak faulting. The middle Truckee tuff and rhyolite is dropped down against pre-Truckee Tertiary volcanics. Close measurement of vertical displacement is not possible, but it is very likely in the neighborhood of 3,000 feet.

These faults support the concept of basin-range faulting in Twp. 25N., Rge. 29E. except that the strike of the major displacements is not parallel to the general trend of the Trinity Range or the Humboldt Basin.

FIELD WORK

A total of 18½ days was spent on these two townships between April

30 and July 10, 1957.

Geophysics

Six man hours were spent prospecting for scheelite with ultra-violet light in Sec. 35. A radiometric survey was made along the north edge of Twp. 25N., Rge. 29E. with negative results. Company files contain a report of radiometric traverses made in Twp. 25N., Rge. 29E. with negative results (Dorsey, 1955).

RECOMMENDATIONS

Twp. 25N., Rge. 29E.

Future scheelite production from Southern Pacific Company land on this township depends upon a more favorable economy for scheelite mining than now exists. This might stimulate prospecting activity in the old St. Anthony district where apparently most of the surface and near surface ore bodies have been exhausted by intermittent mining over nearly half a century. The history of production from the St. Anthony district is anything but impressive, and the possibility of substantial tonnages of ore remaining near the surface is practically nil. Bulk of the ore thus far mined has been from above 150 feet in depth. The known ore bodies have pinched out with depth. However, nothing is known of the potential at depths below 150 to 200 feet except at the St. Anthony mine (350'), and if a favorable economy induces renewed activity in the area it is recommended that interested parties consider the possibility of testing the contact metamorphic zone to moderate depths. It is not recommended, however, that the Southern Pacific Company spend exploration funds in this particular area.

It is a distinct possibility that the sand and gravel deposits in the eastern part of Twp. 25N., Rge. 29E. will be of commercial value in the very near future in view of their proximity to the new highway which

apparently will be constructed across some of these deposits in both Twp. 25N., Rge. 29E., and Twp. 25N., Rge. 30E. It is recommended that the materials in these deposits be trenched by bulldozer to determine thickness and the location of the more favorable materials, and that adequate samples of the trenched sand and gravels be taken for analysis and testing to determine their suitability for federal highway construction.

Analysis of the grab sample of white limestone outcrop in Sec. 31 indicates commercial possibilities.

Twp. 25N., Rge. 30E.

The above remarks concerning the sand and gravel deposits in Twp. 25N., Rge. 29E. are pertinent to the deposits in the northwest corner of Twp. 25N., Rge. 30E. It is further recommended that at least one or two test wells be drilled on company land in this township, or other company land within Humboldt Basin, perhaps guided by a prior gravity survey, to explore the potential for evaporites, clay, potash, oil and gas.

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