dikes. The ore layer is also broken by many small faults, none of which has a throw greater than 10 feet. These faults add difficulty and cost to stoping.

3070 0079

Eugene Mountains (Mill City district)

The Eugene Mountains, in the Mill City district, are west of the Humboldt River, southwest of Winnemucca. They are shown on the Eugene Mountains Area quadrangle and on the smaller-scale Lovelock quandrangle. Tungsten, the settlement and post office for operations of the Nevada-Massachusetts Co., is 8 miles by surfaced road northwest of Mill City, a small station on the Southern Pacific Railroad and on U. S. Highway 40. The Nevada-Massachusetts Co. owns the principal tungsten deposits, which are in secs. 22, 23, 26, 27, 34, and 35, T. 34 N., R. 34 E. ~~(fig. 139)~~. Five other deposits in the range appear to be small, and have made little production.

~~Fig. 139. Tungsten deposits in the Eugene Mountains, Pershing County, Nevada.~~

omit

Scheelite was first found in the district in 1917. By 1918, 3 companies were mining ore (the Humboldt Corporation, the Pacific Tungsten Co., and the Mill City Tungsten Mining Co.) and 2 mills were in operation. The mines were closed in 1919 and were not worked again until 1924 when C. W. Poole leased the Pacific Tungsten Co. property. In 1925, the Nevada-Massachusetts Co. purchased holdings of the Pacific Tungsten Co. and the Mill City Tungsten Mining Co., and in 1928, those of the Humboldt Corporation. The Pacific mill, enlarged to 260 tons daily capacity, was operated continuously by the Nevada-Massachuetts Co., with the exception of 4 months in 1932, until it was destroyed by fire in 1943. A mill with a daily capacity of 1,000 tons was built in 1941 to re-treat accumulated tailings. When the tailings were exhausted in 1944, this plant was converted to treatment of mine ore. Total production to the end of 1945 was 986,842 units of WO_3. The quantity of WO_3 recovered per ton of ore treated was about 16 pounds.

Geology

The scheelite deposits occur in tactite replacing thin beds of limestone in a thick hornfels sequence. The principal deposits are closely related to 2 small, irregular stocks of granodiorite, the Olsen stock with an outcrop area of 0.5 square mile, and the Springer stock with an outcrop area of 0.2 square mile (fig. 140). The walls

Fig. 140. Geologic map of Tungsten and vicinity, Eugene Mountains, Pershing County, Nevada.

of these stocks and of other smaller intrusive bodies appear to dip steeply outward, and the area of the intrusives is only slightly greater in the deepest mine levels than at the surface. In general, the limestone beds are altered for distances of 1,500 to 2,000 feet from the 2 main intrusives although large remnants of only slightly altered limestone are found within this zone.

The sedimentary rocks are of Triassic age, and consist of shale

largely metamorphosed to hornfels, with interstalated beds of limestone and sandstone. The predominant type of hornfels is a brown, compact, blocky rock that can be scratched with a pick, and consists largely of quartz, biotite, and hornblende. A type of hornfels abundant in highly altered areas near ore bodies is a gray and green, dense, hard, banded, chert-like rock composed of quartz, actinolite, tremolite, and sometimes epidote and pyroxene. The thickness of the entire series is unknown, although probably at least a mile.

The limestone beds, of which a dozen or more are known, range in thickness from 1 to 30 feet. Most of the individual beds tend to be fairly continuous and of uniform thickness, but some of the beds become thinner or even pinch out entirely. Within the contact aureole, the limestone beds may be unaltered, bleached, re-crystallized to marble, or replaced by tactite. The tactite is a medium- to coarse-grained, crystalline rock composed of garnet, epidote, and quartz, with small amounts of calcite, scheelite, and pyrite.

The intrusive rocks are granodiorite, quartz diorite, and aplite, all of which are related, and a younger hornblende andesite which cuts across the older rocks. The main granodiorite stocks are composed of a medium-grained, holocrystalline rock containing quartz, orthoclase, andesine, albite, hornblende and biotite as essential minerals, and apatite, sphene, pyrite, zircon, and epidote as accessories. The allied acidic dikes are variable in composition and texture. Many contain only a small amount of dark minerals, and some consist almost entirely of quartz and albite.

Much of that part of the district underlain by sedimentary rocks is covered by mantle rock 1 to 10 feet deep consisting of angular fragments of hornfels with some soil. On slopes, this mantle may completely obscure thick dikes. The poor exposures, coupled with lack of distinctive stratigraphic markers in the ore-bearing series, make the solution of fault problems more difficult, for surface geologic information is at the best generalized.

Structure

The Triassic rocks strike N. 10° - 30° E. and dip steeply. East of the Stank fault, the beds dip west, and west of the fault, they dip east. The beds west of the fault are right side up as shown by minute cross bedding in sandy beds found beneath Codd Hill in the 400-level workings of the Stank mine. It is thought that the beds east of the Stank fault are overturned, but the evidence is not conclusive.

The Stank fault is the major structural feature of the district. Its existence was originally postulated on the basis of change in dip of the beds; the fault was subsequently found underground in the south workings of the Stank mine. The fault strikes northwest, dips southwest, and appears to be a thrust with both pre-granodiorite and post-granodiorite movement. Limestone beds on opposite sides of the fault are mineralized but cannot be correlated. Where exposed on the Stank 400-level, the fault dips 45° - 55° W. and consists of 2 zones

of gouge and breccia 12 and 6 feet thick separated by a thirty-foot width of granodiorite and phyllite. The Stank bed is cut off by the fault, and an entirely different sedimentary sequence is exposed in workings to the southwest. The Stank fault cuts through the Codd dike at the surface and on the 400-level, but offsets it only a few hundred feet. The major displacement apparently took place before intrusion of the granodiorite.

Many other pre-granodiorite and post-granodiorite faults are exposed in the mines. The pre-granodiorite faults are largely obliterated by later metamorphism, and are difficult to recognize, for their general effect on an ore bed is similar to that caused by lack of sedimentation. The only absolute proof of faulting is the discovery of the offset segment. The fault surface itself is not recognizable, and the attitude of the fault is determinable only after three or more points on it are identified. These faults make wedge-shaped terminations to ore beds, and are usually characterized by

broad zones of silication and silicification. The offset segments beyond several of the sealed faults in the Humboldt, Springer, and Stank mines were discovered after considerable exploration. Several others are not yet solved. The south end of the Humboldt bed is cut off below the eighth level and has never been found despite extensive exploration. Some geologists consider that this cut-off was caused by lack of sedimentation; others, including the writer, believe that it represents a sealed fault with greater displacement than that on other similar faults.

Post-granodiorite faults are recognizable underground by gouge on the fault surface and by lack of mineralization. Offsets are generally small, ranging up to 100 feet. Both transverse faults and strike faults are found. The strike faults in places cut the ore beds at angles acute to both strike and dip, and make difficult stoping by the usual shrinkage method.

Ore deposits

Size and shape.--The scheelite ore bodies occur in definite shoots that are largely co-extensive with tactite. The ore shoots rake steeply south along dikes that cut the ore beds. The bodies that have been mined to depth appear to have greater vertical extent than lateral. The Humboldt ore body, the largest mined, was 1,500 feet long at its greatest extension, and by 1945 had been mined to a vertical depth of 1,530 feet. The average width was about 6 feet. The Springer ore body had a maximum length of 700 feet, an average width of 3 feet, and was mined to a depth of 1,000 feet by 1945. The Stank ore body, mined to a depth of 1,100 feet with an average width of 4 feet and maximum length of 800 feet, contained sizable blocks of marble within the ore body. The North Sutton ore body, only explored to shallow depths, was shown to be at least 1,200 feet long on the 125-foot level, and to range in width from 5 to 25 feet.

Grade.--The average grade of all ore mined from the district

from 1917 to 1944 was about 0.375 percent of WO_3. The grade of individual stopes ranged from 0.5 to 10.0 percent. In general, ore from the Stank mine is richer than the average, and that from the North Sutton is leaner.

Mineralogy.--The tungsten-bearing tactite ores contain ~~different proportions of~~ the following minerals, listed in approximate order of abundance: quartz, garnet, epidote, calcite, pyrite, scheelite, actinolite, and occasionally molybdenite and pyrrhotite. The proportions of the various minerals differ widely from mine to mine, and even within single ore shoots. Most of the ore is a medium- to coarse-grained aggregate of quartz, garnet, and epidote with scattered crystals of scheelite. Some of the best ore consists of scheelite crystals embedded in glassy quartz and fine-grained epidote. In the North Sutton mine, much of the scheelite occurs along joints in the tactite. In general, the scheelite forms crystals 1 to 2 mm. in diameter, but in some instances they range up to a few centimeters.

in size. Most of the scheelite fluoresces blue-white, but some of it locally in the Stank, ~~and~~ Yellow Scheelite (and South Sutton) beds fluoresces pale yellow.

Mines of the Nevada-Massachusetts Co.

Up to 1945, mine workings in the district amounted to ~~about~~ about 13 miles of drifts and crosscuts, 4,650 feet of shafts, and $3\frac{1}{2}$ miles of core drill holes. Nearly a third of the level workings are crosscuts. Half the workings are in the Humboldt-Springer mine, which provided about 60 percent of the total amount of ore produced in the district between 1917 and 1943.

Humboldt-Springer

The Humboldt-Springer mine is opened to a vertical depth of 1,420 feet (1,700 level) through the inclined, 2-compartment Humboldt shaft (fig. 141). Three parallel beds are worked in the mine: the

Fig. 141. (Illustration not prepared) Block diagram ~~Humboldt~~ of the Humboldt mine, Eugene Mountains, Nevada.

Humboldt, the Springer, and the George (fig. 142). The Humboldt and

Fig. 142. Geologic sections through the Humboldt and Stank mines, Eugene Mountains, Nevada.

Springer beds were originally developed as separate mines. Below the 300-level, where the mines were connected, the Springer bed was worked from the Humboldt shaft (figs. 143 and 144).

Fig. 143. Geologic map and vertical projection of workings in the Humboldt bed, Humboldt mine, Eugene Mountains, Pershing County, Nevada.

Fig. 144. Geologic ~~plan~~ map and vertical projection of workings in the Springer bed, Humboldt and Springer mines, Eugene Mountains, Pershing County, Nevada.

Humboldt bed.--At the surface, the Humboldt bed can be traced for 1,750 feet, from the Olsen stock at the north end to a cut-off of uncertain origin at the south end. Above the 725-foot level, the bed averages about 1,700 feet in length, and about 75 percent of this length was stoped. Below the 725-foot level, the bed terminates at the south along a line that slopes 40° N. and converges with the granite contact, which slopes steeply south at the north end of the bed. Consequently, the bed and ore shoot are wedge-shaped downward in the lower part of the mine, and are possibly eliminated about 500

feet vertically below the 1700-foot level. If this south cutoff is a sealed fault, discovery of the offset portion of the bed might rejuvenate the mine. On the 1700 level, the bed was explored for a distance of 300 feet and found to be good ore across a width of 7 feet. Both ends of this segment were cut off by sealed faults. At the north end, a hole drilled into the footwall cored feet of ore at a distance of to feet. The south fault is the main cutoff at the south end of the Humboldt bed, and the offset segment had not been found in 1945 despite considerable exploration on this level and levels above. On the 975 level, hole no. 81, drilled horizontally southeast from the south face of the Springer bed, cored feet of white marble at depths of to feet. It is believed that this marble is the offset segment of the Humboldt bed, and that ore will be found elsewhere in the segment.

The north end of the Humboldt bed, against the Olsen stock, is not heavily mineralized. The Humboldt ore shoot terminates irregu-

larly along the north margin, leaving a zone of marble several hundred feet wide between the shoot and the granodiorite.

The Humboldt bed is crossed by several dikes that thicken with depth. These dikes present no special difficulty in mining, but in some instances complicate the theoretically simple operation of core drilling to test parallel ore beds. Because of the difficulty of determining the exact attitude and position of dikes, drill holes may core granodiorite or aplite in the critical location, and thus miss narrow limestone or tactite beds. Uncertainties of this sort increase with length of hole.

Width of ore in the Humboldt bed ranges from 4 to 12 feet and averages 6 feet. The entire bed is not in all places altered to tactite or ore; the hanging wall frequently contains unreplaced marble. The grade of ore differs from place to place in the mine, but the average is almost 0.75 percent of WO_3. One stope, above the 300 level, at the north end of the mine, averaged 10 percent of WO_3.

Springer bed.--The Springer bed is 200 to 250 feet west of the Humboldt bed, and can be traced a distance of 1,400 feet from a fault in Springer Gulch to the north face of the Humboldt train tunnel. The bed is very narrow at the north end, and not of good grade although it is mineralized.

The Springer ore shoot was stoped from the surface to the 1,100 level, 1,080 feet deep. The maximum length of ore was 725 feet, and the average width was 3 feet. The northern half of the ore shoot on the 725, 850, and 975 levels was of low grade, and part of it was not stoped. The possible downward continuation below the 1,100-foot level is unexplored, for development below this level involves progressively longer crosscuts in waste from the south termination of the Humboldt bed.

George bed.--The George bed is 120 to 200 feet west of the Springer bed, and 340 to 400 feet west of the Humboldt bed. At the surface, the bed is exposed intermittently for 1,000 feet along the

strike, and for widths of 5 to 20 feet. An ore shoot 150 feet long and 6 feet wide was opened on a sublevel drift 50 feet above the Humboldt train tunnel. Beneath this ore shoot, exploration on the 300 level, opened by a crosscut from the Springer bed, exposed only a narrow streak of slightly mineralized limestone, although a raise 10 feet above this level showed 4 feet of ore. The bed is lenticular in character, and also appears to be offset by strike faults.

The George bed was found on the 400, 500, and 600 levels in crosscuts driven west from the south end of the Springer ore shoot, approximately 650 feet south of the exploration on the tunnel sublevel. An ore shoot 100 feet long and 5 to 8 feet wide was stoped from the 500 to the 400 level. On the 400 level, the George bed contained no ore where tested 250 and 500 feet farther south in a crosscut and a drill hole.

Hangingwall bed.--The Hangingwall bed is 500 to 600 feet west of the Humboldt bed. The bed crops out at intervals for a distance of 700 feet, and ranges in width from 6 to 12 feet. Underground, it is

opened on the tunnel sublevel, 300 level, and 500 level by crosscuts, and was tested by drill holes on the 1,100 and 1,700 levels. The mineralization is very irregular, and most of the bed is marble.

Stank

The Stank mine is opened to a vertical depth of 1,100 feet (1,200 level) through an inclined shaft to the 700 level and a winze from the 700 to the 1,200 level (figs. 145 and 146). Most of the

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Fig. 145. (Illustration not prepared) Block diagram of the Stank mine, Eugene Mountains, Nevada.

Fig. 146. Geologic ~~plan~~ map and vertical projection of ~~workings in~~ the Stank mine, Eugene Mountains, Nevada.

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workings are in the Stank bed, which is probably equivalent to the Humboldt bed. In 1944-45, crosscuts were extended west to the Yellow Scheelite bed on the 300 and 400 levels (fig. 142). The Yellow Scheelite bed is the probable equivalent of the Springer bed.

Stank bed.--The Stank bed is traceable on the surface for 1,800 feet, from the Springer stock south to the Stank fault which cuts it

off. The fault cutoff lies farther and farther south on successively deeper levels in the mine. The bed ranges in width from 3 to 7½ feet, and averages 4½ feet. The north limit of the Stank ore body is a tongue of granodiorite from the Springer stock; the south limit is not nearly as well defined. Ore was mined as far as 1,000 feet south, but large blocks of unaltered or very low-grade limestone and marble occur within the limits of the ore body. The ratio of waste to ore increased in the south part of the mine. The average grade of ore mined up to 1945 was 0.75 percent to 1.0 percent of WO_3.

The Stank ore body is cut by 2 granodiorite dikes, the Stank and the Codd, and by a gently-dipping dike of hornblende andesite. The ore body is separated into 2 segments by a pre-granodiorite fault that dips gently south. Between the 500 and 850 levels, both the ore bed and the pre-granodiorite fault are offset by several post-mineral strike faults with resultant complications in mining.

Yellow Scheelite bed.--The Yellow Scheelite bed lies 170 to 260

feet west of the Stank bed. It was first opened from the surface to the 200 level at the north end of the Stank mine where the bed is 2 to 2½ feet wide and contains 0.5 to 0.75 percent of WO_3. Farther south in the mine, the bed was opened south of the Stank dike by crosscuts on the 300 and 400 levels, where 2 to 4 feet of ore were exposed. Although mineralization was uneven, part of the bed was commercial ore.

Summit-O'Byrne bed

The Summit-O'Byrne is an east-dipping bed that lies west of the Stank fault. The bed crops out intermittently for 1,800 feet, from the Stank fault south to Codd gulch. The dip of the bed is in the opposite direction to the dip of the Stank fault, and the two converge along the strike. Consequently, the bed is a wedge cut off by the Stank fault along a line that slopes south from the surface intersection. At the O'Byrne shaft, the cutoff is thought to be 450 feet deep.

Exploration in the Summit-O'Byrne bed is limited to a few shallow

adits, a shaft, and a surface drill hole (fig. 147). The Summit work-

Fig. 147. Geologic ~~plan~~ map and vertical projection of ~~workings in~~ the Summit-O'Byrne ~~bed~~ workings, Eugene Mountains, Nevada.

ings at the north end of the bed consist of 2 adits at 20-foot vertical intervals. The upper adit and cut expose about 80 feet of bed cut off on the south side by a pre-mineral fault that appears to slope gently north about parallel to the hillside. Part of the bed was stoped irregularly to the surface along this fault, and yielded ore containing 1.0 percent of WO_3. The continuation of the bed was not found south of the fault in the upper adit, and no bed was found in the lower adit.

The O'Byrne workings on the south side of Stank Hill consist of the 100-foot Upper O'Byrne adit connected with the 50-foot O'Byrne shaft, and the 100-foot Lower O'Byrne adit. These workings are in the mineralized tactite bed, about 2½ feet wide and estimated to contain 0.75 percent of WO_3. Tungsten mineralization is thought to be

continuous for 600 feet.

At the surface, part of the bed between the Summit and O'Byrne workings is eliminated by a granodiorite dike 125 feet thick, and part is unaltered limestone.

West beds

At least 3 limestone beds occur west of the Summit-O'Byrne bed, and are mineralized in part. Only the first of these, located 300 feet west of the Summit-O'Byrne, appears to contain commercial ore. Two short adits in this bed, on the north slope of Stank Hill west of the Summit adits, expose tactite ore 1 to 2 feet wide containing 0.5 to 0.75 percent of WO_3. Two cuts on the south side of the hill contain similar ore several feet thick.

In some of the other west beds, small exposures of scheelite-bearing tactite are found in limestone, but, for the most part, the beds are unaltered. Three holes drilled by the U. S. Bureau of Mines intersected these beds at depths as great as 550 feet beneath

the outcrop; all the cores were barren, unaltered limestone.

South Sutton (Sutton No. 1)

The South Sutton mine, in the Sutton beds at the south edge of the Springer stock, is opened by a 950-foot adit along the beds, an inclined shaft 215 feet deep, and drifts on the 100 and 200 levels extending 300 and 250 feet south of the shaft (fig. 148). On the east

Fig. 148. Geologic ~~plan~~ map and vertical projection of ~~workings in~~ the South Sutton mine, Eugene Mountains, Nevada.

bed, an ore shoot was exposed 300 feet long and 5 to 10 feet thick. On the ~~west~~ bed, the ore shoot is about the same size. Farther south, the beds change to unmineralized limestone. The grade of ore is about 0.5 percent of WO_3.

Between the South Sutton mine and the Springer stock, the Sutton beds are broken into many small segments by faulting. Some of these segments were opened by short adits and open cuts (the Orphan workings), and about 10,000 tons of 0.75 percent ore were mined.

North Sutton (Sutton No. 2)

The North Sutton mine is opened by an adit, about 1,220 feet long on the west bed, and an internal shaft sunk from a point 550 feet within the portal. By 1945, the inclined shaft had reached the 375 level, and the ore body was opened by drifts on the 125 and 250 levels (fig. 149). Although the main workings are in the West Sutton bed, parallel drifts follow the East Sutton bed for long distances. The 2 beds are separated by 10 to 60 feet of hornfels. The east bed is lenticular, and pinches out entirely for distances of several hundred feet. Its width ranges from 2 to 10 feet. The west bed is continuous within the workings, and ranges in width from 5 to 25 feet. At various places within the bed are thin lenses of hornfels.

Fig. 149. Geologic ~~plan~~ map and vertical projection of ~~workings in~~ the North Sutton mine, Eugene Mountains, Nevada.

The Sutton beds are cut off at the north end of the mine by a pre-granodiorite fault, and the next known exposures are 800 feet

northwest near the Uncle Sam mine.

The Sutton ore body is crossed by many joints approximately at right angles to the bedding. These joints, which occur with a frequency of perhaps every 10 feet, are mostly mineralized with veinlets of scheelite and quartz. The scheelite is coarser-grained than that in the main tactite ore. In some places where the mineralized joints are abundant, they link the east bed with the west bed and result in a broad zone of low-grade mineralization.

The North Sutton ore body gives promise of being at least as large as the Humboldt ore body, although it is of lower grade where exposed in the upper workings.

Uncle Sam

The Uncle Sam mine is a prospect in the Sutton beds near the Olsen stock. Workings consist of a 200-foot crosscut adit with a drift 165 feet long on the West Sutton bed, and a raise to the surface (fig. 150). The ore exposed contains about 0.5 percent of WO_3.

Fig. 150. ~~Geologic plan~~ Map and vertical projection of the Uncle Sam mine, Eugene Mountains, Nevada.

Scheelite-bearing float was found for several hundred feet north and south of the mine, and it seems likely that other ore shoots, or continuations of the partly developed shoot, might be found. The East Sutton bed is not mineralized where exposed.

Florence Beds

A number of poorly exposed limestone beds are known to occur north of the Olsen stock. There appear to be 2 groups of 7 or 8 beds each, known as the West Florence beds and the East Florence beds. Neither group can be definitely correlated with other beds in the district, from which they are separated by the Olsen stock.

The West Florence beds, 6 to 30 feet thick, are prospected by 2 short adits that follow a 3- to 5-foot band of tactite in a much wider limestone bed. Most of the tactite is very low-grade, but small pockets of good ore occur in it.

The East Florence beds, 3 to 10 feet wide, appear to be cut off by a fault before they reach the Olsen stock. Small pockets

of ore containing 1 to 2 percent of WO_3, surrounded by barren limestone, were taken from 2 short adits and a 50-foot inclined shaft.

Although the Florence beds are not known to contain minable bodies of commercial ore, the occurrences of small lenses of scheelite-bearing tactite suggests the possibility of ore bodies at greater depth, perhaps far beyond the reach of any expectable mining activity.

Mill beds (East beds)

Two parallel limestone bands, each 10 to 30 feet wide, separated by 10 to 20 feet of hornfels, are known as the Mill beds because of their proximity to the former Nevada-Massachusetts Co. mill. They are the easternmost beds known in the district, and extend as unaltered barren, bluish limestone in almost continuous outcrops for a mile south of the mill. Still farther south, beyond a 1,000-foot gap, the beds again crop out on the Gold Coin (Forge property) claims where they are in part mineralized.

The beds are covered by alluvium north of the mill. About 3,000 feet

northeast, and 2,500 feet east of the North Sutton mine, tactite is exposed in trenches near the upper limit of the pediment. The bed dips 30° NW., and may be a faulted continuation of the Mill beds. The tactite contains only a trace of WO_3.

Other deposits

Gold Coin (Forge)

The Gold Coin group of 3 claims, owned by Phillip Forge, is in sec. 2, T. 33 N., R. 34 E., near the south end of the Eugene Mountains, and adjoins the Nevada-Massachusetts Co. property on the southeast. The claims are reached by 1.3 miles of dirt road that joins the surfaced road between Mill City and Tungsten at a point 0.5 mile below the mill of the Nevada-Massachusetts Co.

Scheelite occurs in tactite formed in a southern extension of the Mill beds where they are cut by a small, irregular granodiorite intrusive (fig. 151). No sizable bodies of commercial ore are exposed al-

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Fig. 151. Geologic map of the Gold Coin claims (Forge property), Eugene Mountains, Nevada.

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though they may exist buried beneath the debris that obscures much of the surface geology. At least 4 limestone beds are known. The 2 eastern ones are largely altered to tactite, whereas the 2 western ones are largely limestone with occasional small lenses of tactite. The east tactite bed is 6 feet wide where exposed in 3 cuts and a few trenches; the best ore seen on the property was on the dump at the upper of 2 prospect pits near the southeast corner of the map area. A few hundred pounds of sorted ore on this dump might average 3 to 5 percent of WO_3, but the balance of the rock exposed on the dump and in the pit contains only about 0.25 percent of WO_3. The third pit, 650 feet northerly, exposes tactite containing perhaps 0.25 percent of WO_3, with much of the scheelite occurring along joints.

The second tactite bed, exposed at the east edge of the gully crossing the property, is about 30 feet wide, and forms 2 bodies 110 and 170 feet long separated by 90 feet of granodiorite. Scheelite occurs sparingly in scattered crystals, and the average grade is estimated at not more than 0.25 percent of WO_3.

Red Hawk

The Red Hawk group of 10 claims are 3 miles northwest of Tungsten at the head of Pole Canyon near the crest of the Eugene Mountains, in sec. ~~15~~ 16, T. 34 N., R. 34 E. A dirt road 7 miles long connects the main deposit with ~~the Federal Housing Settlement at~~ Tungsten.

The claims were owned in 1917 by Nagle and Campbell who shipped a carload of ore containing 2½ percent of WO_3 to a mill at Toulon, Nevada. In 1942, the property was owned by H. G. Murphy, Harry Brechtel, and F. R. O'Leary, and was leased to Leverett Davis. In 1943-44, Davis shipped 266 tons of ore containing 286 units of WO_3 to the Metals Reserve Co.

Scheelite occurs in one or more thin bands of tactite that dip steeply west in shaly hornfels. Mineralization was noted at 8 pits all more or less in a line extending half a mile N. 10° E. Outcrops are poor, and there were not enough trenches in 1943 to prove any continuity between the widely spaced exposures. The best ore is in the central part of the property where a 40-foot crosscut adit was driven

in 1917 to intersect the tactite bed 25 feet beneath the surface. A drift from the face exposed ore 3 feet wide and 45 feet long, with an average grade of 2.0 percent of WO_3.

Major Davis

The Major Davis claim, located in 1943 by Ben H. Jackson, is at the head of Pole Canyon and adjoins the Red Hawk group on the south. In 1944, a 12-inch bed of scheelite-bearing tactite estimated to contain 0.5 to 2.0 percent of WO_3 was exposed in a 15-foot adit and an open cut. The bed strikes North, dips 70° W., and is bordered by hornfels. There are no outcrops.

Keystone (Old Central)

The Keystone mine of the Old Central Mining Co., leased in 1943 to the Dayton Dredging Co., is in secs. 1, 2, and 12, T. 34 N., R. 34 E., on the north side of Mill Creek at the east edge of the Eugene Mountains. Scheelite was identified in core from a hole drilled in 1940 in search of silver-lead ore bodies. The mineralized core was in altered granodiorite at a depth of 185 feet beneath the

surface. In 1943, no similar mineralization was known in the mine or at the surface.

Imlay View

The Imlay View property consists of 5 claims located in 1939 by Emil Stank and Ira Stanley. The claims are near the south end of the Eugene Mountains, approximately in secs. ~~1 and 12~~ 6, T. ~~33~~ 34 N., R. ~~33~~ 34 E. and sec. 1, T. 33 N., R. 33 E.

A small amount of scheelite is found along narrow seams in aplite sills. Scheelite is also found disseminated in several thin tactite beds that are about 1½ feet wide and contain up to 1.0 percent of WO_3.