UNITED STATES DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY

SHEET I

STRATEGIC MINERALS INVESTIGATIONS
PRELIMINARY MAP

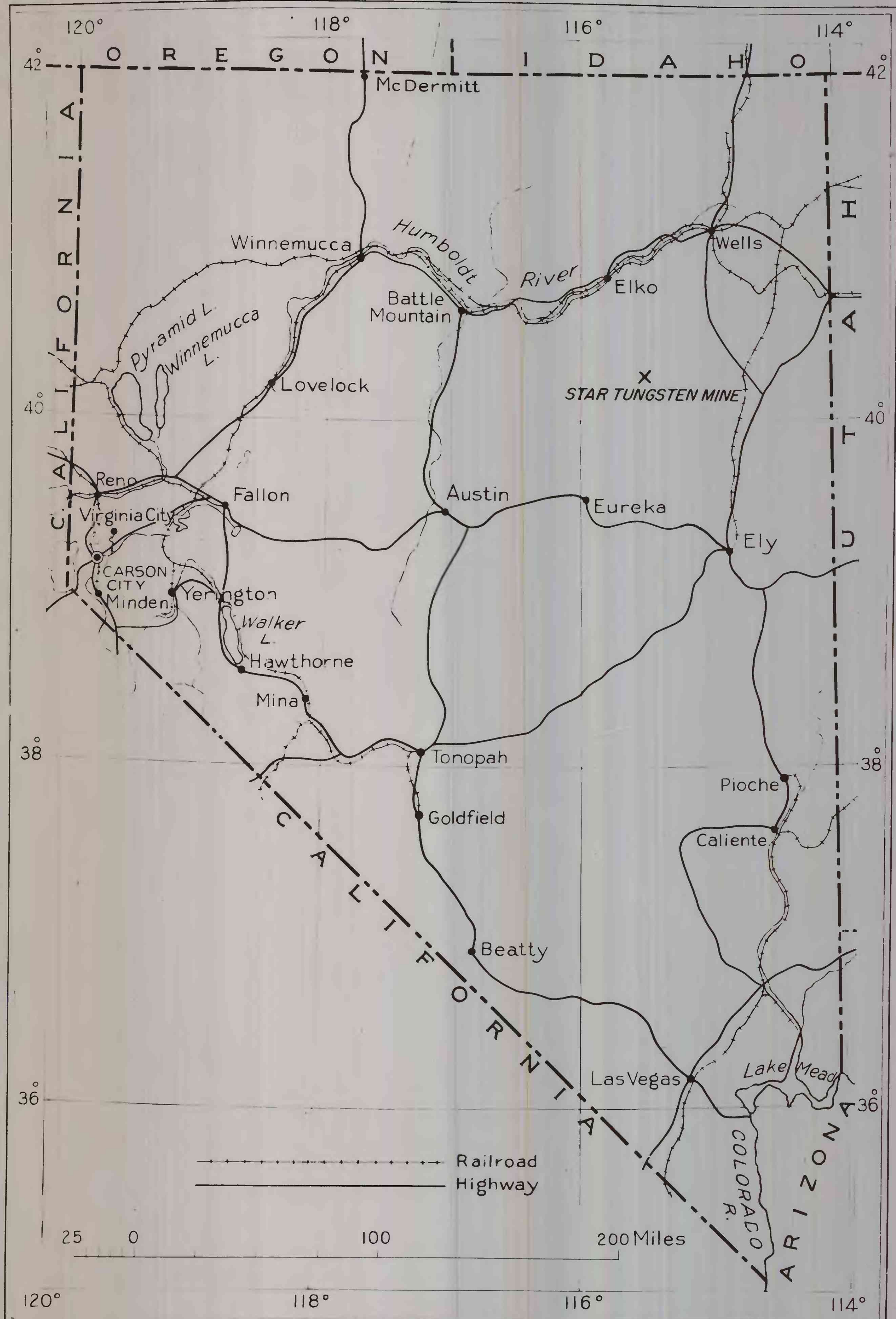

FIGURE I- INDEX MAP OF NEVADA SHOWING LOCATION OF THE STAR TUNGSTEN MINE, ELKO COUNTY

STAR TUNGSTEN MINE AND VICINITY, HARRISON PASS, ELKO COUNTY, NEVADA

Deposits of scheelite (calcium tungstate) occur at the Star Tungsten mine and on the adjacent Campbell property, in the NW¼ of T. 28 N., R. 58 E., Elko County, Nev., on the east slope of the Ruby Range, about 2 miles east of Harrison Pass (fig. 1). The area is easily accessible from the north and east. Elko is 53 miles away by gravel road via Harrison Pass; Currie and Warm Springs, on U. S. Highway 40, are each about 40 miles away by gravel roads via Ruby Valley. The Harrison Pass road may be blocked by snow for a month or more in winter, but the Ruby Valley roads are seldom impassable for more than a day or two at a time.

The deposits occur in small bodies of tactite in a northerly trending contact zone between a stock of quartz monzonite and beds of limestone metamorphosed to marble and hornfels.

These deposits were discovered as early as 1916 or 1917, but they were not actively developed until 1940, and production was first recorded in March 1941. The Star Tungsten mine, known in the past as the Star Tungsten group and the Ogilvie property, is owned jointly by George F. Ogilvie, E. Lane, and A. Francis, but has been leased since October 1942 to the Knowles Brothers, of Elko, Nev. The Campbell property, about 4500 feet S. 15° W. of the Star Tungsten mine, is owned by Russell Campbell, of Salt Lake City, and was also leased to the Knowles Brothers in September 1943.

The deposits were examined and mapped for the Geological Survey, United States Department of the Interior, by M. R. Klepper, who was assisted by John H. Wiese and C. Melvin Swinney, during five weeks in August and September 1942. M. R. Klepper and Peter Joralemon revisited the area during the first week in September 1943 and mapped the geology of the workings opened up during the previous year.

The igneous stock consists principally of white, coarse-grained biotite-quartz monzonite that weathers to a granular rubble of quartz and feldspar. Other types of intrusive igneous rock are closely associated with the quartz monzonite, especially along the eastern margin of the stock. As the contacts between the igneous rocks are generally concealed, and scheelite-bearing tactite was found in contact with all but one of the intrusive rock types, all the igneous rocks were mapped as a unit, designated on the maps as quartz monzonite (fig. 2).

The sedimentary rocks are chiefly impure limestones. In a belt, about 1,500 feet wide, adjacent to the igneous stock, the limestone has been metamorphosed to granular white marble and light-colored, dense, fine-grained hornfels. Hornfels predominates, but marble is more favorable to the formation of tactite, although in some zones both hornfels and marble grade into tactite, and in a few places the hornfels adjacent to the contact is sparsely mineralized with scheelite for a width of a few feet.

The metamorphic rocks form a simple homoclinal structure which dips 40° to 80° E. No major faults were recognized in the area, but the angular pattern of the contacts suggests that the intrusion may have been controlled by minor faults or by joints.

The principal igneous contact is very irregular, in places paralleling the bedding of the metamorphic rocks, elsewhere cutting sharply across it. Many apophyses extend from the main contact into the metamorphic rocks, in some places completely isolating blocks of these rocks. The underground workings and the diamond-drill holes indicate that the contact is as irregular in depth as at the surface.

Small, irregular bodies of tactite were formed locally in the sedimentary beds adjacent to the intrusive rocks where the metamorphism was most intense. The tactite is generally medium-grained and brown to green in color. It consists principally of quartz, garnet, epidote or pyroxene, calcite, and scheelite.

The metamorphic rocks have been altered to tactite along less than 5 percent of the contact. Adjacent to the tactite bodies, the igneous rock is commonly silicified and in places contains epidote and hornblende. Where the igneous contact cuts the bedding of the metamorphic rocks, one or more beds may be altered to tactite for distances of 25 feet or more, although adjacent, less favorable beds are altered for only a few inches to a few feet. The scheelite-bearing tactite bodies are tabular in outline where the contact is parallel to the bedding, and pipelike and irregular in plan where the contact cuts sharply across the bedding. Mineralization appears to have been localized chiefly by the presence of favorable beds and by proximity to the contact.

The Main ore body (fig. 2) is bounded on two sides by quartz monzonite and on two sides by marble and hornfels containing small irregular bodies of low-grade tactite, which tend to lie parallel to the bedding of the metamorphic rocks. The irregular shape of the ore body is due in part to irregularities of the igneous contact, in part to low-angle normal faults, none of which exceeds 50 feet in maximum displacement. In general the ore body tapers downward, and it is expected to terminate as shown in the projections on figure 3.

The ore body is explored by means of a 150-foot adit, a 65-foot winze, and short levels driven from the winze at depths of 45 and 65 feet below the collar (fig. 3). An inclined shaft has been driven beneath the ore body in preparation for the removal of the remaining ore, which is believed to average at least 1.25 percent of WO_3.

The South ore body (fig. 2) is exposed at the surface for a length of 70 feet and for an average width of 3 feet, and trends northward approximately parallel to the bedding of the metamorphic rocks. It is bordered by the aplitic margin of the main intrusive on the west and by alaskite and hornfels on the east.

A crosscut adit was driven to intersect this ore body at a depth of 50 feet, the maximum depth at which ore was found in holes drilled from the surface. The bottom of the ore shoot was intersected almost directly beneath the shallow shaft (fig. 4). At this level, the ore shoot strikes eastward and is pinched out by the encroachment of quartz monzonite from both the hanging-wall and footwall sides. The ore exposed at the adit level is probably continuous, or nearly continuous, with the ore at the surface, but, because of the irregularity of the intrusive contact, the ore zone cuts sharply across the bedding at the adit level, whereas it is essentially parallel to the bedding at the surface. In the adit, mineralized tongues extend away from the contact along favorable beds, but none of the exposed tongues are of minable width and grade. In September 1943 a stope had been started above the adit level and was to be carried through to the surface. The ore was expected to average between 1.5 and 2.0 percent of WO_3.

None of the other small lenses exposed in this area, either at the surface or in the adit, appear to be sufficiently high in WO_3 content to be minable at a profit.

The Mill ore body, about 50 feet west of the mill, is exposed at the surface for a length of 25 feet and a width of 4 feet (fig. 2). Here also the ore body lies along the main intrusive contact and is nearly parallel to the bedding. It is displaced a few feet by each of a series of low-angle normal faults (sec. C-C', fig. 4).

The ore body has been followed to a depth of 35 feet by a 70-foot adit (fig. 4). Development had been discontinued, however, in September 1943, as thin, relatively low grade slices of ore which averaged less than 0.75 percent of WO_3, could not be mined profitably.

At the south end of the property, a mineralized zone is exposed, by means of trenches along the main intrusive contact, for a length of 100 feet and for an average width of 3 to 4 feet. An exploratory shaft (South shaft, fig. 2) was being sunk near the south end of the zone in September 1943 and had then reached a depth of 15 feet. The mineralized zone has a steeply dipping footwall of quartz monzonite and is parallel or nearly parallel to the bedding of the metamorphic rocks. The tactite is estimated to average only about 0.25 percent of WO_3, although it contains about 0.4 percent of WO_3 near the shaft.

A small lens of ore at one corner of a small pendant in the northern part of the area mapped has been explored by means of an open cut (North Open Cut, fig. 2). The ore exposed in the cut is estimated to contain from 1.0 to 1.5 percent of WO_3.

The ore body on the Campbell property extends along both contacts of a vertical quartz-monzonite dike that ranges from a few inches to 8 feet in width (fig. 5). Tactite occurs in favorable beds for varying distances from the dike, and the area of the surface exposure of the extremely irregular ore body amounts to 400 square feet. The tactite has been prospected by means of a few small cuts, and the Knowles Brothers, who leased the property in September 1943, planned to develop it as soon as weather permits during the following spring. The ore is believed to average 1.0 percent of WO_3. However, the occurrence of considerable sphalerite in the ore body might reduce the value of the concentrate from this ore.

A concentration of cobbles and boulders of tactite, some of which may be regarded as ore, occurs in the overburden concealing the igneous contact about 400 feet north of the ore body on the Campbell property. Trenching in this area might reveal ore in place.

Reserves of ore at the Star Tungsten mine and the adjacent Campbell property may amount to approximately 8,000 tons, containing about 9,000 units of WO_3. If it is found possible to treat profitably the old tailings at the Star Tungsten mine, this figure may be increased by a few hundred tons of low-grade material.

STAR TUNGSTEN MINE AND VICINITY, ELKO COUNTY, NEVADA