MINERAL INVESTIGATION OF THE SOUTH PEQUOP WILDERNESS STUDY AREA ELKO COUNTY, NEVADA

by

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UNITED STATES DEPARTMENT OF THE INTERIOR
Donald P. Hodel, Secretary

BUREAU OF MINES
Robert C. Horton

STUDIES RELATED TO WILDERNESS

Bureau of Land Management Wilderness Study Area

The Federal Land Policy and Management Act (Public Law 94-579, October 21, 1976) requires the U.S. Geological Survey and the U.S. Bureau of Mines to conduct mineral surves on certain areas to determine mineral values, if any, that may be present. Results must be made available to the public and be submitted to the President and the Congress. This report presents the results of a mineral survey of the South Pequop Wilderness Study Area (NV-010-035), Elko County, Nevada.

This open file report summarizes the results of a Bureau of Mines wilderness study and will be incorporated in a joint report with the U.S. Geological Survey. The report is preliminary and has not been edited or reviewed for conformity with the Bureau of Mines editorial standards. Work on this study was conducted by personnel from the Intermountain Field Operations Center, Building 20, Denver Federal Center, Denver, CO 80225.

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STUDY AREA, (BLM, NV-010-035),
ELKO COUNTY, NEVADA

By

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SUMMARY

The South Pequop Wilderness Study Area covers 34,544 acres of land administered by the Bureau of Land Management in Elko County, northeastern Nevada. Mineral investigations on BLM Wilderness Study Areas are authorized by Public Law 94-579.

Based on surface evidence, a subeconomic resource of 250,000 short tons of phosphatic rock averaging about 16.4 percent P_2O_5 is present in the southwestern part of the wilderness study area. Geologic evidence indicates that at least 5 times this amount could underlie other parts of the study area.

In the northwest corner of the area, anomalous concentrations of arsenic, barium, manganese, antimony, and zinc present in samples from mineralized fractures are surface indicators of possible precious- and base-metal deposits.

Limestone, dolomite, and sand and gravel are present in the area, but they have no unique characteristics, and similar materials are available in abundance nearer to market areas. Study area limestone, dolomite, and sand and gravel are suitable for road-metal or fill. Some of the limestone units are suitable for agricultural uses.

Petroleum resources are not known to exist in the wilderness study area and the area is rated as having low potential for petroleum.

INTRODUCTION

In May 1984, the Bureau of Mines in conjunction with the U.S. Geological Survey (USGS), studied the mineral resources of the South Pequop Wilderness

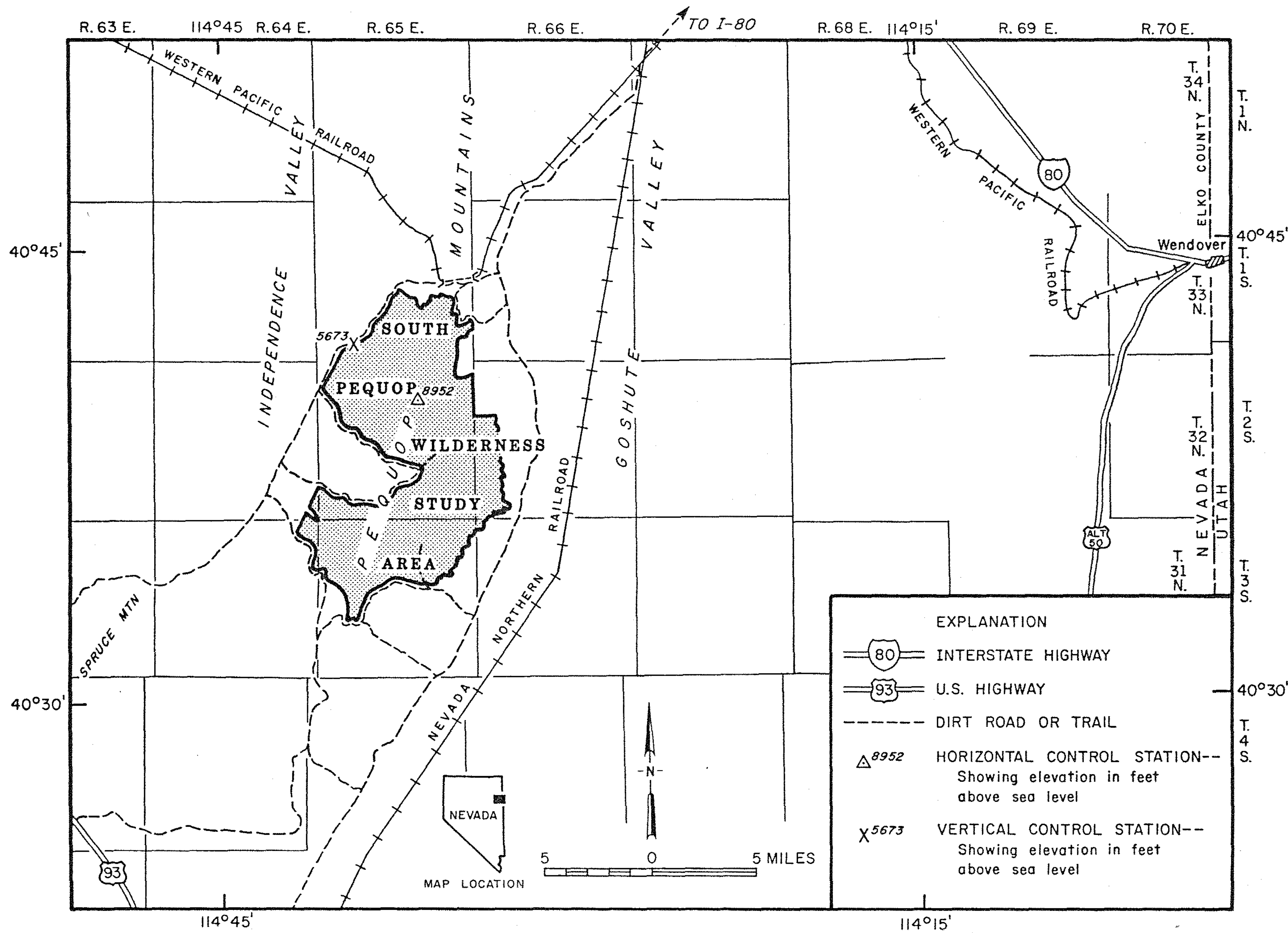

Figure 1. Index map of the South Pequop Wilderness Study Area, Elko County, Nevada

Study Area (WSA), Elko County, Nevada (fig. 1). The land is administered by the Bureau of Land Management (BLM). In these studies the Bureau investigates mines, prospects, and mineralized areas to evaluate quantity and quality of mineral reserves and identified resources. The USGS assesses the mineral potential of the study area based on regional geological, geochemical, and geophysical studies. This report presents the results of the study conducted by the Bureau. The USGS will publish results of its studies separately. A joint Bureau-USGS report will integrate and summarize all the results.

Geographic setting

The South Pequop WSA encompasses 34,544 acres in southeastern Elko County, northeastern Nevada (fig. 1). It is approximately 33 mi west of the Utah state line and 35 mi southwest of Wendover, Nevada.

The WSA is in the south end of the Pequop Mountains, an elongate north-trending range in the Basin and Range physiographic province. Independence Valley, located on the west side of the Pequop Mountains, and Goshute Valley located on the east side, are typical basins within this province. Rugged ridges and hillsides of layered sedimentary rock units dissected by dry washes characterize the topography within the area. Elevations range from 8,952 ft in the north central part of the WSA, to about 5,670 ft along the western border.

Dirt roads off of U.S. Highway 93 and Interstate 80 provide access to the study area boundaries. U.S. Highway 93 is about 16 mi to the southwest and I-80 is about 27 mi to the northeast. A few jeep trails provide access along the southern and eastern borders of the area; the only other access is by foot or pack animal.

Nevada Northern Railroad is within 3 mi of the eastern boundary, and the Western Pacific Railroad is within 1 mi of the northern boundary.

Previous investigations

Geologic mapping in the southern Pequop Mountains has been done by Snelson (1955), Hope and Coates (1976), and Fraser and others (1983). A geologic section that included an 84-ft-thick unit of phosphatic shale was measured about 2 mi south of the study area (Granger and others, 1957). A geochemical reconnaissance of the Pequop Mountains showing a tungsten and arsenic anomaly near the north end of the study area was done by Erickson and others (1966). Mineral resource data on Elko County, including the Pequop Range, has been compiled by Granger and others (1957), and Smith (1976). The geology and mineral resources evaluation of the South Pequop Geology-Energy-Minerals (G-E-M) resource area, showing moderate favorability for phosphate and low favorability for metallic minerals and oil and gas, was done by Great Basin GEM Joint Venture (South Pequop G-E-M resource area, GRA no. NV-01, technical report, WSA NV 010-035, unpublished BLM administrative report, contract no. YA-554-RFP2-1054, 1983). The petroleum potential of wilderness lands in Nevada was evaluated by Sandberg (1983).

Methods of investigation

Prior to the Bureau's field investigation, a detailed literature search was made for geologic and mining information pertinent to the WSA. Mineral lease, prospecting permit, and mining claim information was obtained from the BLM in Nevada. Elko County records were checked for recent mining claim location notices.

The Bureau's field investigation was conducted by three Bureau employees in May, 1984 (16 employee-days). In addition to a general reconnaissance of the area, facilitated by a two hour helicopter overflight, the field study focused on examining prospects, mineral occurrences, and mineralized areas inside and within 1 mi of the WSA. Accessible prospects were mapped by the compass-and-tape method and sampled. Chip samples were taken across veins and other potentially mineralized structures. Prospect dump samples were taken on a grid over the dump from about 0.5 ft below the dump surface. Select samples consisted of specific dump material. Selected beds of limestone and phosphatic rock were sampled to determine their composition.

Fifty-seven rock samples were analyzed by the Bureau's Reno Research Center, Reno, NV (tables 1, 2, and 3). Thirteen of the samples were carbonate rock and were analyzed by inductively-coupled plasma spectrometry for aluminum oxide, calcium oxide, iron oxide, magnesium oxide, silica, and sulfate. Loss on ignition was determined by chemical analysis. The remaining 44 samples were fire assayed for gold and silver, and analyzed spectrographically for 40 elements. (See Appendix A for list of elements and detection limits and Appendix B for spectrographic results). Additional analyses for antimony, arsenic, and thallium were by atomic absorption spectrophotometry; phosphorus and vandium by X-ray flourescence; and uranium by fluorometry methods when minerals containing those elements were identified or suspected.

Geologic setting

The South Pequop WSA covers part of the South Pequop Mountains, an uplifted fault-block of predominantly sedimentary rocks that form a complex northeast-trending synclinorium. Sedimentary rocks, primarily dolomite and limestone, commonly containing some chert, are the dominant rock types exposed in the mountains. Sedimentary rock units exposed in the WSA include the Mississippian Chainman Shale and Diamond Peak Formations; Mississippian and Pennsylvanian Ely Limestone; Pennsylvanian and Permian Riepe Spring Limestone; Permian Rib Hill Formation, Pequop Formation, Loray Formation, Kaibab

Limestone, Plympton Formation, Gerster Limestone; and the Triassic Thaynes Limestone. The Plympton Formation contains phosphatic beds. A small Tertiary or Mesozoic coarse-grained hornblende granodiorite intrusive has been mapped in the central part of the WSA. (See Fraser and others, 1983.)

Low-angle faults near the base of the phosphatic Plympton Formation, ". . . can be traced parallel to bedding or nearly so for several kilometers, but at intervals they cut down sections eliminating entire formations" (Fraser and others, 1983).

Mining Activity

The South Pequop WSA is not within an organized mining district. The nearest organized mining district, the Spruce Mountain District, is 3 to 10 mi to the southeast. Between 1869 and 1949, copper, gold, lead, silver, and zinc minerals were mined from small bedded replacement-type deposits in limestone, and from fissure vein deposits. Prospecting in the mid 1950's resulted in the discovery of two vein-type(?) deposits of barite and a contact deposit of scheelite. (See Smith, 1976, p. 151-156.)

Evidence of mining activity within the study area consist of three small prospects (Pl. 1, sample nos. 7-8, 12, and 13) near the northern boundary. Six other prospects, one southeast of the boundary (sample nos. 51 and 52), and the rest northeast of the boundary (sample nos. 1, 5, 6, and 9-11) are within one mi of the WSA (Pl. 1).

Six phosphate prospecting permits covering part of the southern end of the WSA were in effect between January 1965 and August 1972 (Pl. 1). According to Smith (1976, p. 130), the phosphate exploration that took place in 15 sites in the South Pequop Mountains included nine trenches and several drill holes. One trench was found in the WSA (Pl. 1, sample nos. 28-47). Two additional trenches are within 1 mi of the southern boundary (Pl. 1, sample nos. 48, 49, and 54-57). No phosphate production has been reported from the South Pequop area.

As of September 15, 1984, there were no patented or unpatented mining claims within the WSA. BLM records show that the nearest mining claim is about 2 mi south of the WSA (Pl. 1). It is not known what this claim was originally staked for.

COMMODITIES

Phosphate, carbonate rocks, and sand and gravel are the principal commodities found in the WSA. At the northern end, an area of some anomalously high concentrations of several elements may indicate buried precious and base metal mineralization. Oil and gas are possibly present at depth. Under present (1985) economic criteria, no minable mineral resources were identified in the WSA. (See USGS Circular 831, 1980.)

Phosphate

Phosphate occurs on the surface and subsurface in the Plympton Formation (fig. 2), which crops out in, or underlies, about 10 sq mi of the WSA (Fraser and others, 1983). Phosphatic beds are less resistant to weathering, have a subdued topography, and are generally soil covered. Some of the phosphatic beds in the Plympton Formation are exposed over a width of 164.5 ft in the one trench within the WSA (fig. 3), and the two trenches less than 1 mi south of the WSA. Thirty-two samples were collected and analyzed for phosphate (table 1); twenty samples were from the trench inside the WSA (Pl. 1, sample nos. 28-47).

Chemical analysis and descriptions of samples collected for phosphate analysis are given in Table 1 and on Fig. 3. The P_2O_5 content of the

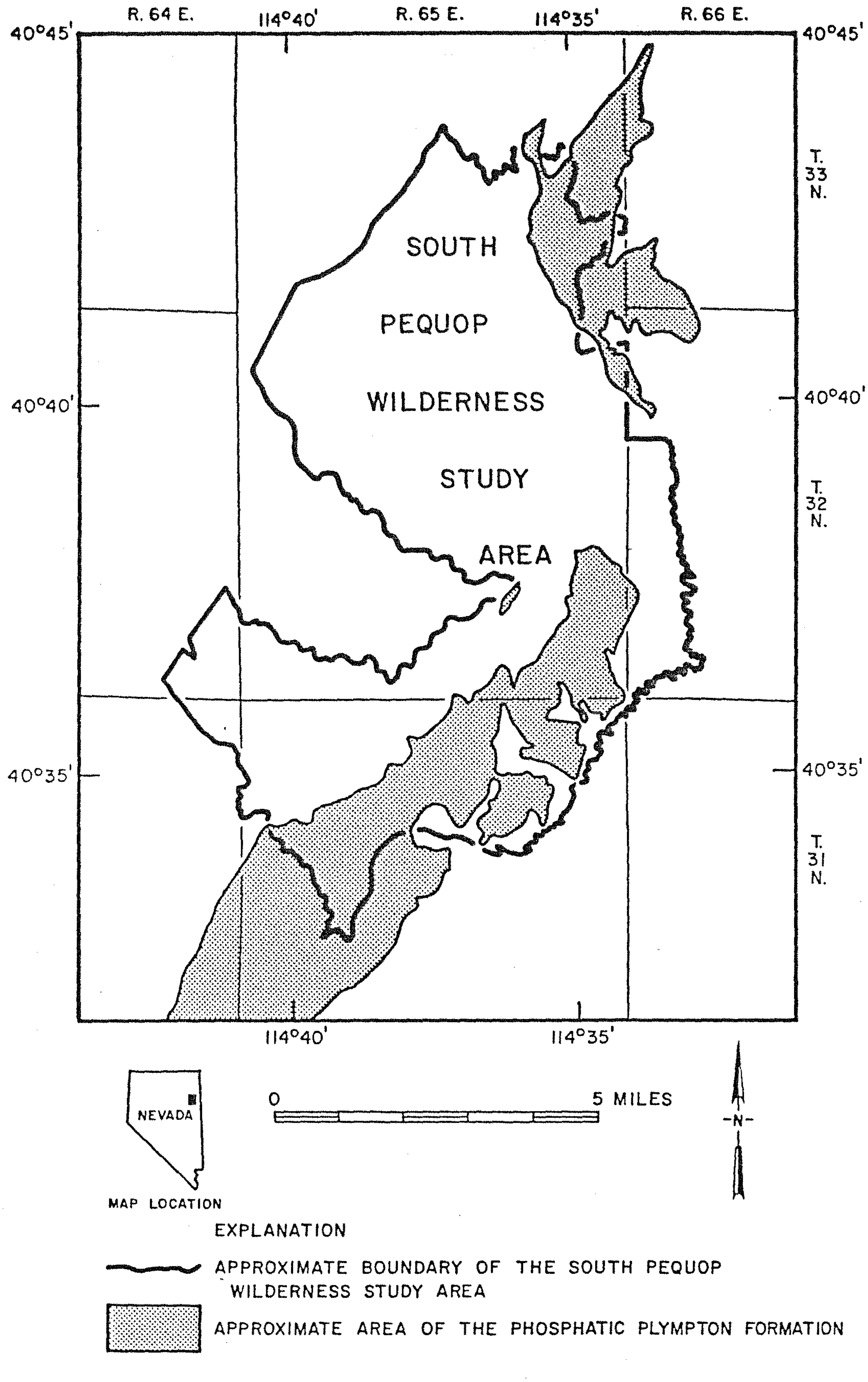

Figure 2. Map of South Pequop Wilderness Study Area showing the approximate surface and subsurface distribution of the phosphatic Plympton Formation(modified after Fraser and others, 1983).

Figure 3. Phosphate prospect trench in the WSA (plastic sample bags indicate approximate locations of sampled beds; sample no. 47 in foreground, intraformational thrust zone is in background; see table 1 for analytical results and fig. 4 for sample description.

Table 1.--Analytical data for samples 2-4, 25-49, and 54-57, collected for phosphate analysis, from in and near the South Pequop Wilderness Study Area, Elko County, Nevada.

[Concentrations were determined by fire assay for Au and Ag, by x-ray flourescence for P_2O_5 and V_2O_5, and by fluorometry for U; ND, not detected; Tr, trace; ---, not applicable.]

Sample			Analytical data					Remarks
No.	type	thickness of bed (feet)	Au (oz/ton)	Ag (oz/ton)	P_2O_5 (percent)	V_2O_5 (ppm)	U (ppm)	
					Roadcut north of WSA			
2	Chip	6	ND	0.1	0.14	ND	2.2	Siltstone; gray, cherty.
3	do.	19	ND	ND	.57	60	4.2	Siltstone; gray to black, cherty.
4	do.	2	Tr	ND	.09	61	4.4	Chert; black.
					Outcrop inside WSA			
25	Grab (select)	---	ND	ND	18.58	86	13	Siltstone; dark gray, phosphatic.
26	do	---	ND	ND	2.63	ND	3.2	Chert; black.
27	Grab	---	ND	.2	11.00	190	8.8	Soil over phosphatic zone.
					Trench inside WSA (fig. 3)			
28	Chip	6.8	ND	.1	0.64	70	4.6	
29	do.	5.4	ND	.2	2.70	180	5.3	
30	do.	2.7	ND	.1	27.49	99	20	
31	do.	4.5	ND	.1	7.33	180	9.2	
32	do.	5.4	ND	.1	10.77	120	7.1	
33	do.	6.8	ND	.1	6.76	220	5.8	
34	do.	16.3	ND	ND	6.67	110	4.7	
35	do.	13.6	ND	ND	9.85	210	7.2	
36	do.	3.5	ND	.1	2.45	95	2.9	
37	do.	3.2	Tr	.1	6.87	160	7.2	
38	do.	2.1	Tr	ND	8.02	100	7.5	
39	do.	3.5	ND	ND	7.33	150	5.8	
40	do.	3.2	ND	.1	7.56	150	6.6	
41	do.	7.4	ND	ND	7.56	170	7.5	
42	do	3.9	ND	.2	2.29	83	3.1	
43	do.	25.1	ND	.2	6.46	180	11	
44	do.	7.7	ND	ND	.21	ND	1.0	
45	do.	4.5	ND	ND	1.90	94	3.1	
46	do.	21.5	ND	ND	2.27	ND	2.8	
47	do.	16.1	Tr	ND	.44	59	1.5	
					Trench southwest of WSA (fig. 3)			
48	Chip	5	ND	ND	3.89	170	6.1	
49	do.	3	Tr	ND	18.79	110	11	
					Trench south of WSA (fig. 3)			
54	Chip	.3	Tr	ND	24.74	82	24	
55	do.	11.5	ND	.1	7.56	160	8.2	
56	do.	2.3	ND	ND	4.93	66	6.0	
57	do.	1	ND	.1	29.78	120	23	

(A) Trench inside WSA

Sample No.	Thickness (feet)	Description
NS	---	Dolomite; gray.
28	6.8	Chert; tan to black, phosphatic.
29	5.4	Siltstone; brown, limey.
30	2.7	Siltstone; black, phosphatic.
31	4.5	Siltstone; buff.
32	5.4	Siltstone; gray, phosphatic.
33	6.8	Siltstone; buff.
34	16.3	Chert; brown to black.
35	13.6	Siltstone; tan to gray.
36	3.5	Chert; black, phosphatic.
37	3.2	Siltstone; tan.
38	2.1	Chert; black, phosphatic.
39	3.5	Siltstone; tan, limey.
40	3.2	Siltstone; gray, phosphatic.
41	7.4	Siltstone; buff to gray, phosphatic.
42	3.9	Chert; black, phosphatic.
43	25.1	Siltstone; tan.
44	7.7	Chert; tan to black.
45	4.5	Mixed gray chert and tan siltstone.
46	21.5	Chert; black to gray.
NS	1.3	Siltstone; gray.
47	16.1	Chert; black, phosphatic.
NS	---	Kaibab Limestone; gray coarsely crystalline.

(B) Trenches outside WSA

Trench southwest

Sample No.	Thickness (feet)	Description
NS	---	Slightly to nonphosphatic siltstones, shales, cherts, and covered units.
48	5	Siltstones; gray to tan, phosphatic.
49	3	Siltstone and shale; phosphatic.
NS	---	Slightly to nonphosphatic siltstones, shales, cherts, and covered units.

Trench south

Sample No.	Thickness (feet)	Description
NS	---	Limestone breccia; thrust fault.
NS	55	Slightly to nonphosphatic siltstones, shales, cherts, and covered units.
54	.3	Siltstone; black, phosphatic.
55	11.5	Siltstone; brown, black, and gray.
56	2.3	Chert; black, phosphatic.
57	1	Siltstone; black, phosphatic.
NS	---	Slightly to nonphosphatic siltstones, shales, cherts, and covered units.

Figure 4.--Measured sections in phosphate prospect trenches in the Plympton formation; (A) inside WSA, (B) outside WSA. [youngest units on top; see fig. 2 for photograph of trench inside area; sample results on Table 1; NS, not sampled; ---, not applicable]

phosphatic beds in the area ranges from 0.21 percent over a 7.7 ft interval (sample no. 44) to 27.49 percent over a 2.7 ft interval (sample no. 30). A one ft sample interval taken south of the WSA represented the highest amount of P_2O_5 sampled (29.78 percent, sample no. 57).

Phosphatic rocks characteristically have a large suite of associated elements. Some of the more important elements associated with western phosphorites are cadmium, chromium, copper, molybdenum, nickel, selenium, strontium, vanadium, uranium, zinc, and rare earths (Gulbrandsen 1967, p. 102). Small amounts of gold (up to a trace), silver (up to 0.2 oz/ton), uranium (1 to 20 ppm), and vanadium (less than 50 to 220 ppm) are present in the South Pequop phosphorites (Table 1, sample nos. 25-47).

Specified minimum physical and chemical criteria are required to identify a reserve base (current and marginally economic reserves), and a subeconomic resource for northwestern U.S. phosphate. These show the order of magnitude thay may apply to evaluate South Pequop deposits. The criteria described in USGS Circular 882 (1982, p. 7 and 9) are as follows:

> The minable unit of phosphate rock must be weathered or oxidized and must average greater than 18 percent P_2O_5; the rock must have a ratio of CaO to P_2O_5 of less than 1.55, and MgO content of less than 1.0 percent and a combined Fe_2O_3 and Al_2O_3 analysis of less than 3 percent; the thickness of the bed must be more than 5 feet; the stripping ratio of cubic yards of overburden per ton of phosphate rock must be less than 3.5; and the size of the deposit must be greater than 20 million tons of rock.
>
> Subeconomic resources include both strippable deposits and underground deposits. Strippable subeconomic resources must be made up of a phosphate bed greater than 3 feet thick, contain greater than 15 percent P_2O_5, and have a stripping ratio of cubic yards of overburden per ton of phosphate rock less than 9. Underground subeconomic resources must be made up of a phosphate bed greater than 3 feet thick, contain greater than 24 percent P_2O_5, and occur in beds not more than 1,000 feet below entry level.

Phosphatic beds outcropping and sampled in the WSA do not meet these tonnage and grade reserve base requirements as outlined by USGS Circular 882 (Appendix B and table 1).

Surface sampling along a band of Plympton Formation (Pl. 1, sample nos. 25-49) over 7 mi long (2 mi inside the WSA), indicates that the criteria required for a subeconomic phosphate resource in USGS Circular 882 (greater than 3 ft thick and 15 percent P_2O_5) are nearly met in some beds. Sample no. 30 (table 1) exceeds the required 15 percent P_2O_5 content but is less than 3 ft thick. If two beds (samples no. 30 and 32) could be selectively mined, so as to eliminate an intervening bed (sample interval 31) (table 1), a subeconomic phosphate resource of 250,000 short tons containing 16.4 percent P_2O_5 can be calculated in the WSA along the 2-mi-long, 8.1-ft-thick band, mined down dip for 34.4 ft (3 to 1 stripping ratio at a 45 degree dip measured in the area). Similar bands of Plympton Formation throughout the WSA shown of figure 2 would increase the estimated tonnage of phosphatic rock by at least 1,250,000 tons. Larger tonnages of lower grade material are present. Sample results from other locations (Pl. 1, sample nos. 48, 49, and 54-57) indicates that grade and thickness of the phosphatic layers changes rapidly. Fraser and others (1983) indicated that low-angle faulting is common in the Plympton Formation and could have eliminated some of the phosphatic beds elsewhere in the area. Detailed surface and subsurface sampling would be needed to establish continuity, grade, and effects of weathering that relate to minability.

Demand will determine if South Pequop phosphate will ever become economic. Large quantities of phosphate rock occur throughout the world and are extensively mined in Florida, Idaho, Montana, North Carolina, Tennessee, and Utah. It is estimated that in 1985, domestic mine production of phosphate rock will be 54 million tons and U.S. consumption will be 41 million tons. From a 1983 base, demand for phosphate rock is expected to increase at an annual rate of about 1.8 percent through 1990. The United States exports about 66 percent of its production either as rock or upgraded phosphate fertilizers. The U.S. exports phosphate to Canada, Europe, Japan, and South America. The main use of phosphate rock is for the production of fertilizers. There are no subsitutes for phosphorous in agriculture. The major byproducts were fluosilicic acid, vanadium, and uranium. Lower grade deposits may become more appealing when high grade deposits are exhausted, and as advances in mining and processing technology permit utilization of lower grade ores. (See Mineral Commodity Summaries, 1985, P. 114-115.)

Past exploration indicates that there has been interest in South Pequop phosphate. The grade of this phosphate, where sampled, is lower than that mined elsewhere in North America. One significant factor in developing the phosphate would be the existing railroad transportation, within 3 mi of the WSA.

Carbonate rocks

Limestone (calcium carbonate) and dolomite (calcium/magnesium carbonate) are the most abundant rocks in the WSA. Chemical analysis and descriptions of sampled carbonate rocks are given in Table 2 and Fig 5. In general, calcium carbonate and magnesium carbonate content is low (90.86 percent and 25.53 percent respectively are the highest grades sampled). Most of the WSA carbonate rocks are suitable for road metal after crushing, and some of the limestone beds (greater than 85 percent $CaCO_3$) are suitable for agricultural uses. Except for very high purity limestone or dolomite, carbonate rocks are common and are readily available closer to industry centers.

Table 2.--Analytical data for carbonate rocks, from in and near the South Pequop Wilderness Study Area, Elko County, Nevada.

[Concentrations of SO_3^{-2} and LOI were determined by chemical analysis and Al_2O_3, $CaCO_3$, Fe_2O_3, $MgCO_3$, and SiO_2 were determined by ICP analysis.]

Sample			Analytical data (percent)							Remarks
No.	Type	Thickness of bed (feet)	SO_3^{-2}	LOI	Al_2O_3	$CaCO_3$	Fe_2O_3	$MgCO_3$	SiO_2	
Measured Section of Pequop Formation (see fig. 4)										
15	Chip	7	0.24	35.00	1.3	67.8	0.28	6.9	17.8	
16	do.	12.5	.82	38.44	.63	85.1	.15	2.7	10.7	
17	do.	7	.29	41.08	.25	86.6	.078	3.6	4.4	
18	do.	16	.36	39.33	.55	83.4	.13	2.9	7.8	
19	do.	8.5	.47	40.28	.43	87.1	.10	1.7	5.6	
20	do.	5	.41	39.96	.38	85.1	.15	.7	8.1	
21	do.	10	.24	38.38	.70	79.3	.20	4.0	10.4	
22	do.	15	.41	39.56	.45	85.3	.11	2.3	7.2	
23	do.	6	.24	28.29	3.1	33.6	.56	24.5	33.4	
24	do.	21	.43	35.53	1.3	50.3	.32	25.5	19.3	
Other carbonate rock analysis										
14	Chip	35	.70	41.24	.23	90.3	.12	2.7	3.3	Ely Limestone; gray to buff calcilutite.
50	do.	25	.35	40.45	.37	87.8	.17	.6	4.9	Thaynes Limestone; biomicrite, sparite upper 8 ft.
53	do.	15	.37	41.75	.48	90.9	.25	.9	2.4	Thaynes Limestone; gray.

Sample No.	Thickness (feet)	Description and remarks
15	7	Limestone; gray, sandy lenses; top of hill.
NS	7	Covered.
NS	12	Limestone; gray, abundant chert beds and nodules.
16	12.5	Limestone; gray, sandy lenses.
NS	19	Covered.
NS	4	Limestone; gray, abundant chert nodules.
NS	3.5	Covered.
17	7	Limestone; gray, rare chert nodules and sandy lenses.
NS	42	Covered.
NS	13	Limestone; gray, chert nodules and sandy lenses.
NS	9	Covered.
NS	9	Siltstone; rusty.
18	16	Limestone; gray, fossil coral.
NS	6	Covered.
NS	3	Dolomite; tan.
NS	3	Covered.
19	8.5	Limestone; gray.
NS	15	Covered.
20	5	Limestone; gray.
NS	2.5	Covered.
NS	2.5	Siltstone; rusty-brown.
NS	5	Covered.
21	10	Limestone; gray, upper 3 ft fossiliferous and interbedded dolomite.
NS	21	Covered.
22	15	Limestone; gray, rare chert nodules.
NS	6	Siltstone.
NS	1.5	Dolomite.
NS	18.5	Covered.
NS	2	Sandstone; limey.
23	6	Dolomite; gray.
24	21	Dolomite; gray, calcite filled vugs.
NS	---	Covered; base of hill.

Figure 5.--Measured section within the Pequop Formation. [sample results on Table 2; NS, not sampled; ---, not applicable]

Sand and gravel

Sand and gravel occur along the flanks and along the drainages of the Pequop Mountains. The most common uses of sand and gravel are aggregate in concrete, road metal, or fill. Transportation costs limit the marketing range. Only local uses such as road metal or fill would be feasible for these commodities.

Precious and base metals

Seven small prospects are in or adjacent to the northwest boundary of the WSA. One prospect is 1/4 mi outside the northeastern boundary, and another is 1.4 mi outside the southeastern boundary (Pl. 1). All of the prospects are on identified or suspected faults or fractures. Iron oxide is associated with each prospect, and calcite, manganese, and silica were seen in some of the prospects. All of the structures associated with the prospects are in, or trend toward, the WSA; however, according to the geologic map by Fraser and others (1983), faults associated with the prospects near the northeastern and southeastern boundaries probably do not extend into the WSA.

Buried or concealed epithermal precious- and base-metal veins and replacement deposits might be detected by recognition of leakage of pathfinder elements (relatively mobile elements occurring in close association with the elements being sought) into fractures. Base metals that might occur in the WSA include lead and zinc. Precious metals could include gold and silver. Some of the pathfinder elements for lead are: silver, arsenic, barium, cadmium, copper, antimony, and zinc. Pathfinder elements for zinc include: fluorine, mercury, manganese, lead and zinc. Pathfinder elements for gold and silver include: silver, arsenic, bismuth, and antimony. (See Levinson, 1980, p. 53, and Appendix E).

Table 3.--Analytical data and description of samples collected for precious and base metal analysis, from in and near the South Pequop Wilderness Study Area, Elko County, Nevada.

[Gold and silver were analyzed by fire assay/AA but not detected in any sample. Thallium was analyzed by AA in samples 5, 51, and 52, but not detected. Analytical results for As and Sb were determined by AA; xxx, not assayed for; ---, not applicable; >, greater than; select, specific rock chips taken from the dump to determine presence of certain elements.]

Sample			Analytical data		Description	Spectrographic data			
No.	type	length (feet)	As (ppm)	Sb (ppm)		As (percent)	Ba (percent)	Zn (percent)	Mn (percent)
1	Chip	3	xxx	xxx	Limestone; fault, strike N. 63°E., dip 88° NW.; limonite, 2 in. silicified zone, chert, and calcite.	ND	0.6	0.002	0.01
5	do.	4	350	3	Limestone breccia; limonite, clay, manganese staining, and calcite.	0.04	3	.06	>3
6	Grab	---	xxx	xxx	Limestone; limonite.	.03	.5	.04	.02
7	do.	---	xxx	xxx	Limestone breccia; limonite, and calcite cement.	ND	.4	.003	.03
8	Grab (select)	---	xxx	xxx	Partly silicified limonite.	.05	.2	.03	.03
9	Grab	---	xxx	xxx	Limestone; limonite.	ND	.05	.004	.02
10	Chip	1.5	xxx	xxx	Limestone breccia; fault, strike N. 15°E., dip vertical; limonite.	ND	>8	.004	.03
11	do.	2	xxx	xxx	Limestone breccia; fault, strike N. 15°E., dip vertical; limonite, and 3 to 4 in. calcite lens.	ND	1	ND	.06
12	Grab	---	xxx	xxx	Limestone breccia; limonite, and calcite cement.	ND	.2	.01	>5
13	do.	---	xxx	xxx	Limestone breccia; limonite, and calcite.	ND	.3	.005	.4
51	Chip	2	240	ND	Limestone breccia; fault, strike N. 40° E., dip 50° SE.; clay, and upper 6 in. limonite.	ND	.02	.04	.1
52	do.	2.5	360	23.6	Limestone; fault, strike N. 40°E., dip 50° SE.; jasperoid.	.05	.06	.06	.09

Chemical analyses and descriptions are given in Table 3. Concentrations above background for average limestone (Levinson, 1980, Appendix E) were detected for arsenic, barium, manganese, antimony, and zinc. In the prospects sampled in and adjacent to the northwest border of the WSA, values were as high as 0.05 percent arsenic, 8.0 percent barium, 5.0 percent manganese, 3.0 ppm antimony, and 0.06 percent zinc. These anomalous values suggest the possibility of a nearby deposit of gold, silver, lead, and zinc.

Anomalous values obtained for As, Ba, Sb, and Zn in the prospect southeast of the WSA suggest the possible presence of precious- and base-metal deposits, but the fault was not mapped into the WSA (Fraser and others, 1983).

More detailed surface and subsurface sampling is required to substantiate the existence of any of these metals in significant deposits.

Oil and gas

The South Pequop WSA has a low potential for petroleum because of the proximity to potential Cretaceous and Tertiary reservoir rocks and the possibility of some Paleozoic source beds being at optimum maturity (Sandberg, 1983). Oil and gas leases cover all of the available federally administered land in the valleys on both sides of the WSA (Pl. 1). As of May 1984, about 20 sq mi in the WSA had been leased. There has been recent (May 1985) seismic surveys in the study area but no drillings.

CONCLUSION

Large parts of the study area are underlain by phosphatic rocks. A subeconomic phosphate resource of 250,000 short tons of 16.4 percent P_2O_5 is present in the Plympton Formation in the southwestern part of the WSA. Larger tonnages of lower grade material are present. Geologic mapping by Fraser and others (1983), indicates that similar sequences in the Plympton Formation in the WSA could increase the estimated tonnage of phosphatic deposits by at least 1-1/4 million tons. Grade and thickness of WSA phosphate beds are variable, and its subsurface character and extent are not known. Extensive surface and subsurface sampling are required to further evaluate the extent and character of this resource.

In the northwestern corner of the WSA, anomalous values of arsenic, barium, manganese, antimony, and zinc were detected. These elements are commonly associated with precious- and base-metal epithermal vein and replacement deposits.

Industrial mineral commodities present in the WSA include limestone, dolomite, and sand and gravel, all of which can be used as road-metal or fill. Some of the limestone beds sampled are also suitable for agricultural uses. Small amounts of these materials may be used locally but there are no markets nearby.

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APPENDIX A.--Semiquantitative optical emission spectrographic analysis detection limits. U.S. Bureau of Mines, Reno Research Center.

Element	Detection limit (percent)	Element	Detection limit (percent)
Ag	.002	Mo	.0001
Al	.001	Na	.3
As	.01	Nb	.007
Au	.002	Ni	.0005
B	.003	P	.7
Ba	.002	Pb	.001
Be	.0001	Pt	.0001
Bi	.01	Re	.0006
Ca	.05	Sb	.06
Cd	.0005	Sc	.0004
Co	.001	Si	.0006
Cr	.0003	Sn	.001
Cu	.0006	Sr	.0001
Fe	.0006	Ta	.02
Ga	.0002	Te	.04
K	2.0	Ti	.03
La	.01	V	.005
Li	.002	Zn	.0001
Mg	.0001	Zr	.003
Mn	.001	Y	.0009

Revised October, 1984.
These numbers are to be used only as a guide.

APPENDIX B--Semiquantitative Optical Emission Spectrographic Analysis Report as received from Reno Research Center.

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SAMPLE NUMBERS

ELEMENTS	1	2	3	4	6	5	7	8
	CONCENTRATION, PERCENT							
AG	<.0006	<.0005	<.0005	<.0005	<.002	<.0005	<.0005	<.002
AL	.3	.4	.5	.09	.3	.5	.09	.08
AS	<.009	<.009	<.009	<.009	.03	.04	<.009	.05
AU	<.002	<.002	<.002	<.002	<.002	<.002	<.002	<.002
B	<.006	<.003	<.004	<.003	<.004	<.005	<.003	<.007
BA	.6	<.002	<.002	<.002	.5	3.	.4	.02
BE	<.0001	<.0001	<.0001	<.0001	.0004	.002	<.0001	.003
BI	<.01	<.01	<.01	<.01	<.01	<.01	<.01	<.01
CA	10.	10.	10.	>10.	10.	10.	>10.	.6
CD	<.0005	<.0005	<.0005	<.0005	<.0005	<.0005	<.0005	<.002
CO	<.001	<.001	<.001	<.001	<.001	<.001	<.001	<.001
CR	<.0003	<.0003	<.0003	<.0003	<.0003	<.0004	<.0003	<.0003
CU	<.0006	<.0006	<.0006	<.0006	<.0006	<.0006	<.0006	<.0006
FE	.8	.3	.4	.04	4.	6.	.4	6.
GA	<.0002	<.0002	<.0002	<.0002	<.0002	<.0002	<.0002	<.0004
K	<.6	<.6	<.6	<.6	<.6	<.6	<.6	<.6
LA	<.01	<.01	<.01	<.01	<.01	<.01	<.01	<.01
LI	<.002	<.002	<.002	<.002	<.002	<.002	<.002	<.003
MG	2.	3.	3.	>10.	1.	.9	.7	.06
MN	.01	.02	.01	.003	.02	>3.	.03	.03
MO	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001
NA	<.3	<.3	<.3	<.3	<.3	<.3	<.3	<.3
NB	<.007	<.007	<.01	<.01	<.007	<.007	<.007	<.007
NI	<.0006	<.0004	<.0003	<.0005	.004	.007	.0008	.002
P	<.7	<.7	<.7	<.7	<.7	<.7	<.7	<.7
PB	<.002	<.002	<.002	<.002	<.002	<.002	<.002	<.002
PD	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001
PT	<.0006	<.0006	<.0006	<.0006	<.0006	<.0006	<.0006	<.0006
SB	<.06	<.06	<.06	<.06	<.06	<.1	<.06	<.06
SC	<.0004	<.0004	<.0004	<.0004	<.0004	<.0004	<.0004	<.0004
SI	>10.	>10.	>10.	3.	>10.	>10.	>10.	>10.
SN	<.0006	<.0006	<.0006	<.0006	<.001	<.002	<.0006	<.006
SR	.002	.0006	.0005	<.0001	.01	.01	.002	.0003
TA	<.02	<.02	<.02	<.02	<.02	<.02	<.02	<.02
TE	<.04	<.04	<.04	<.04	<.04	<.04	<.04	<.04
TI	<.03	<.03	<.03	<.03	<.03	<.03	<.03	<.03
V	<.005	<.005	<.005	<.005	.01	<.007	<.005	.01
Y	<.0009	<.0009	<.0009	<.0009	<.0009	<.0009	<.0009	<.0009
ZN	.002	<.0003	.002	<.0007	.04	.06	.003	.03
ZR	<.003	<.003	<.003	<.003	<.003	<.003	<.003	<.003

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ELEMENTS	9	10	11	12	13	25	26	27
	CONCENTRATION, PERCENT							
AG	<.001	<.001	<.002	<.003	<.001	<.0009	<.0005	<.0005
AL	.5	.6	.6	.2	.4	.5	.5	>3.
AS	<.009	<.02	<.01	<.02	<.02	<.009	<.009	<.009
AU	<.002	<.002	<.002	<.002	<.002	<.002	<.002	<.002
B	<.003	<.005	<.005	<.003	<.005	<.007	.01	.01
BA	.05	>8.	1.	2.	.3	.1	.04	.02
BE	<.0001	.0003	<.0001	.0004	.0005	<.0002	<.0003	<.0003
BI	<.01	<.01	<.01	<.01	<.01	<.01	<.01	<.01
CA	>10.	>10.	>10.	>10.	>10.	>10.	5.	10.
CD	<.0005	<.0005	<.0005	<.0005	<.0005	<.0005	<.0005	<.0005
CO	<.001	<.001	<.001	<.001	<.001	<.001	<.001	<.001
CR	<.0003	<.0005	<.0004	<.0003	<.0003	.02	.006	.02
CU	<.0006	<.0006	<.0006	<.0006	<.0006	<.0006	<.0006	<.0006
FE	2.	3.	2.	3.	2.	2.	1.	3.
GA	<.0002	<.0002	<.0002	<.0002	<.0002	<.0002	<.0002	<.0002
K	<.6	<.6	<.6	<.6	<.6	<.6	<.6	3.
LA	<.01	<.01	<.01	<.01	<.01	<.01	<.01	<.01
LI	<.002	<.002	<.002	<.002	<.002	<.002	<.002	<.002
MG	1.	.6	.8	.5	.3	.2	.6	.7
MN	.02	.03	.06	>5.	.4	.003	.009	.05
MO	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001
NA	<.3	<.3	<.3	<.3	<.3	<.3	<.3	<.3
NB	<.007	<.007	<.007	<.007	<.007	<.007	<.007	<.007
NI	.001	.001	.002	<.0005	.002	.0008	<.0003	.0009
P	<.7	<.7	<.7	<.7	<.7	10.	2.	5.
PB	<.002	<.002	<.002	<.002	<.002	<.002	<.002	<.002
PD	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001
PT	<.0006	<.0006	<.0006	<.0006	<.0006	<.0006	<.0006	<.0006
SB	<.06	<.06	<.06	<.06	<.06	<.06	<.06	<.06
SC	<.0004	<.0004	<.0004	<.0004	<.0004	<.0004	<.0004	<.0004
SI	>10.	>10.	>10.	5.	>10.	>10.	>10.	>10.
SN	<.0006	<.0007	<.001	<.001	<.001	<.0006	<.0006	<.0006
SR	.008	.01	.01	.005	.001	.04	.003	.01
TA	<.02	<.02	<.02	<.02	<.02	<.02	<.02	<.02
TE	<.04	<.04	<.04	<.04	<.04	<.04	<.04	<.04
TI	<.03	<.03	<.03	<.03	<.03	<.03	<.03	<.03
V	<.005	<.005	<.005	<.007	<.005	<.005	<.005	<.005
Y	<.0009	<.0009	<.0009	<.0009	<.0009	<.0009	<.0009	<.0009
ZN	.004	.004	<.0007	.01	.005	.04	.02	.04
ZR	<.003	<.003	<.003	<.003	<.003	<.003	<.003	<.003

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CONCENTRATION, PERCENT

ELEMENTS	28	29	30	31	32	33	34	35
AG	<.0005	<.0006	<.001	<.0005	<.0005	<.0005	<.0005	<.0008
AL	.4	>3.	.8	>2.	1.	>2.	.6	>2.
AS	<.009	<.009	<.009	<.009	<.02	<.009	<.009	<.009
AU	<.002	<.002	<.002	<.002	<.002	<.002	<.002	<.002
B	.01	<.003	<.007	.01	.01	.02	.01	.02
BA	.01	.009	.007	.005	.003	.01	.07	.007
BE	.0003	<.0002	<.0001	<.0002	<.0001	.0003	<.0001	<.0002
BI	<.01	<.01	<.1	<.01	<.01	<.01	<.01	<.01
CA	6.	7.	>10.	10.	9.	8.	10.	10.
CD	<.0005	<.0005	<.0005	<.0005	<.0005	<.0005	<.0005	<.0005
CO	<.001	<.001	<.001	<.001	<.001	<.001	<.001	<.001
CR	.002	.01	.05	.02	.02	.03	.01	.04
CU	<.0006	<.0006	<.0006	<.0006	<.0006	<.0006	<.0006	<.0006
FE	1.	2.	2.	2.	1.	2.	1.	2.
GA	<.0002	<.0002	<.0002	<.0002	<.0002	<.0002	<.0002	<.0002
K	<.6	4.	<.6	<.6	<.6	<.6	<.6	<.6
LA	<.01	<.01	<.01	<.01	<.01	<.01	<.01	<.01
LI	<.002	<.002	<.002	<.002	<.002	<.002	<.002	<.002
MG	.9	1.	.4	.9	.9	.5	.6	.7
MN	.007	.008	<.003	.01	.006	.008	.009	.01
MO	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001
NA	<.3	<.3	<.4	<.3	<.3	<.3	<.3	<.3
NB	<.007	<.007	<.007	<.007	<.007	<.007	<.007	<.007
NI	<.0004	.001	.001	.001	.0007	.001	<.0004	.001
P	<.7	<1.	10.	4.	3.	2.	3.	4.
PB	<.002	<.002	<.002	<.002	<.002	<.002	<.002	<.002
PD	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001
PT	<.0006	<.0006	<.0006	<.0006	<.0006	<.0006	<.0006	<.0006
SB	<.06	<.06	<.06	<.06	<.06	<.06	<.06	<.06
SC	<.0004	<.0004	<.0004	<.0004	<.0004	<.0004	<.0004	<.0004
SI	>10.	>10.	>10.	>10.	>10.	>10.	>10.	>10.
SN	<.0006	<.0006	<.0006	<.0006	<.0006	<.0006	<.0006	<.0006
SR	.001	.001	.06	.008	.006	.004	.009	.01
TA	<.02	<.02	<.02	<.02	<.02	<.02	<.02	<.02
TE	<.04	<.04	<.04	<.04	<.04	<.04	<.04	<.04
TI	<.03	<.06	<.03	<.03	<.03	<.05	<.03	<.04
V	<.005	<.005	<.005	<.005	<.005	<.005	<.005	<.005
Y	<.0009	<.0009	<.001	<.0009	<.0009	<.0009	<.0009	<.0009
ZN	.003	.01	.02	.02	.02	.03	.01	.02
ZR	<.003	<.003	<.003	<.003	<.003	<.003	<.003	<.003

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ELEMENTS — CONCENTRATION, PERCENT

ELEMENTS	36	37	38	39	40	41	42	43
AG	<.0005	<.0005	<.0005	<.0008	<.0005	<.0005	<.002	<.0005
AL	.6	>2.	.5	1.	1.	>2.	.6	>2.
AS	<.009	<.009	<.009	<.009	<.009	<.009	<.009	<.009
AU	<.002	<.002	<.002	<.002	<.002	<.002	<.002	<.002
B	.01	.02	.01	.01	.01	.02	.01	.01
BA	.4	.03	.08	.003	.006	.004	.03	.003
BE	<.0003	<.0003	<.0001	<.0001	<.0001	<.0002	<.0003	<.0002
BI	<.01	<.01	<.01	<.01	<.02	<.01	<.01	<.01
CA	3.	10.	8.	10.	5.	7.	2.	6.
CD	<.0005	<.0005	<.0005	<.0005	<.0005	<.0005	<.0005	<.0005
CO	<.001	<.001	<.001	<.001	<.001	<.001	<.001	<.001
CR	.007	.03	.01	.03	.03	.03	.006	.03
CU	<.0006	<.0006	<.0006	<.0006	<.0006	<.0006	<.0006	<.0006
FE	1.	2.	1.	2.	2.	2.	2.	2.
GA	<.0002	<.0002	<.0002	<.0002	<.0002	<.0002	<.0002	<.0002
K	<.6	<.7	<.6	<.6	<.6	<.6	<.6	<.6
LA	<.01	<.01	<.01	<.01	<.01	<.01	<.01	<.01
LI	<.002	<.002	<.002	<.002	<.003	<.002	<.002	<.002
MG	.2	.7	.4	.5	.4	.4	.09	.4
MN	.008	.01	.005	.01	.01	.02	.005	.007
MO	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001
NA	<.3	<.3	<.3	<.3	<.3	<.3	<.3	<.3
NB	<.007	<.007	<.007	<.007	<.007	<.007	<.007	<.007
NI	<.0005	.001	<.0005	.001	.0008	.001	<.0007	.001
P	<1.	3.	3.	2.	2.	3.	<1.	3.
PB	<.002	<.002	<.002	<.002	<.002	<.002	<.002	<.002
PD	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001
PT	<.0006	<.0006	<.0006	<.0006	<.0006	<.0006	<.0006	<.0006
SB	<.06	<.06	<.06	<.06	<.06	<.06	<.06	<.06
SC	<.0004	<.0004	<.0004	<.0004	<.0004	<.0004	<.0004	<.0004
SI	>10.	>10.	>10.	>10.	>10.	>10.	>10.	>10.
SN	<.0006	<.0006	<.0006	<.0006	<.0006	<.0006	<.001	<.0006
SR	.003	.009	.008	.006	.007	.006	.002	.005
TA	<.02	<.02	<.02	<.02	<.02	<.02	<.02	<.02
TE	<.04	<.04	<.04	<.04	<.04	<.04	<.04	<.04
TI	<.03	<.03	<.03	<.03	<.03	<.03	<.03	<.03
V	<.005	<.005	<.005	<.005	<.005	<.005	<.006	<.005
Y	<.0009	<.0009	<.0009	<.0009	<.0009	<.0009	<.0009	<.0009
ZN	.01	.02	.007	.01	.03	.02	.02	.05
ZR	<.003	<.003	<.003	<.003	<.003	<.003	<.003	<.003

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CONCENTRATION, PERCENT

ELEMENTS	44	45	46	47	48	49	51	52
AG	<.0005	<.0005	<.0005	<.0005	<.005	<.0005	<.0005	<.0007
AL	.3	.8	.5	.4	>2.	.8	.8	.07
AS	<.009	<.009	<.05	<.04	<.03	<.01	<.009	.05
AU	<.002	<.002	<.002	<.002	<.002	<.002	<.002	<.002
B	.01	.02	.01	.01	.01	.009	<.007	<.008
BA	<.002	<.002	.002	.004	.004	.02	.02	.06
BE	.0003	<.0003	.0003	.0003	<.0001	<.0001	<.0001	.0007
BI	<.01	<.01	<.01	<.01	<.01	<.01	<.01	<.01
CA	4.	2.	3.	.5	7.	10.	10.	.3
CD	<.0005	<.0005	<.0005	<.0005	<.0005	<.0005	<.0005	<.0007
CO	<.001	<.001	<.001	<.001	<.001	<.001	<.001	<.002
CR	.002	.01	.004	.004	.02	.03	.005	.001
CU	<.0006	<.0006	<.0006	<.0006	<.0006	<.0006	<.0006	.004
FE	.7	2.	.8	.8	3.	2.	4.	8.
GA	<.0002	<.0002	<.0002	<.0002	<.0002	<.0002	<.0002	<.0002
K	<.6	<.6	<.6	<.6	2.	<.6	<.6	<.6
LA	<.01	<.01	<.01	<.01	<.01	<.01	<.01	<.01
LI	<.002	<.002	<.002	<.003	<.002	<.002	<.002	<.002
MG	.8	.2	.08	.02	1.	.7	.5	.07
MN	.007	.01	<.003	.006	.02	.005	.1	.09
MO	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001
NA	<.3	<.3	<.3	<.3	<.3	<.3	<.3	<.3
NB	<.007	<.007	<.007	<.007	<.007	<.007	<.007	<.007
NI	<.0003	.001	<.0007	.0008	.001	<.0006	.007	.01
P	<.7	<.9	<2.	<.7	<1.	5.	<.8	<.7
PB	<.002	<.002	<.002	<.002	<.002	<.002	<.002	<.003
PD	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001
PT	<.0006	<.0006	<.0006	<.0006	<.0006	<.0006	<.0006	<.0006
SB	<.06	<.06	<.06	<.06	<.06	<.06	<.06	<.06
SC	<.0004	<.0004	<.0004	<.0004	<.0004	<.0004	<.0004	<.0004
SI	>10.	>10.	>10.	>10.	>10.	>10.	>10.	>10.
SN	<.0006	<.0006	<.0006	<.001	<.0006	<.0006	<.0006	<.008
SR	.0003	.001	.002	.0004	.002	.02	.001	<.0001
TA	<.02	<.02	<.02	<.02	<.02	<.02	<.02	<.02
TE	<.04	<.04	<.06	<.07	<.04	<.04	<.04	<.04
TI	<.03	<.03	<.03	<.03	<.03	<.03	<.03	<.03
V	<.005	<.005	<.005	<.005	<.005	<.005	<.005	.03
Y	<.0009	<.0009	<.0009	<.0009	<.0009	<.0009	<.0009	<.0009
ZN	.005	.01	.009	.004	.02	.02	.04	.06
ZR	<.003	<.003	<.003	<.003	<.003	<.003	<.003	.004

RENO RESEARCH CENTER
SPECTROGRAPHIC LABORATORY REPORT

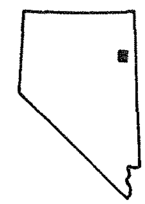
SAMPLE NUMBERS

ELEMENTS	54	55	56	57
	CONCENTRATION, PERCENT			
AG	<.0005	<.0005	<.005	<.0005
AL	.7	1.	.7	.6
AS	<.01	<.02	<.009	<.009
AU	<.002	<.002	<.002	<.002
B	<.006	.01	.01	<.008
BA	.008	.004	.04	.03
BE	<.0001	<.0001	<.0001	<.0001
BI	<.01	<.01	<.01	<.01
CA	>10.	9.	7.	>10.
CD	<.0005	<.0005	<.0005	<.0005
CO	<.001	<.001	<.001	<.001
CR	.02	.02	.008	.03
CU	<.0006	<.0006	<.0006	<.0006
FE	1.	2.	2.	2.
GA	<.0002	<.0002	<.0002	<.0002
K	<.6	<1.	<.6	<.6
LA	<.01	<.01	<.01	<.01
LI	<.002	<.002	<.002	<.002
MG	.8	1.	.7	.3
MN	.003	.009	.01	<.003
MO	<.0001	<.0001	<.0001	<.0001
NA	<.3	<.3	<.3	<.3
NB	<.007	<.007	<.007	<.007
NI	.0009	.0008	<.0006	.001
P	8.	3.	<2.	9.
PB	<.002	<.002	<.002	<.002
PD	<.0001	<.0001	<.0001	<.0001
PT	<.0006	<.0006	<.0006	<.0006
SB	<.06	<.06	<.06	<.06
SC	<.0004	<.0004	<.0004	<.0004
SI	>10.	>10.	>10.	>10.
SN	<.0006	<.0006	<.0006	<.0006
SR	.03	.004	.003	.05
TA	<.02	<.02	<.02	<.02
TE	<.04	<.04	<.04	<.04
TI	<.03	<.03	<.03	<.03
V	<.005	<.005	<.005	<.005
Y	<.0009	<.0009	<.0009	<.0009
ZN	.03	.01	.009	.02
ZR	<.003	<.003	<.003	<.003

Area Name, Number, Classification, Size
South Pequop
NV-010-035
Wilderness Study Area
34,544 acres

State
Nevada

BLM Resource Area
Elko



Mineral/Commodity Significance
A phosphatic rock resource of 250,000 tons at a grade of 16.4 percent P_2O_5 near-surface is subeconomic and higher grade deposits meet current U.S. demand. Significantly larger tonnages of low grade material are present. Limestone and sand and gravel are available closer to market areas. A gold-silver-lead-zinc resource may exist along the northern WSA boundary. There is little likelihood for the discovery of oil and gas.

Recorded Production

None

Mining Districts, Mines, and Claims

Three small prospect pits within the northwestern corner of the WSA. One 150 ft trench on phosphate within the southwestern corner of the WSA. Oil and gas leases are in the valleys along the eastern and western borders. No current mining claims on record with the BLM in the WSA.

Recent Company Activity

None

Mineral Setting

The WSA is underlain by Mississippian to Triassic sediments. Sedimentary phosphate occurs within one of the formations within the WSA. Phosphatic horizon underlies about 6,000 acres of the 34,544 acre study area.

Recommendations

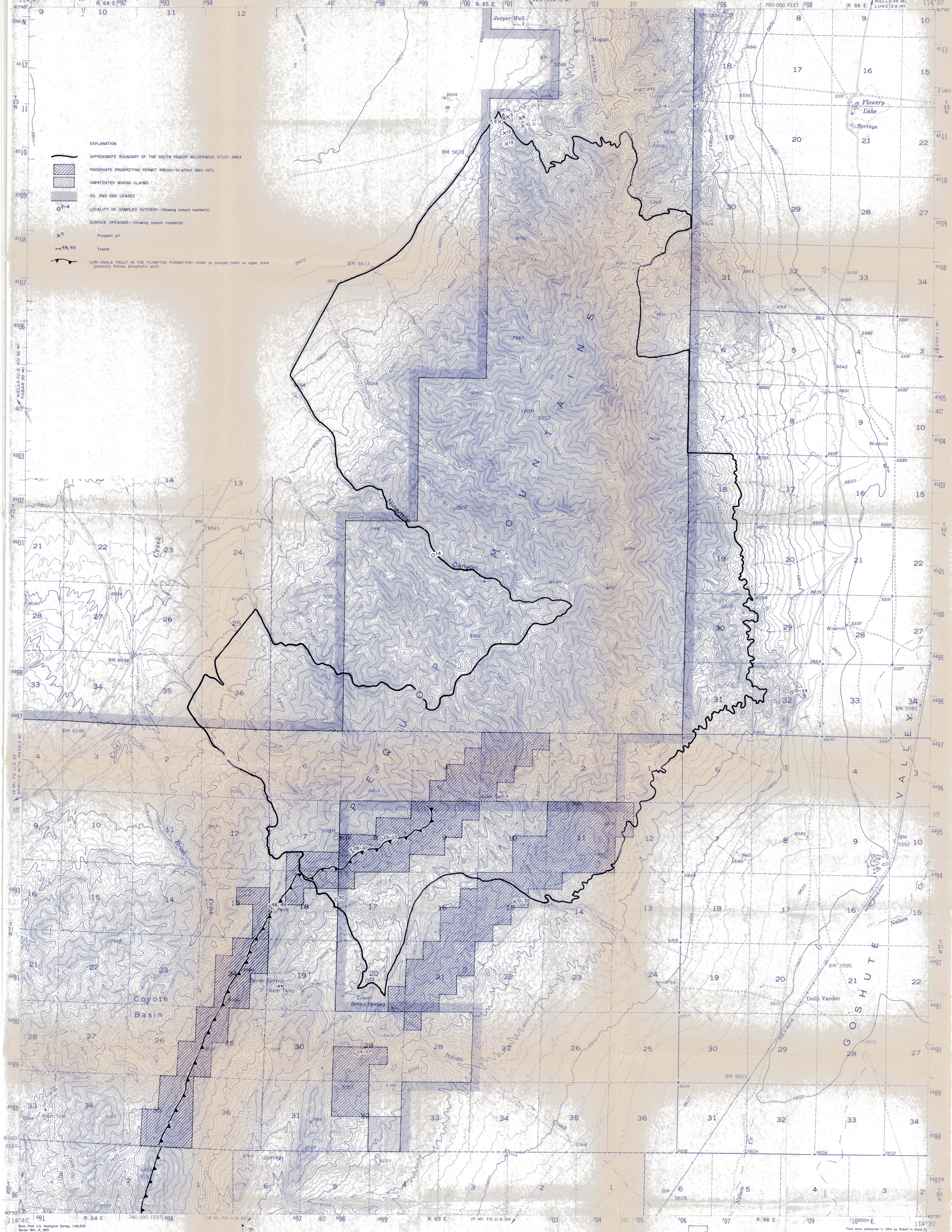
Extensive surface and subsurface sampling are required to further evaluate the exact character of the phosphatic beds in the Plympton Formation and the possible presence of precious-and-base-metal deposits along the northern WSA boundary.

References

Great Basin G-E-M Joint Venture, 1983, South Pequop G-E-M technical report: Prepared for the Bureau of Land Management under Contract No. YA-554-RFP2-1054, 26 p.

Fraser, G. D., Ketner, K. B., and Smith, M. C., 1983, Preliminary geologic map of the Spruce Mountain 4 Quadrangle, Elko County, Nevada: U.S. Geological Survey Open-file Report 83-301, scale 1:24,000.

Erickson, A. P., and others, 1966, Geochemical reconnaissance in the Pequop Mountains and Wood Hills, Elko County, Nevada: U.S. Geological Survey Bulletin 1198-E, p. E1-E20.



Base from U.S. Geological Survey, 1:62,500
Spruce Mtn. 4, 1953

SCALE 1:24,000
CONTOUR INTERVAL 40 FEET

Field work completed in 1984 by Robert H. Wood II, assisted by Clarence E. Ellis and S. Don Brown.
Geology adapted from Fraser and others, 1983.
Oil and gas lease and prospecting permit information from the Bureau of Land Management as of 1984.

SAMPLE LOCALITY MAP OF THE SOUTH PEQUOP WILDERNESS STUDY AREA, ELKO COUNTY, NEVADA

BY

ROBERT H. WOOD II, U.S. BUREAU OF MINES

1985