Pike Creek Cannotite

Kiska Mine - (Uranium) Solar-X Corp. Uranium - Cinnabar (?) -

NAME OLD NAMES PRINCIPAL ORE MINOR MINERALS

24S 24E 17+20

T R S

Harney ..... COUNTY

Steens Mountains ..... AREA

Approximately 4650' 4700' Altimeter ..... ELEVATION

About 1 mile on main Road from ..... ROAD OR HIGHWAY

Folly Farm - Denio gravel Road up Pike Creek ..... DISTANCE TO SHIPPING POINT

PUBLISHED REFERENCES

Or. Bin - Several - Schaffer, Wagner, Corcoran - etc.

MISCELLANEOUS RECORDS

Geologic Report - W.P. Johnson - Private Consultant - Reno, Nev. Dec. 7, 1957

Recon. Preliminary Report by DOGAMI

PRESENT LEGAL OWNER (S) Solar-X Corporation ..... Address .....

Gen. Mgr. (?) Kenneth Arnold ..... Boise, Idaho .....

....

....

OPERATOR K. Arnold - Geo. Slade - Max Hobbs -

Name of claims	Area	Pat.	Unpat.
Pike Creek Group	10 claims	—	

Name of claims	Area	Pat.	Unpat.
~~10~~			

EQUIPMENT ON PROPERTY 1 small Cat - Dump Truck - ~~1~~ - Scout Car - 1 Jeep -

1 large Compressor - Drills - other Misc - Mining Equipment

SG - 276
U_3O_8

STATE DEPARTMENT OF GEOLOGY AND MINERAL INDUSTRIES

2033 First Street
Baker, Oregon

1069 State Office Building
Portland 1, Oregon

239 S.E. "H" Street
Grants Pass, Oregon

REQUEST FOR SAMPLE INFORMATION

The State law governing analysis of samples by the State assay laboratory is given on the back of this blank. Please supply the information requested herein fully and submit this blank filled out along with the sample.

Your name in full Norman V. Peterson (DOGAMI)

Street or P.O. Box P.O. Box 417 City & State Grants Pass, Oregon

Are you a citizen of Oregon? Yes Date on which sample is sent 10/8/58

Name (or names) of owners of the property Kenneth Arnold

Are you hiring labor? _____ Are you milling or shipping ore? _____

Name of claim sample obtained from Pike Creek - Kiska Mine

Location of property or source of sample (If legal description is not known, give location with reference to known geographical point.)

County Harney Mining District _____

Township 34 S Range 34 E Section 20 Quarter section _____

How far from passable road? Road to property Name of road Private Mining Road

	Channel (length)	Grab	Assay for	Description
Sample no. 1		x	U_3O_8	Fault breccia from road level
Sample no. 2				

(Samples for assay should be at least 1 pound in weight)

(Signed) N. V. Peterson

DO NOT WRITE BELOW THIS LINE - FOR OFFICE USE ONLY - USE OTHER SIDE IF DESIRED

Sample Description Reddish rhyolite breccia -- hanging wall of fault zone. No visible uranium minerals - no fluorescence.

Sample number	GOLD oz./T.	GOLD Value	SILVER oz./T.	SILVER Value	URANIUM U_3O_8			
P-23546 SG-276	- - -	- -	- - -	- -	0.37%	- - -	- - -	- - -

Report issued _____ Card filed _____ Report mailed 11-14-58 Called for _____

SIR-5

(Private report - not for public distribution)

GEOLOGIC REPORT

SOLAR X CORPORATION'S PIKE CREEK URANIUM PROPERTY

Steens Mountains Area, Harney County, Oregon

By

W. P. Johnston

Consulting Mining Geologist

Reno, Nevada
December 7, 1957

CONTENTS

ILLUSTRATIONS

Group 2 - Pike Creek Carnotite claims Nos. 2 and 4, and the Hot Potato claim (Figure 2)

Alvord Cave claims Nos. 1 and 2 (General location on Figure 3)

Group 1 claims are on Pike Creek about three-quarters of a mile west from the east front of the Steens Mountains in Sections 17 and 20, T. 34 S., R. 34 E.

Group 2 claims are located on the steep east front of the Steens Mountains in Section 20, T. 34 S., R. 34 E., about a half mile south of the old cabin on Pike Creek.

The Alvord Cave claims are located on the east front of the Steens Mountains about midway between Little Alvord Creek and Alvord Creek in Section 4, T. 34 S., R. 34 E.

These are all unsurveyed claims and Figure 2 is only a sketch of relative and approximate locations.

ACCESS AND FACILITIES

Location and access roads are indicated on Figure 1 and 2. The property can be reached from Burns, Oregon by taking State Highway 78 southeast 65 miles to Folly Farm and then turning south on an improved graded road for 38 miles to a mine road which branches to the west for 0.6 of a mile to an old cabin on Pike Creek near the east front of the Steens Mountains. This cabin is about 3 miles south of the Alvord ranch. The property can also be reached from Boise, Idaho by taking U.S. Highway 95 southwest to its junction with Oregon State Highway 78 and then continuing on the latter northwest 30 miles to Folly Farm. Denio, Nevada, is 42 miles south of the property and Fields, Oregon, is 24 miles to the south.

An air field suitable for small planes is located near the Alvord Ranch.

Nearest rail facilities are 78 miles to the north at Crane, Oregon or 145 miles south at Winnemucca, Nevada.

Water is abundant in Pike Creek and other nearby creeks. Power is lacking in the area.

PREVIOUS TECHNICAL WORK

The writer made full use of previous published data on the district and Appendix I is a list of publications which were available. Publications by Williams and Compton (2) and Fuller (1) describe the regional geology and give details on the rock units which are important in an evaluation of the uranium deposits. Reports by members of the Oregon State Department of Geology and Mineral Industries concerning the uranium discoveries in the Steens Mountain area (Appendix I) were most useful and this organization should be commended for the real service they give the prospector and mining industry.

HISTORY AND PRODUCTION

Prior to 1900 the Pueblo and Steens Mountains were prospected for gold and copper. The production from these ores has been very small. Mercury was discovered about 1900 and the total production to date has been less than 60 flasks.

Uranium was discovered first on Pike Creek in 1955 by Dewey Quier and since that time has been found in a belt about 5 miles long paralleling the east front of the Steens Mountains and extending about 3/4 of a mile west into the range. This belt commences at Indian Creek on the south and extends north to Alvord Creek (Figure 3). Some development work including roads, dozer cuts, pits and short tunnels has been done on several prospects. There has been no production to date.

GENERAL GEOLOGY

All of the uranium prospects examined by the writer or described in the literature occur in the Pike Creek series of Pliocene age. This series consists of tuffs of variable texture and composition, rhyolite flows and vent material,

biotite dacite flows, and beds of volcanic glass. Fine grained basic dikes and sills, and rhyolite breccia dikes have intruded this section. The following stratigraphic section and approximate thicknesses are modified from Williams and Compton, pages 25 and 26 (2).

Pike Creek Series (below)

Upper biotite dacite flow - 300 feet thick
Lower biotite dacite flow - 500 feet thick

Upper tuff - 40 feet thick on Pike Creek, 80 feet on Indian Creek, white to greenish siliceous tuff.
Upper laminated rhyolite - 250 feet on Pike Creek, siliceous platy flow of pinkish rhyolite. Numerous vent areas at this horizon.

Middle tuff - about 300 feet on Pike Creek, siliceous tuff and lapilli tuff.

Lower laminated rhyolite - as much as 200 feet thick. Platy, pink to light colored, rhyolite.

Lower tuff - as much as 200 feet thick, siliceous tuffs; locally cut by many sills of basalt.

UNCONFORMITY

Alvord Series

Exposed thickness 500 feet, acid tuffs, tuffaceous sediments, clays, opaline cherts, and conglomerate. Early Pliocene.

In general the strike of bedding and flow lines is north to northwest and dips range from 5 to 20° in a westerly direction, but there are radical departures near vent areas and near the east range front where many east dips were observed.

The steep east front of the Steens Mountains represents an eroded fault scarp from a concealed regional fault along the alluvial covered base. The range front has been elevated along this fault in relation to the Alvord Valley to the east. Elevations range from about 4500 feet in the valley next to the fault to 9,990 feet at the top of Steens Mountain. A series of subsidiary faults having relatively minor displacements traverse the area west of the range fault for at least three-quarters of a mile. The two faults on Figure 4

represent two directions of faulting which are prevalent in Pike Creek. Some of the uranium deposits may be fairly near the concealed range front fault but most of them appear to be in or adjacent to the subsidiary faults or next to dikes occupying these faults. Fractures roughly at right angles to these faults may have helped control ore in some prospects.

Contact zones between flows, tuffs, and dikes along with fractures and the different permeability characteristics of the different rocks are all factors important in controlling the mineralization.

SOLAR X CORPORATION PROPERTY

Group 1, Pike Creek Carnotite Claims

Claims of this group are located in the canyon of Pike Creek. The main prospect, the original uranium discovery in the Steens Mountains, is exposed on the south wall of the canyon adjacent to Pike Creek about 3/4 of a mile by trail above the old cabin near the range front. (Figure 2)

Uranium mineralization occurs along a rhyolite breccia dike and accompanying fault which strike N. 25° E. and dips 65° E. as shown in the figure 4 sketch. Referring to the stratigraphic section given earlier in the report, the lower laminated rhyolite has been displaced vertically at least 75 feet along the dike and fault; thus from the creek level south up the hill to the vertical cliff face there is a wall of rhyolite on the east side of the dike-fault zone and a talus slope on the west side. The talus slope appears to be underlain by the Lower tuff unit and the contact with the overlying Lower Laminated rhyolite is probably near the base of the west-trending cliff wall at the top of the slope; thus the structure is a normal fault having the east wall moved down at least 75 feet relative to the west wall.

The rhyolite dike is comprised of fragments of platy rhyolite, ranging from pea size to 2 inches in long dimension, set in a matrix of fine-grained to almost glassy rhyolite. The breccia dike filled a fracture or fault zone

and then subsequent faulting occurred along the same break after solidification of the dike. This later faulting has formed a 3 to 5 foot shear zone along the footwall or west side of the rhyolite breccia dike.

Uranium mineralization has been found along the dike-fault zone for a slope distance of about 75 feet. At the time of the writer's visit talus had filled in the three cuts and exposures were poor (figure 4). However, by scintillator readings, black light work on samples and assay results, it was determined that the three following types of uranium mineralization occur here:

(1) In places the footwall side of the rhyolite breccia is highly radioactive over at least 6 inches and some radioactivity was observed over a 6 foot zone including rhyolite breccia dike and platy rhyolite. No uranium minerals have been identified although dark spots appear in the matrix of the breccia in samples with high count. Corcoran and Wagner (7) give a chemical assay of 0.36% U_3O_8 from a sample of this material. A sample PC#5 representing a 6 inch width of rhyolite breccia at Upper Cut No. 2 taken during this examination assayed .35% U_3O_8. This material did not fluoresce; another specimen sample PC#12 assayed .45% U_3O_8.

(2) A 3 to 6 inch thick fault gouge (clay seam) adjacent to the hard footwall of the rhyolite breccia dike contains tiny streaks of black sooty material which is highly radioactive in one place and not in another. Part of this material is probably iron or manganese oxides but some must contain a dark colored uranium mineral of one kind or another. This material does not fluoresce.

(3) In the Upper Cut and Upper Cut No. 2 there is a soft zone about 3 feet wide next to and west of the gouge zone described above. The first 18 inches of this material next to the gouge contains rather abundant autunite along fracture surfaces and the next 18 inches noticeably less.

Different types of uranium mineralization, traces of mercury, accompanying silicification and other rock alteration suggest to the writer that the deposit was formed by ascending solutions and did not result from the leaching of small amounts of uranium from the surrounding rocks. If this assumption is true, the mineralized area represents a channelway in which the solutions rose up along the breccia dike and fault from depth. Although assays of interest

range from .2 to .4% uranium oxide and Scintillator and Geiger counter readings indicate specimen sample of from .5 to 1% uranium oxide, the present surface exposures are not wide enough to represent minable ore. However, the mineralization is strong enough to class this as a good prospect and further development should be done in depth. The possibilities for finding minable ore appear as follows:

(1) There are indications that ore makes out into the softer tuff beds on the west side of the dike-fault. Present exposures are so poor that the actual nature and amount of the tuff beds are unknown and it is possible that some basalt sills may be present. Uranium ore might be expected to be found in certain tuff horizons next to the dike-fault and not in others of different texture and composition.

(2) Another possibility is that the rhyolite breccia type ore might increase in depth.

This prospect warrants an exploration program which will provide for uncovering and gaining some depth along the mineralized zone to help determine the true nature of the deposit and whether minable ore is present or not.

A second radioactive area on Group 1 claims is about 300 feet east from the main discovery described above. Here another small rhyolite breccia dike from 2 to 4 feet wide is exposed along a fault striking N. 30° W. and dipping 65° E. Only about 15 feet of the dike is exposed under a large talus slide. A small amount of dozer work will determine whether this zone is worth further exploration.

A third area of interest on Group 1 claims is near the east end line of Pike Creek Carnotite claim No. 5 (figure 2). An area about 30 feet in diameter gives scintillator readings up to 0.2 MR. Higher readings are indicated along individual N. 30° E. striking fractures. Mr. Dewey Quier had a specimen sample assayed from one of these fractures, and the results were 4 pounds of mercury per ton. The writer cut a 6 inch wide sample from near the same place and it assayed .01% mercury (0.2 pounds per ton) and .116% uranium oxide.

Group 2, Pike Creek Carnotite claims

Claims in this group are located on the east range front south of the old cabin on Pike Creek as shown on figure 2. A trail up the steep slope leads directly to a cliff of rhyolite in the southwest corner of claim No. 2. Scintillator readings of .1 to .2 MR. along the base of the cliff are apparently caused by minor amounts of autunite along fractures in the rhyolite on the hanging wall side of fine grained basic dike. This dike strikes N. 10° W., dips 45° W., and is exposed over a width of 15' in one place. This dike is almost identical to the dike next to the ore at the Timber Beast mine and might possibly be a southern extension of the same structure. Further prospecting along this dike trend might reveal some area worth trenching.

Alvord Cave Claims

These two claims are located on the east range front about midway between Little Alvord Creek and Alvord Creek. (Figure 3) Fractures in massive rhyolite in a cave contain minor amounts of autunite. No appreciable amount of uranium is indicated from the observed surface exposures.

OTHER PROSPECTS IN DISTRICT

Other prospects in the district are shown on Figure 3 for the purpose of showing the areal extent and trend of the uranium mineralization. A few comments will be made on some of these prospects.

The Timber Beast property has been developed by about 300 feet of tunnel and the operators have recently acquired a DMEA loan for further work. Two areas of autunite have been found in dacite and tuff adjacent to a fine-grained basic dike.

The Rhoades prospect in Little Alvord Creek is probably an extension of

the Timber Beast zone. A few tons of low grade ore has been mined from a fault zone in rhyolite next to the basic dike.

The Alex-Ladd property has exploited a 3 to 4-foot wide shear zone in rhyolite containing autunite on fracture surfaces. Assay values as high as 0.34% uranium oxide have been reported.

The Upper Pike Creek property according to Schafer (10) is located on a low count radioactive zone in what is probably a dacite flow. Autunite is said to be visible on fractures and joints but much of the radioactivity is thought to be within the rock minerals.

ORIGIN OF URANIUM DEPOSITS IN STEENS MOUNTAIN

The origin or type of uranium deposits found in Tertiary rhyolite tuffs, flows and related rocks may have considerable bearing on development of the deposits or at least on the attitude of the mining profession toward the area. Briefly the two general modes of origin usually advocated are: (1) the uranium was originally deposited as primary minerals such as pitchblende or uraninite by ascending fluids (hydrothermal) from a deep-seated source, and then oxidation processes converted the primary minerals near the surface to autunite, torbernite and like minerals; (2) the rhyolite and dacite flows and related tuffs contained relatively high amounts of uranium (compared with surrounding rocks such as andesite and basalts) within the rock minerals themselves, and during weathering processes minor amounts of uranium from disintegration of these rock minerals were circulated by ground waters and precipitated along faults and fractures and in certain permeable beds.

Several of the uranium prospects appear to be on the northern extension of structures controlling the mercury deposits at the Alexander and nearby mines. Silicification, clay alteration, and minor amounts of mercury are present in some of the uranium prospects. Most of the uranium deposits have

been found in fault zones adjacent to either basic dikes or rhyolite breccia dikes. These factors lead the writer to believe that the better uranium prospects in the Steens Mountains are of hydrothermal origin. Some of the minor areas of radioactivity could well be caused by leaching of minor amounts of uranium out of the rock minerals or movement of uranium from original sites of primary deposition.

Williams and Compton (2) observed that the higher temperature sulfide minerals such as schwatzite and chalcopyrite were abundant in the central Pueblo-Steens Mountain district and further north toward the Alexander mine cinnabar is the only sulfide and so this area represents a northern low temperature zone of hydrothermal mineralization. It appears that a low temperature uranium zone might be added to the north of this one where cinnabar diminishes at the expense of uranium.

MILLING

At the present time the Steens Mountain area is isolated so far as an outlet for uranium ores is concerned. The closest uranium mill is located at Salt Lake City, a distance by truck and rail of about 500 miles by a southern route through Winnemucca, Nevada or about 600 miles by a northern route through Idaho. A bright spot in this picture, however, is the recent announcement that the Lakeview Mining Company has signed a contract with AEC for sale of uranium concentrates and will build a 210 ton uranium mill within the next 12 months (see Figure 1 for location). It has been announced that this mill will accept some ore from outside sources.

Ore found to date in the Steens Mountains is a highly siliceous oxidized type containing little or no calcium carbonate. Ore shipped from the Steens Mountains at the present time will have to exceed 0.3% uranium oxide to return a profit under usual operating conditions.

CONCLUSIONS AND RECOMMENDATIONS

Developments within the last two years in Oregon and Nevada have indicated that commercial ore bodies of considerable size exist in Tertiary rhyolite flow and tuff sequences. The Lakeview district in Oregon, about 90 air miles southwest of the Steens Mountains Uranium area is reported to have sizable uranium ore bodies in tuffaceous sediments and mill construction has been approved. Recent developments near Mountain City in northeastern Nevada indicate a good possibility for sizable ore bodies near the surface in tuffaceous sediments. These developments should help develop some optimism towards areas of uranium mineralization in similar environments of acid flows and tuffs.

The writer is impressed with the amount of uranium in surface exposures in the Steens Mountains within an elongated belt about five miles by three-quarters of a mile. These deposits are located along definite fault or dike structures in a rhyolite and dacite flow and tuff sequence. Also impressive is the fact that, with the exception of the Timber Beast mine, these surface exposures have been barely scratched so far as real exploration is concerned. Preliminary exploration designed to test these prospects a few tens of feet in depth should give information necessary to determine whether further expenditures are desirable.

One of the best prospects observed in the Steens Mountains by the writer, which can be explored without excessive costs, is the main showing on the Pike Creek Carnotite claim No. 2 (Group 1) belonging to Solar X Corporation. This prospect should be developed by stages, and each stage should be fully evaluated upon completion so that this information can be incorporated in the next phase of exploration. The geology has been described previously and recommendations are as follows:

(1) Complete the approximate half mile of road up Pike Creek to the prospect as shown on Figure 2. It appears that a route can be chosen in which little or no rock work will have to be done.

(2) Bulldoze the talus cover off the west side of the breccia dike-fault from the creek level up to the high rhyolite cliff. This will expose the nature of the tuff section and prevent talus from sliding into subsequent excavations.

(3) After the dozer work, clean the mineralized zone down to bedrock by hand. Then by using a compressor, drill and powder, trench the mineralized zone about 5 feet wide and from 5 to 10 feet deep from the bottom of the hill up to the base of the rhyolite cliff.

(4) By evaluating the work in Stage 3, a decision can be made as to whether certain beds or the dike-breccia contain enough ore to warrant driving a short adit south into the hill along the mineralized zone and also exactly at what point it should be started.

(5) Should this work above the creek level be successful in discovering ore or at least a strong zone of mineralization, consideration should then be given to drilling in the thick section of tuffs and other rocks along the breccia-fault zone below the creek level.

Other prospects on Solar X Corporation's Pike Creek property should be studied further if the above work is initiated. If Solar X Corporation commences exploration work in the district, it will be possible for the corporation personnel to become acquainted with the local prospectors and their prospects and have some advantage over competitors in acquiring other property when it is deemed advisable.

Respectfully submitted,

/s/ W. P. Johnston

Consulting Mining Geologist
Reno, Nevada
December 7, 1957

APPENDIX I - REFERENCES

(1) Fuller, R.E. (1931), The Geomorphology and volcanic sequence of Steens Mountain in southeastern Oregon - University of Washington Publication in Geology, Vol. 3, No. 1, pp. 1-130.

(2) Williams, H.W., and Compton, R.R. (1953), Quicksilver Deposits of Steens Mountain and Pueblo Mountains, Southeast Oregon - U.S. Geological Survey Bulletin 995-B, pp. 1-76.

(3) Matthews, T.C. (Dec. 1955), Oregon radioactive discoveries in 1954 and 1955 - The Ore.-Bin, State of Oregon Dept. of Geol. and Mineral Industries, Vol. 17, No. 12, pp. 6.

(4) Schafer, Max (Dec. 1955) Preliminary report on the Lakeview uranium occurrences - same publication as (3), pp 2.

(5) Schafer, Max (Dec. 1956) Uranium prospecting in Oregon, 1956 - The Ore.-Bin, State of Oregon Dept. of Geol. and Mineral Industries, Vol. 18, No. 12, pp. 4.

(6) Matthews, T.C. (Dec. 1956) Radioactive occurrences in Oregon, 1956 - Same publication as (5) pp. 3.

(7) Corcoran, R.E. and Wagner, N.S. (1955) Pike Creek Carnotite Group, File Report, Oregon State Dept. of Geol. & Min. Industries, pp. 6.

(8) Wagner, N.S. (Nov. 1955) Progress Report No. 1, supplementing (7) - Oregon State Dept. of Geol. & Min. Industries, pp. 3.

(9) Wagner, N.S. (Dec. 1955) Alex-Ladd claims - File report, Oregon State Dept. of Geol. & Min. Industries, pp 2.

(10) Schafer, Max (1956) Upper Pike Creek radioactive area - File report, Oregon State Dept. of Geol. & Min. Industries, pp. 3.

APPENDIX II - ASSAY DATA

GROUP I PIKE CREEK CARNOTITE CLAIM NO. 2 (Main prospect)
(Assays published by Oregon Dept.of Geol.& Min. Industries)

No.	Width	U_3O_8 Equiv.%	U_3O_8 Chem.%	Fluorescence	Mercury %	Remarks
		.4	.372	None	Trace	Tuff and rhyolite breccia
		.3	.186	None	Trace	" " "
		.47	.373			Material not stated
	3"		.36			Rhyolite (prob. near Upper Cut No. 2)
			(PC Samples taken by W.P. Johnston & K.A. Arnold)			
PC #2	3'		.024	Minor Y.G.	-	Upper Cut, soft fracture zone in tuff (?)
PC #3	3'		.026	Yell. green	-	Upper Cut #2, soft zone, some autunite
PC #4	6"		.026	Yell.green	-	Upper Cut #2, soft fault gouge, some autunite
PC #5	6"		.35	None	-	Upper Cut #2, W. side rhyolite breccia
PC #6	Grab		.05	None	-	Rhyolite breccia piled at creek level
PC #12	1"		.45	Minor Y.G.	-	Upper Cut #2, Dark rhyolite breccia
			OTHER AREAS			
PC #1	6"		.116	Minor Y.G.	.01	Group 1, Claim 5, Figure 2, Rhyolite
PC #7	Grab		.013	Rare	-	Group 2, Claim 2, Figure 2, Rhyolite cliff
PC #8	Grab		.012	Rare	-	Group 2, Claim 2, Figure 2, Rhyolite cliff
PC #9	Grab		.003	Rare	-	Alvord Cave claim, soft rhyolite (in cave)
PC #10	Grab		.001	None	-	Alvord Cave claim, hard rhyolite (in cave)
PC #11	Grab		.188	Yell.green	-	Timber Beast claim, S. outcrop, E. of dike

PC #1-12 assayed for uranium by Rare Metals Corp., Murray, Utah.
Mercury assay by Union Assay Office, Salt Lake City, Utah.