

UNITED STATES ATOMIC ENERGY COMMISSION  
DIVISION OF RAW MATERIALS  
DENVER EXPLORATION BRANCH

URANIUM OCCURRENCES, FALL RIVER AREA,  
CLEAR COUNTY, COLORADO

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URANIUM OCCURRENCES  
FALL RIVER AREA  
CLEAR CREEK COUNTY, COLORADO

by

Loren E. Smith and Kenneth E. Baker

ABSTRACT

The Fall River Area is located four miles northwest of Idaho Springs between Quartz Hill and Lawson in Clear Creek County, Colorado. Pitchblende occurs in the No. 4 Vein of the Golconda Mine and in the Blazing Star Vein of the Almaden Mine. Sampling of the No. 4 Vein indicates two pitchblende shoots 45 feet and 65 feet long averaging 10 inches in width and 0.183%  $U_3O_8$ . A selected sample from a dump on the Blazing Star Vein assayed 2.4%  $U_3O_8$  and a sample from the Blazing Star Vein assayed 0.90%  $U_3O_8$ . No other significant occurrences were noted in the Fall River Area.

An exploration program is recommended in the Golconda Mine consisting of rehabilitation, drifting, raising and diamond drilling. It is recommended that the No. 1 Tunnel on the Blazing Star be reopened for examination.

URANIUM OCCURRENCES  
FALL RIVER AREA  
CLEAR CREEK COUNTY, COLORADO

INTRODUCTION

Location

The Fall River Area, defined as the area drained by lower Fall River, Spring Gulch, and lower Hill Creek is located 4 miles northwest of Idaho Springs along U. S. highway 60 in T35N, R75W Clear Creek County, Colorado. The area examined is 2 miles southwest of Quartz Hill and 3 miles northeast of the known district. This area consists of approximately six square miles (Plate 1).

Purpose

The purpose of this project was to examine the favorable area between the known occurrences of pitchblende at Quartz Hill and at known.

Previous Work

Mr. T. F. Anderson, DEE-ANC, made a preliminary reconnaissance of several mine dumps along Fall River after finding that some

museum specimens from mines in that area were radioactive. Samples taken from the dumps of the Almaden and Golconda Mines assayed 0.038% and 0.15% U O respectively. Some of the mines examined are discussed in U.S.G.S. Professional Paper 94 by E. S. Bastin and J. M. Hill 1/ and also in U.S.G.S. Professional Paper 223 by T. S. Lovering and E. M. Goddard. 2/

### Field Work

A total of 14 days was spent in the field during the summer of 1951. Half of the time was spent on the surface making radiometric surveys of mine dumps in the Fall River Area (Plate 1). The rest of the time was spent underground making radiometric surveys of accessible workings, mapping and sampling.

### GEOLOGY

#### General Geology

The Fall River Area is located in the geographic center of the Front Range Mineral Belt. Most of the rocks of the area are

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- 1/ Bastin, E. S. and Hill, J. M., Economic Geology of Gilpin, Clear Creek and Boulder Counties, Colorado: U.S. Geol. Survey Prof. Paper 94, pp. 306-355, 1917.
- 2/ Lovering, T. S. and Goddard, E. M., Geology and Ore Deposits of the Colorado Front Range: U.S. Geol. Survey Prof. Paper 223, p. 183, 1950.

Pre-Cambrian schists and gneisses intruded by Pre-Cambrian granite pegmatites and Tertiary monzonites and diorites.

The Idaho Springs Formation, the oldest formation in the Front Range Mineral Belt, is the predominate country rock in the Fall River Area. It consists of light to dark gray quartz-biotite schist, sometimes with hornblende or muscovite. Hornblende gneiss and schist and injection gneiss are associated with the quartz-biotite schist.

Many small granite pegmatites have been injected along foliation planes of the metamorphic rocks forming long narrow lenses that pinch and swell. Other masses of pegmatite are very irregular and cut the schist foliation in various directions. In many places the pegmatites form a lit-par-lit injection gneiss. The minerals of the pegmatites are quartz, feldspar and mica. Northeast of the Coleocuda Mine is a streak of quartz monzonite porphyry. Feldspar phenocrysts vary in size and distribution, some are 0.5 inches in diameter and may be scattered or abundant. Small prisms of hornblende are recognizable. The ground mass is a dark gray quartz.

#### Veinage

The veins of the Fall River Area are true fissure veins with pinches and swells caused by movement along the fissure. The veins



vary in width from 0.5 inches to 5 feet and can be traced horizontally for distances of 1000 feet. Most of the veins strike northeast, but a few are northwesterly. The veins dip to the northwest or near vertical.

### Mineralogy

There are three distinct mineralogic vein types in the Fall River Area, quartz-pyrite, galena-sphalerite and a combination of the two. In the eastern section of the area the veins are quartz-pyrite, farther west are combination galena-sphalerite/quartz-pyrite veins, and in the area of upper Spring Gulch and Mill Creek are galena-sphalerite veins. Pitchblende occurs in both the quartz-pyrite type and in the combination of quartz-pyrite and galena-sphalerite type.

### URANIUM OCCURRENCES

#### Golconda Mine

The Golconda Mine is located in the Dumont Mining District on the southwest side of Fall River 2.5 miles from the junction of Clear Creek and Fall River in Clear Creek County, Colorado (Plate 1). The property is owned by the Fall River Power Company of Idaho Springs. The claim was patented in 1877 and was worked for gold, silver and copper. Total production of the property is said to be

about \$4000. <sup>3/</sup>

A shaft was sunk on the Golconda Vein on the ridge between Fall River and Spring Gulch but is now inaccessible. A grab sample from the dump at the Golconda Shaft assayed 0.02% U<sub>3</sub>O<sub>8</sub>.

A crosscut tunnel has been driven southwest 1,665 feet from Fall River intersecting the Golconda Vein 1380 feet from the portal at a vertical depth of 535 feet (Plate 2). The tunnel was caved at the Golconda Vein at the time of this examination but Bastin and Hill <sup>4/</sup> report 475 feet of drift along the vein to the west and a cave 50 feet to the east. There is a 40 foot winze 120 feet west of the tunnel and a slope 300 feet west. The vein as described by Bastin and Hill <sup>5/</sup> is 4 to 18 inches wide consisting of crushed schist, disseminated pyrite, and chalcopyrite, with some galena and sphalerite. The galena and sphalerite occur in small bunches and are not scattered through all the ore.

The Virginia Vein, striking N50W and dipping 75° northeast, was cut 1015 feet from the portal and has been drifted on for 20 feet to the northwest. The vein is 4 to 8 inches wide consisting

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<sup>3/</sup> Op. cit., Bastin and Hill, p. 316.

<sup>4/</sup> Ibid., p. 315.

<sup>5/</sup> Ibid., p. 316.

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of white and gray quartz, pyrite, galena and chalcocopyrite. An 8 inch channel sample from the face assayed 0.047%  $U_3O_8$ . The Virginia Vein was examined on the surface and in the shaft on the ridge between Fall River and Spring Gulch but no radioactivity was noted.

The No. 4 Vein, 1190 feet from the portal, has been drifted on 290 feet to the east and is caved 40 feet to the west. In the east drift uranium mineralization was noted for a continuous distance of 130 feet. There are two narrow pitchblende shoots of marginal grade 45 feet and 65 feet long within this distance of 130 feet. (Plate 3). The vein strikes N66W and has an average dip of 60° north. Just east of the Golconda Tunnel the vein has been stopped for a distance of 40 feet to a height of 40 feet.

The No. 4 Vein (Plate 4) varies from 4 inches to 5 feet in width and consists of white and gray quartz, crushed schist and pyrite, with some chalcocopyrite and galena. The pitchblende occurs in black streaks 0.2 inches to 5 inches wide closely associated with fine grained pyrite and crushed schist fragments. These streaks follow fractures in the vein and along the walls of the vein, favoring the hanging wall. The hanging wall is distinct with a 2 inch to 2 foot shear zone of clayey gouge and pitchblende streaks 0.5 inches to 5 inches wide. Pitchblende streaks along the footwall are 0.5 inches to 2 inches wide in a brecciated gouge zone that varies in width from 0.5 inches to 6 inches. The center portion of the vein is a hard

silicified fractured zone with disseminated pyrite and veinlets of pyrite and pitchblende. A small amount of tan carbonate occurs as a gangue mineral in the vein. Unidentified yellow and green secondary uranium minerals were noted on the walls of the tunnel.

#### Almaden Mine

The Almaden Mine or Blazing Star Tunnel is located in the Lincoln Mining District 100 yards northwest of the mouth of the Colocunda Tunnel on the south side of Fall River (Plate 1.). The Almaden property is owned by Homer Mahanty of Superior, Nebraska.

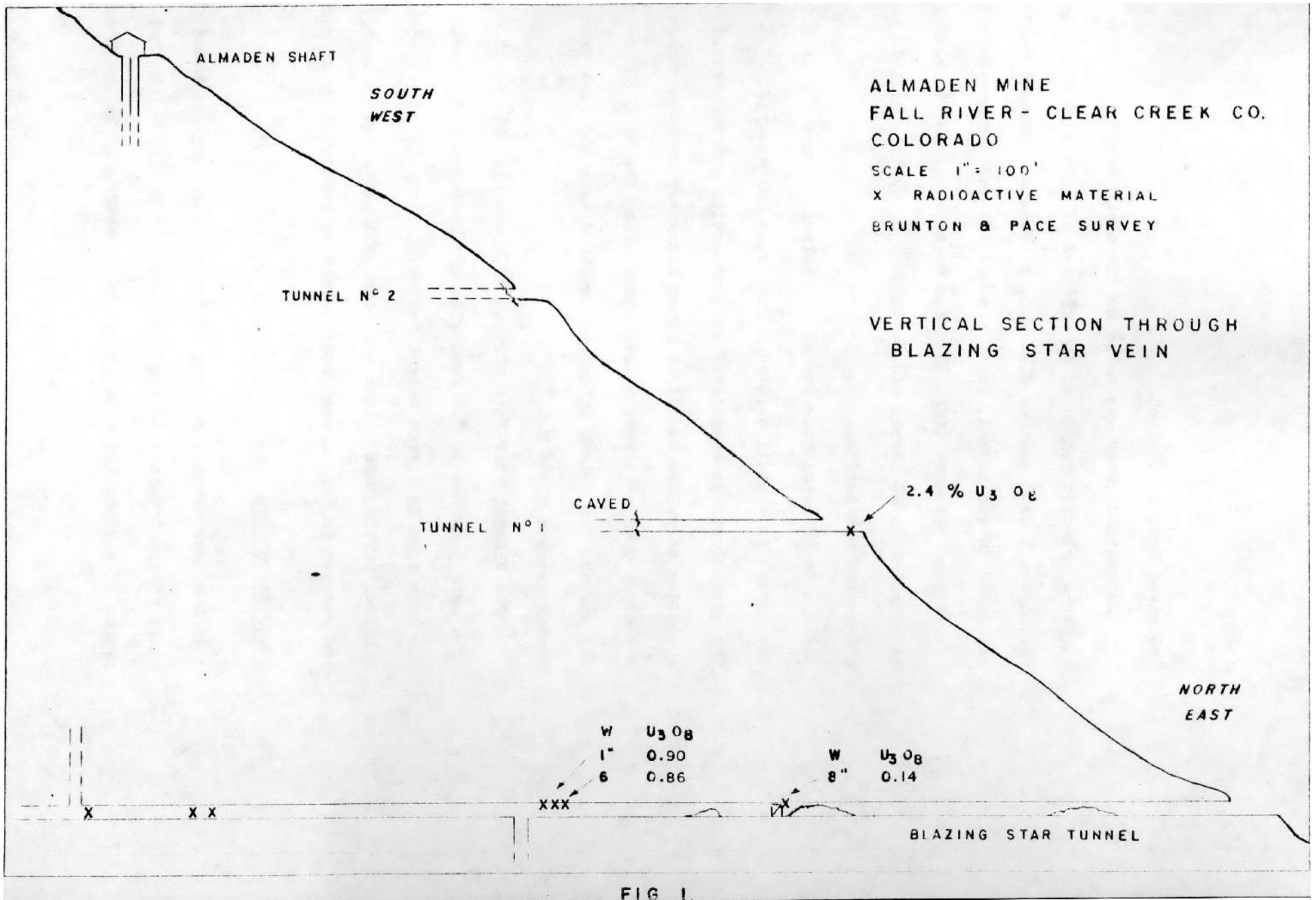
The metals produced from this mine were gold, silver, and lead; shipments were small but of high grade. Two lots of ore from the mine in Blazing Star Tunnel weighed 140 pounds and 510 pounds, and assayed 5,610.3 and 4,084.9 ounces of silver per ton respectively. 6/

The workings of this mine are a shaft and three tunnels, all on the Blazing Star Vein (fig. 2.). The shaft is located on the north side of the ridge between Fall River and Spring Gulch, 600 feet above the river. It is 90 feet deep, but is inaccessible below 50 feet. Tunnel No. 2 is caved at the entrance, Tunnel No. 1 is caved 150 feet from the portal, and the Blazing Star Tunnel is 1300 feet long.

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6/ Op. cit., Dectin and Hill, p. 316.

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but caved beyond 720 feet.

No radioactivity was noted on the shaft dump or on Tunnel No. 2 dump. A selected sample of an oxidized siliceous pyritic rock from Tunnel No. 1 dump assayed 2.4%  $U_3O_8$ ; since no abnormal radioactivity was noted in the tunnel, it is assumed the radioactive material came from beyond the cave (fig. 1). The vein as exposed in Tunnel No. 1 is 6 inches to 20 inches wide with quartz, pyrite, calcite and some galena and sphalerite.

In the Blasing Star Tunnel pitchblende occurs 520 feet from the portal in a small veinlet 1 inch wide and assayed 0.90%  $U_3O_8$ . The pitchblende is associated with proustite and is covered with a coating of yellow and light green secondary uranium minerals. Secondary uranium minerals also occur along the wall 720 feet from the portal. An 8 inch siliceous oxidized zone 360 feet from the portal assayed 0.14%  $U_3O_8$ .

The Blasing Star Vein strikes N85E and dips 85° north consisting of a zone 3 inches to 2.5 feet wide of fractured and crushed schist. The vein zone is barren except for small veinlets of gray quartz, calcite, pyrite, and galena and some sphalerite and chalcopyrite. They are occurred in narrow scattered lenses as indicated by stoping.

#### Other Properties

A Geiger counter reading of twice background was noted in a small prospect tunnel on the north fork of Spring Gulch, but the source of radioactivity could not be determined. In the Standard and

Pennsylvania Tunnels a small amount of slightly radioactive light yellow to blue green precipitate, probably goslarite, has formed on the walls and in the backs of the workings. A selected sample from the dump of the Seven Forty Tunnel assayed 0.003%  $U_3O_8$ , but the tunnel is inaccessible.

POTENTIAL ORE RESERVES

Golconda Mine

The No. 4 Vein was sampled at five foot intervals along the vein for a length of 130 feet (Plate 3). Analysis of the samples indicated two shoots containing  $U_3O_8$  in values of 0.134 per cent or better but over narrow widths. Assuming a height of one half the length of the ore shoot above and below the drift level, the potential ore reserve of  $U_3O_8$  is shown as follows:

Potential Ore Shoot Dimensions, Grade, and Tonnage

BLOCK	LENGTH	AVERAGE WIDTH	TONS	% $U_3O_8$	LOCATION
A	45.0'	12"	162	0.134	222' to 265' E of Golconda tunnel above & below the level.
B	65.0'	8"	242	0.216	99' to 164' E of Golconda tunnel above & below the level.
Total			404	0.133	

This reserve of 404 tons of 0.133 %  $U_3O_8$  is equivalent to 1458 pounds of uranium oxide.

Because of the narrow width of the uranium occurrence, the above calculation is a potential reserve which can not be mined profitably at this time but is a potential source of uranium dependent upon future economic conditions.

#### Almaden Mine

Although no ore reserve can be calculated for this mine, sampling indicates a possible source of uranium between the occurrences in the Blazing Star Tunnel and Tunnel No. 1 as shown in Figure 1.

#### Others

No other occurrence of radioactivity in the Fall River area was indicative of a potential reserve at this examination.

#### CONCLUSIONS

Pitchblende occurs in the No. 4 Vein of the Golconda Mine and in the Blazing Star Vein of the Almaden Mine. Sampling of the occurrence in the No. 4 Vein of the Golconda Mine indicates two narrow pitchblende shoots with an average width of 10 inches, 45 feet and 65 feet long, containing an estimated 404 tons of  $0.183\% \text{ U}_3\text{O}_8$  or 1478 pounds of uranium oxide. Under present economic conditions



these shoots can not be mined at a profit. A sample of dump rock from the No. 1 Tunnel on the Blazing Star Vein assayed 2.46%  $U_3O_8$  and a sample from the Blazing Star Tunnel assayed 2.00%  $U_3O_8$ . There is a vertical distance of 200 feet between these two occurrences.

In order that more information can be obtained regarding the geological conditions under which pitchblende occurs in the Golconda Mine and the Almaden Mine and to explore for a possible higher grade uranium source, a physical exploration program is recommended.

#### RECOMMENDATIONS

##### Golconda Mine

The following are recommendations for exploration in the Golconda Mine in the order of their considered importance (Plate 5):

1. Rehabilitation of Golconda Tunnel, No. 4 Vein East Drift and Golconda Vein drift.
2. (a) Drift 200 feet east on No. 4 Vein  
(b) Two raises, 100 feet each, on No. 4 Vein
3. Exploration of the downward extension of No. 4 Vein by core drilling.

The cost estimate of this exploration program is about \$34,000. The Golconda Mine has not been in operation since 1935 and there is

no equipment of any kind on the property. It would be necessary to build an access road and a combination shelter and compressor house.

Rehabilitation of the Golconda Tunnel and the No. 4 Vein drift would include timbering a 30 foot cave at the portal, sucking out three caves in the tunnel, four caves in the No. 4 Vein and one at the junction of the tunnel and the Golconda Vein drift. It would be necessary to install air and water lines, lay track and suck out a water ditch.

It is proposed to extend the No. 4 Vein drift 200 feet to the east and drive two raises, 100 feet each, in the known pitchblende shoots (Plate 5). The downward extension of the No. 4 Vein could best be explored by diamond drilling. The diamond drilling program would include a 100 foot crosscut to the northeast for a drilling station, four holes to cut the vein 75 feet below the drift level and two holes to cut the vein 100 feet below the drift level; a total of 766 feet of drilling. It is suggested that the diamond drilling phase is not started until the drifting and raising are completed. Drifting, raising and crosscutting to be contracted at an estimated cost of \$40 per foot is to include all costs such as haulage, air, powder, steel etc. The cost estimate for physical exploration is as follows:

COST ESTIMATE FOR PHYSICAL EXPLORATION

REHABILITATION

Surface Work

Access road (2 days bulldozer \$100/day)	\$ 200.00
Bridge	150.00
Combination Shelter and Compressor House	600.00
Gre Mine (2-20'x25'x15' 15 ton cap. @ \$100 ea.)	200.00

Underground

Clean up tunnel & drift (\$1.50/cu.yd.-166 cu.yd.)	400.00
Track (2100 ft. @ \$1.00/ft.)	2100.00
Timber (\$6/ft. 10 sets - 50 ft.)	300.00
Air Line (2100 ft. @ \$1.50/ft.)	630.00
Receiver Tank	50.00
Fan	205.00
Fan Line (1900 ft. @ \$1.00/ft.)	1900.00
Water Line (1900 ft. @ \$0.17/ft.)	325.00
Water Tank	50.00

SUB TOTAL \$ 7,290.00

COST ESTIMATE (continued)

Drifting and Raising

Drifting (200' @ \$40/ft. contract)	\$ 8,000.00
Raising (200' @ \$40/ft. contract)	<u>8,000.00</u>
SUB TOTAL	\$ 16,000.00

Diamond Drilling

Crosscutting (100 ft. @ \$40/ft.)	\$ 4,000.00
Drill Station (8'x10'x12' @ \$5/cu.yd.)	175.00
Diamond Drilling (766' @ \$5/ft.)	<u>4,600.00</u>
SUB TOTAL	\$ 8,775.00

Contingency

Supervision, Engineering, Taxes, Insurance, etc.	<u>1,525.00</u>
TOTAL	\$ 34,000.00

RECOMMENDATIONS (continued)

Almaden Mine

It is recommended that a geologic examination be made of the No. 1 Tunnel of the Almaden Mine. The tunnel is caved 130 feet beyond the portal and it is estimated that it would cost \$400 to make the tunnel accessible.

APPENDIX A

OWNERSHIP DATA

Galconda Mine \*

Pat. No 684 Dumont Mining District

Owner - Fall River Power Company, Idaho Springs, Colorado.

Almaden Mine

Pat. No. 79 Lincoln Mining District

Owner - Homer McAnuty

% Mrs. Helen McAnuty Tabor  
635 Commercial Avenue  
Superior, Nebraska

\* Proof of ownership has been distributed

APPENDIX B

\* Samples of 0.1%  $U_3O_8$  or more

SAMPLE DATA IN NO. 4 YARD

Sample No.	Width in inches	Distance from Golconda Tunnel (in feet)	% $U_3O_8$
F 5599	12	87	0.038
F 5779	16	92	0.067
F 5574	12	97	0.088
F 5778	24	102	0.54*
F 5598	3	107	0.027
F 5777	67	112	0.42*
F 5597	5	117	0.054
F 5776	56	122	0.105*
F 5596	14	127	0.030
F 5771	31	132	0.24*
F 5595	6	137	0.030
F 5770	36	142	0.30*
F 5594	6	147	0.072
F 5769	24	152	0.111*
F 5593	15	157	0.020
F 5768	17	162	0.19*
F 5592	14	167	0.012
F 5767	2	172	0.022
F 5590	3	175	0.051
F 5766	18	180	0.18*

SAMPLE DATA (continued)

Sample No.	Width in inches	Distance from Golconda Tunnel ( in feet )	% U <sub>3</sub> O <sub>8</sub>
F 5589	8	185	0.005
F 5764-5	2.5	190	0.032
F 5588	16	195	0.037
F 5763	3	200	0.111*
F 5587	8	205	0.018
F 5761-2	18.5	210	0.097
F 5586	8	215	0.006
F 5760	0.5	220	0.018
F 5585	16	225	0.125*
F 5759-5573	4	230	0.358*
F 5584	16	235	0.099*
F 5758	18	240	0.19*
F 5757	2	242	0.66*
F 5582	14	245	0.109*
F 5756	0.5	250	0.38*
F 5581	24	255	0.036
F 5754-5	10.5	260	0.055
F 5572	9	265	0.35*