CLEARINGHOUSE FOR FEDERAL SCIENTIFIC AND TECHNICAL INFORMATION CFSTI
DOCUMENT MANAGEMENT BRANCH 410.11

LIMITATIONS IN REPRODUCTION QUALITY

ACCESSION # AD607918

☒ 1. WE REGRET THAT LEGIBILITY OF THIS DOCUMENT IS IN PART UNSATISFACTORY. REPRODUCTION HAS BEEN MADE FROM BEST AVAILABLE COPY.

☐ 2. A PORTION OF THE ORIGINAL DOCUMENT CONTAINS FINE DETAIL WHICH MAY MAKE READING OF PHOTOCOPY DIFFICULT.

☐ 3. THE ORIGINAL DOCUMENT CONTAINS COLOR, BUT DISTRIBUTION COPIES ARE AVAILABLE IN BLACK-AND-WHITE REPRODUCTION ONLY.

☐ 4. THE INITIAL DISTRIBUTION COPIES CONTAIN COLOR WHICH WILL BE SHOWN IN BLACK-AND-WHITE WHEN IT IS NECESSARY TO REPRINT.

☐ 5. LIMITED SUPPLY ON HAND: WHEN EXHAUSTED, DOCUMENT WILL BE AVAILABLE IN MICROFICHE ONLY.

☐ 6. LIMITED SUPPLY ON HAND: WHEN EXHAUSTED DOCUMENT WILL NOT BE AVAILABLE.

☐ 7. DOCUMENT IS AVAILABLE IN MICROFICHE ONLY.

☐ 8. DOCUMENT AVAILABLE ON LOAN FROM CFSTI (TT DOCUMENTS ONLY).

☐ 9.

TSL-107-10/64

PROCESSOR: G. Lee

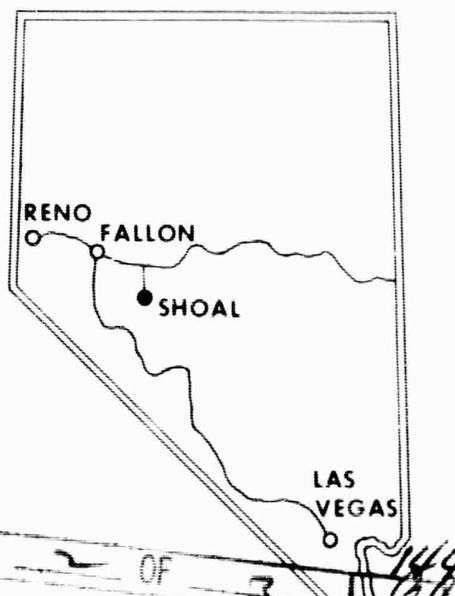
VUF-1010
FINAL REPORT

VELA UNIFORM

PROJECT SHOAL

SPONSORED BY THE ADVANCED RESEARCH PROJECTS AGENCY OF THE DEPARTMENT OF DEFENSE AND THE U. S. ATOMIC ENERGY COMMISSION

FALLON, NEVADA
OCTOBER 26, 1963



STRUCTURAL SURVEY OF PRIVATE MINING PROPERTIES

U.S. BUREAU OF MINES

December 1963

Issuance Date: October 30, 1964

LEGAL NOTICE

Printed in USA. Price $4.00. Available from the Clearinghouse for Federal Scientific and Technical Information, National Bureau of Standards, U. S. Department of Commerce, Springfield, Va.

USAEC Division of Technical Information Extension, Oak Ridge, Tennessee

BLANK PAGE

STRUCTURAL SURVEY OF PRIVATE MINING PROPERTIES

Project Shoal

U. S. ATOMIC ENERGY COMMISSION
NEVADA OPERATIONS OFFICE
Las Vegas, Nevada

December 1963

U. S. BUREAU OF MINES
Area VI Mineral Resource Office
Reno Field Office

TABLE OF CONTENTS

FINAL REPORT

STRUCTURAL SURVEY OF PRIVATE MINING PROPERTIES

PROJECT SHOAL

I INTRODUCTION

1.1 Authority

This survey was conducted in accordance with the Operational Safety Plan for Project Shoal, dated May 1963.

1.2 Purpose and Scope

Mine structures were surveyed to document any physical changes resulting from the Shoal event. Thirteen privately owned mining properties within a 20-mile radius of ground zero had been previously selected by the United States Bureau of Mines (USBM) as susceptible to potential damage from this test. Three additional mines, outside the 20-mile radius, were also examined at the owners' requests. The inspection team included representatives of USBM, United States Public Health Service (USPHS), the Office of the Nevada State Mine Inspector, and Holmes & Narver, Inc., (H&N). Photographic support was provided through H&N procurement.

The Operational Safety Plan stressed the insurance of public safety as well as the assessment of property damage.

1.3 Summary

Minor rock falls, about one cubic foot each, were observed at two properties. These falls caused no damage, and no damage which could be attributed to the Shoal event was observed at any of the properties. A detailed report of each property is contained in Appendix B.

1.4 Background

Preliminary investigations of all active and inactive private mining operations within a 20-mile radius of ground zero were made by the United States Bureau of Mines (USBM) prior to this inspection. The thirteen mines selected for examination are located in the Sand Springs Mining District, Fairview Mining District, Chalk Mountain Mining District, which are all in

Churchill County, and in the Regent Mining District, Mineral County. At the special request of the mine owners, three additional mines outside the 20-mile radius were also examined. These mines were at radial ranges of about 22.3, 31.1, and 52 miles from surface zero in the Broken Hills, Eastgate, and Bell Mining Districts, respectively. A summary of the sixteen mining properties is shown in Table I.

The site for the Shoal event is the Sand Springs Range, Churchill County, Nevada, about 28 miles southeast of Fallon, Nevada. The approximate surface zero location is the SW 1/4, Section 34, Township 16 North, Range 37 East, Mount Diablo base line and meridian (MDB&M). The working point at surface zero is 1,620,173.9 north and 557,543.6 east, USC&GS Nevada Grid. This area is one of recent seismic activity, the earthquakes of December 1954 being the most destructive within the last decade.

The Shoal event was conducted on October 26, 1963 (D-day). The pre-shot survey was made between D-26 and D-22 days, with the exception of the Buffalo Hump Mine which was inspected on D-4. The postshot survey was made between D-day and D+6 days.

II MINERAL DEPOSITS

2.1 Geology

The Sand Springs Range is a northerly elongated, nearly batholitic sized, igneous intrusion about 20 miles long and 3 to 5 miles wide. The intrusion is granitic to granodioritic in composition, locally porphyritic, and of probable Cretaceous age. Many aplite-pegmatite dikes are found in the granitic intrusion. Surface elevations vary from 5000 to 5600 feet in the northern part of the range. Maximum elevations in the southern part average between 6600 and 6800 feet. The eastern part of the range is characterized as a plateau of low relief with long broad canyons while the western part is bordered by steep scarps with narrow steep-walled canyons. The plateau is typically 1000 to 1300 feet above the adjacent valley floor.

The granitic intrusion is in contact with metamorphic rock sequences of probable Mesozoic and older age. Both the granitic and metamorphic rocks are intruded by Quaternary-Tertiary rhyolite dikes and basalt flows. Erosional processes during Recent and Pleistocene time associated with ancestral Lake Lahontan have deposited extensive alluvial and eolian material. Geophysical gravity studies along U. S. Highway 50 across Fairview Valley indicate a possible thickness of unconsolidated alluvium of about 5800 feet. Similar work across Fourmile Flat shows a thickness of alluvium and metamorphic rubble of about 2000 feet.

Major faults of the Sand Springs Range trend about N 50 W forming a parallel system of high-angle uplifted blocks. Another system of similar faults but trending N 30 E contains evidence of horizontal movement. These fault systems with accompanying joints and cleavage have created a closely spaced fracture pattern throughout the entire range. Most of the aplite-pegmatite, andesite, and rhyolite dikes are intruded along these faults. A thrust fault of unknown magnitude is found near the granite-metamorphic contact south of U. S. Highway 50 in the northern part of the range.

2.2 Ore Deposits

Ore deposits of the Sand Springs Range locality are tungsten contact deposits, silver-gold veins, lead-silver veins, silica and barite veins, and salt evaporite beds. The relation of these mineral deposits to the generalized geology in the Shoal area is shown in Table II.

Tungsten mineralization occurs as contact metasomatic deposits in metamorphic rock sequences, most frequently in marbleized limestone, and near the contact with the granitic intrusion. Scheelite and powellite occur with garnet, cordierite, diopside, and other common skarn minerals.

Silver-gold and lead-silver veins are found in fault and shear zones cutting metamorphic rocks. Andesite and rhyolite dikes intruded along fault zones contain vuggy quartz, fault breccia, calcite, and pyrite. The veins are usually offset by cross-faults. In the Sand Springs area, a difference in genetic origin is indicated wherein the gold-silver veins are associated more with volcanic extrusives and fissure zones while the lead-silver veins are more commonly associated with intrusive dikes and contact replacement deposits.

Silica and barite veins occur with extrusive andesite and rhyolite rocks in faulted metamorphic rock sequences. The silica veins commonly occur as vuggy milky quartz and the barite veins are commonly associated with limestone-dolomite rocks.

Salt is obtained from Fourmile Flat where it is harvested in the fall after evaporation of salt saturated water during the summer. A minable crust of several inches of salt is formed as a result of summer evaporation of saturated salt water from playa lake sediments. The water source is from winter rains and snows from mountainous surroundings.

III INSPECTION PROCEDURE

3.1 Pre-shot

Preliminary conferences were held with mine owners or representatives to determine which properties they considered susceptible to damage. Company and USBM mine maps were reviewed in planning a survey which would include all safely accessible mine workings. The Nevada State Mine Inspector determined accessibility and safety conditions at all mines. As each mine structure was examined by the inspection team, its condition was documented and photographs taken. Special attention was given to shafts, shaft stations, ore pockets, pump installations, pillars and stopes, and other mine and geologic structural features susceptible to damage. Ninety-two photographs were selected for the formal pre-shot report.

All active operations were given advance notice of the event.

3.2 Postshot

Following inspection procedures similar to those in the pre-shot inspection, the same mine structures and areas were again examined, photographed, and documented. A representative of USPHS established background radiation levels to determine postshot contamination. Pre- and postshot radiation levels in the mines are shown in Table III.

Seventy-eight postshot photographs in Appendix C are marked by a three-number code to designate (1) the order of mine inspection, (2) the number of that individual photograph taken at that mine, and (3) the cumulative number of photographs taken.

IV SUMMARY OF INSPECTION OBSERVATIONS

4.1 Pre-shot

The pre-shot examination of sixteen privately owned mining properties found only four mining operations presently active and inhabited. These were the Fallon Development Company, with two daytime workmen, the Northern Dipper Mine, with one resident, the Broken Hills Claims, with one family in residence, and the Simon Mine which has about 10 men in two mining crews working two shifts.

The Nevada Scheelite Mine conducts a metallurgical operation, although the mine is shut down, and supports an adjacent community of some 80 people. The remaining mining properties are either abandoned or inactive.

Rock types penetrated by mine workings include alluvial deposits, near vertical thin-bedded metamorphic rock sequences, massive rhyolite flows, and narrow vein systems in zones of heavily fractured and faulted rocks. Stopes, open cuts, drifts, and adits excavated in these rocks are typically narrow, but long and deep. Even though rock spans in some narrow stopes approach 100 feet, they all have stood for many years in their present condition. These excavations are open stopes and cuts which are either not supported, partially supported with timber stulls, or supported by square-set timber methods as at the Nevada Scheelite Mine. Timber supports examined in abandoned mines are either partially caved, intentionally dismantled, or in a decayed condition typical of many years exposure to the desert climate. Timber supports examined in operating mines are in good condition and constructed in accordance with accepted mining practices.

The pre-shot mine survey supported the conclusion that none of the sixteen mines examined was expected to sustain any damage from the Shoal event although mine excavations of diverse dimension, orientation, and geometry has been constructed in numerous rock types. Protective measures for the privately owned mines were not regarded as necessary.

4.2 Postshot

Only negligible change was observed at two mines, and there were no indications of physical change to any of the other mines.

In a presently unused drift on the 100-foot level of the Northern Dipper Mine a few minor rock falls occurred between the pre- and postshot surveys. The fallen rock, which totalled about one cubic foot, was in a previously weakened and loosened condition, and was so noted on the pre-shot report. Numerous other minor rock falls were evident in this drift on the pre-shot inspection. The fallen rock does not impair present mine operations and would, in normal mining practice, be expected for an unsupported drift in heavily faulted rock.

At the Nevada Scheelite Mine a few very minor rock falls occurred between the pre- and postshot surveys. The total amount of fallen rock is estimated at about one cubic foot. Without exception, all these rock falls occurred at locations where ground water seeped into the mine and weakened the rock, especially the clay along rock joints. This fallen rock would not impair mine operations.

Radiation survey measurements by the USPHS indicated no measurable differences between pre-shot and postshot radiation levels in the mines.

V CONCLUSIONS

The pre-shot and postshot mine surveys indicated that no damage attributable to the Shoal event occurred to any of the sixteen private mining properties. The only evidence of physical change was found in the Northern Dipper and Nevada Scheelite Mines where minor rock falls occurred between the pre- and postshot mine surveys. All the rock falls were in mine areas not in present use, and it is not certain that these rock falls were caused by the Shoal event. Measurements by the USPHS indicated no measurable differences between pre-shot and postshot radiation levels. It is concluded from the pre- and postshot mine inspection surveys that the Shoal event caused neither physical damage nor radiation contamination to the mine properties inspected. Future events in a similar environment can be conducted with negligible damage to mine workings. The Operational Safety Plan was adequate to accomplish the outlined objectives for Project Shoal.

REFERENCES

1. Pre-shot and Postshot Structures Survey, Project Shoal, Final Report, HN-20-1003, Holmes & Narver, Inc., Atomic Test Support Organization, Las Vegas Office, December 1963, 186 pages.

2. Nevada Bureau of Mines - Geological, Geophysical and Hydrological Investigations of the Sand Springs Range, Fairview Valley and Fourmile Flat, Churchill County, Nevada, for Shoal Event; University of Nevada, Reno, Nevada, September 1962, 128 pages.

3. Twenhofel, W. S., Moore, J. E., Black, R. A. - Preliminary Evaluation of the Seismicity, Geology, and Hydrology of the Northern Sand Springs Range, Churchill County, Nevada, as a possible site for Project Shoal, U. S. Geological Survey, TEI 796, July 1961, 21 pages.

4. U. S. Bureau of Mines, Area VI Mineral Resources Office, Reno Field Office - Various published and unpublished mining reports of the Sand Springs Range locality.

5. AEC/NVOO - Operational Safety Plan, Project Shoal, May 1963, page 9 (OFFICIAL USE ONLY).

APPENDIX A

TABLES AND LOCATION MAP

TABLE I

LIST OF MINING PROPERTIES *

Property and Owner	County, Mining District, Location
Fallon Development Company Mr. Elmer J. Huckaby Harrigan Road Fallon, Nevada	Churchill County Sand Springs Mining District Sec. 12, T 16 N - R 31 E 5.97 miles from surface zero
Hoover Claims Mr. Charles M. Hoover 39 Nevada Street Fallon, Nevada	Churchill County Sand Springs Mining District Sec. 11, T 16 N - R 32 E 4.92 miles from surface zero
Summit King Mine Summit King Mines, Ltd. 320 Marine Building 335 Burrand Street Vancouver, B. C., Canada	Churchill County Sand Springs Mining District Sec. 1, T 16 N - R 32 E 5.12 miles from surface zero
Northern Dipper Mine Mr. Richard J. Kemp 466 Cedar Street Reno, Nevada	Churchill County Sand Springs Mining District Sec. 1, T 16 N - R 32 E 5.20 miles from surface zero
Dromedary Hump Mine Dromedary Hump Consolidated Mines, Inc. Mr. E. W. Stratton 287 South Broadway Fallon, Nevada	Churchill County Fairview Mining District Sec. 16, T 16 N - R 34 E 11.9 miles from surface zero
Aldona Mine Dr. C. P. McCuskey 395 Williams Street Fallon, Nevada	Churchill County Sand Springs Mining District Sec. 23, T 17 N - R 34 E 16.3 miles from surface zero
Red Top Mine Mr. Cye Cox 269 West Center Street Fallon, Nevada	Churchill County Sand Springs Mining District Sec. 12, T 16 N - R 32 E 4.55 miles from surface zero
Red Ant & East End Mines Mr. Cye Cox 269 West Center Street Fallon, Nevada	Churchill County Sand Springs Mining District Sec. 21, T 15 N - R 32 E 3.89 miles from surface zero

* Listed in order of inspection

TABLE I (cont.)

Property and Owner	County, Mining District, Location
Happy Return Mine Mrs. A. F. Rachel Rawhide, Nevada	Mineral County Regent Mining District Sec. 27, T 14 N - R 32 E 10.4 miles from surface zero
Mint Mine & Grutt Hill Mine c/o Grutt Estate Mr. H. E. Dunning (Atty) 6420 Fair Oaks Blvd. Carmichael, California	Mineral County Regent Mining District Sec. 5, T 13 N - R 32 E 12.8 miles from surface zero
Nevada Scheelite Mine Kennametal, Inc. Mr. E. H. Colwell (Mgr.) 347 Taylor Street Fallon, Nevada	Mineral County Regent Mining District Sec. 12, T 13 N - R 32 E 13.0 miles from surface zero
Robinson-Simkin Ace Claims Mr. Richard Robinson Mr. G. L. Simkin Box 613 Fallon, Nevada	Mineral County Regent Mining District Sec. 34, T 14 N - R 33 E 13.6 miles from surface zero
Highland Mine (includes Eagle Mine) Mr. Fred W. Steiner, Jr. P. O. Box 2171 Reno, Nevada	Mineral County Regent Mining District Sec. 34, T 14 N - R 33 E 13.6 miles from surface zero
Broken Hills Claims Mr. Henry A. Peterson P. O. Box 350 Fallon, Nevada	Mineral County Broken Hills Mining District Sec. 23, T 14 N - R 35 E 22.3 miles from surface zero
Simon Mine Federal Resources Corporation 1370 South Third West Street Salt Lake City 15, Utah	Mineral County Bell Mining District Sec. 7, T 8 N - R 37 E 52 miles from surface zero
Buffalo Hump Mine Dr. F. H. Shambaugh 179 South LaVerne Street Fallon, Nevada	Churchill County Eastgate Mining District Sec. 15, T 15 N - R 37 E 31.5 miles from surface zero

TABLE II

RELATION OF MINERAL DEPOSITS AND MINE WORKINGS TO GENERALIZED GEOLOGY

PROJECT SHOAL AREA

Description	Geologic Age	Principal Mine Working
Recent shallow-lake lacustrine and playa deposits of sand, silt, and clay with coarse alluvial deposits. These sediments are interbedded and age transgressive. Most prominent in Fourmile and Labou Flats.	Very recent and recent	Evaporite salt ponds
Lake Lahontan eolian, lacustrine and undifferentiated sedimentary deposits of gravels, sands, silts and clays, with interbedded coarse alluvium.	Late Pleistocene	Some shaft collars and adit portals
Volcanic rocks of olivine, basalt, andesite, rhyolite, dacite, and tuffs, includes intrusives and flows.	Quaternary-Tertiary	Gold and silver mines
Granite of the Sand Springs batholith. Medium to coarse-grained, locally porphyritic, granite to granodiorite in composition. Aplite-pegmatite dikes intrude the granitic body. Rhyolite dikes intrude both the granite and andesite dikes.	Cretaceous	Tungsten mines are on the contact with metamorphic rocks
Metamorphic rocks. Interlayered rock units of phyllite, schist, slate, and hornfel. Also includes marbleized limestone and dolomitic-limestones	Mesozoic and older	Minable veins of lead-silver, silica, and barite where intruded by Tertiary rocks

TABLE III

RADIATION READINGS, MINE INSPECTION SURVEY

United States Public Health Service

Mine and Location	Gamma @ 3-feet (mr/hr)		Beta-Gamma @ 3-feet (mr/hr)		Beta-Gamma @ 6-inches (mr/hr)	
	Pre-shot	Post-shot	Pre-shot	Post-shot	Pre-shot	Post-shot
Fallon Development Co.						
East edge salt pile	0.015	0.015	0.02	0.025	0.02	0.02
West edge salt pile	0.015	0.01	0.01	0.01	0.025	0.01
North edge salt pile	0.015	0.01	0.025	0.01	0.015	0.01
Hoover Claims						
North shaft	0.02	0.02	0.03	0.04	0.025	0.04
Northeast shaft	0.02	0.015	0.035	0.03	0.035	0.04
Southeast shaft	0.025	0.02	0.04	0.03	0.04	0.03
Southwest shaft	0.02	0.015	0.03	0.035	0.04	0.05
Northwest shaft	0.02	0.015	0.025	0.04	0.06	0.04
Summit King Mine						
Main shaft	0.02	0.01	0.03	0.04	0.035	0.04
Northern Dipper Mine						
Main shaft	0.02	0.02	0.03	0.02	0.03	0.02
100-foot station *	0.025	0.015	0.035	0.02	- -	0.02
100 feet in 100 level *	0.035	0.015	0.04	0.02	0.04	0.02
150-foot station *	0.025	0.02	0.035	0.03	0.035	0.03
40 feet in 150 level *	0.02	0.02	0.04	0.03	0.03	0.03
Dromedary Hump Mine						
Main shaft	0.015	0.02	0.03	0.03	0.05	0.035
Central shaft	0.03	0.015	0.03	0.03	0.035	0.035
East shaft	0.025	0.02	0.035	0.03	0.045	0.03
Aldona Mine						
Main shaft	0.015	0.02	0.02	0.02	0.025	0.02
Big Ben shaft	0.02	0.015	0.02	0.035	0.025	0.04
Red Top Mine						
East shaft	0.02	0.02	0.03	0.025	0.035	0.025
West shaft	0.025	0.015	0.04	0.03	0.045	0.035

* Underground reading - all others are surface readings.

TABLE III (Cont'd)

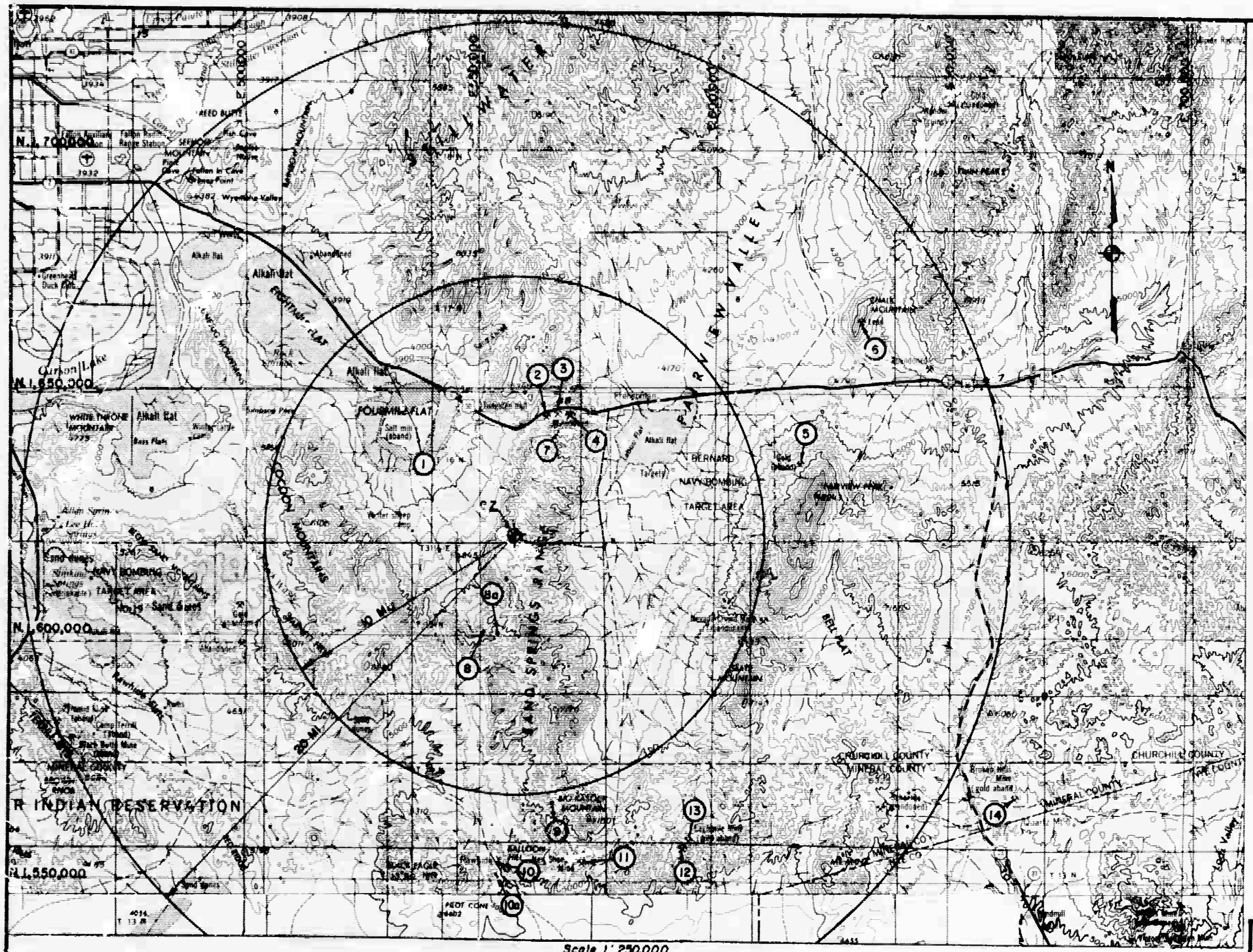
Mine and Location	Gamma @ 3-feet (mr/hr)		Beta-Gamma @ 3-feet (mr/hr)		Beta-Gamma @ 6-inches (mr/hr)	
	Pre-shot	Post-shot	Pre-shot	Post-shot	Pre-shot	Post-shot
Red Ant and East End Mine						
West shaft	0.025	0.025	0.05	0.035	0.05	0.045
No. 2 adit portal	0.02	0.02	0.035	0.045	0.035	0.05
East shaft	0.015	0.025	0.03	0.03	0.04	0.035
Happy Return Mine						
Main shaft	0.025	0.015	0.035	0.025	0.04	0.03
Adit portal	0.02	0.015	0.03	0.025	0.03	0.03
Mint Mine						
Main shaft	0.02	0.025	0.035	0.035	0.04	0.04
Adit portal	0.03	0.02	0.045	0.04	0.075	0.045
Grutt Hill Mine						
East shaft	0.025	0.015	0.04	0.025	0.04	0.035
West shaft	0.03	0.02	0.035	0.03	0.045	0.03
Nevada Scheelite Mine						
Main shaft	0.025	0.02	0.03	0.03	0.03	0.04
100-foot station *	0.015	0.025	0.03	0.035	0.045	0.04
250 stope *	0.015	0.03	0.045	0.04	0.045	0.04
200-foot station *	0.015	0.03	0.03	0.035	0.035	0.035
310 stope *	0.02	0.025	0.06	0.045	0.06	0.045
300-foot station *	0.025	0.025	0.05	0.03	0.05	0.03
300 stope *	0.03	0.025	0.04	0.04	0.04	0.04
400-foot station *	0.015	0.025	0.03	0.025	0.03	0.025
745A stope *	0.03	0.015	0.05	0.025	0.05	0.025
1000 winze *	0.02	0.02	0.04	0.02	0.04	0.02
Robinson-Simkin Ace Claim						
Main shaft	0.015	0.025	0.03	0.04	0.03	0.04
Highland and Eagle Mines						
West adit	0.02	0.03	0.04	0.05	0.04	0.05
West shaft	0.01	0.02	0.02	0.04	0.02	0.04
South adit	0.02	0.02	0.03	0.05	0.03	0.05
North shaft	0.025	0.02	0.03	0.04	0.04	0.05

* Underground reading - all others are surface readings.

TABLE III (Cont'd)

Mine and Location	Gamma @ 3-feet (mr/hr)		Beta-Gamma @ 3-feet (mr/hr)		Beta-Gamma @ 6-inches (mr/hr)	
	Pre-shot	Post-shot	Pre-shot	Post-shot	Pre-shot	Post-shot
Broken Hills Claims						
Main shaft	0.010	0.02	0.02	0.03	0.02	0.03
Simon Mine						
Main shaft	0.015	0.02	0.015	0.025	0.02	0.03
350-foot station *	0.013	0.015	0.015	0.02	0.02	0.02
500-foot station *	0.015	0.015	0.02	0.02	0.025	0.02
Buffalo Hump Mine						
Portal of north adit	0.02	0.02	0.03	0.04	0.03	0.05
Portal of central adit	0.015	0.02	0.025	0.04	0.03	0.04

* Underground reading - all others are surface readings.



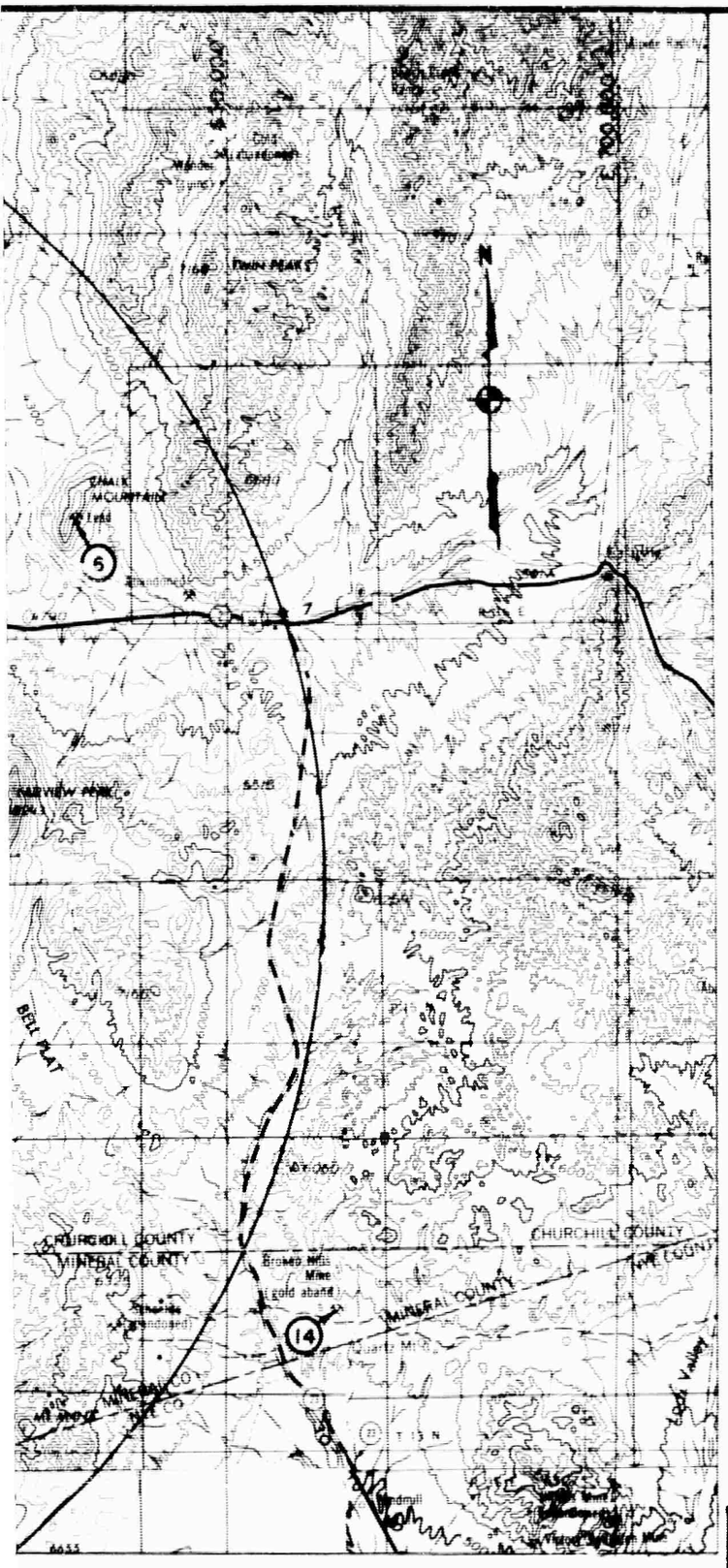
Index to Mining Properties

Number	Name
1	Fallon Development Company
2	Hoover claims
3	Summit King Mine
4	Northern Dipper Mine
5	Dromedary Hump Mine
6	Aldona Mine
7	Red Top Mine
8 8a	Red Ant and East End Mine
9	Happy Return Mine
10 10a	Mint Mine and Grutt Hill Mine
11	Nevada Scheelite Mine
12	Robinson-Simkin Ace Claims
13	Highland Mine (includes Eagle Mine)
14	Broken Hills Claims
15*	Simon Mine
16*	Buffalo Hump Mine

*beyond the limits of this map

PROJECT SHOAL
LOCATION MAP
FALLON, NEVADA

HOLMES & NARVER, INC.
ENGINEERS-CONSTRUCTORS
ATOMIC TEST SUPPORT ORGANIZATION LAS VEGAS OFFICE
3030 S. HIGHLAND DRIVE LAS VEGAS, NEVADA



Index to Mining Properties

Number	Name
1	Fallon Development Company
2	Hoover claims
3	Summit King Mine
4	Northern Dipper Mine
5	Dromedary Hump Mine
6	Aldona Mine
7	Red Top Mine
8 8a	Red Ant and East End Mine
9	Happy Return Mine
10 10a	Mint Mine and Grutt Hill Mine
11	Nevada Scheelite Mine
12	Robinson-Simkin Ace Claims
13	Highland Mine (includes Eagle Mine)
14	Broken Hills Claims
15*	Simon Mine
16*	Buffalo Hump Mine

*beyond the limits of this map

PROJECT SHOAL
LOCATION MAP
FALLON, NEVADA

HOLMES & NARVER, INC.

ENGINEERS-CONSTRUCTORS
ATOMIC TEST SUPPORT ORGANIZATION LAS VEGAS OFFICE
3030 S. HIGHLAND DRIVE LAS VEGAS, NEVADA

BLANK PAGE

APPENDIX B

INSPECTION REPORTS

(Listed in chronological order of inspection)

FALLON DEVELOPMENT COMPANY

Ownership

Mr. Elmer J. Huckaby, Agent
Harrigan Road, Fallon, Nevada

Dates Examined

September 30, 1963
November 4, 1963

Location

317° azimuth grid north; 31,500 feet from surface zero
N 1,643,000, E 536,500 (USC&GS Nevada Grid)
Plant in Section 12, T 16 N - R 31 E (MDB&M)
Settling pond covers portions of Sections 1, 2, 11, 12, 13, 14
Indicated map elevation, 3890 feet

Inspection Team

Mr. Elmer J. Huckaby, Agent, Fallon Development Company *
Mr. George H. Holt s, Jr., U. S. BuMines, Reno Field Office
Mr. Mervin J. Gallagher, Nevada State Mine Inspector *
Mr. Leonard F. Traynor, Deputy State Mine Inspector *
Mr. Paul J. Gaul, Holmes & Narver, Inc., Las Vegas Office
Mr. Eugene H. Skinner, Holmes & Narver, Inc., Las Vegas Office
Mr. Donald J. Stanton, U. S. Public Health Service *
Mr. Richard P. Kingsley, U. S. Public Health Service

Resume of Geology

Minable crust of several inches of sodium chloride, formed as a result of summer evaporation of saturated salt water from playa lake sediments. As planimetered from topographic maps, the water pond covers about 2.9 square miles. The property lies in Fourmile Flat to the northeast of the Sand Springs Range.

Surface Plant

Necessary equipment needed to scrape the salt crust from settling ponds and into a central pile; screening machinery, ore bins, conveyor and loading docks. No refinery facilities.

Underground Workings

None.

* Pre-shot only.

Photo Record

Photo No. 1-1-1. At central salt pile looking southeast across the settling salt pond toward surface zero about six miles distant. A heavy rain occurred between the pre- and postshot surveys, raising the water level.

Photo No. 1-2-2. Northeast across the salt pond and toward the north end of the Sand Springs Range.

Photo No. 1-3-3. Northwest along the access road and northern portion of the salt pond.

Instrumented Measurements

A survey line was run on approximate compass bearings north, south, east, and west across Fourmile Flat. The minimum survey accuracy was third order with both horizontal and vertical control. Station 0+00 was toward the ground zero side immediately to the south of the central salt pile. The survey line ran 6000 feet west, 3250 feet south, and 3000 feet both east and north of the central salt pile. A total of 62 survey points were established with stationing every 250 feet. The arithmetic average of all survey station elevations was 3890.85 feet. Survey measurements made both pre- and postshot indicated no measurable permanent ground displacement either horizontally or vertically.

Postshot Damage

No damage resulting from the Shoal event was observed to the inspected portions of this property.

HOOVER CLAIMS

Ownership

Mr. Charles M. Hoover
30 Nevada Street, Fallon, Nevada

Dates Examined

September 30, 1963
October 29, 1963

Location

15° azimuth grid north; 26,000 feet from surface zero
N 1,645,000, E 564,500 (USC&GS Nevada Grid)
Section 11, T 16 N - R 32 E (MDB&M)
Indicated map elevation, 4640 feet

Inspection Team

Mr. George H. Holmes, Jr., U. S. BuMines, Reno Field Office
Mr. Mervin J. Gallagher, Nevada State Mine Inspector *
Mr. Leonard F. Traynor, Deputy State Mine Inspector *
Mr. Paul J. Gaul, Holmes & Narver, Inc., Las Vegas Office
Mr. Eugene H. Skinner, Holmes & Narver, Inc., Las Vegas Office
Mr. Donald J. Stanton, U. S. Public Health Service *
Mr. Richard P. Kingsley, U. S. Public Health Service

Resume of Geology

Free gold occurs in a steeply dipping east-west silicified shear zone of schist, limestone, and andesite country rocks. The area is heavily fractured and faulted. The property lies immediately south of U. S. Highway 50 in the northern portion of the Sand Springs Range. Property active during the 1930's and to 1942. No activity since early 1950's.

Surface Plant

None. All mining and metallurgical equipment has been dismantled and removed. No hoisting facilities.

Underground Workings

The underground workings were not safely accessible. Two vertical and three inclined shafts are the only remaining evidence of underground mining.

* Pre-shot only.

Photo Record

Photo No. 2-1-4. North two-compartment vertical shaft. Some lagging gone, no partition with manway. Timbered dimensions are 6 x 4 feet. This shaft is reportedly 225 feet deep, but is blocked with debris and water at an estimated 50 feet.

Photo No. 2-2-5. Northeast one-compartment shaft inclined at 65 degrees for about 20 feet, then inclined at an estimated 45 degrees. Some sets and lagging caved, with debris in shaft. Timbered dimensions are 8 x 6 feet. Shaft sunk in 1953 and is only about 30 feet deep.

Photo No. 2-3-6. Southeast one-compartment shaft, about 200 feet long, inclined at 60 degrees, but flattens at depth. Shaft collar and lagging caved, with no sets below collar sets. Generally in weakened and caved condition near surface. Combination bucket guide and ladder in place. Timbered dimensions are 8 x 6 feet.

Photo No. 2-4-7. Southwest two-compartment shaft inclined at 60 degrees. Sets, lagging, and ladder in place. No partition with manway, nor cage guides. Timbered dimensions are 9 x 6 feet. Reportedly about 200 feet long.

Photo No. 2-5-8. Northwest two-compartment vertical shaft, reportedly 250 feet deep. Lagging, sets, and ladders with landings every two sets in place. No partition with manway, nor cage guides on manway side. Timbered dimensions are 10 x 6 feet.

Postshot Damage

No damage resulting from the Shoal event was observed to the inspected portions of this property.

SUMMIT KING MINE

Ownership

Summit King Mines, Ltd.
320 Marine Building
335 Burrand Street
Vancouver, B. C., Canada

Dates Examined

September 30, 1963
October 29, 1963

Location

19° azimuth grid north; 27,000 feet from surface zero
N 1,645,500, E 565,500 (USC&GS Nevada Grid)
Sections 1 and 12, T 16 N - R 32 E (MDB&M)
Indicated map elevation, 4640 feet

Inspection Team

Mr. George H. Holmes, Jr., U. S. BuMines, Reno Field Office
Mr. Mervin J. Gallagher, Nevada State Mine Inspector *
Mr. Leonard F. Traynor, Deputy State Mine Inspector *
Mr. Paul J. Gaul, Holmes & Narver, Inc., Las Vegas Office
Mr. Eugene H. Skinner, Holmes & Narver, Inc., Las Vegas Office
Mr. Donald J. Stanton, U. S. Public Health Service *
Mr. Richard P. Kingsley, U. S. Public Health Service

Resume of Geology

Free gold occurs in a steeply dipping east-west silicified shear zone of schist, limestone, and andesite country rocks. The property lies immediately south of U. S. Highway 50 in the northern portion of the Sand Springs Range. Extensively worked during the 1930's and, except for World War II, to 1951. Since 1951 the mine has been inactive.

Surface Plant

None. All mining and milling equipment has been removed. Only the concrete foundation for the mill remains.

Underground Workings

The underground workings were not safely accessible. A main vertical shaft with an inclined access haulage compartment connecting to the first level is the only mine structure. The shaft had been bulkheaded by the owner at the first level, about 60 feet.

* Pre-shot only.

Photo Record

Photo No. 3-1-9. Two-compartment haulage shaft inclined at 45 degrees to intersection with main vertical shaft at about 60 feet. Sets and combination ladder and skip guides in place. No lagging or partition with manway. Shaft is in caved condition near surface. Timbered dimensions are 8 x 4 feet. The main shaft reportedly is about 500 feet deep.

Photo No. 3-2-10. Surface view of inclined shaft on left, main shaft on right. Collars of both shafts are partially dismantled and in a caving condition especially near the surface. A large amount of timber debris covers the surface area.

Postshot Damage

No damage resulting from the Shoal event was observed to the inspected portions of this property.

NORTHERN DIPPER MINE

Ownership

Mr. Richard J. Kemp and
Mr. E. R. Wade
466 Cedar Street, Reno Nevada

Dates Examined

September 30, 1963
October 29, 1963

Location

22° azimuth grid north; 27,500 feet from surface zero
N 1,645,500, E 568,000 (USC&GS Nevada Grid)
Section 1, T 16 N - R 32 E (MDB&M)
Indicated map elevation, 4720 feet

Inspection Team

Mr. E. R. Wade (Owner)
Mr. George H. Holmes, Jr., U. S. BuMines, Reno Field Office
Mr. Mervin J. Gallagher, Nevada State Mine Inspector *
Mr. Leonard F. Traynor, Deputy State Mine Inspector *
Mr. Eugene H. Skinner, Holmes & Narver, Inc., Las Vegas Office
Mr. Donald J. Stanton, U. S. Public Health Service *
Mr. Richard P. Kingsley, U. S. Public Health Service

Resume of Geology

This property consists of exploratory workings on the eastern extension of the Summit King mineralized zone. The property lies immediately south of U. S. Highway 50 in the northern portion of the Sand Springs Range. No recorded production. Presently active.

Surface Plant

Exploration sinking type single-drum gasoline-powered hoist with wooden headframe. Also portable compressor, mine cars, wooden ore bin, and related mining equipment. No milling equipment.

Underground Workings

Single-compartment unlined exploratory shaft inclined 55 degrees towards the south to the 100-foot level and then inclined 35 degrees to the 150-foot level. The 100-level workings consist of a development drift leading towards the Summit King Mine and crossing the shear zone. The 150-level consists of a drift following another shear zone.

* Pre-shot only.

Photo Record

Photo No. 4-1-11. View at 100-foot level of main shaft looking down t 150-level. Shaft inclined at about 35 degrees to lower level.

Photo No. 4-2-12. View looking back along 150-foot level development drift toward shaft station. Miscellaneous equipment scattered along drift.

Photo No. 4-3-13. Rock along back at 150-foot level shaft station. The rock is in a generally loosened condition.

Photo No. 4-4-14. Rock walls at the intersection between development drift and cross-cut on 150-foot level.

Photo No. 4-5-15. At the 100-foot level shaft station looking upward. The inclination of the upper shaft is 55 degrees to the 100-foot level and 35 degrees to the 150-foot level. No constructed shaft structure but occasional 6 x 6-inch timber stulls are used for support. Rock dimensions are irregular about 8 x 5 feet. Ladderway, bucket guides, ventilation pipe and air line in place.

Photo No. 4-6-16. Intersection between main drift and cross-cut at shear zone on 100-foot level. Drift dimensions are about 6 x 4 feet. The rock at this intersection is in a broken and loose condition.

Photo No. 4-7-17. Minor rock falls along main drift crossing contact with shear zone on the 100-foot level. The drift dimensions are about 6 x 4 feet and the bearing is about north-south. All development drifts are unsupported.

Postshot Damage

Since the pre-shot survey, a small amount of rock (less than two cubic feet) had fallen along an unused drift at the 100-foot level. This dislodged rock does not affect mine operations.

DROMEDARY HUMP MINE

Ownership

Mr. E. W. Stratton
287 South Broadway
Fallon, Nevada

Dates Examined

September 30, 1963
October 29, 1963

Location

75° azimuth grid north; 63,000 feet from surface zero
N 1,636,000, E 619,000 (USC&GS Nevada Grid)
Section 16, T 16 N - R 34 E, unsurveyed (MDB&M)
Indicated map elevation, 5800 feet

Inspection Team

Mr. George H. Holmes, Jr., U. S. BuMines, Reno Field Office
Mr. Mervin J. Gallagher, Nevada State Mine Inspector *
Mr. Leonard F. Traynor, Deputy State Mine Inspector *
Mr. Paul J. Gaul, Holmes & Narver, Inc., Las Vegas Office
Mr. Eugene H. Skinner, Holmes & Narver, Inc., Las Vegas Office
Mr. Donald J. Stanton, U. S. Public Health Service *
Mr. Richard F. Kingsley, U. S. Public Health Service

Resume of Geology

Gold and silver occur in steeply dipping northwest striking faulted fissure veins in silicified andesites and rhyolites. The property lies in an eroded canyon of moderately steep relief on the northwest flank of Fairview Peak (elevation 8243 feet). The greatest production was during the period 1906-1917. Sporadic activity during 1920's and 1930's. Presently inactive.

Surface Plant

All mining and milling equipment has been dismantled and removed. A large abandoned mill building remains. Several other mine buildings are in disrepair. Portions of two mine hoists and a timber headframe over one shaft remain.

Underground Workings

The underground workings were not safely accessible. Three timbered shafts and several unlined ventilation and escape shafts are visible mine structures, all of which are in disrepair.

* Pre-shot only.

Photo Record

Photo No. 5-1-18. Main vertical shaft. Timbered dimensions are 7 x 5 feet. Reported depth is about 600 feet. Lagging, sets, and cage guides in place. Some sets in good rock have no lagging. One compartment timber construction without manway.

Photo No. 5-2-19. East vertical one compartment shaft. Timbered dimensions are 6 x 4 feet. Reported depth is about 400 feet. Some lagging and sets partially caved. Ladderway partially collapsed. No cage guides at collar sets. Shaft collar in caved and weakened condition. Steel hand winch in disrepair over shaft.

Photo No. 5-3-20. Central vertical shaft. Timbered dimensions are 7 x 6 feet. Other than two timber sets at the shaft collar, the shaft is unsupported. Some lagging from these surface sets is gone while other lagging is in a warped and sprung condition. The shaft is in an incipient caved condition at the surface.

Postshot Damage

No damage resulting from the Shoal event was observed to the inspected portions of this property.

Ownership

Dr. C. P. McCuskey
395 Williams Street
Fallon, Nevada

Dates Examined

September 30, 1963
October 29, 1963

Location

59° azimuth grid north; 86,500 feet from surface zero
N 1,665,000, E 632,000 (USC&GS Nevada Grid)
Section 23, T 17 N - R 34 E, unsurveyed (MDB&M)
Indicated map elevation, 4900 feet

Inspection Team

Mr. George H. Holmes, Jr., U. S. BuMines, Reno Field Office
Mr. Mervin J. Gallagher, Nevada State Mine Inspector *
Mr. Leonard F. Traynor, Deputy State Mine Inspector *
Mr. Paul J. Gaul, Holmes & Narver, Inc., Las Vegas Office
Mr. Eugene H. Skinner, Holmes & Narver, Inc., Las Vegas Office
Mr. Donald J. Stanton, U. S. Public Health Service *
Mr. Richard P. Kingsley, U. S. Public Health Service

Resume of Geology

Replacement lead-silver ores occur along fracture and bedding planes of steeply dipping faulted massive limestone beds. The property lies on the east flank of a small uplifted fault block of limestone known as Chalk Mountain in the east-central part of Fairview Valley. The greatest production of oxidized ores was realized during the 1920's, with leasing during the 1930's and 1940's. Development work was conducted between 1952 and 1958 with some ore shipped. There was further exploration between 1955 and 1960. Presently inactive.

Surface Plant

Partially dismantled hoist equipment with wooden headframes in disrepair on two shafts. No mining or milling equipment or buildings.

Underground Workings

The underground workings were not safely accessible. Two shafts, several prospect adits, and open cuts are visible.

* Pre-shot only.

Photo Record

Photo No. 6-1-21. Main vertical two-compartment shaft, reportedly about 500 feet deep. Timbered dimensions are 10 x 6 feet. Lagging, sets, cage guides, and ladderway with landings every two sets in place. No partition with manway. The cage is locked in place at the shaft collar by timbers across the bonnet.

Photo No. 6-2-22. Big Ben shaft inclined at estimated 80 degrees. Rock dimensions are about 5 x 5 feet. Timber collar set in place but otherwise no constructed shaft support. Some caving of loose rock at surface. The shaft is reportedly about 100 feet deep.

Postshot Damage

No damage resulting from the Shoal event was observed to the inspected portions of this property.

RED TOP MINE

Ownership

Mr. Cye Cox
269 West Center Street
Fallon, Nevada

Dates Examined

October 1, 1963
October 30, 1963

Location

23° azimuth grid north; 24,000 feet from surface zero
N 1,642,000, E 567,000 (USC&GS Nevada Grid)
Section 12, T 16 N - R 32 E (MDB&M)
Indicated map elevation, 5160 feet

Inspection Team (Both surveys)

Mr. George H. Holmes, Jr., U. S. BuMines, Reno Field Office
Mr. Paul J. Gaul, Holmes & Narver, Inc., Las Vegas Office
Mr. Eugene H. Skinner, Holmes & Narver, Inc., Las Vegas Office
Mr. Richard P. Kingsley, U. S. Public Health Service

Resume of Geology

Scheelite mineralization occurs in tactite along the contact between the granite intrusion and metamorphic rock sequences. The property, which lies at the upper end of Red Top Canyon in the northern part of the Sand Springs Range, was located in 1952 and development work continued to 1956. Production was small and the mine is presently inactive.

Surface Plant

Prospect wooden headframes in disrepair over two exploratory shafts. No mining or milling buildings and equipment.

Underground Workings

The underground workings were not safely accessible. Two shafts and several open cuts are visible.

Photo Record

Photo No. 7-1-23. Prospect shaft inclined at about 80 degrees. Timbered dimensions are 8 x 4 feet, and the shaft is estimated to be about 75 feet deep. Lagging, sets, bucket guides, and ladder in place. Manway not partitioned from cage compartment.

Photo No. 7-2-24. Prospect shaft inclined at estimated 30 degrees for about 25 feet and then continued at 60 degrees. Rock dimensions are about 5 x 5 feet. Shaft is entirely unsupported. Combination ladder and bucket guides in place.

Postshot Damage

No damage resulting from the Shoal event was observed to the inspected portions of this property.

Ownership

Mr. Cye Cox
269 West Center Street
Fallon, Nevada

Dates Examined

October 1, 1963
October 30, 1963

Location

192° azimuth grid north; 20,500 feet from surface zero
N 1,601,500, E 551,000 (Red Ant)
N 1,601,500, E 554,000 (East End)
Section 21, T 15 N - R 32 E (MDB&M)
Indicated map elevations, 5900 feet for Red Ant and
6100 feet for East End

Inspection Team (both surveys)

Mr. George H. Holmes, Jr., U. S. BuMines, Reno Field Office
Mr. Paul J. Gaul, Holmes & Narver, Inc., Las Vegas Office
Mr. Eugene H. Skinner, Holmes & Narver, Inc., Las Vegas Office
Mr. Richard P. Kingsley, U. S. Public Health Service

Resume of Geology

Scheelite mineralization occurs in tactite along the contact between the granitic intrusion and silicified limestone rocks. The properties lie in a semi-mountainous area of moderate relief about 3.9 miles south of surface zero in the upper end of a dry wash. The properties were located in 1953, and production continued until 1957.

Surface Plant

Wooden prospect headframes and ore bins over two exploratory shafts are all in disrepair. No mining or milling buildings and equipment. Remnants of a concrete foundation for a crusher are found near the Red Ant headframe.

Underground Workings

The underground workings were not safely accessible. Two abandoned shafts, several adits and open cuts are visible.

Photo Record

Photo No. 8-1-25. Surface area around Red Ant No. 2 headframe and shaft. Steep rock slopes and open cut shown on north side, toward surface zero, with rock slopes undercut and near vertical.

Photo No. 8-2-26. Vertical one-compartment shaft of Red Ant No. 2 at first level about 15 feet below collar. Timber sets and lagging in place to first level. Partially timber supported to Red Ant No. 2 adit level at about 40 feet in depth. Ladder and bucket guides in place.

Photo No. 8-3-27. Below first level of Red Ant No. 2 shaft shown in Photo No. 8-2-26. Some timber sets and lagging in place, but generally unsupported. Total shaft depth to Red Ant No. 2 adit level is about 40 feet. Combination ladder and bucket guides in place.

Photo No. 8-4-28. Exploratory adit adjacent to the Red Ant No. 2 shaft. The adit is about 25 feet long, entirely unsupported, and about 6 x 6 feet in dimension. Some minor rock falls have previously occurred, especially near the portal.

Photo No. 8-5-29. Portal of Red Ant No. 2 adit on hillside below shaft. Four portal sets of 4 x 4-inch timber with timber cribbing for mine dump.

Photo No. 8-6-30. Red Ant No. 2 adit from portal. Rock dimensions are irregular, about 6 x 4 feet. The adit extends about 150 feet with a short cross-cut to the Red Ant No. 2 shaft. It was driven along a fault zone in blocky limestone, and has no support beyond the portal timber sets.

Photo No. 8-7-31. East End Mine exploratory shaft inclined at estimated 45 degrees. Rock dimensions are irregular, about 4 x 4 feet. The shaft is about 40 feet in depth. Except for one timber collar set, the shaft is unsupported. Combination bucket guides and ladder in place.

Photo No. 8-8-32. Partially timber supported open stope contiguous with East End shaft at the surface. The open stope is 5 to 8 feet wide and 10 feet deep. Randomly placed stulls of 4 x 4-inch and 6 x 6-inch timber.

Postshot Damage

No damage resulting from the Shoal event was observed to the inspected portions of this property.

Ownership

Mrs. A. F. Rachel
Rawhide, Nevada

Dates Examined

October 1, 1963
October 30, 1963

Location

173° azimuth grid north; 55,000 feet from surface zero
N 1,565,000, E 565,000 (USC&GS Nevada Grid)
Section 27, T 14 N - R 32 E (MDB&M)
Indicated map elevation, 6100 feet

Inspection Team (both surveys)

Mr. George H. Holmes, Jr., U. S. BuMines, Reno Field Office
Mr. Paul J. Gaul, Holmes & Narver, Inc., Las Vegas Office
Mr. Eugene H. Skinner, Holmes & Narver, Inc., Las Vegas Office
Mr. Richard P. Kingsley, U. S. Public Health Service

Resume of Geology

Steeply north dipping narrow quartz veins with nearly east-west strike occur in siliceous metamorphic rock sequences. The property lies in an area of moderate relief at the upper end of a dry wash near the eastern base of Big Kasock Mountain (elevation 7150 feet). The property was located in 1952 with an exploratory shaft and adit excavated between 1952 and 1955. No production has been recorded and the mine is presently inactive.

Surface Plant

None.

Underground Workings

One inclined exploratory shaft is about 40 feet deep. An exploratory adit about 85 feet long is driven along the outcrop of the hillside about 50 feet below the shaft. All workings are unsupported.

Photo Record

Photo No. 9-1-33. Rock back in exploratory shaft inclined at estimated 30 degrees to the southeast and about 40 feet in length. Rock dimensions are irregular, about 5 x 4 feet. The shaft is entirely unsupported, and the floor is covered with backfill and rubble.

Photo No. 9-2-34. At portal of exploratory adit below inclined exploratory shaft. View from portal to 0+25 feet where adit makes 60 degree left turn. The adit was driven on a quartz outcrop and is entirely unsupported. The rock dimensions are irregular, about 6 x 4 feet.

Photo No. 9-3-35. In lower adit at 0+25 feet after 60 degree left turn and into face about 60 feet distant. The rock dimensions are irregular, about 6 x 4 feet. Total length of adit is 85 feet.

Postshot Damage

No damage resulting from the Shoal event was observed to the inspected portions of this property.

Ownership

Grutt Estate
c/o Mr. H. E. Dunning (Atty)
6420 Fair Oaks Blvd.
Carmichael, California

Dates Examined

October 1, 1963
October 30, 1963

Location

184° azimuth grid north; 66,500 feet from surface zero
N 1,554,500, E 554,000 (USC&GS Nevada Grid)
Section 5, T 13 N - R 32 E (MDB&M)
Indicated map elevation, 5200 feet

Inspection Team (both surveys)

Mr. George H. Holmes, Jr., U. S. BuMines, Reno Field Office
Mr. Paul J. Gaul, Holmes & Narver, Inc., Las Vegas Office
Mr. Eugene H. Skinner, Holmes & Narver, Inc., Las Vegas Office
Mr. Richard P. Kingsley, U. S. Public Health Service

Resume of Geology

Gold and silver ores occur with rhyolite, dacite, and andesite rocks along a steeply dipping vein network, principally in fissures kaolinized rhyolite. The property lies in an area of moderate relief in eroded remnants of volcanic flows derived from Pilot Cone (elevation 6602 feet). Maximum production between 1906 and 1923 was followed by sporadic activity during 1930's. Presently inactive.

Surface Plant

Except for a wooden headframe structure in disrepair at one shaft, all mining and milling equipment and buildings have been dismantled and removed. There are remnants of an abandoned hoist at one shaft.

Underground Workings

The underground workings were not safely accessible. Several shafts, adits, open stopes, and open cuts indicate a former large underground mining operation.

Photo Record

Photo No. 10-1-36. Open stope mined to surface. Irregular width about 6 to 8 feet, and less than 100 feet in depth. Randomly placed timber stulls are used for support. The rock is heavily fractured.

Photo No. 10-2-37. At portal of haulage adit. The adit bearing is northwest and it is several hundred feet long. Rock dimensions are irregular, about 7 x 6 feet. The adit is entirely unsupported. Minor rock falls have previously occurred, especially at the portal and at about 300 feet into the adit.

Photo No. 10-3-38. Hoisting compartment of east vertical shaft. Timbered dimensions are about 6 x 5 feet. Sets and lagging in place but some lagging gone. No cage guides.

Photo No. 10-4-39. Manway compartment of east vertical shaft. Timbered dimensions are about 5 x 3 feet. Sets and lagging in place but some lagging gone. Manway ladder in place.

Postshot Damage

No damage resulting from the Shoal event was observed to the inspected portions of this property.

Ownership

Grutt Estate
c/o Mr. H. E. Dunning (Atty)
6420 Fair Oaks Blvd.
Carmichael, California

Dates Examined

October 1, 1963
October 30, 1963

Location

184° azimuth grid north; 69,000 feet from surface zero
N 1,551,500, E 553,000 (USC&GS Nevada Grid)
Section 15, T 13 N - R 32 E (MDB&M)
Indicated map elevation, 5200 feet

Inspection Team (both surveys)

Mr. George H. Holmes, Jr., U. S. BuMines, Reno Field Office
Mr. Paul J. Gaul, Holmes & Narver, Inc., Las Vegas Office
Mr. Eugene H. Skinner, Holmes & Narver, Inc., Las Vegas Office
Mr. Richard F. Kingsley, U. S. Public Health Service

Resume of Geology

Gold and silver ores occur with rhyolite, dacite, and andesite rock along a steeply dipping vein network principally in fissured kaolinized rhyolite. The property lies in an area of moderate relief in eroded remnants of volcanic flows derived from Pilot Cone (elevation 6602 feet). The greatest production was during 1906 - 1923, followed by sporadic activity during the 1930's. Presently inactive.

Surface Plant

Wooden headframes are abandoned and in disrepair at two shafts. All other mining and mill equipment has been dismantled and removed. Several abandoned buildings remain.

Underground Workings

The underground workings were not safely accessible. Several shafts, adits, open stopes and cuts are evidence of former large underground operation.

Photo Record

Photo No. 10-5-40. Glory hole and open stope at surface. Rock dimensions are estimated at over 100 feet in length, up to 25 feet wide, and a hundred or more feet in depth. The bearing is about east-west. A very large rock mass has broken away from the hanging wall and has fallen into the center of the stope.

Photo No. 10-6-41. Narrow open stope lined to surface near west shaft. Irregular width 3 to 6 feet and a hundred or more feet in depth. Random timber stulls are used for support. The stope is nearly vertical. The bearing is about east-west.

Photo No. 10-7-42. Main vertical two-compartment shaft. Timbered dimensions are about 8 x 5 feet. Reportedly 300 feet in depth. Lagging, sets, and ladder in place. No cage guides or manway partition.

Photo No. 10-8-43. West vertical shaft. Timbered dimensions are about 8 x 6 feet. Reportedly 300 feet in depth. Lagging, sets, manway ladder, and bucket guides in place but irregularly constructed. No sets or lagging where rock walls are competert.

Postshot Damage

No damage resulting from the Shoal event was observed to the inspected portions of this property.

Ownership

Kennametal Incorporated
Rawhide, Nevada

Dates Examined

October 2, 1963
October 28, 1963

Location

168° azimuth grid north; 68,500 feet from surface zero
N 1,554,000, E 572,000 (USC&GS Nevada Grid)
Section 12, T 13 N - R 32 E (MDB&M)
Elevation of shaft collar, 5110 feet

Inspection Team

Mr. E. H. Colwell, Manager, Nevada Scheelite Mine
Mr. Harry Manny, Mine Foreman
Mr. George H. Holmes, Jr., U. S. BuMines, Reno Field Office
Mr. Leonard F. Traynor, Deputy State Mine Inspector *
Mr. Eugene H. Skinner, Holmes & Narver, Inc., Las Vegas Office
Mr. Richard P. Kingsley, U. S. Public Health Service

Resume of Geology

Scheelite ores occur in nearly vertical tactite masses along the contact between the granite intrusion and silicified but fractured limestone. The property lies in the southern foothills of the Sand Springs Range in an area of steep but moderate relief. Between 1937 and 1956 the mine produced 277,000 units of tungsten trioxide. The mine has been inactive since 1956.

Surface Plant

All mining equipment is inactive but in standby condition. An active metallurgical community of 67 buildings and about 80 people is devoted to the manufacture of tungsten carbide.

Underground Workings

A very extensive system of levels, drifts, cross-cuts and stopes has been excavated on the 100, 200, 300, 400, and 500-foot levels. A three-compartment 13 x 6-foot timbered shaft is in good condition except for a few water-rotted sets near the 400-foot level. Ground water seepage is pumped from the 400-foot level weekly. The 500-foot level is reached by a winze from the 200-foot level. All stopes are timbered by square sets and cribbing. Some stopes has been backfilled with waste rock. Surface subsidence by undermining is noticeable around the hoist house.

* Pre-shot only.

Photo Record

Photo No. 11-1-44. Shaft station on 100-foot level, elevation 5007 feet. Timbered dimensions are 13 x 6 feet, cage compartment is 5 x 5 feet, the other compartment cannot be used because of squeexing ground. The manway is usable.

Photo No. 11-2-45. Lengthwise view of 250 stope two sets below the 100-foot level. This stope is square set on irregular 5 x 5-foot centers with 8 x 8-inch timbers. Some areas are supported by timber cribbing. Estimated stope dimensions are 100 feet in length and 25 to 75 feet ir width. In vertical dimension the 250 stope extends for several levels. Some timber posts and caps in square sets have been crushed and squeezed by ground movement. The bearing of the stope is about north-south.

Photo No. 11-3-46. Broken cap in square set of 250 stope on the 100-foot level. The timbers are 8 x 8-inch. Some timber square sets in this stope are in a similar weakened condition.

Photo No. 11-4-47. Shaft station on 200-foot level, elevation 4902 feet. See notes on Photo No. 11-1-44.

Photo No. 11-5-48. Haulage drift on north side of 200-foot level shaft station. The support is square sets with 8 x 8-inch timbers.

Photo No. 11-6-49. Widthwise view of 310 stope on 200-foot level. This stope is supported by square sets on irregular 5 x 5-foot centers with round 10-inch and rough 8 x 8-inch timbers. Some portions of the stope are supported by timber cribbing. The stope is about 50 feet long, up to 25 feet wide, and it extends from the 300 to the 100-foot level.

Photo No. 11-7-50. Broken cap in 310 stope on 200-foot level. Timbers are 8-inch round. Several posts and caps in this stope are splintered, broken, and show heavy ground pressure.

Photo No. 11-8-51. Shaft station on 300-foot level, elevation 4798 feet. See notes on Photo No. 11-1-44.

Photo No. 11-9-52. Ore chute and timber support for 300 stope on 300-foot level, constructed of 8-inch and 10-inch round timber. The stope is about 40 feet long, 20 feet wide, and it extends vertically to the 200-foot level. Rock and timber debris are scattered along the haulageway.

Photo No. 11-10-53. Shaft station on 400-foot level, elevation 4696 feet. See notes on Photo No. 11-1-44.

Photo No. 11-11-54. Station for 1000-winze on 400-foot level. Inclination of winze is 72 degrees. Random round 8-inch timbers are used for support. A large amount of mining equipment was found at this winze station.

Photo No. 11-12-55. Row of broken 10-inch round timber posts on hanging wall of 74. A stope on 400-foot level. The bearing of this stope is about northeast.

Photo No. 11-14-57. Subsidence by undermining from the 250 stope has caused separation between the steel leg and concrete pier of left rear post of headframe. Reference mark measured 6.05 inches separation both pre- and postshot. The 1/4 x 3-inch steel straps holding the headframe leg to the concrete pier do not form a rigid connection and the steel straps can be deflected by hand pressure.

Photo No. 11-15-58. Subsidence by undermining from the 250 stope has caused a four degree northward tilt to hoist house. The concrete foundation for the hoisting equipment has a large crosswise crack immediately behind the main drum. The hoist consists of a cylindrical double drum electric powered system mounted on a steel frame.

Instrumented Measurements

The U. S. Coast and Geodetic Survey obtained the following displacements from a Coast Survey Vibration Meter installed on the 100-foot level:

Horizontal, Radial	6.78×10^{-2} cm, 0.7 second period
Horizontal, Transverse	9.4×10^{-2} cm, 0.7 second period

Postshot Damage

Since the pre-shot survey, about one cubic foot of rock has fallen at places where ground water seeps into the mine. The ground water has weakened the rock, especially the clay along rock joint surfaces. This fallen rock would not impair mine operations.

Ownership

Mr. Richard Robinson and
Mr. G. L. Simkin
Post Office Box 613
Fallon, Nevada

Dates Examined

October 2, 1963
October 28, 1963

Location

149° azimuth grid north; 75,000 feet from surface zero
N 1,556,500, E 594,500 (USC&GS Nevada Grid)
Section 34, T 14 N - R 33 E (MDB&M)
Indicated map elevation, 5500 feet

Inspection Team (both surveys)

Mr. George H. Holmes, Jr., U. S. BuMines, Reno Field Office
Mr. Eugene H. Skinner, Holmes & Narver, Inc., Las Vegas Office
Mr. Richard P. Kingsley, U. S. Public Health Service

Resume of Geolcgy

Barite occurs as veins filling narrow, steeply dipping, northwest striking fractures in andesite porphyry country rock. The property lies in the extreme upper end of the southern portion of Fairview Valley in an area of moderate relief. The property was located in November 1962 and some prospect work was done. Presently inactive.

Surface Plant

Timber prospect headframe with hand winch and sinking bucket over one shaft, all in disrepair.

Underground Workings

Prospect shaft with open stope mined to surface around shaft. Several other exploration open cuts.

Photo Record

Photo No. 12-1-59. Vertical prospect shaft about 25 feet in depth with stope mined to surface around shaft. Timber prospect headframe with steel hand winch in place on surface. The shaft consists of four timber legs with a ladder in place. The stope contains two timber stulls.

Postshot Damage

No damage resulting from the Shoal event was observed to the inspected portions of this property.

Ownership

Mr. Fred W. Steiner, Jr.
Post Office Box 2171
Reno, Nevada

Dates Examined

October 2, 1963
October 28, 1963

Location

149° azimuth grid north; 72,500 feet from surface zero
N 1,559,000, E 594,500 (USC&GS Nevada Grid)
Section 34, T 14 N - R 33 E (MDB&M)
Indicated map elevation, 5500 feet

Inspection Team (both surveys)

Mr. George H. Holmes, Jr., U. S. BuMines, Reno Field Office
Mr. Eugene H. Skinner, Holmes & Narver, Inc., Las Vegas Office
Mr. Richard P. Kingsley, U. S. Public Health Service

Resume of Geology

Barite occurs as veins filling narrow, steeply dipping, northwest striking fractures in andesite porphyry country rock. The property lies at the extreme upper end of the southern portion of Fairview Valley in an area of moderate relief. The property was located in the mid-1930's and some barite was produced. No activity since late 1930's.

Surface Plant

One prospect timber headframe partially dismantled. No mining or milling equipment.

Underground Workings

The mine workings consist of numerous open pits and open stopes mined from the surface to depths of about 80 feet.

Photo Record

Photo No. 13-1-60. Vertical prospect shaft about 50 feet deep. Shaft partially supported with irregular timber sets without lagging. Manway ladder and bucket guides in place. Some timber stulls are used for stope support. The vein has been mined out around the shaft to the surface.

Photo No. 13-2-61. Open cut about 100 feet long, up to 15 feet deep, and of irregular width up to 6 feet. Two 6 x 6-inch timber stulls are used for support.

Photo No. 13-3-62. Open stope mined to surface. Occasional 6 x 6-inch timber stulls provide support near the surface, with more stulls at depth. The stope is several hundred feet long, 3 to 6 feet wide, and up to 75 feet deep.

Postshot Damage

No damage resulting from the Shoal event was observed to the inspected portions of this property.

Ownership

Mr. Fred W. Steiner, Jr.
Post Office Box 2171
Reno, Nevada

Dates Examined

October 2, 1963
October 28, 1963

Location

149° azimuth grid north; 72,000 feet from surface zero
N 1,558,500, E 595,000 (USC&GS Nevada Grid)
Section 34, T 14 N - R 33 E (MDB&M)
Indicated map elevation, 5500 feet

Inspection Team (both surveys)

Mr. George H. Holmes, Jr., U. S. BuMines, Reno Field Office
Mr. Eugene H. Skinner, Holmes & Narver, Inc., Las Vegas Office
Mr. Richard P. Kingsley, U. S. Public Health Service

Resume of Geology

Gold occurs in northwest striking quartz fissures in andesite. The property lies at the extreme upper end of the southern portion of Fairview Valley in an area of moderate relief. The property was discovered in the 1880's with intermittent mining to the late 1930's. Presently inactive.

Surface Plant

One wooden headframe, two wooden ore bins, and two timber trestles are in disrepair. All other mining and milling equipment has been dismantled and removed. Several abandoned buildings remain.

Underground Workings

The underground workings were not safely accessible. One shaft, several adits, and prospect pits are evidence of formerly large underground operations

Photo Record

Photo No. 13-4-63. Entrance to west adit. Rock dimensions are about 7 feet wide, 6 feet high, and several hundred feet long. The rock is fractured and weakened above the adit portal. Some rock falls have previously occurred at the portal and along the adit. No support was used for this adit.

Photo No. 13-5-64. Entrance to east adit. Rock dimensions are about 6 x 3 feet and several hundred feet in length. Some rock falls have previously occurred at the portal and along the adit. No support was used for this adit. The portal has been driven in semi-consolidated alluvium.

Photo No. 13-6-65. Collar of main vertical shaft. The timbered dimensions are 8 x 5 feet. The shaft is reportedly 150 feet deep. The cage compartment is blocked by timber planks. The manway is accessible with timber sets, lagging, cage guides, and ladder in place. No partition with manway.

Postshot Damage

No damage resulting from the Shoal event was observed to the inspected portions of this property.

BROKEN HILLS CLAIMS

Ownership

Mr. Henry A. Peterson
Post Office Box 350
Fallon, Nevada

Dates Examined

October 3, 1963
October 31, 1963

Location

116.5° azimuth grid north; 118,000 feet from surface zero
N 1,568,000, E 663,500 (USC&GS Nevada Grid)
Section 23, T 14 N - R 35 E (MDB&M)
Indicated map elevation, 5300 feet

Inspection Team (both surveys)

Mr. James Trease (lessee), P. O. Box 261, Gabbs, Nevada
Mr. George H. Holmes, Jr., U. S. BuMines, Reno Field Office
Mr. Paul J. Gaul, Holmes & Narver, Inc., Las Vegas Office
Mr. Eugene H. Skinner, Holmes & Narver, Inc., Las Vegas Office
Mr. Richard P. Kingsley, U. S. Public Health Service

Resume of Geology

Lead-silver ores occur in veins and lenses with quartz and altered andesite along northwest striking fracture network. The property lies at the extreme northern edge of Gabbs Valley in an area of low relief. Property was discovered in 1913 with greatest production during 1920's and 1930's. Active since 1962 with exploration and shaft rehabilitation work.

Surface Plant

Exploration sinking type single drum gasoline powered hoist with timber headframe. Also portable compressor, wooden ore bin, mine cars, and related mining equipment. Several wooden buildings in disrepair but in present use. No milling equipment.

Underground Workings

The underground workings were not safely accessible. Numerous abandoned shafts and open stopes that have been mined to the surface indicate a formerly large underground operation. A two-compartment shaft, reportedly 600 feet in depth, has been rehabilitated to the 200-foot level and is in present use.

Photo Record

Photo No. 14-1-66. Nearly vertical open stope mined to the surface immediately to the south of the main shaft. Irregular width 3 to 8 feet, and 100 feet or more in length and depth. The trailer in the center background lies near the edge of the open stope. The trailer burned down from unknown causes on October 19, 1963.

Photo No. 14-2-67. Nearly vertical open stope mined to the surface immediately to the north of the main shaft. Blacksmith shop in background lies on edge of open stope. Irregular width up to 15 feet, and 100 feet or more in length and depth. At the surface the stope has overhanging walls. No support was used other than occasional timber stulls.

Photo No. 14-3-68. Open stope shown in previous photo and showing exposed collar set of main shaft in center background. Overhanging rock walls shown.

Photo No. 14-4-69. Manway partition of main shaft. Timbered dimensions of shaft are 8 x 6 feet. The shaft is reportedly 600 feet deep but filled with water to 400 feet. Lagging and sets in place, but some lagging gone. Other lagging is badly warped and sprung from sets. The cage compartment of the main shaft has lagging and sets in place, but some lagging gone. Other lagging is badly warped and sprung from sets. No cage guides with hoisting by unguided bucket. The manway and utility compartment of the main shaft has ladders and landings in place, but in disrepair and unsafe condition. Metal ventilation pipe disconnected.

Postshot Damage

No damage resulting from the Shoal event was observed to the inspected portions of this property.

SIMON MINE

Ownership

Federal Resources Corporation
1370 South Third West Street
Salt Lake City 15, Utah

Dates Examined

October 10, 1963
October 31, 1963

Location

149° azimuth grid north; 52 miles from surface zero
N 1,390,000, E 703,500 (USC&GS Nevada Grid)
Section 7, T 8 N - R 37 E (MDB&M)
Indicated map elevation, 6700 feet

Inspection Team

Mr. Kenneth W. Dunham, Mine Superintendent
Mr. George H. Holmes, Jr., U. S. BuMines, Reno Field Office
Mr. Leonard F. Traynor, Deputy State Mine Inspector *
Mr. Eugene H. Skinner, Holmes & Narver, Inc., Las Vegas Office
Mr. Richard P. Kingsley, U. S. Public Health Service

Resume of Geology

Lead-silver ores occur as irregular replacement deposits in heavily faulted limestones in contact with a northwest-striking alaskite dike. The property lies in the northeast foothills of the Cedar Mountains in an area of moderate relief. The property was located in 1879 but the greatest production was between 1919 and 1932 when the mine closed down. Present effort to dewater and reopen the mine began in July 1963.

Surface Plant

An auxiliary wooden headframe has been constructed within the former wooden headframe. A single drum electric hoist, GM diesel generator sets, and an IR portable compressor are the major items of present mining equipment. All other mining and milling equipment has been dismantled and removed. Many abandoned buildings remain in disrepair, including a large mill building.

Underground Workings

A timbered three-compartment vertical shaft was safely accessible to the 500-foot level. The large underground mining system of haulage drifts, stopes, cross-cuts and raises on the 350-foot level and 500-foot level was

* Pre-shot only.

only partially accessible since reopening the mine. Shaft rehabilitation work has now (November 1, 1963) ceased at 570 feet. The mine is being allowed to refill with water. The original mine workings reportedly extend to 1000 feet depth.

Photo Record

Photo No. 15-1-70. Shaft station on 350-foot level. The timbered dimensions of the shaft are 16 x 6 feet. The shaft is three-compartment, all timbered, with only one compartment in use for shaft rehabilitation work.

Photo No. 15-2-71. Caved area in 412 stope on the 350-foot level. Some timber square set caps and posts are splintered, broken and displaced. The square set members are 8 x 8-inch timbers on 6 x 6-foot centers.

Photo No. 15-3-72. Shaft station on 500-foot level. Sets, lagging, ladderway in place. One cage compartment rehabilitated for present use. The shaft below this level is in a weakened condition due to flooding and squeezing ground conditions.

Photo No. 15-4-73. Rear of shaft station on 500-foot level. Rock and timber debris are scattered about this area.

Photo No. 15-5-74. Haulage drift leading from 500-foot level shaft station to stopes. The drift supports are 8 x 8-inch timbers with a 5-foot caps and 6-foot posts. Minor rehabilitation work has been done along this drift.

Postshot Damage

No damage resulting from the Shoal event was observed to the inspected portions of this property.

BUFFALO HUMP MINE

Ownership

Dr. F. H. Shambaugh
179 South LaVerne Street
Fallon, Nevada

Dates Examined

October 22, 1963
October 31, 1963

Location

95° azimuth grid north; 31.1 miles from surface zero
N 1,607,500, E 721,000 (USC&GS Nevada Grid)
Section 15, T 15 N - R 37 E (MDB&M)
Indicated map elevation, 6600 feet

Inspection Team

Mr. George H. Holmes, Jr., U. S. BuMines, Reno Field Office
Mr. Edwin M. Pratt, Holmes & Narver, Inc., Fallon Office *
Mr. Paul J. Gaul, Holmes & Narver, Inc., Las Vegas Office **
Mr. Eugene H. Skinner, Holmes & Narver, Inc., Las Vegas Office **
Mr. Richard P. Kingsley, U. S. Public Health Service

Resume of Geology

Gold and silver ores occur in fractured and kaolinized rhyolite along a wide breccia zone. The property lies in semi-mountainous foothills of moderate relief in the southern portion of the Desatoya Mountains. The recorded production from this mine is small.

Surface Plant

Remnants of the foundation for a former mill are the only evidence of mining. Also on the property are three abandoned cabins and a blacksmith shed, all in disrepair.

Underground Workings

The underground workings were not safely accessible. Three unsupported adits were examined. Several other open cuts and prospect pits are also on the property. An unsupported vertical shaft is caved and sealed at a depth of about 30 feet. All mine workings are in a state of disrepair.

* Pre-shot only.
** Postshot only.

Photo Record

Photo No. 16-1-75. Caved portal of north adit. The adit bearing is about north-south. At about 25 feet the adit bifurcates. Timber sprags are used for support at the portal, otherwise the adit is unsupported. The adit dimensions are about 6 feet in height and 4 feet in width.

Photo No. 16-2-76. Caved portal of south adit. The adit bearing is about east-west. No support was used for this adit which is about 6 feet high and 3 feet wide.

Photo No. 16-3-77. Portal of central adit. The adit bearing is about east-west and the length is about 400 feet. Five 6 x 6-inch timber sets on irregular 6 x 4-foot spacing with timber sprags for lagging are at the portal, otherwise the adit is unsupported. The adit dimensions are about 6 feet in height and 4 feet in width.

Photo No. 16-4-78. Surface view of main vertical shaft looking to southeast. Some uncut timber sprags are laid across the collar. No support was used in this shaft. The rock dimensions are about 5 x 5 feet. The shaft is caved and sealed with debris about 30 feet below the surface.

Postshot Damage

No damage resulting from the Shoal event was observed to the inspected portions of this property.

APPENDIX C

PHOTOGRAPHIC RECORD

Photo 1-1-1. Preshot. September 30, 1963

Photo 1-1-1. Postshot. November 4, 1963.

Photo 1-2-2. Preshot. September 30, 1963.

Photo 1-2-2. Postshot. November 4, 1963.

Photo 1-3-3. Preshot. September 30, 1963.

Photo 1-3-3. Postshot. November 4, 1963.

Photo 2-1-4. Preshot. September 30, 1963.

Photo 2-1-4. Preshot. September 30, 1963.

Photo 2-2-5. Preshot. September 30, 1963.

Photo 2-2-5. Postshot. October 29, 1963.

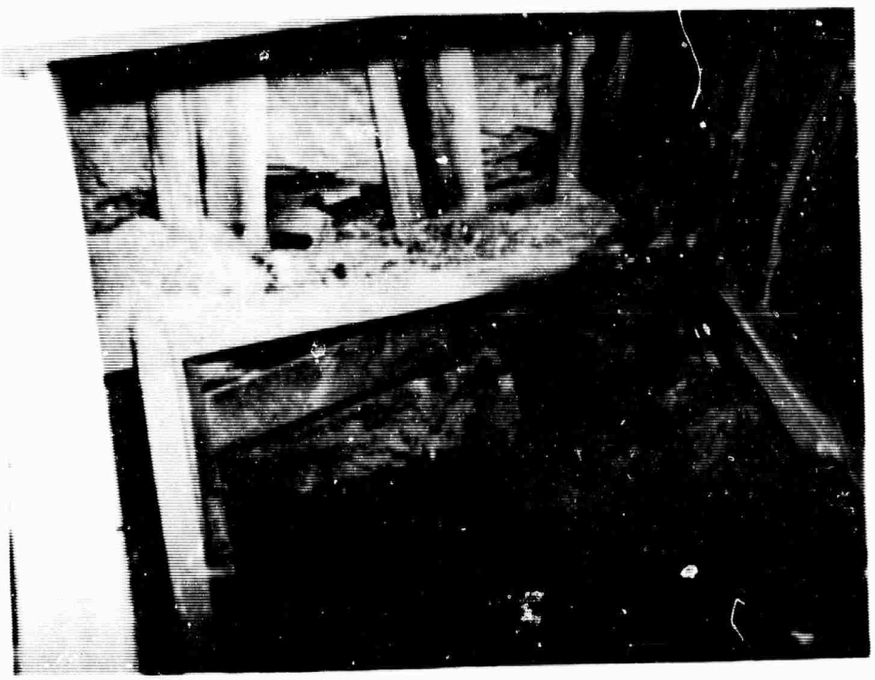


Photo 2-3-6. Preshot. September 30, 1963.

Photo 2-3-6. Postshot. October 29, 1963.

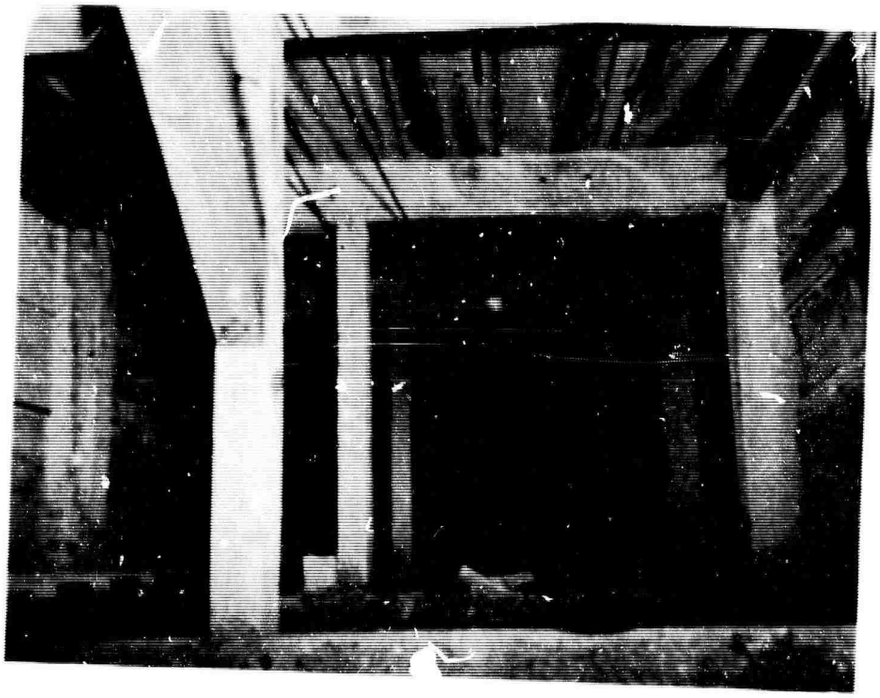


Photo 2-4-7. Preshot. September 30, 1963.

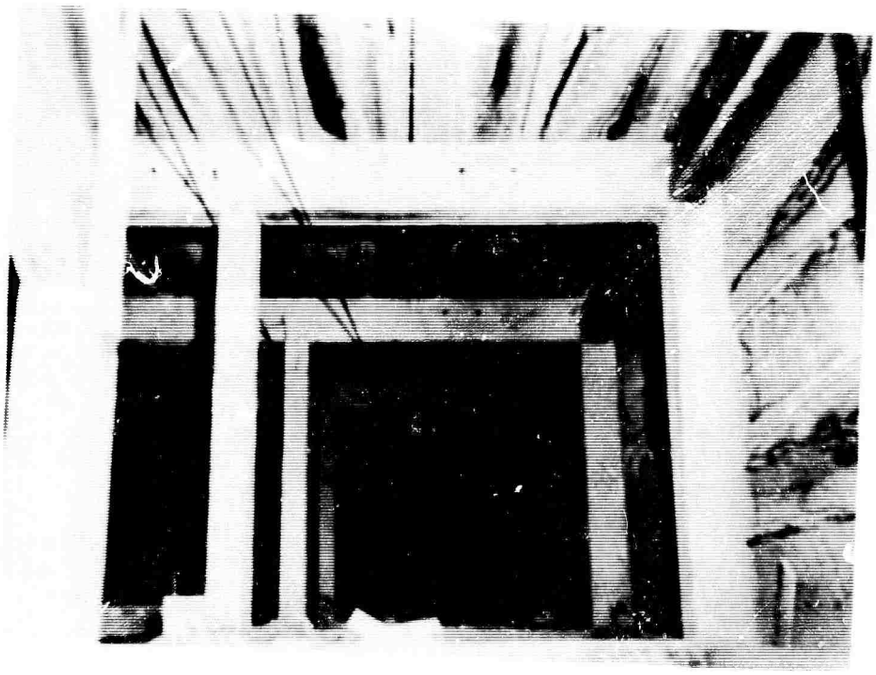


Photo 2-4-7. Postshot. October 29, 1963.

Photo 2-5-8. Preshot. September 30, 1963.

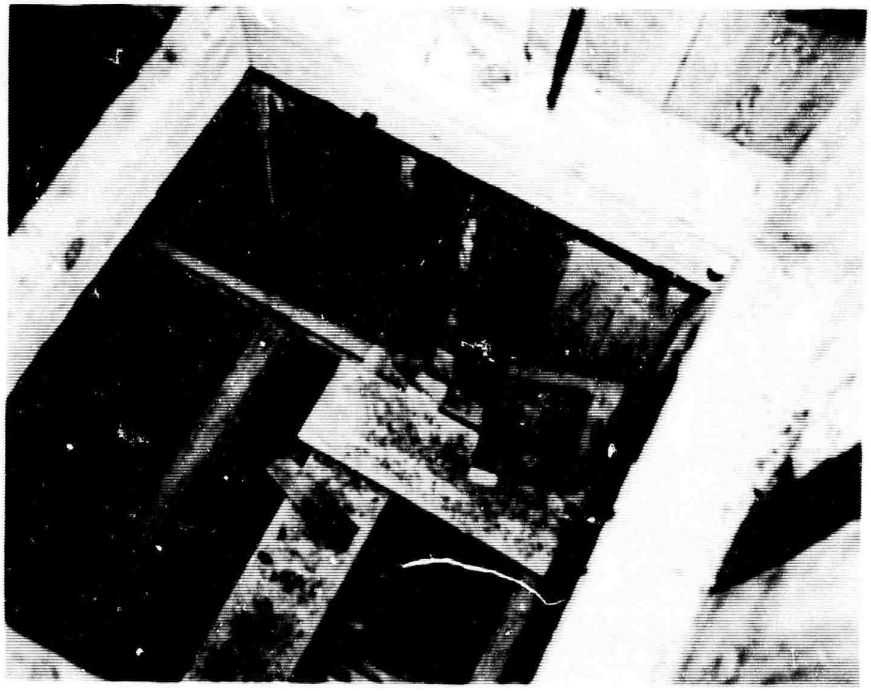


Photo 2-5-8. Postshot. October 29, 1963.

Photo 3-1-9. Preshot. September 30, 1963.

Photo 3-1-9. Postshot. October 29, 1963.

SUMMIT KING MINES, LTD.

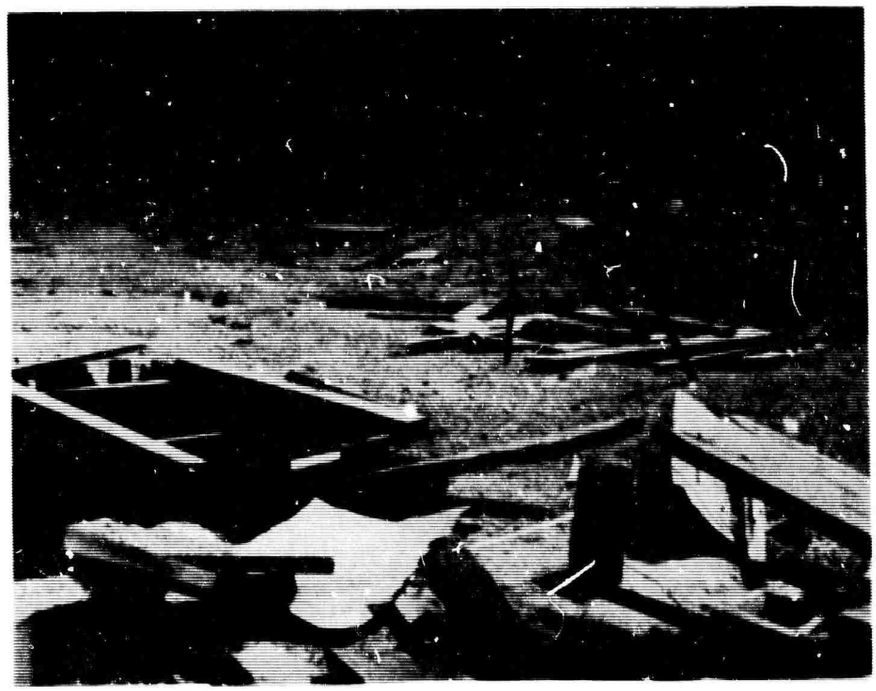


Photo 3-2-10. Preshot. September 30, 1963.

Photo 3-2-10. Postshot. October 29, 1963.

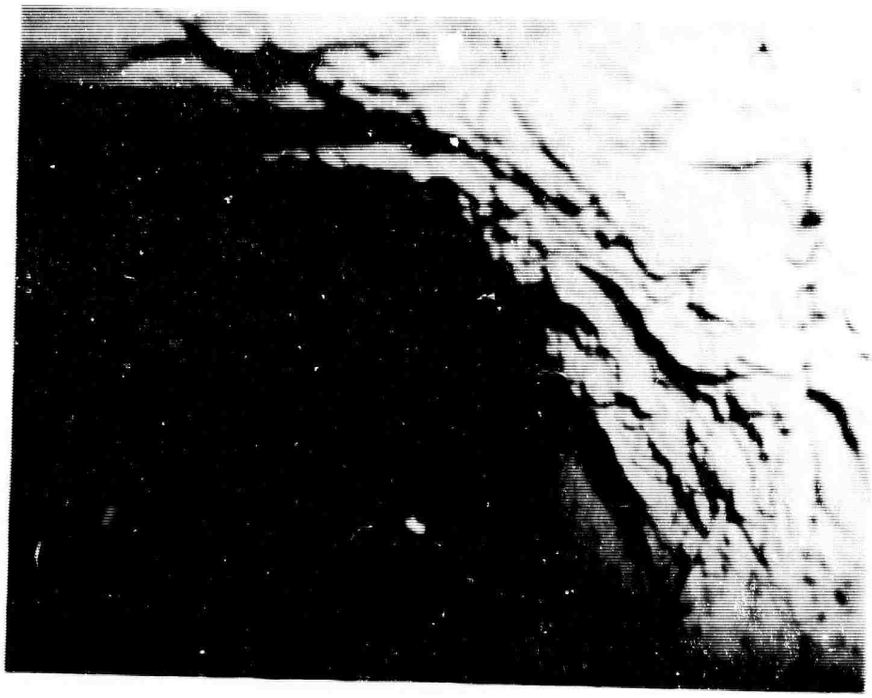


Photo 4-1-11. Preshot. September 30, 1963.

Photo 4-1-11. Postshot. October 29, 1963.

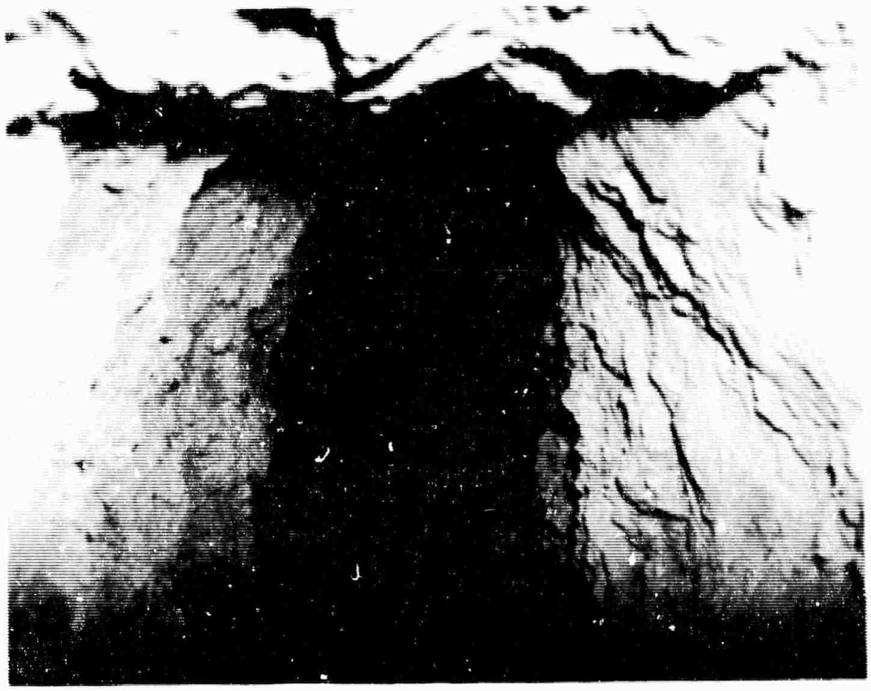


Photo 4-2-12. Preshot. September 30, 1963.

Photo 4-2-12. Postshot. October 29, 1963.

NORTHERN DIPPER MINE

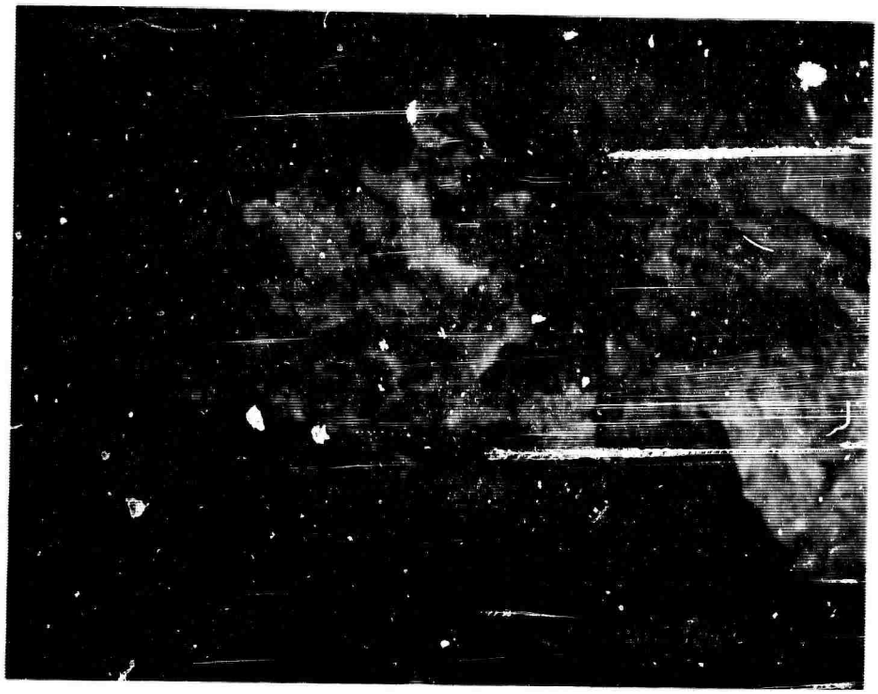


Photo 4-3-13. Preshot. September 30, 1963.

Photo 4-3-13. Postshot. October 29, 1963.

NORTHERN DIPPER MINE

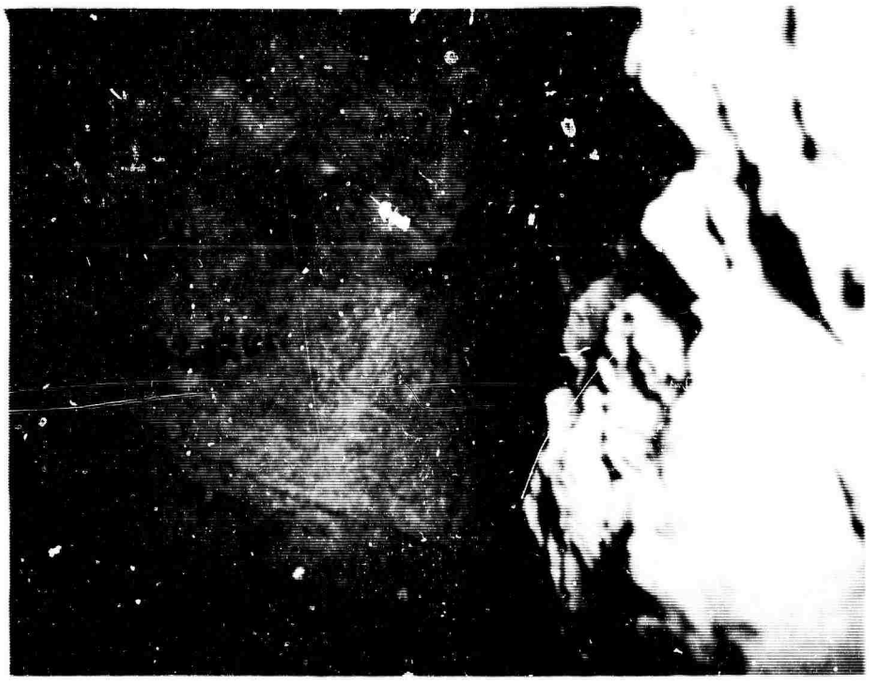


Photo 4-4-14. Preshot. September 30, 1963.

Photo 4-4-14. Postshot. October 29, 1963.

Photo 4-5-15. Preshot. September 30, 1963.

Photo 4-5-15. Postshot. October 29, 1963.

NORTHERN DIPPER MINE

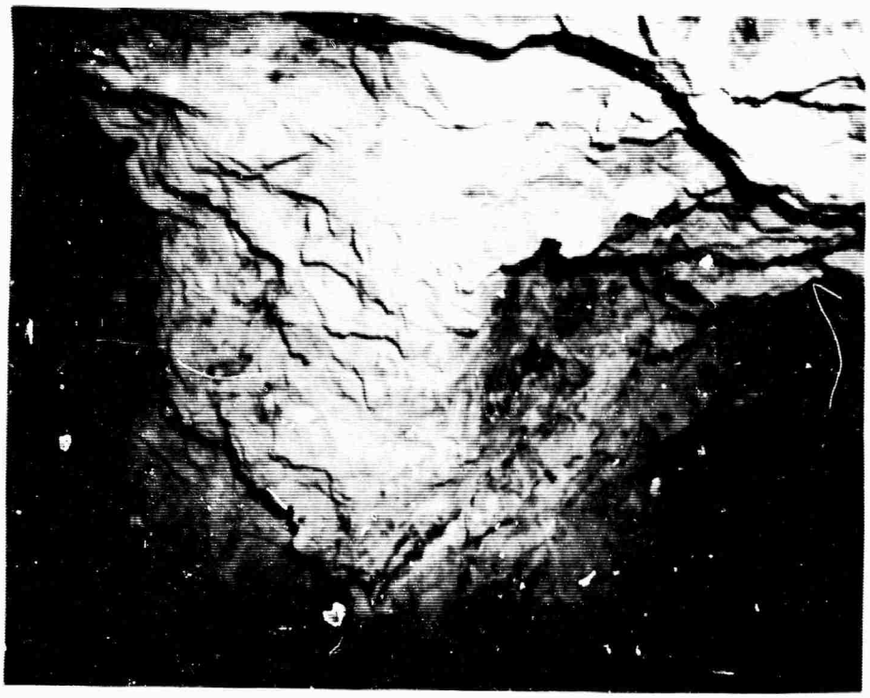


Photo 4-6-16. Preshot. September 30, 1963.

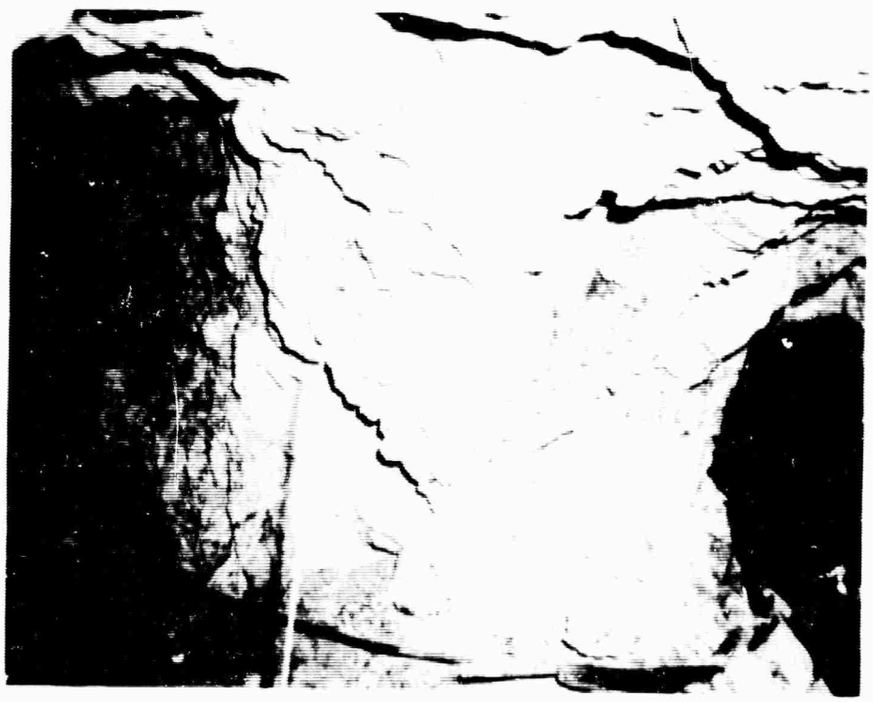


Photo 4-6-16. Postshot. October 29, 1963.

NORTHERN DIPPER MINE

Photo 4-7-17. Preshot. September 30, 1963.

Photo 4-7-17. Postshot. October 29, 1963.

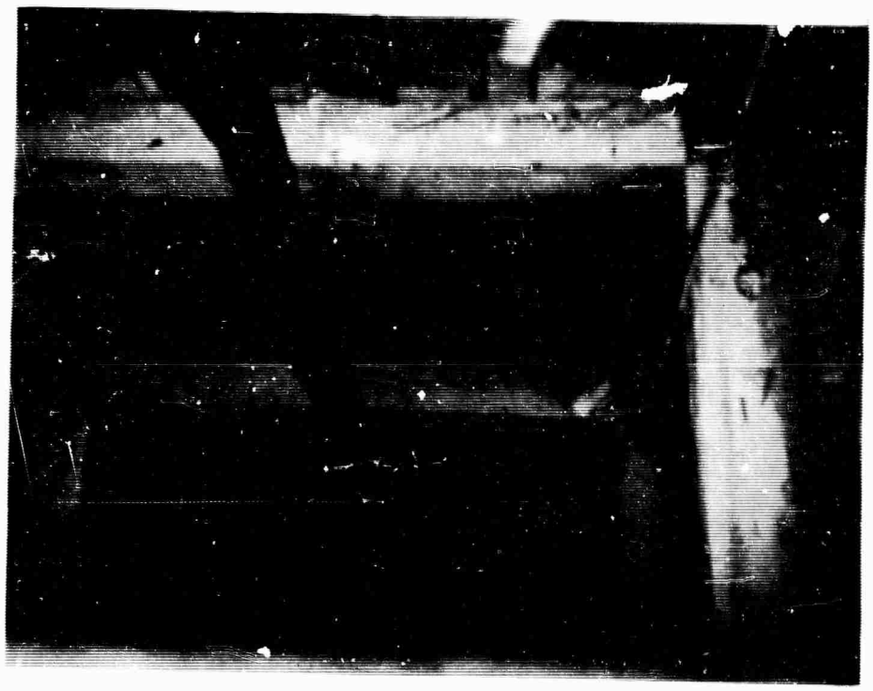


Photo 5-1-18. Preshot, September 30, 1963.

Photo 5-1-18. Postshot. October 29, 1963.

Photo 5-2-19. Preshot. September 30, 1963.

Photo 5-2-19. Postshot. October 29, 1963.

DROMEDARY HUMP MINE

Photo 5-3-20. Preshot. September 30, 1963.

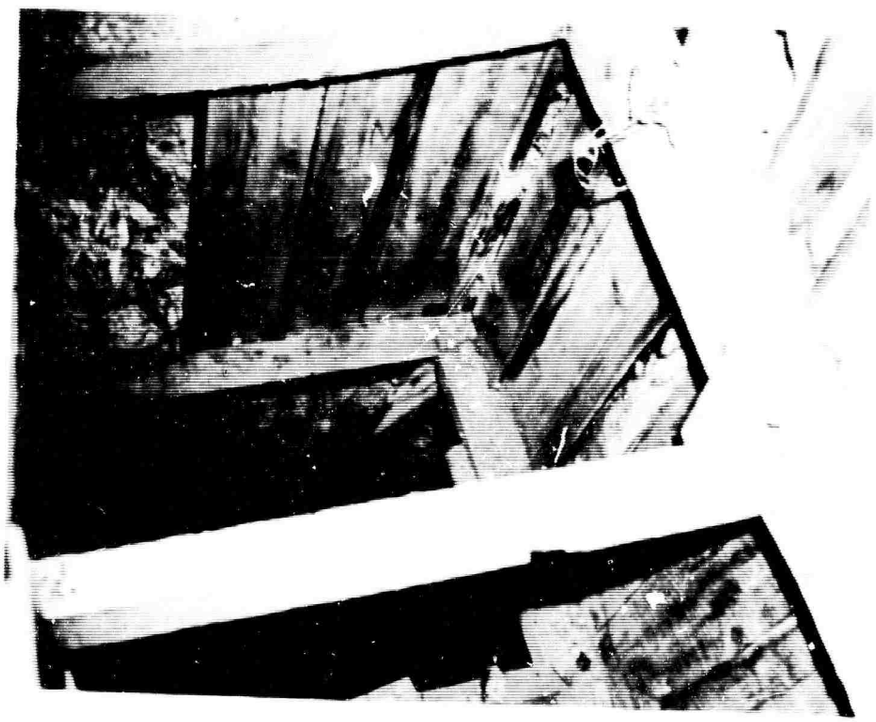


Photo 5-3-21. Postshot. October 29, 1963.

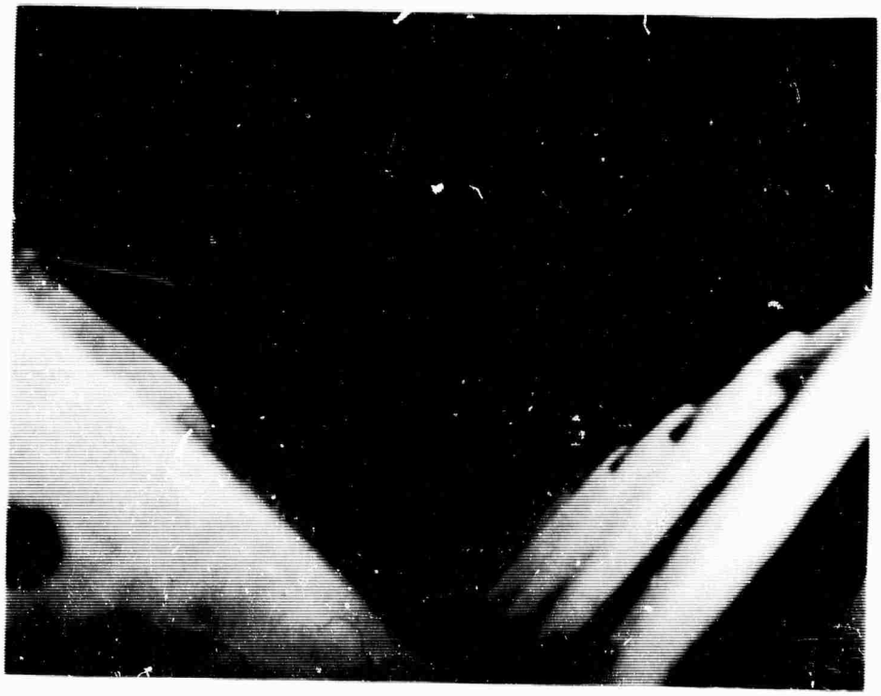


Photo 6-1-21. Preshot. September 30, 1963.

Photo 6-1-21. Postshot. October 29, 1963.

Photo 6-2-22. Preshot. September 30, 1963.

Photo 6-2-22. Postshot. October 29, 1963.

Photo 7-1-23. Preshot. October 1, 1963.

Photo 7-1-23. Postshot. October 30, 1963.

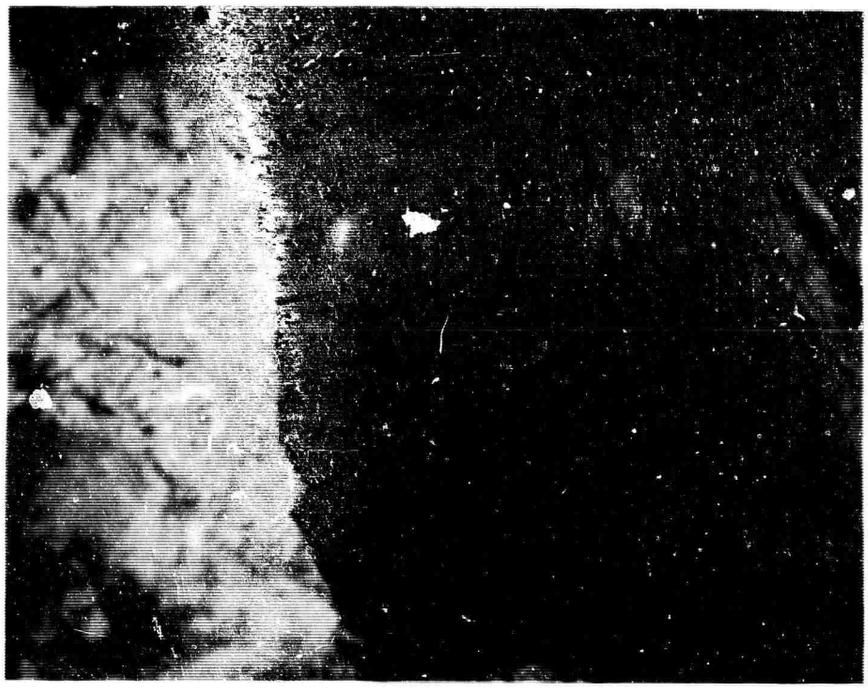


Photo 7-2-24. Preshot. October 1, 1963.

Photo 7-2-24. Postshot. October 30, 1963.

Photo 8-1-25. Preshot. October 1, 1963.

Photo 8-1-25. Postshot. October 30, 1963.

Photo 8-2-26. Preshot. October 1, 1963.

Photo 8-2-26. Postshot. October 30, 1963.

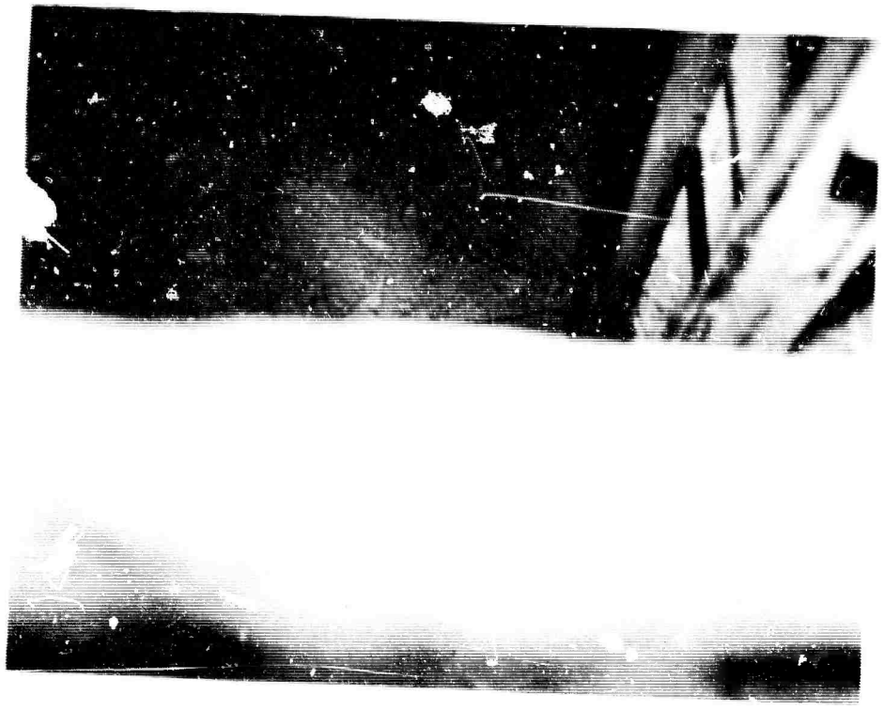


Photo 8-3-27. Preshot. October 1, 1963.

Photo 8-3-27. Postshot. October 30, 1963.

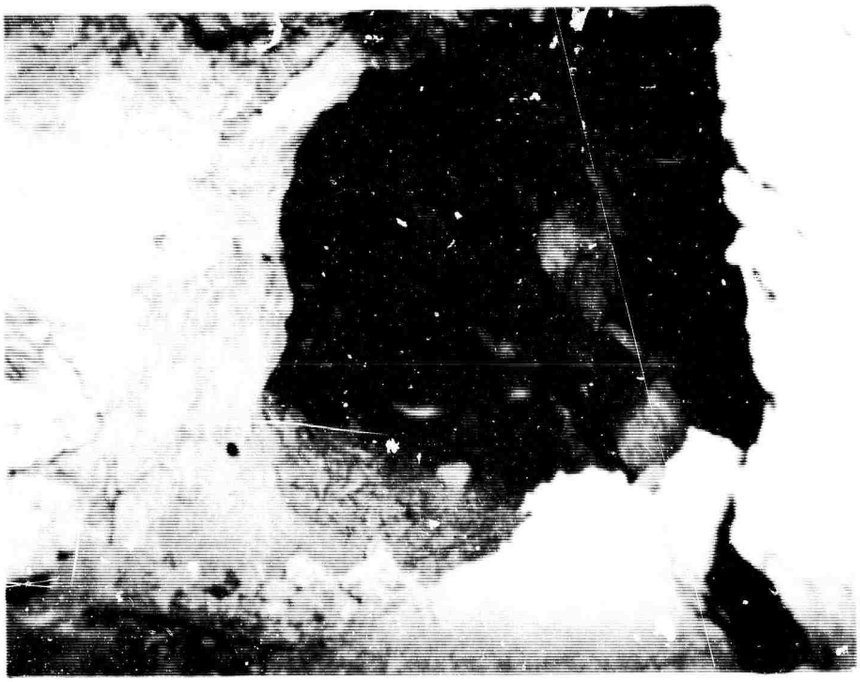


Photo 8-4-28. Preshot. October 1, 1963.

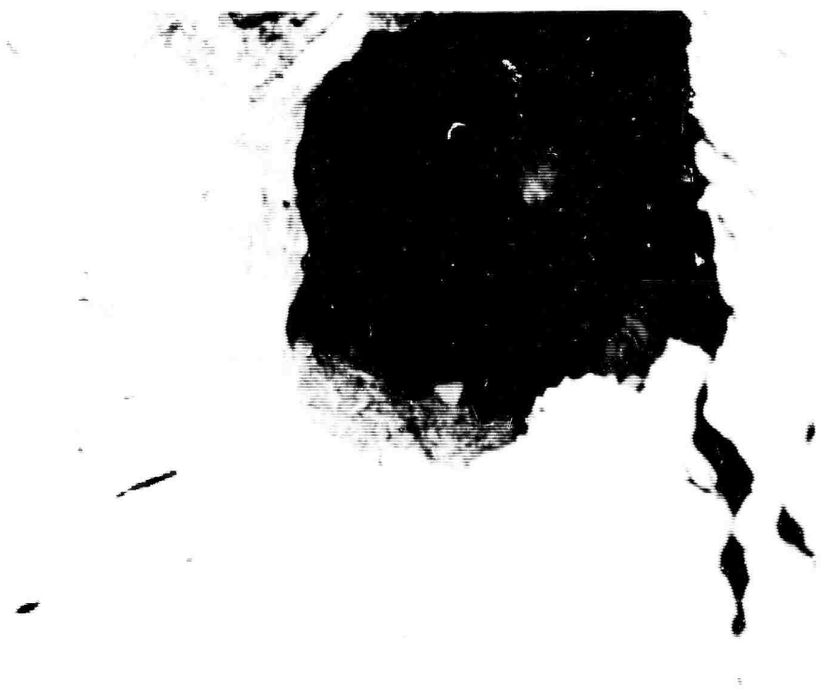


Photo 8-4-28. Postshot. October 30, 1963.

Photo 8-5-29. Preshot. October 1, 1963.

Photo 8-5-29. Postshot. October 30, 1963.

RED ANT AND EAST END MINES

Photo 8-6-30. Preshot. October 1, 1963.

Photo 8-6-30. Postshot. October 30, 1963.

RED ANT AND EAST END MINES

Photo 8-7-31. Preshot. October 1, 1963.

Photo 8-7-31. Postshot. October 30, 1963.

RED ANT AND EAST END MINE

Photo 8-8-32. Preshot. October 1, 1963.

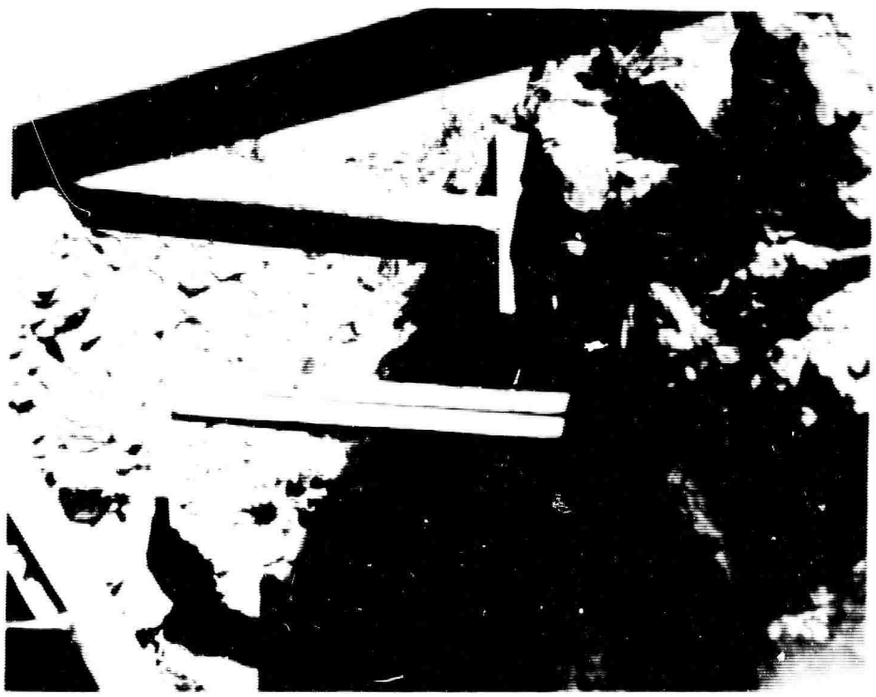


Photo 8-8-32. Postshot. October 30, 1963.

RED ANT AND EAST END MINES

Photo 9-1-33. Preshot. October 1, 1963.

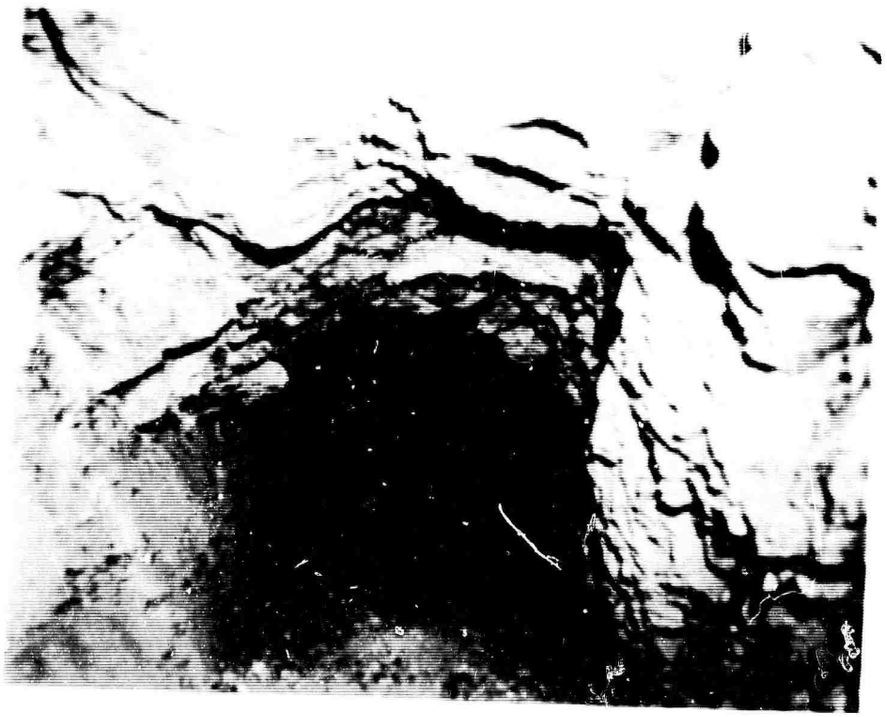


Photo 9-1-33. Postshot. October 30, 1963.

Photo 9-2-34. Preshot. October 1, 1963.

Photo 9-2-34. Postshot. October 30, 1963.

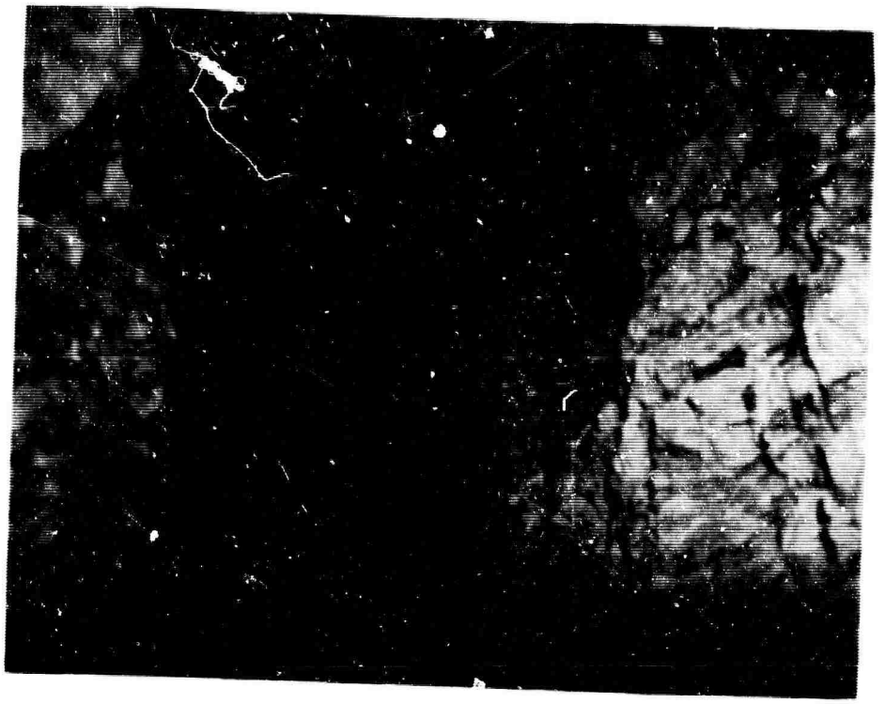


Photo 9-3-35. Preshot. October 1, 1963.

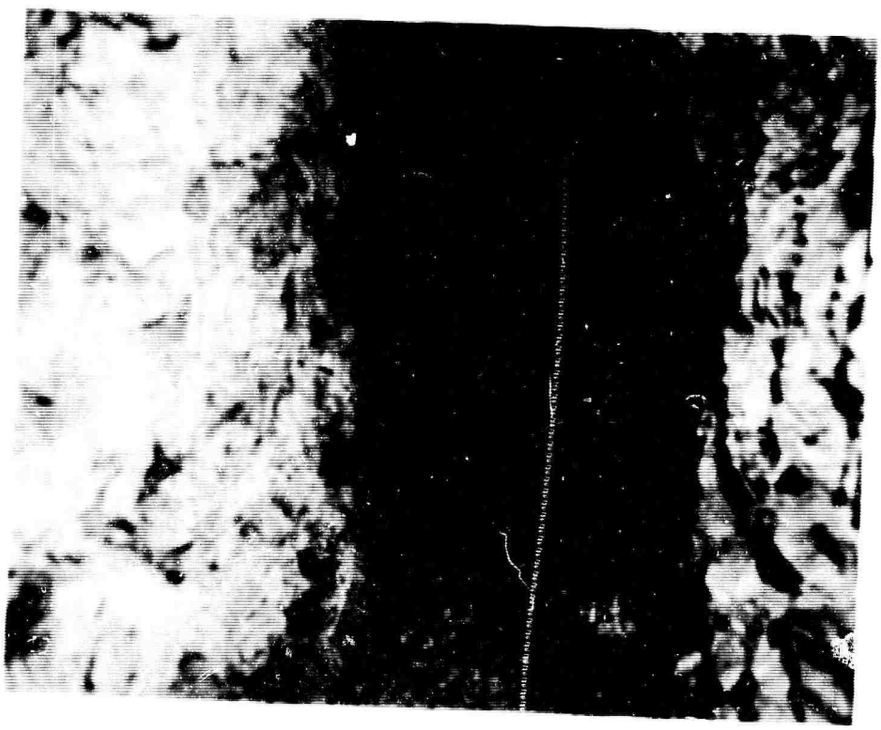


Photo 9-3-35. Postshot. October 30, 1963.

Photo 10-1-36. Preshot. October 1, 1963.

Photo 10-1-36. Postshot. October 30, 1963.

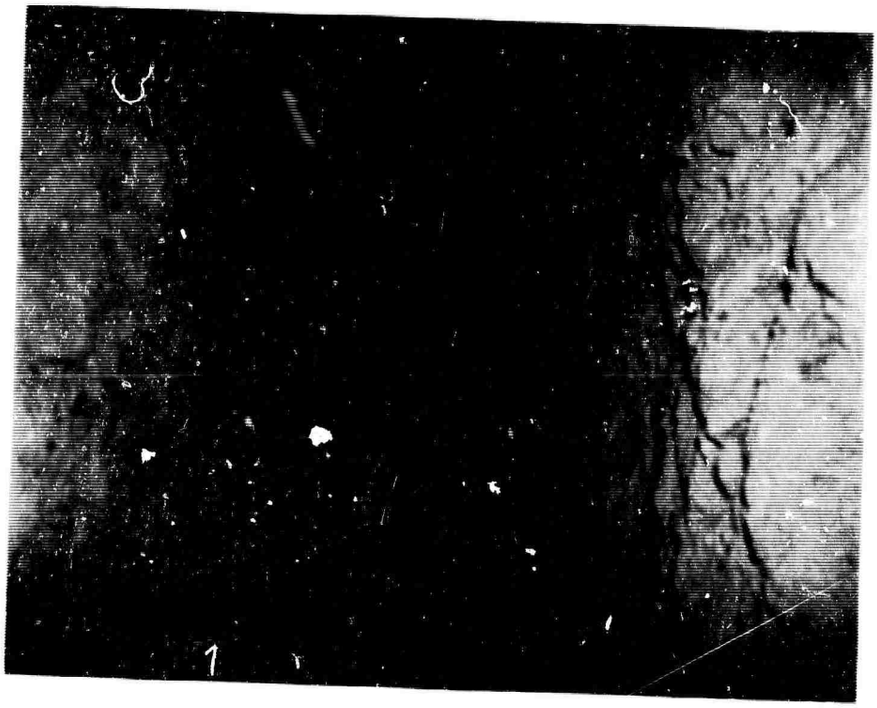


Photo 10-2-37. Preshot. October 1, 1963.

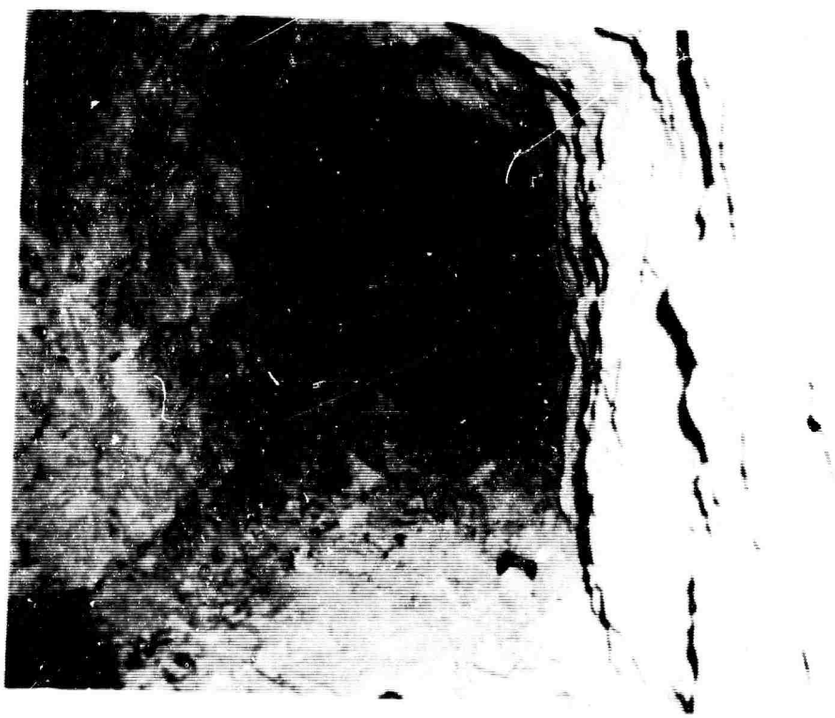


Photo 10-2-37. Postshot. October 30, 1963.

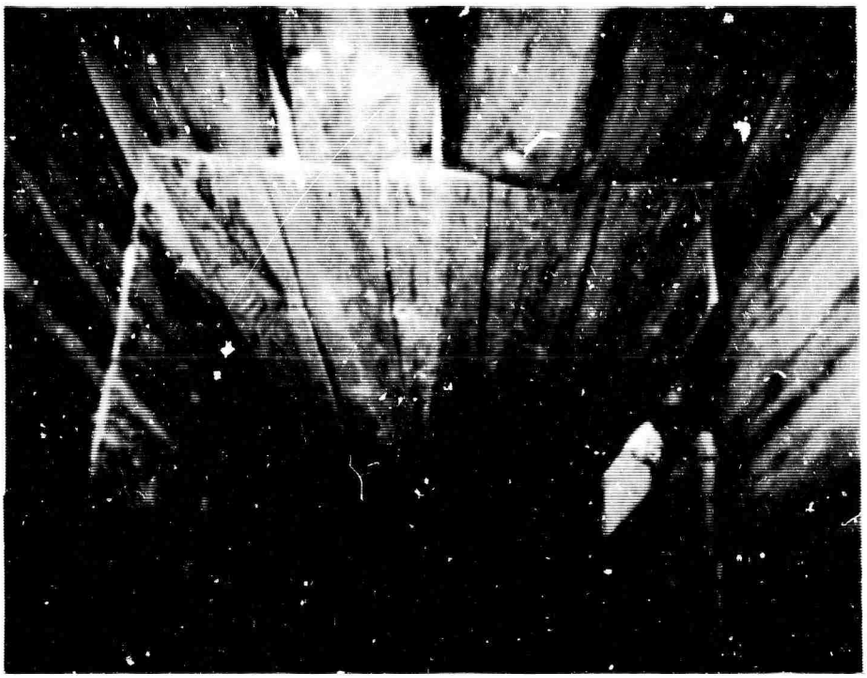


Photo 10-3-38. Preshot. October 1, 1963.

Photo 10-3-38. Postshot. October 30, 1963.

Photo 10-4-39. Preshot. October 1, 1963.

Photo 10-4-39. Postshot. October 30, 1963

Photo 10-5-40. Preshot. October 1, 1963.

Photo 10-5-40. Postshot. October 30, 1963.

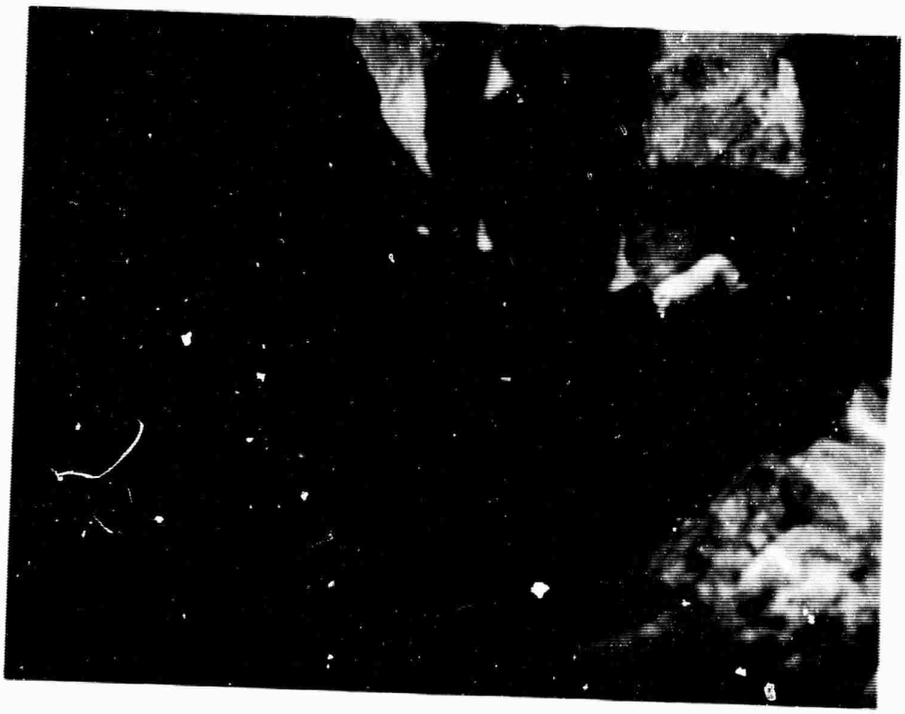


Photo 10-6-41. Preshot. October 1, 1963.

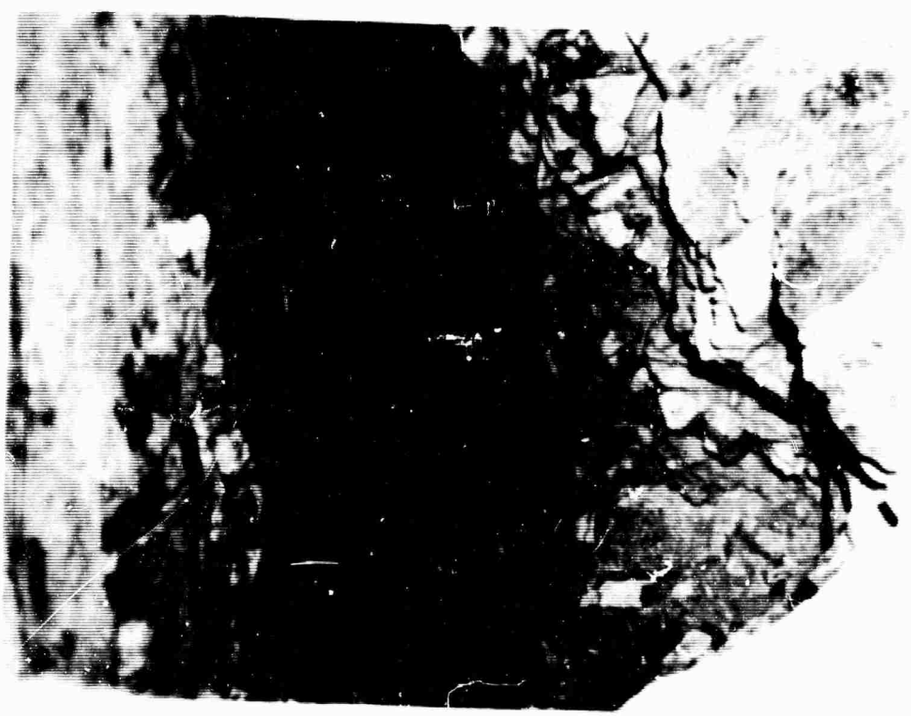


Photo 10-6-41. Postshot. October 30, 1963.

GRUTT HILL MINE

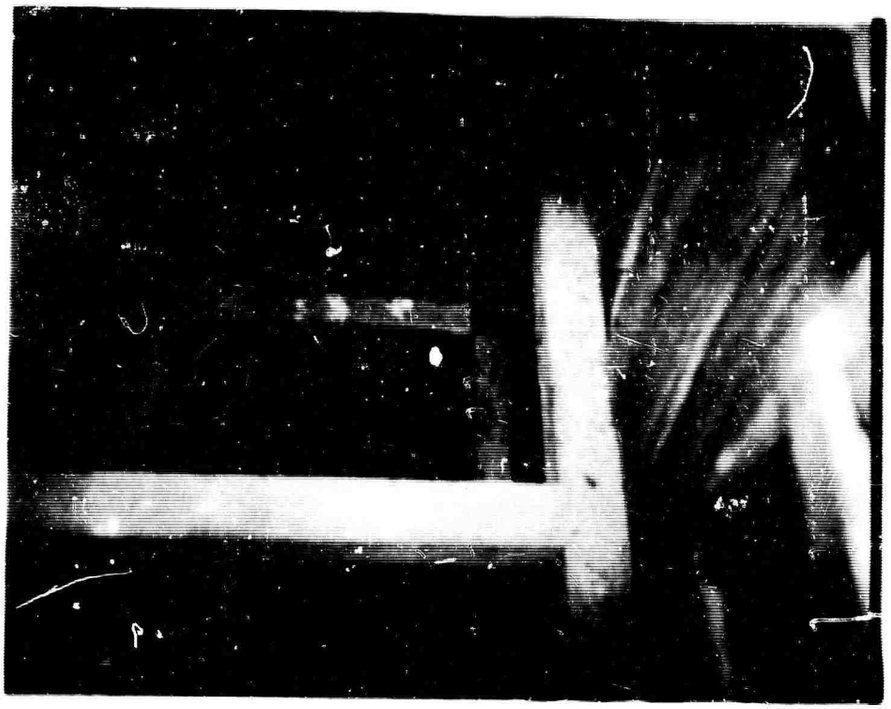


Photo 10-7-42. Preshot. October 1, 1963.

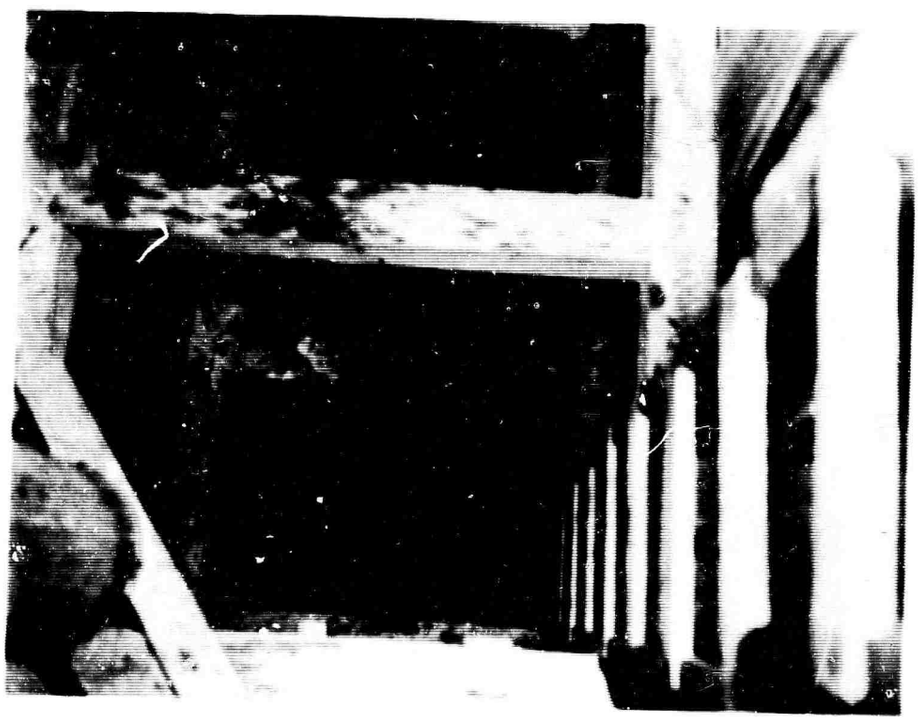


Photo 10-7-42. Postshot. October 30, 1963.

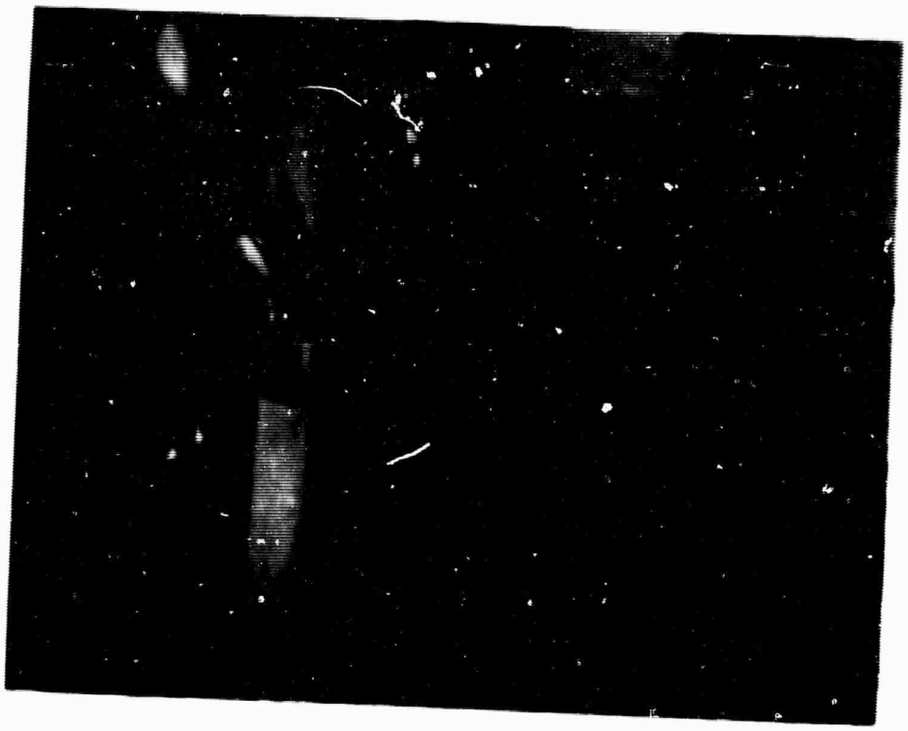


Photo 10-8-43. Preshot. October 1, 1963.

Photo 10-8-43. Postshot. October 30, 1963.

GRUTT HILL MINE

C-44

Photo 11-1-44. Preshot. October 2, 1963.

Photo 11-1-44. Postshot. October 28, 1963.

NEVADA SCHEELITE MINE

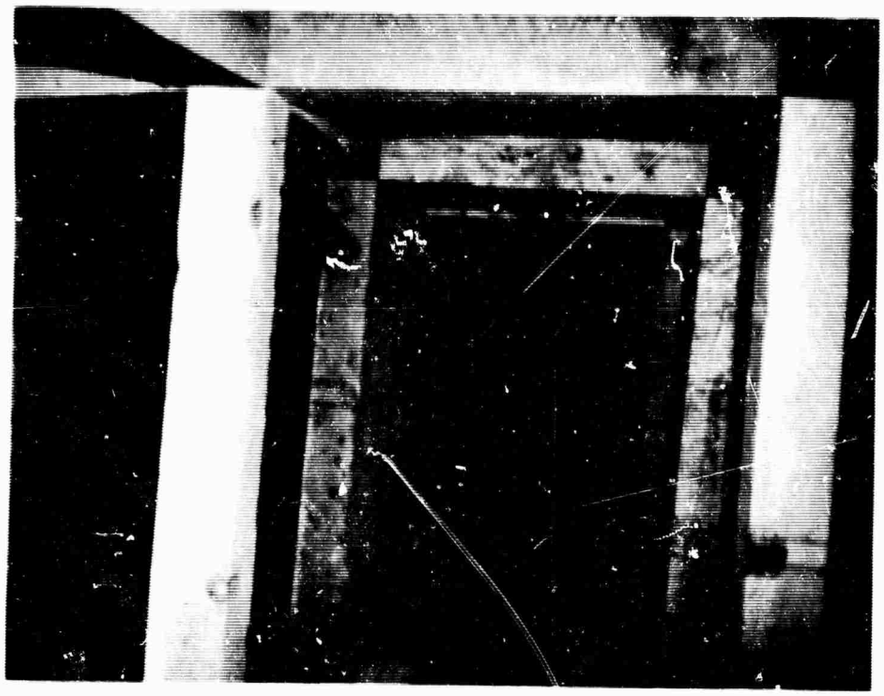


Photo 11-2-45. Preshot. October 2, 1963.

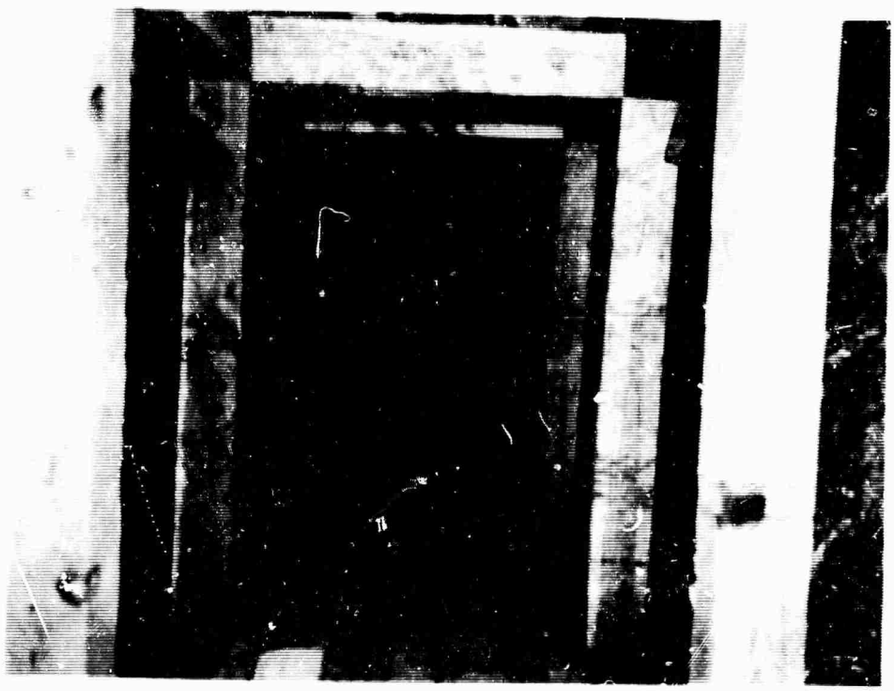


Photo 11-2-45. Postshot. October 28, 1963.

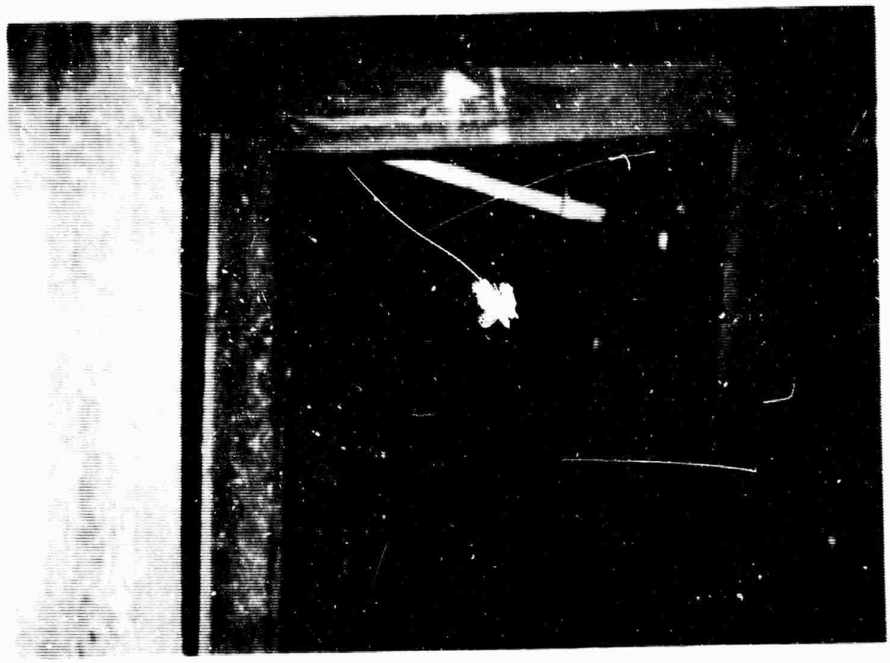


Photo 11-3-46. Preshot. October 2, 1963.

Photo 11-3-46. Postshot. October 28, 1963.

Photo 11-4-47. Preshot. October 2, 1963.

Photo 11-4-47. Postshot. October 28, 1963.

Photo 11-5-48. Preshot. October 2, 1963.

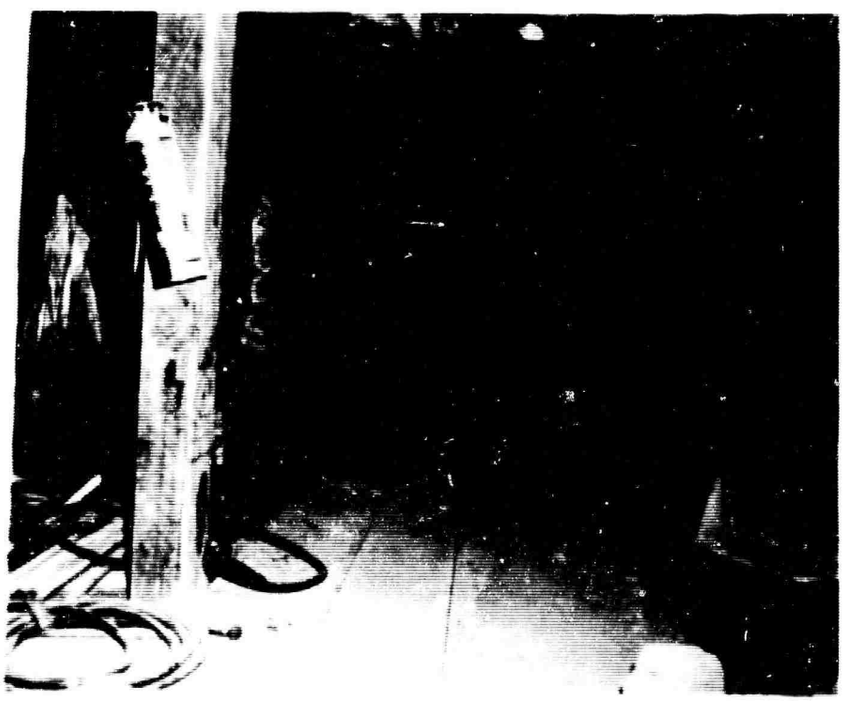


Photo 11-5-48. Postshot. October 28, 1963.

Photo 11-6-49. Preshot. October 2, 1963.

Photo 11-6-49. Postshot. October 28, 1963.

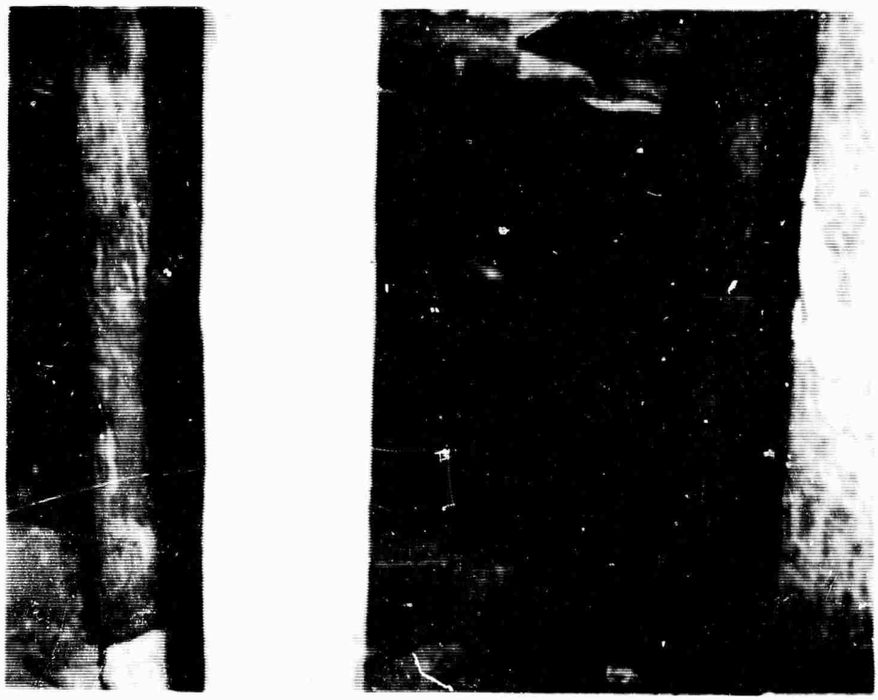


Photo 11-7-50. Preshot. October 2, 1963.

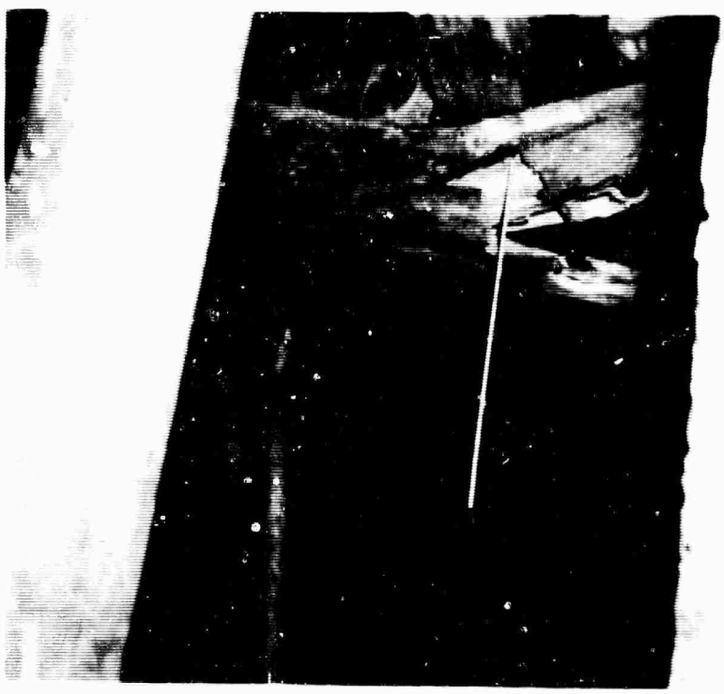


Photo 11-7-50. Postshot. October 28, 1963.

NEVADA SCHEELITE MINE

Photo 11-8-51. Preshot. October 2, 1963.

Photo 11-8-51. Postshot. October 28, 1963.

NEVADA SCHEELITE MINE

Photo 11-9-52. Preshot. October 2, 1963.

Photo 11-9-52. Postshot. October 28, 1963.

NEVADA SCHEELITE MINE

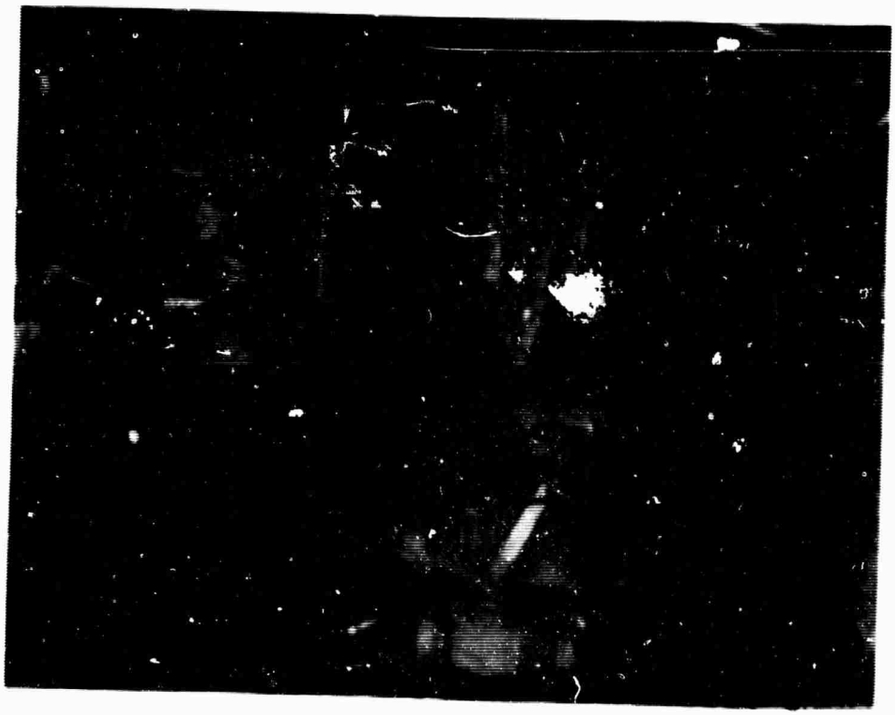


Photo 11-10-53. Preshot. October 2, 1963.

Photo 11-10-53. Postshot. October 28, 1963.

NEVADA SCHEELITE MINE

Photo 11-11-54. Preshot. October 2. 1963.

Photo 11-11-54. Postshot. October 28, 1963.

NEVADA SCHEELITE MINE

Photo 11-12-55. Preshot, October 2, 1963.

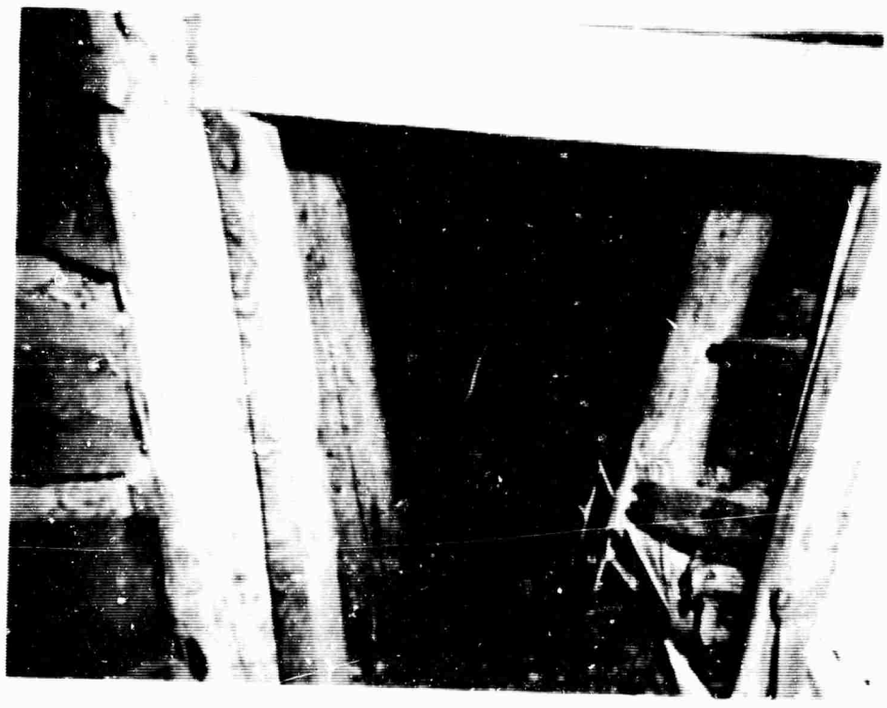


Photo 11-12-55. Postshot. October 28, 1963.

NEVADA SCHEELITE MINE

Photo 11-13-56. Preshot. October 2. 1963.

Photo 11-13-56. Postshot. October 28, 1963.

NEVADA SCHEELITE MINE

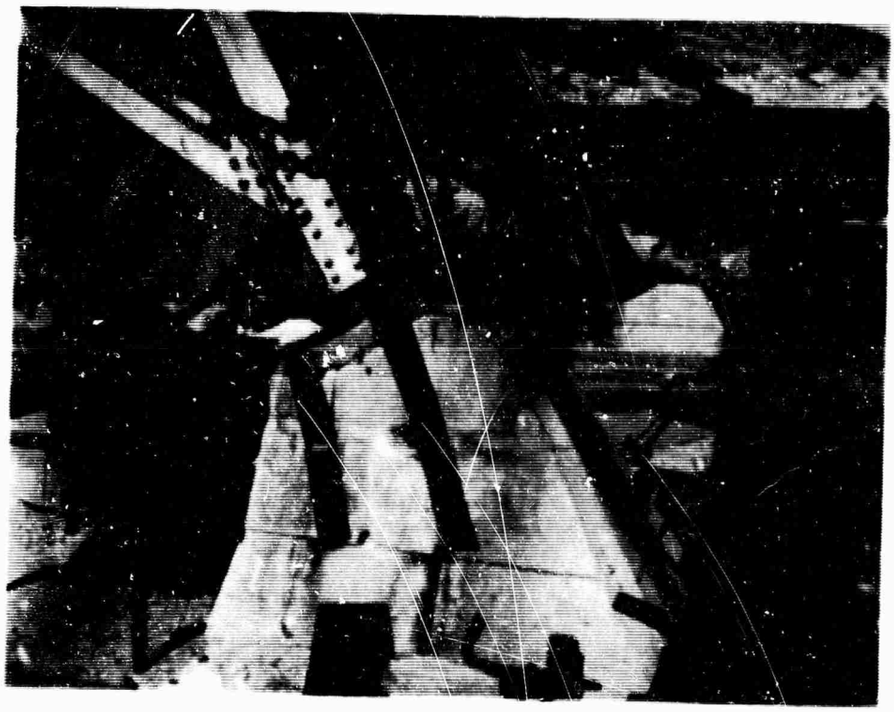


Photo 11-14-57. Preshot. October 2, 1963.

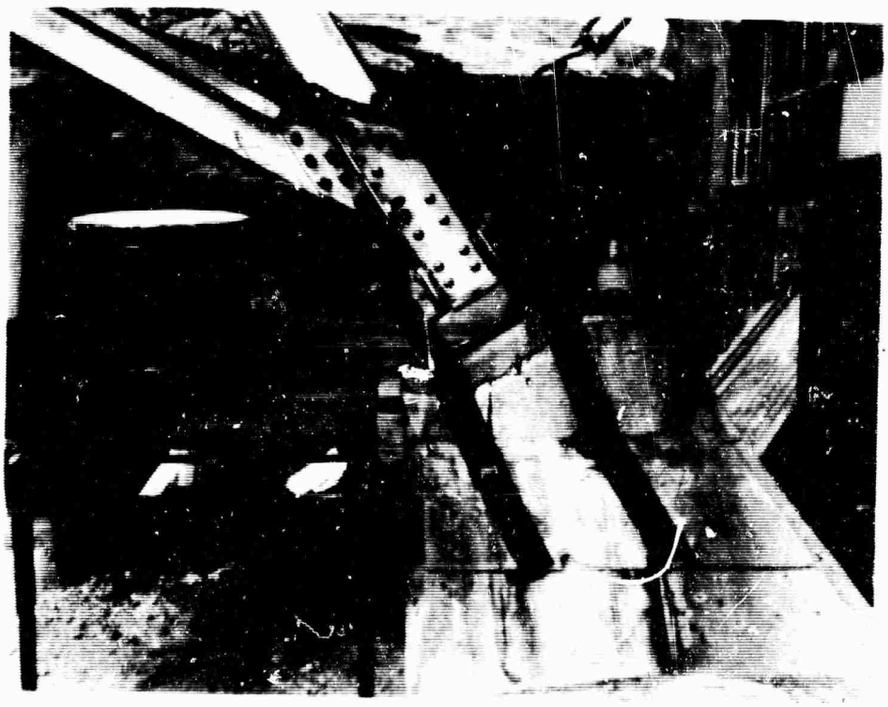


Photo 11-14-57. Postshot. October 28, 1963.

NEVADA SCHEELITE MINE

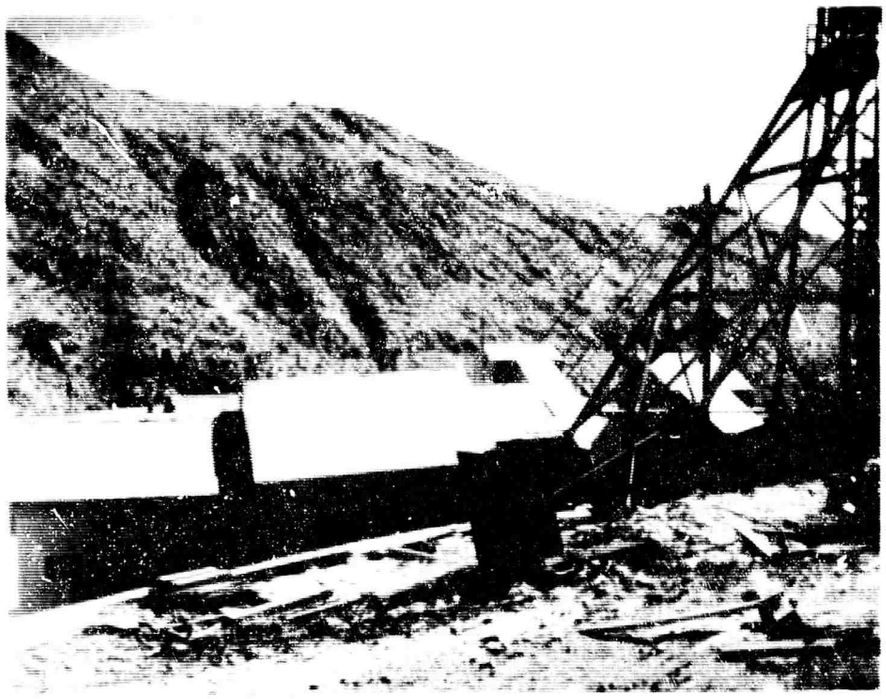


Photo 11-15-58. Preshot. October 2, 1963.

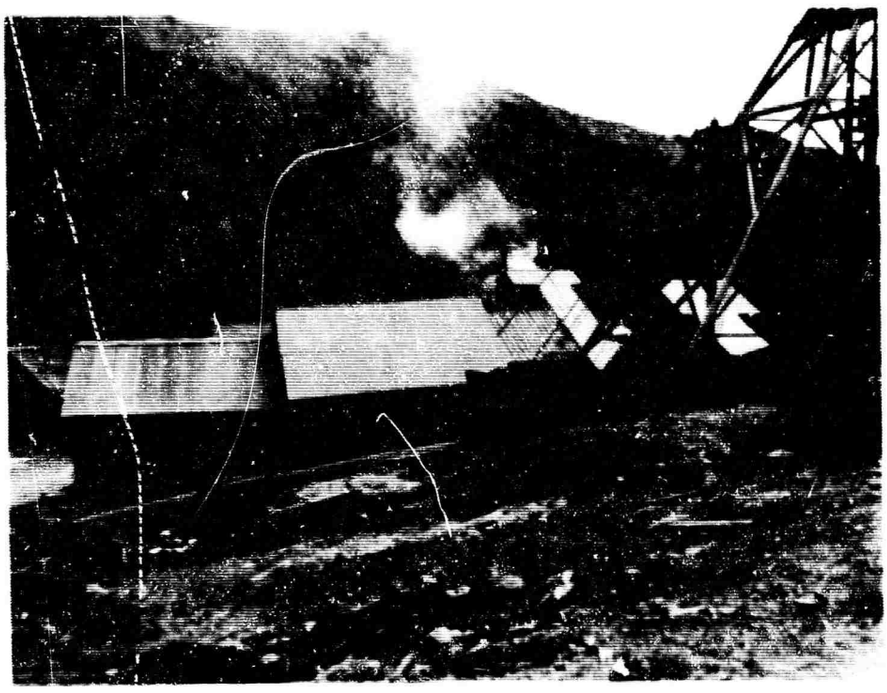


Photo 11-15-58. Postshot. October 28, 1963.

NEVADA SCHEELITE MINE

Photo 12-1-59. Preshot. October 2, 1963.

Photo 12-1-59. Postshot. October 28, 1963.

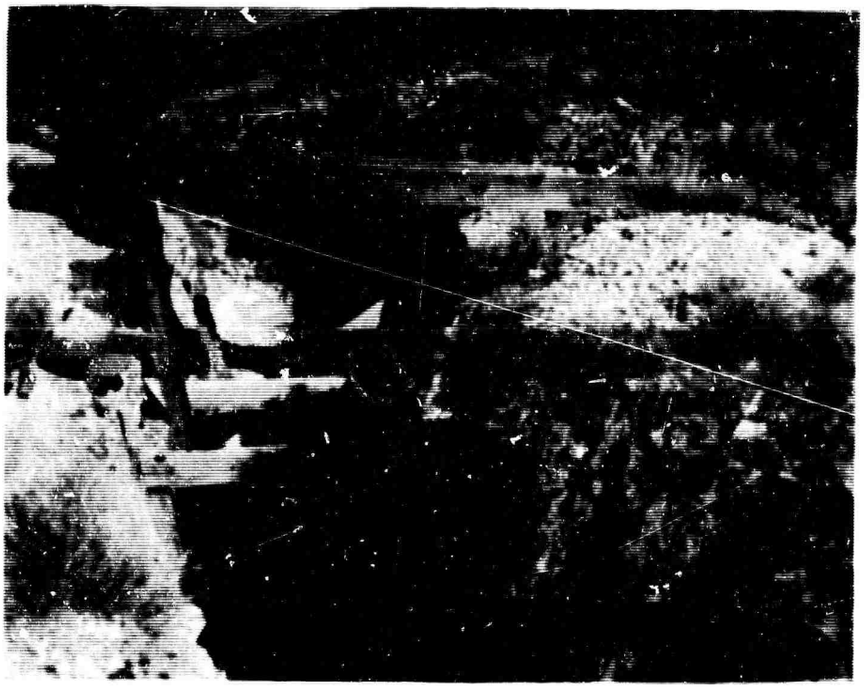


Photo 13-1-60. Preshot. October 2, 1963.

Photo 13-1-60. Postshot. October 28, 1963.

HIGHLAND MINE

Photo 13-2-61. Preshot. October 2, 1963.

Photo 13-2-61. Postshot. October 28, 1963.

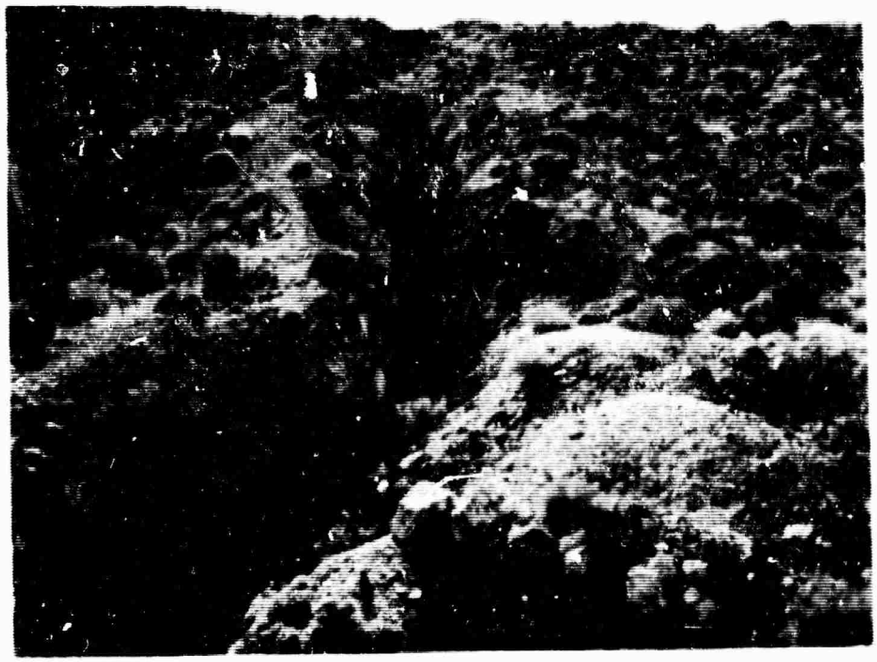


Photo 13-3-62. Preshot. October 2, 1963.

Photo 13-3-62. Postshot. October 28, 1963.

Photo 13-4-63. Preshot. October 2, 1963.

Photo 13-4-63. Postshot. October 28, 1963.

Photo 13-5-64. Preshot. October 2, 1963.

Photo 13-5-64. Postshot. October 28, 1963.

EAGLE MINE

Photo 13-6-65. Preshot. October 2, 1963.

Photo 13-6-65. Postshot. October 28, 1963.

EAGLE MINE

Photo 14-1-66. Preshot. October 3, 1963.

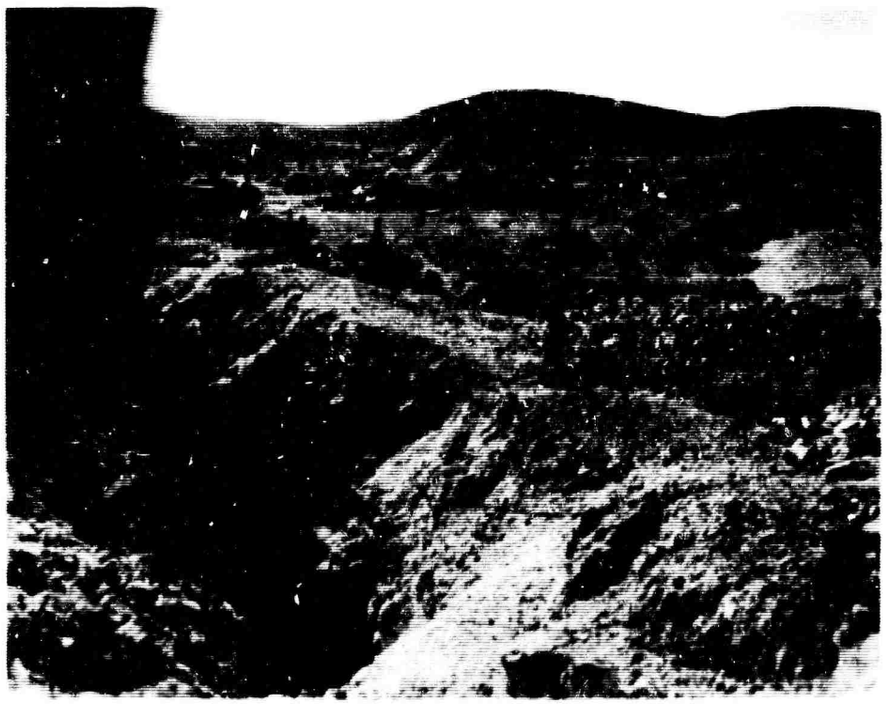


Photo 14-1-66. Postshot. October 31, 1963.

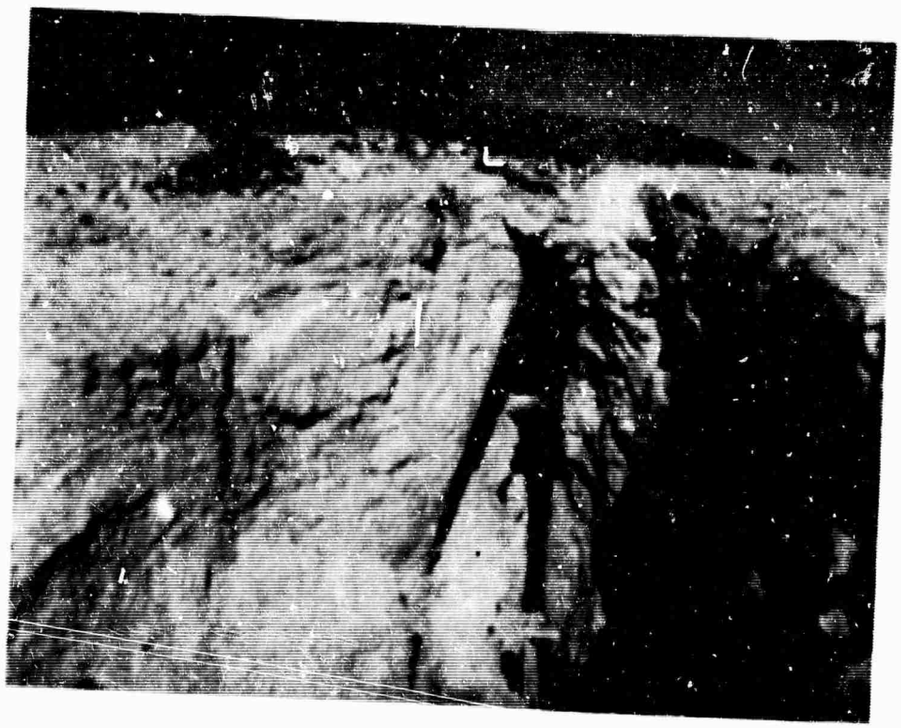


Photo 14-2-67. Preshot. October 3, 1963.

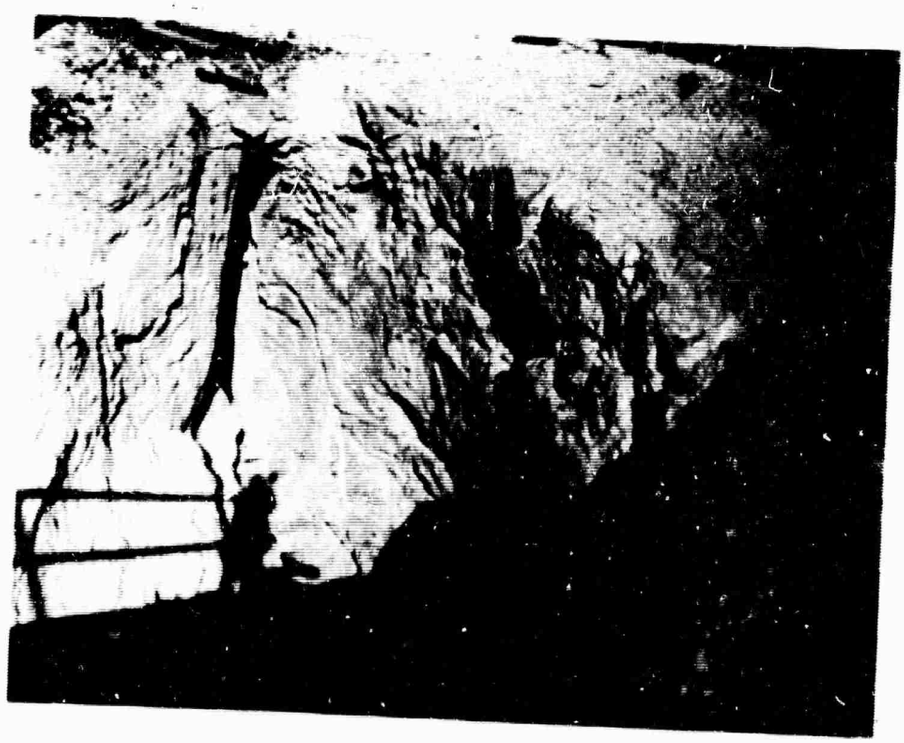


Photo 14-2-67. Postshot. October 31, 1963.

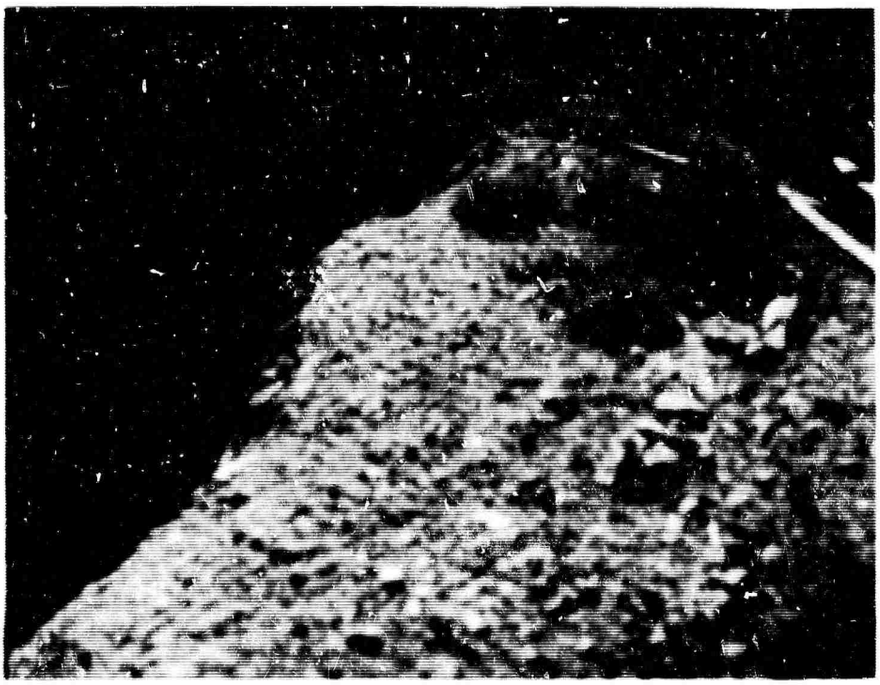


Photo 14-3-68. Preshot. October 3, 1963.

Photo 14-3-68. Postshot. October 31, 1963.

BROKEN HILLS CLAIMS

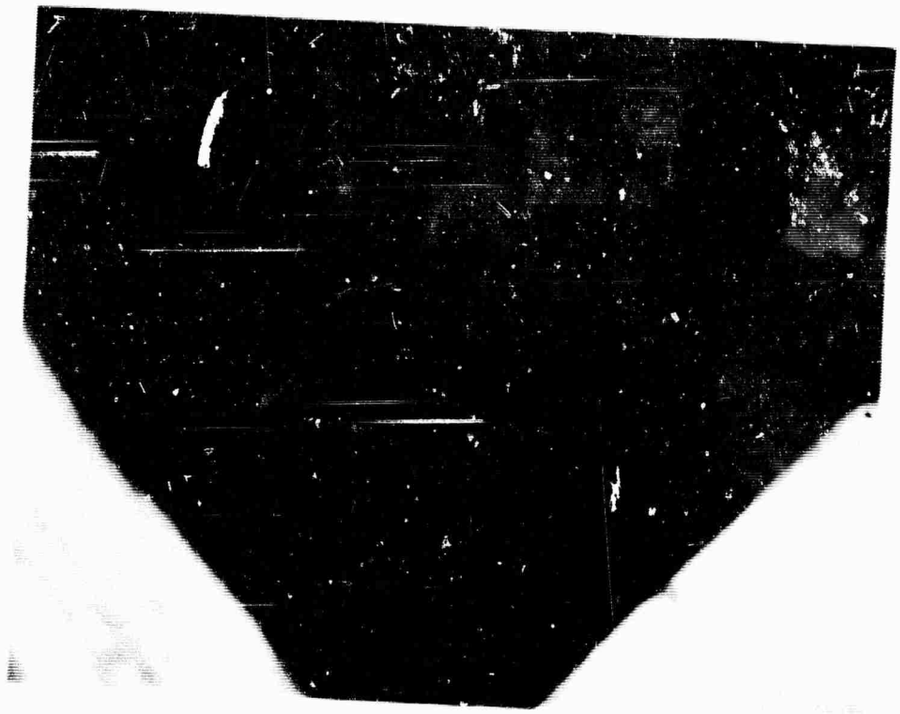


Photo 14-4-69. Preshot. October 3, 1963.

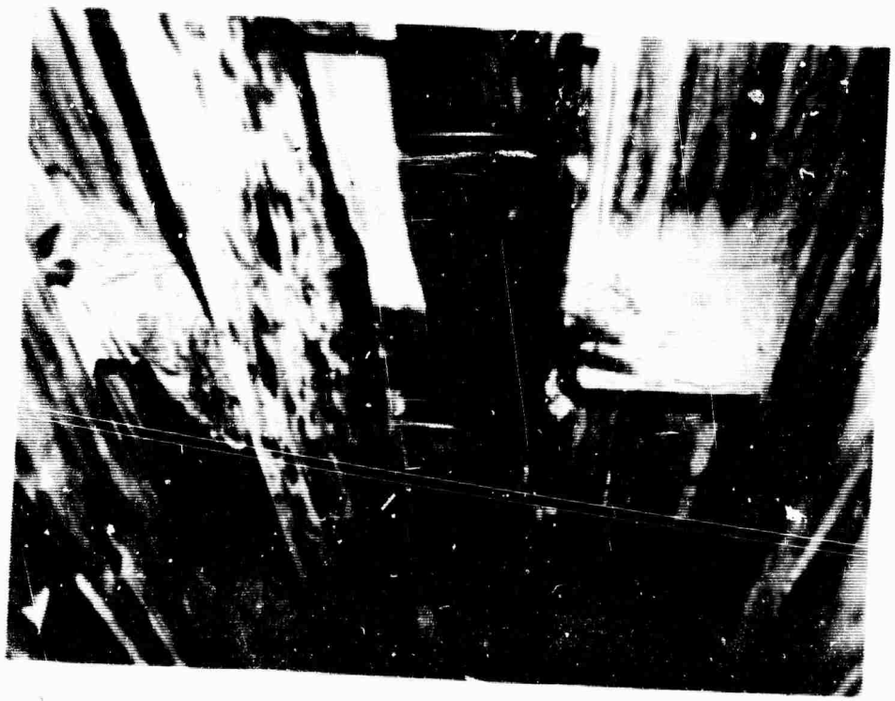


Photo 14-4-69. Postshot. October 31, 1963.

Photo 15-1-70. Preshot. October 10, 1963.

Photo 15-1-70. Postshot. October 31, 1963.

SIMON MINE

Photo 15-2-71. Preshot. October 10, 1963.

Photo 15-2-71. Postshot. October 31, 1963.

Photo 15-3-72. Preshot. October 10, 1963.

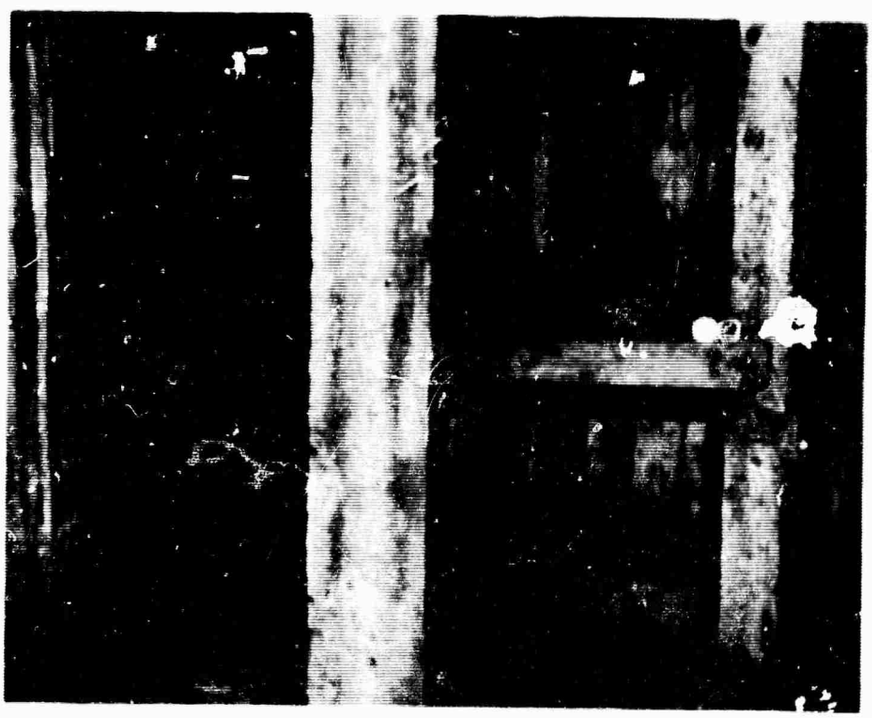


Photo 15-3-72. Postshot. October 31, 1963.

SIMON MINE

Photo 15-4-73. Preshot. October 10, 1963.

Photo 15-4-73. Postshot. October 31, 1963.

SIMON MINE

Photo 15-5-74. Preshot. October 10, 1963.

Photo 15-5-74. Postshot. October 31, 1963.

SIMON MINE

Photo 16-1-75. Preshot. October 22, 1963.

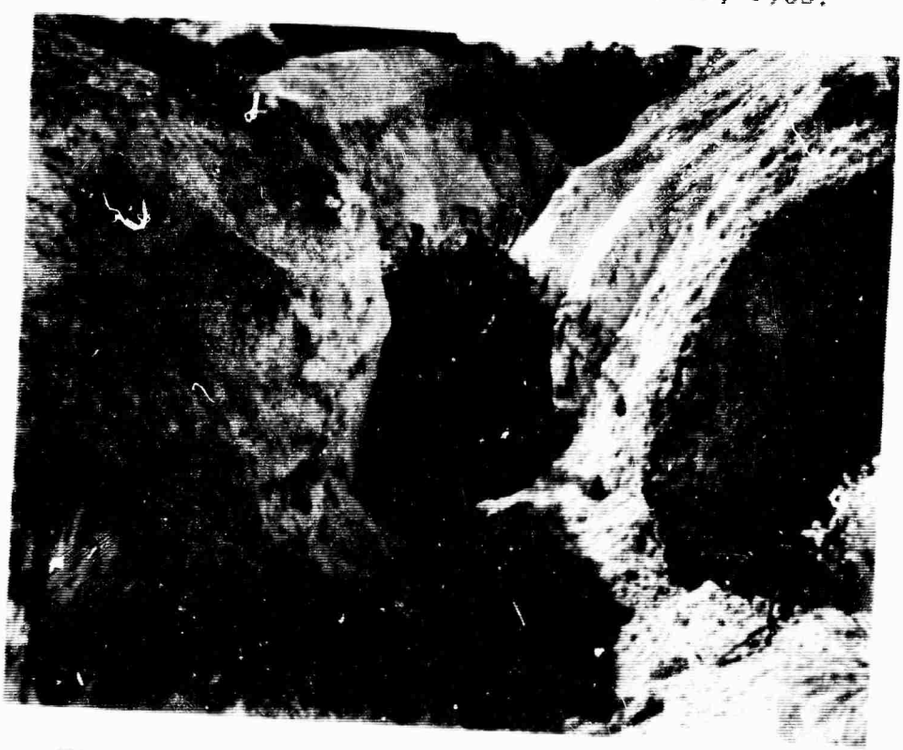


Photo 16-1-75. Postshot. October 31, 1963.

BUFFALO HUMP MINE

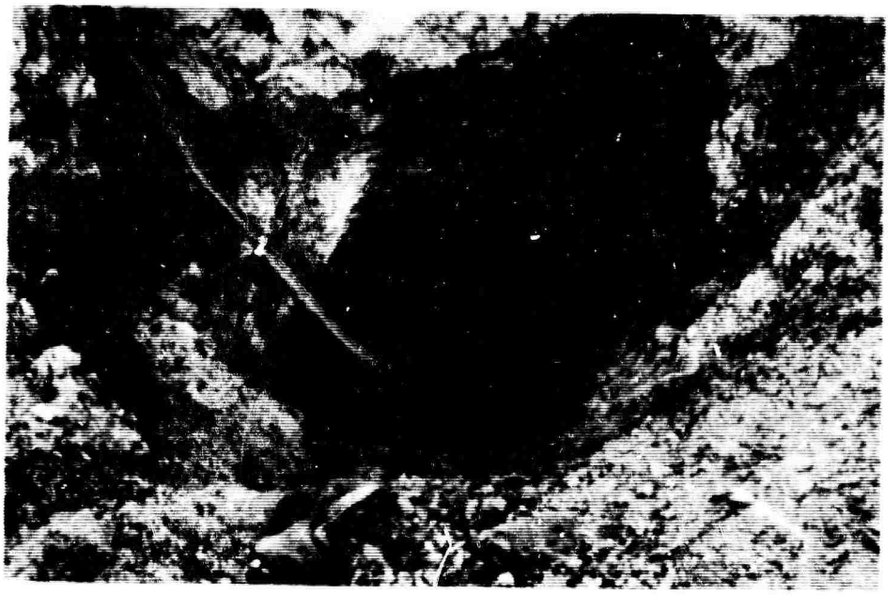


Photo 16-2-76. Preshot. October 22, 1963.

Photo 16-2-76. Postshot. October 31, 1963.

BUFFALO HUMP MINE

Photo 16-3-77. Preshot. October 22, 1963.

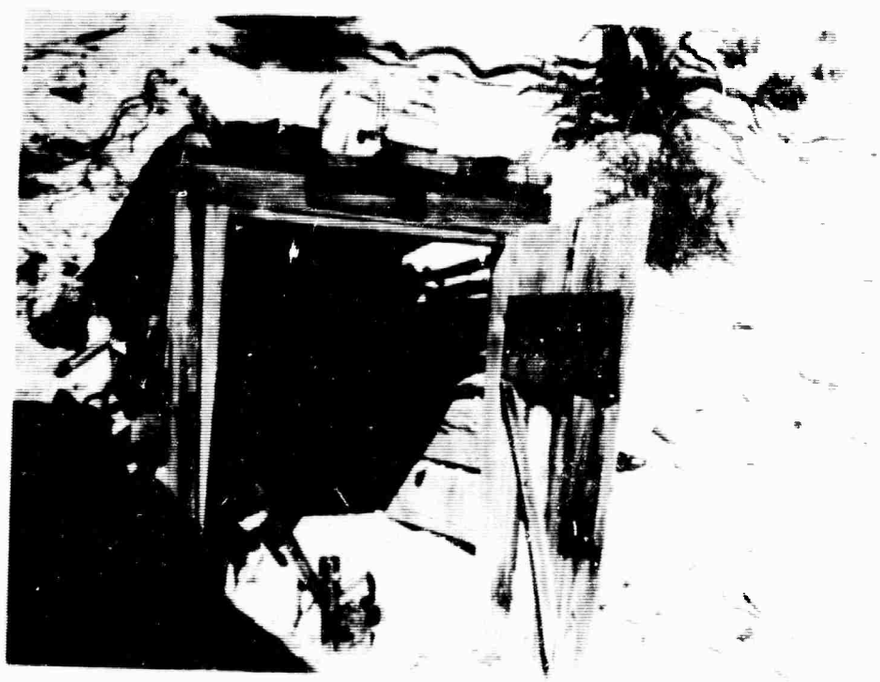


Photo 16-3-77. Postshot. October 31, 1963.
BUFFALO HUMP MINE

Photo 16-4-78. Preshot. October 22, 1963.

Photo 16-4-78. Postshot. October 31, 1963

BUFFALO HUMP MINE

BLANK PAGE

TECHNICAL REPORTS SCHEDULED FOR ISSUANCE BY AGENCIES PARTICIPATING IN PROJECT SHOAL

AEC REPORTS

Agency	Report No.	Project No.	Subject or Title
NBM	VUF-1001	33.2	Geological, Geophysical and Hydrological Investigations of the Sand Springs Range, Fairview Valley and Fourmile Flat, Churchill County, Nevada
SC	VUF-1002	40.5	Seismic Measurements at Sandia Stations
SC	VUF-1003	45.3	Hydrodynamic Yield Measurements
SC	VUF-1004	45.5	Device Support, Arming, Stemming and Yield Determination
SC	VUF-1005	45.6	Radiological Safety
EG&G	VUF-1006	60.4	Final Timing and Firing Report - Final Photo Report
USBM-PRC	*		Subsurface Fracturing From Shoal Nuclear Detonation
USWB	VUF-1008		Weather and Surface Radiation Prediction
USPHS	VUF-1009		Off-Site Surveillance
USBM	VUF-1010		Structural Survey of Private Mining Properties
USC&GS	VUF-1011		Seismic Safety Net
REECo	VUF-1012		On-Site Health and Safety Report

Agency	Report No.	Project No.	Subject or Title
RFB, Inc.	VUF-1013		Analysis of Shoal Data on Ground Motion and Containment
H-NSC	VUF-1014		Shoal Post-Shot Hydrologic Safety Report
H&N	VUF-1015		Pre-Shot and Post-Shot Structure Survey
H&N	VUF-1016		Test of Dribble-Type Structures
FAA	VUF-1017		Federal Aviation Agency Airspace Advisory
		DOD REPORTS	
SC	VUF-2001	1.1	Free Field Earth Motions and Spalling Measurements in Granite
SC	VUF-2002	1.2	Surface Motion Measurements Near Surface
** USC&GS	VUF-2300	1.4	Strong Motion Seismic Measurements
LPI	VUF-2600	1.6	In-Situ Stress in Granite
** STL	VUF-2400	1.7	Shock Spectrum Measurements
SRI	VUF-3001	7.5	Investigation of Visual and Photographic On-Site Techniques
SRI	VUF-3002	7.6	Local Seismic Monitoring - Vela CLOUD GAP Program

TI	VUF-3003	7.8	Surface and Subsurface Radiation Studies
USGS	VUF-3004	7.9	Physical and Chemical Effects of the Shoal Event
ITEK	VUF-3005	7.10	Airborne Spectral Reconnaissance
BR Ltd.	VUF-3006	7.15	The Mercury Method of Identification and Location of Underground Nuclear Sites
NRDL	VUF-3007	7.16	Multi-Sensor Aerial Reconnaissance of an Underground Nuclear Detonation
GIMRADA	VUF-3008	7.17	Stereophotogrammetric Techniques for On-Site Inspection
ISOTOPES	VUF-3009	7.19	Detection in Surface Air of Gaseous Radionuclides from the Shoal Underground Detonation
*** USC&GS		8.1	Microearthquake Monitoring at the Shoal Site
**** GEO-TECH		8.4	Long-Range Seismic Measurements

---

* This is a Technical Report to be issued as PNE-3001 which will receive TID-4500 category UC-35 Distribution "Nuclear Explosions-Peaceful Applications"

** Project Shoal results are combined with other events, therefore, this report will not be printed or distributed by DTIE

*** Report dated March 1964 has been published and distributed by USC&GS

**** Report dated December 9, 1963, DATDC Report 92, has been published and distributed by UED

LIST OF ABBREVIATIONS FOR TECHNICAL AGENCIES

BR Ltd.	Barringer Research Limited Rexdale, Ontario, Canada
EG&G	Edgerton, Germeshausen & Grier, Inc. Boston, Massachusetts Las Vegas, Nevada Santa Barbara, California
FAA	Federal Aviation Agency Los Angeles, California
GEO-TECH	Geo Technical Corporation Garland, Texas
GIMRADA	U. S. Army Geodesy, Intelligence and Mapping Research and Development Agency Fort Belvoir, Virginia
H-NSC	Hazleton-Nuclear Science Corporation Palo Alto, California
H&N, Inc.	Holmes & Narver, Inc. Los Angeles, California Las Vegas, Nevada
ISOTOPES	Isotopes, Inc. Westwood, New Jersey
ITEK	ITEK Corporation Palo Alto, California
LPI	Lucius Pitkin, Inc. New York, New York
NBM	Nevada Bureau of Mines University of Nevada, Reno, Nevada
NRDL	U. S. Naval Radiological Defense Laboratory San Francisco, California
REECo	Reynolds Electrical & Engineering Co., Inc. Las Vegas, Nevada
SC	Sandia Corporation Albuquerque, New Mexico
SRI	Stanford Research Institute Menlo Park, California

RFB, Inc.	R. F. Beers, Inc. Alexandria, Va.
STL	Space Technology Laboratories, Inc. Redondo Beach Park, California
TI	Texas Instruments, Inc. Dallas, Texas
USBM	U. S. Bureau of Mines Washington, 25, D. C.
USBM-PRC	U. S. Bureau of Mines Bartlesville Petroleum Research Center Bartlesville, Oklahoma
USC&GS	U. S. Coast and Geodetic Survey Las Vegas, Nevada
USGS	U. S. Geologic Survey Denver, Colorado
USPHS	U. S. Public Health Service Las Vegas, Nevada
USWB	U. S. Weather Bureau Las Vegas, Nevada