UNITED STATES
DEPARTMENT OF THE INTERIOR
DEFENSE MINERALS EXPLORATION ADMINISTRATION
WASHINGTON 25, D. C.
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So. 157 Howard Street
Spokane 4, Washington

March 15, 1954

Memorandum

To: Field Team, Region II

From: R. A. Weeks, Geologist, U. S. Geological Survey

Subject: Recommendations on Snowshoe Gulch Property, Docket No. DMEA-2973 (tungsten), Boulder Gree, Inc., Assignee of Florian L. Glimsaki, Powell County, Montana, Contract No. Idm-2588.

A report on the subject property has been prepared by P. H. Toepfer, and received in this office. In it, Toepfer transmits the results of his geologic and engineering work conducted on DMEA funds, and his recommendations to the operators. The report and accompanying maps are of good quality. I have gone over the area with Toepfer in the field, and discussed it recently in the office. His recommendations are basically sound, but the work he outlines is somewhat in excess of the terms of the contract. He admits this, but points out that the report, prepared for the operators, should be of use to them in planning work beyond the present exploration program.

With this report in hand, it is desirable to review the status of this contract, and to recommend to the operators the best program possible from the present state of our knowledge. To do this, I have recompiled Toepfer's 60-scale maps to a single 200-scale map (copy attached). Work performed under the contract thus far has amounted to 32 hours of bulldozing on the Arnold claim, labor required to open the portals of adits on the Arnold and Montana claims, and Toepfer's mapping, sampling, and report writing. Work remaining to be done under Stage I amounts to 110 hours of dozing, and appropriate sampling. The dozer trenches for Stage I were located, but work had scarcely begun when weather conditions forced the operations to cease. It is anticipated that bulldozing the remaining trenches of Stage I will require less than a month, as soon as the snow cover is gone, presumably sometime in May.

The results of Toepfer's mapping indicates that tungsten mineralization is as widespread as previously believed, and that sufficient tungsten exists on the claims lying west of Snowshoe Creek to merit authorization of some of the work under Stage II of the contract. If the bulldozing work outlined in Stage II is authorized, it will permit continuous employment of a bulldozer at a savings to the contract in both time and money. Further work by Toepfer is

essential to locate the trenches. This work should include the remainder of the mapping, plus sampling of the trenches.

In order to save on wordiness, the remainder of my specific recommendations are tabulated below:

432 hours of bulldozing to be used in the following trenches:

Arnold area - Finish trench #1 and #2, plus about nine additional trenches, to test the South Arnold, Montana, East Arnold, and Arnold Fraction claims.

Coppertung prospects - 2 or more trenches contingent upon further mapping.

Friday area - Central Friday prospect, 4 trenches; South Friday prospect, 4 trenches.

Tungstate area - Complete mapping before locating trenches, but tentatively 3 or more trenches will be needed.

Strategic-Shamrock area - Lower Tungstate area, 1 trench (?); Lower Shamrock prospect, 2 trenches; Southeast Shamrock island, 1 trench; Upper Shamrock prospect, 2 trenches; Strategic adit, no trenching; Southern tactite outcrops, 2 trenches; Northern tactite outcrops, 4 trenches; Twin shafts, 5 trenches.

North Flagstaff area - South Strategic pit, 2 or 3 trenches; North Flagstaff island, 1 trench; Flagstaff mine, 3 trenches; Chief prospect, 2 trenches.

It is recommended that the opening of caved adits suggested by Toepfer be allowed as follows:

Friday prospect	(2 man weeks)
South Friday prospect	(4 man weeks)
Lower tungstate prospect	(2 man weeks)
Flagstaff mine	(2 man weeks)

It is recommended that exploration drifting as suggested by Toepfer in the Arnold, East Arnold and Strategic adits not be authorized at this time, pending completion of the mapping, trenching and sampling suggested above. After the results of these recommended exploration jobs are studied, the best method and places for further exploration can be established. Similarly, diamond drilling is not recommend at this time.

In summary, the following work is recommended:

a) completion of mapping
b) cutting of approximately 40 trenches, with appropriate sampling and assaying
c) necessary work to reopen 4 caved adits for mapping and sampling

If the Field Team approves these recommendations, the operators should be so advised, and with their concurrence, the portions of Stage II discussed above should be authorized.

Enclosure

Distribution:
DGMA (4)
USBM (2)
Docket
Weeks

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In summary, the following work is recommended:

a) completion of mapping
b) cutting of approximately 40 trenches, with appropriate sampling and assaying
c) necessary work to reopen 4 caved adits for mapping and sampling

If the Field Team approves these recommendations, the operators should be so advised, and with their concurrence, the portions of Stage II discussed above should be authorized.

Enclosure

Distribution:
DMMA (4)
DMMM (2)
Docket
Weeks

Docket No. DMEA 2973 (tungsten)
Contract Idm-E588

SNOWSHOE GULCH TUNGSTEN-COPPER DEPOSITS
POWELL COUNTY, MONTANA

(Report of engineering work done under the DMEA contract by Peter H. Toepfer during the year, 1953.)

My original report on the Snowshoe deposits covered only the Arnold Mine area, which was the only area mapped in detail. The engineering work this year consisted mainly of bringing this map up to date, and surveying and mapping five new areas. The following maps are to accompany this report:

ARNOLD MINE AREA
FRIDAY AREA
TUNGSTATE AREA
STRATEGIC-SHAMROCK AREA
NORTH FLAGSTAFF AREA
FLAGSTAFF MINE AREA

Except for the STRATEGIC-SHAMROCK AREA, further survey work will be required for the completion of these maps. However, these maps can be used for expanding the bulldozer trenching program into these other important areas. If three further maps are made, the known tungsten deposits will be completely covered.

Several geological observations were made during the course of the work, which should be added to my original report. My original report, written from survey and geological notes 10 years old, in general appears to be accurate. However, the report stresses the presence of quartz veins in the limestone east of the Arnold mine. Re-examination showed that while quartz is present in quantity, tactites are also present in quantity, and some scheelite was observed in all these "veins".

Actually, no true veins are present in the limestone and the contact zones. The ore occurs in tactite zones along the granite-limestone contact, and extending from that contact into the limestone. Most of the ore occurences are enclosed by unaltered limestone walls. Where ore does occur in the contact zones, it appears to be always directly under the unaltered limestone. In the maps, I have retained the use of the word, "vein", to describe the ore occurences between limestone walls. I have stressed this so that future trenching and underground exploration will not be confined solely to the contact zones.

During the course of the surveying, it was observed that where the granite-limestone contact is relatively flat, little or no tactite was formed, and no ore occurred. The ore occurences appear confined in places where the granite batholith has unusually steep sides. Future bulldozer trenching should be confined to areas where there is geological evidence of a steeply-dipping contact.

My original report stated that the average grade of the ore shipped by Porter Bros. Corp. was 0.533% WO_3. On the basis of samples taken this year, it appears that either Porter Bros. was stung, or else paid on the basis of poor recovery. My sample of ore remaining in the ore bin assayed 1.05% WO_3, and a sample taken near the Porter stopes assayed 1.85% WO_3.

The remainder of this report will describe the various ore occurences shown on the maps, with recommendations regarding further exploration.

ARNOLD MINE AREA

Main Arnold Mine (Arnold Copper Patent)

The dumps were sampled, and the eastern part of the main dump was found to carry 0.35% WO_3. An estimated 250 tons of this grade is available, and suitable to milling concentration. A further tonnage may be concealed below the surface of the dumps.

One sample was taken from the vein outcrop, this sample assaying 1.85% WO_3 over a width of 3.6 feet.

Bulldozer trench #1 uncovered the wide tactite zone just north of the main portal, but disclosed no mineralization. Trench #2 has been almost completed, crossing the tactite zone near the portal of the eastern adit. Mineralization was disclosed, but no examination was made because of the snowfall which ended work for the season. This trench disclosed two tactite zones, one at the contact, and one far into the limestone in the bottom of the gulch. The tactite at the bottom of the gulch projects with the ore zone of the Arnold Mine and may prove to be its extension. Previous exploration was confined to the contact zone, and the extension of the Arnold deposit had never been looked for in this direction.

Further trenches are planned eastward along the granite-limestone contact, and have been laid out. It is expected that the trenching will show the granite to extend farther south and east than shown on the map.

A large scale map of the Arnold Mine was started, but as the weather was favorable to the more important general mapping, the lower level was not mapped, nor were any underground samples taken. This should be done next year. Should trench #2 disclose the extension of the Arnold "vein", underground drifting is to be recommended to pick up this vein beyond the point where it was lost.

South Arnold Mine (Arnold Copper and Montana Patents)

A roadway was bulldozed to the lower portal of the South Arnold, and from there to the portal of the Main Arnold Mine. This roadway, to be extended to the East Arnold, is for use in future drifting and diamond drill exploration to which water and supplies must be hauled.

In bulldozing the road, an unexpected outlier of limestone was crossed on the ridge east of Snowshoe Creek. Trenching failed to disclose mineralization at the contacts.

One of the upper dumps was sampled and assayed 0.25% WO_3. An estimated 50 tons are available for milling.

In only one place could the full thickness of the vein be sampled. This assayed 1.35% WO_3 for a width of 4.6 feet. Three bulldozer trenches are planned in this area.

The lower adit of the South Arnold is entirely in granite, and drifting eastward into the limestone will be required to pick up the vein. When the surface trenching is completed, the further information will allow the projection of the vein to the lower level to be determined, and very likely, drifting is to be recommended.

Montana Prospect (Montana Patent)

The caved upper adit showed a seam of high grade copper ore within a wide zone of soft limonite. Due to the caved condition, few observations could be made, and little scheelite was observed. The lower adit is barren. One bulldozer trench is planned to cross

the granite spur just south of the upper workings.

East Arnold Mine (Arnold Fraction Claim)

A strong tactite vein was mined for copper here. Scheelite is present rather spottily, and it is my belief that in depth, as the granite batholith is approached, commercial tungsten ore will be found. As erosion has not cut down this deposit, it is my belief that this is one of the best prospects in the district. This year, a tactite vein outcrop was observed 120 feet eastward from the present workings, which indicates this vein to be longer than shown on the map.

One bulldozer trench is planned west of the workings, but eastward, no bulldozing can be done because of a cliff along the course of the vein. This cliff, which is not indicated by the contouring on the map, will allow easy exploration in depth by either diamond drilling or cross-cutting. A relatively short adit would intercept the vein 100 feet below the presnt lower adit, and this cross-cut would yield reliable information. The pockety nature of the scheelite occurences would make the results of diamond drilling unreliable. This cross-cutting is to be recommended as soon as the bulldozer trench is completed and a large-scale map is prepared.

It is further recommended that the lower adit be cleaned out so that channel samples can be taken across the vein on the adit floor. This may take two men, one week.

Eastern Prospects (Arnold Copper Patent and Arnold Fraction Claim)

East of the East Arnold Mine, two veins similar to the East Arnold and an area of float copper ore indicative of a third vein, are found. Little work has ever been done here. If commercial tungsten ore is found in depth on the East Arnold vein, these veins can also be assumed to carry commercial ore in depth. Three bulldozer trenches are planned in this area.

Goppertung Prospects (Goppertung Claim)

Further mapping to outline the granite contacts is recommended. With this mapping completed, bulldozer trenching can be planned, and is to be recommended.

The prospect workings show wide tactite zones, but relatively little scheelite. Some copper of fair grade is found. Bulldozer trenching will be highly informative, as the old prospectors were handicapped by the deep soil cover and the heavy vegetation in this north-sloping area.

FRIDAY AREA

This map is uncompleted, and very likely a new map covering the MOLYTUNG AREA to the north will have to be made. Granite-limestone contacts will be found throughout the FRIDAY AREA map, and extend northwestward into the MOLYTUNG AREA.

Friday Prospect (Dozer Claim)

This adit is just beyond the area mapped, and was the original scheelite discovery in the district. This adit was driven into a granite-limestone contact. This adit was later found to have penetrated extremely high-grade scheelite ore. Later drilling

and blasting is said to have shown the scheelite to be merely a small pocket, but as the portal is caved, no observations can be made. The portal should be reopened so that an examination can be made. This may require two men, one week.

No ore remains on the dump, which testifies to the efficiency of rock hounds in removing samples. It is hard to believe that ore was actually found here, and but for my first-hand knowledge, I would not believe it.

Central Friday Prospect (Friday #1 Claim)

These workings are in dark tactites close to the granite contact. No copper nor scheelite was found. However, the tactite zone is of unusual width, certainly wider than 70 feet, and as the ore is generally found on the limestone contact or within the limestone, bulldozer trenching is to be recommended. Four trenches across the tactite zone is to be recommended in this area.

South Friday Prospect (Friday #1 Claim)

This appears to be one of the best prospects in the district. The test pit above the adit shows scheelite through a distance of at least 8 feet below the limestone. This ore occurence was insufficiently exposed for sampling. The adit is caved at the point where it enters the tactite zone. This adit should be reopened and may require the work of two men for two weeks, and possibly longer if further caved areas are encountered.

Chunks of high-grade scheelite ore were found all over the surface of the dump, which proved that the workings encountered ore. However, I sampled the minus 1-inch material from the surface of the dump and it assayed only 0.15% WO_3. It is evident that the prospector who formerly owned this claim gathered the high-grade chunks from the slopes of the dump, and dressed up the top of the dump. Regardless of this, it does show that high-grade ore was encountered in the workings. It is important that this adit be reopened.

It is further recommended that four bulldozer trenches be placed across the contact in this area.

The limestone in the vicinity of the Friday prospects is different from the uniformly pure limestone in the rest of the district. Beyond the mapped area north of the Central Friday, it approaches an argillite. Elsewhere, stratification is prominent. Much of the limestone is very pure, and recrystallized in coarse calcite crystals. It is expected that bedding will be important in the localization of the ore in this area, though bedding appears to be unimportant elsewhere in the district.

TUNGSTATE AREA

This map is incomplete, and until completed, cannot be used as a basis for exploration work. The surface workings of the Tungstate prospects were plotted from my surveys made 11 years ago. I believe these prospects were mapped and sampled by the Homestake Mining Co., and the maps are in the Bureau of Mines files in Spokane. If so, that information can be plotted on this map, and be used for recommending exploration. These prospects are said to be among the most important in the district.

Further mapping is required along the granite-limestone contact

east of Snowshoe Creek on the Portal Claim. I have not fully examined this contact, but my impression is that this is a flat-lying contact which has produced no mineralization nor even a tactite zone. North of the Portal Claim, the contact turns abruptly westward and this abrupt turn may be indicative of a steep-sided part of the batholith. It is my belief that the ore occurences are confined along the steep-sided portions of the batholith.

STRATEGIC-SHAMROCK AREA

Lower Tungstate Prospect (Tungstate Claim)

This adit was driven on the granite-limestone contact, and from the size of the dump, may be over 700 feet in length. Only slight showings of ore were found on the dump, and the adit is caved at the portal. This adit should be reopened so that the contact can be examined. When surveyed, this adit may prove to be an ideal location from which diamond drill exploration can explore the Tungstate prospects in depth.

It should take two men, two days to dig through the caved portal, though a week should be allowed for this work as further caving may be encountered.

Lower Shamrock Prospect (Shamrock Patent)

Some copper and scheelite is found scattered in these workings, but there appears to be no important ore showing uncovered. Nevertheless, it is recommended that two trenches be bulldozed across this small limestone "island" to see whether ore can be found. Likewise, one trench should be bulldozed across the limestone "island" at the south corner of the Shamrock, as this area has been unexplored.

Upper Shamrock Prospect (Shamrock Patent)

The sample taken in the test pit on the side of this small limestone "island" yielded a result of 5.15% WO_3 for a thickness of 2.2 feet. This ore is under a limestone capping in a contact zone. It is doubtful whether this ore zone is extensive, but nevertheless, trenches should be placed across this contact above and below this test pit to determine the extent of this high-grade ore.

Strategic Prospect (Strategic Claim)

The Strategic Adit was driven on a contact zone which is plainly indicated on the surface by a deep gulley. This gulley had its origin in the erosion which attacked the tactite zone more readily than the adjoining granite and limestone. As the contact zone dips steeply, a sharp and deep gulley has been formed.

The adit begins in detrital material and enters mineralized tactite enclosed in limestone walls. Due to timbering, few observations of the scheelite content can be made, and the copper content appears to have been mainly leached out. Near the end of the accessible part, the tactite zone appears to split. The left-hand split enters the wall of the drift and assayed 0.85% WO_3 for an estimated thickness of 4.5 feet. The main drift followed the right hand split of the tactite zone which appears to be wider. This drift is blocked by caving and old gob and timbering prevent any sampling. A newer drift was started in the limestone to the right of the main drift in an effort to drive around the caved area, but this drift was not

completed.

This prospect appears to be one of the best in the district. Bulldozer trenching cannot be done because of the deep gulley on the contact and the heavy surface detritus within the gulley. Diamond drilling is not advisable due to the soft and blocky nature of the weathered ore, and its spotty mineralization. Exploration would best be conducted by further drifting. It is my recommendation that 200 feet of drifting be conducted here. The adit will require retimbering as the old timbers are rotton. The new drift would follow the left-hand fork of the tactite zone, beginning at the point where the 0.85% WO_3 sample was taken. After drifting 70 feet, a crosscut to the right should be driven to determine the grade of ore on the right-hand fork of the tactite zone beyond the caved area. Further drifting would follow the best of the ore showings.

No samples were taken on the Strategic dump. Very likely, some milling grade ore is present on the dump but has been covered over by the later drifting in the barren limestone.

Southern Tactite Outcrops (Strategic Claim)

North of the Strategic adit, there is a large surface area of tactite, apparently flat-lying and of considerable thickness. While I have stated that tactite seldom forms where the contact is relatively flat, this thick tactite apparently had its origin in the steep-sided section of the batholith known to be present immediately to the west. This tactite zone consists of almost pure, dark red garnet. It is probably too soft for use as commercial garnet, though this possibility should be investigated.

A great deal of prospect drifting has been carried out, but little evidence that commercial copper ore was found. In examining the workings with the ultra-violet light, three zones of scheelite mineralization were observed. These zones do not appear to be persistant, the scheelite fading out in short distances. For the most part, the ore appears to be low grade. However, some tonnage should be available by low-cost surface mining. It is recommended that three bulldozer trenches be cut in the vicinity of the surface workings so that sampling can be done. Likewise, it is recommended that four further trenches be cut across the narrow tactite zones lying immediately north of this area.

East Strategic Shaft (Strategic Claim)

This shaft was sunk on a tactite "vein" enclosed in limestone walls. At the collar, the ore assayed 1.15% WO_3 through a thickness of 3.8 feet. At the bottom of the shaft, the incompletely exposed ore zone appears to be of lower grade, but as the foot wall is unexposed, this ore may be equally good.

Due to the cliff-like limestone exposures along the course of this tactite vein, bulldozer trenching to determine itscontinuation, cannot be done. Test pitting by hand would be advisable here, and four test pits should be put down. This should require the work of two men, one week.

Northern Tactite Outcrops (Strategic Claim)

Another large surface area of tactite lies immediately west of the East Strategic Shaft. Examination of a shallow roadway cut

crossing this tactite area showed scheelite particles to be scattered throughout the soil. Float copper ore of good grade was also observed. It is evident that at least one scheelite-bearing ore zone will be found here. It is advisable that four bulldozer trenches be cut across the tactite in this area.

Twin Shafts (Strategic Claim)

At the northeastern end of the Northern Tactite Outcrops, two short shafts have been sunk within the contact zone. In the western shaft, a 2.2-foot sample assayed 0.25% WO_3. In the eastern shaft, a 4.3-foot sample assayed 0.45% WO_3. The strike of the mineralization in the western shaft appears to follow the contact, while the strike in the eastern shaft follows fracturing at right angles to the contact.

It is not certain that these shafts have been placed on the best scheelite bearing zone. Two bulldozer trenches should cut this contact in the immediate vicinity of the shafts, and three further trenches should be located to cross the contact farther east. The test pit east of the shafts showed abundant scattered scheelite on its dump, and the contact zone in this direction is concealed by heavy detritus.

NORTH FLAGSTAFF AREA

South Strategic Pit (Strategic Claim)

A scheelite-bearing tactite zone, containing ore of good grade and width, has been opened south of the Strategic Adit. No samples nor geological observations were made previous to the snowfall which blocked further work. The tactite zone is enclosed within limestone walls. The dump appears to carry milling grade ore.

This ore zone occurs within a narrow limestone finger extending into the granite area. The limestone is deeply covered with hillside detritus which has hindered prospecting. It is recommended that bulldozer trenches be placed both north and south of the known tactite zone, and the southern trench be extended to follow along the lower granite-limestone contact as far south as the limestone extends. Should float tactite be found in the detrital material, the bulldozer should do further trenching within the limestone to determine its source.

North Flagstaff Limestone "Island". (Flagstaff Patent)

No float tactite nor indications of ore were observed at this limestone area. Neither has any prospecting been done here. However, as further bulldozing will be required high on the hillside at the Flagstaff Outcrops and at the Chief Prospect, and the bulldozer will have to cross this limestone area on its way to these locations, it will be advisable to trench where the roadway crosses the contacts, and check closely for tactite float where the roadway crosses the limestone area.

FLAGSTAFF ~~XXXX~~ MINE AREA

Flagstaff Mine (Flagstaff Patent)

The Flagstaff Mine has produced copper ore; one stope extending

125 feet to the surface. That this ore contained scheelite is evident as some of the dump rock contains this mineral. The snowfall prevented me from examining the upper workings with an ultra-violet light. The lower adit extends 240 feet, at which point it is blocked by caving. This level is said to be 500 feet in length. To the point at which it is caved, the adit is entirely in granite, but it is said that the adit enters limestone just beyond this point. These workings should be made accessible for examination, and may require the work of two men for one week.

The surface workings disclose two tactite zones. The one zone is the "vein" which has been stoped from the lower adit. Where the stope reaches the surface, its average width appears to be about 2.5 feet. Its lateral extent on the surface may not exceed 50 feet. Northward, the outcrop is concealed by detritus, and immediately south, the upper adit shows only barren shearing on the projection of the ore zone. This "vein" is approximately in the center of the limestone area.

The other tactite zone is on the western granite-limestone contact, and was reached at the face of the upper adit. A raise was driven to the surface on this tactite zone. The bottom of the raise is blocked by caved material so no observations could be made on the adit level. At the collar of the raise, the tactite zone appears to be about 5 feet wide and vertical. A slight amount of copper is present. No examination was made for scheelite.

It would be advisable to cut three bulldozer trenches across the limestone area above the Flagstaff workings. Any new discoveries here could immediately be developed in depth from the present workings.

Chief Prospect (Harmony Claim ?)

A short adit has been driven in the limestone south of the Flagstaff patent. This adit was intended to cut the granite-limestone contact, but was abandonned short of its goal. The contact it was to cut is well-defined by a deep gulley extending from the west and beyond the area mapped. One side of the gulley has steep limestone walls and the other side has somewhat less steep granite slopes. It is evident that the contact is close to being vertical, and the gulley follows a soft tactite zone. As such, it is definitely worthy of exploration, though no work has ever been done on the contact and no float can be observed.

It is doubtful whether bulldozer trenching can cut through the deep detritus to expose the contact zone, as the gully is quite narrow. Nevertheless, bulldozer trenching should be attempted in at least four places along the gulley. The bulldozer should be able to reach a depth of 15 feet, and further sinking could be done by hand methods. This contact is on the southern edge of the batholith, no further granite being observed to the south.

OTHER AREAS TO THE WEST.

Steep exposures of limestone along the granite contact indicate a steep-sided batholitic margin for probably 3,000 feet westward from Snowshoe Creek beyond the Chief Adit. Strangely, no prospect work has been done on the contact along this distance. I consider this area highly favorable.

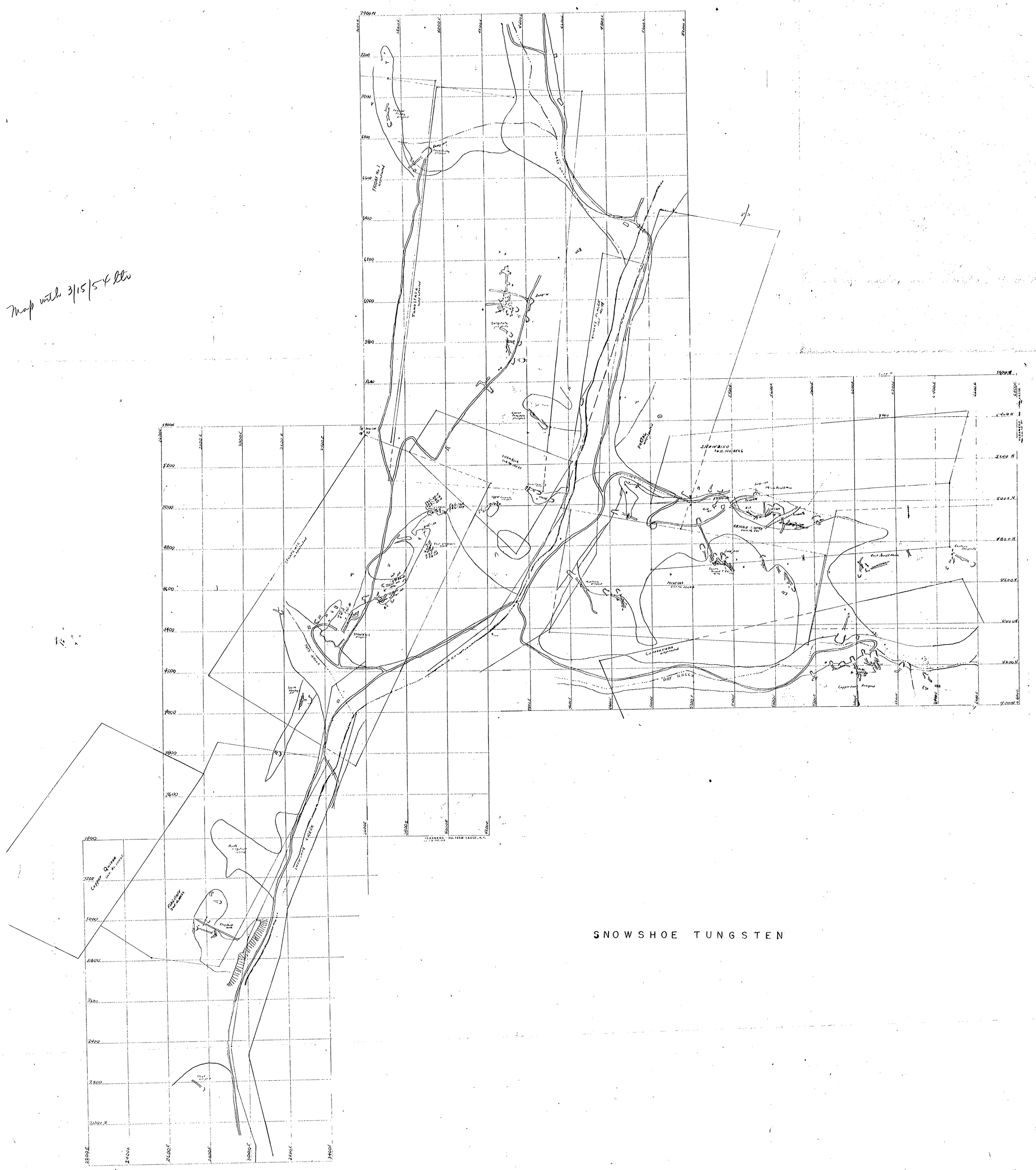
Farther west, within the valley of the east fork of Basin Gulch, the batholitic contact appears to be flat-lying and probably unfavorable. A slight amount of prospecting has been done near the valley bottom, but without favorable results.

On the east side of the west fork of Basin Gulch, the Old Lady Smith mine was located, and is said to have produced a fair tonnage of high-grade copper ore. Examination of leached material on the dump showed that this ore contained high-grade scheelite. As I recall, my belief 10 years ago was that this ore occurred in a small isolated block of limestone sunk into the granite close to the main contact, and that this ore-body was completely mined out. However, it does show that scheelite mineralization extends along the contact in this direction, and further prospects may be found in this area. The area has not been thoroughly prospected, and all of the work done to date in the district has been in search of copper ore; the presence of scheelite being unknown.

Philipsburg, Montana.
Dec. 6, 1953.

Peter H. Toepfer, Mining Engineer.

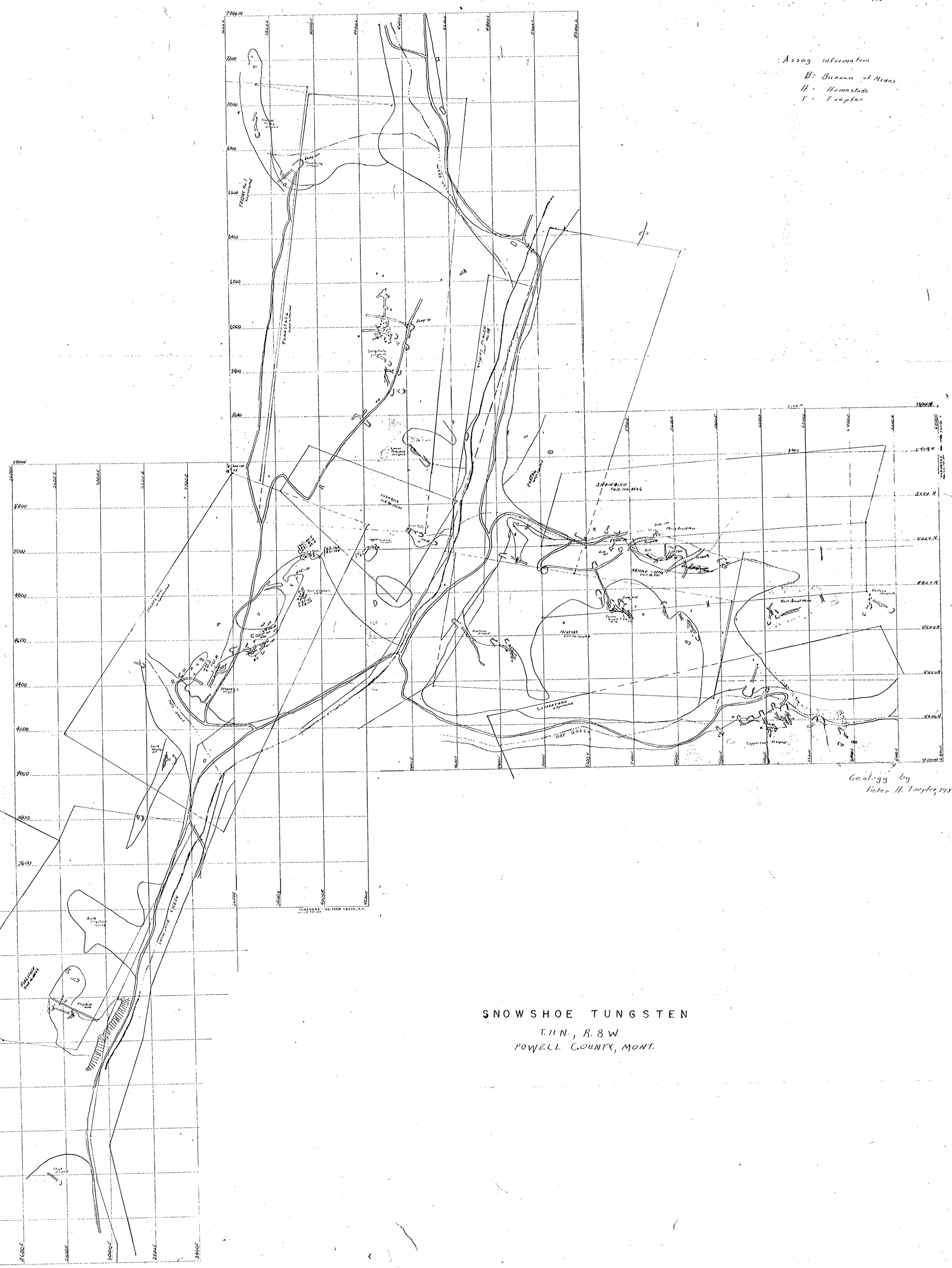
Map with 3/15/54 ltr



SNOWSHOE TUNGSTEN

DMEA DOCKET No. 2773

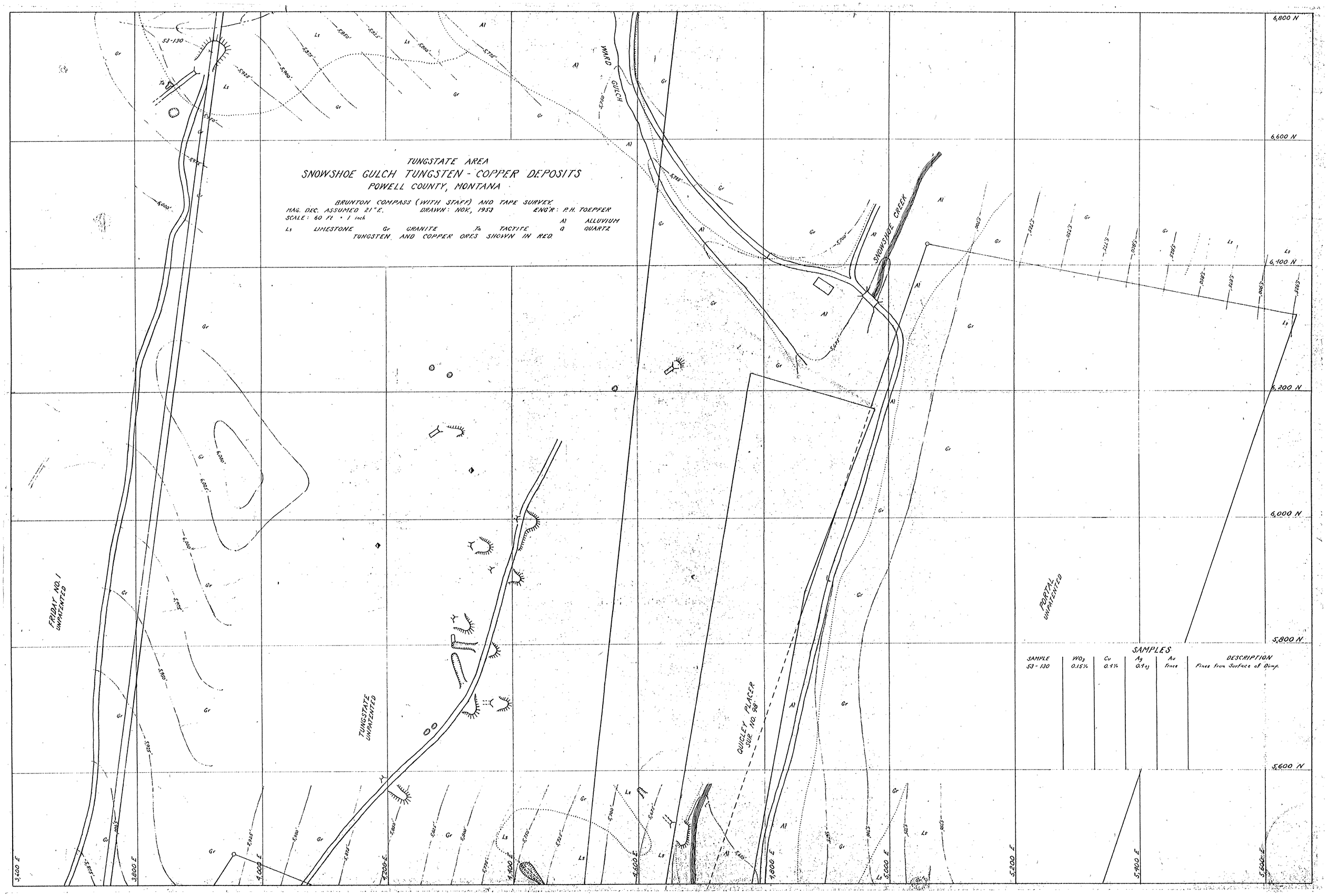
Assay information
B - Bureau of Mines
H - Homestake
T - Toepfer



SNOWSHOE TUNGSTEN

T. 11 N., R. 8 W.

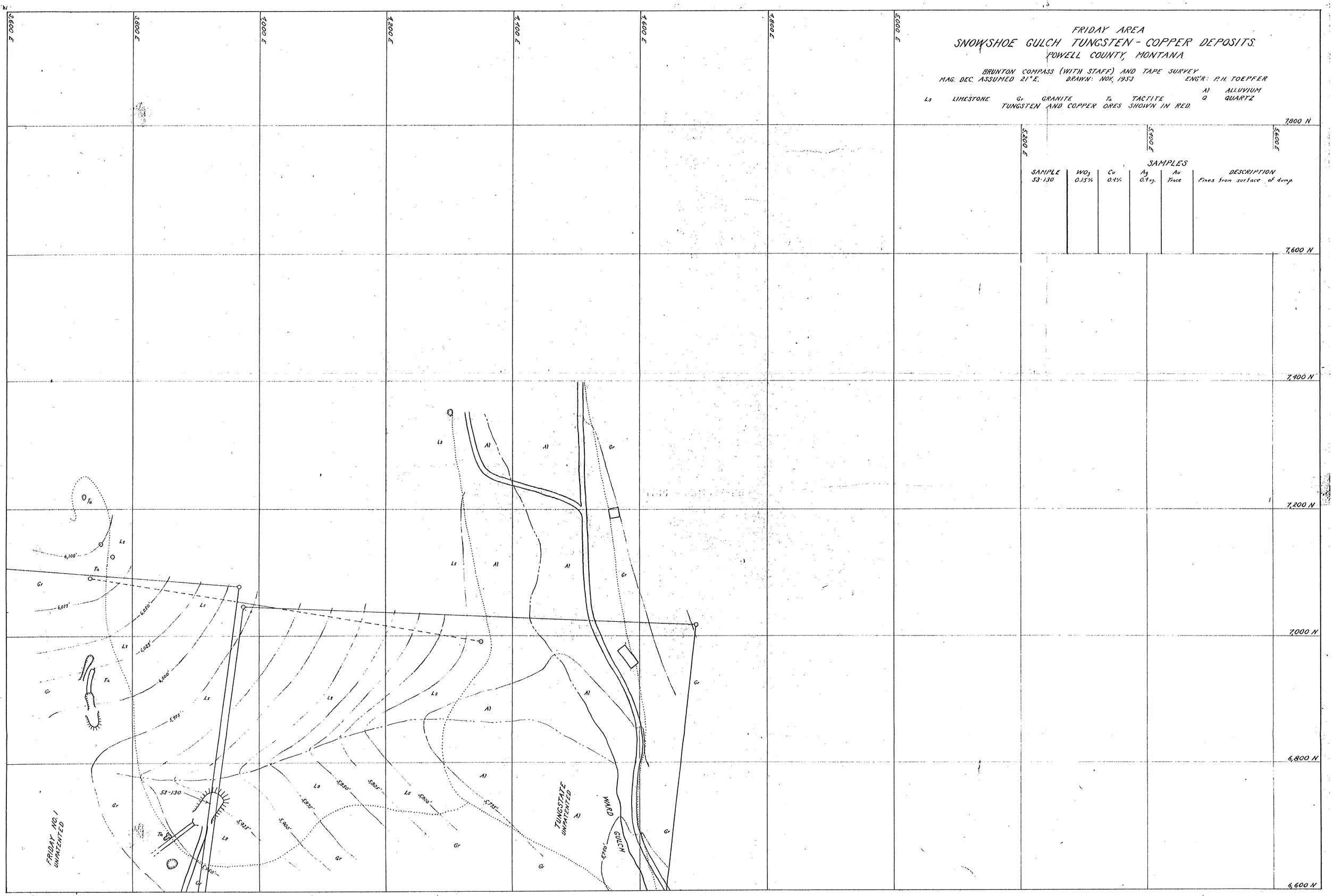
POWELL COUNTY, MONT.


TUNGSTATE AREA
SNOWSHOE GULCH TUNGSTEN - COPPER DEPOSITS
POWELL COUNTY, MONTANA
BRUNTON COMPASS (WITH STAFF) AND TAPE SURVEY.
MAG. DEC. ASSUMED 21° E.
DRAWN: NOV. 1953
ENG'R: P.H. TOEPFER
SCALE: 60 Ft = 1 inch
Al ALLUVIUM
Ls LIMESTONE
Gr GRANITE
Ta TACTITE
Q QUARTZ
TUNGSTEN AND COPPER ORES SHOWN IN RED.
WARD GULCH
SNOWSHOE CREEK
FRIDAY NO. 1 UNPATENTED
TUNGSTATE UNPATENTED
QUICLEY PLACER SUR. NO. 98
PORTAL UNPATENTED
53-130
6,800 N
6,600 N
6,100 N
6,200 N
6,000 N
5,800 N
5,600 N
3,200 E
3,800 E
4,000 E
4,200 E
4,400 E
4,600 E
4,800 E
5,000 E
5,200 E
5,400 E
5,600 E
SAMPLES
SAMPLE | WO3 | Cu | Ag | Au | DESCRIPTION
53-130 | 0.15% | 0.1% | 0.1 oz | Trace | Fines from Surface of Dump.

FRIDAY AREA
SNOWSHOE GULCH TUNGSTEN - COPPER DEPOSITS
POWELL COUNTY, MONTANA

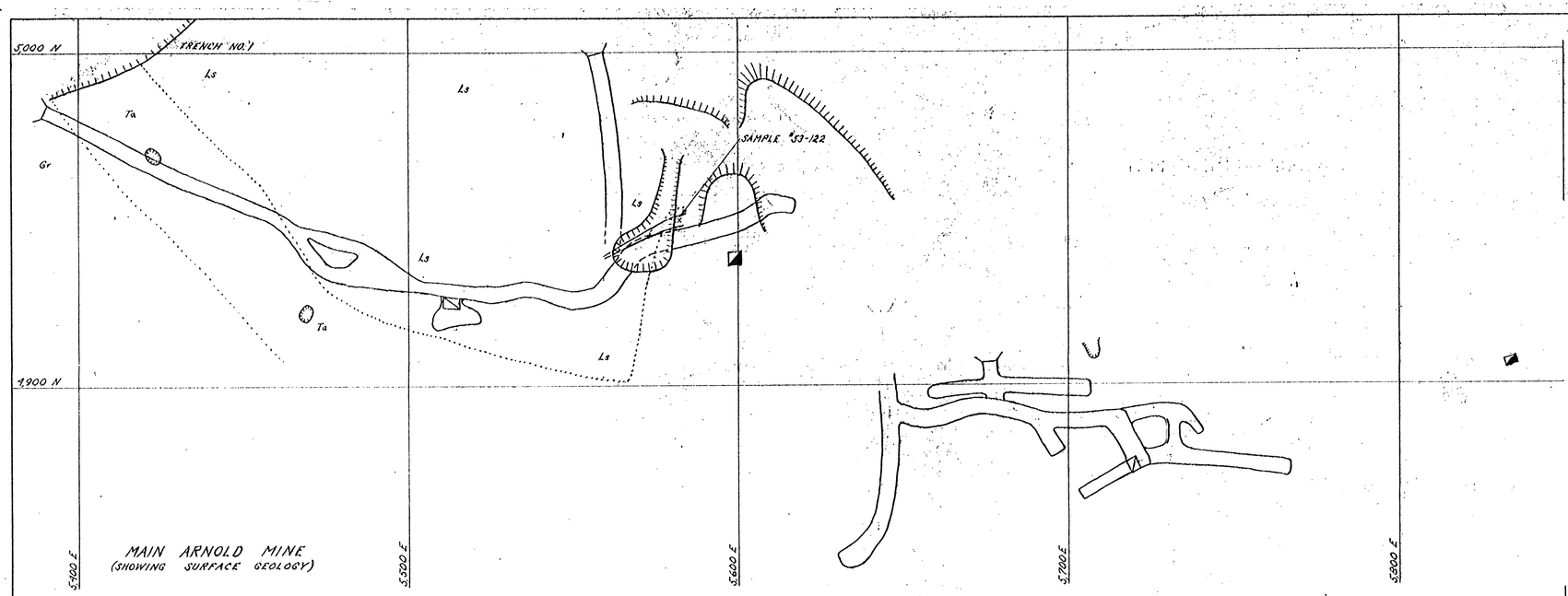
BRUNTON COMPASS (WITH STAFF) AND TAPE SURVEY
MAG. DEC. ASSUMED 21° E. DRAWN: NOV, 1953 ENG'R: P.H. TOEPFER

Ls LIMESTONE Gr GRANITE Ta TACTITE Al ALLUVIUM Q QUARTZ
TUNGSTEN AND COPPER ORES SHOWN IN RED.



SAMPLES

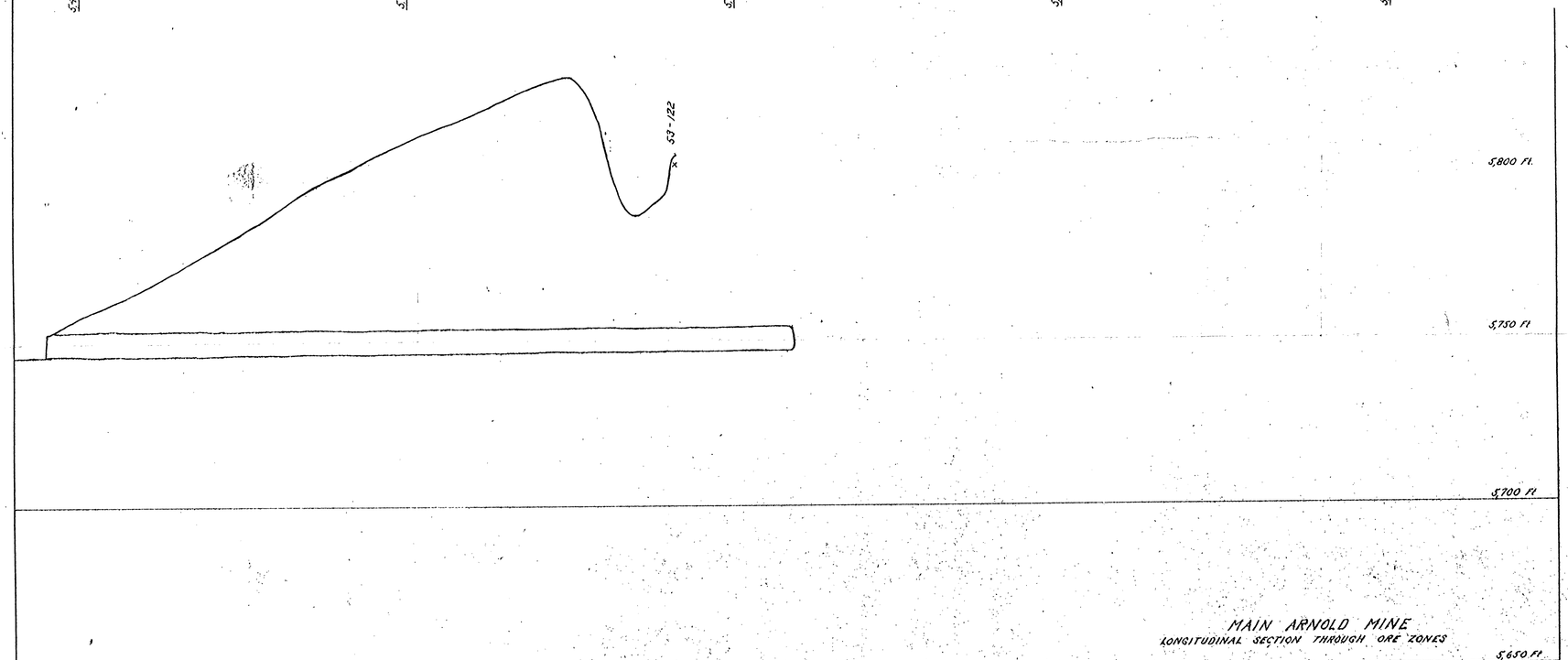
SAMPLE	WO_3	Cu	Ag	Au	DESCRIPTION
53-130	0.15%	0.1%	0.1 oz.	Trace	Fines from surface of dump.



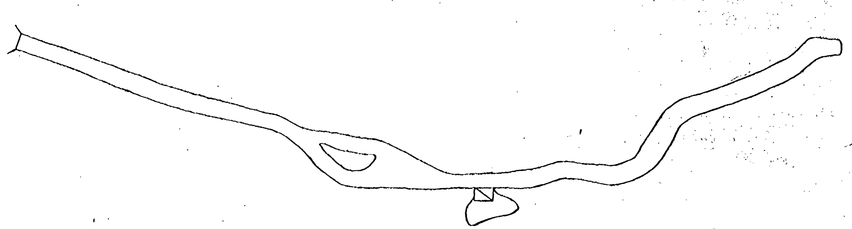
MAIN ARNOLD MINE
(SHOWING SURFACE GEOLOGY)

SAMPLES

SAMPLE	WO_3	Cu	Ag	Au	DESCRIPTION
53-118	1.05%	0.8%	0.5 oz	0.005 oz	Chips from lump ore in ore bin. Believed representative of ore mined by Porter Bros. Corp. Estimated 25 tons available on dump.
53-119	0.05%	1.4%	0.5 oz	0.005 oz	Dump sample. Minus 1-inch material from western end of main dumps. Estimated 500 tons available.
53-120	0.35%	3.1%	1.3 oz	0.02 oz	Dump sample. Minus 1-inch material from eastern end of main dumps. Estimated 250 tons available.
53-121	0.15%	2.4%	1.4 oz	0.02 oz	Dump sample. Minus 1-inch material from lower dumps of upper workings. Estimated 50 tons available.
53-122	1.85%	0.9%	0.3 oz	Trace	Vein sample. East side of surface stope. Width - 3.7 ft. Strike & Dip obscure.



MAIN ARNOLD MINE
LONGITUDINAL SECTION THROUGH ORE ZONES



GEOLOGY
MAIN LEVEL

MAIN ARNOLD MINE

SNOWSHOE GULCH TUNGSTEN - COPPER DEPOSITS
POWELL COUNTY, MONTANA.

SCALE: 20 Ft. = 1 in.
NOVEMBER, 1953

MAG. DEC. ASSUMED 21° E
ENG'R: P. H. TOEPFER

Ls LIMESTONE Gr GRANITE Ta TACTITE ORE SHOWN RED

NORTH FLAGSTAFF AREA

SNOWSHOE GULCH TUNGSTEN - COPPER DEPOSITS.

POWELL COUNTY, MONTANA.

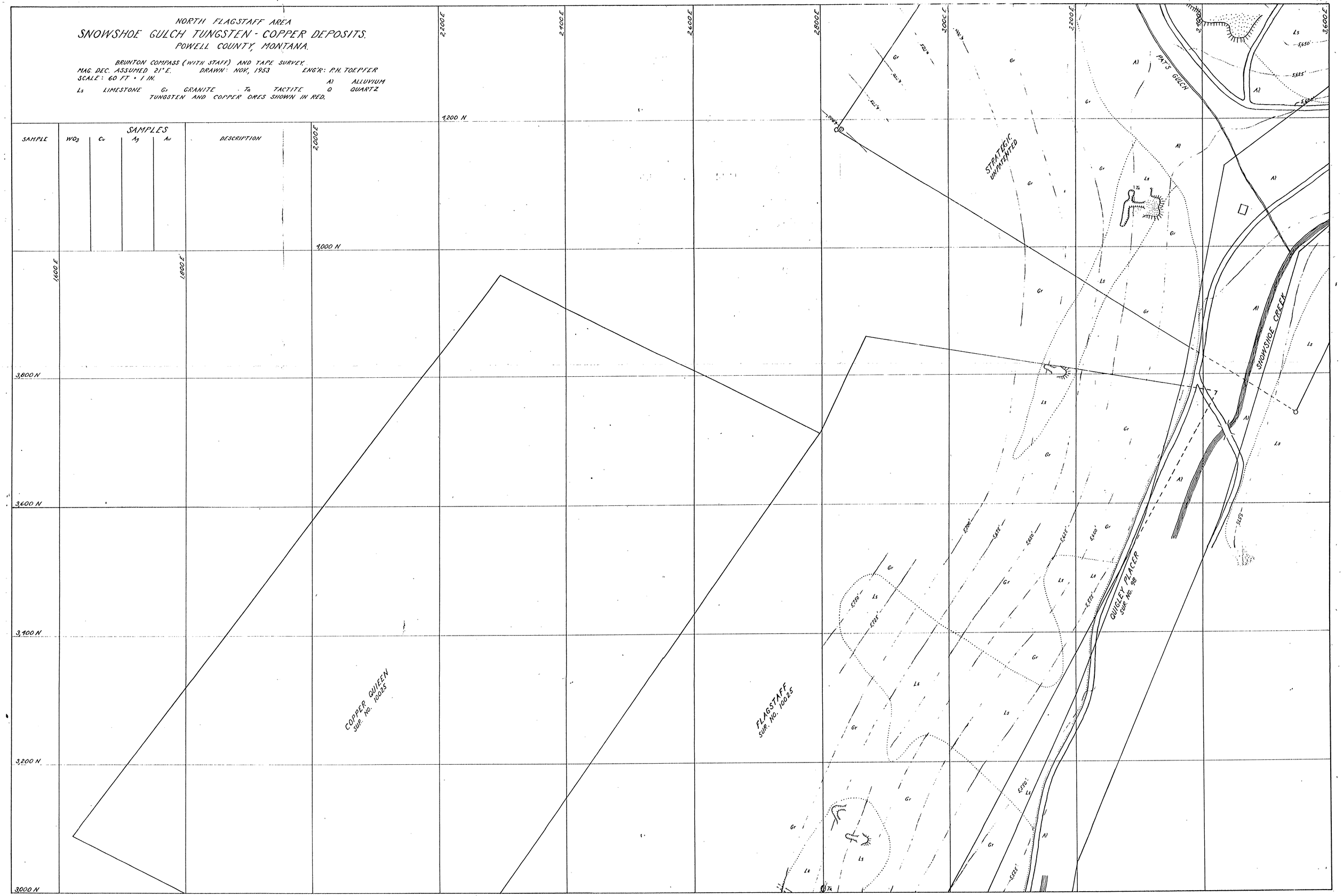
BRUNTON COMPASS (WITH STAFF) AND TAPE SURVEY.
MAG. DEC. ASSUMED 21° E. DRAWN: NOV, 1953 ENG'R: P.H. TOEPFER
SCALE: 60 FT = 1 IN.

Ls LIMESTONE Gr GRANITE Ta TACTITE Al ALLUVIUM Q QUARTZ

TUNGSTEN AND COPPER ORES SHOWN IN RED.

SAMPLES

SAMPLE	WO_3	Cu	Ag	Au	DESCRIPTION



STRATEGIC - SHAMROCK AREA
SNOWSHOE GULCH TUNGSTEN - COPPER DEPOSITS
POWELL COUNTY, MONTANA

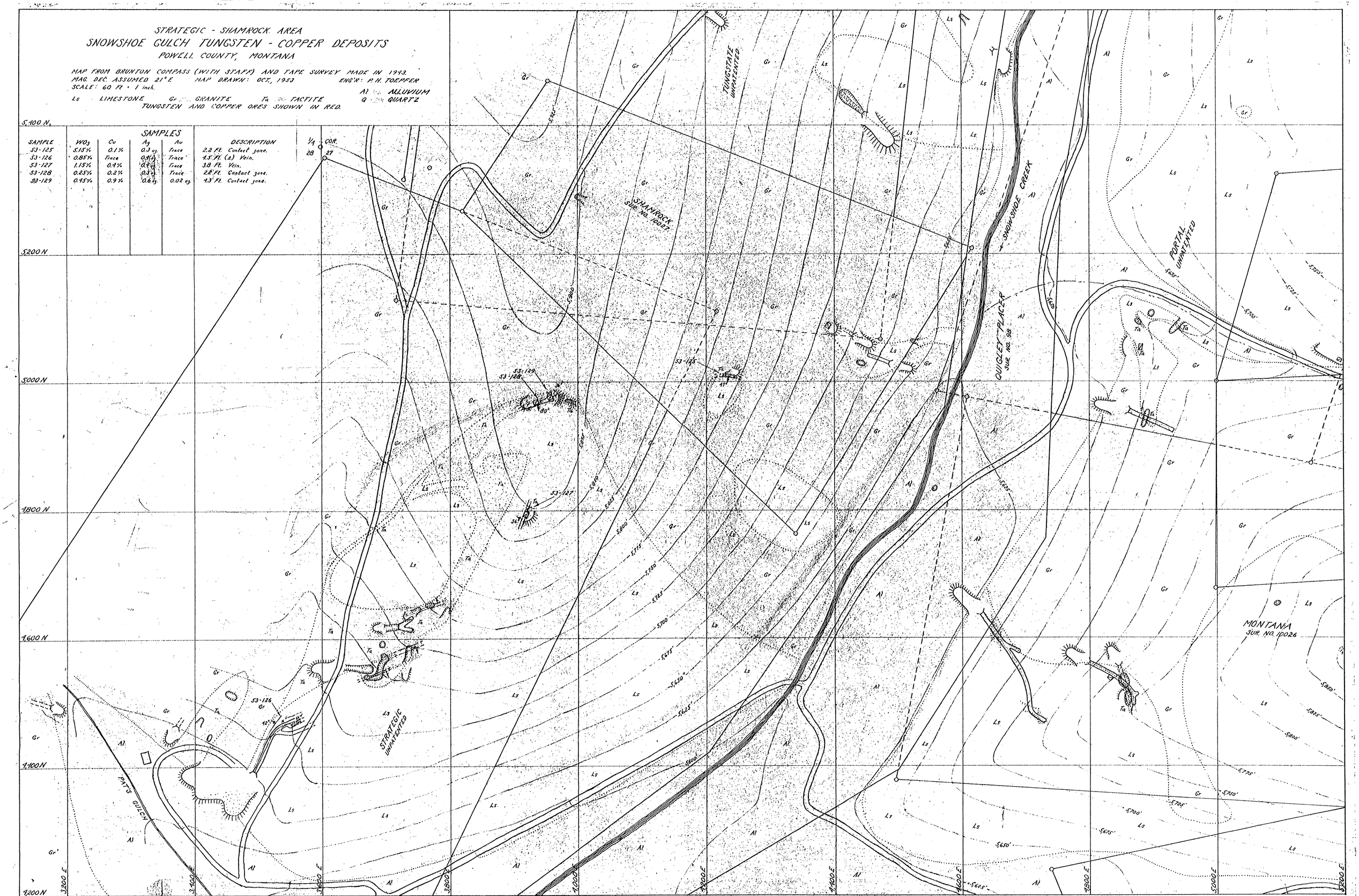
MAP FROM BRUNTON COMPASS (WITH STAFF) AND TAPE SURVEY MADE IN 1943.
MAG. DEC. ASSUMED 21° E MAP DRAWN: OCT., 1953 ENG'R: P.H. TOEPFER
SCALE: 60 Ft = 1 inch.

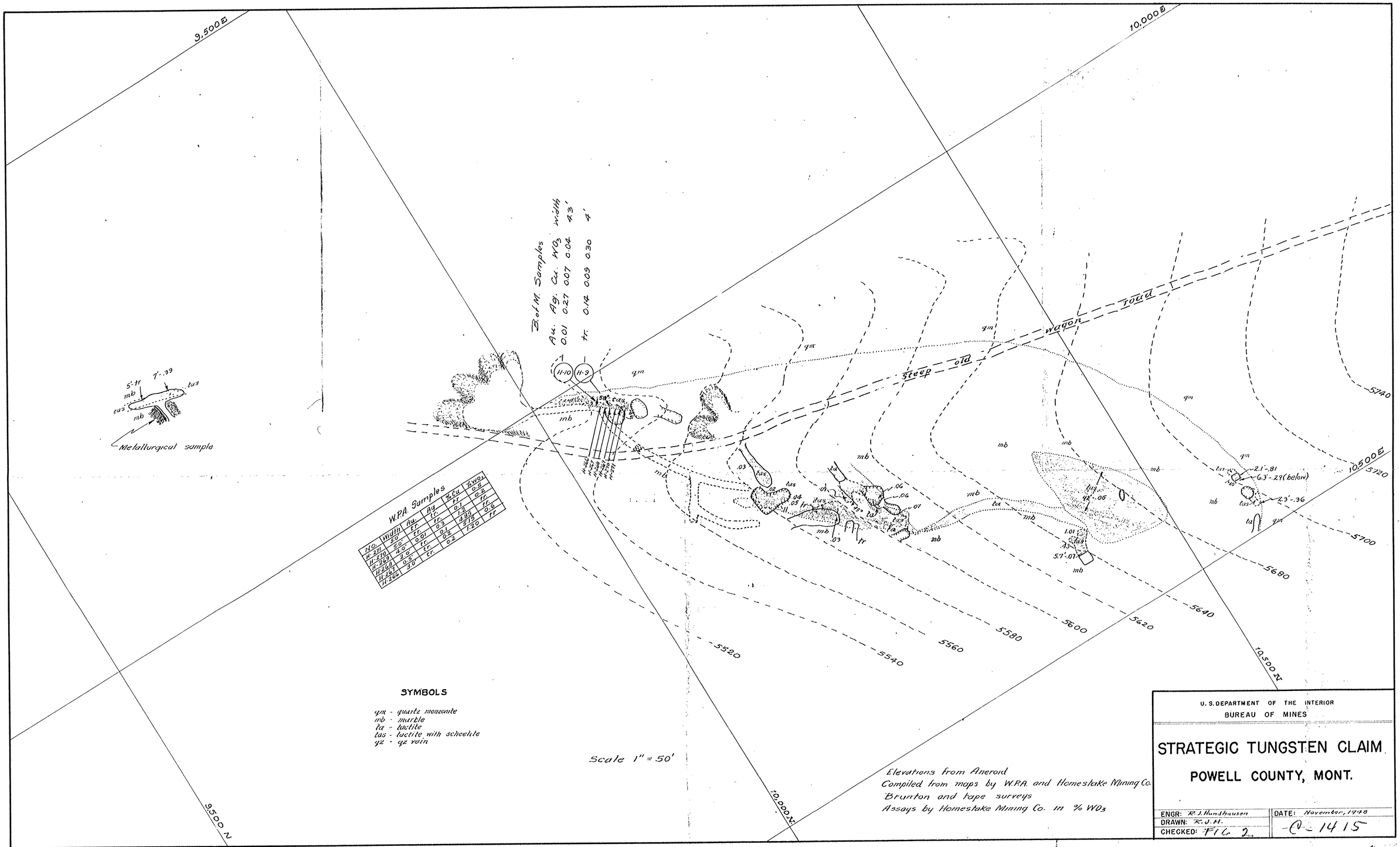
Al ALLUVIUM
Q QUARTZ

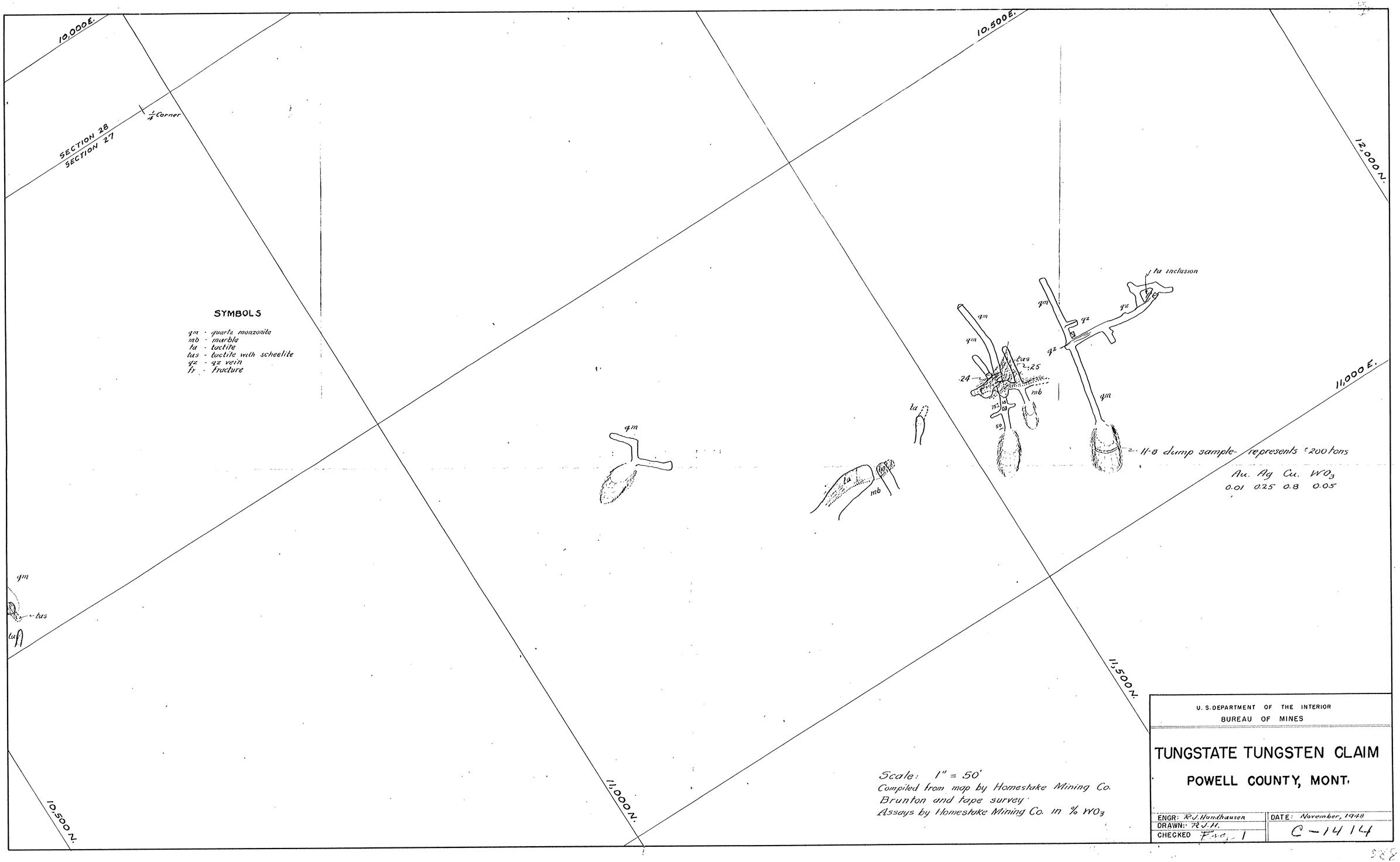
Ls LIMESTONE Gr GRANITE Ta TACTITE
TUNGSTEN AND COPPER ORES SHOWN IN RED.

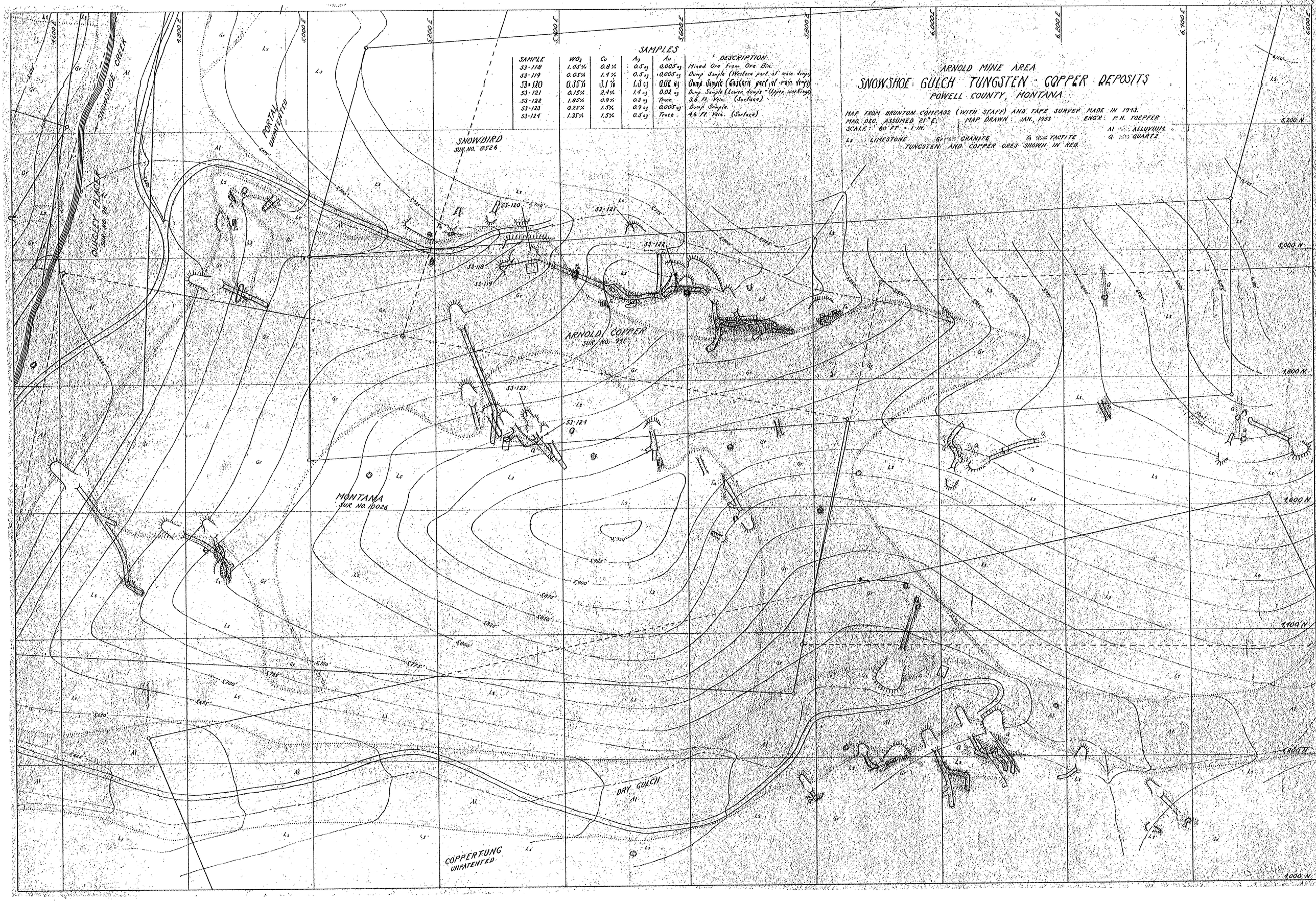
SAMPLES

SAMPLE	WO_3	Cu	Ag	Au	DESCRIPTION
53-125	5.15%	0.1%	0.3 oz.	Trace	2.2 Ft. Contact zone.
53-126	0.85%	Trace	0.1 oz.	Trace	1.5 Ft. (±) Vein.
53-127	1.15%	0.1%	0.1 oz.	Trace	3.8 Ft. Vein.
53-128	0.25%	0.2%	0.3 oz.	Trace	2.8 Ft. Contact zone.
53-129	0.15%	0.9%	0.6 oz.	0.02 oz.	1.3 Ft. Contact zone.




9,500 E
10,000 E
10,500 E
9,500 N
10,000 N
10,500 N
5740
5720
5700
5680
5640
5620
5600
5580
5560
5540
5520
steep old wagon road
qm
mb
ta
tas
qz
Metallurgical sample
5'-tr
7'-.39
B. of M. Samples
Au. Ag. Cu. WO3 width
0.01 0.27 0.07 0.04 4.3'
tr. 0.14 0.09 0.30 4'
11-10
11-9
W.P.A. Samples
No. Width Au. Ag. % Cu. % WO3
H-218 5.0' tr. tr. 0.1 0.2
H-219 5.0' 0.01 tr. 0.3 tr.
H-220 2.0' tr. tr. 1.3 tr.
H-221 0.5' tr. 0.4 4.85 0.6
H-222 2.0' tr. 0.2 5.75 tr.
2.1'-.81
6.3'-.29 (below)
2.3'-.36
5.7'-.01
1.01
.13
.06
.04
.05
.03
.01
SYMBOLS
qm - quartz monzonite
mb - marble
ta - tactite
tas - tactite with scheelite
qz - qz vein
Scale 1" = 50'
Elevations from Aneroid
Compiled from maps by W.P.A. and Homestake Mining Co.
Brunton and tape surveys
Assays by Homestake Mining Co. in % WO3
U. S. DEPARTMENT OF THE INTERIOR
BUREAU OF MINES
STRATEGIC TUNGSTEN CLAIM
POWELL COUNTY, MONT.
ENGR: R. J. Hanthausen
DRAWN: K. J. H.
CHECKED: FIG. 2
DATE: November, 1948
-C-1415


10,000 E.
10,500 E.
11,000 E.
12,000 N.
11,500 N.
11,000 N.
10,500 N.
SECTION 28
SECTION 27
1/4 Corner
SYMBOLS
qm - quartz monzonite
mb - marble
ta - tactite
tas - tactite with scheelite
qz - qz vein
fr - fracture
qm
mb
ta
tas
qz
fr
ta inclusion
.24
.25
11-8 dump sample- represents ± 200 tons
Au. Ag Cu. WO3
0.01 0.25 0.8 0.05
Scale: 1" = 50'
Compiled from map by Homestake Mining Co.
Brunton and tape survey.
Assays by Homestake Mining Co. in % WO3
U. S. DEPARTMENT OF THE INTERIOR
BUREAU OF MINES
TUNGSTATE TUNGSTEN CLAIM
POWELL COUNTY, MONT.
ENGR: R.J. Hundhausen
DRAWN: R.J.H.
CHECKED Fig. 1
DATE: November, 1948
C-1414


ARNOLD MINE AREA
SNOWSHOE GULCH TUNGSTEN - COPPER DEPOSITS
POWELL COUNTY, MONTANA
MAP FROM BRUNTON COMPASS (WITH STAFF) AND TAPE SURVEY MADE IN 1943.
MAG. DEC. ASSUMED 21° E.
MAP DRAWN: JAN., 1953
ENG'R: P.H. TOEPFER
SCALE: 50 FT. = 1 IN.
Al ALLUVIUM
Ls LIMESTONE
Gr GRANITE
Ta TACTITE
Q QUARTZ
TUNGSTEN AND COPPER ORES SHOWN IN RED.
SAMPLES
SAMPLE | WO3 | Cu | Ag | Au | DESCRIPTION
53-118 | 1.05% | 0.8% | 0.5 oz | 0.005 oz | Mined Ore From Ore Bin.
53-119 | 0.05% | 1.4% | 0.5 oz | 0.005 oz | Dump Sample (Western part of main dump)
53-120 | 0.35% | 3.1% | 1.0 oz | 0.02 oz | Dump Sample (Eastern part of main dump)
53-121 | 0.15% | 2.4% | 1.4 oz | 0.02 oz | Dump Sample (Lower dumps - Upper workings)
53-122 | 1.85% | 0.9% | 0.3 oz | Trace | 3.6 Ft. Vein. (Surface)
53-123 | 0.25% | 1.5% | 0.9 oz | 0.005 oz | Dump Sample.
53-124 | 1.35% | 1.5% | 0.5 oz | Trace | 4.6 Ft. Vein. (Surface)
QUIGLEY PLACER
SUR. NO. 98
SNOWSHOE CREEK
PORTAL
UNPATENTED
SNOWBIRD
SUR. NO. 8526
ARNOLD COPPER
SUR. NO. 941
MONTANA
SUR. NO. 10026
DRY GULCH
COPPERTUNG
UNPATENTED
53-118
53-119
53-120
53-121
53-122
53-123
53-124
5,200 N
5,000 N
1,800 N
1,600 N
1,400 N
1,200 N
1,000 N
1,600 E
1,800 E
5,000 E
5,200 E
5,400 E
5,600 E
5,800 E
6,000 E
6,200 E
6,400 E
6,600 E

FLAGSTAFF MINE AREA

SNOWSHOE GULCH TUNGSTEN - COPPER DEPOSITS.

POWELL COUNTY, MONTANA.

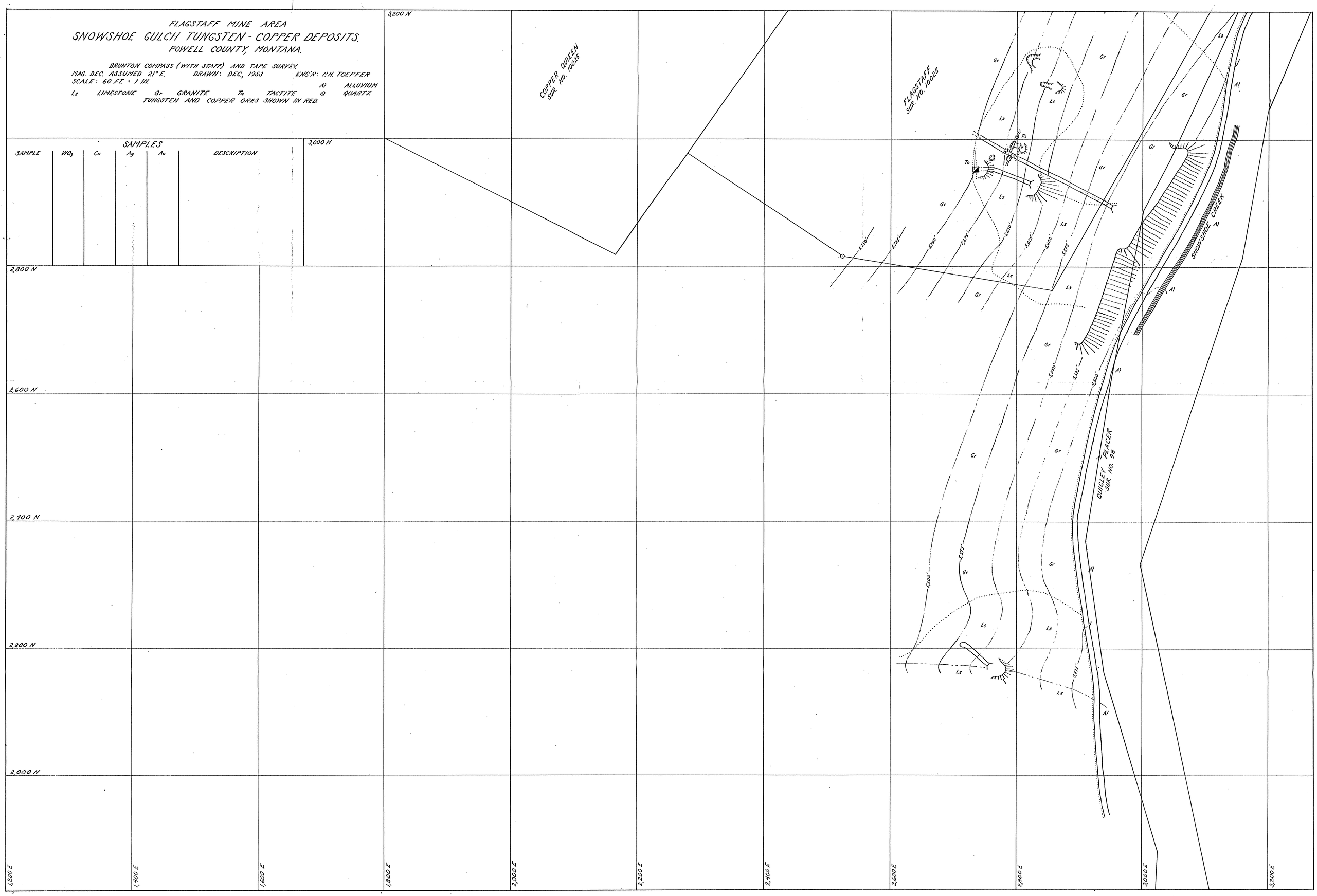
BRUNTON COMPASS (WITH STAFF) AND TAPE SURVEY.
MAG. DEC. ASSUMED 21° E. DRAWN: DEC, 1953 ENG'R: P.H. TOEPFER
SCALE: 60 FT. = 1 IN.

Ls LIMESTONE Gr GRANITE Ta TACTITE Al ALLUVIUM Q QUARTZ

TUNGSTEN AND COPPER ORES SHOWN IN RED.

SAMPLES

SAMPLE	WO_3	Cu	Ag	Au	DESCRIPTION



Boulder Ores, Inc.
Contract Idm-E588
DOCKET UMEA 2973
(tungsten)

FLAGSTAFF MINE AREA
SNOWSHOE GULCH TUNGSTEN - COPPER DEPOSITS.
POWELL COUNTY, MONTANA.

BRUNTON COMPASS (WITH STAFF) AND TAPE SURVEY.
MAG. DEC. ASSUMED 21° E. DRAWN: DEC, 1953 ENG'R: P.H. TOEPFER
SCALE: 60 FT. = 1 IN.

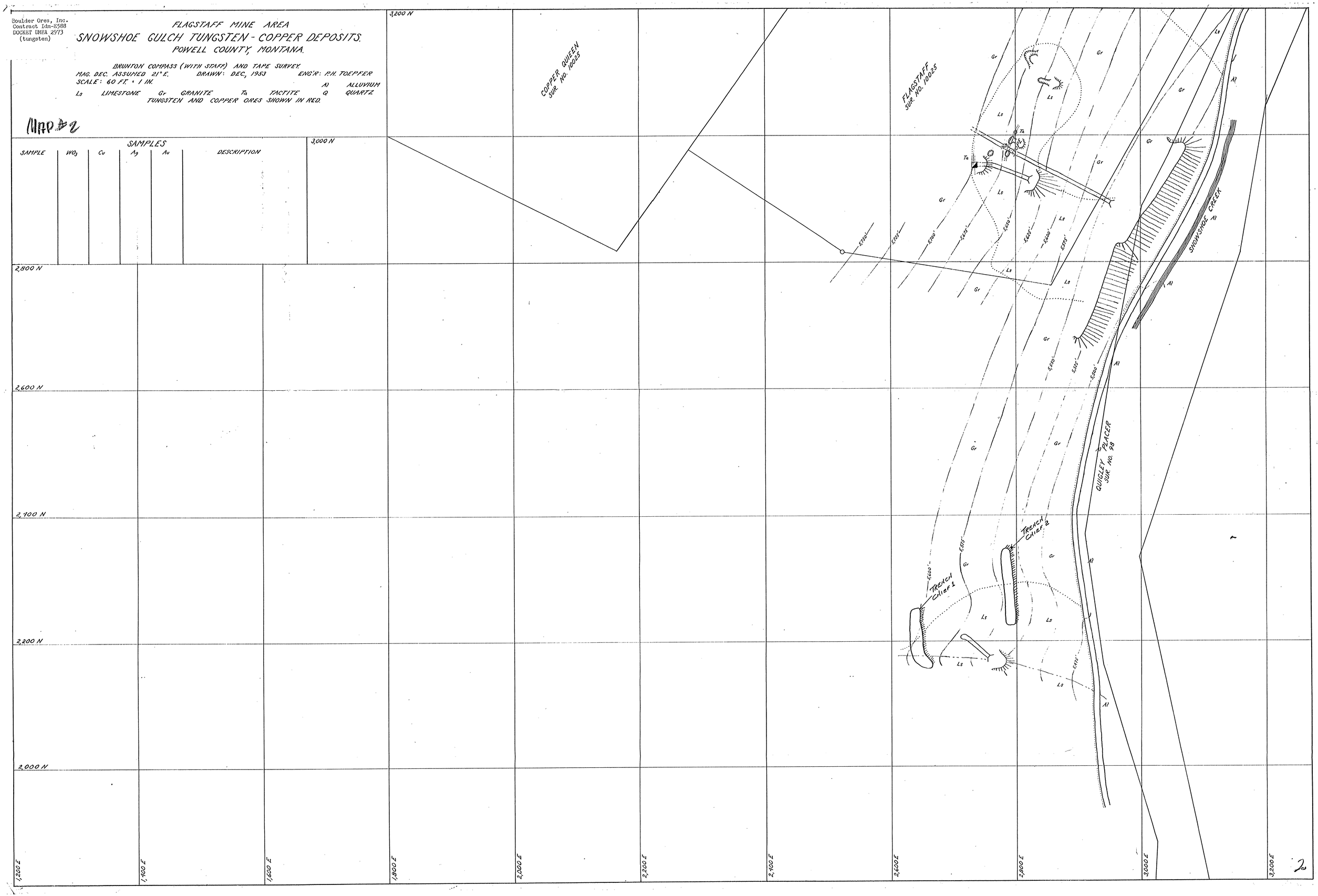
Ls LIMESTONE Gr GRANITE Ta TACTITE Al ALLUVIUM Q QUARTZ

TUNGSTEN AND COPPER ORES SHOWN IN RED.

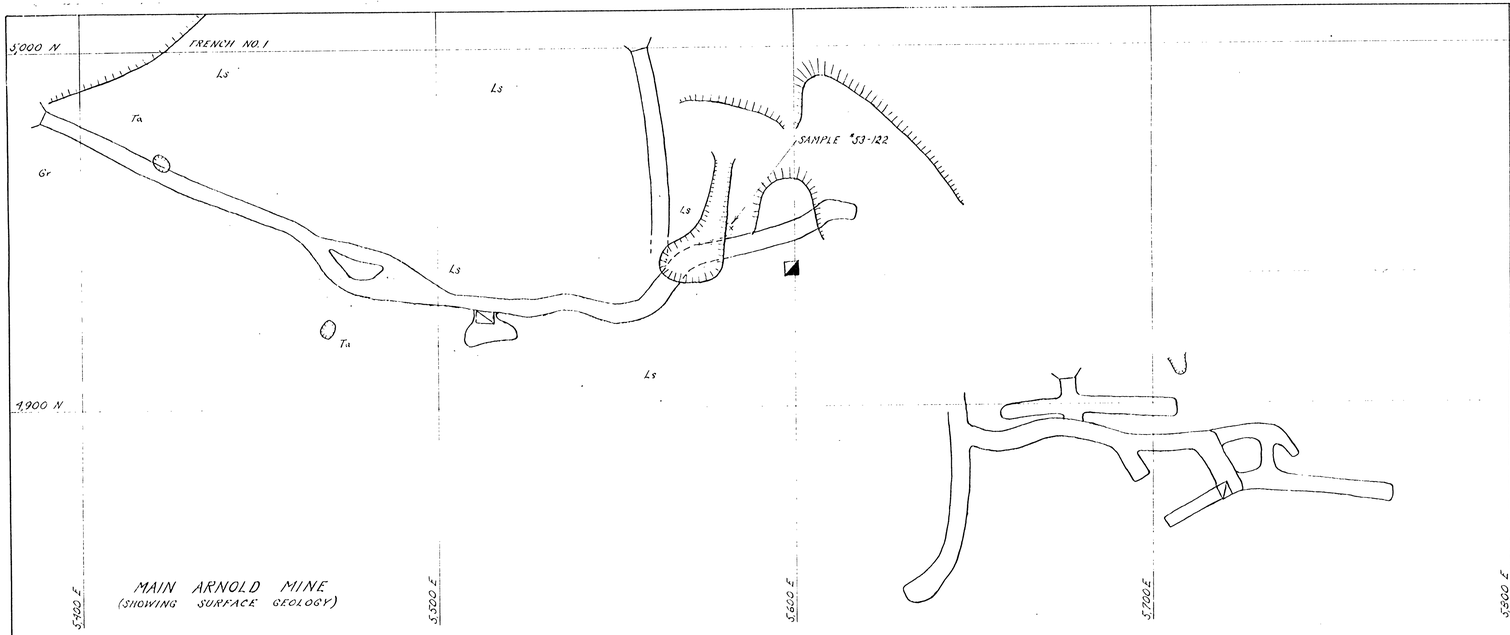
MAP #2

SAMPLES

SAMPLE	WO_3	Cu	Ag	Au	DESCRIPTION



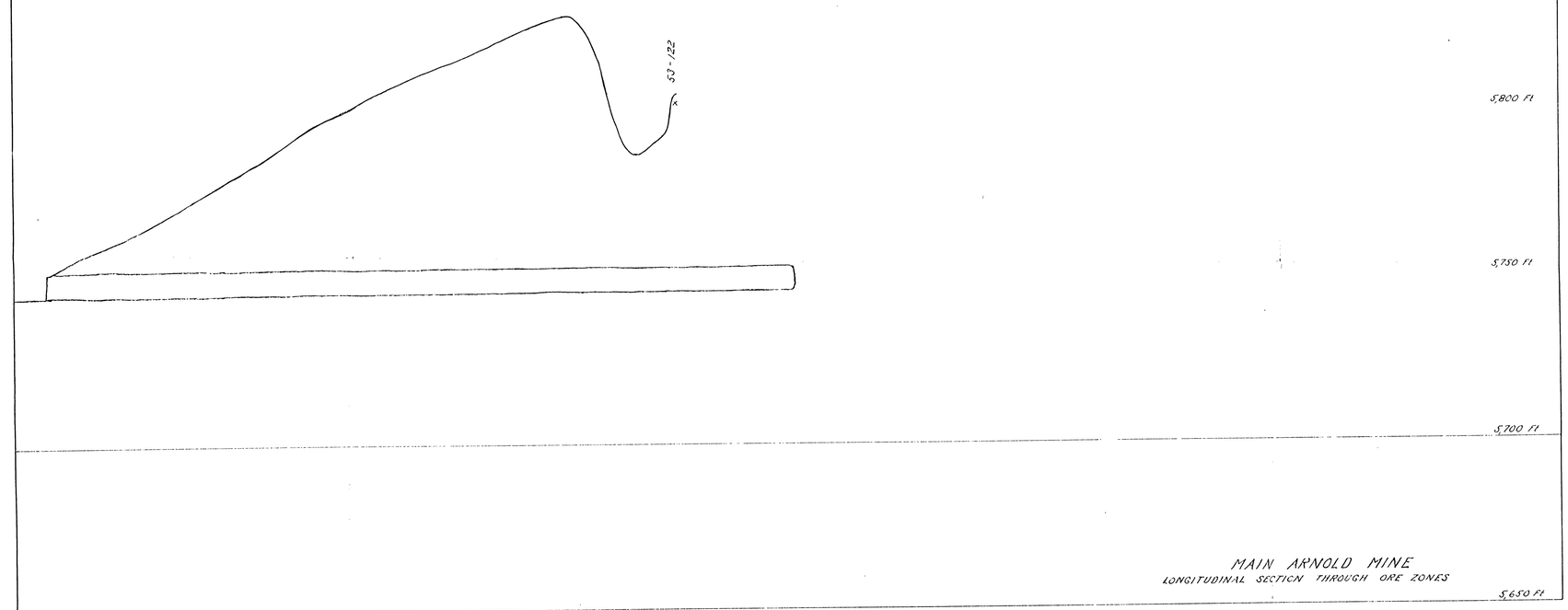
2



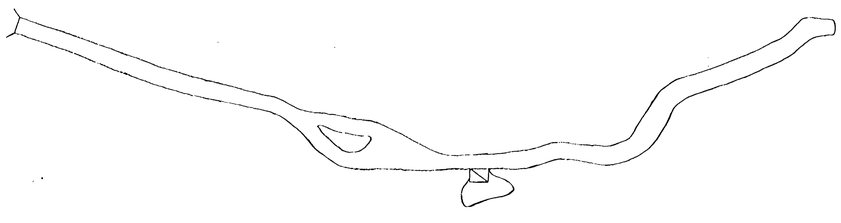
MAIN ARNOLD MINE
(SHOWING SURFACE GEOLOGY)

SAMPLES

SAMPLE	WO_3	Cu	Ag	Au	DESCRIPTION
53-118	1.05%	0.8%	0.5 oz	0.005 oz	Chips from dump ore in ore bin. Believes representative of ore mined by Porter Bros. Corp. Estimated 25 tons available on dump.
53-119	0.05%	1.4%	0.5 oz	0.005 oz	Dump sample. Minus 1-inch material from western end of main dumps. Estimated 500 tons available.
53-120	0.35%	3.1%	1.3 oz	0.02 oz	Dump sample. Minus 1-inch material from eastern end of main dumps. Estimated 250 tons available.
53-121	0.15%	2.4%	1.4 oz	0.02 oz	Dump sample. Minus 1-inch material from lower dumps of upper workings. Estimated 50 tons available.
53-122	1.85%	0.9%	0.3 oz	Trace	Vein sample. East side of surface stope. Width - 3.7 ft. Strike & Dip obscure.



MAIN ARNOLD MINE
LONGITUDINAL SECTION THROUGH ORE ZONES



GEOLOGY
MAIN LEVEL

Boulder Ores, Inc.
Contract Idm-8588
Docket DMSA 2973
(tungsten)

MAP #3

MAIN ARNOLD MINE

SNOWSHOE GULCH TUNGSTEN - COPPER DEPOSITS
POWELL COUNTY, MONTANA.

SCALE: 20 Ft : 1 in.
NOVEMBER, 1953

MAG. DEC. ASSUMED 21° E
ENG'R: P. H. TOEPFER

Ls LIMESTONE Gr GRANITE Ta TACTITE ORE SHOWN RED

Boulder Ores, Inc.
Contract Idm-8588
Docket DMEA 2973
(tungsten)

ARNOLD MINE AREA
SNOWSHOE GULCH TUNGSTEN - COPPER DEPOSITS
POWELL COUNTY, MONTANA

MAP FROM BRUNTON COMPASS (WITH STAFF) AND TAPE SURVEY MADE IN 1943.
MAG. DEC. ASSUMED 21° E. MAP DRAWN: JAN., 1953 ENG'R: P. H. TOEPFER
SCALE: 60 FT = 1 IN.

Ls LIMESTONE Gr GRANITE Ta TACTITE Al ALLUVIUM Q QUARTZ

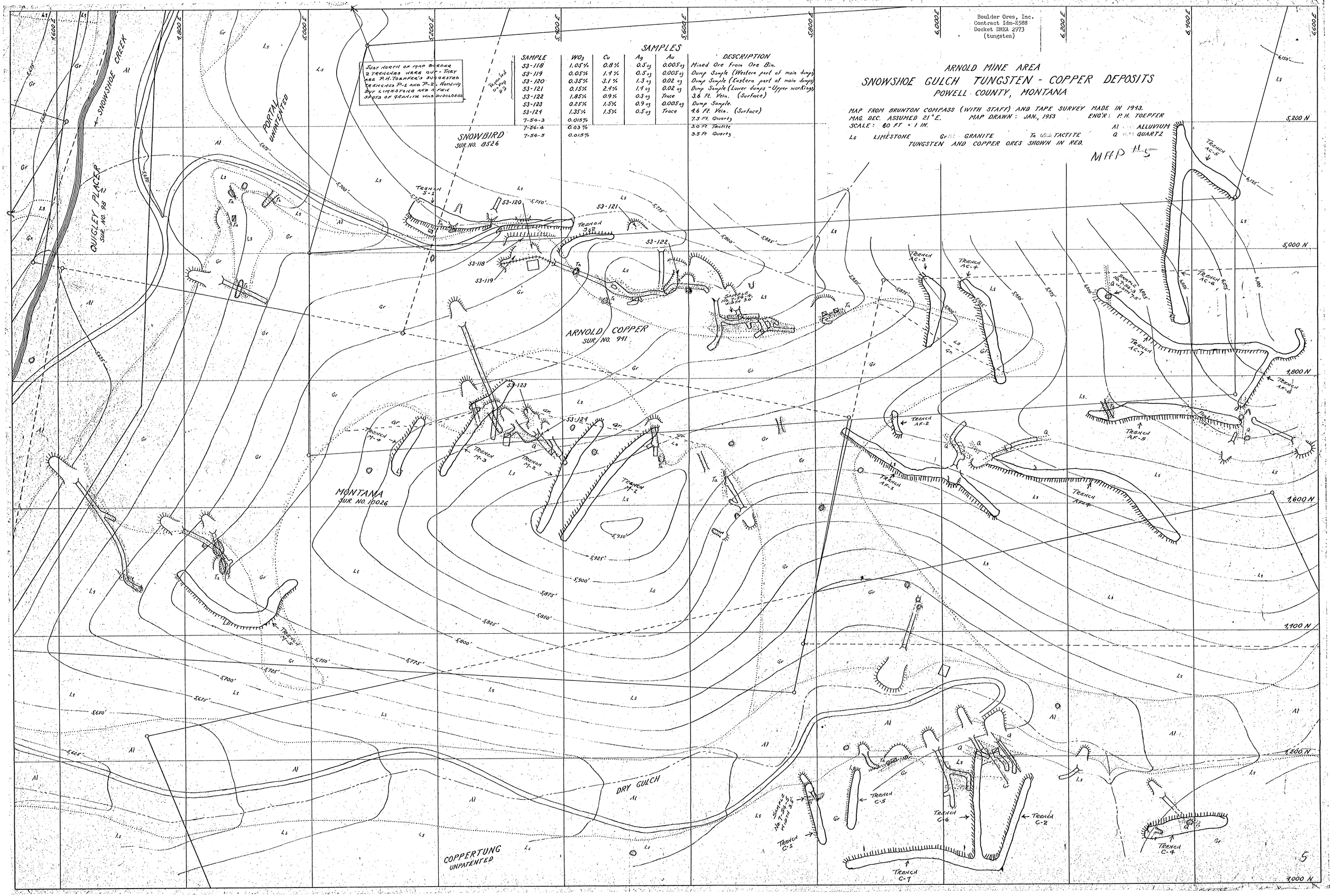
TUNGSTEN AND COPPER ORES SHOWN IN RED.

MFP #5

Just north of map border 2 trenches were cut - they are P.H. Toepfer's suggested trenches P-1 and P-2. Nothing but limestone and a few spots of granite was disclosed.

SAMPLES

SAMPLE	WO_3	Cu	Ag	Au	DESCRIPTION
53-118	1.05%	0.8%	0.5 oz	0.005 oz	Mined Ore from Ore Bin.
53-119	0.05%	1.4%	0.5 oz	0.005 oz	Dump Sample (Western part of main dump)
53-120	0.35%	3.1%	1.3 oz	0.02 oz	Dump Sample (Eastern part of main dump)
53-121	0.15%	2.4%	1.4 oz	0.02 oz	Dump Sample (Lower dumps - Upper workings)
53-122	1.85%	0.9%	0.3 oz	Trace	3.6 Ft. Vein. (Surface)
53-123	0.25%	1.3%	0.9 oz	0.005 oz	Dump Sample.
53-124	1.35%	1.5%	0.5 oz	Trace	4.6 Ft. Vein. (Surface)
7-54-3	0.015%				7.5 Ft. Quartz
7-54-4	0.03%				3.0 Ft Tactite
7-54-5	0.015%				3.5 Ft Quartz



Boulder Ores, Inc.
Contract Idm-8588
DOCKET DMEA 2973
(tungsten)

STRATEGIC - SHAMROCK AREA
SNOWSHOE GULCH TUNGSTEN - COPPER DEPOSITS
POWELL COUNTY, MONTANA

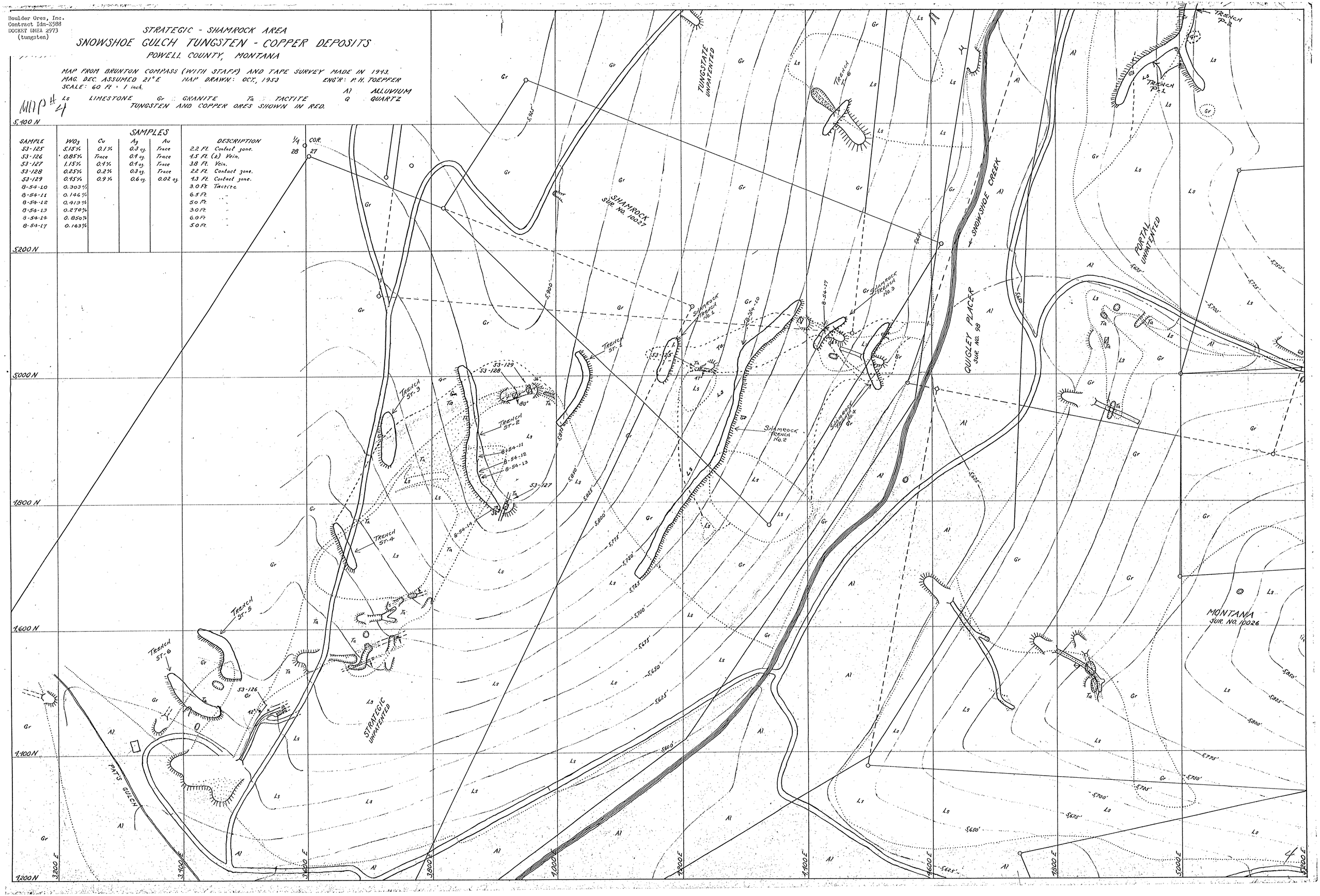
MAP FROM BRUNTON COMPASS (WITH STAFF) AND TAPE SURVEY MADE IN 1943.
MAG. DEC. ASSUMED 21° E MAP DRAWN: OCT., 1953 ENG'R: P.H. TOEPFER
SCALE: 60 Ft = 1 inch.

Ls LIMESTONE Gr GRANITE Ta TACTITE Al ALLUVIUM Q QUARTZ
TUNGSTEN AND COPPER ORES SHOWN IN RED.

MAP #4

SAMPLES

SAMPLE	WO_3	Cu	Ag	Au	DESCRIPTION
53-125	5.15%	0.1%	0.3 oz.	Trace	2.2 Ft. Contact zone.
53-126	0.85%	Trace	0.1 oz.	Trace	1.5 Ft. (±) Vein.
53-127	1.15%	0.1%	0.1 oz.	Trace	3.8 Ft. Vein.
53-128	0.25%	0.2%	0.3 oz.	Trace	2.2 Ft. Contact zone.
53-129	0.15%	0.9%	0.6 oz.	0.02 oz.	1.3 Ft. Contact zone.
8-54-10	0.303%				3.0 Ft. Tactite
8-54-11	0.146%				6.5 Ft. "
8-54-12	0.413%				5.0 Ft. "
8-54-13	0.270%				3.0 Ft. "
8-54-14	0.850%				6.0 Ft. "
8-54-17	0.163%				5.0 Ft. "



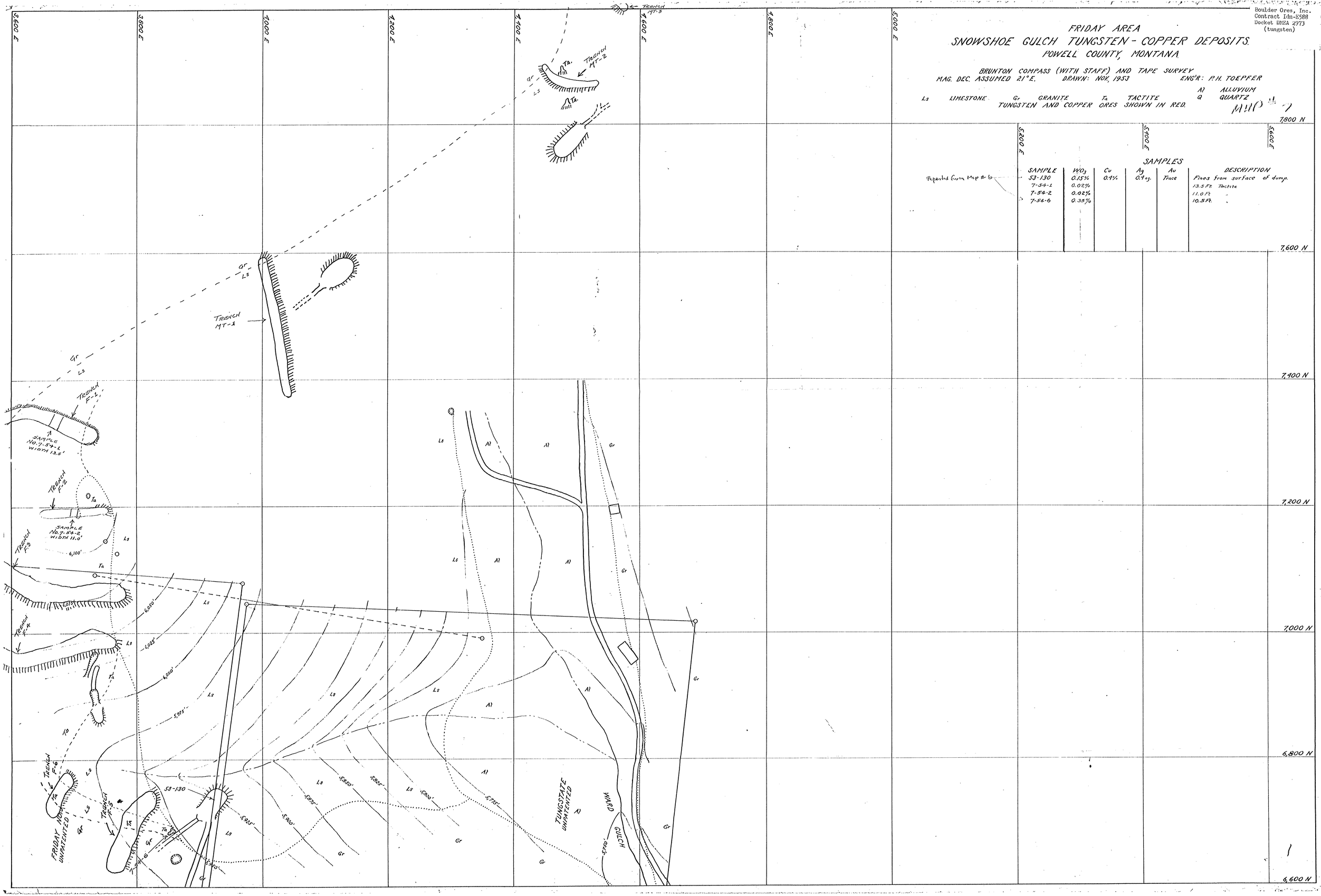
Boulder Ores, Inc.
Contract Idm-8588
Docket DMEA 2973
(tungsten)

FRIDAY AREA
SNOWSHOE GULCH TUNGSTEN - COPPER DEPOSITS
POWELL COUNTY, MONTANA

BRUNTON COMPASS (WITH STAFF) AND TAPE SURVEY
MAG. DEC. ASSUMED 21° E. DRAWN: NOV. 1953 ENG'R: P.H. TOEPFER

Ls LIMESTONE Gr GRANITE Ta TACTITE Al ALLUVIUM Q QUARTZ
TUNGSTEN AND COPPER ORES SHOWN IN RED.

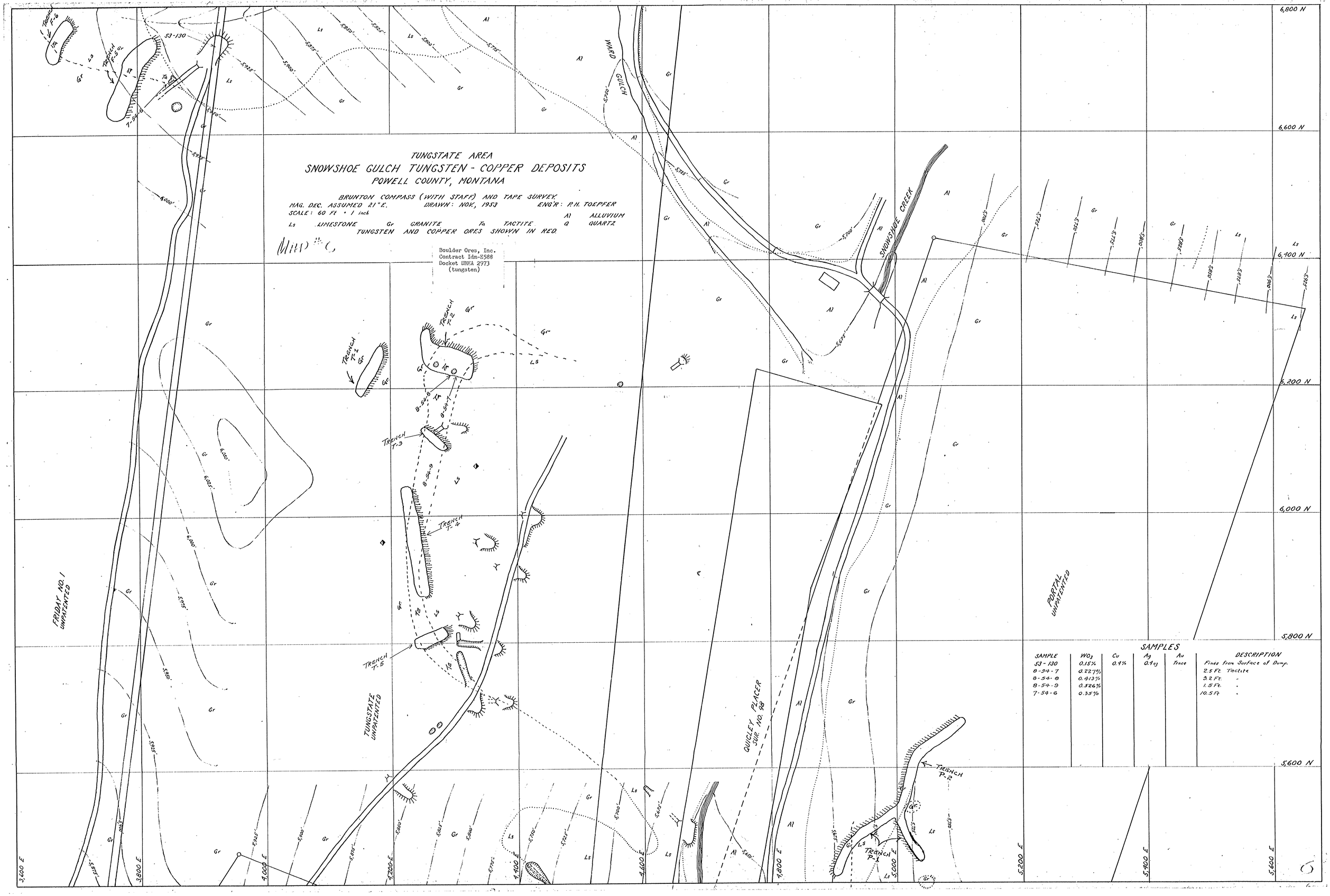
MAP # 7



Reported from Map # 6

SAMPLES

SAMPLE	WO_3	Cu	Ag	Au	DESCRIPTION
SS-130	0.15%	0.1%	0.1 oz.	Trace	Fines from surface of dump.
7-54-1	0.02%				13.5 Ft. Tactite
7-54-2	0.02%				11.0 Ft. "
7-54-6	0.35%				10.5 Ft. "



SAMPLES

SAMPLE	WO_3	Cu	Ag	Au	DESCRIPTION
53-130	0.15%	0.1%	0.1 oz	Trace	Fines from Surface of Dump.
8-54-7	0.227%				2.5 Ft. Tactite
8-54-8	0.413%				3.2 Ft. "
8-54-9	0.526%				1.5 Ft. "
7-54-6	0.35%				10.5 Ft. "

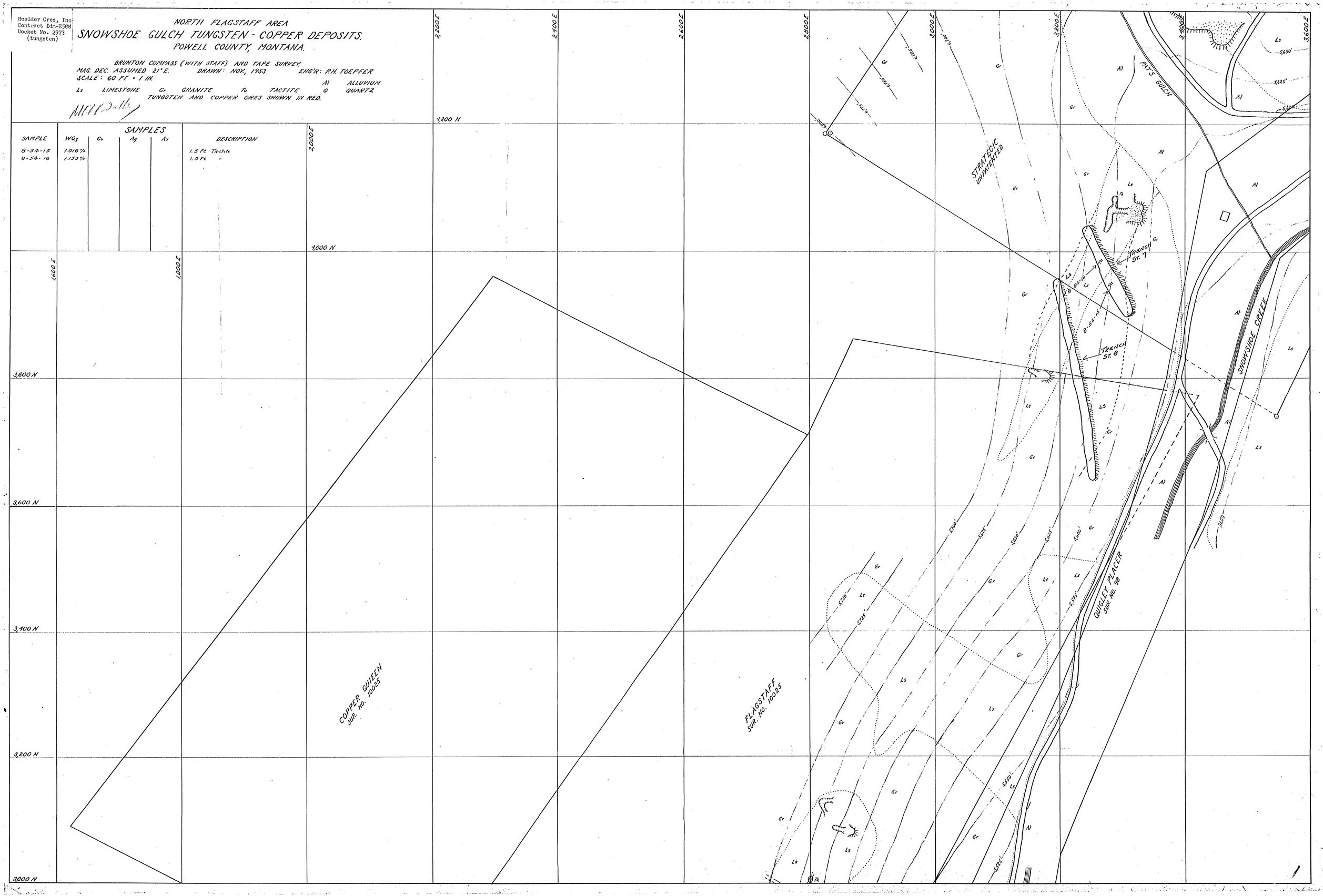
Boulder Ores, Inc.
Contract Idm-E588
Docket No. 2973
(tungsten)

NORTH FLAGSTAFF AREA
SNOWSHOE GULCH TUNGSTEN - COPPER DEPOSITS.
POWELL COUNTY, MONTANA.

BRUNTON COMPASS (WITH STAFF) AND TAPE SURVEY.
MAG. DEC. ASSUMED 21° E. DRAWN: NOV., 1953 ENG'R: P.H. TOEPFER
SCALE: 60 FT. = 1 IN.

Ls LIMESTONE Gr GRANITE Ta TACTITE Al ALLUVIUM Q QUARTZ
TUNGSTEN AND COPPER ORES SHOWN IN RED.

MHPatty

SAMPLES

SAMPLE	WO_3	Cu	Ag	Au	DESCRIPTION
8-54-15	1.016%				1.5 Ft. Tactite
8-54-16	1.153%				1.5 Ft. "