

CONTACT INFORMATION

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James Doyle Sell Mining Collection

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November 14, 1986

FILE NOTE

Drilling on WSA Lands

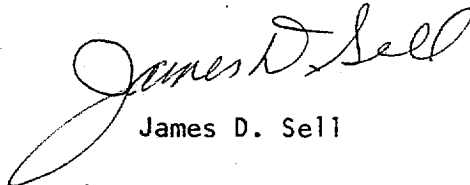
Orocopia Project
Riverside County, CA

Mr. Jerry Haggard has returned the attached packet of information and his cover letter in regard to conducting exploration drilling on the Orocopia are.

The apparent bottom line is that we should talk to the local BLM office, i.e., Leslie Cone in Palm Springs, and mutually arrive at a plan suitable to all with the minimum of terrain disturbance.

A tentative meeting with Cone has been set for the week of Nov. 24.

JDS:mek
Atts.


James D. Sell

cc: W.L. Kurtz (Haggard Ltr. only)
W.D. Gay (w/atts.)

WILLIAM A. EVANS [1907-1978]
JOS. S. JENCKES, JR. [1908-1970]

LAW OFFICES

Evans, Kitchel & Jenckes, P.C.

2600 NORTH CENTRAL AVENUE
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November 13, 1986

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JOHN F. BOLAND, JR.
OF COUNSEL

TELECOPIER 602-234-8856

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Mr. James D. Sell
Manager
Exploration Department
Southwestern United States Division
ASARCO, Incorporated
P.O. Box 5747
1150 North 7th Avenue
Tucson, Arizona 85703

ASARCO Incorporated

NOV 14 1986

SW Exploration

Re: Orocopia Project
Riverside Co., CA

Dear Mr. Sell:

Thank you for the material which you sent with your November 7, 1986 letter regarding your planned Orocopia Exploration Project in the California Desert Conservation Area. We understand that ASARCO expects to submit to the Bureau of Land Management a plan of operations for exploration drilling on unpatented mining claims in this area. Some of the drilling can be conducted from existing roads but cross-country travel or new roads may be required to reach other drill sites. You requested our advice on what restrictions or prohibitions may be imposed on your planned operations.

At least the following three legal regimes apply to the area of your anticipated operations:

1. Section 601 of the Federal Land Policy and Management Act (FLPMA) which established the California Desert Conservation Area ("CDCA").
2. Section 603 of FLPMA and the regulations thereunder (43 C.F.R. Subpart 3802) will apply to mining law activities in the areas within the CDCA designated for wilderness study.
3. The off-road vehicle regulations (43 C.F.R. Part 8340) will apply to those areas and roads designated as closed or limited to off-road vehicle use.

Mr. James D. Sell
November 13, 1986
Page 2

There may, of course, be other particular regulatory programs which apply such as those for areas of critical environmental concern or to national trails, if any areas within the CDCA have been designated as such.

The relevant section of FLPMA applying to the CDCA provides:

" (f) Subject to valid existing rights, nothing in this Act shall affect the applicability of the United States mining laws on the public lands within the California Desert Conservation Area, except that all mining claims located on public lands within the California Desert Conservation Area shall be subject to such reasonable regulations as the Secretary may prescribe to effectuate the purposes of this section. Any patent issued on any such mining claim shall recite this limitation and continue to be subject to such regulations. Such regulations shall provide for such measures as may be reasonable to protect the scenic, scientific, and environmental values of the public lands of the California Desert Conservation Area against undue impairment, and to assure against pollution of the streams and waters within the California Desert Conservation Area." (Underlining added).

43 U.S.C. § 1781(f).

By this section, Congress established three principles governing mining law activities in the CDCA. First, it is provided that the United States mining laws continue to apply to this area. Second, Congress authorized the Secretary of the Interior to promulgate regulations to protect the environmental values of the area from "undue" impairment. This implies that some impairment is permitted. Third, those regulations so promulgated must be reasonable which should be construed to mean that, although mining law activities may be regulated, such regulation must not go beyond that necessary to protect environmental values from undue impairment and cannot prohibit mining law activities. This statute controls the extent of the Secretary's authority to establish the regulations hereafter discussed.

The BLM general mining law surface management regulations, and special provisions in those regulations, apply

Mr. James D. Sell
November 13, 1986
Page 3

to the CDCA. The most significant special provision of those regulations is that a plan of operations is required for any operation, except "casual use" on lands in the CDCA designated as "controlled" or "limited use" areas by the CDCA plan. 43 C.F.R. § 3809.1-4(b). Activities which constitute "casual use" are defined as those ordinarily resulting in only negligible disturbance and which do not involve the use of mechanized earth-moving equipment or the use of motorized vehicles in areas designated as closed to off-road vehicles. 43 C.F.R. § 3809.0-5(b). Operations on lands outside of "controlled" or "limited use" areas would require only a notice to the BLM, at least 15 days prior to commencement, if such operations are to cause a cumulative surface disturbance of 5 acres or less during any calendar year. Such disturbance of more than 5 acres in any calendar year would require a plan of operations. If a plan of operations is required, the general provisions of 43 C.F.R. Subpart 3809 apply the same as to all other BLM land areas. However, the special environmental protection standards set forth above in 43 U.S.C. § 1781(f) would also be imposed in the plan of operations.

I understand that some portions of the area in which you are interested have been designated wilderness study areas. Although, as stated in the materials which you sent, those areas were removed from wilderness study status in 1983, the same areas were restored as wilderness study areas pursuant to the court's decision in Sierra Club, et al. v. Watt, 608 F. Supp. 305 (E.D. Calif. 1985). The more restrictive regulations found in 43 C.F.R. Subpart 3802 will apply to those areas. Those restrictions include, in general, the prohibition of any activity which would permanently impair the suitability of the area for inclusion in the wilderness system. Particularly in a desert area, this may preclude the construction of new roads or drill pads and it may be difficult to obtain the authorization to transport drilling equipment cross-country. See, Utah v. Andrus, 486 F. Supp. 995 (D. Utah 1979). Enclosed, for your information, are documents and correspondence which were involved in ASARCO gaining access into the Roberts Creek Mountains Wilderness Study Area in Nevada. You will note that permission was granted in that area only to transport drilling equipment on existing roads and cross-county.

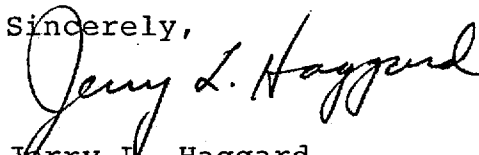
The documents which you provided indicate that some areas and roads within your area of interest have been designated as closed to off-road vehicles pursuant to 43 C.F.R. Subpart 8340. The original off-road vehicle regulations issued in 1973 specifically exempted vehicles being used to explore

Mr. James D. Sell
November 13, 1986
Page 4

public lands for minerals pursuant to the U.S. mining laws. 43 C.F.R. § 6291.1(c) (1973). This exemption is not present in the current regulations. 43 C.F.R. § 8340.0-5(a). However, those current regulations allow any vehicle to be used in closed areas and trails if such use is officially approved. Such authorization may be obtained by special use permit. If the BLM has any question in this regard, you may wish to refer that BLM official to the enclosed letter dated August 19, 1974 from the Bureau of Land Management Washington Office to the undersigned explaining that the mineral exploration exemption was removed from the regulations because everyone has the potential of becoming an instant "weekend mineral explorer". The letter states that, even on closed lands, mineral exploration with off-road vehicles is permitted with certain stipulations. Also enclosed for your information are copies of our letters dated May 13 and August 26, 1974 to Mr. W. L. Kurtz.

The designation of special areas within the CDCA will be found in the CDCA 1980 Management Plan which I understand is quite voluminous and has been amended at least seven times since it was adopted. I understand from Ray Hunter, Executive Director of the California Mining Association, that the BLM offices administering the CDCA have been quite cooperative with the mining industry. This is because legislation has been introduced in past sessions of Congress to designate parts of the CDCA as national parks which has caused the BLM to be concerned about losing jurisdiction over the area and to seek support in opposing that legislation. I suggest that ASARCO representatives meet with personnel in the appropriate BLM office, identify the areas in which operations will take place and determine the classification of those areas and what requirements may be imposed by the BLM. If the BLM insists upon imposing unsatisfactory requirements, we would be pleased to assist you in determining whether such specific requirements are authorized and working with the BLM to obtain relief from them.

Sincerely,



Jerry L. Haggard
For EVANS, KITCHEL & JENCKES, P.C.

JLH/jb
Enclosures

cc: James L. Woods, Esq.

WILLIAM A. EVANS [1907-1978]
JOS. S. JENCKES, JR. [1908-1970]

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April 17, 1986

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RICHARD LIEBERMAN

FEDERAL EXPRESS

James L. Woods, Esq.
Associate General Counsel
ASARCO, Incorporated
180 Maiden Lane
New York, New York 10038

Re: Cooper Peak Project

Dear Mr. Woods:

Enclosed are two draft letters to the Bureau of Land Management regarding the subject project. One letter describes the exploration project which will involve access and drilling only on existing roads. Please note the statement in that letter that only hand equipment will be used to repair portions of those existing roads. Under 36 C.F.R. § 3802.1-2(d), if mechanized earth moving equipment is used, a plan of operations would be required. The only possible difficulty which should be encountered in this phase of the project is the possibility that those existing roads have been designated as closed under 43 C.F.R. Part 8340. However, Brian Maher in ASARCO's Reno office advises me that there are no signs or other indication that those roads have been so closed.

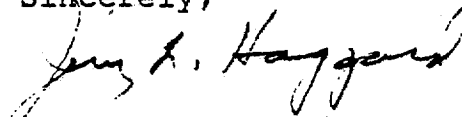
The second letter, which should be submitted a few days after the first letter is submitted, is intended to transmit a plan of operations. I expect that Fred Graybeal and your Reno office are familiar with the preparation of those plans which must contain the information specified in 36 C.F.R. § 3802.1-4.

ASARCO Incorporated
NOV 14 1986
SW Exploration

James L. Woods, Esq.
April 17, 1986
Page 2

Please call if there are any questions on these approaches which have been suggested.

Sincerely,

A handwritten signature in cursive script, appearing to read "Jerry L. Haggard".

Jerry L. Haggard
For EVANS, KITCHEL & JENCKES, P.C.

JLH/jb
Enclosures

cc: Mr. Peter Vikre

D R A F T

Mr. Neil D. Talbot
Area Manager
Shoshone-Eureka Resource Area
Bureau of Land Management
Battle Mountain, Nevada 89820

Re: 3809 (NV-066.2)

Dear Mr. Talbot:

This is in reference to your March 24, 1986 letter regarding an exploration project contemplated by ASARCO, Incorporated partially within the Roberts Mountains Wilderness Study Area in Eureka County, Nevada about which we advised you in our March 5, 1986 letter. After reviewing your letter and consulting with our counsel, we believe that we should amplify our March 5, 1986 letter.

Between the period of May 7 (?) to August 1, 1986 ASARCO plans an exploration project to drill approximately _____ drill holes in the Roberts Wilderness Study Area on existing roads at locations shown on the enclosed map. In your review of our description of this project, we invite your attention to 36 C.F.R. § 3802.1-2. For this program, instead of using tracked vehicles, as mentioned in our March 5, 1986 letter, to transport the drilling equipment and associated supplies and personnel, balloon tired vehicles will be used entirely on the existing roads. Those roads were constructed before 1968 and during 1968, 1969 and 1974 and have been used and maintained periodically since they were constructed. Only minor repairs using hand equipment will be made to those roads which repairs will not alter their alignment, width, gradient, size or character. The locations at which the minor repairs will be made to those roads are shown in the enclosed map. Therefore, it is quite clear that these activities are fully provided for in 36 C.F.R. § 3802.1-2. The repairs will consist only of moving to the side of the roads rocks and dirt which have fallen onto the roads.

I believe you will agree that, pursuant to 36 C.F.R. § 3802.1-2, no plan of operations is required for this project. Nevertheless, although the BLM regulations (36 C.F.R. Subpart 3802) require no notice of intent or plan of operations to be provided by ASARCO for the activities we now contemplate carrying out in this program, we wish to keep you informed of those activities.

We believe it would be helpful both to your office and ASARCO if we could meet in the near future to discuss any questions you may have regarding our planned operation. As we presently intend to commence our drilling project on May 7(?), 1986, please call us at your earliest convenience if you desire such a meeting.

Thank you for your cooperation.

Sincerely,

Enclosure .

D R A F T

Mr. Neil D. Talbot
Area Manager
Shoshone-Eureka Resource Area
Bureau of Land Management
Battle Mountain, Nevada 89820

Re: 3809 (NV-066.2)

Dear Mr. Talbot:

Our letter dated [date of the initial letter of notice for the on-road drilling] advised you of the intent of ASARCO, Incorporated to carry out an exploration project on our mining claims in the Roberts Mountains Wilderness Study Area in Eureka County, Nevada which will involve access and drilling only upon existing roads. This letter transmits the enclosed plan of operations pursuant to 36 C.F.R. Subpart 3802 for an additional exploration project in that Wilderness Study Area.

You notified us in your March 24, 1986 letter that activities will not be permitted within wilderness study areas which "will impair the wilderness value of the land", that "the portion of the planned exploration that lies within the Roberts Mountains Study Area does not meet the non-impairment criteria" and that you "cannot approve the use of tracked vehicles for access to the proposed drilling areas and associated on the ground support traffic within the Wilderness Study Area boundary". After consulting with our counsel, we believe that some misunderstandings exist regarding permitted exploration in wilderness study areas which should be addressed in this letter. Pursuant to 36 C.F.R. § 3802.1-4, the attached plan of operations is submitted for your approval.

This exploration project is planned to commence on or about August 1, 1986 and will utilize tracked vehicles transporting drilling rigs and support equipment on existing roads and cross-country without the necessity of constructing any roads or clearing sites for the drilling rig. You indicated in your March 24, 1986 letter that such activities would impair the wilderness values of the land and, therefore, do not meet the non-impairment criteria. The activities ASARCO proposes will not impair the wilderness characteristics of the area. In addition, we wish to call to your attention to the fact that some impairment is allowed under the regulations. The definition of "impairment" is found in 36 C.F.R. § 3802.0-5(d) as follows:

"Impairment of suitability for inclusion in the Wilderness System" means taking actions that cause impacts, that cannot be reclaimed to the point of being substantially unnoticeable in the area as a whole by the time the Secretary is scheduled to make a recommendation to the President on the suitability of a wilderness study area for inclusion in the National Wilderness Preservation System or have degraded wilderness values so far, compared with the area's values for other purposes, as to significantly constrain the Secretary's recommendation with respect to the area's suitability for preservation as wilderness.

Please note that this definition contemplates that there can be some surface disturbance so long as it can be reclaimed to the point of being "substantially unnoticeable" in the area as a whole. That quoted term is further defined in 36 C.F.R. § 3802.0-5(m) to allow some noticeable surface disturbance to remain so long as that disturbance is only a very minor feature of the overall wilderness study area. It appears that the only activity involved in this exploration project which may require a plan of operations under the regulations is that tracked vehicles will be used. We should emphasize that the use of tracked vehicles capable of cross-country travel is being proposed to avoid the construction of trails which would be required if balloon tired vehicles were used. Although we are not proposing access trails, it should be pointed out that even the construction of new access routes in wilderness study areas is contemplated under 36 C.F.R. §§ 3802.3-2(g) and 3802.4-2(b).

These regulations carry out the purpose of the Interim Management Policy and Guidelines for Lands Under Wilderness Review published in the Federal Register on December 12, 1979 (44 Fed. Reg. 72014) which states, at page 72016:

" Some temporary uses can be permitted even though they cause physical or aesthetic impacts, because those impacts are temporary and will be reclaimed promptly. It is generally felt to be in the public interest, for instance, for wilderness study areas to be explored, within the non-impairment standard, so as to learn as much as possible about all the resource values that are present."

In the enclosed plan of operations, we have selected the routes to drill sites over which cross-country travel can be accomplished and the construction of trails would not be required. We have done this with the sacrifice of drilling in some areas during this season which would be more geologically preferable and to assure the expeditious processing of

this plan of operations.

We have regarded and ask your office to regard the following guidance which appeared in the Preamble of the 36 C.F.R. Subpart 3802 regulations when those regulations were promulgated:

Finally, a few of the comments [on the proposed regulations] were concerned that the route of access to a mining claim would be established by the authorized officer without any reference to the operator and the impact the selected access route might have on the operations. The authorized officer will select the access route in consultation with the operator, after discussion of the operator's needs and his ability to meet the requirements imposed by the authorized officer. There is no intention to place conditions on a route of access that make it impossible for the operator to carry out operations that are approved under a plan of operations.

43 Fed. Reg. 13973 (March 3, 1980).

In carrying out this expressed spirit of cooperation between the BLM and mining claim owners, we would be happy to meet with you at your earliest convenience to discuss any matters in the enclosed plan of operations on which you may have questions.

Sincerely,

Enclosure

COOPER PEAK



United States Department of the Interior

BUREAU OF LAND MANAGEMENT

Shoshone-Eureka Resource Area
P. O. Box 1420
Battle Mountain, NV 89820

MAR 24 1986

IN REPLY
REFER TO:

3809
(NV-066.2)

R. L. B.

635-5181

F.T.G. NL 3-25-86
APR 3 REC'D

APR 8 1986

Mr. Brian J. Maher
ASARCO Incorporated
Exploration Department
510 East Plumb Lane
Reno, Nevada 89502

ASARCO Incorporated

NOV 14 1986

SW Exploration

Dear Brian:

I have received the notice of intent for proposed exploration on ASARCO's claim block on the eastern slope of Roberts Creek Mountains. It is Bureau policy in Nevada not to allow activities in wilderness study areas which will impair the wilderness value of the land. The portion of the planned exploration that lies within the Roberts Mountains wilderness study area does not meet the non-impairment criteria that we have been directed to use. Therefore, we cannot approve the use of tracked vehicles for access to the proposed drilling areas and associated "on the ground" support traffic within the wilderness study area boundary.

The portion of the exploration which lies outside the WSA is approved with the following stipulations:

1. Construct a 3% outslope on all roads which require cut and fill construction.
2. Exploration roads for which further use in exploration and mine development is anticipated shall be drained adequately by outsloping and waterbaring. Construct waterbars on existing and newly constructed roads having grades of 4% or greater in such a way that water is diverted to the downslope side of the road and off the road surface. On ridgetop roads with no downslope side, extend waterbars as short diversion ditches (30' or less in length) to divert water away from the road surface. Water bars shall be constructed as shown on the drawing with a spacing no greater than 100 feet.
3. Final restoration of roads not needed for further exploration and mine development will consist of complete recontouring of the road prism to conform to the existing slope and terrain.

If you have any questions, please don't hesitate to call me or Rich Young, area geologist. Thank you.

Sincerely,

Neil J. Talbot
Area Manager

NOV 14 1986

SW Exploration

Decision Record
E.A. Number N66-EA66-29

OCT - 2 1986

Decision

The Plan of Operation N66-WP6-02 submitted by ASARCO for mineral exploration in the Roberts Mountain WSA located in the unsurveyed area, Township 23 North, Range 50 East should be allowed.

Rationale

1. Mineral exploration is consistent with existing land use plans. The proposed action would not cause impairment of the suitability of the area for preservation as wilderness.
2. Benefits from the proposed action outweigh the impacts caused.
3. No condition sufficient to warrant disapproval of the Plan of Operations was found. This decision is made in accordance with 43 CFR 3802, the IMP, and I.M. NV 86-466.

Mitigating Measures

1. Operations under this Plan of Operations is conditioned on the strict adherence to all documented mitigation measures for air, water, soil, wildlife, vegetation, visual, and historical and archaeological resources, and all documented plans and restrictions for reclamation of the mining area contained in the Plan of Operations and Environmental Assessment.

Finding of No Significants

Preparation of an Environmental Impact Statement pursuant to Section 102(2)(c) of NEPA is not required for the following reasons:

1. Sensitive resource values would not be impacted by the proposed action.
2. The comments on the proposed action notice have been received and reviewed and incorporated into the environmental assessment. The proposed action has not generated significant public controversy.


Neil D. Talbot
Area Manager

9/29/86
Date



United States Department of the Interior

BUREAU OF LAND MANAGEMENT

Shoshone-Eureka Resource Area
P. O. Box 1420
Battle Mountain, NV 89820

IN REPLY
REFER TO:

3809
(NV-066.2) -

OCT - 2 1986

ASARCO, Incorporated
510 East Plumb Lane
Reno, Nevada 89502

Dear Sirs:

The Plan of Operation N66-WP6-02 as submitted by ASARCO for mineral exploration in the Roberts Mountain WSA has been reviewed and has been found adequate and acceptable. The comments on the proposed action notice have been received and reviewed and incorporated into the environmental assessment.

Approval of the plan is hereby granted with the understanding that all standards and stipulations for air and water quality, wildlife and plant habitat, soil, cultural and visual resources and reclamation and appropriate mitigation measures as documented in the attached Environmental Assessment are agreed upon by ASARCO and will be performed as an integral part of the operation. Any subsequent modifications to the plan will be approved in the same manner as the initial plan.

This letter does not constitute: certificate of ownership to any person or company named in your Plan to Operate; recognition of the validity of any mining claims named in your plan of operation, or recognition of the economic feasibility of the operation proposed in the Plan of Operation.

If you have any questions, please contact Rich Young, Shoshone-Eureka Resource Area Geologist.

Sincerely,


Neil D. Talbot
Area Manager

UNITED STATES DEPT OF INTERIOR
BUREAU OF LAND MANAGEMENT
BATTLE MOUNTAIN DISTRICT

RESOURCE AREA: S/E
SUBACTIVITY-PE: 4132
DATE: 9/14/80

ENVIRONMENTAL ASSESSMENT CHECKLIST

EA No./NAME: N66-EA6-40

LEAD PREPARER-NAME/TITLE: Rich Young, Geologist

ENVIRONMENTAL COORDINATOR: Jon Menten

LEVEL OF ANALYSIS: MINIMAL ☒ MODERATE ☐ HIGH ☐ (Use EIS Format)

AFFECTED RESOURCE	SPECIALIST NAME	COMMENTS (None or Attachment)	INITIALS	DATE
*WILDERNESS			JW.	9/29/80
*CULTURAL RESOURCES		OK	DM	9/16/80
*T/E SPECIES		OK	KHC	9-18
*VISUAL RESOURCES			JW.	9/29/80
MINERALS		OK	CWW	9/24
WILDLIFE		OK	KHC	9-18
WILD HORSES				
RANGE (VEG)		O.K.	CZL	9/23/80
SOILS		O.K.	CZL	9/23/80
WATERSHED		O.K.	CZL	9/23/80
FORESTRY				
OPERATIONS				

ENVIRONMENTAL COORDINATOR REVIEW Jon Menten DATE 9/26/80

FINAL APPROVAL:
ENVIRONMENTAL COORDINATOR Jon Menten DATE 9/26/80

RESOURCE AREA MANAGER Heild R. Talbot DATE 9/29/80

DISTRICT MANAGER _____ DATE _____

STATE OFFICE _____ DATE _____

ENVIRONMENTAL ASSESSMENT
FOR THE
PROPOSED MINING PLAN-OF-OPERATIONS
FOR EXPLORATION IN
THE ROBERTS MOUNTAIN WILDERNESS STUDY AREA
July, 1986

Shoshone-Eureka Resource Area
Battle Mountain District
Bureau of Land Management

I. INTRODUCTION

On March 5, 1986 ASARCO Incorporated submitted a mining plan of operation for exploration partially inside and partially outside the Roberts Mountain Wilderness Study Area (NV-060-541). On March 24th the Shoshone-Eureka Resource Area responded and denied the proposed exploration inside the WSA on the basis that access by a track-mounted drill rig and support vehicles would create substantially noticeable wilderness impairing impacts which could not be reclaimed by the time the Secretary is expected to forward wilderness recommendations to the President. The reclamation deadline was, at that time, established as June 30, 1984 (NV-83-857, July 25, 1983). The portion of the proposed exploration outside the WSA was permitted with stipulations.

On May 2, 1986 the Battle Mountain District Office received two revised plans of operation for proposed exploration inside the WSA. One plan proposed the use of a rubber-tired drill and support vehicles on existing roads and ways and stated that only minor hand repair work would be required. The grade and alignment of the roads and ways would not be altered. The second plan proposed the use of a track-mounted drill and track-mounted support vehicles off the existing roads and ways. A visit to the site was scheduled for June 7 by BLM and ASARCO representatives.

On June 2 BLM received a revised notice of intent from ASARCO for exploration outside the WSA. The field meeting was held on June 7 and stipulations were formed and evaluated for impacts. It was agreed that exploration outside the WSA would proceed and during that time several holes off existing ways would be drilled using the nonimpairment methods. The impacts would be evaluated and permission to drill inside the WSA would be contingent on the results of the evaluation.

During the month of June a proposed action notice was written and submitted for public comment. The comment period commenced on July 1 and ended July 31, 1986. Also, during the month of July Instruction Memorandum NV-86-466 was received which revised the reclamation deadline to March 30, 1989.

II. OPERATORS PROPOSED ACTION AND ALTERNATIVES

A. Description of Operators Proposed Action

ASARCO Incorporated proposes to perform mineral exploration in the Roberts Mountain WSA unsurveyed, T. 23 N., R. 50 E. using a track-mounted or rubber-tired drill and track-mounted or rubber-tired support vehicles. The proposed action is to drill approximately six holes on existing ways and six holes off existing ways according to the stipulations provided. The approximate location of the drill holes is shown in Figure 2. Nonimpairment criteria will be followed and approval is contingent upon the result of the evaluation of the impact caused by exploration using similar methods and equipment outside and adjacent to the WSA. Exploration will conform to the following stipulations:

1. Drilling on Existing Ways

- a. Allow track or rubber-tired drill one trip in and one trip out per drill hole.
- b. Allow one service vehicle one trip in and one trip out per day per drill hole.
- c. Cuttings, substances required for drilling, and circulated drill water will not be allowed to be discarded on the surface inside the WSA.

2. Drilling Off Existing Ways

- a. Monitor activities outside WSA with same equipment to be used inside WSA.
- b. Based on evaluation of activities outside WSA, allow tracked drill one trip in and one trip out of WSA. Allow one trip to each drill hole from previously drilled hole by shortest most direct feasible route.
- c. All water will be pumped or packed in by non motorized methods (horse or back pack).
- d. All fuel will be transported on drill or packed in by non motorized methods.
- e. Fuel and water may be transported by helicopter as an alternative.
- f. Cuttings, substances required for drilling, and circulated drill water will not be allowed to be discarded on the surface inside the WSA.
- g. No road or drill pad construction will be allowed in the WSA and traffic will be limited to the extent that the nonimpairment criteria will be met. No reclamation will be required.

B. No Action Alternative

The main alternative to the operators proposed action is a no-action alternative from which there would be no impacts to the environment.

III. AFFECTED ENVIRONMENT OF THE PROPOSED ACTION

A. Air Resources

The air quality of the area is high due to the limited population of the area and absence of concentrated industrial activity.

B. Water Resources

The surface water resources in the area exist as precipitation and perennial first order drainages. Snow accumulation in the area is high and during melt periods there is a considerable amount of runoff and percolation. Additional runoff is produced during summer high-intensity thunderstorms.

C. Wildlife Resources

Wildlife species occurring in the proposed project area include a variety of small mammals, songbirds, reptiles, and raptors. The primary game species are mule deer, chukar, partridge, and sage grouse. The slopes and higher ground surrounding Roberts Mountain is mule deer summer range. The headwater of Vinini Creek is adjacent to the project area. Portions of this creek provide critical riparian habitat for a variety of wildlife including trout.

D. Threatened or Endangered Species

No known threatened or endangered plants or animals occur in the project area. Bald Eagles are infrequently seen in central Nevada but occur only as winter migrants.

E. Vegetation

Vegetation in the area varies as do the soils and areas of moisture accumulation. Vegetation on the crests and upper sideslopes consists of low sagebrush, sandberg bluegrass, bluebunch wheatgrass, needle and thread, and Idaho fescue. The deep and more moisture retentive soils on the main sideslopes support mountain big sagebrush, lupine, Idaho fescue, mountain brome, and some needle and thread.

F. Soils

Soils on the crests and upper sideslopes are 10 to 36 inches deep over bedrock and have slopes of 10 to 35 percent. Surface soils are characterized by an abundance of cobble and gravel-sized rock fragments and are underlain by coarse gravelly and cobbly soil with a high clay content. Water supplying capacity is about 12 inches and runoff is rapid.

Soils on the mainslopes are 20 to 36 inches deep over bedrock and have slopes of 20 to 50 percent. Surface soils are thick, dark, and gravelly and overlie gravelly clay loam subsoils. Water supplying capacity is about 15 inches and runoff is rapid.

G. Wilderness

The proposed exploration lies partially within the Roberts Mountain Wilderness Study Area and is subject to the nonimpairment standards of the Interim Management Policy.

H. Cultural Resources

For that portion of the proposed activity off the existing ways an archaeological survey was performed. The survey consisted of a total of five lines on a 50-foot spacing for the entire length and width of the project area. No artifacts were observed.

I. Socioeconomic Resources

No significant impact.

J. Visual Resources

The area is within a Class II visual rating category. The area is characterized by gently sloping high meadows which slope upward to steep rock mountain sides and jagged rocky peaks. Most of the natural aspect of the area has not been altered. The only noticeable disturbance is caused by existing ways which appear as parallel linear and curving or linear patterns which are different in color, texture, and form.

IV. ENVIRONMENTAL CONSEQUENCES AND MITIGATION MEASURES

A. Air Resources

No mitigation measures are required for air quality. The project area is remote and the air quality is good. The small amount of machine exhaust to the atmosphere will have a negligible effect on air quality.

B. Water Resources

The effect on surface and subsurface water quality of the proposed action will be negligible. Drilling stipulations require all drilling fluids to be contained and not discarded on the surface. The main reason for the containment is to prevent discoloration of the surface. The water and drill cutting mixture is not anticipated to be a pollutant and is not a threat to the overall water quality. The drill cuttings are to be returned to the hole and the holes are to be plugged at the surface.

C. Wildlife

The proposed action is to occur in a remote area for a duration of approximately 3 weeks. The activity will be localized and will displace the game animals and birds only slightly for a short time. The effect on wildlife is not anticipated to be significant.

D. Threatened or Endangered Species

No threatened or endangered species exist within the area and there will be no impact.

E. Vegetation

The impacts to the vegetation will be the greatest of all impacts but yet are temporary. Travel from the existing ways to the drill site will crush the vegetation along the route under each track. As long as severe soil compaction does not occur the vegetation will regenerate within approximately two years. To prevent severe compaction to the vehicle travel has been limited to one trip in, one trip out, and one trip between drill holes for the drill for the drill only. Support services will have to be provided from areas outside the WSA or by non motorized methods.

F. Soil

Severe soil compaction will be prevented by limited vehicle travel to one pass for each area for one vehicle only. Only minor surface disturbance is anticipated by the single pass of a tracked-mounted drill. No further mitigation measures are required.

G. Wilderness

The long-range effect of the proposed action is anticipated to be negligible. Full restoration of the wilderness quality of the area is expected by the revised reclamation deadline of March 30, 1989.

H. Cultural

No significant impact

I. Socioeconomic

No significant impact

J. Visual

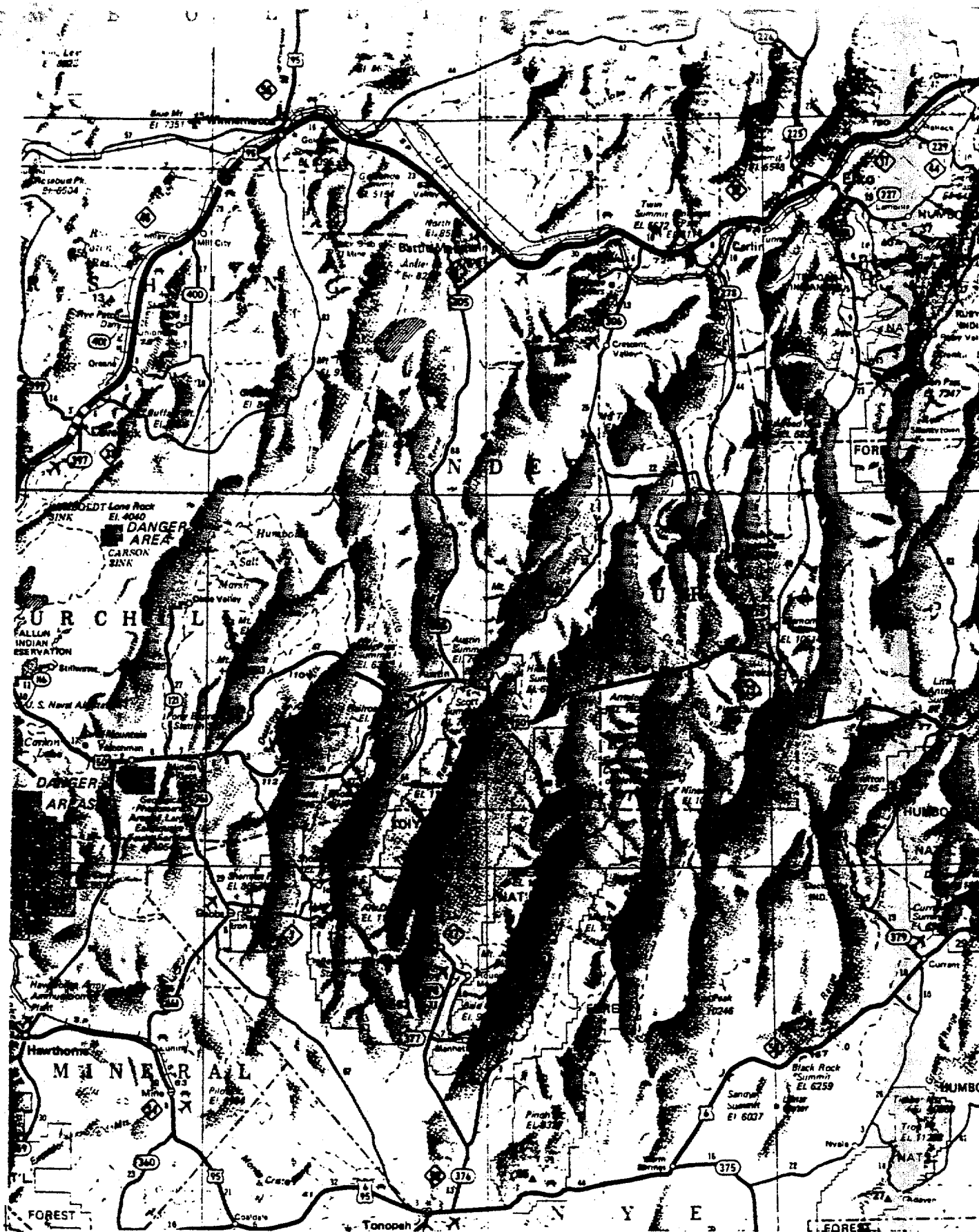
The impact on visual resources will be minimal and temporary. The patch created by the track-mounted drill as evidenced by the crushed vegetation will be visible for one to two years after the activity. It is anticipated that the visual impact will be unnoticeable after two years. The impact is reduced by limiting the number of passes to one.

K. Irretrievable Commitment of Resources

There is no irretrievable commitment of resources.

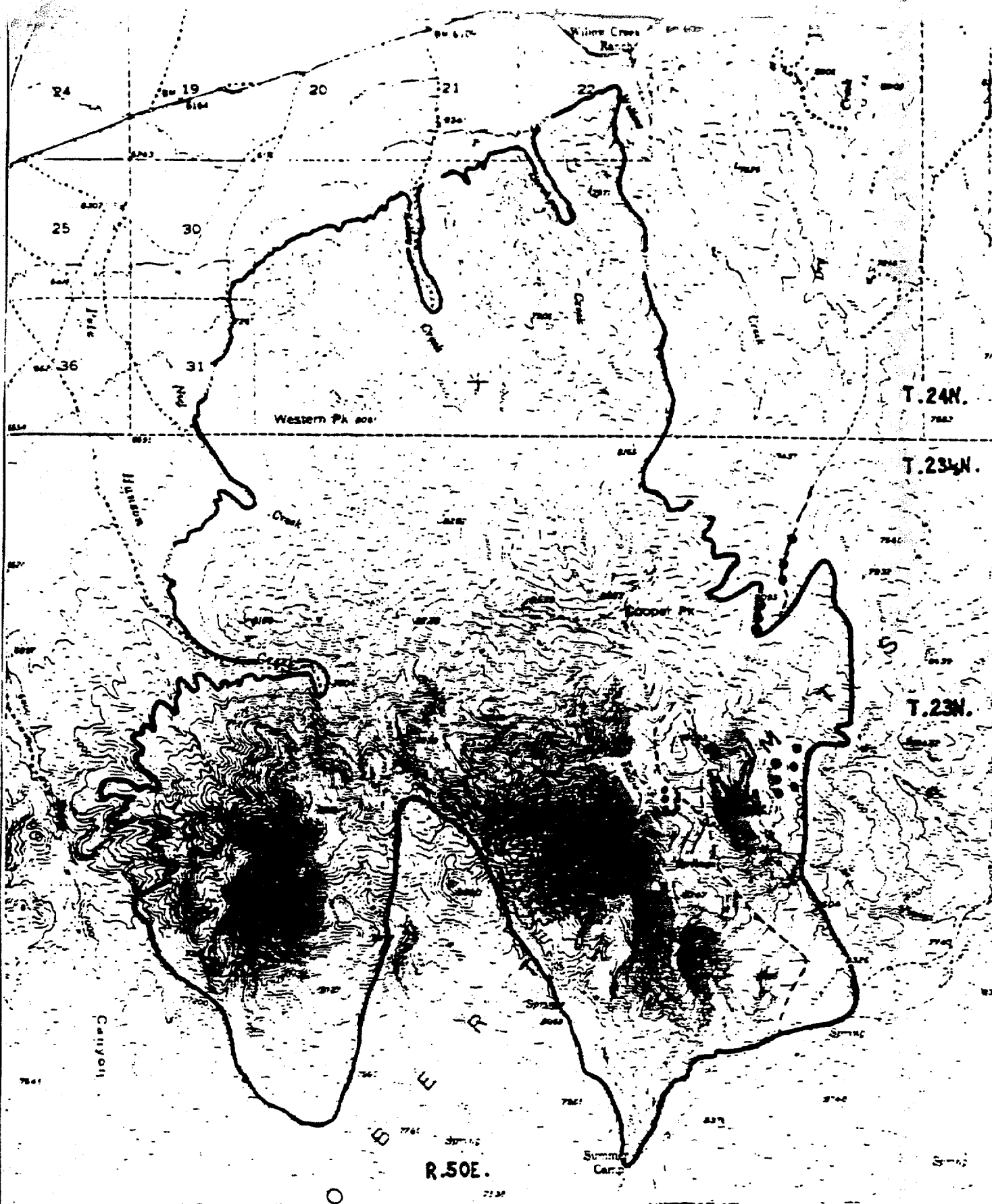
V. RECLAMATION

- A. Reclamation will be natural and efforts beyond the stipulations for the proposed action are not necessary.



GENERAL LOCATION MAP

Site of proposed mineral
exploration in the Augusta
Mts. wilderness study area



ROBERTS CREEK MOUNTAIN
WILDERNESS STUDY AREA

SCALE: 1:62500
CONTOUR INTERVAL=40'

PROPOSED
DRILL HOLE

ROBERTS CREEK MTN. NEW
NAME—ADDED 15

1945

DVA 37111 SERIES VTM

UNITED STATES
DEPARTMENT OF THE INTERIOR
BUREAU OF LAND MANAGEMENT

CULTURAL RESOURCES REPORT FORMAT/FIELD WORKSHEET

1. CR Report No. 6-967(N) 2. Date(s) of Field Ops 6/3/86
3. Archeologist or DAT Rich Young
4. Project Name & Description/Description of Potential Impacts ASARCO - Mineral
exploration on Roberts Mountain claims - WSA. Potential impact is limited to that
caused by one pass of track-mounted drill.
5. District Office Battle Mountain 6. County and State Eureka, Nevada
7. Planning Unit/Resource Area Shoshone-Eureka Resource Area
8. Land Status BLM
9. Legal Description T. 23 N., R. 50 E., E $\frac{1}{2}$ Section 7, W $\frac{1}{2}$ Section 10, 12
10. Relationship to Cadastral Markers _____
11. Relationship to Other Permanent Features _____
12. Map Reference U.S.G.S. Roberts Creek Mountain 15' quad
13. Purpose of Survey To determine existing resources
14. Consultations/Existing Data Review No data in area, reference National Register
Volume 45, No. 54 to Volume 54, No. 144
15. Vegetation Zones Types: mountain big sagebrush, lupine, Idaho fescue,
mountain home, needle and thread

(Continued on reverse)

NV 8100-3 (Dec. 1980)

16. Soils, Topography is situated along perimeter high mountain meadows.

Soils are colluvial and residual gravelly, sandy, and silty loams.

17. Nearest Water 1/2 mile

18. Field Techniques Survey consisted of 5 lines on 50-foot spacing for anticipated length of project are (about 300 feet).

19. Findings No artifacts observed

20. National Register Recommendations

21. Summary and Avoidance/Mitigation Recommendations None

Note: "The techniques used in this survey were such that most cultural resources existing in the project area visible to surface examination should have been found. If, however, cultural resources are subsequently discovered that could be adversely affected by project-related activities, the latter should immediately cease and the Battle Mountain District Manager should be immediately informed."

22. Project Area/Length of Line 300 feet

Area Surveyed: 1.5 acres

Transect Interval/No./Type linear: 5 lines on 50-foot spacing about 300 feet in length. Total area 200' x 300'.

23. Time Expenditure

Field (including travel): 6 hrs.

Office: 0.5 hrs.

Total: 6.5 hrs.

24. Submitted by: Rich L. Gurnea : Date: 9/8/86

Title: Geologist

Reviewed by: W. M. G. D. : Date: 9/11/86
(District or Area Archeologist)

25. Approved by: : Date:

DEGREE OF CONTRAST		FEATURES												2. Does project design meet visual resource management objectives? <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No (Explain on reverse side)
		LAND/WATER BODY				VEGETATION				STRUCTURES				
		(1)				(2)				(3)				
		3	2	1	0	3	2	1	0	3	2	1	0	3. Additional mitigating measures recommended <input type="checkbox"/> Yes <input type="checkbox"/> No (Explain on reverse side)
		Strong	Moderate	Weak	None	Strong	Moderate	Weak	None	Strong	Moderate	Weak	None	
ELEMENTS	Form	4			X				X				X	Evaluator's Names <i>Richard B. Young</i> Date <i>9/6/86</i>
	Line	3			X			X				X		
	Color	2			X			X				X		
	Texture	1			X			X				X		



United States Department of the Interior

BUREAU OF LAND MANAGEMENT
WASHINGTON, D.C. 20240

IN REPLY REFER TO:

AUG 19 1974

ASARCO Incorporated

NOV 14 1986

SW Exploration

Mr. Jerry L. Haggard
Evans, Kitchel and Jenckes, P.C.
363 North First Avenue
Phoenix, Arizona 85003

Dear Mr. Haggard:

Your letters, of May 15 and May 30, 1974, to Director Berklund were forwarded to the Bureau of Land Management's Division of Recreation.

As you noted in your May 30 letter, off-road vehicles used for mineral exploration are not exempted from restriction. Off-road vehicles are only restricted on national resource lands which are designated as "closed" or "restricted." Areas are designated as restricted because they support uses or contain resource values which are judged to be incompatible with ORV use. Presently, the Bureau of Land Management lands generally are open to ORV use.

You should note that, even on closed lands, mineral exploration with off-road vehicles is permitted with certain stipulations. These stipulations are indicated on the mineral exploration permit issued by the District Manager in charge of the national resource lands where the exploration is to be carried out. Without these stipulations and permits our ORV regulations become unenforceable since everyone has the potential to become an instant "weekend mineral explorer" on restricted lands. Given these provisions we do not believe that exploration will be seriously restricted.

Notices for public meetings are published by the District Offices and released to local news media. We feel it is the responsibility of an organization doing mineral exploration in an area to keep abreast of local events and act accordingly. The Bureau provides ample notice and opportunity for local comment before actions are taken.

Lists of land closures will eventually be published in either local newspapers or the Federal Register or both. In addition, the Bureau of Outdoor Recreation is committed to the publication of regional maps of the closed areas. Since many lands are still being evaluated, however, these actions will occur over a period of time in the future.

The time for comment is during the public hearing phase of the action. Once the lands are designated the time for comments from user groups has passed. Please note this relation to the last line of your May 30 letter.

In relation to your May 15 letter, please realize that the best places to obtain notices of hearings or schedules are at the District Offices or through the local news media. Due to the number of such hearings we have no comprehensive schedules in this office. Management plans for areas with "closed" or "restricted" ORV designations can be obtained from State and District Offices. This office keeps no comprehensive file of such plans. Those few areas which possess resource values entitling them to primitive area designation will be published, along with management plans, in the Federal Register.

Sincerely yours,

/s/ Wayne Boden

Acting

Chief, Division of Recreation

May 13, 1974

Mr. W. L. Kurtz
Manager of Exploration
Southwestern Exploration Division
American Smelting & Refining Co.
P. O. Box 5747
Tucson, Arizona 85703

Dear Bill:

In your May 8 letter you inquired about the off-road vehicle regulations recently promulgated by the Bureau of Land Management. You asked whether the Interior Department can legally deny access by off-road vehicles to a valid existing mining claim.

We believe the Department of the Interior presently has no authority to close or restrict any area of public lands to vehicles being used for mineral exploration, development or mining under the Mining Laws, unless the area is withdrawn from mineral entry under the Secretary's withdrawal power. See, United States v. 9,947.71 Acres of Land, 220 F. Supp. 328 (D. Nev. 1963); Rights of Mining Claimants to Access Over Public Lands to Their Claims, 66 I.D. 361 (1959); Alfred E. Koenig, 4 IBLA 19 (1917). A copy of the later two cited decisions are enclosed. Even the Secretary's withdrawal power with respect to metalliferous minerals is subject to question. No qualified person can be restricted from the use of vehicles for mineral exploration on B.L.M. lands under the Mining Laws whether or not that person holds valid mining claims. Of course, if there is a restriction or prohibition of access to valid mining claims, there would be a property right involved in addition to the statutory right to explore.

The definition of "off-road vehicles" in Section 6290.0-5 of the regulations is broad enough to apply to any motorized vehicle. Although it is doubtful that the definition is intended to apply to helicopters, the definition is vague in this respect.

MEMORANDUM FOR MR. W. L. KURTZ

May 13, 1974

Page Two

One of the difficulties created by these regulations is that it will become necessary to review the "multiple use" plans being proposed and implemented by the local B.L.M. district offices, and to seek an exception for Mining Law vehicular exploration in each area proposed to be restricted or closed. Heretofore, these multiple use plans did not affect Mining Law activities. Another problem will be in determining the existence and boundaries of closed or restricted areas. These areas will be shown as open to mineral entry on the official land records maintained in each state B.L.M. office, and it will only be in the local district B.L.M. offices that these areas can be identified. Finally, any notice to the B.L.M. or application for a permit prior to using vehicles to locate mining claims in a closed or restricted area will create serious security problems.

Whether the mining industry will acquiesce in or challenge these regulations in particular instances, is, of course, a matter of policy. However, as stated above, we believe the law is quite clear that the Interior Department has no present authority to enforce the regulations against Mining Law activities.

Sincerely,

Jerry L. Haggard
For EVANS, KITCHEL & JENCKE, P.C.

JLH:mo
Enclosures

August 26, 1974

Mr. W. L. Kurtz
Manager of Exploration
Southwestern Exploration Division
American Smelting & Refining Co.
P. O. Box 5747
Tucson, Arizona 85703

Dear Mill:

Enclosed is a copy of a letter dated August 19, 1974 from the Bureau of Land Management concerning the B.L.M. off-road vehicle regulations.

The major point worth noting in this letter is that mineral exploration with off-road vehicles will be permitted even on closed lands, although with certain stipulations. The regulations state that "the authorized officer may allow . . ." the use of off-road vehicles under a special use permit. Therefore, if any of the local B.L.M. officials take the regulations as granting discretionary authority to allow or prohibit mineral exploration in closed areas, this statement from the Washington office may be helpful in convincing them that the use of off-road vehicles for mineral exploration in closed areas is not a matter of discretion. We suggest that you contact us if any of the local B.L.M. officers propose to apply stipulations which would unreasonably interfere with or delay an exploration activity.

It is interesting to note the B.L.M.'s explanation for not providing a blanket exemption in the regulations for mineral exploration off-road vehicles. They are probably correct in that such an exemption would create a new class of instant weekend prospectors against whom the regulations would be unenforceable.

Sincerely,

Jerry L. Haggard
For EVANS, KITCHEL & JENCKES, P.C.

JLH:mo
Enclosure

ASARCO Incorporated
NOV 14 1986
SW Exploration.

QUESTIONS AND ANSWERS ON EXECUTIVE ORDER 11644
AND PROPOSED REGULATIONS TO CONTROL
OFF-ROAD VEHICLES (ORV) USE ON THE PUBLIC LANDS

1. Q. Under what authority are regulations being issued to control off-road vehicle use on the Public Lands?
 - A. Executive Order 11644 - "Use of Off-Road Vehicles on the Public Lands", signed by the President, February 8, 1972, and authority of the Secretary of the Interior to issue regulations regarding use of public lands (43 USC 1201).
2. Q. What is the purpose of the Executive Order?
 - A. The purpose is to establish policies and provide for procedures that will ensure that the use of off-road vehicles on public lands will be controlled and directed so as to protect the resources of those lands, to promote the safety of all users of those lands, and to minimize conflicts among the various users of those lands.
3. Q. What does the Executive Order require?
 - A. That each agency head shall develop and issue regulations and administrative instructions, to provide for administrative designation of the specific areas and trails on public lands on which the use of off-road vehicles may be permitted, and areas in which the use of off-road vehicles may not be permitted, and set a date by which designation of all public lands shall be completed.

Agencies are also required to develop and issue regulations prescribing operating conditions for off-road vehicles within one year from the date of the Executive Order.
4. Q. When will areas be designated?
 - A. Immediately upon approval and final publication in the Federal Register, all lands administered by BLM will be either designated as open, closed, or restricted. These designations will be amended through decisions made through the operation of the Bureau Planning System.
5. Q. Why are Off-Road Vehicle Regulations needed?
 - A. The widespread and rapidly increasing use of such vehicles on the public lands (which frequently conflicts with wise land and resource management practices, environmental values, and other types of recreational activity) has demonstrated the need for unified Federal policy toward the use of such vehicles on the public lands.

6. Q. What is meant by the "Public Lands" under Executive Order 11644?
- A. "Public Lands" means: (1) all lands under the custody and control of the Secretary of the Interior and the Secretary of Agriculture, except Indian lands, (2) lands under the custody and control of the Tennessee Valley Authority that are situated in western Kentucky and Tennessee and are designated as "Land Between the Lakes," and (3) lands under the custody and control of the Secretary of Defense.
7. Q. Will there be one set of regulations that will apply to BLM, Forest Service, National Park Service, and other Federal Agencies?
- A. No, because each agency has different management objectives as directed by Congressional mandate. ORV use regulations being developed by BLM will apply only to that portion of the lands being administered by this Bureau. However, all regulations governing ORV use on Federal lands will be coordinated to the extent possible to provide for a unified Federal Policy for the control of this use.
8. Q. What is meant by the term "Off-Road Vehicle"?
- A. In the regulations being developed by BLM an "off-road vehicle" means any vehicle (including the standard automobile) designed for, or capable of, travel on or immediately over land, water, sand, snow, ice, marsh, swampland, or other natural terrain. It includes, but is not limited to: four-wheel drive or low-pressure-tire vehicles, motorcycles, and related two-wheel vehicles, snowmobiles, amphibious machines, ground-effect or air-cushion vehicles, recreation vehicle campers, and any other means of transportation deriving motive power from any source other than muscle.
9. Q. Are there any exceptions to this definition?
- A. Yes, the definition excludes: (1) any registered motorboat and sailboat; (2) any emergency vehicle, including military, fire emergency, or law enforcement vehicle, (3) any vehicle whose use is expressly authorized by the authorized officer under a permit, lease, license, contract, or written agreement, and (4) horse-drawn wagons.
10. Q. What kind of designations will BLM be making on its lands under the regulations?
- A. All BLM lands will be designated under one of the following categories: (a) open use areas with few restrictions (b) closed areas, and (c) restricted areas.

11. Q. How soon will all BLM lands be designated.
- A. Immediately upon adoption of regulations. Decisions on amending designations will be determined through the established Bureau Multiple-Use Planning System with public participation in the planning process.
12. Q. Are all vehicle users subject to the same restrictions?
- A. No, at this time vehicles used for mining or prospecting purposes are excluded from certain effects of the regulations. (See 6291.1(c)).
13. Q. Under what circumstances may the authorized officer require a permit for off-road vehicle use on land administered by BLM, now called the National Resource Lands?
- A. A permit will be required for any organized off-road vehicle event where more than 25 vehicles compete on a defined course or area.
14. Q. Where can I get a permit for authorized ORV use on the National Resources Lands?
- A. From the local BLM District Office.
15. Q. Will any ORV use be allowed on a closed area?
- A. In emergency situations, such as wild fire, public health and/or safety situations, and mining and geophysical exploration vehicles.
16. Q. If I want to enter a closed area, may I do this on foot or horseback?
- A. Yes, restrictions apply only to ORV.
17. Q. How do I know when I am on National Resource Lands?
- A. Secure maps and designation orders from local BLM District Office and check for signs and posters on the land.
18. Q. In an Open Use Area, does a permit entitle the holder to use all lands within the designated area, irrespective of land ownership?
- A. No. The permit entitles the holder to use only the lands administered by BLM.
19. Q. Who will determine where ORV race courses will be located on the National Resource Lands?
- A. A local BLM official in cooperation with ORV user groups.

20. Q. Will designations ever change?

A. ORV use designations will be monitored and reviewed on the ground by field people of the Bureau and designations may be amended or rescinded by the authorized officer when he deems it advisable to meet the policies and objectives of the regulations. This will ordinarily be done through the Bureau Planning System.

21. Q. As an ORV operator, is it my responsibility to become aware of ORV restrictions on any specific area I wish to use?

A. Yes. Copies of maps and closure restrictions will be available to the public in the office of the appropriate BLM District Office.

22. Q. Will ORV user groups be involved in the selection and redesignation of open use areas, restricted areas, and closed areas?

A. Yes, the Bureau will consult with user groups, Federal, State, county and local agencies, landowners, and other interested parties in this process.

23. Q. Will these regulations cover such matters as vehicle registration, drivers' licenses, lights, mufflers, brakes, speed limits, etc.?

A. Yes, operating conditions are covered in these regulations.

24. Q. Where can I get copies of these regulations or designation orders?

A. At the local BLM District Office.

25. Q. How will the public know what areas are open, restricted, or closed to ORV use?

A. Copies of designation orders and maps will be available at the local BLM District Offices, and appropriate signs will be placed on the National Resource Lands.

26. Q. Will fees now be required for ORV use on the National Resource Lands?

A. Yes, fees are charged for organized off-road vehicle events where more than 25 vehicles compete on a defined course or area.

27. Q. How and where do I make my views known on these proposed regulations?

A. Your nearest BLM Office or to the Director (210) Bureau of Land Management, Washington, D.C. 20240.

RECEIVED
FEB 21 1990
ASARCO GBED

PRECIOUS METALS WITH A VOLCANOGENIC BASE METAL DEPOSIT:
THE UNITED VERDE EXTENSION MINE,
JEROME, ARIZONA

by
Don C. White, Geologist, Prescott, AZ
Robert W. Hodder, Univ. Western Ontario, London, Ont.

Presented at the 94th Annual
Northwest Mining Association Convention
Spokane, Washington
November 30, 1988

PRECIOUS METALS WITH A VOLCANOGENIC BASE METAL DEPOSIT:
THE UNITED VERDE EXTENSION MINE,
JEROME, ARIZONA

by Don C. White and Robert W. Hodder
A paper presented at the 1988 N.W.M.C.

ABSTRACT

From 1915 to 1938 the UVX produced 3.9 million tons of 10.2% Cu, 0.04 oz/t Au, and 1.7 oz/t Ag. This production came from three distinct types of ore bodies: i) About 3.0 million tons averaging 12% Cu, .03 oz/t Au, and 1.2 oz/t Ag. This occurred in the main orebody and a couple satellitic bodies, each massive chalcocite/cuprite grading downward into chalcopyrite/pyrite and ultimately near barren pyrite. The main orebody occurs above a quartz eye rhyolite traversed by a stockwork of chalcopyrite veinlets flanked by dense black chlorite. The copper mineralization is overlain by chert, volcaniclastic rocks, and basalt flows. The nature of this base metal occurrence is the principal evidence for a volcanogenic origin. ii) 850,000 tons averaging 6% Cu as chalcocite, malachite and azurite, 0.06 oz/t Au and 3.5 oz/t Ag from lens-shaped breccia zones which averaged 55% silica, were very iron oxide rich and appear to be silicified volcanic rocks off the margin of the main chalcocite orebody. iii) 35,000 tons of fine grained, brecciated and iron-oxide bearing material which averaged 90% silica, 0.40 oz/t Au and 2.0 oz/t Ag. This material is also peripheral to the main orebody and adjacent to top and bottom margins of a diorite sill which intrudes the volcaniclastic succession overlying and flanking the chalcocite body. The diorite has a core of chlorite, epidote and calcite pseudomorphing primary minerals, a middle zone which is essentially an argillic assemblage and an edge that is extremely siliceous and which fades into a siliceous hornfelsic-textured equivalent of the hosting volcaniclastic rocks.

The interpretation is that the chalcocite body is a supergene enriched pyritic lense of syngenetic origin above a focused discharge site for hydrothermal fluids, probably sea water convected by the heat of a rhyolite dome. The siliceous gold ore lenses at the margin of the diorite sill are viewed as primary gold concentration in chert off the edge of the rhyolite dome, locally reworked, silicified, and reconstituted into higher grade pods by alteration of the diorite sill at its time of emplacement. This alteration was essentially an exchange of water into the sill and silica into the possibly still wet volcaniclastic rocks. A third reconstitution and upgrading took place after lithification, uplift, fracturing along linear faults and downward percolation of ground water, which redistributed silica, copper, iron, and precious metals into the now most auriferous zones adjacent to the diorite sill but notably within 300 feet of the Precambrian-Paleozoic unconformity. The silica-copper ore bodies are interpreted as mainly supergene concentrations of quartz and secondary copper minerals in broken volcanic rocks adjacent to the steep regional Verde Fault. This copper and appreciable precious metal was carried downhill from the major United Verde orebody which is uphill and across the regional fault from the United Verde Extension. The supergene process is still active and can be observed in the stream course which bisects both deposits and the fault.

INTRODUCTION

Copper was the principal product through the first half of this century at Jerome in Yavapai County, central Arizona. This came from two large and several small massive sulfide bodies stratabound within steeply dipping Proterozoic volcanic rocks successively overlain by flat lying Paleozoic sandstone and limestone and Tertiary conglomerate and basalt (Anderson and Creasy, 1958). The first found, and largest of these deposits was the United Verde which outcropped and produced 33 million short tons at 4.8% Cu, .043 oz/t Au and 1.5 oz/t Ag from massive and stringer chalcopryite in the footwall of a pyritic lense perched upon a chlorite pipe penetrating a rhyolite footwall and overlain by chert, tuffs, and basalt (figure 1 and table 1). The second largest orebody was the United Verde Extension (UVX) which did not outcrop but was found by underground exploration on the downthrown side of the Verde Fault which bisects the area. The United Verde Extension produced 3.9 million short tons averaging 10.2% Cu, 0.039 oz/t Au, and 1.7 oz/t Ag, mostly from a lense of chalcocite above a chalcopryite stringer zone within rhyolite and overlain by chert and tuff. Initially these massive sulfide bodies were interpreted as sulfide replacement of schistose rock and the United Verde Extension was believe to be the downfaulted, supergene enriched, top of the United Verde. Subsequently Paul Handverger's and Paul Lindberg's (1974) mapping convinced most that the two ore bodies are independent, each above their own hydrothermal roots which flair out upon a common exhalative stratigraphic horizon now folded into the Jerome Anticline and separated by over 2,000 feet of normal displacement on the Verde Fault (figure 2).

In 1980, Paul Handeverger, vice-president of Verde Exploration, Ltd., had the presence of mind to assay for gold in ferruginous cherty specimens from the company's classic rock collection taken from mine workings inaccessible since the 1930's. These rocks were originally mapped as gossan above the supergene copper deposit (figure 2). It was Handverger's contention that this might be auriferous chert peripheral to a volcanogenic base metal massive sulfide deposit and an attractive target of gold-bearing silica flux rock much in demand by Arizona's copper smelters. A. F. Budge (Mining) Limited has drilled this target from rehabilitated mine workings (figure 3) concurrently with compilation of past production records. This work has defined three ore types on the basis of metals, gangue minerals, and location, and supports a reinterpretation of distribution of precious metals at the United Verde Extension.

CHALCOCITE-CUPRITE ORE

The main ore body which sustained production at the UVX was an equi-dimensional lense of massive chalcocite and cuprite of approximately 3 million tons at 12% Cu, 0.03 oz/t Au and 1.2 oz/t Ag, which extended from 400 to 800 feet below the Precambrian-Paleozoic unconformity to diminishing amount of chalcopryite and pyrite in stringers within chloritic schist persisting downward an additional 250 feet. It has a footwall of rhyolite against the Verde Fault and a hanging wall of chert and tuffs.

COPPER-SILICA ORE

Copper-silica ore was mined from more than 20 separate bodies aggregating about 850,000 tons of 6% Cu, 0.06 oz/t Au, 3.5 oz/t Ag, plus 55% SiO₂ and 12% Fe. Gold abundance was extremely variable from stope to stope and body to body over a range of 0.02 oz/t to 1 oz/t (tables 2 and 3). These ore bodies are between 100 and 400 feet below the Precambrian-Paleozoic unconformity in immediate hanging wall strands of the Verde Fault (figure 4). Malachite, azurite, chalcocite, and minor cuprite and native copper occur with up to 25% hematite and goethite along fractures in shattered, massive, fine grained quartz. The hematite varies from blood red to brown in color and earthy and porous to massive and flinty. Some hematite is specular.

GOLD-ONLY ORE

Gold-only ore was discovered in the 1920's when an exploration cross-cut intersected a fine grained, gritty quartz interval which "flowed like sand" and contained more than 1 oz/t Au. This material was more than 90% SiO₂ and virtually devoid of alumina and alkalis. It was mined for flux and shipped direct to the smelter at the rate of one car of gold-only ore to three cars of massive chalcocite. Most of the gold-only ore came from one stope, the Gold Stope (figures 3, 4, and 5) of 35,000 tons averaging 0.4 oz/t Au and 2.0 oz/t Ag with less than 1000 ppm combined base metals but with appreciable As, Bi, Hg, Mo, Sb, Se, Sn, and Te. Except for Sn as cassiterite, none of these trace metals has been identified in mineral species. Gold occurs in micron-size grains of native metal and electrum.

The Gold Stope, and additional gold-only ore bodies found by recent exploration, are farther into the siliceous hanging wall of the Verde Fault and stratigraphically above copper-silica ore. They are in the first 300 vertical feet below the Precambrian-Paleozoic unconformity, and within wrinkles on foot and hanging wall of a diorite sill which is roughly conformable to the Verde Fault and to hanging wall tuffs and cherts. The ore bodies are shattered lenses with several generations of hairline to millimeter thick fractures healed by quartz and yellow to brown goethite and hematite which contain in some instances discordant pipe-like zones of matrix-supported breccia in which clasts are inches to several feet in diameter of finely fractured, equigranular, fine grained quartz. Clasts are angular to round and both clasts and matrix are traversed by nearly horizontal liesegang bands of variously colored iron oxides. Fractures and bands fade outward from the hanging wall of the Gold Stope into doubly graded chert breccias. The footwall of the Gold Stope grades into a massive siliceous hematite-rich rock and progressively into a beige delicately banded to massive and siliceous margin to the diorite sill. This so-called beige-banded silica is the hornfelsed margin which occurs everywhere concentric to the diorite sill.

THE DIORITE SILL

The diorite sill has an average thickness of 250 feet and extends from above the massive chalcocite-cuprite body for 2,000 feet to the northwest beneath the Precambrian-Paleozoic unconformity (figure 3). It has a core with a sub-ophitic texture of chlorite, epidote, and calcite

pseudomorphing plagioclase and hornblende. This propylitic assemblage at the core of the sill grades outward to both hanging and footwall zones dominated by clay minerals. There is abundant hematite and occasional native copper along fractures. The argillic zone grades outward to an intensely silicified and kaolinized margin. Beyond are the earlier volcanics, generally cherts, which are hornfelsed for several feet adjacent to the diorite.

INTERPRETATION

In brief, the United Verde Extension ore body is steeply inclined and from bottom up is veinlets of chalcopyrite and pyrite in black chlorite overlain by a lense of massive chalcocite after pyrite and succeeded upward by extremely siliceous, iron-rich, broken rocks adjacent to the Verde Fault and in hanging and footwall of a diorite sill. This siliceous, iron-rich rock contains copper-silica bodies with 0.06 oz/t Au and 3.5 oz/t Ag and gold-only bodies with an average of 0.17 oz/t Au and 3.8 oz/t Ag which are close to the diorite sill and the unconformity between Precambrian and Paleozoic.

Lindberg's (1974) interpretation of base metal massive sulfide distribution does not consider gold except as a primary trace metal of volcanogenic base metal massive sulfide deposits with some supergene enrichment in the UVX. In his interpretation the siliceous, iron-rich zone is an in situ gossan immediately below the unconformity and immediately above the supergene massive chalcocite-cuprite body.

However, it is our contention that the hypogene and supergene processes must be somewhat more complex to explain the total metal content and its distribution relative to the diorite sill. We interpret the following events: 1) the diorite sill intruded into still hydrous exhalative cherts and cherty tuffs overlying and flanking the primary sulfide deposit of the UVX.

2) during emplacement and cooling the diorite was hydrated by water from the cherts and tuffs to propylitic and argillic mineral assemblages by an exchange of water for silica. The bulk of expelled silica is now the beige-banded siliceous halo to the diorite, and the siliceous, repeatedly fractured cherts and tuffs marginal to the sill.

3) intake of cold water into the sill was diffuse but discharge of warm water bearing iron, gold, and other metallic elements was focused at step-like wrinkles in the sill margins and into coincident disrupted zones within flanking cherts and tuffs. This fluid flow affected the first upgrading of iron and precious metals and other attendant trace elements at epithermal-like sites.

4) with erosion following Tertiary normal movement on the Verde Fault, the United Verde massive sulfide deposit was exposed. Meteoric water running down the fault scarp and into the fault zone progressively enriched the copper deposit of the UVX in place but also selectively leached precious metals, copper, silica, and iron from the United Verde and redeposited them in the Verde Fault zone in the first few hundred feet below the unconformity.

There is no convincing pseudomorphous evidence that the siliceous and iron-rich area was ever sulfide-bearing or particularly metalliferous. In addition, the present course of Bitter Creek is through the United Verde to the UVX and during the rainy season has running water which is milky with silica gel and assayable iron, copper, and gold. This is depositing as ferricrete just down stream from the UVX and as copper oxides on fractures in Tertiary basalt.

CONCLUSIONS

The primary gold content of the base metal massive sulfide deposits at the United Verde and UVX is average for this type of deposit. The elevated gold content at the UVX is by secondary hypogene concentration in peripheral cherts during early mafic sill emplacement in the Precambrian and, by transported supergene enrichment from Tertiary to present.

ACKNOWLEDGEMENTS

The authors thank A. F. Budge (Mining) Ltd., lessee of the UVX, for whom much of the data herein was acquired, for permission to present this paper. Verde Exploration Ltd., the UVX owner, also provided support through access to its historical data on the UVX and by permission to share same.

Two excellent theses at the University of Western Ontario have advanced understanding of the effects of the diorite and the petrology of the silica body. They were done by Steve Harding (1986) and Iain Sloan (1987) respectively.

Other laboratory support is much appreciated from Tom Nash (petrographic study - USGS, Denver), Holly Huyck and Tiebing Lieu (XRD and SEM work, University of Cincinnati, Ohio) and Peter McLéan (petrographic study of the gold-only ores, University of Western Ontario, London, Ontario).

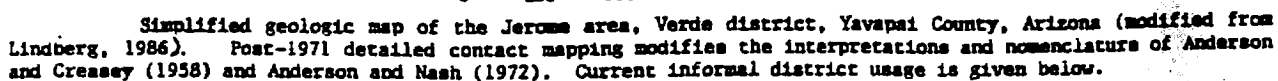
	<u>U.V.</u>	<u>U.V.X.</u>
Production (millions short tons)	33.0	3.9
%Cu	4.8	10.2
oz/t Au	0.043	0.039
oz/t Ag	1.6	1.7

Table 1: Production from the United Verde and United Verde Extension Mines













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PROTEROZOIC ROCKS:

- | | | |
|---|-------|--|
|  | gb | Synvolcanic Intrusive Gabbro Sill |
|  | ggs | Grapevine Gulch Fm: Volcaniclastic Sediments, Tuffs |
|  | usr | Upper Succession Rhyolite/Dacite Domes & Breccias |
|  | ms | United Verde & U.V.X. (Concealed) Massive Sulfides |
|  | bs | Mg-Chlorite Alteration Zone ("Black Schist") |
|  | cf | Cleopatra Formation; Undiff. Rhyodacitic Extrusive |
|  | cqp | Cleopatra Quartz Porphyry Dikes |
|  | ms | Verde Central Massive Sulfide Horizon |
|  | dru | "Upper Deception Rhyolite" with Polygonal Flow (p) |
|  | drude | Dacitic Dome within "Upper Deception Rhyolite" |
|  | sbu | "Upper Shea Basalt"; Includes Minor Rhyolitic Strata |
|  | drl | "Lower Deception Rhyolite" Flows & Breccias |





- | | | |
|---|------|------------------------------|
|  | Qg | Quaternary Alluvium |
|  | Thv | Miocene Hickay Basalt |
|  | Tmrg | Pre-Miocene Conglomerates |
|  | Pz | Paleozoic Sediments: Undiff. |

FIGURE 1 - JEROME AREA GEOLOGY; from Lindberg and Gustin, 1987.

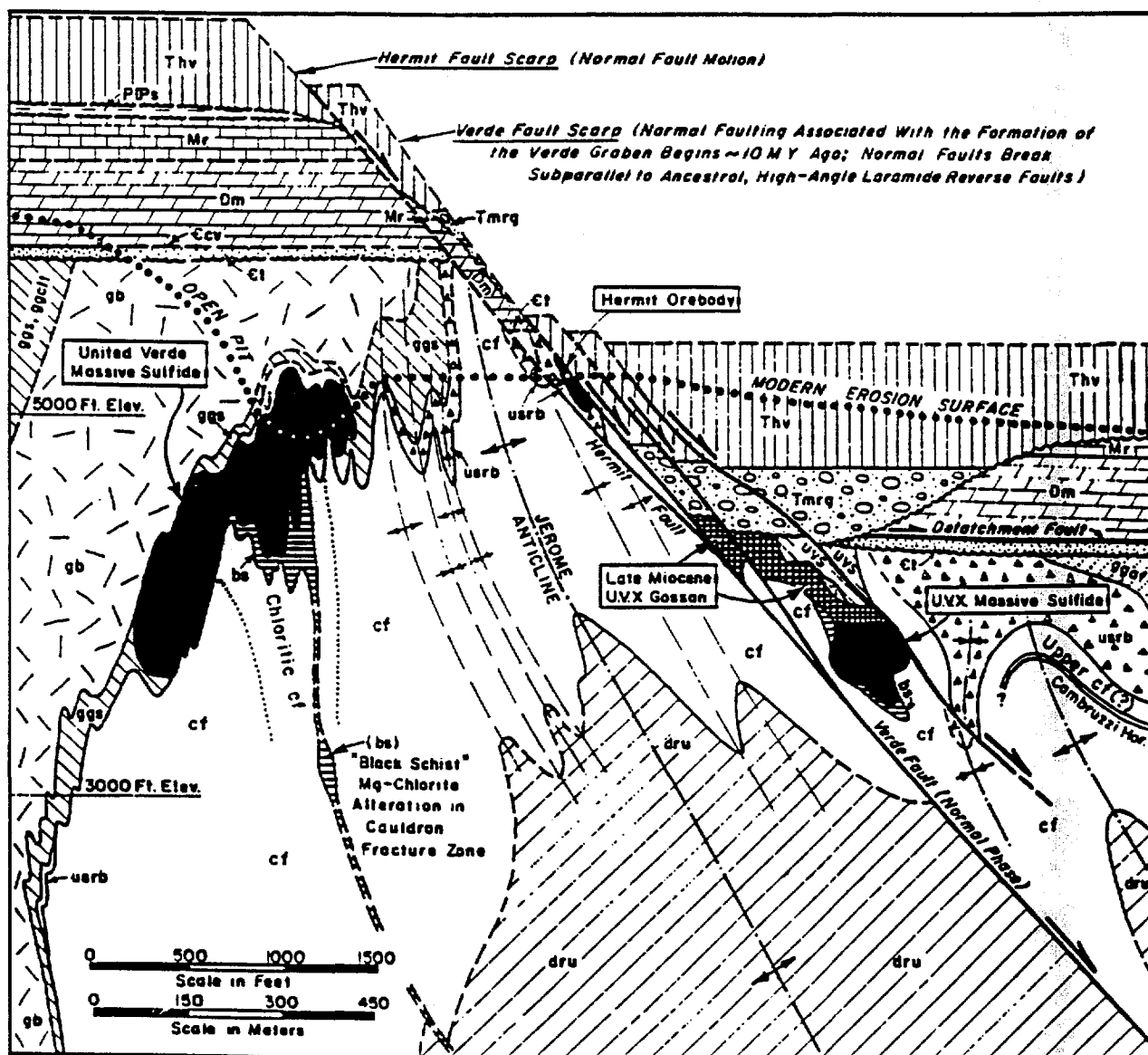


FIGURE 2 - EAST-WEST CROSS SECTION, LOOKING NORTH, THROUGH THE JEROME ANTICLINORIUM; from Lindberg and Gustin, 1987. Geologic notations are given in figure 1. The time is about 10 Ma when normal Verde graben faulting began. Note the UVX "Gossan" which is reinterpreted herein as primary chert, metasomatic silica, and supergene silica. It hosts the "copper-silica" and "gold-only" ores. The "uvs" unit adjacent to the gossan is actually the argillic-altered diorite sill.

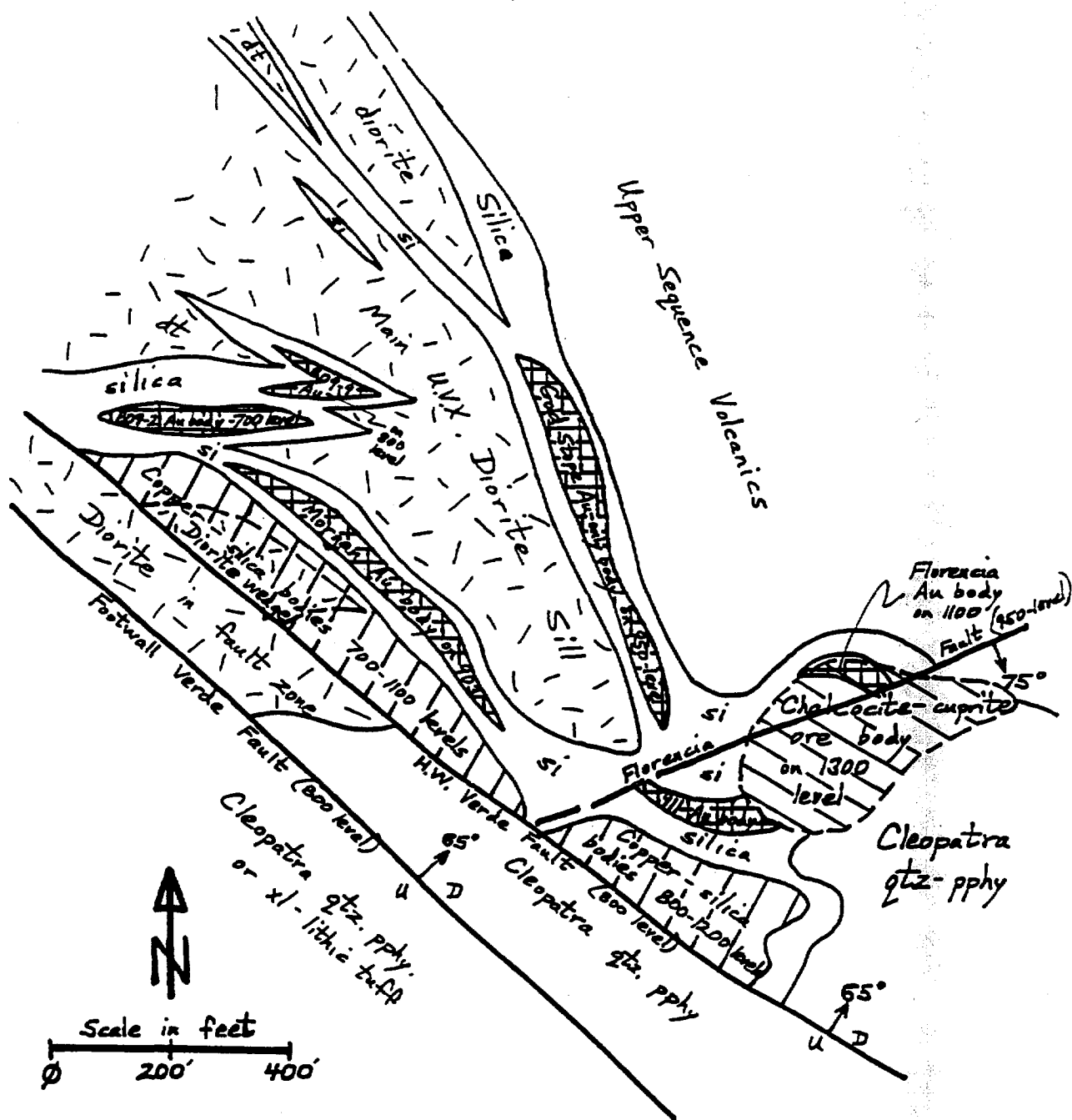


Figure 3 - U.V.X. Composit Plan

Showing three main ore types (chalcocite-cuprite, copper-silica, and gold-only) with respect to major structures, silica, and the diorite sill.

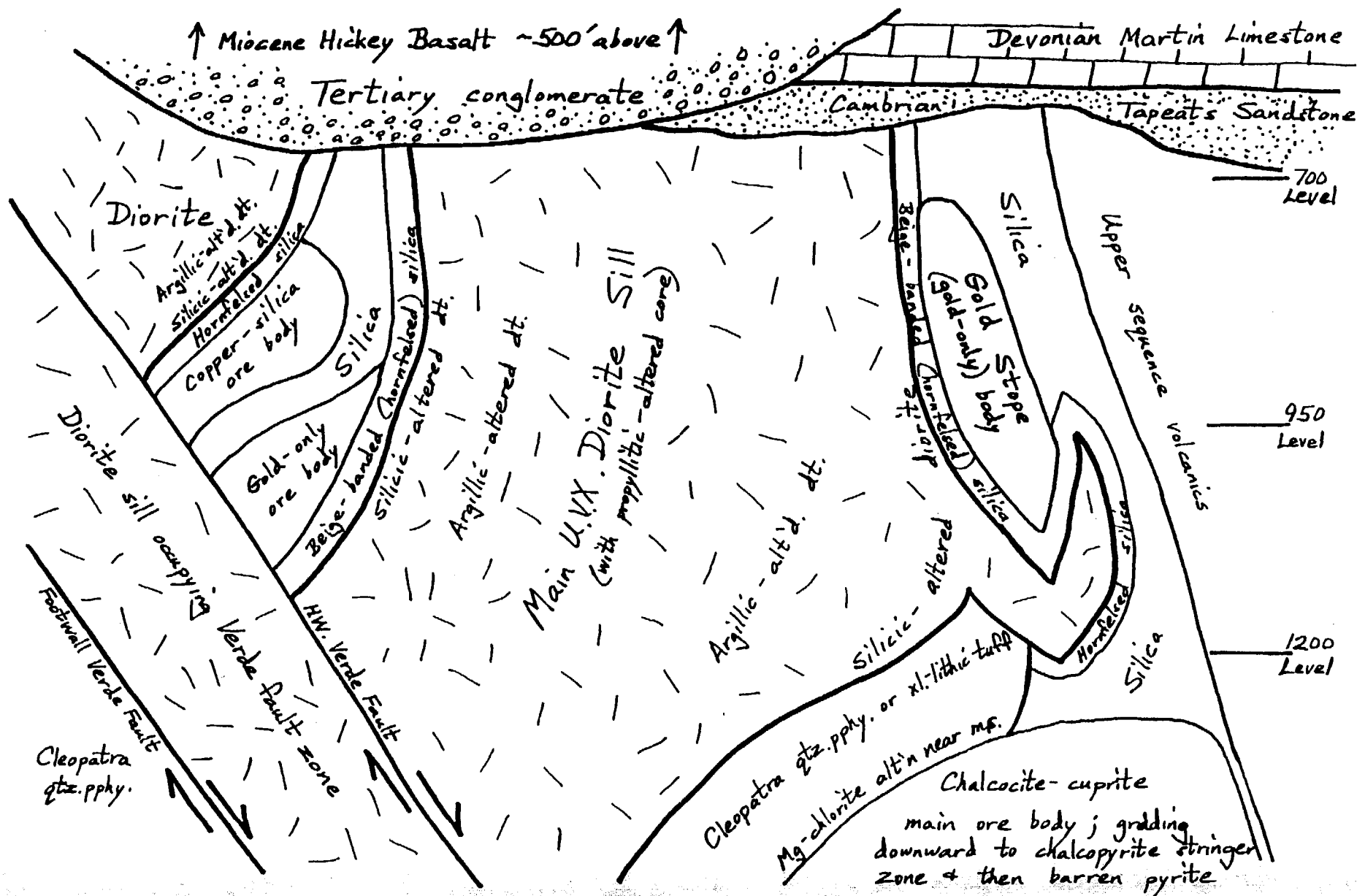


Figure 4 - U.V.X. Schematic X-Sec., looking NW

Showing three ore types with respect to Verde fault, silica bodies, diorite sill, and Precambrian-Paleozoic/Tertiary unconformity.

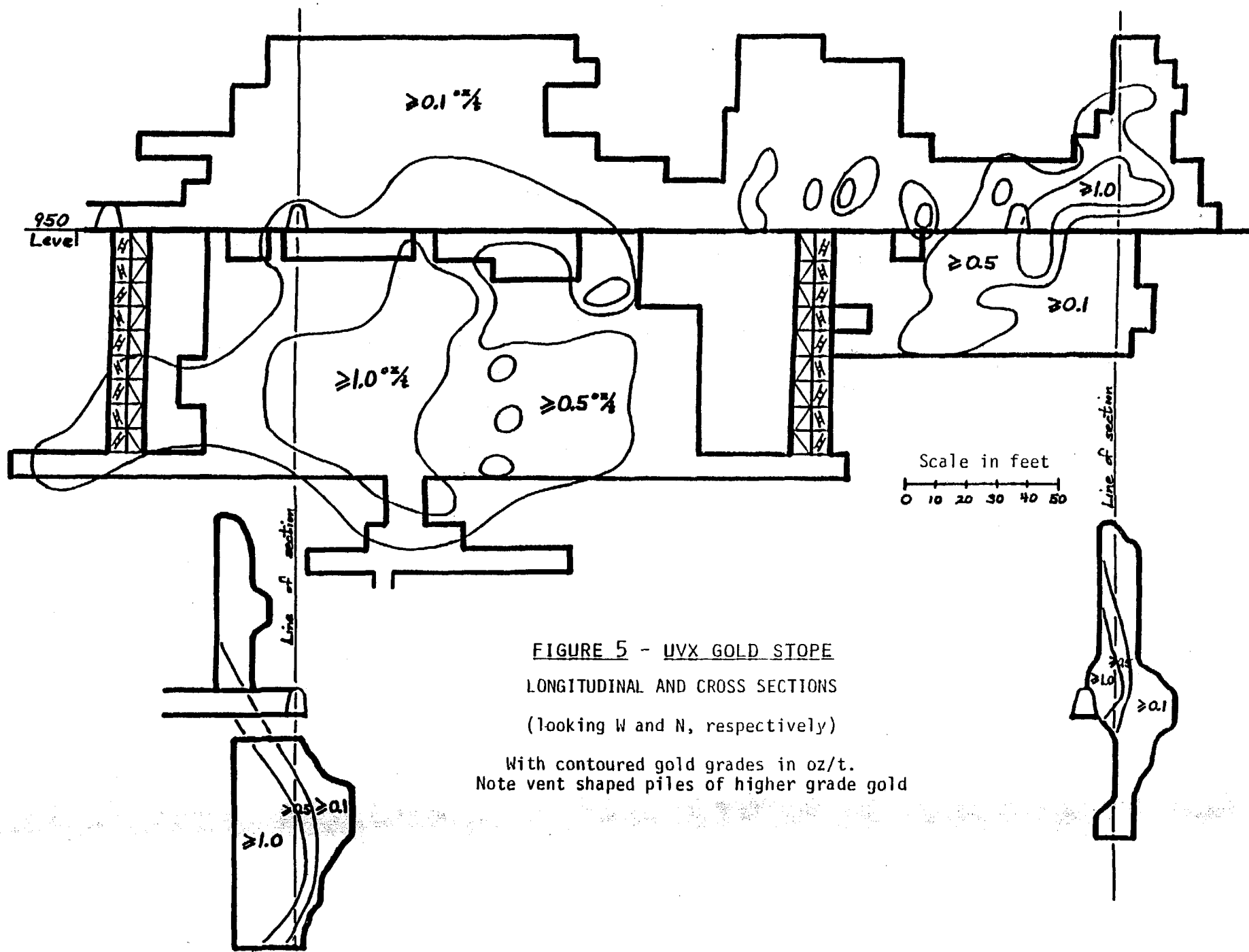


FIGURE 5 - UVX GOLD STOPE

LONGITUDINAL AND CROSS SECTIONS

(looking W and N, respectively)

With contoured gold grades in oz/t.
Note vent shaped piles of higher grade gold

Abundance (relative; no scale) →

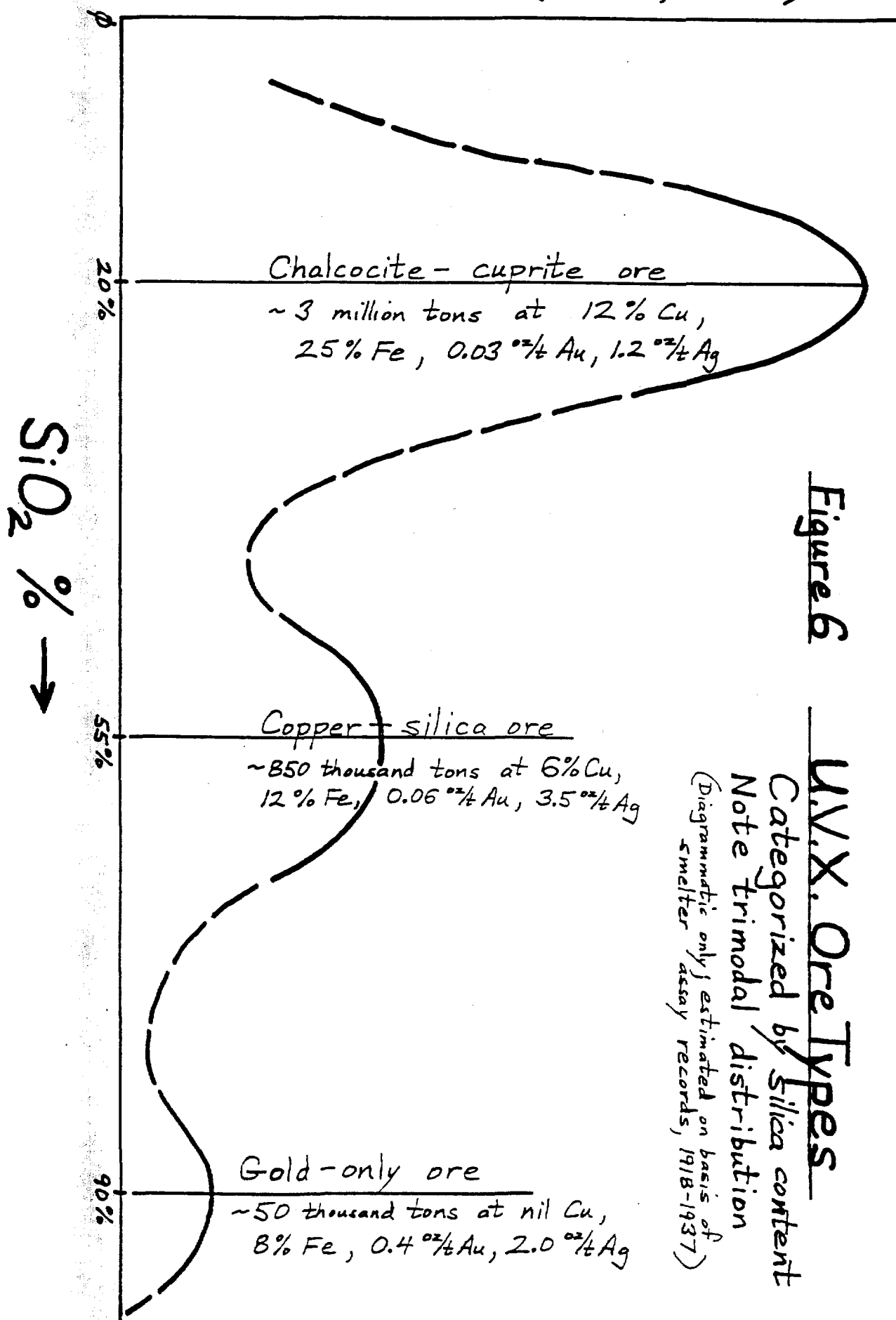


Figure 6

U.V.X. Ore Types

Categorized by Silica content
Note trimodal distribution

(Diagrammatic only; estimated on basis of
smelter assay records, 1918-1937)

Figures 7+8 - Histograms of average copper & gold by ore type for all U.V.X. production.

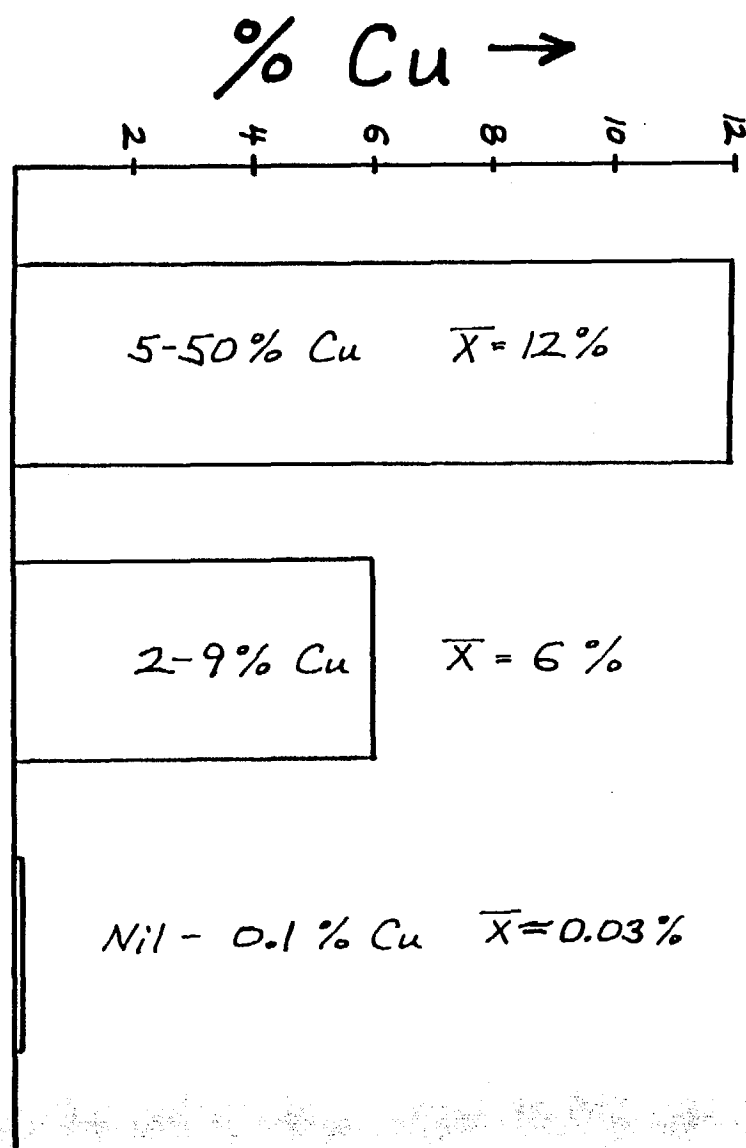
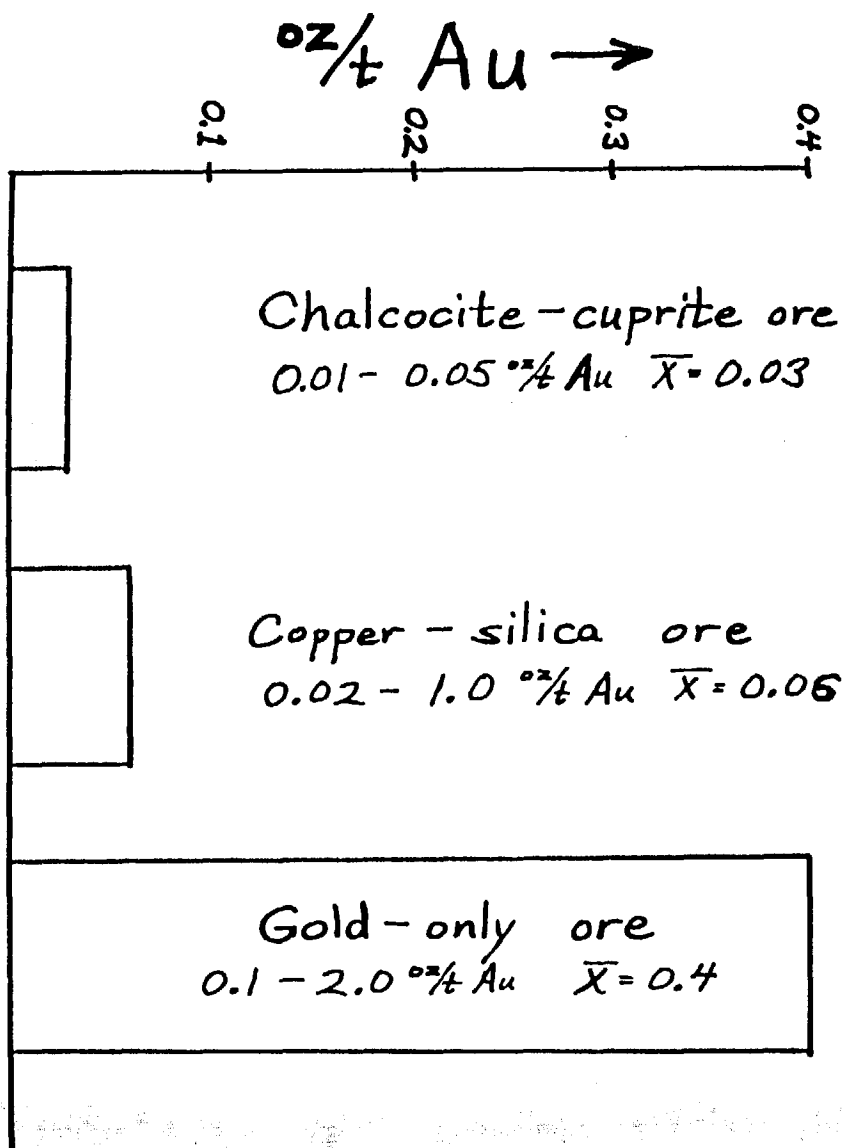


TABLE 2 - ANALYSES OF UNITED VERDE EXTENSION ORE TYPES PRODUCED*

	<u>CHALCOCITE-CUPRITE</u>			<u>COPPER-SILICA</u>			<u>GOLD-ONLY</u>			<u>TOTAL</u>
Tonnage* (short tons)	3,000,000			850,000			50,000			3,900,000
<u>Grades</u>	<u>Min.</u>	<u>Max.</u>	<u>Avg.</u>	<u>Min.</u>	<u>Max.</u>	<u>Avg.</u>	<u>Min.</u>	<u>Max.</u>	<u>Avg.</u>	
%Cu	5	50	12	2	9	6	Nil	0.1	Nil	10.2
%SiO ₂	10	30	20	45	65	55	80	99	90	30
%Fe	20	30	25	4	20	12	1	17	8	22
oz/t Au	.01	.05	.03	.02	1.0	.06	0.1	2.0	0.4	0.04
oz/t Ag	0.5	100.	1.2	2.0	50.	3.5	0.5	10.	2.0	1.7

*Approximate figures, based upon smelter assay data, annual reports, and production records, 1915-1938; new gold reserves not included in chart.

TABLE 3 - CHARACTERISTICS OF UVX METAL CONCENTRATION TYPES

Metal conc. type	<u>CHALCOCITE-CUPRITE</u>	<u>COPPER-SILICA</u>	<u>GOLD-ONLY</u>
Old ore term	Main orebody/1st Class	Silica ore/2nd Class	Gold ore/silica flux
Vertical position	400'-800' beneath Paleozoic unconformity	Top 400' of p6	Top 300' of p6
Horizontal position	Nearly equidimensional lobe at top of massive sulfide pipe	N.W. of main orebody and adjacent to (H.W. of) Verde Fault	N and NW of main orebody on stratigraphic top of and parallel to Cu-silica ore. Spatially related to diorite sill.
Ore minerals	Chalcocite, cuprite, native copper, chalcopyrite	Chalcocite, malachite, azurite	Native gold, electrum
Gangue minerals	Pyrite, hematite, silica	Silica, hematite	Silica, hematite, goethite
Footwall rock/structure	Cleopatra "qtz pphy" or qtz. crystal tuff	Verde Fault	Copper-silica ore or iron rich silica or intrusive (diorite)
Hanging wall rock	Exhalative chert, upper sequence flows, volcanoclastics	Ferruginous silica, "gold-only" silica ore	Intrusive (diorite) and upper sequence flows/volcanoclastics
Footwall alteration	Chloritization, silicification	Silicification	Silicification
Genetic interpretation	Supergene enrichment of chalcopyrite - pyrite volcanogenic massive sulfide deposit. Possibly some primary chalcocite in a fairly oxygenated environment.	Supergene copper from United Verde, deposited in H.W. breccia along the Verde Fault, with some possible precursor Cu-Au-silica exhalite.	Supergene Au & Ag, Fe & SiO ₂ from the U.V., deposited in more distal HW breccias where exhalative Au-silica and silica-Fe fm. had already been locally upgraded by contact metamorphism from the diorite sill.

GEOPHYSICAL OFFICE - EXPLORATION DEPARTMENT
Salt Lake City, Utah

January 6, 1977

FILE MEMO:

CARLIN-TYPE GOLD DEPOSITS
U. S. G. S. VISIT

On the second of December, I visited the U. S. Geological Survey office in Denver, Colorado to discuss techniques for assessing gold occurrences in Nevada. Contact was made with two geophysicists, Charles Zablocki and Donald Peterson, and one geochemist, Howard McCarthy. I was advised that contact should possibly be made with Ralph Erickson, Chester Wrucke and Keith Kettner, at some future date.

Geophysics

In the sedimentary section in eastern Nevada, the resistivity is extremely variable because of carbon contained in various formations. The carbon occurs in both limestone and shale horizons, but occurrence is not consistent within a formation from one location to the next. Laboratory studies conducted by U. S. G. S. personnel determined that the carbon contained in the carbonate and shale section is from a non-organic source. The carbon is too finely dispersed for a positive determination as to whether it is in a crystalline or amorphous form. The distribution of carbon in the limestone and shale is such that it generally exhibits electrical continuity. Formations with as little as three percent carbon by weight have resistivity values close to zero. In contrast, the same formation where no carbon is present have resistivities near 1000 Ω /m. In many areas there seems to be an association between carbon and pyrite. The association is based on visual observation alone. No analytical studies were made to prove or disprove this observation. The relationship of the carbon or pyrite to gold occurrences was unknown to the people with whom I spoke. They did suggest that some chert carried pyrite and in some instances also a trace of gold. Not much work has been done in this area by U. S. G. S. geophysicists and it is possibly an area we could investigate further. Because of the carbon and pyrite content of the limestone and shale in various locations, resistivity and I. P. results are difficult to interpret.

Resistivity soundings have proven valuable in determining thicknesses of volcanic cover. Soundings have been used to a limited extent for determining thickness of alluvium. At present, no known attempt has been made by the U. S. G. S. to use resistivity soundings to determine thickness of a thrust's upper plate. Asarco's past experience using soundings suggest that they could be used to determine upper plate thickness in selected areas. Resistivity soundings could be used in areas where geologic or other geophysical data suggest that the upper plate might be thin.

Electromagnetic techniques have been tried only to a limited extent. Normal V. L. F. is a very poor method in areas which have rough topography. The anomalies are associated with ridges and valleys. A new technique which measures the E field as well as the H field has proven to be less sensitive to topography.

Turam, as well as other large loop or long wire techniques, has not been tried by the U. S. G. S. to any extent in Nevada. Mr. Zablocki did, however, say that slingram techniques using co-axial loop had been tried with some success. This technique suppressed geologic noise and gave a single peak over dikes, conductive faults and fractures.

Gravity has been used to determine pediment extent and depth of fill. The extent of coverage was limited to one or two profiles in each location. Resistivity was also used to aid in pediment depth estimates.

Aeromagnetics was used on a reconnaissance basis. The U. S. Geological Survey worked on the assumption that mineral occurrences in Nevada are associated with intrusives. They assume the entire area contained within the magnetic high is prime ground for mineralization.

Ground magnetics were used to locate dikes and intrusive contacts. The data was generally gathered using a mobile unit mounted on the back of a carryall. These data are used in profile form for general reconnaissance, and for the purpose of locating local structures. The magnetometer was a total field flux-gate unit. Ground profiles were used when airborne data was unavailable. Mr. Zablocki felt low level airborne magnetic profiles were better because they did not contain the near surface noise that ground magnetic profiles contain.

Geochemistry

Geochemistry for gold has mainly utilized rock chip samples. The samples were taken in fractures, box works, jasperoids and altered rocks to check for leakage from buried mineral occurrences. This type of sampling results in geochem anomaly patterns that are erratic in nature. The rock chip samples were not designed to outline mineralization but rather to test for the possibility of mineral occurrence.

Soil geochem samples have yielded poor results and are only marginally indicative of mineralization over known deposits.

Stream sediment geochem has been very disappointing, yielding little or no reliable data in the past. Last year Ken Watts and Henry Almainas looked at the heavy-minerals fraction of stream sediment. Preliminary results obtained from the technique were encouraging enough to warrant further testing. The examination of cobble size float in stream sediments has also shown promise as a reconnaissance geochem technique.

Geochem studies conducted by the U. S. G. S. indicate that there is a peculiar set of elements which occur with gold values in the Basin and Range. The five elements associated are gold, tungsten, mercury, antimony and arsenic. Each of the last four occur in quantities generally between 100 and 1000 ppm when associated with gold. There are, naturally, exceptions to the rule but, in general, the associations are diagnostic for gold occurrences in the Basin and Range. In addition, tellurium has a wide dispersion halo around gold deposits.

Mr. McCarthy feels that most gold is associated with porphyry systems and generally the outermost alteration zone. A few gold occurrences could be associated with vulcanogenetic-type mineralization. However, to date the massive sulfides typical of this type of deposit have not been found. He feels, however, they may still exist in the western facies volcanic environment of Nevada. Mr. McCarthy also suggested that gold mineralization is generally associated with silicification of sediments.

The following circulars were also suggested for future study: 534, 563, 606 and 623. The U. S. G. S. people did not know of any general geochemical surveys covering the entire area of gold occurrences. In general, the surveys were detailed and local in nature.

Three areas were suggested as possibilities for future exploration. The first is near Battle Mountain and is shown in Circular 595. The second area is near Gold Acres and Tenabo. The third is around Cortez.

JRM:am

J. R MONTGOMERY

CKM

Outline for Suggested
SLX Precious Metal Exploration - 1977

"Good Recon Exploration without flitting from prospect to prospect".

I. Model Conceptualizations

- A. Define what it is we are looking for, how it occurs, and why it is present.
- B. Propose a variety of realistic models which incorporate the above and provide a basis for target area selection.

II. Target Area Selection

A. Geologic Setting Evaluation.

- 1) In light of the proposed models, evaluate available geologic data (maps, reports, articles, etc.) in an effort to select regions with favorable exploration potential for carrying out physical exploration.
- 2) In light of the proposed models, study and evaluate available space imagery in conjunction with the review of geologic data for the purpose of delineating regions with favorable exploration potential.

B. Known Occurrence Considerations.

In the process of evaluating the regional geologic settings for the purpose of target area selection, due consideration should be given to the occurrence within these regions of known economic and/or anomalous concentrations not only of gold and silver but of mercury, arsenic, antimony, etc., also. Consideration such as type of occurrence, size of occurrence, relationships to similar occurrences, host rock type, probable source, etc. seem particularly important.

III. Exploration Within Target Areas

A. Geochemical.

The principal thrust of the reconnaissance level exploration within target areas should be geochemical sampling. Sampling should be designed to:

- 1) Establish the presence of precious metal mineralization within the target areas in places where it was not previously known to occur. To accomplish this stream sediment sampling may be useful, but the sampling of mineralized fractures, zones of alteration (particularly silicification), etc. will likely be the most productive.
- 2) Extend zones of precious metal mineralization outward from known occurrences of this metalization in an effort to

significantly increase the tonnage of certain of these occurrences. Sampling of surrounding country rock and, in some cases, surrounding soils are probably most applicable here.

- 3) Discover new zones of precious metal mineralization in areas where this mineralization is known to occur. Sampling of country rock, soils, and any secondary mineralization should be considered.

B. Geological.

Second only to geochemical sampling in importance during reconnaissance level exploration of the target areas are geological considerations. Geological considerations will be the most important considerations in all detailed work carried out on "favorable zones" delineated within the target areas by the reconnaissance level exploration. During reconnaissance exploration of the target areas every effort should be made to:

- 1) Note rock type(s) at and/or near all sample locations.
- 2) Note orientation of sedimentary units where applicable.
- 3) Locate and note orientation of faults and major fracture patterns.
- 4) Note, locate, and describe all zones of alteration.
- 5) Note, locate, and describe all occurrences of metallic mineralization.
- 6) Locate and describe all important contacts or any unusual contact relationships.

Smaller areas within the larger target areas which are shown to warrant follow-up work should be mapped in detail. Detailed geochemical sampling should be carried out in conjunction with any such detailed geologic studies in an effort to get a more complete picture of the surface distribution of the anomalous metals within the area of interest.

C. Geophysical.

Though the application of geophysics to the exploration for precious metal deposits is as yet a mostly unknown quantity, every effort should be made to make use of any geophysical technique which might aid our exploration efforts. Important input must come from our geophysical division, but possible geophysical applications include:

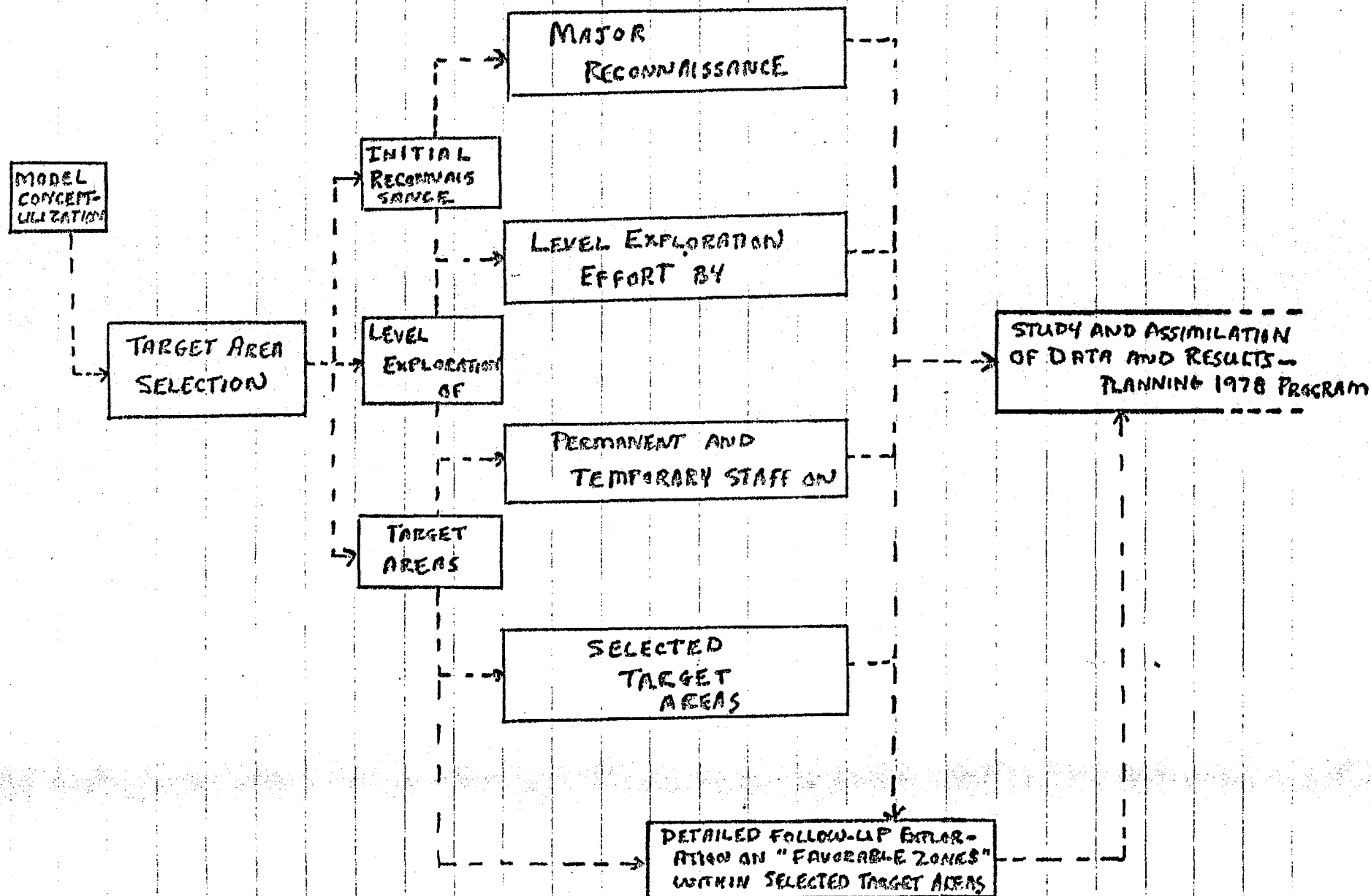
- 1) Acquisition and interpretation of reconnaissance and regional magnetic data to aid in the evaluation and selection of target areas.
- 2) Interpretation of regional gravity data to possibly aid in the evaluation of target areas.
- 3) Acquisition and interpretation of more detailed geophysical data including magnetics, gravity, and I. P. during any detailed investigations on "favorable zones" delineated during reconnaissance exploration of the target areas.

Suggested Timetable for Implementation of
SLX Precious Metal Exploration Program - 1977

- January 4 - Initial staff meeting to formally consider possible format and direction of our 1977 exploration efforts - including precious metal exploration.
- January 4 - Model Conceptualization. I believe this is a critical though
February 2 often times neglected phase of a good exploration program. If we each spend a significant amount of time during this month thinking about and researching what it is we are looking for, how it occurs, and why it occurs, I think we can each come up with an original and realistic model for both Carlin-type and volcanic hosted gold-silver deposits. A day long meeting at the end of this period at which we each present our models and discuss them among ourselves should allow us to agree upon one good working model for each type of deposit.
- February 2 - Working Models Meeting.
- February 2 - Target Area Selection. A significant effort by those who you
April 1 feel can devote a portion of their time to this project should be made in the area of Target Area Selection. A procedure for such selection is suggested on the accompanying outline, though it is open to modification by input from others. Such input is, indeed, sought.
- April 1 - Meeting to review potential target areas (around 12) & establish an order of priority for their exploration.
- April 1 - Detailed planning of field work on the specified target areas,
April 15 mobilization of necessary equipment and gear, decisions regarding summer personnel, etc.
- April 15 - Commence Active Field Exploration.

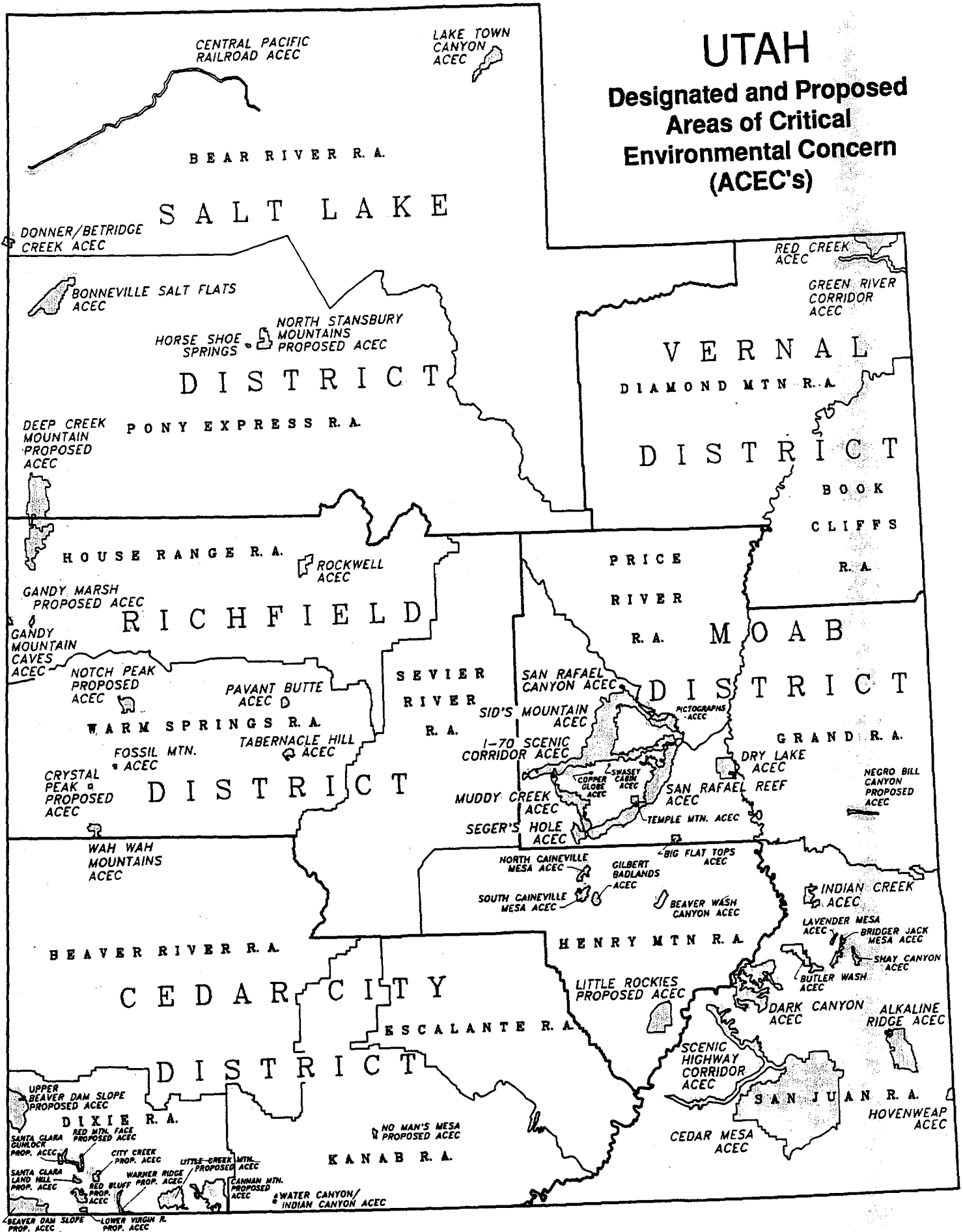
1977 PREVIOUS METAL EXPLORATION FLOW CHART

JAN.	FEB	MAR.	APRIL	MAY	JUNE	JULY	AUG.	SEPT.	OCT.	NOV.	DEC.
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UTAH

Designated and Proposed Areas of Critical Environmental Concern (ACEC's)



Utah ACEC's Designated/*Proposed*

Salt Lake District

Name	Acres	Values
Central Pacific Railroad	250	historic
Donner/Bettridge Creek	1,120	special status fish, riparian
Lake Town Canyon	7,592	municipal watershed, riparian
Bonneville Salt Flats	30,203	geologic feature
Horseshoe Springs	760	biological wetlands, riparian

<i>No. Stansbury Mtn.</i>	10,000	<i>scenic, riparian</i>
<i>Deep Creek Mtns.</i>	28,260	<i>scenic, riparian</i>

Richfield District

North Caineville Mesa	2,000	relic vegetation
South Caineville Mesa	4,100	biological community
Beaver Wash Canyon	4,800	biological/wildlife community
Gilbert Badlands	3,680	geologic feature
Rockwell	9,630	sand dunes
Gandy Mtn. Caves	1,120	geologic feature
Fossil Mountain	1,920	prehistoric life form
Pavant Butte	2,500	inactive volcano
Tabernacle Hill	3,567	unusual volcanic features
Wah Wah Mountain	5,970	biological comm., geologic

<i>Deep Creek Mtns.</i>	30,740	<i>scenic, riparian</i>
<i>Gandy Marsh</i>	2,270	<i>unique biological, riparian</i>
<i>Notch Peak</i>	9,000	<i>scenic, unique geologic</i>
<i>Crystal Peak</i>	640	<i>scenic, unique geologic</i>
<i>Little Rockies NNL</i>	38,700	<i>scenic, unique geologic</i>

Cedar City District

Water/Indian Canyon	260	biological comm., riparian
<i>No Mans Mesa RNA</i>	13,000	<i>relic vegetation</i>
<i>Beaver Dam Slope</i>	26,960	<i>desert tortoise</i>
<i>City Creek</i>	2,595	<i>riparian, desert tortoise</i>
<i>Lower Virgin River</i>	1,460	<i>endang. fish, archaeo.</i>
<i>Warner Ridge/Fort Pearce</i>	3,690	<i>endang. plant, riparian</i>
<i>Red Bluff</i>	6,010	<i>scenic, endang. plant</i>
<i>Santa Clara Land Hill</i>	1,770	<i>riparian, archaeo.</i>

Name	Acres	Values
<i>Canaan Mtn.</i>	31,870	<i>scenic</i>
<i>Red Mtn. Face</i>	5,480	<i>scenic</i>
<i>Little Creek Mtn.</i>	18,455	<i>archaeological</i>
<i>Santa Clara/Gun Lock</i>	1,790	<i>riparian, archaeo.</i>
<i>Upper Beaver Dam Wash</i>	30,360	<i>riparian</i>

Moab District

Shay Canyon	1,770	archaeological, riparian
Alkalie Ridge	35,890	archaeological
Dark Canyon	62,040	bighorn shp, archaeo., ripar.
Indian Creek	13,100	scenic
Butler Wash	13,870	scenic
Cedar Mesa	302,380	archaeo., scenic, riparian
U-95 Scenic Corridor	81,890	scenic
Hovenweep	2,000	archaeological, riparian
Lavender Mesa	640	relic vegetation
Bridger Jack Mesa	5,290	relic vegetation
Big Flat Tops	2,640	relic vegetation
Bowknot Bend	1,830	relic vegetation
Copper Globe	220	mining
Dry Lake Archaeological	16,990	archaeological, geologic
I-70 Scenic Corridor	50,650	scenic
Muddy Creek	22,540	scenic, mining, riparian
Pictographs	40	archaeological
San Rafael Canyon	34,420	scenic
San Rafael Reef	68,720	scenic, relic vegetation
Sid's Mountain	64,870	scenic
Segers Hole	7,120	scenic
Swasey Cabin	220	historic ranching
Temple Mountain		
Historical District	2,580	mining

<i>Negro Bill Canyon ONA</i>	1,375	<i>outstanding natural area</i>
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Vernal District

Green River	17,349	scenic, T&E fish and plants
Red Creek	22,889	erosion

In 1985, only three Areas of Critical Environmental Concern totaling 47,830 acres existed in Utah. Today, six years later, the BLM in Utah is responsible for managing 41 designated ACEC's totalling 911,420 acres. Twenty more areas are proposed for designation with acreage counted at 264,425.

1,175,845 acres !