



CONTACT INFORMATION  
Mining Records Curator  
Arizona Geological Survey  
416 W. Congress St., Suite 100  
Tucson, Arizona 85701  
602-771-1601  
<http://www.azgs.az.gov>  
[inquiries@azgs.az.gov](mailto:inquiries@azgs.az.gov)

The following file is part of the Arimetco, Inc. Mining Collection

#### **ACCESS STATEMENT**

These digitized collections are accessible for purposes of education and research. We have indicated what we know about copyright and rights of privacy, publicity, or trademark. Due to the nature of archival collections, we are not always able to identify this information. We are eager to hear from any rights owners, so that we may obtain accurate information. Upon request, we will remove material from public view while we address a rights issue.

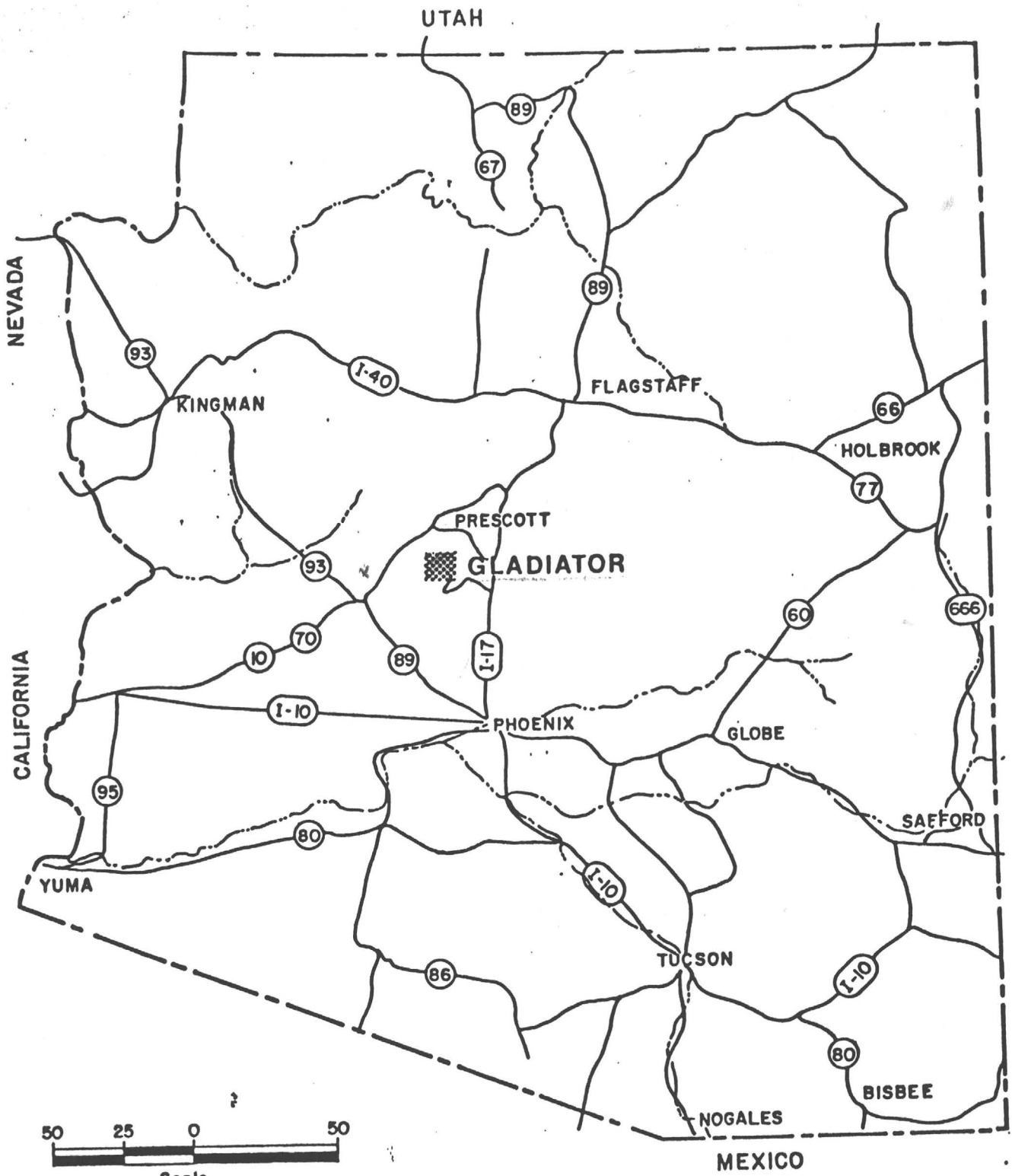
#### **CONSTRAINTS STATEMENT**

The Arizona Geological Survey does not claim to control all rights for all materials in its collection. These rights include, but are not limited to: copyright, privacy rights, and cultural protection rights. The User hereby assumes all responsibility for obtaining any rights to use the material in excess of "fair use."

The Survey makes no intellectual property claims to the products created by individual authors in the manuscript collections, except when the author deeded those rights to the Survey or when those authors were employed by the State of Arizona and created intellectual products as a function of their official duties. The Survey does maintain property rights to the physical and digital representations of the works.

#### **QUALITY STATEMENT**

The Arizona Geological Survey is not responsible for the accuracy of the records, information, or opinions that may be contained in the files. The Survey collects, catalogs, and archives data on mineral properties regardless of its views of the veracity or accuracy of those data.



Nor-Quest Arizona Inc.  
 Gladiator-War Eagle Project

LOCATION MAP  
 ARIZONA

**LEGEND.**

-  River
-  Highway
-  Arizona Boundary

## Gladiator - War Eagle Mine

### Property Review

March 1988

#### Introduction and History

The Gladiator - War Eagle mining property is located in north central Arizona, about 50 miles south of Prescott in the Bradshaw Mountains. The property is owned by Nor-Quest Arizona Inc. and consists of 17 patented and 47 unpatented mining claims situated primarily in the Pine Grove Mining District of Yavapai County, three miles north of the town of Crown King. The area is wooded and of high relief between the elevations of 6 - 7000 feet.

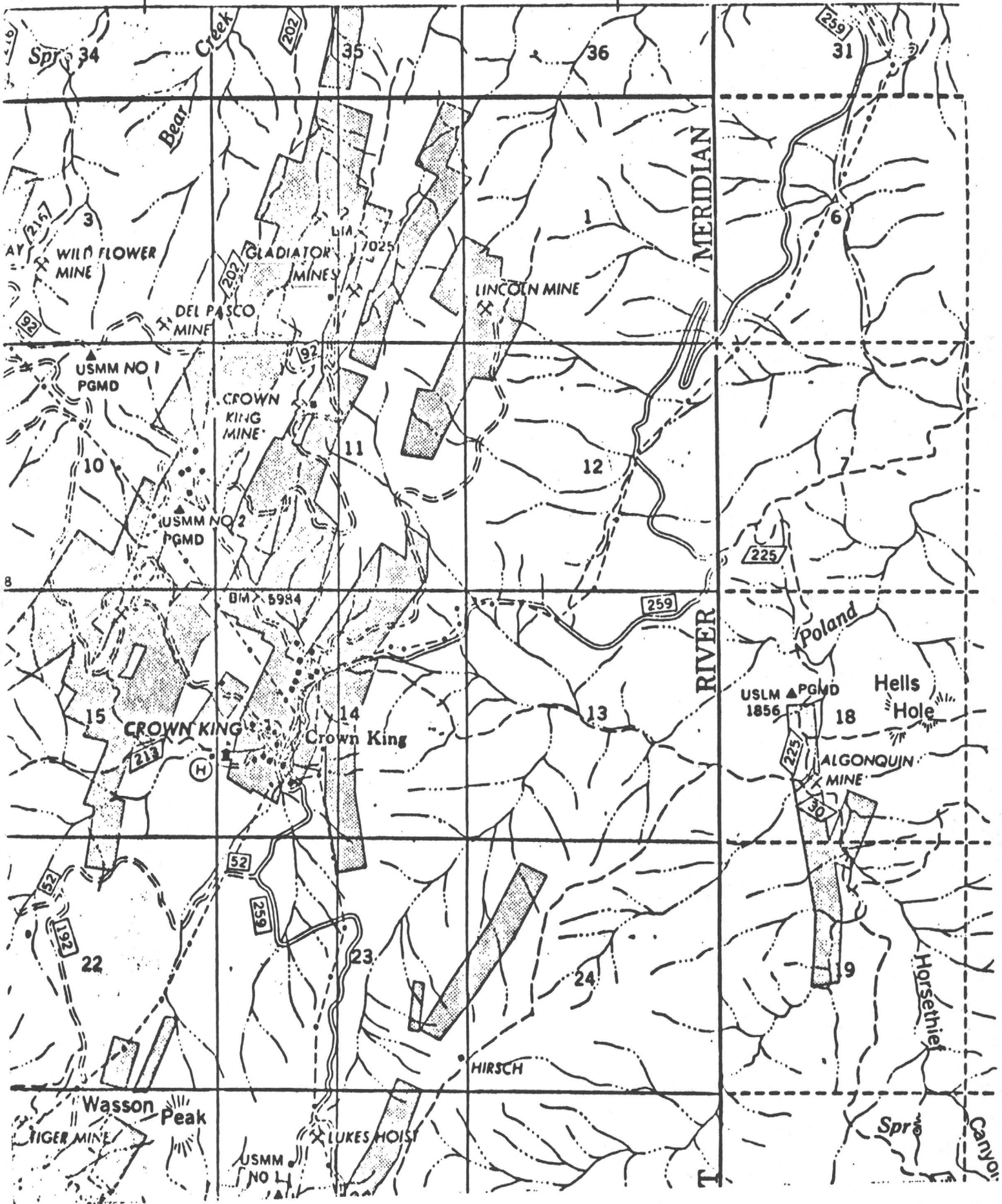
Production history at the Gladiator mine dates from the early 1870's but very little was recorded until 1937. This early production was estimated from the mine workings to be about 50,000 tons of high grade gold ore. During the period from 1937 to 1942, 21,961 tons were produced averaging 0.44 oz/ton Au, 3 oz/ton Ag, 0.35% Cu, 4.5% Pb and 15.0% Zn. No records are available to 1947 when the property was shut down after the war. The property was not explored again until 1981 when Noranda Exploration Co. completed a district wide drilling and sampling program. In the wake of program reductions, Noranda turned the property back to the owners in 1982.

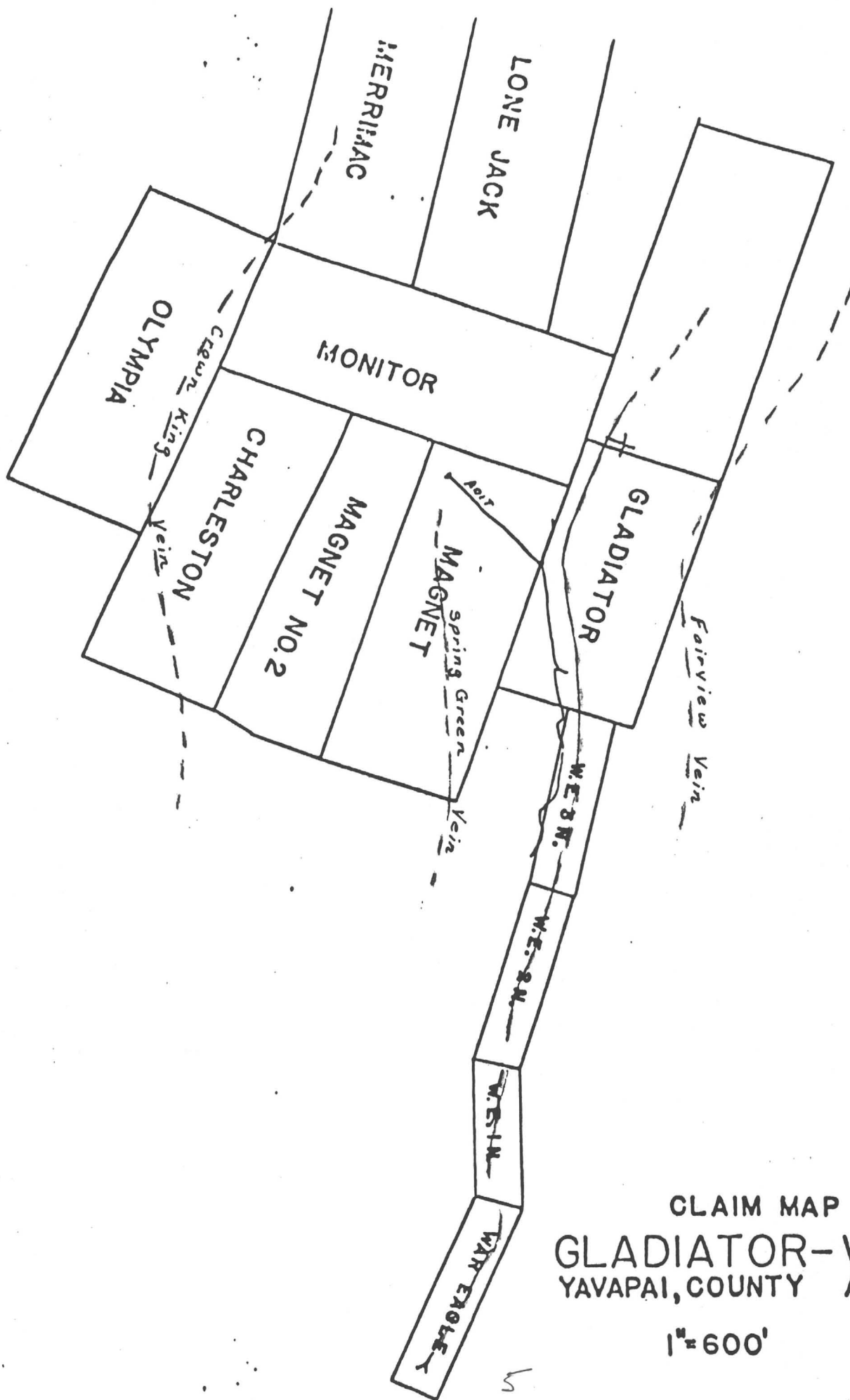
Nor-Quest obtained a lease and option in 1983 and continued the exploration program begun by Noranda. After surface drilling and underground sampling indicated favorable down-dip extensions of known ore zones, the lower 560 level adit was widened to accomodate new production. A 100 ton per day gravity mill was constructed below the portal and a new well drilled to supply increased water demands. Underground development began as traditional shrink stoping but was converted to a modified shrink to accomodate greater mining selectivity. Production began in earnest in 1986 concurrent with mine development and continued through 1987. Since start-up, the property has produced 1800 ounces of gold and 5400 ounces of silver.

#### Geology and Mineralogy

The geology of the Gladiator - War Eagle properties is very similar to the geology of many other precious and base metal deposits of the Central Arizona Pre-Cambrian Schist Belt. The Gladiator - War Eagle quartz-massive sulfide veins are situated in a narrow sulfide facies of the Yavapai schist. The veins extend northerly from the Crown King granodiorite stock on a bearing of N 10 - 20° E and dip steeply to the west at about 70°.

20'





CLAIM MAP  
 GLADIATOR-WAR EAGLE  
 YAVAPAI, COUNTY ARIZONA

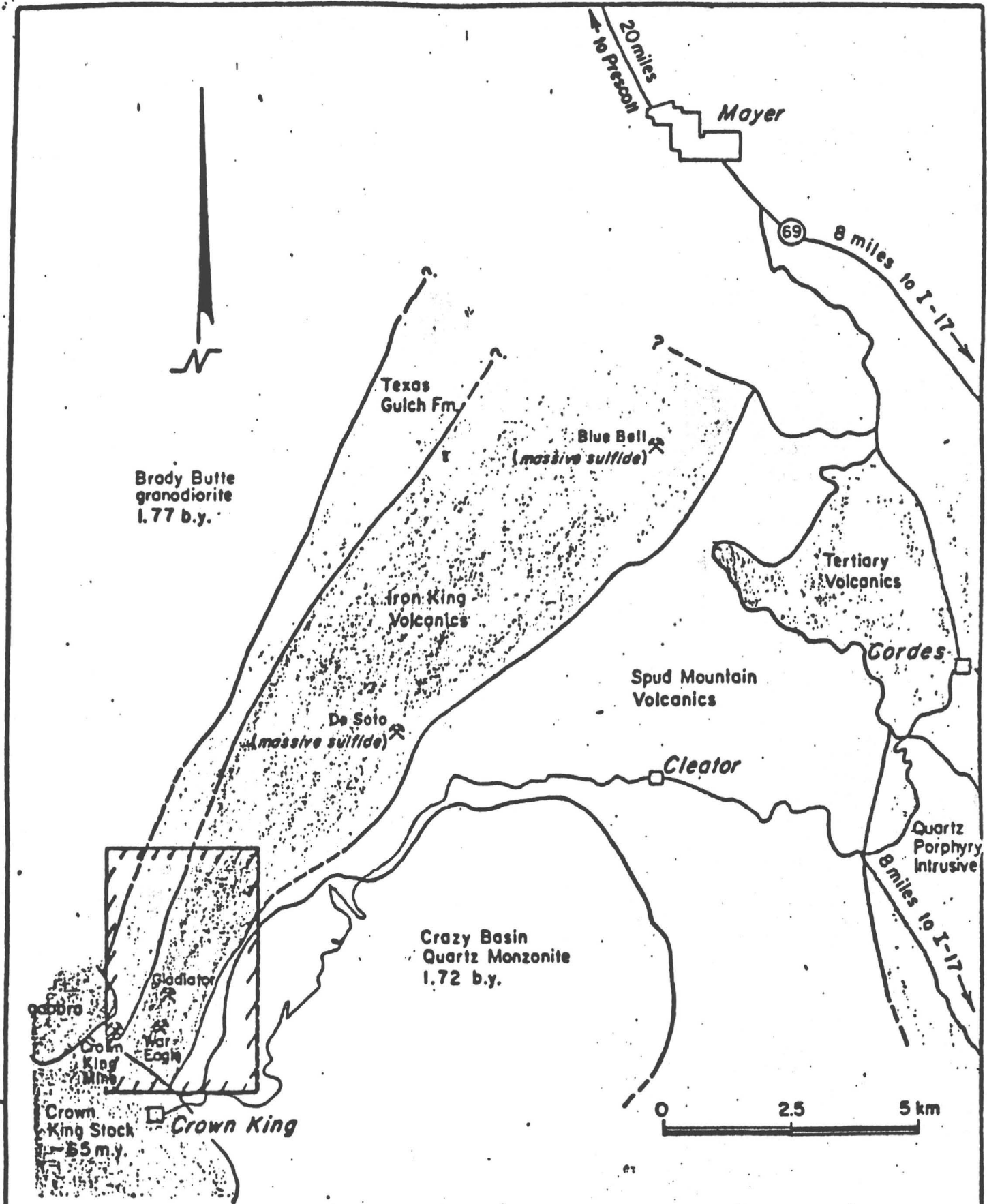
1" = 600'

The Gladiator - War Eagle vein is one of a series of gold-bearing Laramide-age veins that strike northeasterly across the Bradshaw Mountains. Others in the sequence which cross Nor-Quest property are the Del Pasco, Crown King, Spring Green, Fairview and Lincoln veins. These veins can be traced quite continuously paralleling the major fold structures in the banded iron formation sequence. The veins occupy zones of pre-mineral faulting, shearing and subsequent diking. These later events have had the greatest impact on precious metal distribution throughout the mining district.

The Gladiator vein is a high grade steeply dipping fissure fill and replacement deposit with basic quartz-base metal sulfide mineralogy. This hydro-thermal veining is directly associated with an igneous dike latite composition which often splits the vein into both a foot-and hanging-wall member. Gold and silver values show a considerable variation with respect to vein thickness and mineralogy. In general, good sulfide mineralization can be expected to assay in the 0.1 to 0.5 oz/ton range with anomalies up to 2.5 oz/ton. A second hanging wall vein occurs about 20 feet to the west of the footwall structure and is quartz-rich in composition. Quartz mineralization has been found to be more highly variable in gold-silver content than the massive sulfide type, but significant reserves are possible in this hanging wall section.

A typical distribution of gold mineralization is exhibited in the Crown King mine to the southwest where higher grade zones form a northerly plunge of 20 - 30 degrees. This same pattern can also be seen along the Gladiator vein system. The currently known higher grade zones are generally outlined by the "A" and "D" ore blocks which seem to rake northerly at low angles. This pattern is undoubtedly due both to the direction of pre-mineral diking and general metamorphic fabric of host rocks.

This "ore shoot" pattern of distribution of vein gold mineralization is very common in the district but has only been partially tested at the Gladiator by previous exploration programs. At present, four of the producing stopes above the 560 level, have generally progressed upward into lower grade ore zones. It is now recommended that an underground drifting and diamond drilling program be instituted to properly outline the higher grade areas along the veins. Information from the recent mining experience and the known strength of the vein system, indicate a high degree of probability that an additional 50,000 ounces of gold could be developed both laterally and above the current known reserves.



**FIGURE 1.** Location Map and Regional Geologic Map of the Mayer - Crown King and Black Canyon Schist Belts.

## Ore Reserves

Ore Reserves along the Gladiator - War Eagle vein system have been developed by sampling mine workings, and by both surface and underground diamond drilling. Recently, the ore reserves have undergone considerable revision with respect to the separate vein splits and their mineability. The current reserves are all attributed to the footwall vein and are categorized into four separate zones labeled A, B, C, and D from south to north. An average mining dilution of 20% has been included along with a minimum mining width of 3.5'. A summary of all reserve classes is as follows:

<u>Ore Block</u>	<u>Tonnage</u>	<u>Grade</u>	
		<u>Au</u>	<u>Ag</u>
"A" ✓	34,000	0.382	1.82
"B"	30,201	0.360	2.99
"C"	10,249	0.420	1.10
"D" ✓	19,200	0.432	2.47
Broken Ore	5,500	0.310	1.08
Total (all classes)	99,150	0.385	2.14

## Ore Zone Development

A program of underground drifting and diamond drilling is planned to effectively define the precious metal distribution along the Gladiator - War Eagle vein system. The proposed plan calls for 1700 feet of drifting on the 560 level to establish 10 diamond drill stations in strategic positions along the vein. From these stations, a total of 19,200 feet of diamond drilling will be required to penetrate the vein at relatively even intervals for accurate reserve calculations. Both plans and sections are included (inside envelope) which illustrates this proposal. It is estimated that at a 50% success rate over 50,000 additional ounces of gold can be developed at the Gladiator.



## Mining Method

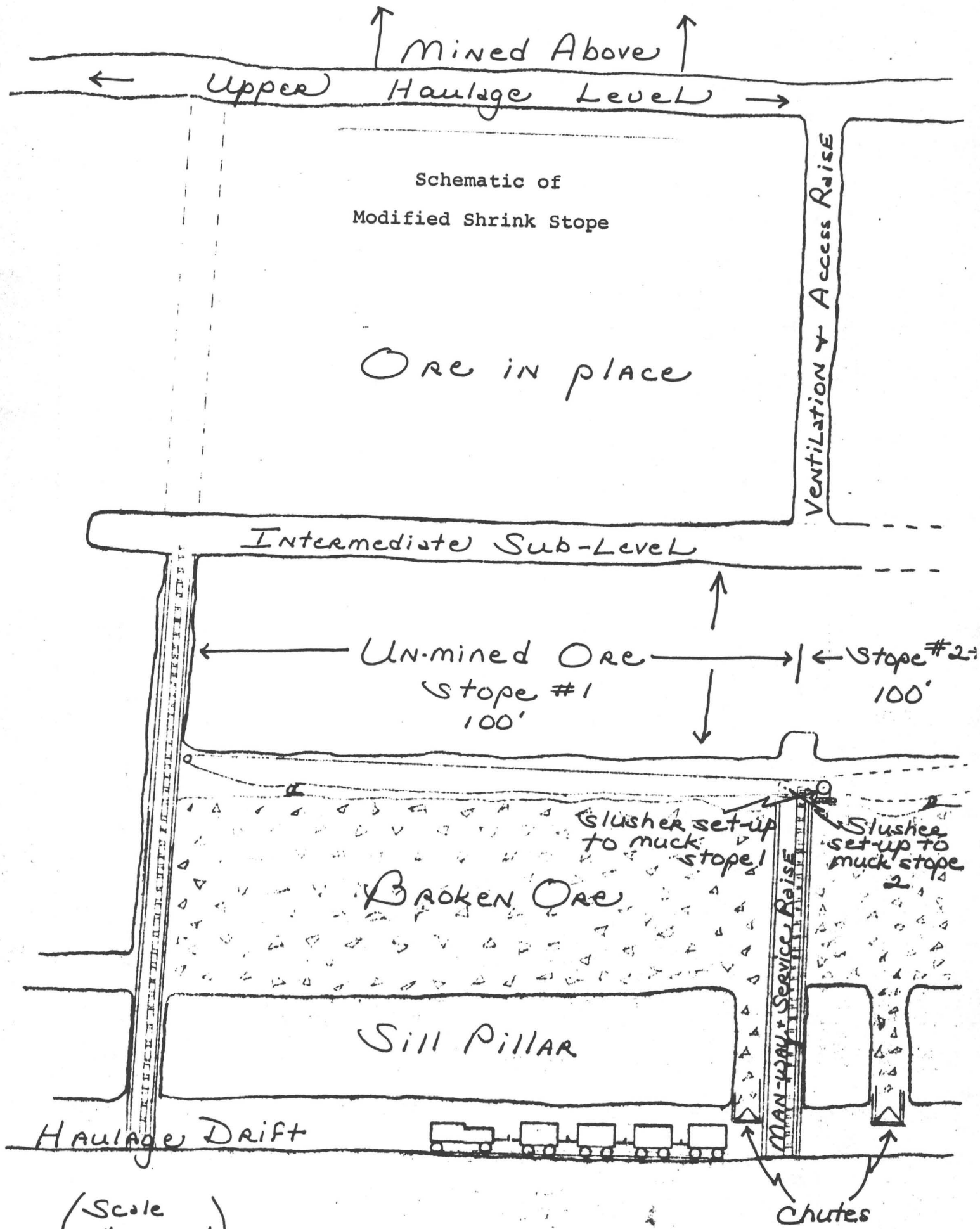
The Gladiator ore body consists of narrow veins which vary from 1.5' to 4.0' wide and dip to the west at 68 to 70 degrees. The minimum mining width is 3' which is maintained in all stopes. The attitude of the ore lends itself to shrinkage stope mining. The actual method in use is a modified shrinkage which utilizes 5 H.P. air slushers and scrapers. One chute is used to draw the ore from each stope. The swell from each cut is moved to that draw point with the slusher and scraper.

Each stope is started with a boxhole and raise to the ore from the haulage drift. When the chute and manways have been installed, the sub-drift proceeds north and south to open the ore for mining. As the stope limits are reached, an access raise is drilled to the level above to provide ventilation. When the raise is completed the stoping sequence begins. (See sketch)

Stoping is done by drilling up holes and blasting with non-electric caps and ANFO. Most cuts are shot with 2 blasts per 100' length of stope. After scaling, the swell is removed to provide the proper drilling height for the next cut. This sequence will provide 350T to 400T per month per stope.

Experience has shown that in order to produce the required 100T/D for the mill operation, a total of 8 stopes will be necessary in the following stages: 2 on "free draw", which are completed stopes and ore can be removed on a scheduled basis; 2 in development stage and 4 in the mining phase. If more than 100T/D is required, additional stopes will be needed.

When the mine closed on March 4, 1988, two stopes were under development and 3 stopes were being mined. This was not sufficient for the required 100T/D mill supply. There had not been sufficient exploration to allow stope development to obtain the required tonnage. When the exploration program has opened sufficient reserves it will require 3 to 4 months to develop more stopes to provide the necessary mill feed. During this period any ore produced will be crushed and stockpiled to await the start of milling.



Schematic of  
Modified Shrink Stope

Ore in place

Ventilation + Access Raise

Intermediate Sub-Level

Un-mined Ore  
Stope #1  
100'

Stope #2  
100'

BROKEN ORE

Sill Pillar

Slusher set-up  
to muck  
stope #1

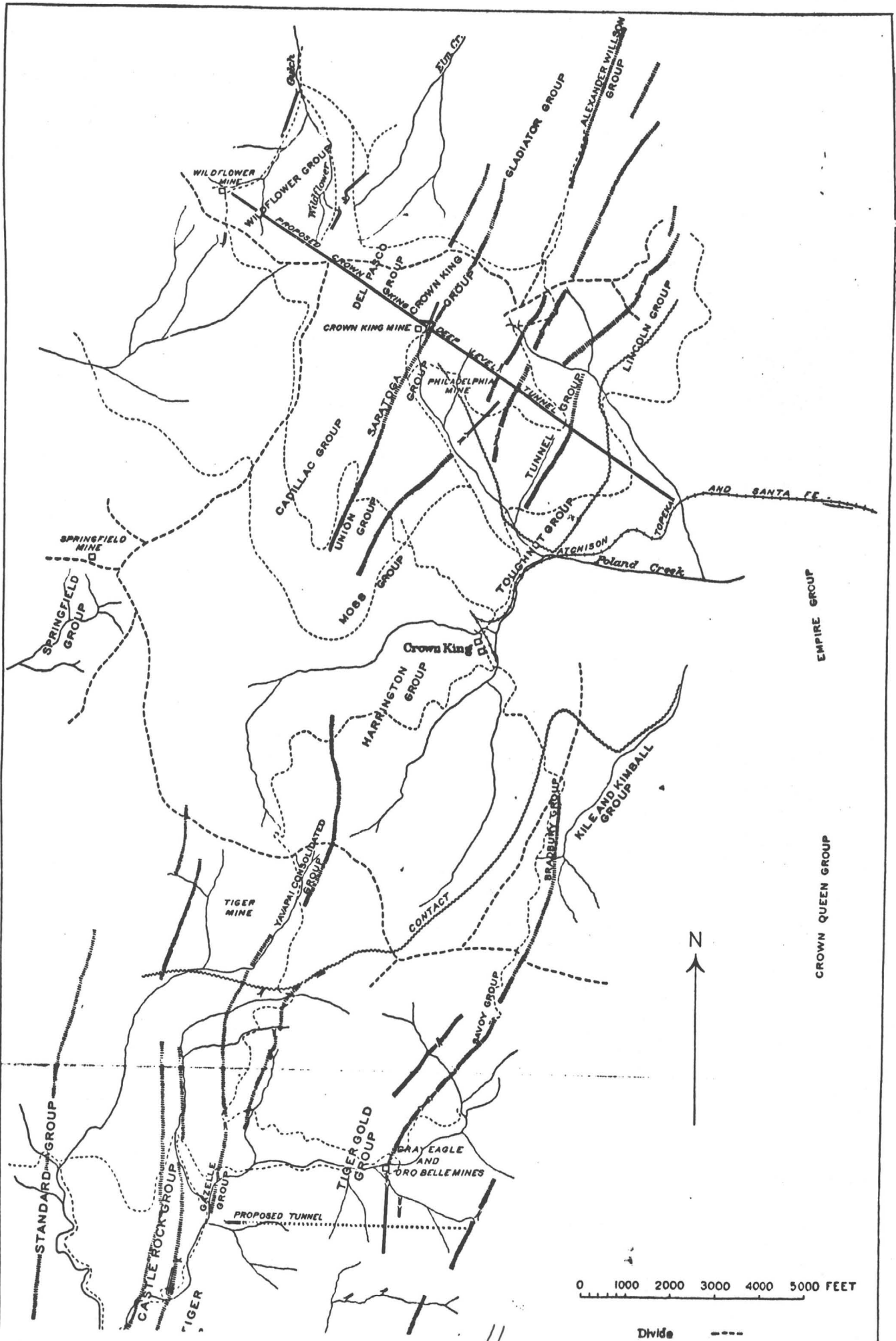
Slusher  
set-up to  
muck  
stope  
2

Man-way + Service Raise

Haulage Drift

Chutes

(Scale  
1" = 20')



## District Potential

It is important to note that only a very limited amount of diamond drilling has been completed in the district and that the planned exploration does not exhaust the potential targets even on the Gladiator - War Eagle vein. Mineralization along the Gladiator is suspected to continue laterally (both north and south) and down-dip. Ore along the Crown King vein to the west extended over 2000 feet laterally and over 500 feet vertically.

The Fairview vein some 500 feet to the east roughly parallels the Gladiator - War Eagle vein. Exploration efforts to date have all been positive in demonstrating a plus 0.6 oz. gold mineralization for a strike length of nearly 300 feet and a down-dip extension of 150 feet. This vein is the next most promising prospect outside of the Gladiator and can most likely be developed from the 560 level development.

The Spring Green vein to the west about 400 feet is also sub-parallel to the Gladiator. Results of only a small number of samples on this prospect have remained inconclusive. A series of short surface holes would be needed to test for higher gold values along strike. The other two veins to the west are the northerly extension to the Crown King deposit and the Del Pasco group. These also have reasonable good potential for developing additional gold reserves. It is obvious from the past production and strength of the various vein systems that the potential for additional precious metal deposits district wide remains high.

## Alternate Plan 6-88

### Exploration with Development

Prior to any full scale production at the Gladiator Mine, additional geologic information is required to prove up mineable tonnages, maintain grade and provide for general mine efficiency. Of primary concern is ore grade distribution and geologic structure. To achieve this and allow for greater mining selectivity with increased production, additional drifting and diamond drilling is necessary.

The proposed development has been laid out on the 100 scale plan and section and modified (6-88) to accommodate footwall development along the southerly "A" zone drive. Development along the B, C, and D zones remained the same as previously reported. (3-88) Beyond this work, an evaluation of the Fairview vein should be made before establishing a lower level (300) to mine the "D" block.

### Precious Metal Distribution

The gold-silver distribution at the Gladiator can be determined by plotting assay data, mineral zoning and geologic structure. It has been shown that the assumed (approx.) 30 degree northerly rake of the ore zones is not adequate for a selective mining operation. Further, the property lacks sufficient "quality" data in terms of diamond drill intercepts to accurately plot higher grade ore shoots with respect to stope development. From examining the assay data generated by the 5144 and 5141 stopes, it has been determined that grade information is needed roughly every 100 feet to accurately define higher grade boundaries. The planned diamond drilling pattern along with follow-up raise and under-cut samples, should be sufficient to predict individual stope grades.

### Ore Zone Development

In examining ore zones A through D, only a limited portion of the "A" zone approximately 200' above the 560 haulage level has been adequately evaluated by diamond drilling. Apparently this block was to be developed from the 750' level instead of the 560. Development of the "A" block will require additional ventilation above the 750 level to the surface or breaking into old workings above.

The 5144 winze and the two lower levels (475 and 385) have a fair amount of sampling data along with the two drill holes (14 & 15) to establish a continuation of the "D" zone. This zone appears to be the most heavily mined above. But this information is still not sufficient to establish an entire new level for mining. The planned "D" zone drilling as well as the proposed lower holes to the south should provide this data.

Ore zone "C" contains proven ore in and about the most recent mining but past grade data was probably not as reliable as it should have been. The only quality data here are the four holes drilled to locate the 5140 F.W. stope. These workings should be fully re-sampled before continuing.

Although the initial drilling of holes 1A, 2A and 3A were reasonably successful, the additional "B" zone drilling is required to work out several structural problems. At least 4 or 5 faults have to be considered in properly positioning these stopes.

#### Summary

This modified plan allows mining to start in the fifteenth week after the exploration program starts. Ore can be crushed and stockpiled until sufficient stoping areas have been opened to provide the desired mill feed. During this time any additional metallurgical testing required will be completed and any changes necessary in the mill circuit can be made.



## Nor-Quest Arizona Inc.

June 28, 1988

The accompanying schedule shows the development and mining sequence to arrive at the 100 tpd required to feed the mill. If a higher tonnage is to be milled a second mining area must be developed.

Current reserves are approximately 100,000 tons in the four zones. The mining program will be in the A, B and C zones which will result in congestion and problems scheduling, blasting and ore removal. It is compounded by the narrow widths of the orebody and the relatively small tonnage removed as each cut is mined in the shrinkage stopes.

The new area to be developed will be determined by the diamond drilling results in the D zone and the Fairview. Development of the area will require at least 6 months before ore is available at which time higher tonnages could be scheduled.

Milling results were unsatisfactory when the property was closed on March 4, 1988. A thorough metallurgical test must be run to determine the mill flow sheet that will produce the best recovery. The mill flow sheet used at shutdown is enclosed. In addition to the flow sheet changes that will be required, thickner tanks and filters will be required for the concentrates and tails to increase water recovery capacity. An additional source of water will be required if the daily tonnage rate is to be increased. The current well provides 35 gpm which is barely adequate to run the mill with the reclaim water that was in place. Note, that no cost figures have been included for the milling in the costs on the enclosed schedule.

There are many areas that could be explored in addition to those shown on the plan. Geo chem surveys have been done on the area by previous owners which indicate continuity of the Gladiator and Fairview veins to the north. The area south of the A zone (the War Eagle at depth) could also be explored.

Preliminary Work Required Prior to Start-up

Before starting any program approximately 5 weeks work by maintenance crews will be required. In addition, some construction will be required to bring the property into proper operating condition.

The following is a list of necessary work with estimated costs:

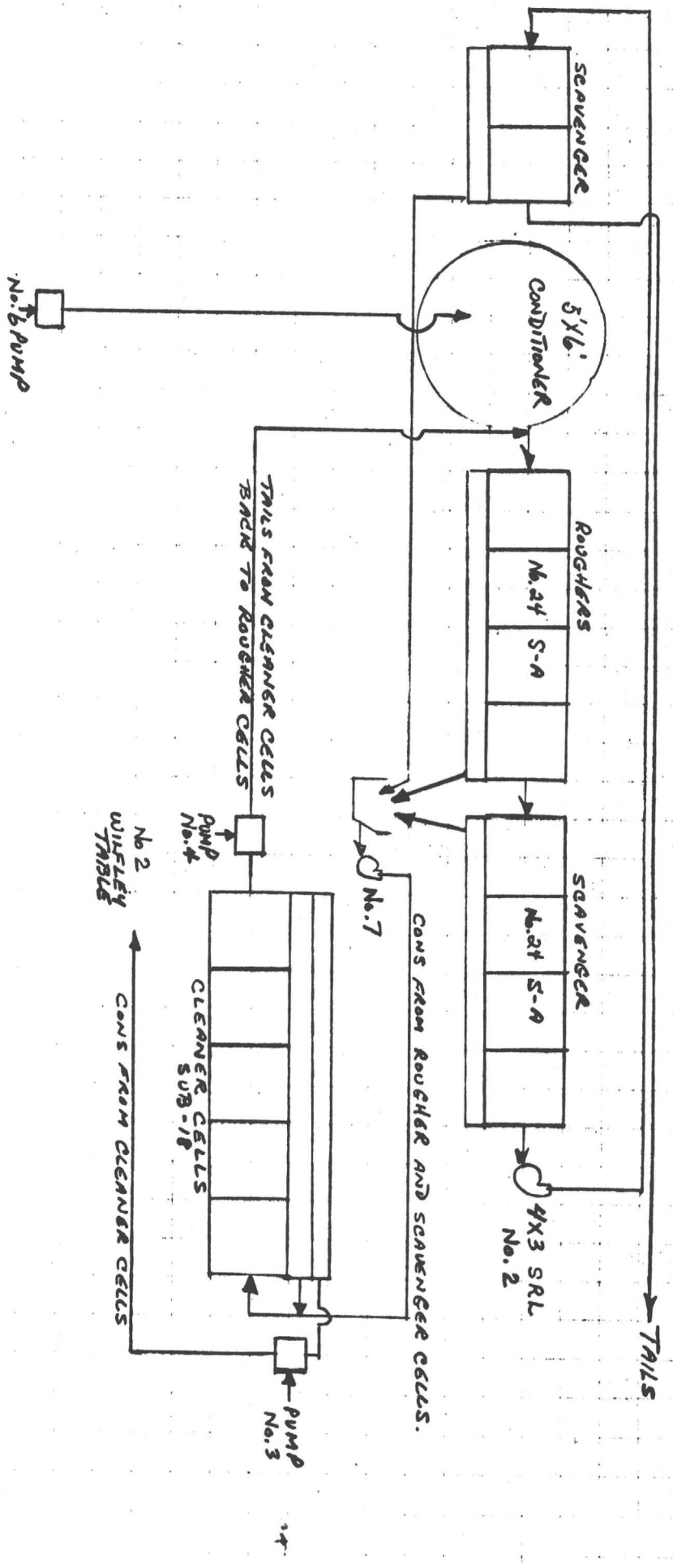
1. Service all mine equipment	\$ 4,000.✓
2. Check out electric system. Bring up to standard.	700.✓
3. Winterize all water lines.	1,600.✓
4. Change potable water pump.	2,500.✓
5. Purchase and install proper change house facilities.	35,000. Hold - 10000
6. Complete compressor building.	2,400.✓
7. Main office repairs.	1,000.✓
8. Install diesel fuel lines. (2)	2,000.✓
9. Repair crusher circuit.	2,500.✓
10. Remove old assay office. Erect a new building. Purchase furnace and a new balance.	35,000. Hold 10000
11. Road work. (a)	5,000.✓
12. Purchase drills and other mine supplies for start-up.	25,000.✓
13. Purchase 3 new pick-up trucks.	36,000.✓
14. Hire miners for start of exploration.	500. - ?
15. Mine track repair. (4 men 1 week)	2,600.✓

The cost of these has been estimated. Where construction is involved a 25% contingency has been added. The total cost of this necessary work is \$155,800. say \$160,000.

a. Rather than continually repair the road from Crown King it may be more cost effective to construct the road to Mayer. This would reduce mileage to the mine and permit employees to live in Mayer. The cost was estimated at \$50,000 when the original permits were obtained. If this road is to be built then the cost will be \$200,800 say \$200,000.

160,000  
50,000  
210,000



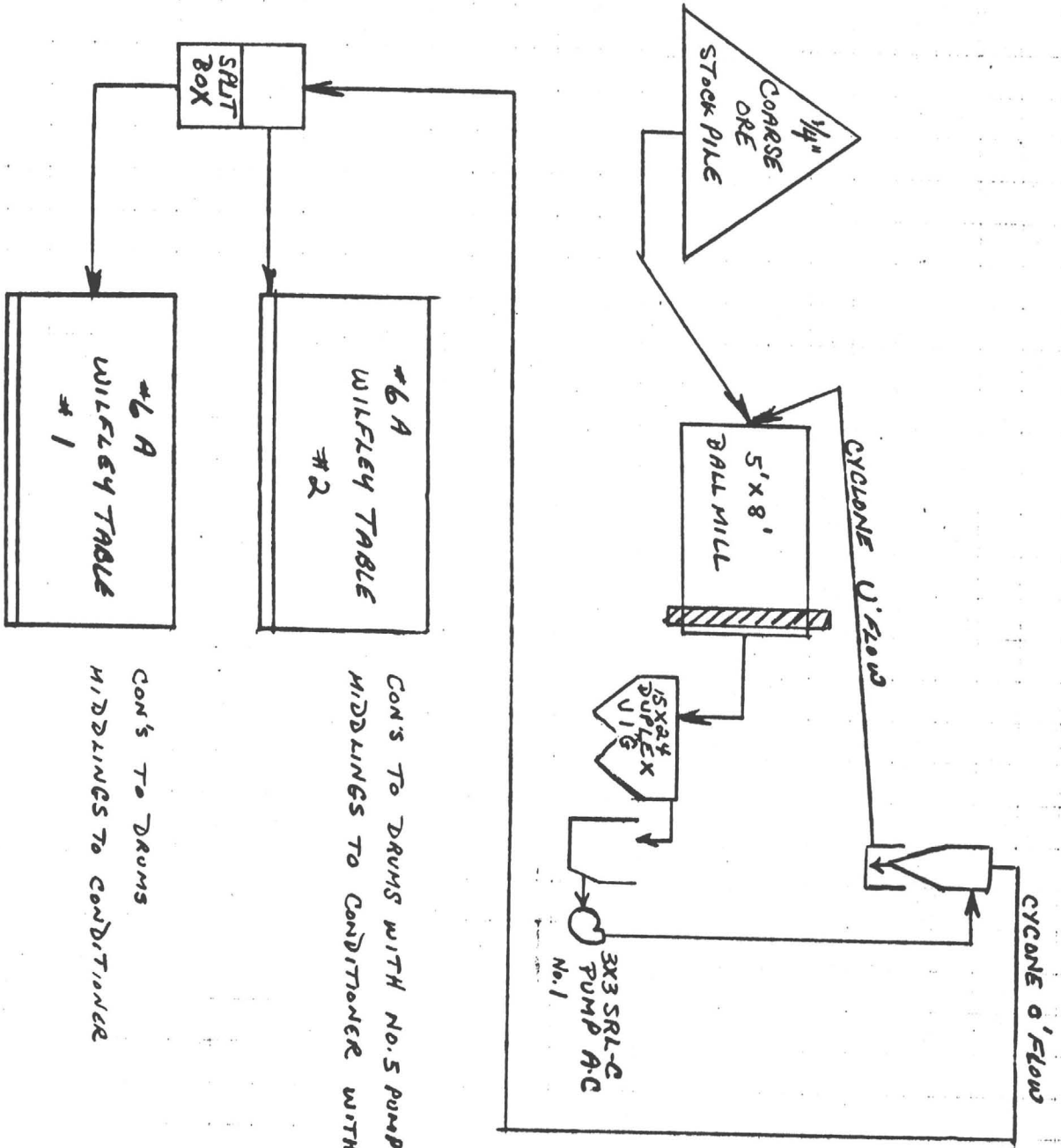


MIDDINGS FROM #1 & #2 WILEY TABLES TO CONDITIONER TANK

- No. 1 PUMP - 3X3 SRL-C
- No. 2 " - 4X3 GALICHER
- No. 3 " - 1 1/2" GALICHER SAND PUMP.
- No. 4 " - 1 1/2" " "
- No. 5 " - 1 1/2" X 2" GALICHER VACSEAL PUMP.
- No. 6 " - 1 1/2" GALICHER SAND PUMP.
- No. 7 " - 1 1/2" " "

SPARE PUMPS

- 1 - 3X3 SRL-C A/E
- 1 - 1 1/2" GALICHER SAND PUMP.



CON'S TO DRUMS WITH NO. 5 PUMP  
MIDDINGS TO CONDITIONER WITH NO. 6 PUMP

CON'S TO DRUMS  
MIDDINGS TO CONDITIONER

Plan 6-8-88

DESCRIPTION	SCHEDULE																				
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	
DRIETING																					
CREW 1 <sup>s</sup>																					
DRIFT A																					
CREW 2 <sup>e</sup>																					
DRIFT B																					
DRIFT C																					
DRIFT D																					
FAIRVIEW																					
RAISE CREW																					
34-RSE																					
37/38 RSE																					
35/36 RSE																					
31/32 RSE																					
VENT DRIFT																					
750 LEV.																					
STOPE																					
PREP																					
5140																					
5136/35																					
5134/33																					
5132/31																					
MINING																					
5141																					
5139																					
5138/37																					
FREE																					
DRAW																					
5144 (1700)																					
5141 (4400)																					
5138 37 (4000)																					
5139 (1600)																					
DIA DRILL																					
A BLOCK																					
B BLOCK																					
C BLOCK																					
D BLOCK																					
FAIRVIEW																					
AGT TONAGE	193	303	771	1335	2211	3000	3000	3000	3000	3000	3000	3000	3000	3000	3000	3000	3000	3000	3000	3000	
ACC TONAGE		496	1267	2602	4813	7813	10813	13813	16813	19813	22813	25813	28813	31813	34813	37813	40813	43813	46813		
VARIANCE																					
WAGES	200000	80000	86000	92600	111000	111000	111000	111000	111000	111000	111000	111000	111000	111000	81000	81000	81000	111000	111000	111000	111000
SUPPLIES		18000	18000	18000	35000	35000	35000	35000	35000	35000	35000	35000	35000	35000	50000	50000	50000	50000	50000	40000	40000
ADMIN EXP	21844	21844	21844	21600	21600	21600	21600	21600	21600	21600	21600	21600	21600	21600	21600	21600	21600	21600	21600	21600	21600
TOTAL	221844	125844	125844	132200	167600	167600	167600	167600	167600	167600	167600	167600	167600	167600	152600	152600	152600	182600	182600	172600	152600
	See attached Preliminary work required prior to start up.																	Determine at this point whether to develop block or Fairview			

\$ = 000

7/21 ARRIETA

COLUMN - WRITE

	1	2	3	4	5	6
	Approved	1	2	3	4	
1	Income:					
2	@ 430 <sup>1/2</sup> @ 15%		4340	4340	4340	4340
3	TAILS	300				
4						
5	Capital Cost:					
6	Purchase	500	500	667	667	667
7	Mine Upgrade	105				
8						
9	Mill Upgrade	250				
10						
11	Expense:					
12	Evaluation	100				
13	TEST WORK	50				
14	16,500/yr Shutdown Cost	198				
15	Mine Devel. - Gmo.	754				
16	Mine & Devel		2100	2100	2100	2100
17						
18	B/F TAX CF	(1657)	1744	1579	1579	1579
19	B/F TAX - NPV @ 12%	(1677)	1650	1333	1185	1063
20	Depreciable Capital	355				
21	TAXES					
22	Depreciation		88.8	88.8	88.8	88.8
23	Balance		1657.2	1490.2	1490.2	1490.2
24	Depletion		248	237	237	237
25	B/F TAX CF		1409	1253	1253	1253
26	TAX		733	664	664	664
27	Working Capital		120			
28	Salvage			1254		0
29	AFTER TAX CF		676	589	589	589
30						
31	NPV @ 12% mid period	(1657)	638.8	497.1	443.5	396.4
32						
33						
34						
35	DCF ROI =	17.2%				
36						
37						
38						
39						
40						

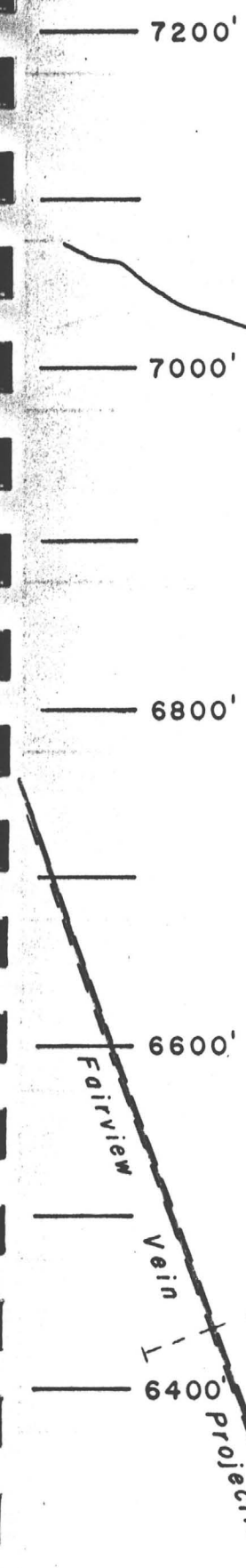
12,400 North

Cross - Section  
N 70°W

(Looking So.)

"A" ZONE  
Planned Drilling

J. F. P. 3-88



Fairview Vein

Projection

Alter. 450' -20°

6570'

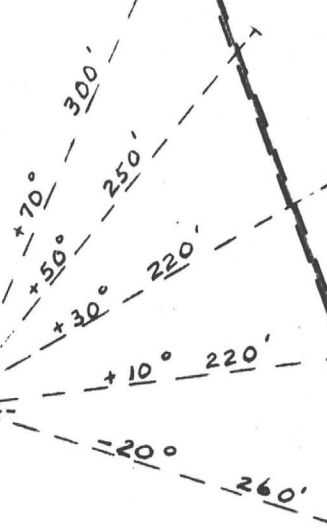
11,000 East

Gladiator Vein

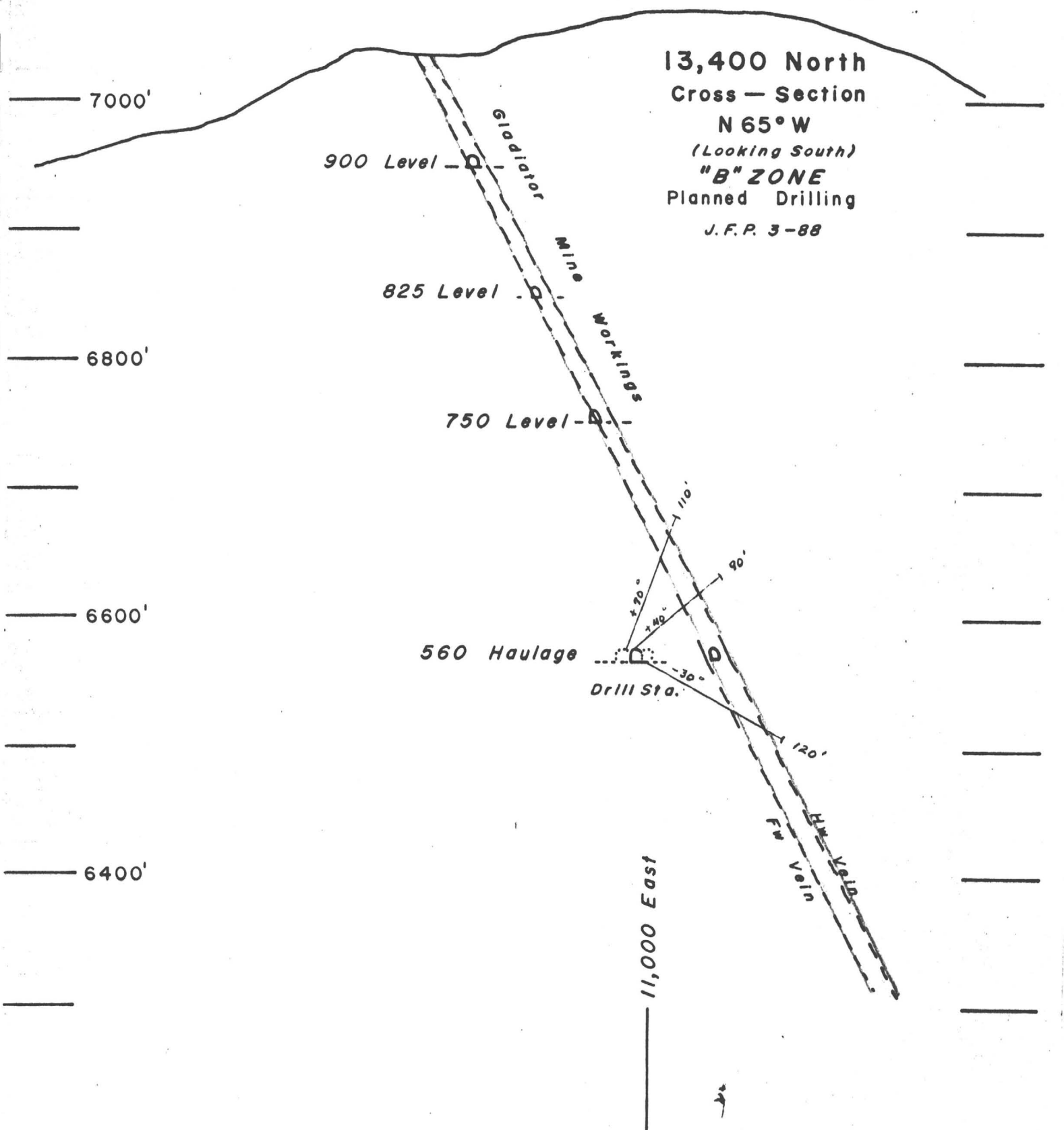
DDH 83-12

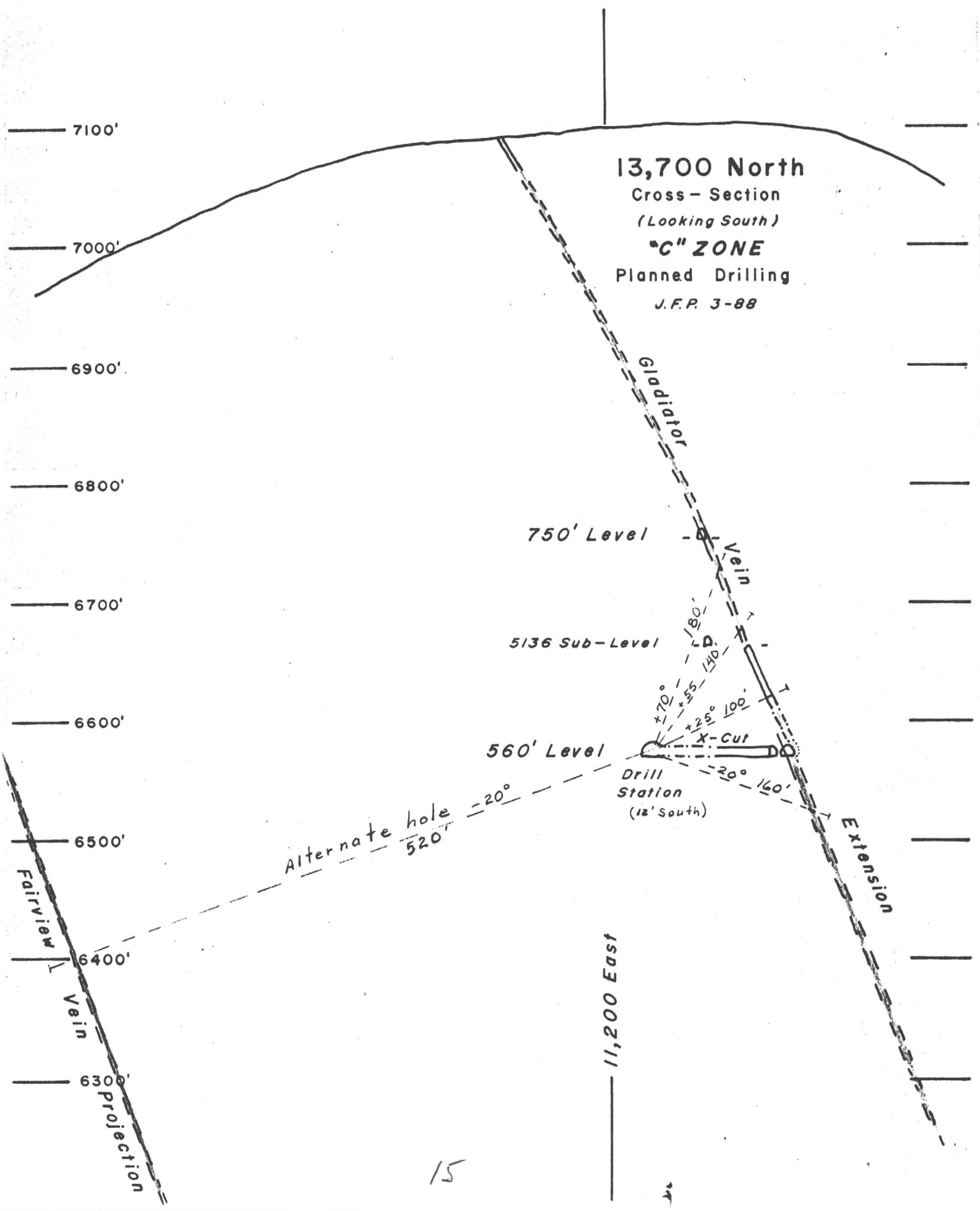
26' North

No Intercept



13,400 North  
Cross - Section  
N 65° W  
(Looking South)  
"B" ZONE  
Planned Drilling  
J.F.P. 3-88





13,700 North  
 Cross - Section  
 (Looking South)  
 "C" ZONE  
 Planned Drilling  
 J.F.P. 3-88

7100'

7000'

6900'

6800'

6700'

6600'

6500'

6400'

6300'

750' Level

5136 Sub-Level

560' Level

Drill Station  
 (12' South)

Alternate hole  
 520'

Gladiator

Vein

Extension

Fairview

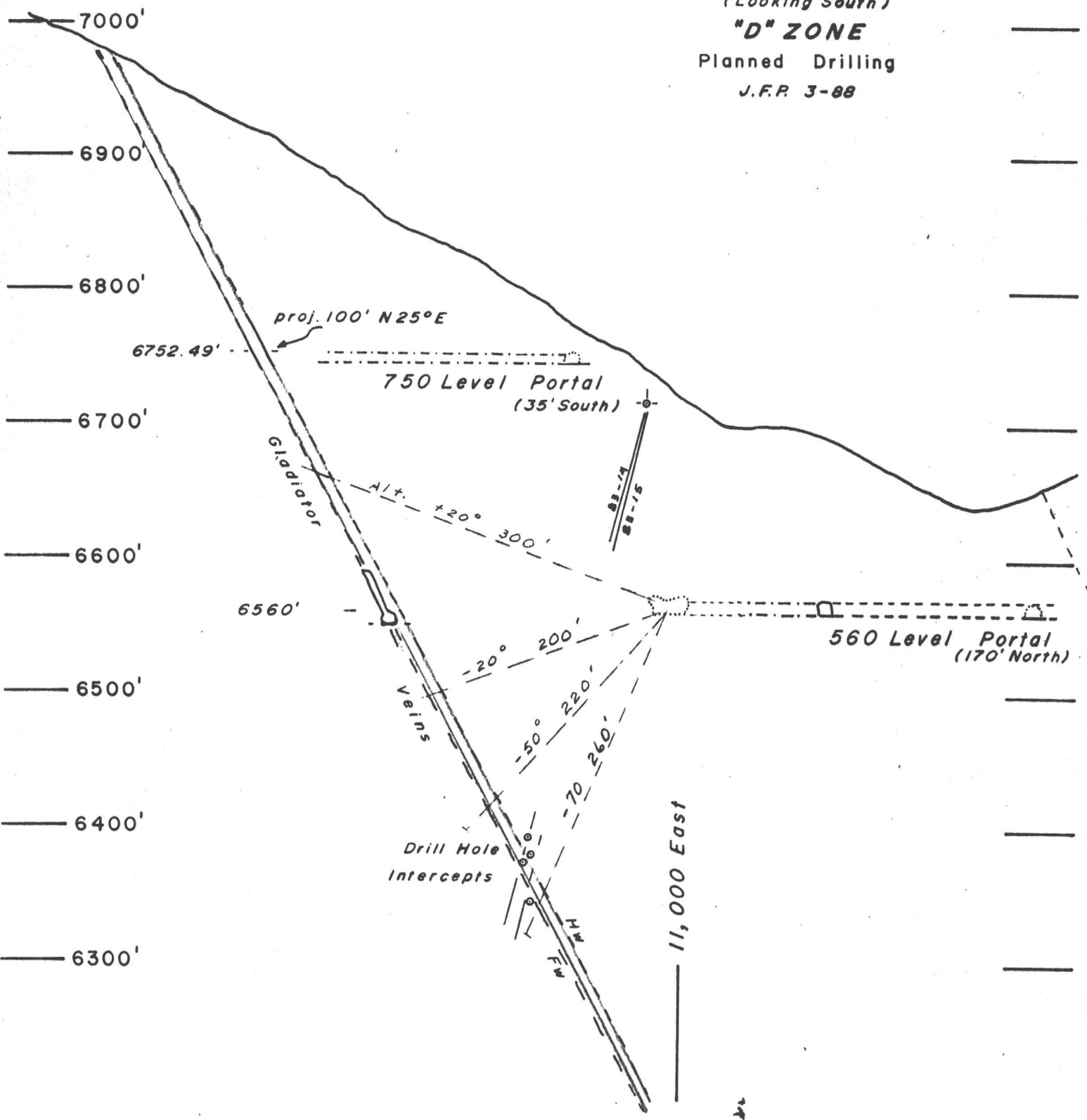
Vein

Projection

11,200 East

15

14,700 North  
 Cross - Section  
 (Looking South)  
 "D" ZONE  
 Planned Drilling  
 J.F.R. 3-88





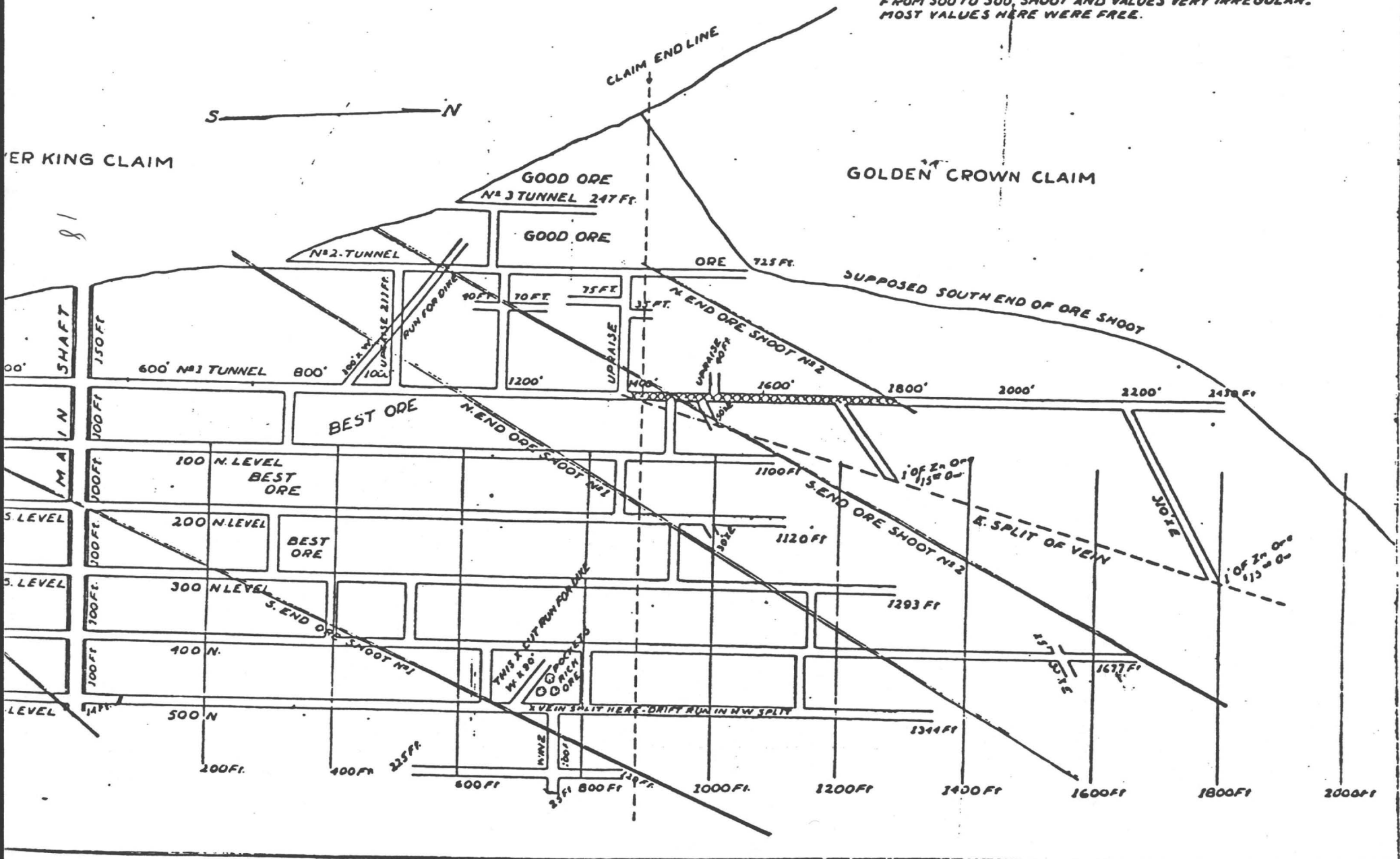


Month	1					2					3					4				
Week	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18		
Drift "A"	TRACK DRIFT & Dia. Drill stations For Block A 960'																			
Actual																				
Cost schedule	7350	7350	7350	7350	7350	7350	7350	7350	7350	7350	7350	7350	7350	7350	7350	7350	7350	7350		
Cost actual																				
Drift "B"	D.S STATION B BLOCK																			
Actual																				
Cost schedule	7350	7350																		
Cost actual																				
Drift "C"	TRACK DRIFT & D.D Stations 320'																			
Actual																				
Cost schedule			7350	7350	7350	7350	7350	7350	7350	7350										
Cost actual																				
Drift "D"	Track Drift & St. CREW #2 F.																			
Actual																				
Cost schedule											7350	7350	7350	5512						
Cost actual																				
D.D. "A"	17																			
Actual																				
Cost schedule						6000	6000	6000	6000	6000	6000	6000	6000	6000	6000	6000	6000	6000		
Cost actual																				
D.D. "B"																				
Actual																				
Cost schedule						1400	1400	1190												
Cost actual																				
D.D. "C"																				
Actual																				
Cost schedule						210	1400	1400	1400	1400	1400	1400	1400	1400	1400	1400	1400	1400		
Cost actual																				
D.D. "D"																				
Actual																				
Cost schedule																				
Cost actual																				
Variance +																				
Wages	Salary	3400	3400	3400	3400	3400	3400	3400	3400	3400	3400	3400	3400	3400	3400	3400	3400	3400		
Bonus	800	800	800	800	800	800	800	800	800	800	800	800	800	800	800	800	800	800		
Supplies	Calculated in at										147.00/ft.					Drifting and 7.00/ft				
Admin. Exp.	5080	5080	5080	5080	5080	5080	5080	5080	5080	5080	5080	5080	5080	5080	5080	5080	5080	5080		
Totals	23950	23950	25380	25380	25380	31380	31380	31380	31380	31380	31380	31380	31380	29542	23630	23630	23630	23630		

# ING WORKINGS

1" = 100 Ft.

FROM 300 LEVEL UP TO N#1 TUNNEL, SHOOT AND VALUES AVERAGE ABOUT 30%  $Pb$  + 10%  $Zn$ , MOSTLY  $Pb$  +  $Zn$  WITH LITTLE  $Cu$  SULFIDS FROM 300 TO 300, SHOOT AND VALUES VERY IRREGULAR. MOST VALUES HERE WERE FREE.



# CROWN KING WORKINGS

SCALE 1" = 100 FT.

