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Arizona Geological Survey
416 W. Congress St., Suite 100
Tucson, Arizona 85701
602-771-1601
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DAWSON
METALLURGICAL
LABORATORIES, INC.

P.O. Box 7685
5217 Major Street
Murray, Utah 84107-0685
Phone: 801-262-0922

2.1.28

November 17, 1988

A. F. Budge Mining Ltd.
4301 North 75th Street
Suite 101
Scottsdale, Arizona 85251

Attention: Mr. Dale Allen

Subject: Results of Laboratory Testing on a Grab Sample Composite of Iron King Tailings. Our Project No. P-1611.

Gentlemen:

In accordance with discussions with Mr. Dale Allen during his visit to our laboratory November 1, 1988, various laboratory tests were performed on a grab sample composite of Iron King Tailings. These tests were performed to determine if the tailings are amenable to cyanidation or flotation for recovery of contained gold and silver values. Specific testwork performed included:

- Assay screen analysis of as-received head sample.
- Selective gold-silver-copper-lead sulfide flotation of a screened (-35 mesh) sample.
- Bulk sulfide flotation of a screened (-35 mesh) sample.
- Cyanide leach of a screened (-35 mesh) sample, followed by flotation of sulfides from the leach residue with amine.

I. Sample Description And Head Analysis

Two separate tailings grab samples weighing five kilograms each were submitted to our laboratory November 1, 1988, by Mr. Dale Allen and assigned our Lot No. P-1611. These samples contained approximately ten percent moisture and consisted of fine, free flowing tailings and agglomerated clumps. These two samples were combined, air dried, and crushed through ¼ inch to break up the hardened clumps prior to testing. A head sample was not split out prior to testing, however, back-calculated heads from testwork are presented on the following page.

P-1611: A. F. Budge Mining
Head Assay Results: Iron King Tails

	Back-Calculated* Head Assay oz/ton	
	Au	Ag
Iron King Composite Grab Sample	0.079	1.39

*Average of 3 tests

Visual examination of the sample under the binocular microscope indicated abundant fine pyrite (10-15 percent of the total sample). A few grains of bornite were also detected.

II. Test Results

Test results presented in this section are also included in individual test data sheets attached to the end of this report.

A. Summary

The pyrite in this sample of Iron King Tailings responds well to flotation in a naturally acid pulp of pH 2.4 using Phillips Chemical Orfom C-150. Unfortunately only 33 percent of the gold and 11 percent of the silver was contained in this product, indicating that most of the gold and silver is probably associated with non-sulfide minerals. Attempts to produce a selective sulfide concentrate containing sulfides other than pyrite were unsuccessful.

Approximately 62 percent of the gold (0.046 oz/ton of ore) and 22 percent of the silver (0.30 oz/ton of ore) was extracted by direct cyanidation of the minus 35 mesh fraction of the tailings. Cyanide and lime consumption was 7.8 and 78 pounds per ton of sample, respectively. The sample required screening at 35 mesh to remove agglomerated chunks which did not break down, even after 30 minutes agitation at 40 percent solids.

B. Head Assay Screen

This Iron King Tailings sample contains approximately 76 percent minus 325 mesh material. Most of the gold and silver is contained in this size fraction, as indicated on the following page.

P-1611: A. F. Budge Mining
Head Assay Screen Results (Test No. 4)

Screen Fraction Mesh	Weight Percent	Assay, oz/ton Au	Ag
+100	5.10	0.026	<0.05
-100 +200	8.31	0.046	0.32
-200 +325	10.26	0.078	0.32
-325	76.34	0.112	2.17
Total	100.00	0.082	1.43

Between 17 and 18 percent of the tailings weight dissolved during wet screening. The water used in wet screening was dark brown in color and was quite acidic (pH ~4), indicating probable dissolution of iron salts.

C. Selective Flotation of Sulfides

Attempts to selectively float sulfides other than pyrite in an effort to produce a possible high grade gold and silver concentrate were unsuccessful. Approximately 140 lb/ton of lime was required to raise the flotation pulp pH from 2.3 to 5.5 prior to adding a small amount (0.005 lb/ton) of isopropyl xanthate. No sulfide flotation was achieved until 0.065 lb/ton xanthate was added. Unfortunately all the sulfides floated at this reagent addition and the test was discarded.

D. Bulk Sulfide Flotation

Bulk sulfide flotation of this Iron King Tailings composite without pH adjustment recovered 32 percent of the gold and 11 percent of the silver in a pyrite cleaner concentrate assaying 0.191 oz/ton gold and 1.05 oz/ton silver. Approximately 17 percent of the sample weight was recovered into this product, as indicated on the following page.

P-1611: A. F. Budge Mining
Bulk Sulfide Flotation Results (Test 5)

Product	Weight Percent	Assay, oz/ton Au	Assay, oz/ton Ag	Distribution, % Au	Distribution, % Ag
+35 Mesh	9.09	0.055	0.75	4.94	4.07
-35M. Cleaner Conc.	16.68	0.191	1.05	31.49	10.46
-35M. Cleaner Tails	3.32	0.165	3.41	5.41	6.75
-35M. Rougher Tails	70.91	0.083	1.86	58.16	78.72
Total (Calc.)	100.00	0.083	1.37	100.00	100.00

This test was performed at an unadjusted pulp pH of 2.4 using an acid resistant collector Orform C-150, manufactured by Phillips Chemical Company. This reagent produced a clean pyrite cleaner flotation concentrate, with very little sulfides in the flotation tailings. The low gold and silver content of the pyrite cleaner concentrate indicates significant gold and silver association with non-sulfide minerals.

Approximately 18 percent of the tailings weight dissolved during test work. Although the tailings sample was agitated at 40 percent solids for 30 minutes prior to testing, some agglomerates would not break down, and the pulp was therefore screened at 35 mesh prior to flotation.

E. Cyanidation And Flotation Of The Leach Residue

Cyanidation of a screened (minus 35 mesh) sample extracted 62 percent of the contained gold and 22 percent of the silver, as indicated on the following page.

P-1611: A. F. Budge Mining
Cyanidation Results (Test 3)

Product	WGT %	Assay, oz/ton Au	Assay, oz/ton Ag	Distribution, % Au	Distribution, % Ag
+35 Mesh*	7.8	0.056	0.67	5.60	3.54
Leach Solution	-	0.039	0.26	62.36	21.94
Leach Residue	92.2	0.027	1.19	32.04	74.53
Total	100.0	0.068	1.29	100.00	100.00

NaCN Consumed: 7.8 lb/ton sample
Lime Consumed: 77.9 lb/ton sample
*This fraction was not leached.

Some acid was washed from the sample by screening out the +35 mesh material. Therefore, the actual lime consumption projected for treating the total tailings sample would approach the 140 lb/ton figure calculated from the selective sulfide flotation test.

Approximately 31 percent of the gold and nine percent of the silver was recovered by bulk sulfide flotation of the cyanide leach residue.

P-1611: A. F. Budge Mining
Cyanide Leach Residue Flotation Test 3)

Product	WGT %	Assay, oz/ton Au	Assay, oz/ton Ag	Distribution, % Au	Distribution, % Ag
No. 2 Cleaner Conc.	14.4	0.059	0.76	31.28	9.18
Combined Cleaner Tails	9.9	0.035	2.34	12.83	19.53
Rougher Tails	75.7	0.020	1.12	55.89	71.29
Total	100.0	0.027	1.19	100.00	100.00

This flotation concentrate was produced using 0.75 lb/ton Armac T (Tallow Amine Acetate Salt) at a pulp pH of 10.0.

III. Test Results

Results presented in this section are also included in Test Data Sheets attached to the end of this report.

A. Head Assay Screen

One thousand grams of sample was slurried at 40 percent solids in a high speed Waring blender for ten minutes to break up any clumps in the sample. The sample was then wet screened at 100, 200 and 325 mesh. Each fraction was dried, weighed and submitted for gold and silver assay.

B. Selective Sulfide Flotation

One thousand grams dry equivalent weight of sample was slurried at 40 percent solids, agitated for 30 minutes, and screened at 35 mesh. The minus 35 mesh fraction was conditioned five minutes in a 1000 gram Agitair flotation machine with 120 lb/ton hydrated lime to raise the pulp pH from 2.4 to 5.5. A small amount (0.005 lb/ton) of Cyanamid sodium isopropyl xanthate was added, and a rougher concentrate floated for one minute. Additional lime was added to the rougher tailings to maintain pH 5.5, and another 0.010 lb/ton xanthate added, however, no sulfide mineralization in the froth was noted until 0.065 lb/ton xanthate was added. This reagent addition floated all the pyrite in the sample, therefore, the test was discarded.

C. Bulk Sulfide Flotation

One thousand grams of sample was slurried and screened at 35 mesh as previously described. The minus 35 mesh material was conditioned for ten minutes in an Agitair flotation machine with 0.20 lb/ton Phillips Chemical Orfom C-150 Collector at a naturally acidic pulp pH of 2.4. A rougher concentrate was then floated for seven minutes using a small amount (0.038 lb/ton) of MIBC-F65 frother mixture to maintain a stable froth. The rougher concentrate was cleaned once for seven minutes without additional reagents.

D. Cyanidation And Flotation Of The Leach Residue

Approximately 932 grams of sample was slurried and screened at 35 mesh as previously described. The minus 35 mesh material was adjusted to pH 10.5 - 11.0 with hydrated lime and cyanide added to provide a leach solution containing ten lb NaCN per ton (initial concentration). The slurry was then bottle roll leached at 43 percent solids for 48 hours.

The slurry was weighed, filtered and the filter cake washed once and placed in a 1000 gram agitair flotation cell. The slurry was conditioned for five minutes with 0.5 lb/ton carboxymethylcellulose (CMC) slimes dispersant and 0.5 lb/ton Armac T (Tallow Amine Acetate). The pulp pH was 10.0. A rougher concentrate was then floated for six minutes. The rougher tailings were then conditioned for two minutes with another 0.25 lb/ton Armac T and a second rougher concentrate floated for three minutes. The rougher concentrates were combined and cleaned twice without additional reagents.

No further test work is planned on this sample.

If you have any questions or comments concerning this test work, please call.

Sincerely,

DAWSON METALLURGICAL LABORATORIES, INC.

Philip Thompson
Vice President

PT/fg

Enclosures

cc: Mr. Frank Millsaps
3865 Wasatch Blvd.
Room 2021
Salt Lake City, Utah 84109

DAWSON
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P. O. Box 7685
5217 Major Street
Murray, Utah 84107
Phone: 801-262-0922

PROJECT NO. P-1611
DATE 11/1/88
BY MT

TEST NO. 1 NAME A. F. Budge (5' channel #2)

As received NaCN leach, filter and wash once with 500 ml H20. Sulfide float on washed residue.

PRODUCT	Weight	PERCENT WEIGHT	ASSAY					UNITS			DISTRIBUTION				
				Au	Ag										
+35 mesh	144.1														
Amine Ro. Conc.	158.8			0.088	1.17										
Amine Ro. Tails	692.3														
Total (Calc)	995.2														

OPERATION				Leach	Leach		Screen	-35 mesh Cond.	Ro.	Ro. #1	Ro. #2			GRINDING PRODUCT
TIME				1:00	2:00		At	5	1	2 - 2	2 - 4			
REAGENTS - LBS PER TON				Start	Stop		35 Mesh							
													MESH	%
As received ore	gm	1100											+10	
Water	gm	900											+14	
Lime	gm		65.0										+20	
NaCN	gm			5.0									+28	
NaCN Titration													+35	
CaO Titration													+48	
KAX								0.010					+65	
Na_2SiO_3								1.0	Armact	0.5	0.5		+100	
									CMC	0.5			+150	
MACHINE													+200	
R.P.M.													+325	
pH		1.9		10.5	11.0			10.3					-325	
% SOLIDS														
TEMPERATURE														

REMARKS:

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PROJECT NO. P-1611
DATE 11/1/88
BY PT

TEST NO. 2 NAME A. F. Budge Iron King 5' channel #2

Selective Ag-Cu-Pb flotation from -35 mesh screened sample, followed by bulk sulfide for pyrite

PRODUCT	Weight	PERCENT WEIGHT	ASSAY					UNITS			DISTRIBUTION				
			DISCARD TEST – NO SELECTIVITY												

OPERATION		Screen At	-35 mesh Cond	No 1 Ro	No 2 Ro	No 3 Ro
TIME		35	5	1	2 - 2	2 - 5
REAGENTS - LBS PER TON						
Sample Wgt	1100					
Water - as required						
NAIPX			0.005		0.010	0.050
Lime			60.0		10.0	
Na_2SiO_3					1.0	
KAX						0.050
MACHINE			1000	1000	1000	1000
R.P.M.			800	800	800	800
pH		2.3	5.8	4.5	5.5	5.4
% SOLIDS						
TEMPERATURE						

GRINDING PRODUCT MESH	%	%
+10		
+14		
+20		
+28		
+35		
+48		
+65		
+100		
+150		
+200		
+325		
-325		

REMARKS:

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PROJECT NO. P-1611
DATE 11/7/88
BY MT

TEST NO. 3 NAME A. F. Budge Iron King Comp

48 hour NaCN leach on -35 mesh material (with 10 lbs/ton NaCN soln, 50% solids)

Product	Weight	Assay Au	Assay Ag	Units Au	Units Ag	Distribution Au	Distribution Ag	
+35mesh	68.0	0.056	0.67	0.0381	0.456	5.60	3.54	V1C
-35m Leach Solution	1087.1	0.039	0.26	0.4240	2.826	62.36	21.94	
-35m Leach Residue	806.9	0.027	1.19	0.2179	9.602	32.04	74.53	
Head Calculated	932.0	0.073	1.38	0.6799	12.884	100.00	100.00	

Product	Weight	% Wt.	Assay Au	Assay Ag	Units Au	Units Ag	Distribution Au	Distribution Ag	V1G
L.Res.#2 Cl. Conc.	115.9	14.36	0.059	0.76	0.0085	0.109	31.28	9.18	
L.Res.Comb Cl Tails	80.1	9.93	0.035	2.34	0.0035	0.232	12.83	19.53	
L.Res.Ro. Tails.	610.9	75.71	0.020	1.12	0.0151	0.848	55.89	71.29	
Head Calculated	806.9	100.00	0.027	1.19	0.0271	1.189	100.00	100.00	
L.Res.Rougher Con.		24.29	0.049	1.41	0.0119	0.341	44.11	28.71	

Leach residue amine flot.

OPERATION			Leach					Cond	#1 Ro.	#2 Ro.	Cl.	Cl.	GRINDING PRODUCT	
TIME			9:45	24 hr.		48 hr.		5	6	2 - 3	7	7		
REAGENTS - LBS PER TON			Start			Off								
												MESH	%	%
-35 mesh	932											+10		
Water	932											+14		
Lime		37.0			2.0							+20		
NaCN			4.67									+28		
NaCN Titration, lb/ton soln						1.42						+35		
CaO Titration, lb/ton soln						0.05						+48		
NaCN Consumed, lb/ton ore						7.8	Armact	0.5		0.25		+65		
Lime Consumed, lb/ton ore						77.9	CMC	0.5				+100		
												+150		
MACHINE								1000	1000	1000	500	+200		
R.P.M.								800	800	800	800	+325		
pH	2.2		11.2	10.3		10.6		10.0				-325		
% SOLIDS														
TEMPERATURE														

REMARKS:

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PROJECT NO. P-1611
DATE 11/7/88
BY MT

TEST NO. 4 NAME A. F. Budge Iron King Comp

Assay Screen of -6 mesh sample

Product	Weight	% Wt.	Assay Au	Assay Ag	Units Au	Units Ag	Distribution Au	Distribution Ag	V1G
+100 mesh Head	42.4	5.10	0.026	0.02	0.0013	0.001	1.34	0.06	
100/200 mesh Head	69.1	8.31	0.046	0.32	0.0038	0.027	3.87	1.55	
200/325 mesh Head	85.3	10.26	0.078	0.32	0.0080	0.033	8.11	1.91	
-325 mesh Head	634.9	76.34	0.112	2.17	0.0855	1.657	86.67	96.48	
Head Calculated	1000.0*	100.00	0.082	1.43	0.0986	1.717	100.00	100.00	

*Approximately 16.8% of sample dissolved during assay screening.

OPERATION												MESH	GRINDING PRODUCT %	%
TIME														
REAGENTS - LBS PER TON														
Ore -6 mesh	1000											+10		
												+14		
												+20		
												+28		
												+35		
												+48		
												+65		
												+100		
												+150		
MACHINE												+200		
R.P.M.												+325		
pH												-325		
% SOLIDS														
TEMPERATURE														

REMARKS:

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5217 Major Street
Murray, Utah 84107
Phone: 801-262-0922

PROJECT NO. P-1611
DATE 11/8/88
BY PT

TEST NO. 5 NAME A. F. Budge Iron King Tails

Bulk sulfide flotation for Au, Ag without slurry pH adjustment

Product	Weight	% Wt.	Assay Au	Assay Ag	Units Au	Units Ag	Distribution Au	Distribution Ag
+35 mesh	74.3	9.09	0.055	0.75	0.0050	0.068	4.94	4.07
-35m Cleaner Conc.	136.3	16.68	0.191	1.05	0.0319	0.175	31.49	10.46
-35m Cleaner Tails.	27.1	3.32	0.165	3.41	0.0055	0.113	5.41	6.75
-35m Rougher Tails.	579.3	70.91	0.083	1.86	0.0589	1.319	58.16	78.72
Head Calculated	1000.0*	100.00	0.083	1.37	0.1012	1.675	100.00	100.00
Rougher Conc.		20.00	0.187	1.44	0.0373	0.288	36.90	17.21
+35 mesh		9.09	0.055	0.75	0.0050	0.068	4.94	4.07
-35 mesh		90.91	0.106	1.77	0.0962	1.607	95.06	95.93

V1G

*Approximately 18.3% of sample dissolved in flotation pulp.

OPERATION		Screen At	-35 mesh Cond.	Ro.	Cl.					
TIME		35	10	7	5					
REAGENTS - LBS PER TON		Mesh								
Sample		1000								
Water		2000								
Orfom C-150* (.007 gm/)			0.20							
MIBC - F65				0.038						
MACHINE			2000	2000	500					
R.P.M.			800	800	800					
pH		2.4	2.4	2.4	2.7					
% SOLIDS										
TEMPERATURE										

GRINDING PRODUCT MESH	%	%
+10		
+14		
+20		
+28		
+35		
+48		
+65		
+100		
+150		
+200		
+325		
-325		

REMARKS: *From Phillips Chemical Co.

ASSAY REPORT SHEET

ASSAY LAB, INC.
1376 W. 8040 So. Unit #4
West Jordan, Utah 84084

Date Received ______________ Date Reported 11/11/88

Client Dawson Metallurgical Labs

Sample Identification	Oz/Ton Au	Oz/Ton Ag	Remarks
			* Ounces per ton of 2000 lbs.
P-1611			
A.F.Budge			
Test #4			
Iron King Comp.			
+100mesh	.026	<.05	
+200mesh	.046	.32	
+325mesh	.078	.32	
-325	.112	2.17	
Test #5			
Ro. Tail	.084	1.86	
	.082	1.86	
+35mesh	.056	.72	
	.053	.78	

Ronald Bianchi

ASSAY REPORT SHEET

ASSAY LAB, INC.
1376 W. 8040 So. Unit #4
West Jordan, Utah 84084

Date Received ______________ Date Reported 11/14/88

Client Dawson Metallurgical Labs

Sample Identification	Oz/Ton Au	Oz/Ton Ag	Remarks
			* Ounces per ton of 2000 lbs.
P-1611			
A.F.Budge			
Test #5			
Cl. Tails	.153mg	3.17mg	
Cl. Conc.	.192	1.05	
	.190	1.05	
Test #3			
Iron King Comp.			
Leach Sol'n.	.039	.26	
	.038	.26	

[signature]

ASSAY REPORT SHEET

ASSAY LAB, INC.
1376 W. 8040 So. Unit #4
West Jordan, Utah 84084

Date Received ______________ Date Reported 11/15/88

Client Dawson Metallurgical Labs

Sample Identification	Oz / Ton Au	Oz / Ton Ag	Remarks
			* Ounces per ton of 2000 lbs.
P-1611			
A.F.Budge			
Iron King Comp.			
Leach Residues			
Test #3			
Ro. Tails	.020	1.12	
	.020	1.12	
Comb.Cl. Tail	.034	2.33	
	.036	2.34	
#2 Cl. Conc.	.060	.76	
	.057	.76	
+35mesh	.055	.67	
	.057	.66	
P-1601A			
A.F.Budge			
Head Samples			
2 A.T.Dup.			
Comp. #3			
Lower 15-B	.0295	<.05	
	.0290	<.05	
Upper 0-15'	.0330	<.05	
	.0315	<.05	
Comp. #4			
Lower Bottom	.0310	<.05	
	.0304	<.05	

Ronald Bierenka

ASSAY REPORT SHEET

ASSAY LAB, INC.
1376 W. 8040 So. Unit #4
West Jordan, Utah 84084

Date Received ______________ Date Reported 11/7/88

Client Dawson Metallurgical Labs

Sample Identification	Oz / Ton Au	Oz / Ton Ag	Remarks
P-1611			* Ounces per ton of 2000 lbs.
A.F.Budge			
Test #1			
5'Channez #2			
Amine Ro. Conc.	.088	1.15	
	.088	1.19	

Ronald Bianchi

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November 17, 1988

A. F. Budge Mining Ltd.
4301 North 75th Street
Suite 101
Scottsdale, Arizona 85251

Attention: Mr. Dale Allen

Subject: Results of Laboratory Testing on a Grab Sample Composite of Iron King Tailings. Our Project No. P-1611.

Gentlemen:

In accordance with discussions with Mr. Dale Allen during his visit to our laboratory November 1, 1988, various laboratory tests were performed on a grab sample composite of Iron King Tailings. These tests were performed to determine if the tailings are amenable to cyanidation or flotation for recovery of contained gold and silver values. Specific testwork performed included:

- Assay screen analysis of as-received head sample.

- Selective gold-silver-copper-lead sulfide flotation of a screened (-35 mesh) sample.

- Bulk sulfide flotation of a screened (-35 mesh) sample.

- Cyanide leach of a screened (-35 mesh) sample, followed by flotation of sulfides from the leach residue with amine.

I. Sample Description And Head Analysis

Two separate tailings grab samples weighing five kilograms each were submitted to our laboratory November 1, 1988, by Mr. Dale Allen and assigned our Lot No. P-1611. These samples contained approximately ten percent moisture and consisted of fine, free flowing tailings and agglomerated clumps. These two samples were combined, air dried, and crushed through ¼ inch to break up the hardened clumps prior to testing. A head sample was not split out prior to testing, however, back-calculated heads from testwork are presented on the following page.

P-1611: A. F. Budge Mining
Head Assay Results: Iron King Tails

	Back-Calculated* Head Assay oz/ton	
	Au	Ag
Iron King Composite Grab Sample	0.079	1.39

*Average of 3 tests

Visual examination of the sample under the binocular microscope indicated abundant fine pyrite (10-15 percent of the total sample). A few grains of bornite were also detected.

II. Test Results

Test results presented in this section are also included in individual test data sheets attached to the end of this report.

A. Summary

The pyrite in this sample of Iron King Tailings responds well to flotation in a naturally acid pulp of pH 2.4 using Phillips Chemical Orfom C-150. Unfortunately only 33 percent of the gold and 11 percent of the silver was contained in this product, indicating that most of the gold and silver is probably associated with non-sulfide minerals. Attempts to produce a selective sulfide concentrate containing sulfides other than pyrite were unsuccessful.

Approximately 62 percent of the gold (0.046 oz/ton of ore) and 22 percent of the silver (0.30 oz/ton of ore) was extracted by direct cyanidation of the minus 35 mesh fraction of the tailings. Cyanide and lime consumption was 7.8 and 78 pounds per ton of sample, respectively. The sample required screening at 35 mesh to remove agglomerated chunks which did not break down, even after 30 minutes agitation at 40 percent solids.

B. Head Assay Screen

This Iron King Tailings sample contains approximately 76 percent minus 325 mesh material. Most of the gold and silver is contained in this size fraction, as indicated on the following page.

P-1611: A. F. Budge Mining
Head Assay Screen Results (Test No. 4)

Screen Fraction Mesh	Weight Percent	Assay, oz/ton Au	Assay, oz/ton Ag
+100	5.10	0.026	<0.05
-100 +200	8.31	0.046	0.32
-200 +325	10.26	0.078	0.32
-325	76.34	0.112	2.17
Total	100.00	0.082	1.43

Between 17 and 18 percent of the tailings weight dissolved during wet screening. The water used in wet screening was dark brown in color and was quite acidic (pH ~4), indicating probable dissolution of iron salts.

C. Selective Flotation of Sulfides

Attempts to selectively float sulfides other than pyrite in an effort to produce a possible high grade gold and silver concentrate were unsuccessful. Approximately 140 lb/ton of lime was required to raise the flotation pulp pH from 2.3 to 5.5 prior to adding a small amount (0.005 lb/ton) of isopropyl xanthate. No sulfide flotation was achieved until 0.065 lb/ton xanthate was added. Unfortunately all the sulfides floated at this reagent addition and the test was discarded.

D. Bulk Sulfide Flotation

Bulk sulfide flotation of this Iron King Tailings composite without pH adjustment recovered 32 percent of the gold and 11 percent of the silver in a pyrite cleaner concentrate assaying 0.191 oz/ton gold and 1.05 oz/ton silver. Approximately 17 percent of the sample weight was recovered into this product, as indicated on the following page.

P-1611: A. F. Budge Mining
Bulk Sulfide Flotation Results (Test 5)

Product	Weight Percent	Assay, oz/ton Au	Assay, oz/ton Ag	Distribution, % Au	Distribution, % Ag
+35 Mesh	9.09	0.055	0.75	4.94	4.07
-35M. Cleaner Conc.	16.68	0.191	1.05	31.49	10.46
-35M. Cleaner Tails	3.32	0.165	3.41	5.41	6.75
-35M. Rougher Tails	70.91	0.083	1.86	58.16	78.72
Total (Calc.)	100.00	0.083	1.37	100.00	100.00

This test was performed at an unadjusted pulp pH of 2.4 using an acid resistant collector Orform C-150, manufactured by Phillips Chemical Company. This reagent produced a clean pyrite cleaner flotation concentrate, with very little sulfides in the flotation tailings. The low gold and silver content of the pyrite cleaner concentrate indicates significant gold and silver association with non-sulfide minerals.

Approximately 18 percent of the tailings weight dissolved during test work. Although the tailings sample was agitated at 40 percent solids for 30 minutes prior to testing, some agglomerates would not break down, and the pulp was therefore screened at 35 mesh prior to flotation.

E. Cyanidation And Flotation Of The Leach Residue

Cyanidation of a screened (minus 35 mesh) sample extracted 62 percent of the contained gold and 22 percent of the silver, as indicated on the following page.

P-1611: A. F. Budge Mining
Cyanidation Results (Test 3)

Product	WGT %	Assay, oz/ton Au	Assay, oz/ton Ag	Distribution, % Au	Distribution, % Ag
+35 Mesh*	7.8	0.056	0.67	5.60	3.54
Leach Solution	-	0.039	0.26	62.36	21.94
Leach Residue	92.2	0.027	1.19	32.04	74.53
Total	100.0	0.068	1.29	100.00	100.00

NaCN Consumed: 7.8 lb/ton sample
Lime Consumed: 77.9 lb/ton sample
*This fraction was not leached.

Some acid was washed from the sample by screening out the +35 mesh material. Therefore, the actual lime consumption projected for treating the total tailings sample would approach the 140 lb/ton figure calculated from the selective sulfide flotation test.

Approximately 31 percent of the gold and nine percent of the silver was recovered by bulk sulfide flotation of the cyanide leach residue.

P-1611: A. F. Budge Mining
Cyanide Leach Residue Flotation Test 3)

Product	WGT %	Assay, oz/ton Au	Assay, oz/ton Ag	Distribution, % Au	Distribution, % Ag
No. 2 Cleaner Conc.	14.4	0.059	0.76	31.28	9.18
Combined Cleaner Tails	9.9	0.035	2.34	12.83	19.53
Rougher Tails	75.7	0.020	1.12	55.89	71.29
Total	100.0	0.027	1.19	100.00	100.00

This flotation concentrate was produced using 0.75 lb/ton Armac T (Tallow Amine Acetate Salt) at a pulp pH of 10.0.

III. Test Results

Results presented in this section are also included in Test Data Sheets attached to the end of this report.

A. Head Assay Screen

One thousand grams of sample was slurried at 40 percent solids in a high speed Waring blender for ten minutes to break up any clumps in the sample. The sample was then wet screened at 100, 200 and 325 mesh. Each fraction was dried, weighed and submitted for gold and silver assay.

B. Selective Sulfide Flotation

One thousand grams dry equivalent weight of sample was slurried at 40 percent solids, agitated for 30 minutes, and screened at 35 mesh. The minus 35 mesh fraction was conditioned five minutes in a 1000 gram Agitair flotation machine with 120 lb/ton hydrated lime to raise the pulp pH from 2.4 to 5.5. A small amount (0.005 lb/ton) of Cyanamid sodium isopropyl xanthate was added, and a rougher concentrate floated for one minute. Additional lime was added to the rougher tailings to maintain pH 5.5, and another 0.010 lb/ton xanthate added, however, no sulfide mineralization in the froth was noted until 0.065 lb/ton xanthate was added. This reagent addition floated all the pyrite in the sample, therefore, the test was discarded.

C. Bulk Sulfide Flotation

One thousand grams of sample was slurried and screened at 35 mesh as previously described. The minus 35 mesh material was conditioned for ten minutes in an Agitair flotation machine with 0.20 lb/ton Phillips Chemical Orfom C-150 Collector at a naturally acidic pulp pH of 2.4. A rougher concentrate was then floated for seven minutes using a small amount (0.038 lb/ton) of MIBC-F65 frother mixture to maintain a stable froth. The rougher concentrate was cleaned once for seven minutes without additional reagents.

D. Cyanidation And Flotation Of The Leach Residue

Approximately 932 grams of sample was slurried and screened at 35 mesh as previously described. The minus 35 mesh material was adjusted to pH 10.5 - 11.0 with hydrated lime and cyanide added to provide a leach solution containing ten lb NaCN per ton (initial concentration). The slurry was then bottle roll leached at 43 percent solids for 48 hours.

The slurry was weighed, filtered and the filter cake washed once and placed in a 1000 gram agitair flotation cell. The slurry was conditioned for five minutes with 0.5 lb/ton carboxymethylcellulose (CMC) slimes dispersant and 0.5 lb/ton Armac T (Tallow Amine Acetate). The pulp pH was 10.0. A rougher concentrate was then floated for six minutes. The rougher tailings were then conditioned for two minutes with another 0.25 lb/ton Armac T and a second rougher concentrate floated for three minutes. The rougher concentrates were combined and cleaned twice without additional reagents.

No further test work is planned on this sample.

If you have any questions or comments concerning this test work, please call.

Sincerely,

DAWSON METALLURGICAL LABORATORIES, INC.

Philip Thompson
Vice President

PT/fg

Enclosures

cc: Mr. Frank Millsaps
3865 Wasatch Blvd.
Room 2021
Salt Lake City, Utah 84109

DAWSON METALLURGICAL LABORATORIES, INC.
P. O. Box 7685
5217 Major Street
Murray, Utah 84107
Phone: 801-262-0922

PROJECT NO. P-1611
DATE 11/1/88
BY MT

TEST NO. 1 NAME A. F. Budge (5' channel #2)

As received NaCN leach, filter and wash once with 500 ml H20. Sulfide float on washed residue.

PRODUCT	Weight	PERCENT WEIGHT		ASSAY Au	Ag			UNITS			DISTRIBUTION				
+35 mesh	144.1														
Amine Ro. Conc.	158.8			0.088	1.17										
Amine Ro. Tails	692.3														
Total (Calc)	995.2														

OPERATION			Leach	Leach		Screen	-35 mesh Cond.	Ro.	Ro. #1	Ro. #2		GRINDING PRODUCT	
TIME			1:00	2:00		At	5	1	2 - 2	2 - 4			
REAGENTS - LBS PER TON			Start	Stop		35 Mesh							
												MESH	%
As received ore gm	1100											+10	
Water gm	900											+14	
Lime gm		65.0										+20	
NaCN gm			5.0									+28	
NaCN Titration												+35	
CaO Titration												+48	
KAX							0.010					+65	
Na_2SiO_3							1.0	Armact	0.5	0.5		+100	
								CMC	0.5			+150	
MACHINE												+200	
R.P.M.												+325	
pH	1.9		10.5	11.0			10.3					-325	
% SOLIDS													
TEMPERATURE													

REMARKS:

DAWSON
METALLURGICAL
LABORATORIES, INC.

P. O. Box 7685
5217 Major Street
Murray, Utah 84107
Phone: 801-262-0922

PROJECT NO. P-1611
DATE 11/1/88
BY PT

TEST NO. 2 NAME A. F. Budge Iron King 5' channel #2

Selective Ag-Cu-Pb flotation from -35 mesh screened sample, followed by bulk sulfide for pyrite

PRODUCT	Weight	PERCENT WEIGHT	ASSAY					UNITS			DISTRIBUTION				
				DISCARD TEST - NO SELECTIVITY											

OPERATION		Screen At	Cond	No 1 Ro	No 2 Ro	No 3 Ro
		-35 mesh				
TIME		35	5	1	2 - 2	2 - 5
REAGENTS - LBS PER TON						
Sample Wgt	1100					
Water - as required						
NAIPX			0.005		0.010	0.050
Lime			60.0		10.0	
Na_2SiO_3					1.0	
KAX						0.050
MACHINE			1000	1000	1000	1000
R.P.M.			800	800	800	800
pH		2.3	5.8	4.5	5.5	5.4
% SOLIDS						
TEMPERATURE						

GRINDING PRODUCT

MESH	%
+10	
+14	
+20	
+28	
+35	
+48	
+65	
+100	
+150	
+200	
+325	
-325	

REMARKS:

DAWSON METALLURGICAL LABORATORIES, INC.
P. O. BOX 7685
5217 Major Street
Murray, Utah 84107
Phone: 801-262-0922

PROJECT NO. P-1611
DATE 11/7/88
BY MT

TEST NO. 3 NAME A. F. Budge Iron King Comp

48 hour NaCN leach on -35 mesh material (with 10 lbs/ton NaCN soln, 50% solids)

Product	Weight	Assay Au	Assay Ag	Units Au	Units Ag	Distribution Au	Distribution Ag	
+35mesh	68.0	0.056	0.67	0.0381	0.456	5.60	3.54	V1C
-35m Leach Solution	1087.1	0.039	0.26	0.4240	2.826	62.36	21.94	
-35m Leach Residue	806.9	0.027	1.19	0.2179	9.602	32.04	74.53	
Head Calculated	932.0	0.073	1.38	0.6799	12.884	100.00	100.00	

Product	Weight	% Wt.	Assay Au	Assay Ag	Units Au	Units Ag	Distribution Au	Distribution Ag	V1G
L.Res.#2 Cl. Conc.	115.9	14.36	0.059	0.76	0.0085	0.109	31.28	9.18	
L.Res.Comb Cl Tails	80.1	9.93	0.035	2.34	0.0035	0.232	12.83	19.53	
L.Res.Ro. Tails.	610.9	75.71	0.020	1.12	0.0151	0.848	55.89	71.29	
Head Calculated	806.9	100.00	0.027	1.19	0.0271	1.189	100.00	100.00	
L.Res.Rougher Con.		24.29	0.049	1.41	0.0119	0.341	44.11	28.71	

								Leach residue amine flot.					GRINDING PRODUCT	
OPERATION			Leach					Cond	#1 Ro.	#2 Ro.	Cl.	Cl.		
TIME			9:45	24 hr.		48 hr.		5	6	2 - 3	7	7		
REAGENTS - LBS PER TON			Start			Off								
												MESH	%	%
-35 mesh	932											+10		
Water	932											+14		
Lime		37.0			2.0							+20		
NaCN			4.67									+28		
NaCN Titration, lb/ton soln						1.42						+35		
CaO Titration, lb/ton soln						0.05						+48		
NaCN Consumed, lb/ton ore						7.8	Armact	0.5		0.25		+65		
Lime Consumed, lb/ton ore						77.9	CMC	0.5				+100		
												+150		
MACHINE								1000	1000	1000	500	+200		
R.P.M.								800	800	800	800	+325		
pH	2.2		11.2	10.3		10.6		10.0				-325		
% SOLIDS														
TEMPERATURE														

REMARKS:

DML
DAWSON METALLURGICAL LABORATORIES, INC.
P. O. BOX 7685
5217 Major Street
Murray, Utah 84107
Phone: 801-262-0922

PROJECT NO. P-1611
DATE 11/7/88
BY MT

TEST NO. 4 NAME A. F. Budge Iron King Comp

Assay Screen of -6 mesh sample

Product	Weight	% Wt.	Assay Au	Assay Ag	Units Au	Units Ag	Distribution Au	Distribution Ag	V1G
+100 mesh Head	42.4	5.10	0.026	0.02	0.0013	0.001	1.34	0.06	
100/200 mesh Head	69.1	8.31	0.046	0.32	0.0038	0.027	3.87	1.55	
200/325 mesh Head	85.3	10.26	0.078	0.32	0.0080	0.033	8.11	1.91	
-325 mesh Head	634.9	76.34	0.112	2.17	0.0855	1.657	86.67	96.48	
Head Calculated	1000.0*	100.00	0.082	1.43	0.0986	1.717	100.00	100.00	

*Approximately 16.8% of sample dissolved during assay screening.

OPERATION													GRINDING PRODUCT	
TIME														
REAGENTS - LBS PER TON														
												MESH	%	%
Ore -6 mesh	1000											+10		
												+14		
												+20		
												+28		
												+35		
												+48		
												+65		
												+100		
												+150		
MACHINE												+200		
R.P.M.												+325		
pH												-325		
% SOLIDS														
TEMPERATURE														

REMARKS:

DAWSON
METALLURGICAL
LABORATORIES, INC.

P. O. BOX 7685
5217 Major Street
Murray, Utah 84107
Phone: 801-262-0922

PROJECT NO. P-1611
DATE 11/8/88
BY PT

TEST NO. 5 NAME A. F. Budge Iron King Tails

Bulk sulfide flotation for Au, Ag without slurry pH adjustment

V1G

Product	Weight	% Wt.	Assay Au	Assay Ag	Units Au	Units Ag	Distribution Au	Distribution Ag
+35 mesh	74.3	9.09	0.055	0.75	0.0050	0.068	4.94	4.07
-35m Cleaner Conc.	136.3	16.68	0.191	1.05	0.0319	0.175	31.49	10.46
-35m Cleaner Tails.	27.1	3.32	0.165	3.41	0.0055	0.113	5.41	6.75
-35m Rougher Tails.	579.3	70.91	0.083	1.86	0.0589	1.319	58.16	78.72
Head Calculated	1000.0*	100.00	0.083	1.37	0.1012	1.675	100.00	100.00
Rougher Conc.		20.00	0.187	1.44	0.0373	0.288	36.90	17.21
+35 mesh		9.09	0.055	0.75	0.0050	0.068	4.94	4.07
-35 mesh		90.91	0.106	1.77	0.0962	1.607	95.06	95.93

*Approximately 18.3% of sample dissolved in flotation pulp.

OPERATION	Screen At	-35 mesh Cond.	Ro.	Cl.
TIME	35	10	7	5
REAGENTS - LBS PER TON	Mesh			
Sample	1000			
Water	2000			
Orfom C-150* (.007 gm/)		0.20		
MIBC - F65			0.038	
MACHINE		2000	2000	500
R.P.M.		800	800	800
pH	2.4	2.4	2.4	2.7
% SOLIDS				
TEMPERATURE				

GRINDING PRODUCT

MESH	%	%
+ 10		
+ 14		
+ 20		
+ 28		
+ 35		
+ 48		
+ 65		
+ 100		
+ 150		
+ 200		
+ 325		
-325		

REMARKS: *From Phillips Chemical Co.

ASSAY REPORT SHEET

ASSAY LAB, INC.
1376 W. 8040 So. Unit #4
West Jordan, Utah 84084

Date Received ____________ Date Reported 11/11/88

Client Dawson Metallurgical Labs

Sample Identification	Oz/Ton Au	Oz/Ton Ag	Remarks
			* Ounces per ton of 2000 lbs.
P-1611			
A.F.Budge			
Test #4			
Iron King Comp.			
+100mesh	.026	<.05	
+200mesh	.046	.32	
+325mesh	.078	.32	
-325	.112	2.17	
Test #5			
Ro. Tail	.084	1.86	
	.082	1.86	
+35mesh	.056	.72	
	.053	.78	

Ronald Bianchi

ASSAY REPORT SHEET

ASSAY LAB, INC.
1376 W. 8040 So. Unit #4
West Jordan, Utah 84084

Date Received ____________ **Date Reported** 11/14/88

Client Dawson Metallurgical Labs

Sample Identification	Oz / Ton Au	Oz / Ton Ag	Remarks
			* Ounces per ton of 2000 lbs.
P-1611			
A.F.Budge			
Test #5			
Cl. Tails	.153mg	3.17mg	
Cl. Conc.	.192	1.05	
	.190	1.05	
Test #3			
Iron King Comp.			
Leach Sol'n.	.039	.26	
	.038	.26	

Arnold Bianchi

ASSAY REPORT SHEET

ASSAY LAB, INC.
1376 W. 8040 So. Unit #4
West Jordan, Utah 84084

Date Received ____________ Date Reported 11/15/88

Client Dawson Metallurgical Labs

Sample Identification	Oz / Ton Au	Oz / Ton Ag	Remarks
			* Ounces per ton of 2000 lbs.
P-1611			
A.F.Budge			
Iron King Comp.			
Leach Residues			
Test #3			
Ro. Tails	.020	1.12	
	.020	1.12	
Comb.Cl. Tail	.034	2.33	
	.036	2.34	
#2 Cl. Conc.	.060	.76	
	.057	.76	
+35mesh	.055	.67	
	.057	.66	
P-1601A			
A.F.Budge			
Head Samples			
2 A.T.Dup.			
Comp. #3			
Lower 15-B	.0295	<.05	
	.0290	<.05	
Upper 0-15'	.0330	<.05	
	.0315	<.05	
Comp. #4			
Lower Bottom	.0310	<.05	
	.0304	<.05	

ASSAY REPORT SHEET

ASSAY LAB, INC.
1376 W. 8040 So. Unit #4
West Jordan, Utah 84084

Date Received ____________ Date Reported 11/7/88

Client Dawson Metallurgical Labs

Sample Identification	Oz / Ton Au	Oz / Ton Ag	Remarks
P-1611			* Ounces per ton of 2000 lbs.
A.F.Budge			
Test #1			
5'Channez #2			
Amine Ro. Conc.	.088	1.15	
	.088	1.19	

Ronald Bianchi

M E M O

TO: Carole A. O'Brien, A.F. Budge, Ron R. Short

FROM: Don White

DATE: November 3, 1988

SUBJECT: Eddie Basha's submittal, Mt. Union vicinity, Yavapai Co., AZ

INTRODUCTION: Carole O'Brien was provided several reports on a series of vein gold occurrences, some with historical production, on the west flank of Mt. Union about 14 miles south of Prescott, Arizona. The data was provided by Harvey Smith and was mainly Gerald Mathis' collections of historical data from published sources plus some metallurgical test results on dump samples and some recent assays.

The property is called variously the "B&C", Hassayampa Golden Girl, the EDG Mining Venture, the Wilson Property or by the various patent names and/or major vein names within the claim group. Patent names of import are the Alligator and Evergreen. Vein names from other records include the Crook vein (also called the Westerner) Premium vein, Storm Cloud vein, Vanderbilt vein, and the Ella Wick vein.

Having reviewed the file provided plus other published and unpublished information on the Hassayampa District veins, I spent one day traversing the claim block to inspect the old workings and outcrops. Because of the steep relief, heavy forest and undergrowth cover, and old age of the workings, this property is a case in which there is at least as much to be learned from the records as there is from on-site work. In fact, when it comes to assays, the old data is much more valuable than new surface or dump samples. Much sampling has already been done and my own coverage could not improve upon it without a major program. So no new samples were collected.

TYPE OF MINERALIZATION: All the mineralization is structurally controlled, NNE-trending fissure-filling veins (see accompanying map). The veins are quartz with or without calcite, pyrite, base-metal sulfides, gold, and silver. Thus they are very much like the McCabe Mine now in production at Humboldt and the Carter-Raymond and Gold Links-Sacramento Mines near Gunnison, Colorado, looked at on your behalf a couple years ago.

Veins are typically thin, up to about 6 feet in thickness but the "pay streak" in each is rarely over 2 feet thick. Of the large system of veins, the two most productive are northwest of Basha's claims. They are the Senator and Cash Mines. The Senator vein mineralization was up to 18 inches thick, the Cash up to 30 inches thick. Ore shoots plunge along the veins and average 200 feet wide and about 500 high. This gives 10,000 to 20,000 ton ore shoots.

Most of the value of the vein rock is in gold. Silver is far subordinate, as are copper, lead, and zinc for those sectors of veins carrying chalcopyrite, galena, and sphalerite respectively. The one main ore shoot of the Senator vein ran about one ounce gold per ton. Small sectors of each of the other veins ran about that as well, particularly in the oxide zone. Oxidation rarely extends more than 40 feet beneath the surface. Most of the historical mining activity was during the 1880's and 90's and developed only the oxide zone. Only at the Senator and Cash Mines were ore shoots found to be profitable into the sulfide zone.

The range of production grades for veins within Basha's claim block is about 0.2 to 0.5 oz/t Au. The average of many underground assays taken in the 1920's is reportedly 0.28 oz/t Au.

LOGISTICS: The claim area is very steep and rugged. While there are some access roads to adit portals, they are old wagon routes only. Others are just burro trails. Access for exploration drilling would necessarily involve bulldozed terrace-like roads through thick Ponderosa Pine forest and past bold outcrops requiring blasting. A track-mounted rig would probably be necessary.

Small tonnage deposits occurring as narrow veins could not possibly justify new shaft sinking at today's gold price ($400./oz). Thus one may only consider that potential approachable by adit from say 6,400 ft. elevation along the Senator "Highway" (rarely graded, one lane, Forest Service road) south of the claim block. This limits the height of potential finds to a maximum of about 500 feet at the northern edge of the claim block and much less than that closer to the portals.

Winter weather at about 7,000 feet in the Bradshaws is often quite snowy. Road access is cut off 2-3 months of the year and interrupted other times by fall and spring snows. A partial operating year would have to be planned on.

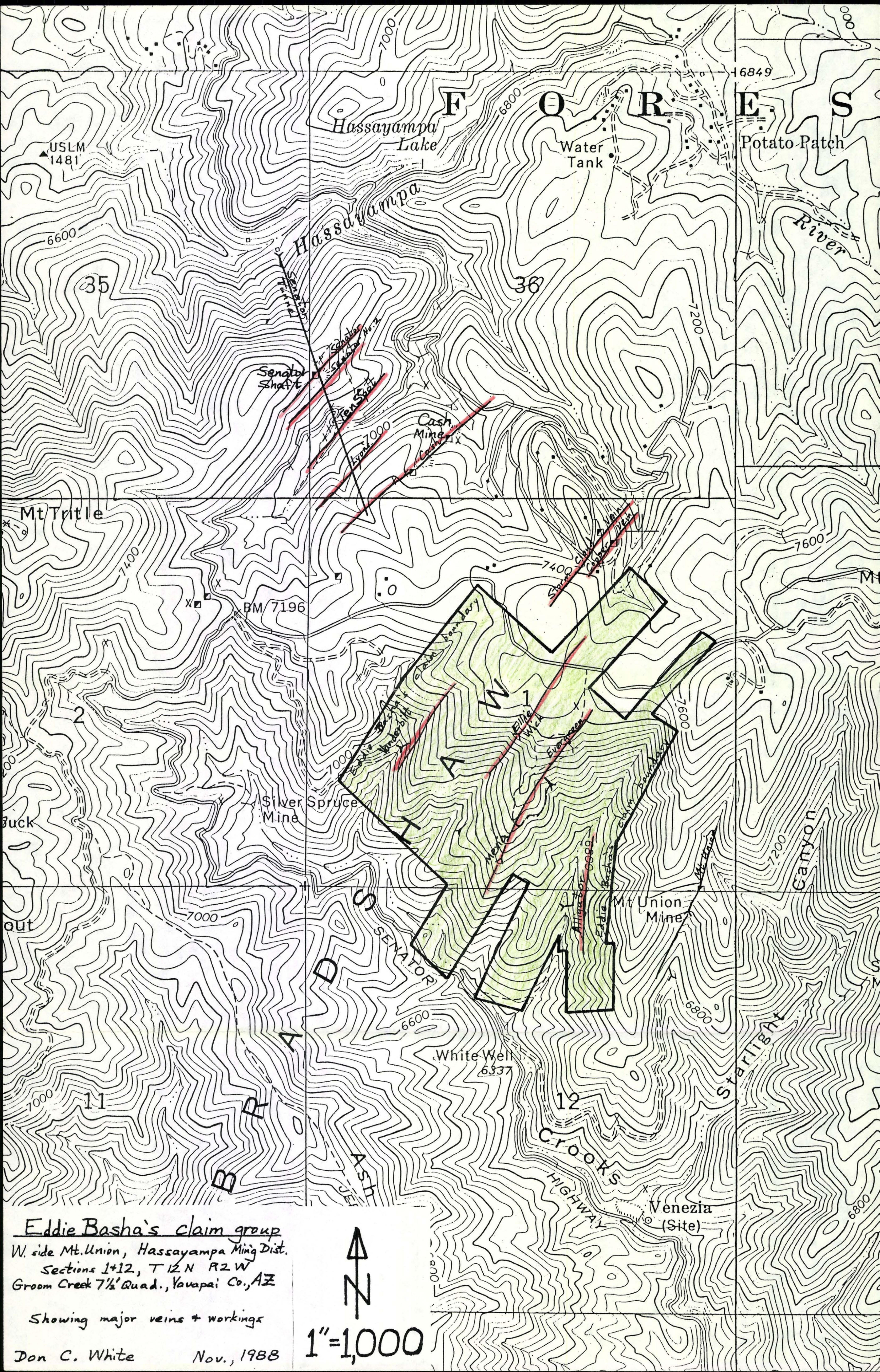
Because of the thinness of the pay streak in each vein, and the lack of disseminated mineralization in the wall rock, dilution would be a major problem. A 12-inch vein of, say optimistically 0.4 oz/t Au, diluted to a mere 4-foot mining width would yield 0.1 oz/t diluted grade. Thus split shooting and strict waste versus ore segregation would have to be the practice. Such techniques are costly.

The product of such mining would be a polymetallic sulfide and quartz ore. It would not likely be the best silica flux if very much aluminous wall rock is included. It may lend itself to flotation concentration and cyanidation as at McCabe but would have to be shipped. There would not be enough tonnage to justify a mill on site.

CONCLUSIONS: Basha's claims have potential for no more than about four ore shoots of average 15,000 short tons each from adit level to ground surface; say 60,000 tons total at the historical production grade of 0.28 oz/t Au. Such bodies would be thin and fraught with mining and dilution difficulties. They would be very difficult to locate by any but the most comprehensive exploration drilling program.

RECOMMENDATIONS: I do not see Basha's claim group as an attractive exploration target at the present time. If access is improved, mining technology is improved for narrow veins and/or ore segregation, and most critically, the gold price strengthens substantially, then it may be reconsidered. I believe at least $800./oz gold will be required to justify very serious expenditures there. Till then I do not recommend Budge's involvement.

DW:sk



Eddie Basha's claim group
W. side Mt. Union, Hassayampa Ming Dist.
Sections 1+12, T 12 N R 2 W
Groom Creek 7½' Quad., Yavapai Co., AZ

Showing major veins + workings

1"=1,000

Don C. White Nov., 1988

Carole

2.1.29 → 2.4.3

Don White
521 East Willis St.
Prescott, AZ 86301
602-778-3140

June 2, 1988

Robert Crook
Iron King Assay Inc.
Prescott Valley, AZ

Dear Bob & Kati,

Accompanying are forty nine (49) samples of tailings, each for gold (only) fire assay, AA followup, one assay ton in all cases. Please send the results and billing to Carole A. O'Brien, copy to me, as usual. Please save both pulps + rejects.

Samples are numbered:

1 T-54-A Ø-3
2 " 3-7
3 TR-1-A-Ø-5
4 " 5-10
5 " 10-14
6 T-101-Ø-3
7 " 3-6
8 " 6-9
9 T-102-Ø-2
10 T-103-Ø-2
11 T-104-Ø-3
12 T-105-Ø-3
13 " 3-4
14 T-106-Ø-2
15 T-107-Ø-3
16 " 3-6
17 " 6-9
18 T-108-Ø-3
19 3-6
20 6-8
21 T-109-Ø-3
22 T-110-Ø-1
23 T-111-Ø-3
24 " 3-5
25 T-112-Ø-2
26 T-113-Ø-3
27 T-114-Ø-3
28 " 3-5
29 T-115-Ø-3
30 " 3-6
31 T-116-Ø-3
32 " 3-6
33 " 6-8
34 T-117-Ø-4
35 T-118-Ø-3
36 " 3-5
37 T-119-Ø-3
38 " 3-6
39 " 6-8
40 T-120-Ø-3
41 " 3-6
42 " 6-9
43 " 9-12
44 " 12-14
45 T-121-Ø-3
46 " 3-6
47 T-122-Ø-3
48 " 3-6
49 " 6-9

Thank You!
Don White
Enclosures + CPG.

Conde

AUTHOR INFORMATION FORM: Please return this form as soon as possible to Northwest Mining Association, 414 Peyton Building, Spokane, WA 99201.

SESSION INFORMATION:

SESSION: Precious Metals in Base Metal Massive Sulfides

TIME: 2:15 pm DATE: Nov. 30

LOCATION: N. + Center Ballrooms, Sheraton

PAPER INFORMATION:

TITLE: Precious Metals at the United Verde Extension Mine, a Volcanogenic Base Metal Sulfide Deposit, Jerome, Arizona

TIME OF DELIVERY: 3:45 pm.

✓ Yes, my paper will be available for publication before the convention. I will send it to the Northwest Mining Association before November 1.

_____ Yes, my paper will be available but I will not be able to meet the November 1 publication date; I will bring the paper with me to the convention and deliver it to Carla Snyder in the Registration Area (South C Ballroom, Sheraton Hotel).

_____ I have no objection to making my paper available but do not have ample time to prepare the final copy. The Northwest Mining Association may tape my talk and send the typed draft to me for editing after the convention.

_____ No, my paper will not be available for publication.

AUTHOR INFORMATION:

Please type or print the following information:

NAMES: Don C. White (and) Robert W. Hodder
(Give full name as you wish to have it printed)

TITLES: Geologist | Chairman, Dept. of Geology

COMPANY: Independent | Univ. of Western Ontario

ADDRESS: 521 East Willis St. | London, Ontario

Prescott, AZ 86301 ~~ZIP CODE:~~ Canada N6A 5B7

TELEPHONE: 602-778-3140 FAX:

Please attach a copy of your biography or type a short biographical sketch on the opposite side of this page for publicity purposes.

Thank you.

Don C White

Speaker - sign here

Carole

Don White
521 East Willis St.
Prescott, AZ 86301
778-3140

June 10, 1988

Robert Crook
Iron King Assay Inc.
Prescott Valley, AZ

Dear Bob & Kati,

Accompanying are forty five (45) samples of tailings, each for gold (only) fire assay, AA followup, one assay ton.

Please send the results and billing to Carole A. O'Brien, copy to me, as usual. Please save both pulps & rejects.

The samples are numbered:

1	T-123	ϕ-3	21	T-127	3-6	41	T-133	3-6
2	"	3-6	22	"	6-9	42	T-134	ϕ-3
3	"	6-9	23	"	9-12	43	"	3-6
4	"	9-12	24	"	12-15	44	"	6-9
5	"	12-15	25	"	15-16	45	"	9-12
6	"	15-17	26	T-128	ϕ-3			
7	T-124	ϕ-3	27	"	3-5			
8	"	3-6	28	T-129	ϕ-2			
9	"	6-9	29	T-130	ϕ-3			
10	"	9-12	30	"	3-6			
11	"	12-15	31	"	6-9			
12	T-125	ϕ-3	32	"	9-12			
13	"	3-6	33	"	12-15			
14	T-126	ϕ-3	34	"	15-16			
15	"	3-6	35	T-131	ϕ-3			
16	"	6-9	36	"	3-6			
17	"	9-12	37	"	6-8			
18	"	12-15	38	T-132	ϕ-3			
19	"	15-17	39	"	3-4			
20	T-127	ϕ-3	40	T-133	ϕ-3			

Thank you,
Don White
Geologist, C.P.G.

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Carole

M E M O

TO: R. Short, C.A. O'Brien, A.F. Budge
cc: R.W. Hodder

FROM: Don C. White

DATE: June 14, 1988

SUBJECT: U.V.X. preliminary geochemical trends and correlations based upon Bondar-Clegg analytical data

With the first Bondar-Clegg & Co. Ltd. instrumental nuclear activation analyses (INAA) in hand, several types of studies have been undertaken. They include graphic and statistical analyses of the geochemical trends within and between the 902 and 911 areas samples. Samples are now pending for the 809 (northwest) area to compare and contrast that with the middle and southeast portions of the Verde target overall.

Iron King's work has been pretty much limited to gold and silver assays. Only on select samples have we run base metals and iron. The INAA technique yields precious metal checks, iron analyses, and 31 other elements of geochemical significance for only $1. more per sample than I.K. charged for Cu, Pb, Zn and Fe only.

The first task performed on the INAA data was checking of precious metal assays. The following two graphs demonstrate what a linear relation there is between Iron King's fire assays (with atomic absorption finish, as needed) versus Bondar-Clegg's INAA work. The lack of undue spread around the trend line speaks well for the accuracy of both labs and the validity of both analytical techniques.

The iron analyses are plotted graphically (attached) and will be fully incorporated into the reserve tally. They already point up that the yellow, goethitic grit and saccharoidal silica can be very much more ferruginous (and thus less siliceous) than one would guess based upon visual inspection and heft. This is of major importance to the saleability of silica smelter flux. For that reason alone we may have to perform many more of these analyses to better document the iron distribution. A separate study of that issue will be made.

Graphic plots of two vertical sections, one in the 902 area (223°) and one in the 911 area (230°) are accompanying for each element of the INAA suite except those where all results were below detection limit. They are contoured geometrically and colored to highlight each metal's distribution. By comparing each overlay to the initial lithology base or to the precious metal distributions, one may discern the Au and Ag associates and halo elements.

Another method that further quantifies the assocation of metals within the U.V.X. silica lithologies is statistical analysis. With 85 initial samples and 23 useful elements for each, one has statistically significant amounts of data to make many tests. Thus I had a friend with the proper software, Pat O'Hara, apply some statistical analyses as follows:

Carole —
A.F.B.'s copy has
the colored sections
with it. Also RWH's,
Ron Short's, Holly's,
my own. If you'd
like them, we'll make
them but 6 copies

1) Standard statistics, by element, for each lithology (i.e., mean, standard deviation, skewness).

2) Log (base 10) correlation matrix between elements for all lithologies.

3) Factor analysis; all samples and grit only.

4) Cluster analysis; all samples and grit only.

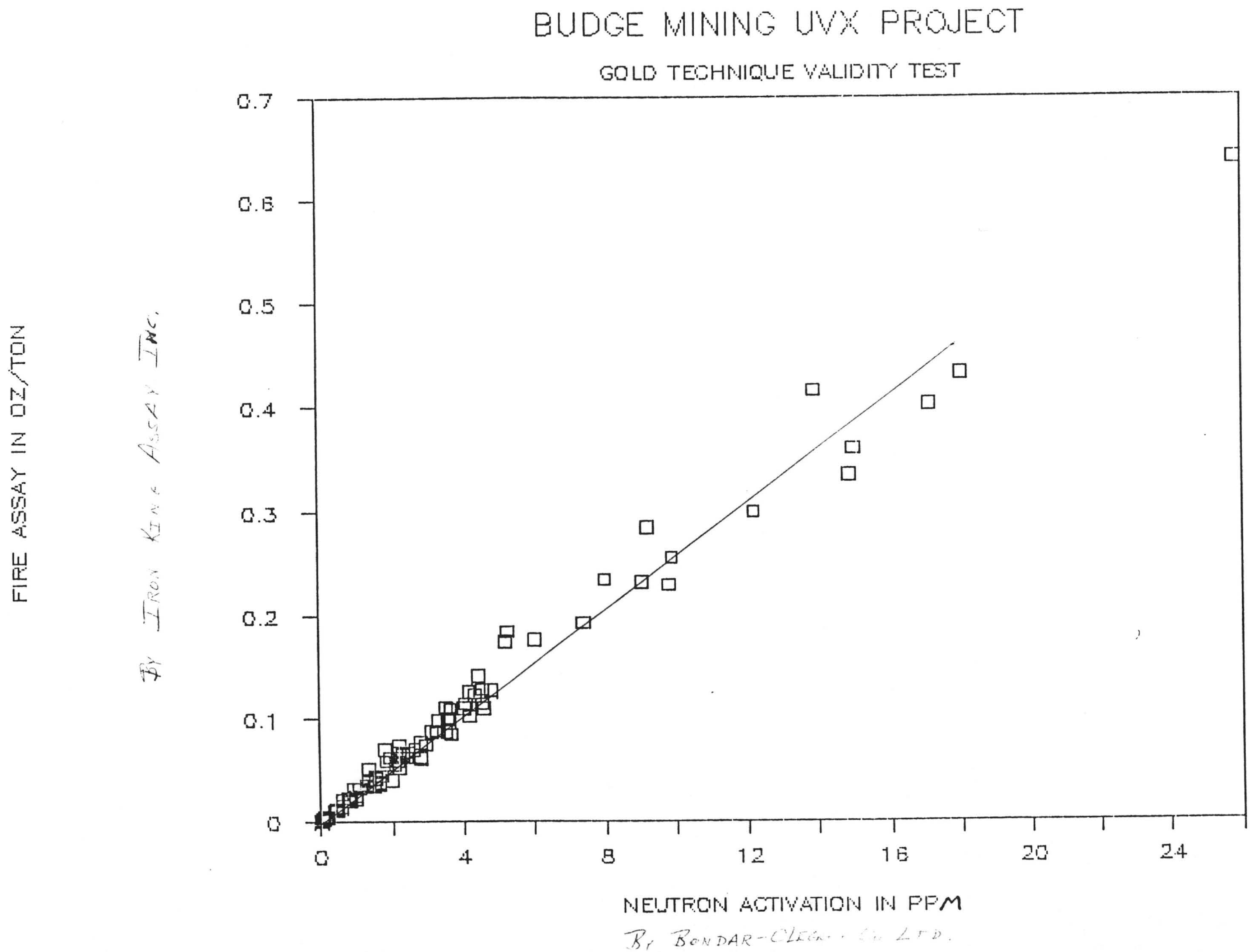
5) Discriminant analysis; by lithology, by elevation (up-dip versus down-dip position) and by position along strike (i.e., 902 versus 911 areas).

6) Frequency histograms; by element, all lithologies.

As the product of Pat's computer - generated statistical analysis was rather voluminous, I have prepared the following annotated charts to highlight the more useful facts. They include charts of mean elemental concentrations by lithology, correlation coefficients, and element suites yielded by the factor analysis and careful consideration of the correlation data. I believe the charts are succinct enough that I needn't try to reiterate their meaning here.

When this data is combined with the 809 area we shall have a good handle on the geochemical variations throughout the length of the Verde area. A fuller summary of its meaning and usefulness will follow at that time.

DW:sk


BUDGE MINING UVX PROJECT
GOLD TECHNIQUE VALIDITY TEST
FIRE ASSAY IN OZ/TON
By Iron King Assay Inc.
NEUTRON ACTIVATION IN PPM
0
0.1
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0.3
0.4
0.5
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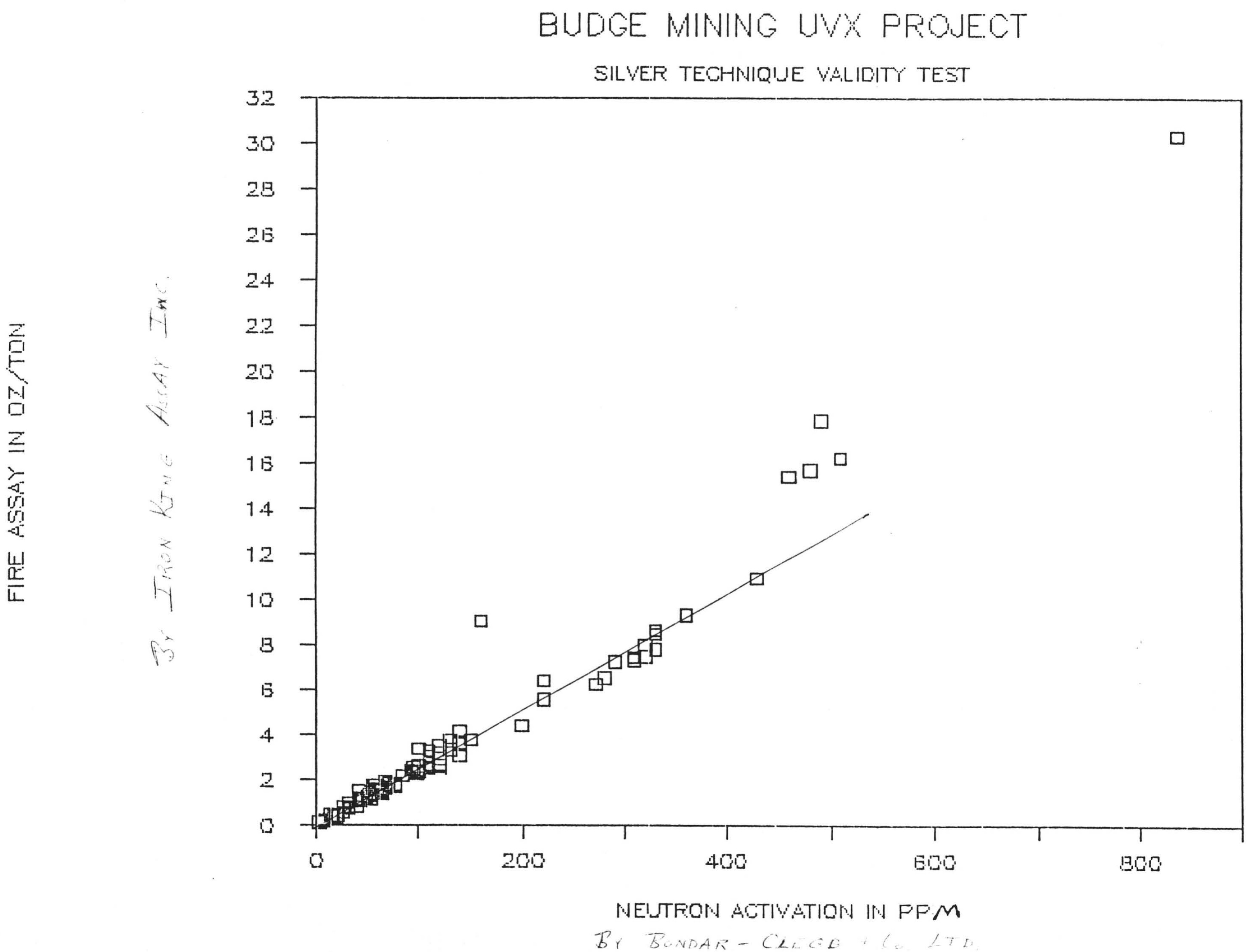

BUDGE MINING UVX PROJECT
SILVER TECHNIQUE VALIDITY TEST
FIRE ASSAY IN OZ/TON
By Iron King Assay Inc.
NEUTRON ACTIVATION IN PPM
By Bondar - Clegg & Co. Ltd.
0
2
4
6
8
10
12
14
16
18
20
22
24
26
28
30
32
0
200
400
600
800

Mean (log normalized) elemental concentrations by silica lithogy; nuclear activation analyses

Bondar-Clegg + Co Ltd. INAA.
Pat O'Hara's statistical manipulation
Don White's simplification, interpretat
June, 1988

Element		Silica lithology: Grit (± Fe)	Silica lithology: Brown, vuggy	Silica lithology: Beige, banded	Remarks
N		58	10	13	Number of samples in statistical base
Au	oz/t	0.1	0.03	0.01	Gold enriched in grit, depleted in beige-banded
Ag	oz/t	3.5	1.2	1.0	Silver " " "
As	ppm	950	1550	500	Arsenic with iron + base metals, down section
Ba	ppm	65	70	90	Barium highest in beige-banded
Br	ppm	4	4	2	Bromine depleted (?) in beige-banded
Cd	ppm	8	8	5	Cadmium " " "
Ce	ppm	5	6	12	Cerium enriched " " "
Co	ppm	7	8	9	Cobalt consistent across lithologies
Cr	ppm	40	35	70	Chromium enriched in beige-banded
Fe	wt%	13	21	8	Iron with As + Cu, Pb, Zn down section, depleted in beige-banded
La	ppm	2	3	5	Lanthanum slightly enriched (?) in beige banded
Mo	ppm	17	19	14	Molybdenum fairly consistent across lithologies
Rb	ppm	6	11	6	Rubidium slightly higher with Fe, As, down section
Sb	ppm	40	30	22	Antimony highest in grit
Sc	ppm	0.5	0.7	3	Scandium enriched (?) in beige-banded
Se	ppm	75	75	13	Selenium depleted (?) in beige-banded
Sm	ppm	0.2	0.4	0.8	Samarium depleted (?) in grit, enriched in beige-banded
Sn	ppm	230	180	100	Tin enriched in grit, depleted in " "
Te	ppm	23	12	16	Tellurium enriched (?) in grit
Th	ppm	0.7	0.7	3.7	Thorium enriched (?) in beige-banded
U	ppm	2.3	3.9	7.4	Uranium enriched (?) in " "
W	ppm	4	5	5	Tungsten very consistent across lithologies
Zn	ppm	420	720	310	Zinc enriched (?) in brown-vuggy, depleted (?) in beige-banded

Summary of most significant correlation coefficients

(between 23 elements from nuclear activation analyses of 85 U.V.X. samples; 58 silica grit, 13 beige-banded, 10 brown-raggy, and 4 non-silica.)

	Au	Ag	As	Ba	Br	Cd	Ce	Co	Cr	Fe	La	Mo	Rb	Sb	Sc	Se	Sm	Sn	Te	Th	U	W	Zn
Au	—																						
Ag	.7	—																					
As			—																				
Ba				—																			
Br		.5			—																		
Cd			.6			—																	
Ce	-.7	-.6		.5			—																
Co								—															
Cr									—														
Fe			.8			.5		.6		—													
La	-.7	-.6					1.0				—												
Mo		.5	.6			.5		.6		.8		—											
Rb								.5		.5			—										
Sb	.5	.5												—									
Sc	-.5	-.6					.6				.6				—								
Se	.5	.5	.7			.5				.8		.7				—							
Sm	-.7	-.6		.5			.9				.9				.7		—						
Sn	.6																	—					
Te					.5			.5				.5							—				
Th							.5				.5				.9		.5			—			
U															.6					.7	—		
W																						—	
Zn			.9			.5				.8		.5	.5			.5							—

Computed by Pat O'Hara with SPSS software
Greatly simplified by Don White; June, 1988

Correlation Coefficients between 23 elements

(from log-normalized nuclear activation analyses of 85 U.V.X. samples; 58 silica grit, 13 beige-banded silica, 10 brown-muggy silica, 4 non-silica)

	Au	Ag	As	Ba	Br	Cd	Ce	Co	Cr	Fe	La	Mo	Rb	Sb	Sc	Se	Sm	Sn	Te	Th	U	W	Zn
Au	—																						
Ag	.73	—																					
As	.12	.13	—																				
Ba	-.26	-.20	.04	—																			
Br	.17	.50	.33	-.12	—																		
Cd	.21	.27	.59	-.03	.24	—																	
Ce	-.69	-.59	-.05	.45	-.12	-.16	—																
Co	.07	.17	.41	-.01	.44	.35	-.08	—															
Cr	-.34	-.08	-.21	.25	-.05	-.28	.27	-.02	—														
Fe	.25	.25	.82	.07	.41	.54	-.22	.61	-.21	—													
La	-.68	-.58	-.05	.44	-.12	-.14	.99	-.06	.25	-.20	—												
Mo	.34	.45	.65	-.01	.43	.51	-.38	.57	.03	.76	-.38	—											
Rb	-.03	-.08	.43	.08	.02	.31	-.04	.48	-.21	.52	-.01	.33	—										
Sb	.49	.53	.30	-.08	.15	.25	-.33	-.01	-.12	.13	.31	.34	-.01	—									
Sc	-.54	-.55	-.02	.24	-.07	-.22	.62	-.11	.13	-.02	.61	-.22	.07	-.32	—								
Se	.54	.50	.70	-.13	.37	.50	-.40	.42	-.31	.80	.38	.72	.36	.40	-.20	—							
Sm	-.73	-.63	-.05	.53	-.14	-.16	.95	-.09	.27	-.19	.94	-.38	.01	-.36	.66	-.43	—						
Sn	.55	.39	-.13	-.09	.00	.13	-.32	-.18	-.21	-.12	-.34	.02	-.11	.41	-.27	.09	-.32	—					
Te	.22	.36	.36	-.15	.48	.33	-.20	.54	.01	.42	-.22	.54	.10	.18	-.11	.33	-.23	.01	—				
Th	-.42	-.37	.02	.16	.09	-.09	.51	-.01	.12	.05	.50	-.06	.10	-.28	.88	-.07	.54	-.21	.07	—			
U	-.17	-.03	.32	.11	.23	.22	.22	.30	.13	.41	.21	.38	.26	-.02	.63	.31	.25	-.14	.25	.74	—		
W	.13	.33	.23	.12	.26	.11	-.02	.29	.24	.23	-.03	.32	.16	.26	.12	.21	.02	.08	.19	.25	.44	—	
Zn	-.03	-.03	.88	.14	.25	.50	.11	.39	-.20	.75	.11	.47	.46	.16	.13	.50	.13	-.21	.24	.09	.30	.24	—

Computed by Pat O'Hara with SPSS software
Simplified by Don White; June, 1988

Generalized UVX. Silica Element Associations

Increasing absolute value of correlation coefficients (~0.9, ~0.7, ~0.5)

Au	Fe	Ce
Ag	As	La
⟨Ce⟩	Zn	Sm
⟨La⟩	Mo	Sc
⟨Sm⟩	Se	U
Sn	Co	Th
Sb	Cd	Ba
Se	Rb	Br
⟨Sc⟩		Te
Br		
Mo		

Interpretation: Gold + silver related to each other, inversely to light rare earth elements, positively to tin, antimony, selenium, and silver to a lesser degree with bromine, (probably chlorine too) and moly.

Iron associated strongly with arsenic and zinc (probably copper + lead too) as well as molybdenum, selenium, cobalt, cadmium and rubidium

Light rare earths are intimately associated with each other (cerium, lanthanum, samarium, scandium) as well as with uranium and thorium and slightly with barium, bromine, and tellurium

Elements with no significant affinity for the groupings above: Cr, W

Elements generally below detection limit and hence unclassifiable: Cs, Eu, Hf, Ir, Lu, Na, Ni, Ta, Tb, Yb, Zr.

Don White
June, 1988

U.V.X. Silica Element Associations

Listings in inverse order of absolute value of correlation coefficients, based upon log normalized statistics from 85 samples, analyzed for 34 elements by nuclear activation.

Au	Ag	As	Ba	Br	Cd	Ce
Ag	Au	Zn	Ce	Ag	As	La
<Ce>	<Ce>	Fe	Sm	Te	Fe	Sm
<La>	<La>	Se			Mo	<Au>
<Sm>	<Sc>	Cd			Se	<Ag>
Sn	<Sm>	Mo			Zn	Sc
Sb	Br					Ba
Se	Mo					Th
<Sc>	Sb					
	Se					

Co	Fe	La	Mo	Rb	Sb	Sc
Fe	As	Ce	Fe	Co	Au	Th
Mo	Mo	Sm	Se	Fe	Ag	Sm
Rb	Se	<Au>	As	Zn		Ce
Te	Zn	<Ag>	Co			La
	Co	Th	Ag			U
	Cd		Cd			<Ag>
	Rb		Te			<Au>
			Zn			

Se	Sm	Sn	Te	Th	U	Zn
Fe	Ce	Au	Br	Sc	Th	As
As	La		Co	U	Sc	Fe
Mo	Sc		Mo	Ce		Cd
Au	<Au>			La		Mo
Ag	<Ag>			Sm		Rb
Cd	Ba					Se
Zn	Th					

Notes: Elements with no correlation ≥ 0.5 to the above : Cr, W

Elements generally below detection limit + limit in ppm : Cs (1) Eu (2) Hf (2) Ir (100) Lu (0.5) Na (0.05%) Ni (50) Ta (1) Tb (1) Yb (5) Zr (500)

Carole

M E M O

TO: R. Short, C.A. O'Brien, A.F. Budge
cc: R.W. Hodder

FROM: D.C. White

DATE: June 14, 1988

SUBJECT: U.V.X. supergene metal transport evidenced by present Bitter Creek geochemistry

It has long been observed that runoff from the United Verde Mine area is laden with copper. After storms, the streams flow turquoise color until they dry up. Indeed, copper precipitation on steel was practiced both beneath the U.V. waste dumps at the so-called 500-level warehouse, and at a small plant still standing below the UVX dump, probably by diverting Bitter Creek drainage through the concrete flume now gravel-clogged.

As Bob Hodder and I have come to be more suspect of the supergene role in U.V.X. gold occurrences, we deemed it worth some minimal sampling of Bitter Creek when it last flowed in April. We sampled the water, sludge, and sediment as per the accompanying plans (figures 1 and 2) and photos (figures 3 through 6).

What comes out of the analytical results is confirmation that the mildly acid mine drainage is carrying base metals, iron and probably precious metals. The sediments and ferricrete along Bitter Creek are laden with copper, lead, zinc, iron, and anomalous gold and silver. One can surmise that with all the geologic time the top of the United Verde deposit has been subject to erosion, great quantities of base and precious metals as well as iron and silica have been leached and redeposited down-slope.

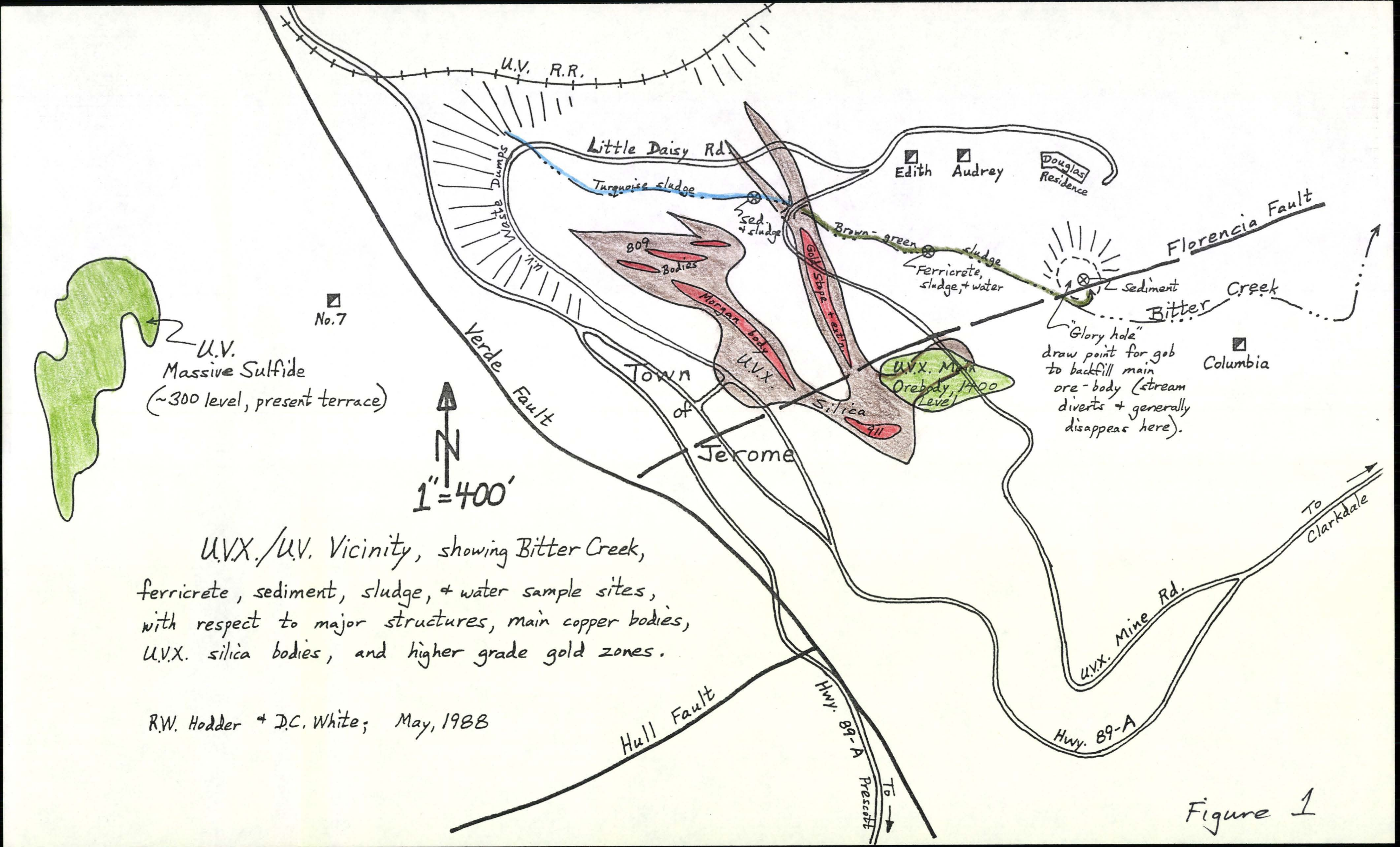
Such activity has no doubt occurred for large portions of the last half billion years as we have the Cambrian Tapeats Sandstone resting upon the "Great Unconformity" just above the U.V. pit and at the 800 level of the U.V.X. We also have a Tertiary channel, filled with alluvial pebbles to boulders, cutting through the Paleozoic section all the way to the Precambrian.

We observe supergene chalcocite coatings on select clasts within the Tertiary conglomerate. Chalcocite-malachite-azurite copper mineralization was mined from the basal Tertiary conglomerate near the Verde Fault at the U.V.X. Beneath that we have our Verde target area silica body with a southeast plunge from the 809 bodies through the Morgan zone to the 911 zone at a position closest to the main copper orebody. There are lithologic and geochemical trends throughout that length which we are just now getting ahandle on with Iain Sloan's thesis work, the Bondar-Clegg analytical work, and the plan and section compilation.

Iain Sloan's thesis has already been passed along, a very well done piece of work. The plots, in section, for Bondar-Clegg data from the 902 and 911 areas are summarized graphically and statistically in a separate memo (D.C. White, June 14, 1988) and plans and sections are all roughed out at 1" = 20' scale though not yet drafted for the 809 area.

I recommend we utilize the experience of Bob Hodder and the analytical help of Holly Huyck (Univ. of Cincinnati) to further understand and interpret these phenomena as they are real, empirical, trends which may well help find more mineralization at the U.V.X. or more like it in the district.

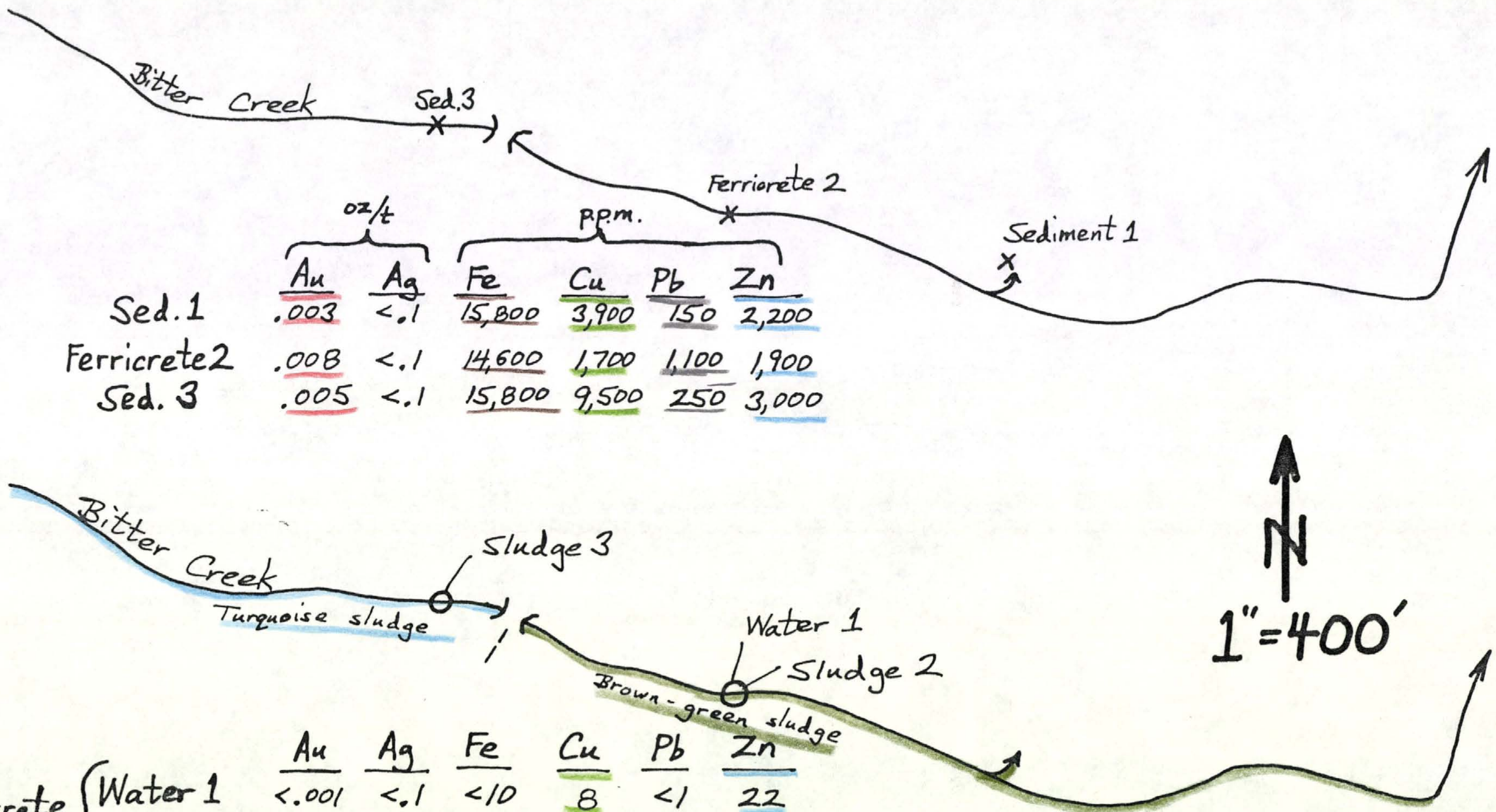
DW:sk



U.V.X./U.V. Vicinity, showing Bitter Creek, ferricrete, sediment, sludge, + water sample sites, with respect to major structures, main copper bodies, U.V.X. silica bodies, and higher grade gold zones.

R.W. Hodder + D.C. White; May, 1988

Figure 1



	oz/t		ppm			
	Au	Ag	Fe	Cu	Pb	Zn
Sed. 1	.003	<.1	15,800	3,900	150	2,200
Ferricrete 2	.008	<.1	14,600	1,700	1,100	1,900
Sed. 3	.005	<.1	15,800	9,500	250	3,000

		Au	Ag	Fe	Cu	Pb	Zn
Filtrate analyses	Water 1	<.001	<.1	<10	8	<1	22
	Sludge 2	<.001	<.1	<10	<1	<1	20
	Sludge 3	<.001	<.1	<10	32	<1	50

pH of each ~6.5

Solids from filtering 2 sludge samples ~10% Fe, ~5% Cu

Results of analyses (A.A.) on Bitter Creek ferricrete, sediment, sludge + water samples

R.W. Hodder + D.C. White; May, 1988

Figure 2

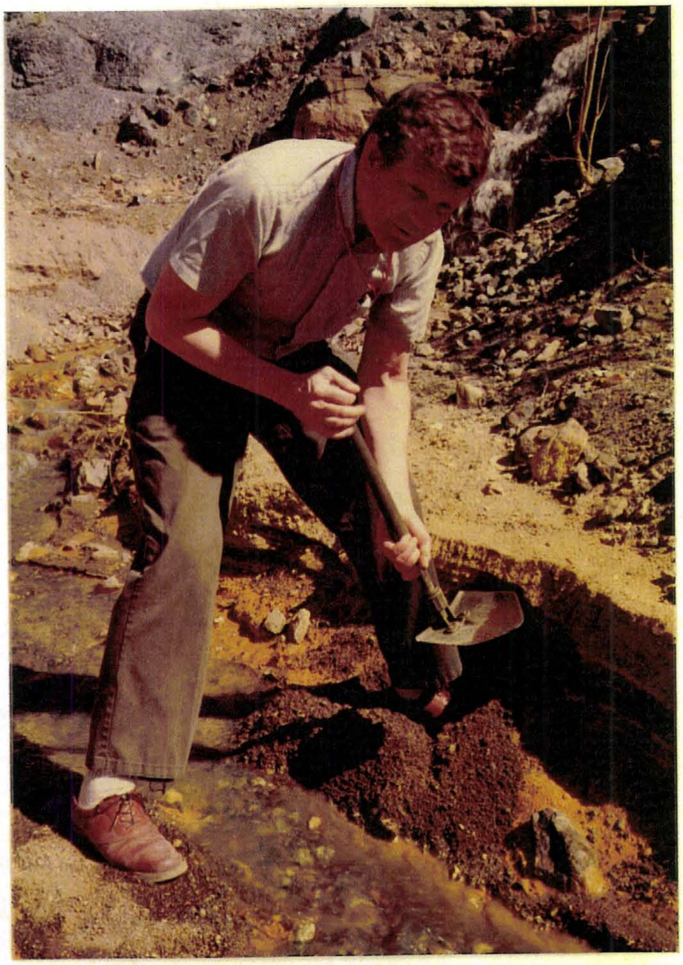


Figure 3:

Bob Hodder sampling ferruginous sediment at the "glory hole" gob draw-point ("Sediment 1" site)

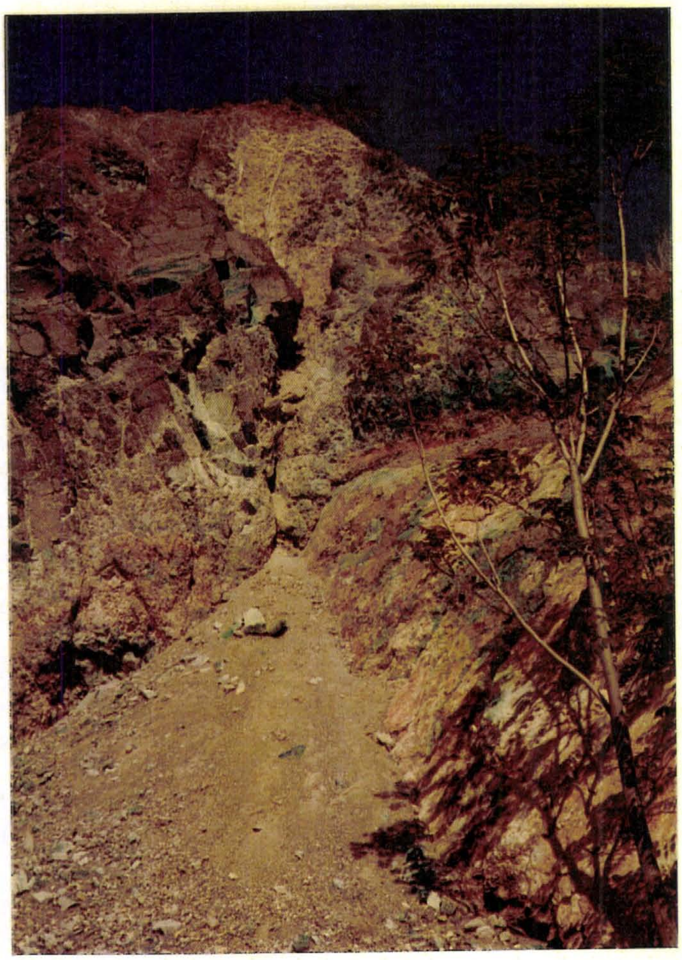


Figure 4:

Supergene copper carbonate along a fault in Hickey Basalt (about 12 m.y. age) on the east side of the "glory hole."

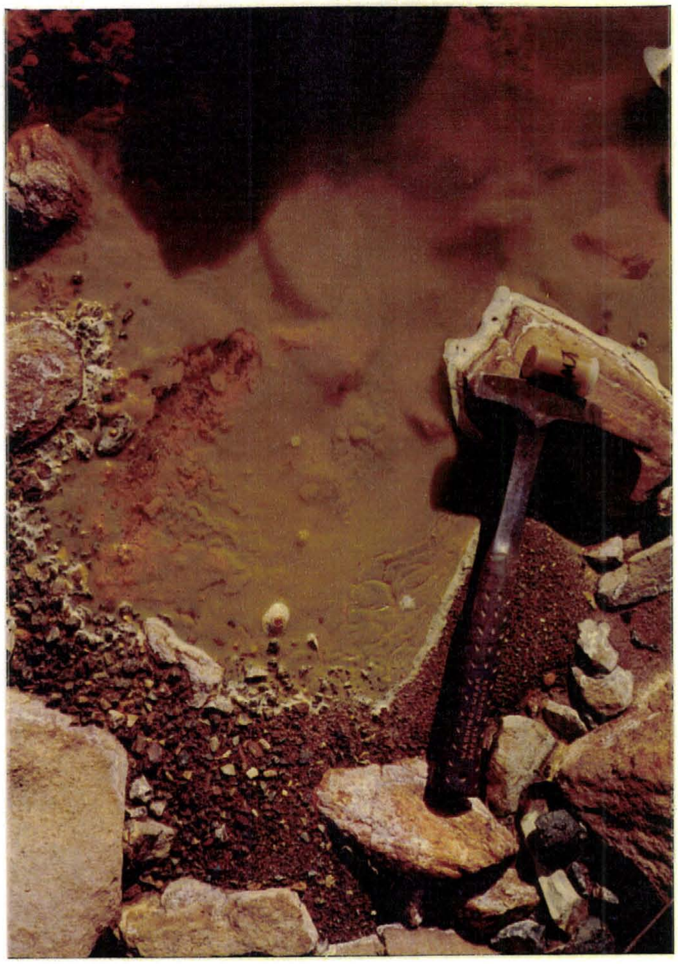


Figure 5:

Siliceous sludge ("Sludge 2" site") in Bitter Creek with iron and copper precipitate.

Figure 6:

Ferricrete along bank of Bitter Creek ("Ferricrete 2" site) with heterogeneous clast types from Precambriam jasper through Tertiary conglomerate and Hickey Basalt.

To: Anthony F. Budge

From: Carole A. O'Brien

Date: July 18, 1988

Red will do house tomorrow morning at 10 a.m. and report back to me.

Did you make contact with Ralph Smith last time you were here about the HK94??

Company picnic not quite as good this year as it was last. The company was good; barbequed chicken was half raw!

Cundo was telling me that McCabe has had two lost-time accidents in past few weeks.

All employees at Vulture spent 10 hours today doing their mandatory safety training.

Carole

MEMO

TO: R. Short, C.A. O'Brien, A.F. Budge

FROM: Don C. White

DATE: June 14, 1988

SUBJECT: Outside studies being done related to U.V.X.

Several studies are now in progress or pending that could substantially advance our understanding of the U.V.X. mineralization and thus aide in finding more.

One avenue of study is the X-ray diffraction and scanning electron microscopy expected to be done by Asst. Prof. Holly Huyck and one of her graduate students at the University of Cincinnati. That will hopefully identify the iron minerals in select 902 and 911 area samples and allow us to determine the conditions of deposition of that iron. We feel that may be a critical clue in determining the conditions of deposition and hence origin of the precious metals.

If possible, Bob Hodder is trying to arrange for some oxygen isotope work on the Verde area silica. Like with the iron, knowing the conditons of formation of the silica may be very revealing. With any luck, the oxygen would be unequivocally meteoric or magmatic and lead us to the proper conclusion as to what kind of silicification we are dealing with. We hope that the oxygen work and iron mineralogy work complement each other.

There will inevitably be some monetary cost to both these studies if carried far enough. Holly is able to run most of the XRD work free within her department as part of the student's study but the SEM work will require some subsidy. We will know the SEM cost and how much of it could be usefull, when the XRD work is completed. A cap of $500.00 has already been communicated to Holly on that, though I'd like to think that if it's very useful we could increase that.

Bob Hodder will have some news on the oxygen work and its costs later this month. There's no getting around the high cost of sophisticated laboratory work but I think its worth pointing out that the sample acquisition cost over $500,000. in direct drilling costs alone. Thus even a $5,000 expense now is less than a one percent add-on to the sampling cost. It sure would be tragic to spend 99% on a program and then economize to such an extent that the samples sit in core boxes and conclusions aren't drawn for lack of the final one percent. Expenditures of a few thousand dollars will position us to find whatever possibly remains within the present lease boundary, to evaluate the merits of exploration for similar targets on Verde or P.D. ground, and to do so most cost effectively, by using our intellect to the maximum and thereby saving on expensive drilling costs. Realize that even a few percent savings on drilling costs more than pays back the cost of a little geochemical or petrographic work.

Some other studies include Tom Nash's petrographic work at the U.S. Geologic Survey in Denver. His feedback has already been very useful, at no cost to Budge other than a little of my time for sample collecting and transmittal.

Jim Bussman, U. of Arizona M.Sc. candidate, has been delayed in his petrographic work by courses and summer work. His work has cost less than $100 thus far, with a promise of about $500 analytical fees reimbursed if they are useful to the project.

The largest out-of-pocket costs lately are the roughly $1,000 for nuclear activation analyses by Bondar-Clegg & Co. Ltd. of Vancouver on select 902 and 911 area samples. Those costs were committed in March with Carole's approval, same as for about that amount again for 809 area samples only recently sent off. The utility of the INAA data is multiple; as check assays, as iron analyses for flux evaluation, and as a check for other elements that could be useful tracers of the precious metals and/or help us understand some of its why and wherefores. The INAA data received thus far has been very revealing, as summarized in another memo (D.C. White, June 14, 1988).

Lastly, Bob Hodder and I were asked in late April whether we could present what is known about the U.V.X. precious metal distribution and genesis in relation to the base metal deposits, to the Northwest Mining Convention in Spokane, Washington on November 30th of this year. Already having Carole's approval for Budge and that of Paul Handverger for Verde, we plan to attend and speak there. A draft paper will be submitted to both parties for approval before that time. There is no cost to Budge for our travel to or attendance at that meeting.

DW:sk

Carole

Don White
521 E. Willis St.
Prescott, AZ 86301
602/778-3140

June 14, 1988

Holly Huyck
Asst. Prof. - Dept. of Geology
547 Geology/Physics Bldg.
Univ. of Cincinnati
Cincinnati, OH 45221

Dear Holly,

Enclosed is some more information of possibly use to you and Tiebing. It is mainly my summaries of some recent surface and underground geochemical work. The latter is handy in that it is on the same samples in the same sections as those samples you have as pulps and core specimens. In fact one reason it took me a while to get your samples to you was that I had to wait for the pulps to be returned from the laboratory in order to make the selections for your work.

Let's talk about the XRD results and the SEM costs before you jump into it too far. I'm excited to hear what's been learned and hope you and Tiebing can be interested enough to pursue it further. As you'll be able to tell from the geochemical plots enclosed, it's a fascinating assemblage that deserves some careful study.

I'll expect to hear from you.

Sincerely,

Don

Don White
Geologist, C.P.G.

DW:sk

Enclosure

cc: Carole A. O'Brien

Carole

MEMORANDUM

June 29, 1988

TO: C.A. O'Brien and R. Short

FROM: R.W. Hodder and D.C. White

SUBJECT: Reconnaissance of Verde fault zone for UVX-type iron-silica-gold occurrences.

INTRODUCTION

Our present documentation of the UVX gold occurrence includes the following:

1. Brecciation in hanging wall of the Verde fault.
2. Gold within 300 vertical feet of the €/p€ unconformity
3. Quartz-rich and in an en-echelon array with the highest breccia zones cemented by quartz, malachite, azurite and average 0.06 oz Au/t, middle elevations breccias cemented by brown and red iron oxides, quartz and fickle gold grades and lowest elevation breccias cemented by yellow iron oxides, quartz and some of the best precious metals.
4. Down-drainage from base metal massive sulfide, averaging 0.03 oz Au/t or within the leached top of such a sulphide body.

The idea of this reconnaissance along the Verde fault is that the quartz, malachite, azurite breccias may have been mined in past times for their copper, silica, precious metal content, but the iron-rich breccias may not have been mined because the extremely fine gold would not have been noted in panning crushed rock, the usual precurser to assaying in the old days. In addition the lack of copper and abundance of iron made this less attractive as flux ore. And further, those were looked upon as gossans, that is, residual products of weathering and if there was not evidence of base metal content they were set aside. However, we interpret a progressive residual and transported enrichment at the €/p€ unconformity and downhill from protore as massive sulphide to produce a series of products at different elevations. This dependence on a multitude of variable for optimum concentration may not have been recognized by the previous prospectors.

METHODOLOGY

In this reconnaissance we examined dumps and old workings, and sampled where appropriate, from the Copper Chief south of Jerome to the Arkansas Arizona north of Jerome. This covers approximately five miles of fault strike length and ten major prospects. The traversing was also extended to faults sympathetic to the Verde Fault These parallel faults raise Precambrian rocks to surface at two places: 1) the area east of Jerome between the Verde and Bessie faults and downstream on Bitter Creek from the UVX and 2) the area of the Green Monster to the south of Jerome.

INITIAL FINDINGS

1. There are several sites where the characteristics of the UVX iron-silica-

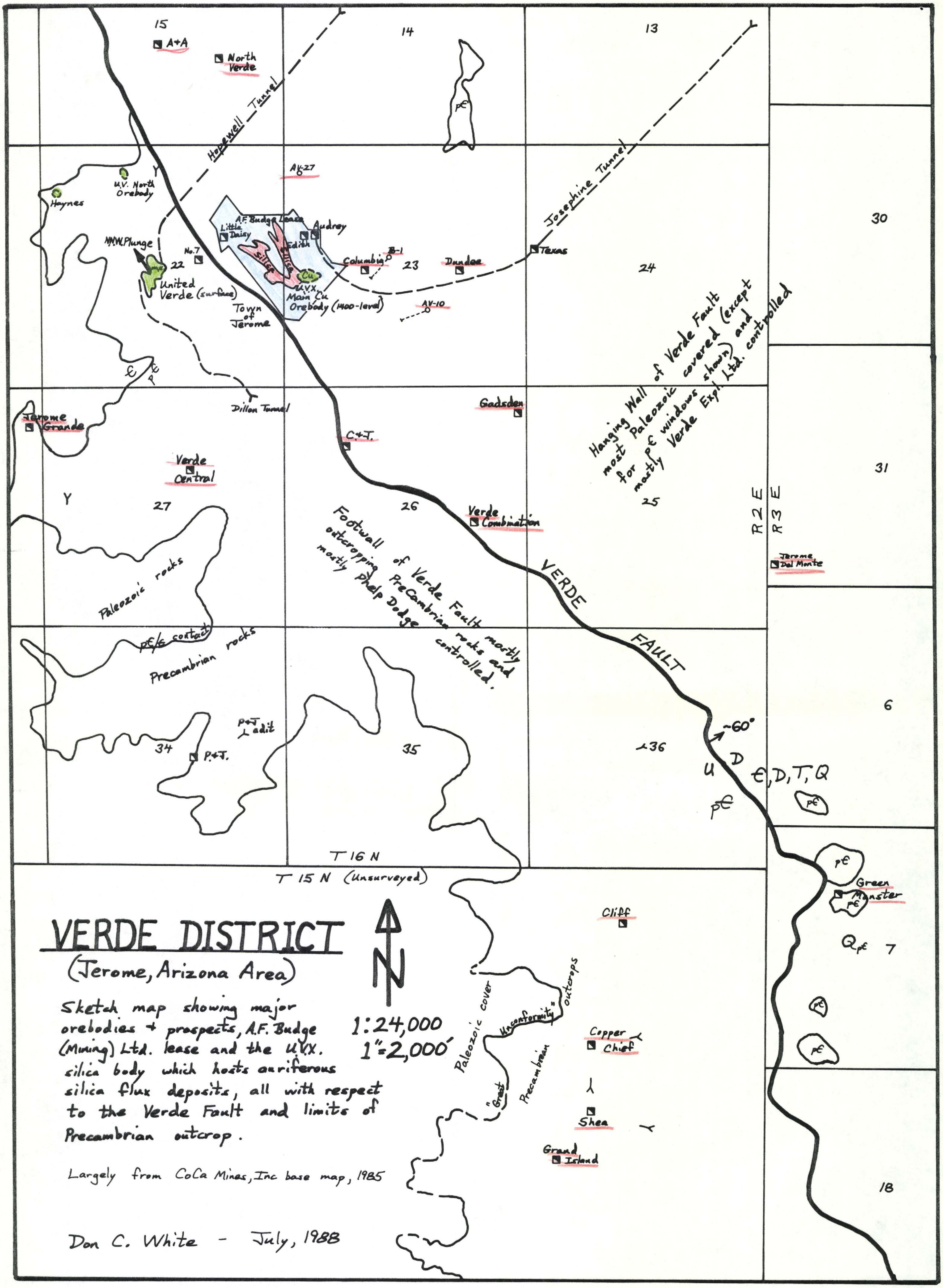
gold prevail. These are most manifest in the so-called "windows" to the Precambrian in the otherwise Paleozoic-dominated hanging wall to the Verde and Bessie faults. None of the assays of the samples collected there are attractive but they are quite few and far between. Most of the ground in these areas is Verde Exploration controlled (see sketch map) and could be prospected further for UVX-like, near surface potential.

2. The most immediately attractive outcrops visited are the siliceous knob of the Cliff Mine and the gently dipping siliceous and iron stained porphyritic rhyolite (?) of the so-called "flat fault" at the Copper Chief Mine. Both areas yielded low grade, open-pit, heap leach gold grades (.02-.06 oz/t) from grab samples of various lithologies (see attached sample descriptions with assay results). Unfortunately, both the Cliff and Copper Chief are Phelps Dodge owned (patented) properties. We know how far one gets with proposals for leases or joint ventures with them. However, if and when some deal could be struck, those two properties deserve evaluation.

3. Our reconnaissance took us repeatedly across the Precambrian-Cambrian unconformity. That contact holds the potential for geochemical clues to UVX-like gold occurrences in proximity to its outcrop and also has potential for harboring mineralization of its own. The structural and chemical boundary between the Tapeats Sandstone and underlying Proterozoic volcanics is an excellent locus of supergene iron-silica-gold. We know that CoCa Mines, Inc. started a comprehensive geochemical prospecting program focused on this unconformity. That data may be available from CoCa (through Bob Rivera) but was surely provided to Verde too. Thus Paul Handverger should be able to provide it if we don't mind letting him know our district-wide interests. CoCa's target was a UVX-like base metal target and their data ought to be reexamined in light of our understanding of the precious metal potential.

4. The most obvious and most attractive target remains P.D.'s United Verde. The hanging wall zone of the pit is known to have been sampled recently (May) under Paul Lindberg's direction (consultant to P.D.). Reputedly, his review of the old data yielded some attractive gold assays. Also, Bob Ludden (W. Region Expl. Mgr., Tucson) had said that a sampling and data review under P.A.L.'s guidance would be prerequisite to any deal with Budge. So maybe there is progress.

Another possibility that may come up, or could be sought, is a joint venture with a third party to include the U.V. zinc zone. Likely tens of millions of tons of several percent zinc remain in the hanging wall, between the mined copper zone and the more distant hanging wall silica gold target. Various firms active in the U.S. (e.g. Lac, Rayrock) are eager for zinc and capable of approaching such a capital-intensive project (it would almost certainly include shaft rehabilitation and a major mill investment). The opportunity would then exist to include Budge as evaluator of the gold picture.



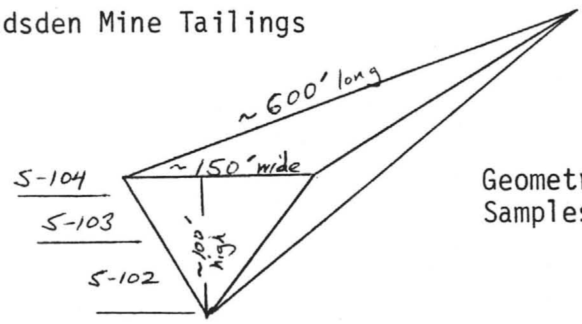
VERDE DISTRICT
(Jerome, Arizona Area)
Sketch map showing major orebodies + prospects, A.F. Budge (Mining) Ltd. lease and the U.V.X. silica body which hosts auriferous silica flux deposits, all with respect to the Verde Fault and limits of Precambrian outcrop.
1:24,000
1"=2,000'
Largely from CoCa Mines, Inc base map, 1985
Don C. White - July, 1988
15
A+A
North Verde
14
13
pЄ
Hopewell Tunnel
Josephine Tunnel
AV-27
U.V. North Orebody
Haynes
A.F. Budge Lease
Little Daisy
Audrey
Edith
Silica
Cu
U.V.X. Main Cu Orebody (1400-level)
N.W. Plunge
No. 7
22
United Verde (surface)
Town of Jerome
Columbia
B-1
23
Dundee
Texas
24
30
AV-10
Hanging Wall of Verde Fault most Paleozoic covered (except for pЄ windows shown) and mostly Verde Expl. Ltd. controlled
Є
pЄ
Dillon Tunnel
Jerome Grande
Gadsden
C+J.
Verde Central
Y
27
26
Verde Combination
25
31
R2E
R3E
Jerome Del Monte
Footwall of Verde Fault mostly outcropping PreCambrian rocks and mostly Phelp Dodge controlled.
Paleozoic rocks
VERDE
pЄ/Є contact
Precambrian rocks
FAULT
6
P+J adit
34
P+J.
35
36
~60°
U
D
Є, D, T, Q
pЄ
T16N
T 15 N (Unsurveyed)
Green Monster
Cliff
Qpc
7
Paleozoic cover
"Unconformity" outcrops
"Great Precambrian
Copper Chief
Shea
Grand Island
18

VERDE DISTRICT RECONNAISSANCE

Samples Assayed for Gold and Silver

(All samples are rock chips except S-118, a stream sediment)

Sample	Location/Description	Fire Assay/AA (oz/t) Au	Fire Assay/AA (oz/t) Ag
S-101	Calumet & Jerome (C&J) dump; selections of most siliceous rock	< .001	.12
S-102, 103, 104	Gadsden Mine Tailings	All < .001	.15



Geometry of valley-fill tailings. Samples from dam face.

Sample	Location/Description	Au	Ag
S-105	Verde Combination (VC) dump; selections of most siliceous rock	< .001	<.10
S-106,107	Green Monster vicinity; red and black jasper with black specular hematite, orange siderite, occurring in footwall of Verde fault, just upslope from W. adit	Both<.001	.14
S-108	Cliff Mine; siliceous volcaniclastic with azurite and malachite, from open cut on NW slope of siliceous knob	.066	1.69
S-109	Cliff Mine; light brown and beige and red-tan, vuggy, goethitic (?), slightly gossanous, same site as S-108	< .001	< .10
S-110	Cliff Mine; light gray quartz porphyry volcaniclastic with some azurite, malachite, chalcocite, bleaching, and clay alteration. Fine grained py and cpy in least oxidized specimens. Occurs in open cut at very top of knob.	< .001	.75
S-111	Cliff Mine; dark chocolate brown, "vuggy, limonitic" gossan with concentric, banded siliceous infilling. Occurs as car-size blocks in ravine NW of mine.	.034	.57

Sample	Location/Description	Fire Assay/AA (oz/t) Au	Ag
S-112	Copper Chief; 2 meter chip sample from pale tan kaolinitic gouge through iron-stained orange-brown vuggy, porphyritic rhyolite to gossonous rock. Relict white and gray quartz clasts. Occurs as basal portion of so-called "Flat fault," above mid-level adit.	.026	12.53
S-113	Columbia Shaft; 2 to 4 foot wide shear zone in Devonian Martin Limestone, with $CuCo_3$, FeOx (brown, orange, yellow-brown, red brown). Shear is just 10 ft. NW of shaft collar but is one of a set of at least four, all striking N40°E and near vertical.	<.001	<.10
S-114	Columbia Shaft; dark brown and yellow-brown, hard, indurated, very iron rich and siliceous (UVX "brown, vuggy") with fragments of Devonian Martin Limestone wall-rock incorporated. Fills a fracture to about 1 ft thick. Trends N40°E, vertical. Occurs 10 ft W of powder magazine (?) door on scarp about 300 ft W of Columbia collar.	.030	.23
S-115	U.V.X. Mine dump; fresh, saccharoidal, slightly banded pyrite, little silica	.030	.23
S-116	UVX Mine dump; siliceous banded pyrite, about 60% white silica interbedded with fresh, sugary pyrite.	.018	.38
S-117	Precambrian "window" in Bitter Creek; some silicification and hematization of p€ rock in railroad cut of Hopewell haulage just N of old UVX aerial tram loadout.	< .001	< .10
S-118	Bitter Creek stream sediment; from just below slaughterhouse	< .001	<.10

Carole

Don White
521 E. Willis St.
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602-778-3140

July 15, 1988

Holly Huyck
Asst. Prof. - Dept. of Geology
547 Geology/Physics Bldg.
Univ. of Cincinnati
Cincinnati, OH 45221

Dear Holly,

As promised, I shall attempt to answer your questions posed in your June 21, 1988 letter regarding the U.V.X. silica breccias.

To take them in order:

1,2,3) Sorry we have you confused between "banded" and "beige-banded". The former can apply to any silica with parallel coloration patterns. It typically does occur within clasts in the cores of silica bodies and may be the closest thing to "chert" of hypogene hydrothermal origin. Beige-banded, however, very likely represents the hornfelsed margin of the diorite "sill" or "subvolcanic dome." There are no dates on the diorite or its wall rock at the U.V.X., but all the geometric evidence suggests a diorite body wedged its way into the pre-existing silica (chert - ?) stratigraphy, splitting into multiple wedge-like prongs as it advanced. The silica immediately adjacent to the diorite, virtually without fail, is "beige-banded" and/or "purple-gray-massive", both variations of the "hornfelsed". The thickness of the hornfelsed zone can vary, probably as a function of the pluton's local temperature, rate of intrusion, rate of cooling, etc. The hornfelsed silica generally exhibits the breccia characteristics of unhornfelsed silica breccia but is so well silica healed that those features are not so obvious as the superimposed contact metasomatic features.

Subsequent to diorite emplacement and hornfelsing of adjacent silica, some fracturing and silicification activity took place. We know this by the shattered beige-banded occurrences, even to the point of matrix supported beige banded clasts, generally in a red-brown, very hematite rich silica matrix. This lithology appears preferentially along the Verde Fault, hence the suspicion of tectonic shattering and supergene silicification.

Don't be confused by beige-banded silica, solid or as clasts, occurring in seemingly odd places in a drillhole or section or plan. The three dimensional geometric complexity of the diorite is such that beige-banded silica at any given point simply indicates that diorite is not far away, up, down, fore, aft or to either side.

4) Hypogene, metasomatic, or supergene? We don't know but we suspect all the above in varying proportions for any given component at

any specific level of the stratigraphy. In other words, hypogene base metal sulfides, hypogene silica, possible hypogene base metal oxides and iron oxides, and primary gold (protore). This was likely followed by metosomatic silica and iron, accompanied by mobilization of precious metals out of what is now beige-banded silica, into cores of silica bodies virtually floating as huge zenoliths in diorite. Then, late Precambrian through the present, all was fortuitously located in elevation to collect supergene base metal sulfides, oxides, carbonates, iron oxides and carbonates, and precious metals from the weathering of the up-slope United Verde deposit, all transported by meteoric waters down along the Verde Fault zone. We have some oxygen isotope work commenced through R.W. Hodder at U.W.O. (memo accompanying). While it may provide some definition, it may all be ambiguous too. We'll let you know as that develops.

5) Present thinking is that the only true gossan developed in place is that from the 1100 level to 1250 level, over the main orebody. Much of the other so-called gossan may be in large part look-alike dropped out by meteoric waters rich in U.V. constituents. We see chalcocite as coatings on many cobbles even in the Tertiary conglomerate. It's interpreted as supergene sulfide, just as the abundant azurite and malachite and hematite and siderite are thought to be supergene oxides and carbonates. Previous references to copper-silica ore, as primary even in my own works as recently as a year ago, are now suspect. That too may be supergene.

6) Cu, Pb, and Mn data? Yes, for one hole only, we have those elements. I have plotted histograms for Au, Ag, Ag/Au, Cu, Pb, Zn, Cu+Pb+Zn, Fe, Hg, As, Sb, Se, Bi, Ni, Cr, and Mn for a critical stretch of hole M-3, log also enclosed. That hole turns out to have made a very oblique intercept to stratigraphy (perhaps 60° or more) and hence apparent thicknesses are to be much discounted. Grades are quite exceptional too, but hardly representative.

The Mn plot is not very revealing. The Ag/Au ratio plot seems to indicate cycles which we used to think were primary but I now simply don't know.

7) Yes, stratigraphic tops are all to the N.E.

8) There are open spaces, within the silica, of all kinds and all ages. Some may result from decarbonatization, some from early tectonism, some from later tectonism, even pre- and post-metamorphism.

9) I follow what you're saying but I have more pieces of the puzzle to work with than you do. In fact we see vertical zonation well displayed in all areas (809, Morgan (incl. 902), 911, etc.) and the Au and Ag invariably occur within the top-most 300 ft. of Precambrian (i.e., within 300 ft. beneath the Paleozoic unconformity).

The lateral zonation which we too took to mean syngenetic zonation earlier on, may in fact be only an artifact of lateral migration of supergene fluids from the 60° NE dipping Verde Fault.

It is all this lack of convincing evidence of one origin (or, alternatively, abundant evidence of multiple phenomena) that has prompted interest in your figuring out the iron mineralogies and Bob Hodder's isotope study. Of course I'm continuing to pursue the trace metal geochemistry end of it and to keep abrest of any new underground exposures as development proceeds.

Best of luck with the SEM and let me know what turns up.

Scanning
electron
microscopy

Best Wishes,

Don

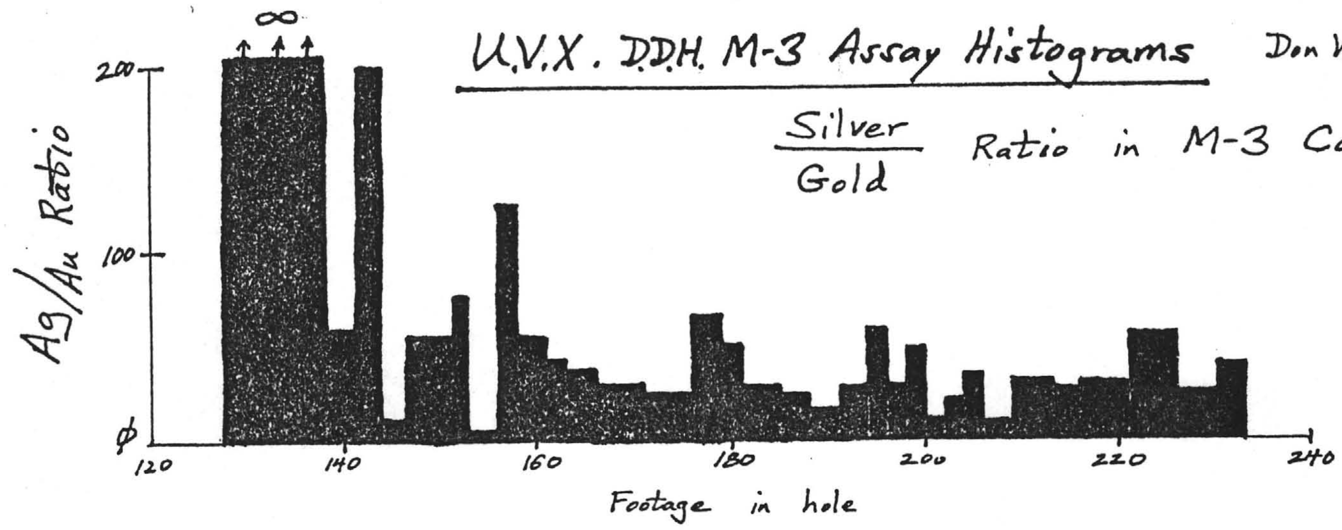
Don White
Geologist, C.P.G.

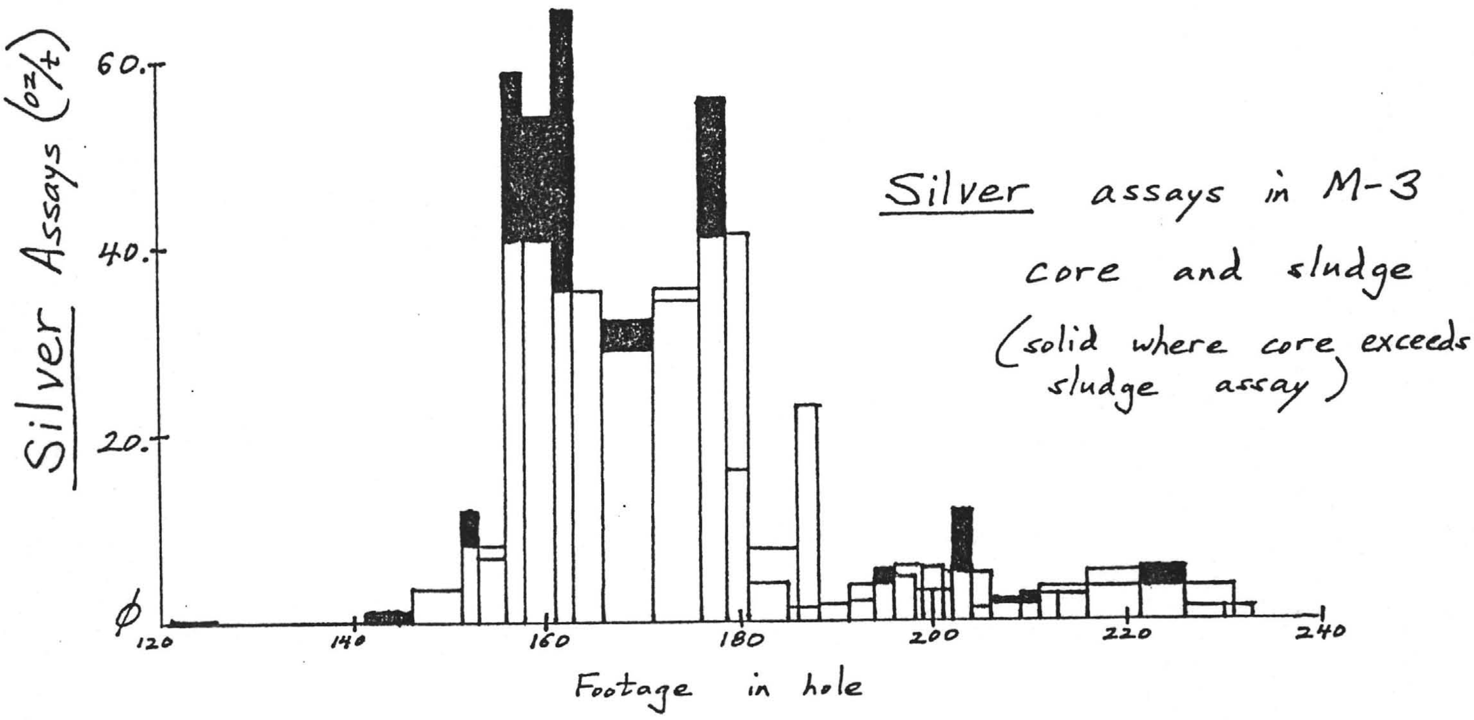
DW:sk

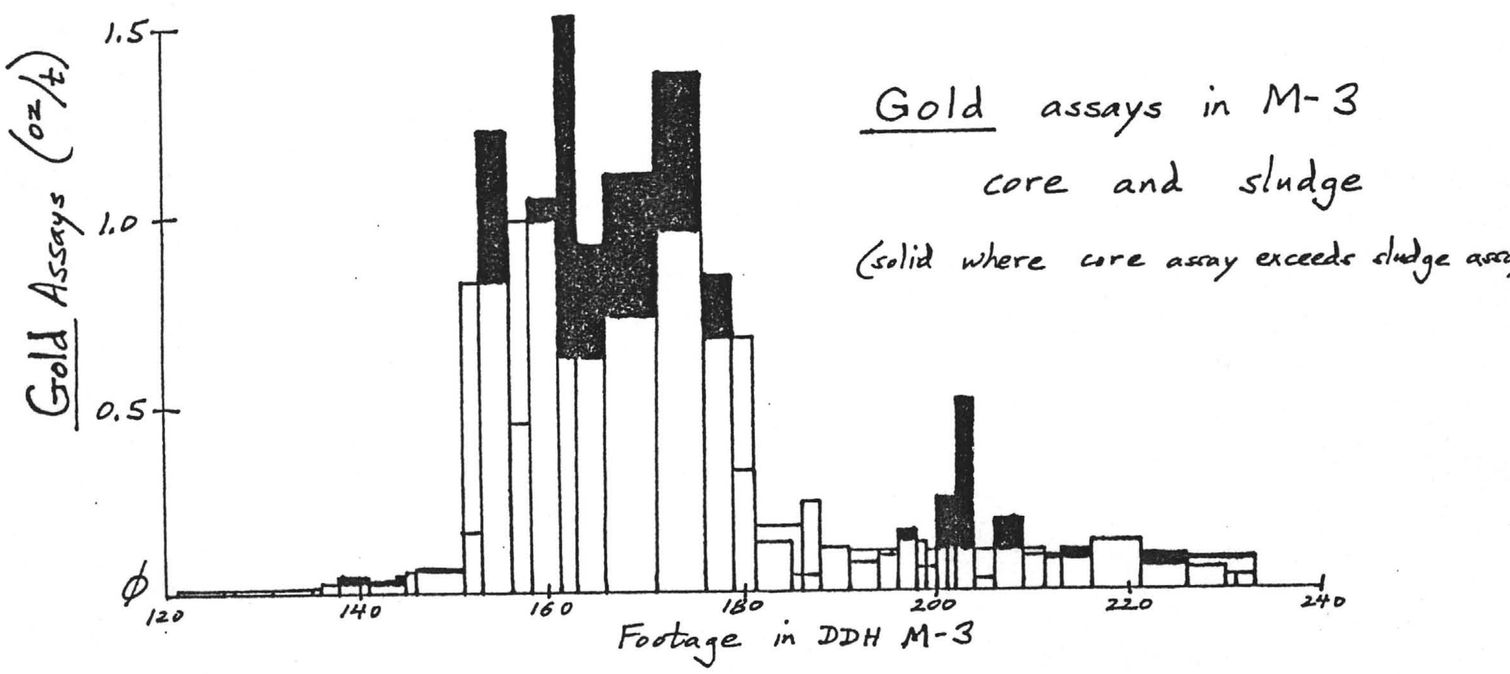
cc: Carole A. O'Brien
Robert W. Hodder

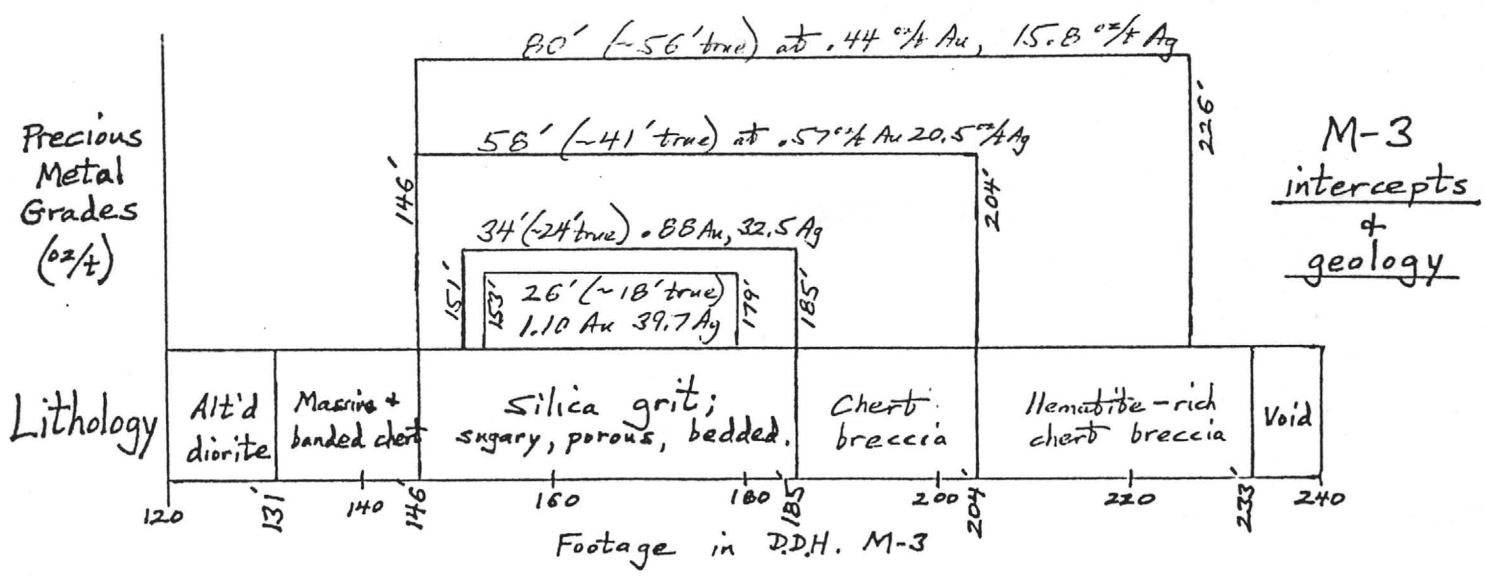
U.V.X. D.D.H. M-3 Assay Histograms

Don White March'



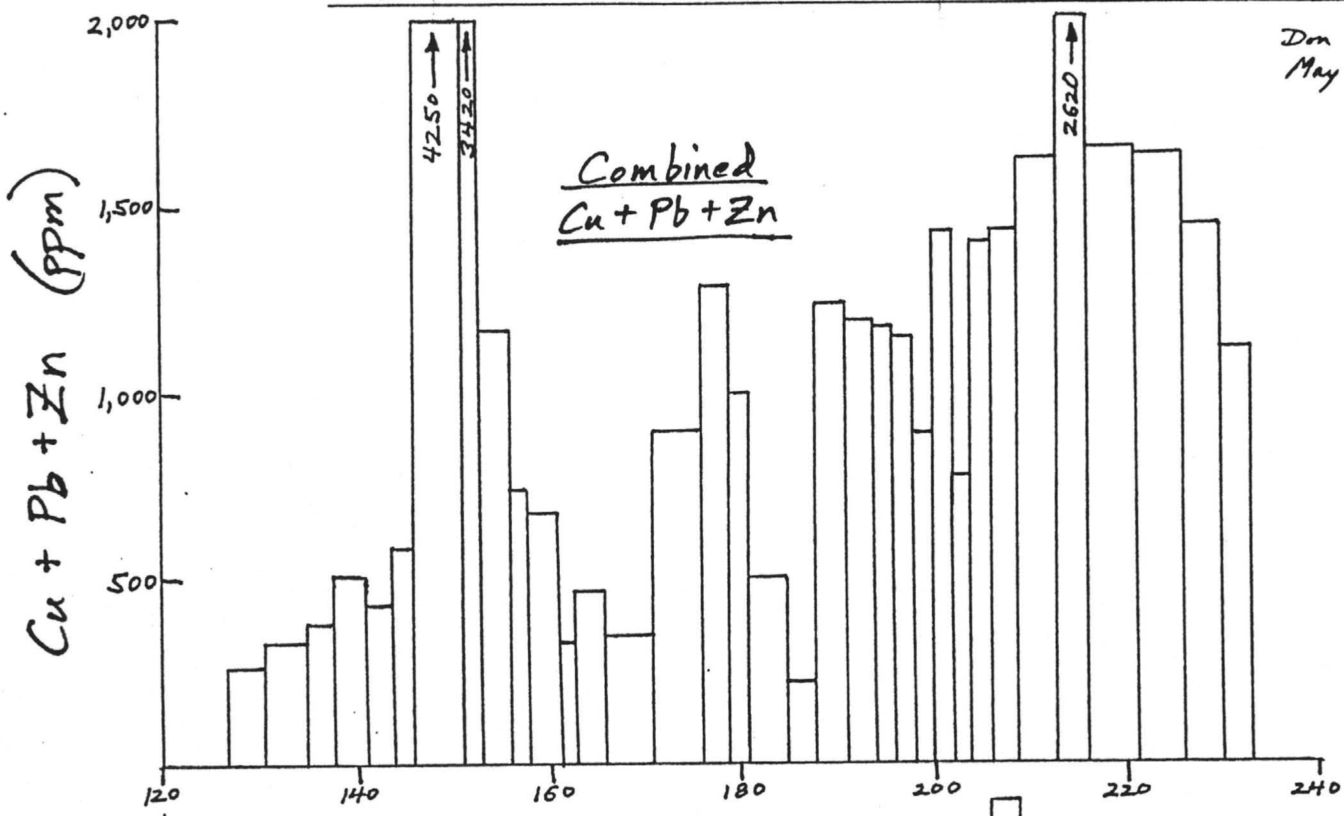


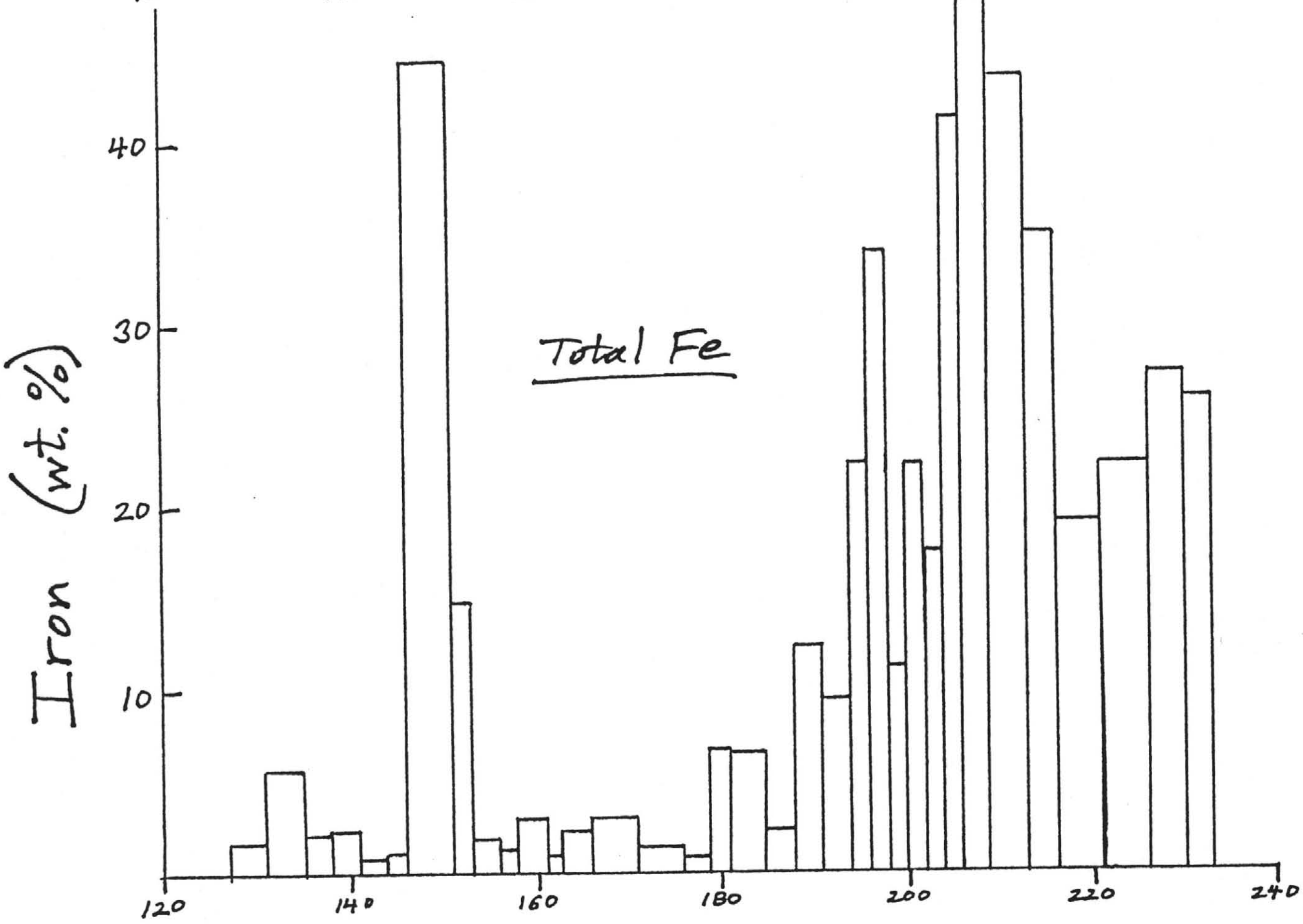


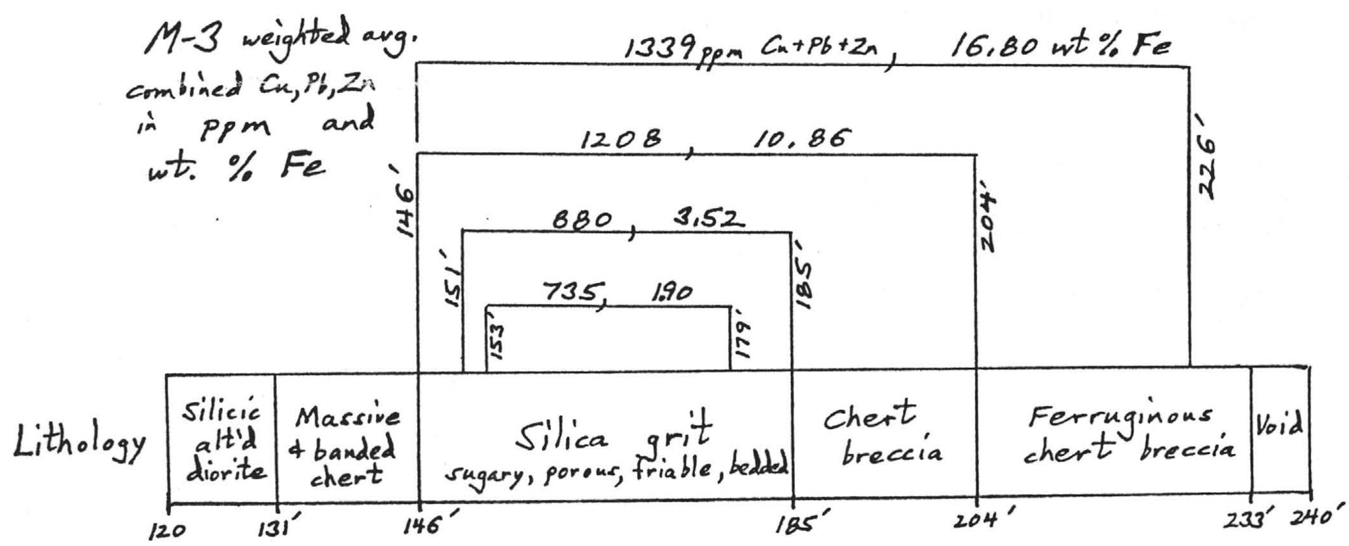


U.V.X. D.D.H. M-3 Combined Base Metal and Total Iron Histograms

Don White
May 31, 1987



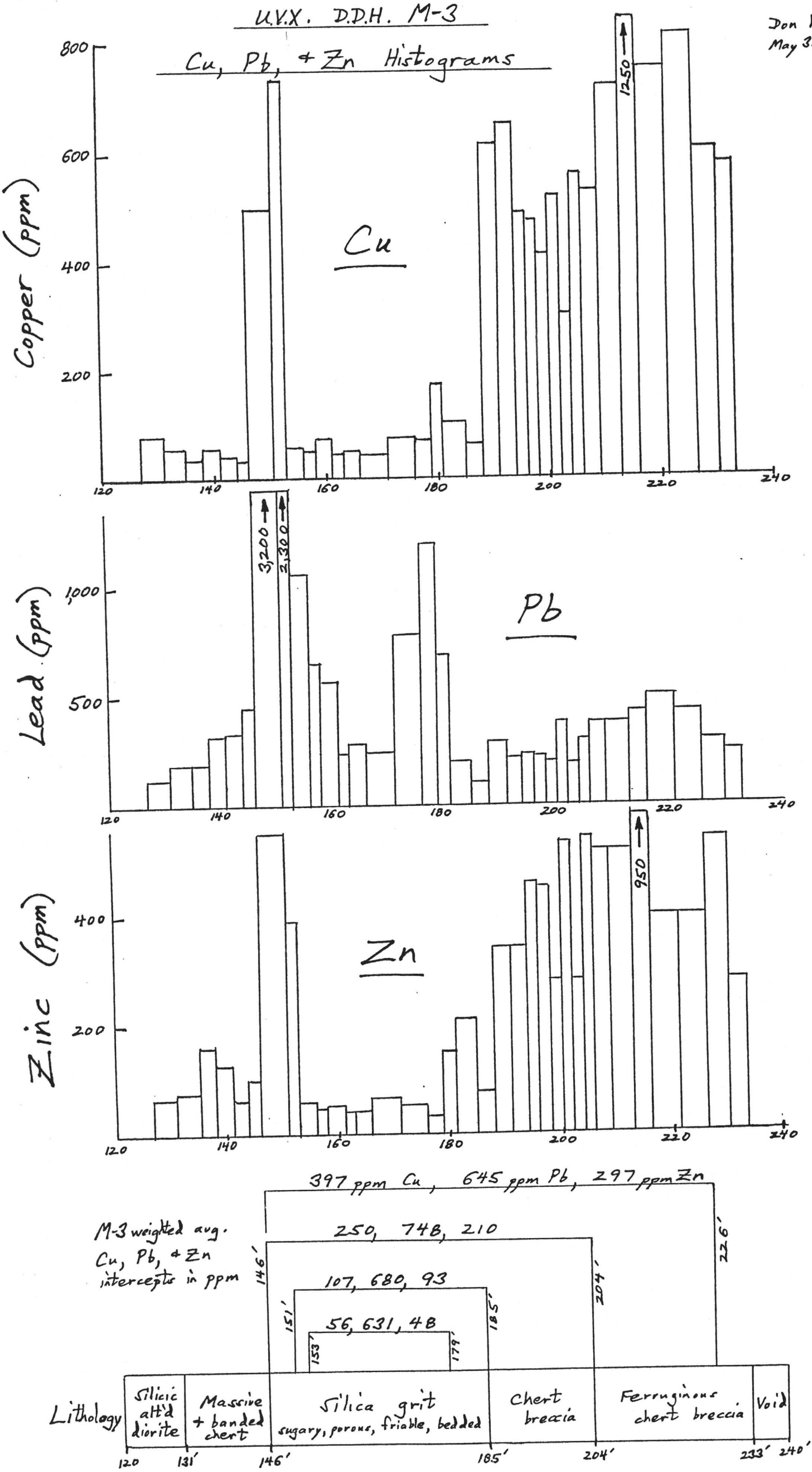


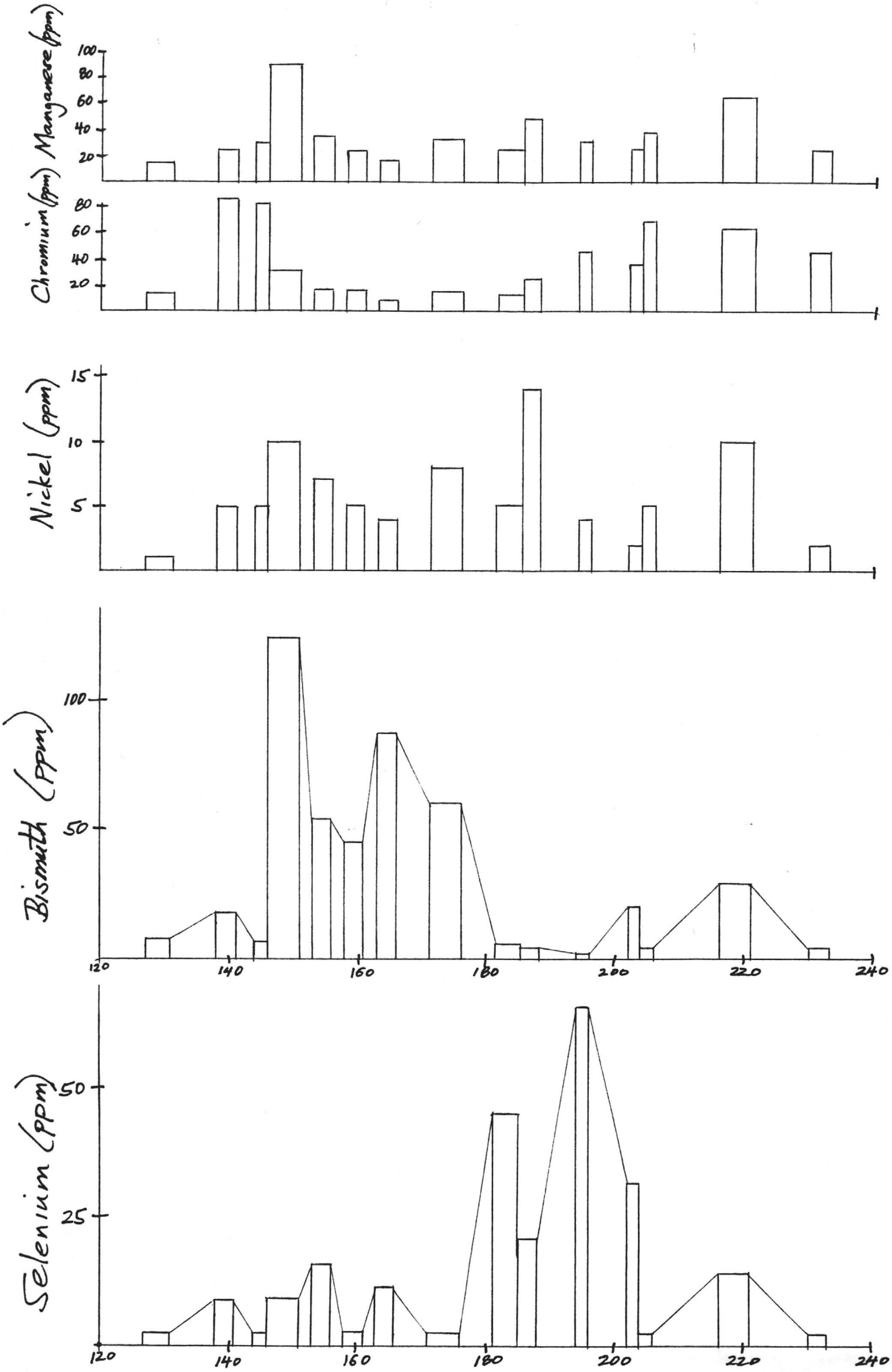


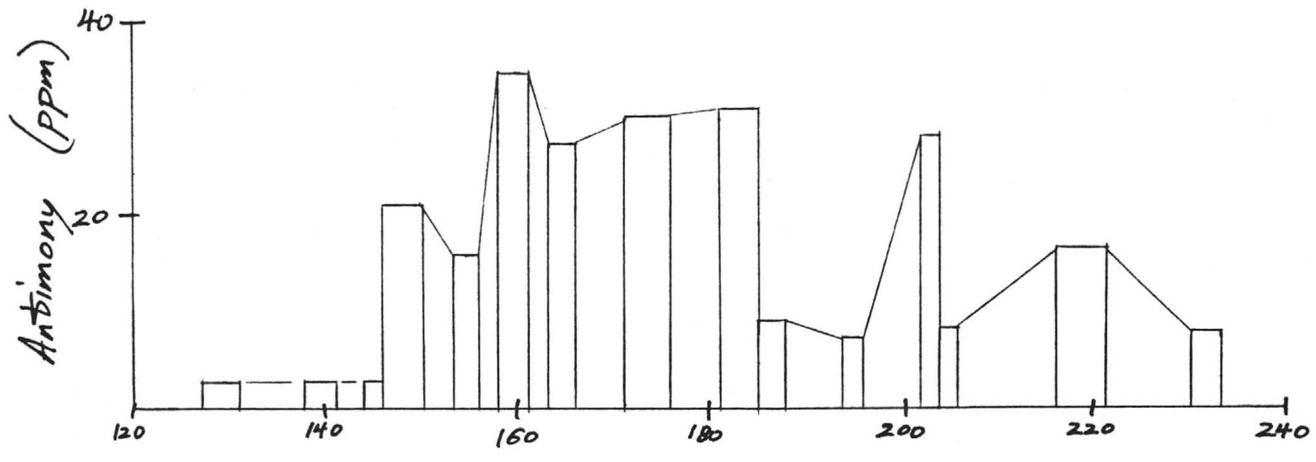
U.V.X. D.D.H. M-3

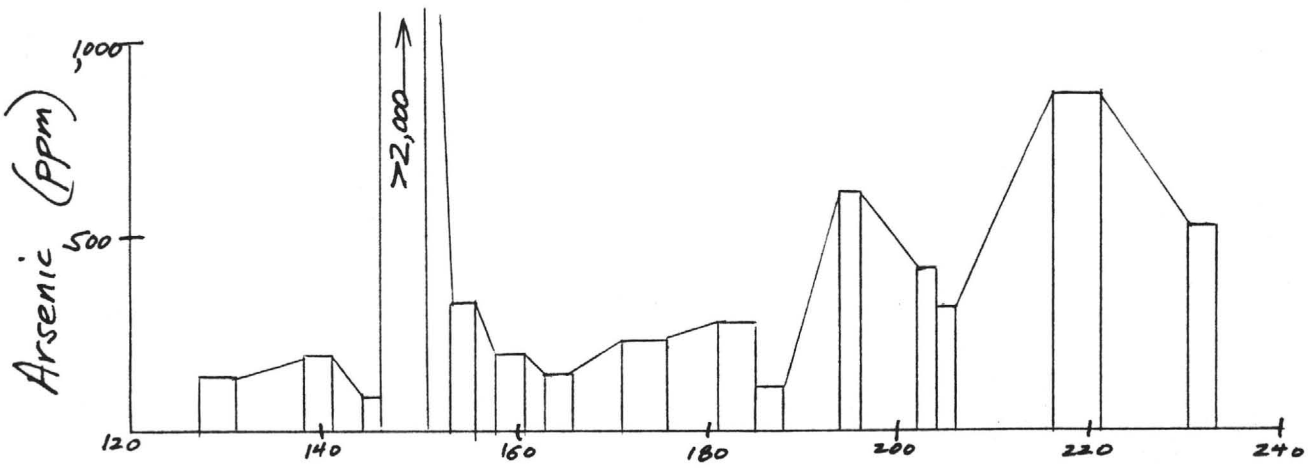
Cu, Pb, & Zn Histograms

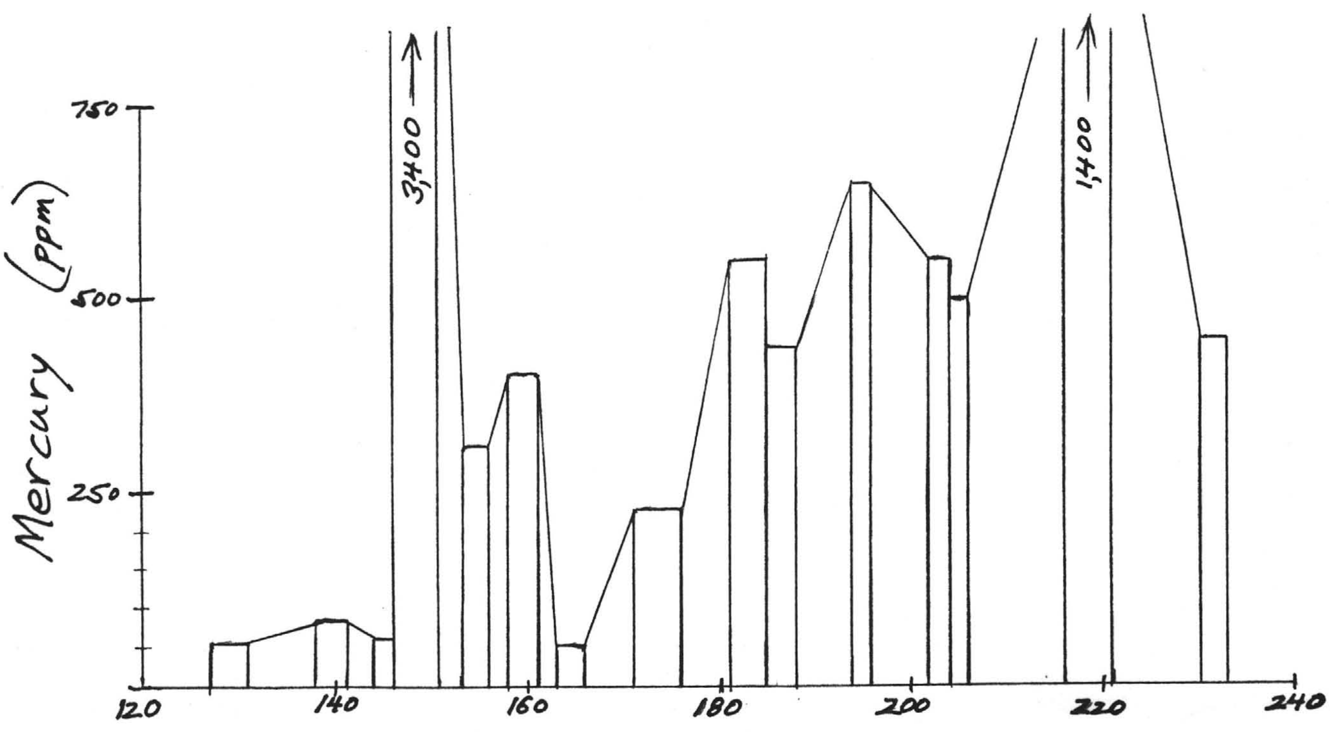
Don White
May 31, 1987




Manganese (ppm)
100
80
60
40
20
Chromium (ppm)
80
60
40
20
Nickel (ppm)
15
10
5
Bismuth (ppm)
100
50
Selenium (ppm)
50
25
120
140
160
180
200
220
240


40
20
Antimony (ppm)
120
140
160
180
200
220
240


1,000
500
Arsenic (ppm)
>2,000
120
140
160
180
200
220
240


750
500
250
Mercury (ppm)
3,400
1,400
120
140
160
180
200
220
240

University of Cincinnati

Department of Geology

500 Geology / Physics Building
Cincinnati, Ohio 45221-0013

June 21, 1988

Mr. Don White
521 East Willis Street
Prescott, AZ 86301

Dear Don:

Your samples, plans, and (more recently) assay information, have arrived in good condition. Tiebing and I began working on the materials last Monday (as soon as final exams had finished for spring quarter). I must say that we both found Iain Sloan's thesis to be <u>very</u> confusing. Perhaps having worked with the samples, you could understand what he referred to. For example, can you translate the following sentence (p.26)?

> "Subelliptical quartz grains where present, have lobate sutured grain boundaries are foliated and are in the iron-rich microcrystalline quartz matrix that is composed of hematite, magnetite and smaller <0.1mm angular fragments of bedded chert (Plate 6A) or microcrystalline quartz."

I tried to compile what I <u>thought</u> Iain was saying in the enclosed Table 1. Please make any corrections.

I have several new questions regarding your ideas about the sequence of events in this deposit:

1. As you can see in Table 1, the descriptions suggest beige-banded silica as the <u>first</u>-formed rock (no breccia; botryoidal manganese). Grey breccia - includes "faintly banded" clasts--possibly beige banded?--and two types of quartz clasts. Ages of different fractures are unclear; only iron oxides are late. Ferruginous breccias are multiple, again with iron coatings or matrix occurring late in each brecciation.

This gives a sequence: beige - gray - ferruginous.

2. BUT your drill logs show banded beige clasts and purple-gray (same as Iain's "grey"?) clasts in silica-rich to ferruginous matrix for the "Banded Beige/Massive" segments. Does this classification simply indicate relative amounts of Iron-rich veining? Does "grey breccia" indicate simply more grey (versus beige) clasts?

3. In your letter of June 3, you wrote that the beige-banded or banded-and-massive silica is a "hornfelsed silica which rims the semi-concordant diorites, likely an immediate post-exhalative subvolcanic dome which locally broke through and was extrusive."

a. Do you mean that the diorite was a subvolcanic dome? Do age dates agree with this? (I don't have the Lindberg articles at my fingertips - sorry.)

b. How can the beige-banded/banded-and-massive silica represent both original silica and hornfels? Is it possible that the "hornfels" is basically silica flooding to form the "massive" portion of "Banded Beige/Massive" Silica?

c. At first I entertained that idea that the banded beige silica might be a bleached equivalent of the ferruginous breccias, as hinted at in your letter. However, Iain's and your descriptions, and the presence of beige-banded <u>clasts</u> in ferruginous breccia (see ddh902-7, 140'-159') suggest that these are originally distinct units. How does this fit with the beige being "hornfels?"

d. Zonation of banded beige is not clear with respect to diorite--too many faults to tell, in cross-section at least. Comments?

I see that you noted copper carbonates (malachite) in your logs. This means that at <u>some</u> point, carbonate was in the water. One model I am exploring is that the rock types that you see are dominantly stratigraphic, with beige-banded and grey silica forming at similar times (thus the mixture), and ferruginous breccias forming last. (Iain's chemistry suggests that the siliceous rocks and all original and hydrothermal.) Possible late silification could be associated with the diorite, but I'm not clear what else is. The gritty zone <u>could</u> have been quartz-carbonate-sulfide/oxide-gold. Dissolution of carbonates could form very vuggy breccias to grits, at the same time as oxidizing copper sulfides to copper carbonates (Homestake is a carbonate-arsenopyrite layer, and you have plenty of arsenic in the system albeit not exactly with gold).

4. My question is when this could occur. Was this hypogene, diorite-

driven or supergene? During our spring visit, you hinted that oxides and carbonates might be original. Do you have any further thoughts about that? For example, the iron oxides could be original, while the copper carbonates could be exotic supergene.

5. The copper-silica ore occurs vertically above the gold-rich zones. Wasn't this entirely sulfides (chalcocite, in particular). Wouldn't this place much of the gold below the "gossan?" All we have seen thus far on XRD is hematite--not very helpful for using Blain and Andrew's paper.

6. Do you have Cu, Pb, Mn contents for these samples? If Mn is consistently high in the banded-beige silica, this may be a more peripheral ochre/umber to, say, the grey or ferruginous breccias.

7. Is stratigraphic "up" always to the NE? Can you tell?

8. Iain believes that formation of vugs to be "late stage" (p. 58) I'm not sure whether he means post-lithification, syn-intrusion or supergene. Comments? I guess that he means pre-metamorphic at least, since he considers veining to be pre-metamorphic (p. 57).

9. I suggest mapping Au/Ag on the cross sections. Silver seems to be more mobile, so it either leaves the system or moves farther down under supergene conditions. The Au/Ag tends to decrease from weathered surfaces to areas unaffected by supergene enrichment (at least in epithermal and some disseminated copper deposits). A vertical enrichment would suggest supergene alteration. A horizontal enrichment would be more likely caused by original alteration. Based on a quick view of Au and Ag plots, the 911 section indicates original zoning, while the 902 section suggests supergene remobilization. This could be due to original zonation. However, I would look for more supergene affects in 902. (Surprisingly--as 911 is closer to the surface.)

Finally, I have a few comments about our XRD work. Thus far, Tiebing has run 12 samples, including representatives of each breccia type. In every sample, we have identified quartz and hematite. No magnetite, geothite nor jarosite peaks have been seen. Minor amounts of illite are also present in a few samples. Sample 902-3-112-116 contains large amounts of either chlorite or kaolinite (XRD peaks are very similar). Based on Iain's description of altered diorite, I'd say that Kaolinite is more likely, or there is a mixture. I'm surprised that the mineralogy is generally so uniform. Perhaps other phases are present in quantities too small to see without mineral separation. (We are trying to avoid this, as

Tiebing is not receiving anything for his efforts. I have asked the department to pay him something for his work, but I have no answer yet. Also, the possible minerals of interest may not separate well enough to help us.)

As for SEM, the cost is $65 per hour. We can look at the iron phases, 5 samples for starters, then decide whether to do more. The samples would most likely be 2 grits, 2 ferruginous, 1 beige. The Materials Science technician thinks that we can probably do 5 samples in approximately 4 hours (or ~$260). This would leave some funds for any follow-up work, so we would not spend $500 all at one shot. What do you need from us to appropriate funds for SEM? I can't use it until I have the funds. You mentioned that you want to talk about this first. We plan to do all the XRD before picking samples to prepare for SEM. Would you rather we picked only 2 or 3 first? Tiebing is available for July only, and I will be working on other projects June 22 - July 1 and July 7 - August 22. (I have one proposal, 2 manuscript revisions and 2 other projects in addition to this. I might be able to work on SEM July 22, just before I head to Oklahoma.) We will be able to do the XRD, then wait for your comments, and perhaps I could do SEM in late August, if you would prefer. (That's pushing timing, however. The SEM technician is available only through August 31.) I <u>do</u> need a decision about whether you are going to pay for SEM soon, however, because I need to schedule time with the Materials Science Department, and Tiebing will do sample preparation while I am out of town. As Blain and Andrew note, mineralogy may or may not be very helpful in determining extent of supergene enrichment. The surprisingly simple mineralogy seen thus far is not diagnostic. I suspect that morphology of these minerals will be more helpful.

As you can see, we are getting some results, and are doing as much as possible in a limited time frame. I am quite interested in your answers to my questions and in the project in general. If you want more work done beyond the scope of what Tiebing and I are currently doing, I will see if another student can work this fall. Also, I have asked Dan Sims (who will start at the University of Arizona next January) to call you about the project that some other UA student had dropped. I don't know whether you and he will work out an arrangement, but he is a very bright student and a careful observer.

I will keep you updated as more results come in, and I look forward to your prompt response about SEM. Thank you for all the information; it has helped us put the samples in context. Your answers to my questions will help to elucidate the issues even more.

Sincerely,

Holly Huyck

Holly Huyck

mab

Table 1. Clast Descriptions of Various Breccias Based upon Iain Sloan's Thesis (April, 1988)

Name; General comments	Texture + mineralogy	Clasts	Matrix	Fracture[s]
1. Beige Banded "chert"	Faint Banding 50% anhedral, monocrystalline quartz Disseminated magnetite, faintly banded Traces of albite, rutile, fibrous malachite Local botryoidal banded Manganese Oxid			small qua[rtz] veinlets cu[t] beige band[ed] chert
2. Grey Breccia Center of fractures [illegible] ⇒ [What is % clasts versus matrix]	≤ 5% vugs Quartz-rich clasts in iron oxide-quartz matrix Traces of clay, sericite, iron oxides and epidote in clasts	80% microcrystalline quartz. 10% anhedral interlocking quartz grading into microcrystalline quartz, faintly banded	Tiny iron oxides in microcrystalline quartz. Local vugs filled with iron oxides, sericite In vugs, iron oxides may be replaced by acicular quartz.	- Chlorite veinlet[s] - Anhedral qtz. veinle[ts] ± ≤ 10% magnet[ite] Fractures [illegible] Malachite ⇓ veinlets of quartz-Fe [illegible] ⇓ iron oxide[s]
3. Ferruginous Breccia ⇒ [What is % clasts vs matrix?] Several episodes of quartz veining. hematite coatings are late, on microcrystalline quartz matrix	55% microcrystalline quartz 35% quartz grains 20-30% iron oxides Sequence: qtz coated by iron oxides; → comb qtz. growth 5% vugs: coated with: - comb quartz - fibrous or colloform sphalerite (?) (later fragmented) - rutile	- microcrystalline quartz - microcrystalline quartz with relict quartz veinlets) [qtz overgrowths] - quartz grains - anhedral magnetite or hematite fragments - banded chert (qtz-mt-banded), with qtz veins [beige?] - jasper	- microcrystalline qtz, outlined by hematite - hematite matrix - massive magnetite - ≤ .1mm fragments of bedded chert, or microcrystalline qtz, hm, mt. Traces of: Chlorite, kaolinite, malachite	iron oxide[s] in fracture[s] coating microcryst[alline] quartz

FeOx = iron oxides

Carole-, For your review + comments
Don

Draft abstract for NWMC

PRECIOUS METALS AT THE UNITED VERDE EXTENSION MINE, A VOLCANOGENIC BASE METAL SULFIDE DEPOSIT, JEROME, ARIZONA

by Don C. White, Consultant, and Robert W. Hodder, Univ. Western Ontario

The U.V.X. Mine, operated 1915 to 1938, was an exceptionally high grade copper producer. It is considered a classic example of a supergene-enriched volcanogenic base-metal sulfide deposit. The main orebody graded 15% Cu but only .03 oz/t Au, 1.5 oz/t Ag. Many peripheral bodies of so-called copper-silica ore were mined with average 55% silica, 6% Cu, .06 oz/t Au, and 2.0 oz/t Ag.

Renewed exploration within the silica breccia zones flanking the main orebody and stratigraphically overlying the copper-silica bodies, has found several economic grade gold-silver silica flux bodies. These average 90% silica, 0.2 oz/t Au, and 5.0 oz/t Ag. They appear to be a mixture of hypogene hydrothermal metallization, plutonic remobilization by an adjacent diorite sill, and supergene concentration. Trace metal associates of Au and Ag are Sn, Sb, Bi, and Se, and there are parallel As, Fe, and Mo anomalies. The most consistently mineralized lithology is a saccharoidal-textured, sometimes friable, goethitic silica breccia that occurs as lenses, within other silica types.

Carole - F.Y.I.

Don White
521 E. Willis St.
Prescott, AZ 86301
602/778-3140

June 14, 1988

Carla J. Snyder
Northwest Mining Association
414 Peyton Bldg.
Spokane, WA 99201-0772

Dear Ms. Snyder,

Enclosed is the author information form for this fall's meeting. Sorry about the tardiness but the June 3 "deadline" could hardly apply when it was received here June 5 and I had to be out of town since then.

The main item of note is that we are two "authors", not just myself. So please add Dr. Robert W. Hodder to the appropriate listings, though I will be the "speaker."

We will have the abstract you requested by about the first week of July. Hope that is not too late for your purposes.

Lastly, I am not "Dr." White.

Sincerely,

Don White

Don White
Geologist, C.P.G.

DW:sk

Enclosure

cc: Richard L. Moore
Robert W. Hodder

Carole — FYI.

5-29-88

DON —

BY NOW YOU MUST BE WONDERING WHAT HAPPENED TO ME & THE THESIS PROJECT. SO AM I. ST. JOE KEPT ME ON THE HOOK FOR A FEW WEEKS, THEN I WORKED IN NEVADA FOR 2 WEEKS; AFTER THAT, THINGS JUST CAME APART PERSONALLY.

I RECEIVED YOUR LETTER FROM NASH — I COULDN'T GET ANY INFORMATION TO SPEAK OF FROM MY THIN SECTIONS, EITHER. I'M ENCLOSING A SADLY OVERDUE BILL FROM QUALITY THIN SECTIONS FOR MAKING THEM. PLEASE LET ME KNOW IF BUDGE WON'T PAY FOR THEM, ~~SO~~ IN WHICH CASE I WILL. AT THE MOMENT I DON'T HAVE $68 TO MY NAME.

I'LL BE IN NEVADA FOR THE NEXT 4 MONTHS. PLEASE INFORM ME OF ANYTHING I SHOULD KNOW, SUCH AS WHETHER THE DEPOSIT WILL BE MINED OUT & THE UVX CLOSED BY THEN. THANKS.

APOLOGETICALLY,

Jim Brusman

SUMMER ADDRESS: c/o ASARCO, INC.
510 E. PLUMB LANE
RENO, NV 89502

Phoned Chris Eastoe (advisor at U. of A.) 621-6029 re: progress, resumption?, need for focus, utility/timeliness relationship, etc. Also the need to pursue the study ourselves; w/ Holly Huyck on Fe Ox w/ Iain Sloan on breccia petrography, self on geochem + statistics.

THE UNIVERSITY OF ARIZONA
TUCSON, ARIZONA 85721

DEPARTMENT OF GEOSCIENCES
BUILDING #77
GOULD-SIMPSON BUILDING
TEL. (602) 621-6024

June 6, 1988

Jim Bussman,
C/ ASARCO Inc.,
510 E Plumb Lane,
Reno NV 89502

Dear Jim:

I've just been talking to Don White on the phone, and we both had some concerns about the project at UVX. Don tells me that you've sent him a bill for some thin section work, and says he'll be quite happy to pay for that work, but he isn't clear as to whether the cheque should be made out to you or to Quality Thin Sections. Could you let him know, please? He would also like to know where the thin sections are going to be kept, so that the mine people could eventually use them if ever they wanted to. I would suggest telling him where they'll be at the University while you're working on the project, and that you'll give them to him when you're done.

Another concern, much more important, is the general timing of the work. This sort of research is of most value to the company while they're in the development stages of the mine; once production begins, the questions become largely academic in this type of relatively small operation. Questions that are really crucial will have to be answered in any case before production starts, so that the company may be forced to look elsewhere to get some of the work done. Some of the things Don wants you to do are of this nature, which is why I have been encouraging you to give him a very clear idea of when you will be doing the work. Needless to say, the prospects of financial support from Budge are infinitely better for work done earlier rather than later.

I gather you've told Don that you'll be working at your summer job for four months. This is already perilously close to the starting date of production, all going as the company is planning. I think Don is still interested in seeing the work done next Fall, the earlier the better of course. My general suggestions for proceeding from here are as follows.

First, don't prolong your summer employment. To do so will be at the risk of losing part or all of the project. Given the investment you've made in grad. studies to this point, I think it would be a poor choice to do an excessive amount of someone else's summer work and finish up with little or no project. What you have to resist is the tendency to keep doing things that you are already comfortable with when confronted with a problem that you're not so comfortable with. This can be a form of escapism. It is certainly part of a good Masters experience to have to tackle a problem you're unfamiliar with, whether you want a career in exploration or in research. Very seldom does so little come out of the work that you don't have enough to write a thesis on!

Second, make some effort to communicate with Don in detail. It would be a good idea to write him a detailed letter at this point to let him know what you have found out so far, even if the results are confusing. He may have a lot to contribute, but will not find it easy to do so unless he knows exactly what you're thinking. If you have questions about what you've seen, explain them to him carefully and see what he thinks. He's more likely than me or anyone else to have some answers. Also let him know what your program is going to be -- give him some dates. I would appreciate hearing about these things too. I will be available in Tucson to discuss any of this during June. Both exercises will help you to establish where you are with the project, so are well worth the effort from every point of view. If looking at the breccias isn't leading anywhere we need to decide to go on with something else. If there are materials you need from Tucson, just let me know where they are and I will get them to you.

I hope all is going well with your summer job, and that the Nevada gnats are bearable this year. I've just returned from my trip to northern California, which is a great place to be in the spring.

Regards,

Chris Eastoe.

cc Don White

Carole

Jim Landy, Senior Process Eng'r – Inspiration Consol. Copper Co phoned 6-21-88 with news + analytical results.

	%Cu	oz/t Au	oz/t Ag	% SiO_2	% Fe	% Al_2O_3	% CaO	Σ
U.V.X. Insp. 1	.08	.108	8.91	94.2	1.4	.4	.1	96.2
U.V.X. Insp. 2	.28	.114	6.09	73.6	15.1	1.1	.2	90.3

Sample 1 was the more gritty + saccharoidal textured silica from our stockpile (905-S source area) and Sample 2 was the more Fe-rich, harder, tighter silica which breaks more coarse. It came from the surface stockpile, ultimately from the 902-W X-Cut.

Mr. Landy's comment on #1 was that "it's super furnace flux, first rate material anyone in the smelting business would be happy to have." He says type 2 material is not converter flux because of the high Fe, low SiO_2, but still valuable material under the right circumstances (ie, cost).

Mr. Landy says the pending acquisition of Inspiration Consolidated Copper's home facilities, including the Globe-Miami mine-mill-smelter complex, the Reymert flux mine and the Christmas property, is still pending. If and when Cyprus Minerals consummates the deal, they (Cyprus) will make decisions as to production/smelting volumes and flux sources. Until then, he is not authorized to pursue any deals.

Don White
521 East Willis Street
Prescott, AZ 86301
778-3140

May 24, 1988

James H. Lundy, Jr.
Senior Process Engineer
Inspiration Consolidated Copper Co.
P.O. Box 4444
Claypool, AZ 85539

Dear Mr. Lundy,

Shipped separately via U.P.S. to your "Open Pit Office, c/o #3 Warehouse, Miami" are two samples of auriferous silica flux from the U.V.X. Mine, Jerome, AZ. I send them in response to your letter of April 4, 1988 to Carole A. O'Brien of Budge (Mining) Ltd.

Each sample is about 13 pounds of run-of-mine silica but representing a different lithology.

The samples are:

UVX - Insp.-1 - Low Fe, high Au & Ag, low density, porous, gritty silica prone to breaking fine.

UVX - Insp.-2 - High Fe (all oxides), modest Au & Ag, more dense, tight silica which breaks coarser (than the "grit" of sample 1).

Budge has drill indicated reserves at the U.V.X. amounting to many tens of thousands of tons of each rock type represented by these samples and all gradations in between.

Would you please share your analyses of these samples with us by sending a copy to me. I would also appreciate a copy of your results on a sample I sent two years ago (my cover letter to Al Binegar was April 17, 1986) known as "1104-1, 193'-225'." Perhaps those results are in your files. We never received them.

I look forward to hearing what you think of the present two samples and then pursueing whatever discussions are appropriate.

Sincerely,

Don White

Don White
Geologist, C.P.G.

DW:sk

cc: Carole A. O'Brien

Carole

Don White
521 East Willis St.
Prescott, AZ 86301

778-3140

Date: June 29, 1988

Robert Crook / Jim Weatherby
Iron King Assay, Inc.
P.O. Box 56
Humboldt, AZ 86329
(632-7410)

UVX Batch # 128

Hello Bob + Jim + Kati;

Accompanying are eighteen (18) samples for one assay ton gold and silver fire assay with AA followups as appropr[iate]. The samples are numbered:

1 thru 18 S-101 through S-118

(Reconnaissance samples based on Supergene ideas for SiO_2, Au, CuO, FeOx concentration)

Please save all pulps + rejects for my pickup.
Please send a copy of the results + billing to Carole (bel[ow])

c.c. Carole A. O'Brien
A.F. Budge (Mining) Ltd.
7340 East Shoeman Ln.
Suite 111-B-(E)
Scottsdale, AZ 85251

Thanks,
Don
Don White
Geologist, C.P.G.

Carole

Don White
521 East Willis St.
Prescott, AZ 86301

Date: June 23, 1988

778-3140

Robert Crook / Jim Weatherby
Iron King Assay, Inc.
P.O. Box 56
Humboldt, AZ 86329
(632-7410)

UVX Batch # 127

Hello Bob & Jim & Kati;

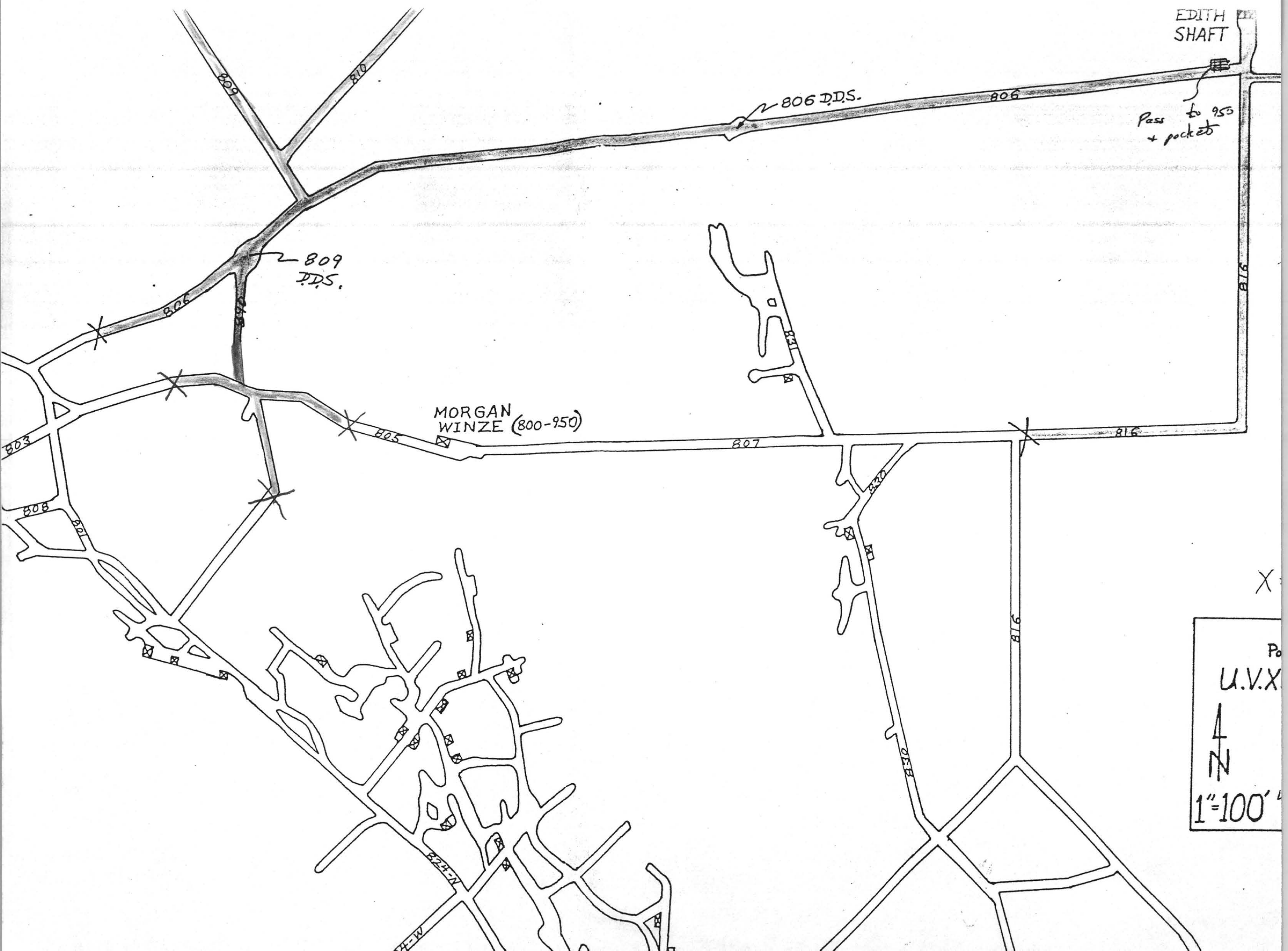
Accompanying are four (4) samples for one assay ton gold and silver fire assay with AA following as appropri[ate]. The samples are numbered:

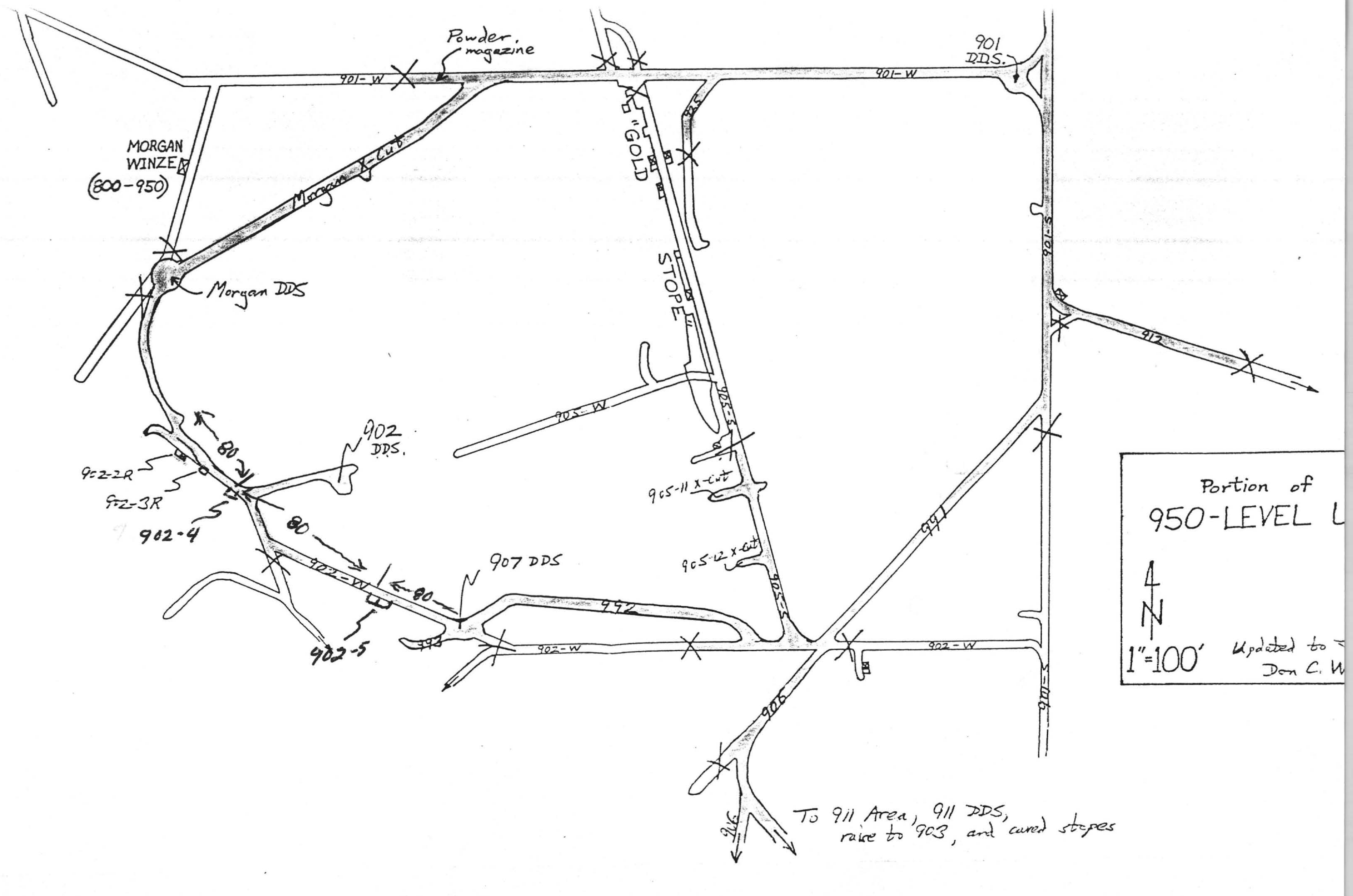
1 907-1
2 907-2
3 907-3
4 907-4

Please save all pulps & rejects for my pickup.
Please send a copy of the results & billing to Carole (below)

c.c. Carole A. O'Brien
A.F. Budge (Mining) Ltd.
7340 East Shoeman Ln.
Suite, 111-B-(E)

Thanks,
Don
Don White


EDITH
SHAFT
Pass to 950
+ pockets
806
806 D.D.S.
809
810
809
D.D.S.
806
803
808
801
MORGAN
WINZE (800-950)
805
807
816
816
816
831
830
830
824-N
U.V.X.
N
1"=100'



Portion of
950-LEVEL
N
1"=100'
Updated to
Don C. W
Powder magazine
901-W
901 DDS.
901-S
MORGAN WINZE
(800-950)
Morgan X-Cut
Morgan DDS
"GOLD STOPE"
905-S
905-W
905-11 X-Cut
905-12 X-Cut
902 DDS.
902-2R
902-3R
902-4
902-5
902-W
907 DDS
80
941
942
906
912
To 911 Area, 911 DDS, raise to 903, and caved stopes

IRON KING ASSAY INC.

26-Jul-88

LAB JOB #:	AFB02798	ATTN: Carole A. O'Brien	
Client name:	A.F. Budge (Mining) Ltd.	No. Samples:	3
		Date Received:	07-14-88
Billing address:	4301 N. 75th St. Suite #101 Scottsdale, AZ 85251-3504	Submitted by:	Don White
Phone number:	(602) 945-4360/778-3140	INVOICE ATTACHED	

ANALYTICAL REPORT

Client ID AFB02798	Lab ID		FA/AA Au oz/ton	Fire Assay Ag oz/ton
993-3	2798-	1	0.005	<.10
GM-1	2798-	2	0.002	<.10
GM-2	2798-	3	0.020	1.25

REGISTERED ASSAYER
CERTIFICATE NO.
14615
ROBERT G.
CROOK
Date Signed 7-27-88
ARIZONA, U.S.A.

P.O. Box 56 • Humboldt, Arizona 86329 • Phone (602) 632-7410

IRON KING ASSAY INC.

Page 1 08-Jul-88

LAB JOB #:	AFB02714	ATTN: Carole A. O'Brien	
Client name:	A. F. Budge (Mining) Ltd.	No. Samples:	4
		Date Received:	06-23-88
Billing address:	4301 N. 75TH St. Suite #101 Scottsdale, AZ 85251-3504	Submitted by:	Don White
Phone number:	(602) 945-4630/778-3140	INVOICE ATTACHED	

ANALYTICAL REPORT

Client ID AFB02714	Lab ID	FA/AA Au oz/ton	Fire Assay Ag oz/ton
	UVX BATCH #127		
907-1	2714- 1	0.062	2.30
907-2	2714- 2	<.001	2.77
907-3	2714- 3	0.061	1.77
907-4	2714- 4	0.045	1.94

REGISTERED ASSAYER
CERTIFICATE NO.
14315
ROBERT G.
CROOK
Date Signed 7-8-88
ARIZONA, U.S.A.

P.O. Box 56 • Humboldt, Arizona 86329 • Phone (602) 632-7410

IRON KING ASSAY INC.

08-Jul-88

LAB JOB #:	AFB02743	ATTN: Carole A. O'Brien	
Client name:	A. F. Budge (Mining) Ltd.	No. Samples:	18
		Date Received:	06-29-88
Billing address:	4301 N. 75TH St. Suite #101 Scottsdale, AZ 85251-3504	Submitted by:	Don White
Phone number:	(602) 778-3140/945-4630	INVOICE ATTACHED	

ANALYTICAL REPORT

Client ID AFB02743	Lab ID		FA/AA Au oz/ton	Fire Assay Ag oz/ton
	UVX BATCH #128			
#5-101	2743-	1	<.001	0.12
#5-102	2743-	2	<.001	0.15
#5-103	2743-	3	<.001	0.17
#5-104	2743-	4	<.001	0.14
#5-105	2743-	5	<.001	<.10
#5-106	2743-	6	<.001	0.14
#5-107	2743-	7	<.001	0.15
#5-108	2743-	8	0.066	1.69
#5-109	2743-	9	<.001	<.10
#5-110	2743-	10	<.001	0.75
#5-111	2743-	11	0.034	0.57
#5-112	2743-	12	0.026	12.53
#5-113	2743-	13	<.001	<.10
#5-114	2743-	14	<.001	<.10
#5-115	2743-	15	0.030	0.23
#5-116	2743-	16	0.018	0.38

REGISTERED ASSAYER CERTIFICATE NO. ROBERT G. CROOK Date Signed 7-8-88 ARIZONA, U.S.A.

Client ID AFB02743	Lab ID		FA/AA Au oz/ton	Fire Assay Ag oz/ton
#5-117	2743-	17	<.001	<.10
#5-118	2743-	18	<.001	<.10

REGISTERED ASSAYER
CERTIFICATE NO.
14315
ROBERT G.
CROOK
Date signed 7-8-88
ARIZONA, U.S.A.

Robert G. Crook

Bondar-Clegg & Company Ltd.
130 Pemberton Ave.
North Vancouver, B.C.
Canada V7P 2R5
Phone: (604) 985-0681
Telex: 04-352667

BONDAR-CLEGG

Geochemical Lab Report

A.F. BUDGF (MINING) LTD.
MS. CAROLE A. O'BRIFN
7340 E. SHOFMAN LANE
SUITE 111-B-(E)
SCOTTSDALF, AZ. 85251

Bondar-Clegg & Company Ltd.
130 Pemberton Ave.
North Vancouver, B.C.
Canada V7P 2R5
Phone: (604) 985-0681
Telex: 04-352667

BONDAR-CLEGG

Geochemical Lab Report

REPORT: V88-04149.0 (COMPLETE)

REFERENCE INFO:

CLIENT: A.F. BUDGE (MINING) LTD.
PROJECT: NONE GIVEN

SUBMITTED BY: DON WHITE
DATE PRINTED: 7-JUL-88

ORDER	ELEMENT		NUMBER OF ANALYSES	LOWER DETECTION LIMIT	EXTRACTION	METHOD
1	Au	Gold	100	5 PPB	NOT APPLICABLE	INST. NEUTRON ACTIV.
2	Ag	Silver	100	5 PPM	NOT APPLICABLE	INST. NEUTRON ACTIV.
3	As	Arsenic	100	1 PPM	NOT APPLICABLE	INST. NEUTRON ACTIV.
4	Ba	Barium	100	100 PPM	NOT APPLICABLE	INST. NEUTRON ACTIV.
5	Br	Bromine	100	1 PPM	NOT APPLICABLE	INST. NEUTRON ACTIV.
6	Cd	Cadmium	100	10 PPM	NOT APPLICABLE	INST. NEUTRON ACTIV.
7	Ce	Cerium	100	10 PPM	NOT APPLICABLE	INST. NEUTRON ACTIV.
8	Co	Cobalt	100	10 PPM	NOT APPLICABLE	INST. NEUTRON ACTIV.
9	Cr	Chromium	100	50 PPM	NOT APPLICABLE	INST. NEUTRON ACTIV.
10	Cs	Cesium	100	1 PPM	NOT APPLICABLE	INST. NEUTRON ACTIV.
11	Eu	Europium	100	2 PPM	NOT APPLICABLE	INST. NEUTRON ACTIV.
12	Fe	Iron	100	0.5 PCT	NOT APPLICABLE	INST. NEUTRON ACTIV.
13	Hf	Hafnium	100	2 PPM	NOT APPLICABLE	INST. NEUTRON ACTIV.
14	Ir	Iridium	100	100 PPB	NOT APPLICABLE	INST. NEUTRON ACTIV.
15	La	Lanthanum	100	5 PPM	NOT APPLICABLE	INST. NEUTRON ACTIV.
16	Lu	Lutetium	100	0.5 PPM	NOT APPLICABLE	INST. NEUTRON ACTIV.
17	Mo	Molybdenum	100	2 PPM	NOT APPLICABLE	INST. NEUTRON ACTIV.
18	Na	Sodium	100	0.05 PCT	NOT APPLICABLE	INST. NEUTRON ACTIV.
19	Ni	Nickel	100	50 PPM	NOT APPLICABLE	INST. NEUTRON ACTIV.
20	Rb	Rubidium	100	10 PPM	NOT APPLICABLE	INST. NEUTRON ACTIV.
21	Sb	Antimony	100	0.2 PPM	NOT APPLICABLE	INST. NEUTRON ACTIV.
22	Sc	Scandium	100	0.5 PPM	NOT APPLICABLE	INST. NEUTRON ACTIV.
23	Se	Selenium	100	10 PPM	NOT APPLICABLE	INST. NEUTRON ACTIV.
24	Sm	Samarium	100	0.1 PPM	NOT APPLICABLE	INST. NEUTRON ACTIV.
25	Sn	Tin	100	200 PPM	NOT APPLICABLE	INST. NEUTRON ACTIV.
26	Ta	Tantalum	100	1 PPM	NOT APPLICABLE	INST. NEUTRON ACTIV.
27	Tb	Terbium	100	1 PPM	NOT APPLICABLE	INST. NEUTRON ACTIV.
28	Te	Tellurium	100	20 PPM	NOT APPLICABLE	INST. NEUTRON ACTIV.
29	Th	Thorium	100	0.5 PPM	NOT APPLICABLE	INST. NEUTRON ACTIV.
30	U	Uranium	100	0.5 PPM	NOT APPLICABLE	INST. NEUTRON ACTIV.
31	W	Tungsten	100	2 PPM	NOT APPLICABLE	INST. NEUTRON ACTIV.
32	Yb	Ytterbium	100	5 PPM	NOT APPLICABLE	INST. NEUTRON ACTIV.
33	Zn	Zinc	100	200 PPM	NOT APPLICABLE	INST. NEUTRON ACTIV.
34	Zr	Zirconium	100	500 PPM	NOT APPLICABLE	INST. NEUTRON ACTIV.

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Geochemical Lab Report

REPORT: V88-04149.0 (COMPLETE)

REFERENCE INFO:

CLIENT: A.F. BUDGE (MINING) LTD.
PROJECT: NONE GIVEN

SUBMITTED BY: DON WHITE
DATE PRINTED: 7-JUL-88

SAMPLE TYPES	NUMBER	SIZE FRACTIONS	NUMBER	SAMPLE PREPARATIONS	NUMBER
P PREPARED PULP	100	4 AS REC'D	100	AS RECEIVED, NO SP	100

REPORT COPIES TO: MS. CAROLE A. O'BRIEN
MR. DON WHITE

INVOICE TO: MS. CAROLE A. O'BRIEN

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Geochemical Lab Report

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PROJECT: NONE GIVEN PAGE 1A

SAMPLE	ELEMENT	Au	Ag	As	Ba	Br	Cd	Ce	Co	Cr	Cs	Eu	Fe
NUMBER	UNITS	PPB	PPM	PPM	PPM	PPM	PPM	PPM	PPM	PPM	PPM	PPM	PCT
P4 809-1 179-183		85	27	620	330	<2	<10	64	17	59	<1	<2	8.0
P4 809-1 183-187		3190	73	198	120	<2	<10	23	<10	140	<1	<2	3.5
P4 809-1 187-190		11500	91	68	<100	<2	<10	<12	<10	220	<1	<2	1.1
P4 809-1 190-193		3690	130	70	<100	<2	<10	<10	<10	140	<1	<2	3.0
P4 809-1 193-196		4030	99	16	<100	<2	<10	<10	<10	160	<1	<2	1.1
P4 809-1 196-200		2590	88	452	<100	<2	<10	<10	<10	150	<1	<2	7.8
P4 809-1 200-203		9610	39	596	<100	<2	<10	<13	<10	150	<1	<2	11.0
P4 809-1 203-206		6240	33	51	<100	<2	<10	<10	<10	170	<1	<2	2.2
P4 809-1 206-210		14000	29	27	<100	<2	<10	<12	<10	150	<1	<2	0.6
P4 809-1 210-214		4730	27	101	<100	<2	<10	<10	<10	150	<1	<2	2.0
P4 809-1 214-219		1210	52	420	<100	<2	<10	<10	<10	180	<1	<2	7.4
P4 809-1 219-222		8140	41	669	<100	<2	<10	<13	11	230	<1	<2	10.0
P4 809-1 222-225		2390	44	385	<100	<2	<10	<10	<10	170	<1	<2	5.7
P4 809-1 225-228		3710	47	120	<100	<2	<10	<10	<10	190	<1	<2	3.5
P4 809-1 228-231		8910	49	457	<100	<2	<10	<13	11	210	<1	<2	8.5
P4 809-1 231-234		8450	76	383	<100	<2	<10	<12	10	150	<1	<2	8.2
P4 809-1 234-237		2780	83	289	<100	<2	<10	<10	<10	200	<1	<2	5.7
P4 809-1 237-240		1620	73	407	<100	<2	<10	<10	<10	160	<1	<2	7.6
P4 809-1 240-245		321	64	450	<100	<2	<10	<10	12	120	<1	<2	14.0
P4 809-1 245-249		268	14	198	110	<2	<10	32	<10	65	<1	<2	2.0
P4 809-2 39-43		12	8	125	1200	<2	<10	22	<10	<50	<1	<2	1.4
P4 809-2 105-108		19	29	132	<100	<2	<10	34	<10	240	<1	<2	2.4
P4 809-2 118-122		33	13	255	150	<2	<10	37	<10	170	<1	<2	2.3
P4 809-2 136-140		982	33	1460	120	4	<10	25	<10	260	<1	<2	12.0
P4 809-2 156-160		2260	91	942	200	2	<10	33	<10	250	<1	<2	5.3
P4 809-2 163-167		2280	170	302	<100	<2	<10	<10	<10	180	<1	<2	1.4
P4 809-2 170-173		2910	69	182	<100	<2	<10	<10	<10	180	<1	<2	1.3
P4 809-2 173-176		5630	40	123	<100	<2	<10	<10	<10	160	<1	<2	1.3
P4 809-2 176-179		13000	30	185	<100	<2	<10	<12	<10	170	<1	<2	1.5
P4 809-2 179-182		19200	78	170	<100	<2	<10	<16	<10	170	<1	<2	1.6
P4 809-2 182-185		15000	62	414	<100	<2	<10	<15	<10	150	<1	<2	3.1
P4 809-2 185-188		21500	78	211	<100	<2	<10	<10	<10	200	<1	<2	1.6
P4 809-2 188-191		>30000	76	121	<100	<2	<10	<12	<10	180	<1	<2	0.9
P4 809-2 191-194		14800	97	186	<100	<2	<10	<13	<10	190	<1	<2	1.7
P4 809-2 194-197		4510	63	378	<100	<2	<10	<10	<10	180	<1	<2	1.9
P4 809-2 197-200		5730	67	178	<100	<2	<10	<10	<10	170	<1	<2	2.0
P4 809-2 200-203		2230	29	235	<100	<2	<10	<10	<10	190	<1	<2	2.7
P4 809-2 203-206		1800	37	199	<100	<2	<10	<10	<10	150	<1	<2	2.8
P4 809-2 206-209		3470	33	105	100	<2	<10	<10	<10	140	<1	<2	1.9
P4 809-2 209-212		244	18	180	200	<2	<10	<10	<10	160	<1	<2	3.3

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Geochemical Lab Report

REPORT: V88-04149.0

PROJECT: NONE GIVEN

SAMPLE NUMBER	ELEMENT UNITS	Hf PPM	Ir PPB	La PPM	Lu PPM	Mo PPM	Na PCT	Ni PPM	Rb PPM	Sb PPM	Sc PPM	Se PPM	Sm PPM
P4 809-1 179-183		6	<100	40	<0.5	<2	<0.05	<50	<10	17.9	14.0	<10	8.9
P4 809-1 183-187		<2	<100	12	<0.5	<2	<0.05	<50	10	8.4	12.0	<10	4.0
P4 809-1 187-190		<2	<100	<5	<0.5	6	<0.05	<50	<10	4.4	2.0	<10	0.6
P4 809-1 190-193		<2	<100	<5	<0.5	7	<0.05	<50	<10	5.8	<0.5	30	0.2
P4 809-1 193-196		<2	<100	<5	<0.5	<2	<0.05	<50	<10	2.9	<0.5	<10	<0.2
P4 809-1 196-200		<2	<100	<5	<0.5	4	<0.05	<50	<10	4.5	<0.5	150	<0.2
P4 809-1 200-203		<2	<100	<5	<0.5	14	<0.05	<50	<10	11.2	<0.5	83	<0.2
P4 809-1 203-206		<2	<100	<5	<0.5	3	<0.05	<50	<10	6.5	<0.5	<10	<0.2
P4 809-1 206-210		<2	<100	<5	<0.5	<2	<0.05	<50	<10	9.1	<0.5	<10	<0.2
P4 809-1 210-214		<2	<100	<5	<0.5	4	<0.05	<50	<10	6.1	<0.5	<10	0.4
P4 809-1 214-219		<2	<100	<5	<0.5	6	<0.05	<50	<10	25.7	<0.5	55	0.3
P4 809-1 219-222		<2	<100	<5	<0.5	8	<0.05	<50	<10	11.7	<0.5	12	0.8
P4 809-1 222-225		<2	<100	<5	<0.5	8	<0.05	<50	<10	12.0	<0.5	12	1.0
P4 809-1 225-228		<2	<100	<5	<0.5	2	<0.05	<50	<10	6.8	<0.5	<10	0.6
P4 809-1 228-231		<2	<100	5	<0.5	8	<0.05	<50	<10	16.7	1.1	<10	0.8
P4 809-1 231-234		<2	<100	<5	<0.5	8	<0.05	<50	<10	16.3	<0.5	<10	0.5
P4 809-1 234-237		<2	<100	<5	<0.5	5	<0.05	<50	<10	18.8	<0.5	34	<0.2
P4 809-1 237-240		<2	<100	<5	<0.5	6	<0.05	<50	<10	21.5	<0.5	81	0.4
P4 809-1 240-245		<2	<100	6	<0.5	5	<0.05	<50	11	10.0	2.1	53	1.5
P4 809-1 245-249		3	<100	13	<0.5	<2	<0.05	<50	<10	4.3	5.2	<10	4.0
P4 809-2 39-43		<2	<100	10	<0.5	<2	0.05	<50	<10	4.5	6.4	<10	2.0
P4 809-2 105-108		7	<100	16	<0.5	<2	<0.05	<50	<10	13.6	11.0	<10	3.4
P4 809-2 118-122		<2	<100	15	<0.5	<2	<0.05	<50	<10	8.2	4.8	<10	4.7
P4 809-2 136-140		<2	<100	10	<0.5	6	<0.05	<50	<10	19.7	3.5	60	4.6
P4 809-2 156-160		3	<100	20	<0.5	10	<0.05	<50	<10	18.6	8.9	22	4.6
P4 809-2 163-167		<2	<100	<5	<0.5	5	<0.05	<50	<10	7.0	<0.5	<10	0.2
P4 809-2 170-173		<2	<100	<5	<0.5	5	<0.05	<50	<10	11.9	<0.5	<10	<0.2
P4 809-2 173-176		<2	<100	<5	<0.5	6	<0.05	<50	<10	14.7	<0.5	<10	0.2
P4 809-2 176-179		<2	<100	<5	<0.5	11	<0.05	<50	<10	14.0	<0.5	<10	<0.2
P4 809-2 179-182		<2	<100	<5	<0.5	6	<0.05	<50	<10	16.4	<0.5	<10	0.2
P4 809-2 182-185		<2	<100	<5	<0.5	11	<0.05	<50	<10	22.9	<0.5	<10	<0.2
P4 809-2 185-188		<2	<100	<5	<0.5	6	0.10	<50	<10	8.6	0.6	<10	0.2
P4 809-2 188-191		<2	<100	<5	<0.5	5	0.10	<50	<10	6.5	<0.5	<10	0.2
P4 809-2 191-194		<2	<100	<5	<0.5	5	<0.05	<50	<10	8.2	<0.5	<10	<0.2
P4 809-2 194-197		<2	<100	<5	<0.5	4	<0.05	<50	<10	8.6	<0.5	<10	0.3
P4 809-2 197-200		<2	<100	<5	<0.5	4	<0.05	<50	<10	10.3	<0.5	<10	<0.2
P4 809-2 200-203		<2	<100	<5	<0.5	7	<0.05	<50	<10	11.9	<0.5	11	<0.2
P4 809-2 203-206		<2	<100	<5	<0.5	5	<0.05	<50	<10	8.6	<0.5	<10	<0.2
P4 809-2 206-209		<2	<100	<5	<0.5	4	<0.05	<50	<10	7.8	<0.5	<10	0.5
P4 809-2 209-212		<2	<100	<5	<0.5	3	<0.05	<50	<10	7.8	<0.5	<10	1.0

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PROJECT: NONE GIVEN PAGE 1C

SAMPLE NUMBER	ELEMENT UNITS	Sn PPM	Ta PPM	Tb PPM	Te PPM	Th PPM	U PPM	W PPM	Yb PPM	Zn PPM	Zr PPM
P4 809-1 179-183		<200	<1	<1	39	7.3	5.3	5	<5	1100	<500
P4 809-1 183-187		280	<1	<1	<20	2.3	2.3	9	<5	580	<500
P4 809-1 187-190		240	<1	<1	<20	<0.5	<0.5	6	<5	900	<500
P4 809-1 190-193		390	<1	<1	<20	<0.5	<0.5	2	<5	210	<500
P4 809-1 193-196		390	<1	<1	<20	<0.5	<0.5	<2	<5	<200	<500
P4 809-1 196-200		260	<1	<1	<20	<0.5	0.6	3	<5	420	<500
P4 809-1 200-203		650	<1	<1	<29	0.7	0.7	<2	<5	380	<500
P4 809-1 203-206		220	<1	<1	<20	<0.5	0.7	<2	<5	<200	<500
P4 809-1 206-210		<200	<1	<1	<20	<0.5	<0.5	<2	<5	<200	<500
P4 809-1 210-214		<200	<1	<1	<20	1.2	0.6	<2	<5	<200	<500
P4 809-1 214-219		560	<1	<1	<22	1.2	0.8	3	<5	360	<500
P4 809-1 219-222		330	<1	<1	<29	5.2	2.2	3	<5	1000	<500
P4 809-1 222-225		600	<1	<1	<20	4.9	1.5	3	<5	580	<500
P4 809-1 225-228		740	<1	<1	<20	7.1	1.5	<2	<5	210	<500
P4 809-1 228-231		290	<1	<1	40	11.0	2.6	4	<5	450	<500
P4 809-1 231-234		310	<1	<1	<29	7.2	2.2	3	<5	450	<500
P4 809-1 234-237		1700	<1	<1	<21	2.2	1.1	2	<5	420	<500
P4 809-1 237-240		240	<1	<1	<23	1.4	1.0	<2	<5	380	<500
P4 809-1 240-245		<200	<1	<1	<22	2.9	4.1	<3	<5	950	<500
P4 809-1 245-249		<200	<1	<1	<20	4.7	2.6	4	<5	320	<500
P4 809-2 39-43		<200	<1	<1	<20	3.3	1.7	3	<5	230	<500
P4 809-2 105-108		<200	<1	1	<20	10.0	6.2	3	<5	230	<500
P4 809-2 118-122		<200	<1	<1	<20	1.9	1.8	2	<5	320	<500
P4 809-2 136-140		<230	<1	<1	<39	4.0	4.4	<5	<5	1600	<500
P4 809-2 156-160		320	<1	<1	<33	4.0	4.8	<3	<5	730	500
P4 809-2 163-167		610	<1	<1	<20	1.3	0.9	<3	<5	240	<500
P4 809-2 170-173		740	<1	<1	<20	1.1	1.1	<2	<5	210	<500
P4 809-2 173-176		950	<1	<1	<20	1.3	1.0	<2	<5	<200	<500
P4 809-2 176-179		970	<1	<1	<23	0.9	1.0	<2	<5	200	<500
P4 809-2 179-182		1400	<1	<1	<29	0.6	0.9	<2	<5	<200	<500
P4 809-2 182-185		820	<1	<1	<32	0.9	0.8	<3	<5	290	<500
P4 809-2 185-188		990	<1	<1	<20	1.6	1.9	<5	<5	<200	<500
P4 809-2 188-191		1200	<1	<1	24	0.9	1.1	<6	<5	<200	<500
P4 809-2 191-194		1300	<1	<1	<24	1.1	1.0	<2	<5	<200	<500
P4 809-2 194-197		610	<1	<1	<20	0.7	0.9	<2	<5	<200	<500
P4 809-2 197-200		1200	<1	<1	<20	0.7	0.7	<2	<5	<200	<500
P4 809-2 200-203		290	<1	<1	<20	<0.5	0.7	<2	<5	<200	<500
P4 809-2 203-206		<200	<1	<1	<20	<0.5	<0.5	<2	<5	200	<500
P4 809-2 206-209		480	<1	<1	<20	0.6	0.7	<2	<5	<200	<500
P4 809-2 209-212		<200	<1	<1	<20	1.4	0.6	<2	<5	200	<500

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REPORT: V88-04149.0

PROJECT: NONE GIVEN

SAMPLE NUMBER	ELEMENT UNITS	Au PPB	Ag PPM	As PPM	Ba PPM	Br PPM	Cd PPM	Ce PPM	Co PPM	Cr PPM	Cs PPM	Eu PPM	Fe PCT
P4 809-4 160-163		548	26	729	250	2	<10	62	<10	110	<1	<2	7.5
P4 809-4 179-182		1090	61	386	<100	<2	<10	<10	<10	<50	<1	<2	6.8
P4 809-4 192-195		6620	130	2780	<100	3	21	<11	16	54	<1	<2	31.8
P4 809-4 198-201		8100	74	3210	<100	4	<13	<10	27	52	<1	<2	35.4
P4 809-4 210-214		2780	100	6960	<100	9	<16	<11	12	62	<1	<2	40.6
P4 809-4 220-223		1500	63	1730	<100	4	21	<10	10	<50	<1	<2	29.4
P4 809-4 235-237		6920	67	1680	<100	<2	<10	<10	<10	72	<1	<2	19.0
P4 809-4 239-242		10400	61	1750	<100	2	<10	<10	25	<50	<1	<2	24.9
P4 809-4 247-250		3270	150	1340	160	<2	16	<10	12	<50	<1	<2	40.7
P4 809-4 259-262		2800	160	1230	130	3	<10	<12	36	93	<1	<2	14.0
P4 809-4 274-277		528	100	563	<100	<2	<10	<10	<10	63	<1	<2	8.9
P4 809-4 277-281		2110	324	5190	<100	8	<15	<10	12	290	<1	<2	19.0
P4 809-4 281-285		12400	110	6950	<100	11	<16	<13	13	<50	<1	<2	25.9
P4 809-4 285-289		5240	130	557	<100	<2	<10	<10	<10	50	<1	<2	7.2
P4 809-4 289-292		7150	170	1450	<100	3	<10	<14	<10	53	<1	<2	6.0
P4 809-4 292-296		4810	211	6640	<100	11	<16	<12	15	62	<1	<2	28.7
P4 809-4 296-300		7800	52	1560	<100	3	<10	<16	37	62	<1	<2	19.0
P4 809-4 300-304		3770	36	564	<100	<2	<10	<10	11	67	<1	<2	5.3
P4 809-4 304-308		5180	64	552	<100	<2	<10	<10	10	<50	<1	<2	4.4
P4 809-4 308-312		1770	130	958	<100	<2	<10	<10	26	<50	<1	<2	8.9
P4 809-4 312-315		5610	85	580	<100	<2	<10	<11	38	78	<1	<2	16.0
P4 809-4 315-318		>30000	86	754	310	<2	<16	<15	84	87	<1	<2	34.1
P4 809-4 318 322		>30000	160	1060	250	<5	<21	<30	36	<50	<1	<2	20.0
P4 809-4 322-326		20100	80	575	<100	<2	<10	<10	32	72	<1	<2	19.0
P4 809-4 326-330		9310	346	808	220	<2	<10	<14	25	<50	<1	<2	14.0
P4 809-4 330-334		6320	342	1280	<100	3	<10	<15	34	<50	<1	<2	21.5
P4 809-4 350-354		1870	32	1270	<100	3	<10	<11	20	75	<1	<2	14.0
P4 809-5 85-90		2850	36	1610	190	4	<10	<13	<10	<50	<1	<2	14.0
P4 809-5 105-110		1690	69	576	<100	<2	<10	<10	<10	55	<1	<2	18.0
P4 809-5 137-140		5970	140	980	<100	<2	<10	<12	<10	<50	<1	<2	13.0
P4 809-5 142-145		4140	81	1110	<100	3	<10	<11	<10	70	<1	<2	11.0
P4 809-5 148-151		5940	34	78	<100	<2	<10	<10	<10	67	<1	<2	2.0
P4 809-5 157-160		8780	27	103	<100	<2	<10	<10	<10	<50	<1	<2	1.8
P4 809-5 162-165		4660	16	45	<100	<2	<10	<10	<10	<50	<1	<2	1.6
P4 809-5 168-172		1250	47	775	300	<2	<10	47	<10	88	<1	<2	13.0
P4 809-5 180-185		31	12	1020	170	3	10	27	18	80	<1	<2	11.0
P4 809-8 155-158		5710	180	351	<100	<2	<10	<10	<10	<50	<1	<2	4.0
P4 809-8 162-165		4020	98	1090	<100	3	<10	<12	<10	<50	<1	<2	16.0
P4 809-8 172-175		2270	97	820	<100	<2	<10	<10	<10	<50	<1	<2	8.0
P4 809-8 187-190		18200	55	714	<100	<2	<10	<16	<10	<50	<1	<2	3.4

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Geochemical Lab Report

REPORT: V88-04149.0

PROJFCT: NONE GIVFN

SAMPLE NUMBER	ELEMENT UNITS	Hf PPM	Ir PPB	La PPM	Lu PPM	Mo PPM	Na PCT	Ni PPM	Rb PPM	Sb PPM	Sc PPM	Se PPM	Sm PPM
P4 809-4 160-163		5	<100	35	<0.5	9	<0.05	<50	<10	15.3	9.0	12	8.0
P4 809-4 179-182		<2	<100	<5	<0.5	10	<0.05	<50	<10	12.1	<0.5	15	0.3
P4 809-4 192-195		<2	<100	<5	<0.5	21	0.22	<50	<10	30.8	<0.5	56	<0.2
P4 809-4 198-201		<2	<100	<5	<0.5	15	0.17	<50	11	16.8	<0.5	59	<0.2
P4 809-4 210-214		<2	<100	<5	<0.5	10	0.17	<50	19	6.8	<0.5	66	0.4
P4 809-4 220-223		<2	<100	<5	<0.5	20	0.14	<50	15	16.0	<0.5	130	0.2
P4 809-4 235-237		<2	<100	<5	<0.5	10	0.10	<50	12	4.0	<0.5	<10	<0.2
P4 809-4 239-242		<2	<100	<5	<0.5	11	0.14	<50	<10	10.0	<0.5	33	<0.2
P4 809-4 247-250		<2	<100	<5	<0.5	8	0.17	<50	18	16.7	0.6	26	0.2
P4 809-4 259-262		<2	<100	<5	<0.5	14	<0.05	<50	<10	10.8	<0.5	10	<0.2
P4 809-4 274-277		<2	<100	<5	<0.5	9	<0.05	<50	<10	6.6	<0.5	40	<0.2
P4 809-4 277-281		<2	<100	<5	<0.5	15	0.23	<50	12	17.3	<0.5	130	<0.2
P4 809-4 281-285		<2	<100	<5	<0.5	20	0.24	<50	14	20.8	<0.5	110	<0.2
P4 809-4 285-289		<2	<100	<5	<0.5	9	<0.05	<50	<10	13.2	<0.5	32	<0.2
P4 809-4 289-292		<2	<100	<5	<0.5	10	<0.05	<50	<10	8.6	<0.5	36	<0.2
P4 809-4 292-296		<2	<100	<5	<0.5	15	0.23	<50	16	14.0	<0.5	57	<0.2
P4 809-4 296-300		<2	<100	<5	<0.5	14	<0.05	<50	12	13.0	<0.5	23	0.3
P4 809-4 300-304		<2	<100	<5	<0.5	8	<0.05	<50	<10	5.5	<0.5	<10	0.2
P4 809-4 304-308		<2	<100	<5	<0.5	6	<0.05	<50	<10	4.3	<0.5	<10	0.2
P4 809-4 308-312		<2	<100	<5	<0.5	7	<0.05	<50	<10	6.7	<0.5	13	0.4
P4 809-4 312-315		<2	<100	<5	<0.5	9	<0.05	<50	10	8.1	<0.5	15	0.5
P4 809-4 315-318		<2	<100	<5	<0.5	11	0.21	<50	13	18.0	<0.5	<10	<0.2
P4 809-4 318 322		<2	<100	5	<0.7	11	0.48	<50	<11	16.8	<0.6	<17	2.1
P4 809-4 322-326		<2	<100	<5	<0.5	15	0.17	<50	<10	16.2	<0.5	28	0.2
P4 809-4 326-330		<2	<100	<5	<0.5	13	<0.05	<50	<10	16.6	<0.5	38	<0.2
P4 809-4 330-334		<2	<100	<5	<0.5	12	<0.05	<50	17	12.4	<0.5	27	<0.2
P4 809-4 350-354		<2	<100	<5	<0.5	12	<0.05	<50	<10	15.3	<0.5	10	0.5
P4 809-5 85-90		<2	<100	7	<0.5	8	<0.05	<50	<10	8.6	2.6	31	2.9
P4 809-5 105-110		<2	<100	<5	<0.5	12	<0.05	<50	<10	12.8	<0.5	210	0.3
P4 809-5 137-140		<2	<100	<5	<0.5	13	<0.05	<50	<10	14.2	0.8	88	0.8
P4 809-5 142-145		<2	<100	<5	<0.5	11	<0.05	<50	<10	16.5	<0.5	29	<0.2
P4 809-5 148-151		<2	<100	<5	<0.5	6	<0.05	<50	<10	6.9	<0.5	<10	<0.2
P4 809-5 157-160		<2	<100	<5	<0.5	7	<0.05	<50	<10	10.1	<0.5	<10	<0.2
P4 809-5 162-165		<2	<100	<5	<0.5	7	<0.05	<50	<10	6.3	<0.5	<10	<0.2
P4 809-5 168-172		3	<100	26	<0.5	15	<0.05	<50	<10	43.8	9.4	67	7.9
P4 809-5 180-185		<2	<100	18	<0.5	25	<0.05	<50	<10	41.8	7.1	<10	4.9
P4 809-8 155-158		<2	<100	<5	<0.5	9	<0.05	<50	<10	6.8	<0.5	34	0.3
P4 809-8 162-165		<2	<100	<5	<0.5	12	<0.05	<50	<10	13.8	<0.5	55	<0.2
P4 809-8 172-175		<2	<100	<5	<0.5	12	<0.05	<50	<10	17.7	<0.5	39	<0.2
P4 809-8 187-190		<2	<100	<5	<0.5	10	<0.05	<50	<10	16.4	<0.5	<10	<0.2

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SAMPLE NUMBER	ELEMENT UNITS	Sn PPM	Ta PPM	Tb PPM	Te PPM	Th PPM	U PPM	W PPM	Yb PPM	Zn PPM	Zr PPM
P4 809-4 160-163		<200	<1	<1	<27	5.5	4.4	<5	<5	510	<500
P4 809-4 179-182		560	<1	<1	<20	0.8	1.2	<4	<5	460	<500
P4 809-4 192-195		4900	<1	<1	<31	0.5	2.8	<11	<5	2000	<500
P4 809-4 198-201		1100	<1	<1	<30	<0.5	3.1	<10	<5	2500	<500
P4 809-4 210-214		530	<1	<1	<37	0.5	2.0	<12	<5	1400	<500
P4 809-4 220-223		530	<1	<1	<21	0.7	2.9	<8	<5	950	<500
P4 809-4 235-237		230	<1	<1	<20	<0.5	1.1	<7	<5	640	<500
P4 809-4 239-242		1400	<1	<1	<23	<0.5	2.7	<17	<5	1300	<500
P4 809-4 247-250		570	<1	<1	<23	1.4	6.8	<17	<5	1300	<500
P4 809-4 259-262		260	<1	<1	<33	1.6	3.7	<5	<5	510	<500
P4 809-4 274-277		850	<1	<1	<20	<0.5	1.4	<3	<5	350	<500
P4 809-4 277-281		290	<1	<1	59	<0.5	2.9	<18	<5	770	<500
P4 809-4 281-285		<200	<1	<1	240	0.6	4.2	<11	<5	1100	<500
P4 809-4 285-289		230	<1	<1	28	<0.5	1.6	<3	<5	450	<500
P4 809-4 289-292		520	<1	<1	<42	0.6	2.1	<5	<5	350	<500
P4 809-4 292-296		930	<1	<1	<33	<0.5	8.6	<29	<5	1100	<500
P4 809-4 296-300		1400	<1	<1	<42	2.0	6.5	3	<5	610	<500
P4 809-4 300-304		560	<1	<1	<22	1.0	2.1	<2	<5	310	<500
P4 809-4 304-308		320	<1	<1	<22	1.2	2.7	<3	<5	460	<500
P4 809-4 308-312		390	<1	<1	<28	2.3	5.1	<2	<5	600	<500
P4 809-4 312-315		740	<1	<1	<26	1.2	4.2	<2	<5	760	<500
P4 809-4 315-318		2300	<1	<1	<33	1.0	7.1	<12	<5	1200	<500
P4 809-4 318 322		3100	<1	<1	<60	<0.9	2.4	23	<5	770	<500
P4 809-4 322-326		340	<1	<1	<23	1.0	3.9	<13	<5	520	<500
P4 809-4 326-330		900	<1	<1	<34	<0.6	1.9	<6	<5	330	<500
P4 809-4 330-334		780	<1	<1	<39	1.2	4.3	<8	<5	730	<500
P4 809-4 350-354		230	<1	<1	<31	1.6	3.0	<7	<5	560	<500
P4 809-5 85-90		<200	<1	<1	<35	2.5	1.9	<8	<5	900	<500
P4 809-5 105-110		<200	<1	<1	<22	0.5	1.1	<3	<5	470	<500
P4 809-5 137-140		490	<1	<1	<31	2.4	1.5	<7	<5	520	<500
P4 809-5 142-145		400	<1	<1	<30	0.6	1.6	<3	<5	450	<500
P4 809-5 148-151		330	<1	<1	<20	<0.5	<0.5	<2	<5	<200	<500
P4 809-5 157-160		540	<1	<1	<20	<0.5	<0.5	<2	<5	<200	<500
P4 809-5 162-165		300	<1	<1	<20	<0.5	<0.5	<2	<5	<200	<500
P4 809-5 168-172		<200	<1	<1	<33	7.2	6.0	<18	<5	350	<500
P4 809-5 180-185		<200	<1	<1	58	2.9	4.0	<6	<5	510	<500
P4 809-8 155-158		520	<1	<1	<21	<0.5	0.6	<2	<5	220	<500
P4 809-8 162-165		1200	<1	<1	<31	<0.5	0.6	<6	<5	430	<500
P4 809-8 172-175		<200	<1	<1	<25	1.0	1.3	<2	<5	330	<500
P4 809-8 187-190		250	<1	<1	<34	<0.6	0.9	<2	<5	<200	<500

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Geochemical Lab Report

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SAMPLE NUMBER	ELEMENT UNITS	Au PPB	Ag PPM	As PPM	Ba PPM	Br PPM	Cd PPM	Ce PPM	Co PPM	Cr PPM	Cs PPM	Eu PPM	Fe PCT
P4 809-8 192-194		3720	120	431	<100	<2	<10	<10	<10	69	<1	<2	6.3
P4 809-8 198-200		1600	71	351	<100	<2	<10	<10	<10	<50	<1	<2	5.7
P4 809-8 210-213		1050	20	397	<100	<2	<10	<10	<10	<50	<1	<2	5.5
P4 809-8 220-223		935	27	213	<100	<2	<10	<10	<10	58	<1	<2	3.3
P4 809-9 77-80		22	14	311	<100	<2	<10	36	<10	<50	<1	<2	6.3
P4 809-9 83-85		9770	62	31	<100	<2	<10	<10	<10	<50	<1	<2	1.8
P4 809-9 89-91		4550	43	22	<100	<2	<10	<10	<10	<50	<1	<2	1.7
P4 809-9 93-95		5120	42	25	<100	<2	<10	<10	<10	<50	<1	<2	1.5
P4 809-9 97-99		9610	35	31	<100	<2	<10	<10	<10	<50	<1	<2	1.4
P4 809-9 101-103		11900	33	30	<100	<2	<10	<10	<10	<50	<1	<2	1.7
P4 809-9 105-107		18200	38	40	<100	<2	<10	<14	<10	<50	<1	<2	1.4
P4 809-9 109-111		5220	27	14	<100	<2	<10	<10	<10	<50	<1	<2	1.3
P4 809-9 113-115		6550	34	15	<100	<2	<10	<10	<10	<50	<1	<2	1.0
P4 809-9 117-120		9390	36	18	<100	<2	<10	<10	<10	<50	<1	<2	1.0
P4 809-9 123-125		6300	51	25	<100	<2	<10	<10	<10	<50	<1	<2	0.6
P4 809-9 128-133		10700	160	456	<100	<2	<10	15	<10	<50	<1	<2	2.4
P4 809-9 138-140		5870	15	103	<100	<2	<10	<10	<10	<50	<1	<2	1.2
P4 809-9 148-150		8280	35	124	<100	<2	<10	<10	<10	50	<1	<2	1.7
P4 809-9 156-158		5990	26	111	<100	<2	<10	<10	<10	<50	<1	<2	1.5
P4 809-9 160-163		364	29	346	<100	<2	<10	21	<10	91	<1	<2	3.3

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Geochemical Lab Report

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PROJECT: NONE GIVEN   PAGE 3B

SAMPLE NUMBER	ELEMENT UNITS	Hf PPM	Ir PPB	La PPM	Lu PPM	Mo PPM	Na PCT	Ni PPM	Rb PPM	Sb PPM	Sc PPM	Se PPM	Sm PPM
P4 809-8 192-194		<2	<100	<5	<0.5	10	<0.05	<50	<10	17.1	<0.5	<10	0.3
P4 809-8 198-200		<2	<100	<5	<0.5	8	<0.05	<50	<10	11.8	<0.5	<10	0.2
P4 809-8 210-213		<2	<100	<5	<0.5	6	<0.05	<50	<10	11.1	<0.5	14	<0.2
P4 809-8 220-223		<2	<100	<5	<0.5	8	<0.05	<50	<10	24.2	0.5	<10	0.5
P4 809-9 77-80		4	<100	19	<0.5	10	<0.05	<50	<10	12.7	5.4	25	3.0
P4 809-9 83-85		<2	<100	<5	<0.5	7	<0.05	<50	<10	8.4	<0.5	<10	<0.2
P4 809-9 89-91		<2	<100	<5	<0.5	7	<0.05	<50	<10	5.8	<0.5	<10	<0.2
P4 809-9 93-95		<2	<100	<5	<0.5	7	<0.05	<50	<10	5.6	<0.5	<10	<0.2
P4 809-9 97-99		<2	<100	<5	<0.5	6	<0.05	<50	<10	9.4	<0.5	<10	<0.2
P4 809-9 101-103		<2	<100	<5	<0.5	7	<0.05	<50	<10	24.2	<0.5	<10	<0.2
P4 809-9 105-107		<2	<100	<5	<0.5	6	<0.05	<50	<10	19.9	<0.5	<10	<0.2
P4 809-9 109-111		<2	<100	<5	<0.5	5	<0.05	<50	<10	5.7	<0.5	<10	<0.2
P4 809-9 113-115		<2	<100	<5	<0.5	5	<0.05	<50	<10	8.9	<0.5	<10	<0.2
P4 809-9 117-120		<2	<100	<5	<0.5	4	<0.05	<50	<10	9.0	<0.5	<10	<0.2
P4 809-9 123-125		<2	<100	<5	<0.5	4	<0.05	<50	<10	50.9	<0.5	<10	<0.2
P4 809-9 128-133		<2	<100	<5	<0.5	5	<0.05	<50	<10	72.5	<0.5	<10	<0.2
P4 809-9 138-140		<2	<100	<5	<0.5	5	<0.05	<50	<10	14.6	<0.5	<10	<0.2
P4 809-9 148-150		<2	<100	<5	<0.5	7	<0.05	<50	<10	13.3	<0.5	<10	<0.2
P4 809-9 156-158		<2	<100	<5	<0.5	5	<0.05	<50	<10	19.1	<0.5	<10	<0.2
P4 809-9 160-163		4	<100	13	<0.5	9	<0.05	<50	<10	33.0	10.0	<10	2.8

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SAMPLE NUMBER	ELEMENT UNITS	Sn PPM	Ta PPM	Tb PPM	Te PPM	Th PPM	U PPM	W PPM	Yb PPM	Zn PPM	Zr PPM
P4 809-8 192-194		320	<1	<1	<21	<0.5	1.2	<3	<5	250	<500
P4 809-8 198-200		470	<1	<1	<20	1.2	2.1	<4	<5	280	<500
P4 809-8 210-213		1900	<1	<1	<20	<0.5	0.6	<4	<5	<200	<500
P4 809-8 220-223		1400	<1	<1	<20	0.6	1.1	<4	<5	<200	<500
P4 809-9 77-80		<200	<1	<1	<20	4.3	3.6	<4	<5	260	<500
P4 809-9 83-85		680	<1	<1	<20	<0.5	<0.5	<3	<5	<200	<500
P4 809-9 89-91		280	<1	<1	<20	<0.5	<0.5	<2	<5	<200	<500
P4 809-9 93-95		300	<1	<1	<20	<0.5	<0.5	<2	<5	<200	<500
P4 809-9 97-99		930	<1	<1	<20	<0.5	0.7	<3	<5	<200	<500
P4 809-9 101-103		1800	<1	<1	<20	<0.5	<0.5	<3	<5	<200	<500
P4 809-9 105-107		900	<1	<1	<25	<0.5	<0.5	<2	<5	<200	<500
P4 809-9 109-111		750	<1	<1	<20	<0.5	<0.5	<2	<5	<200	<500
P4 809-9 113-115		320	<1	<1	<20	<0.5	<0.5	<2	<5	<200	<500
P4 809-9 117-120		240	<1	<1	<20	<0.5	<0.5	<2	<5	<200	<500
P4 809-9 123-125		1600	<1	<1	<22	<0.5	<0.5	<2	<5	<200	<500
P4 809-9 128-133		2600	<1	<1	<32	<0.5	<0.5	<8	<5	260	<500
P4 809-9 138-140		420	<1	<1	<20	<0.5	<0.5	<3	<5	<200	<500
P4 809-9 148-150		1100	<1	<1	<20	<0.5	<0.5	<35	<5	<200	<500
P4 809-9 156-158		950	<1	<1	<20	<0.5	<0.5	<3	<5	<200	<500
P4 809-9 160-163		<200	<1	<1	<20	3.8	5.8	<11	<5	200	<500

IRON KING ASSAY INC.

12-Jul-88

LAB JOB #: AFB02768

ATTN: Carole A. O'Brien

Client name: A.F. Budge (Mining) Ltd.

No. Samples: 3
Date Received: 07-06-88
Submitted by: Don White

Billing address: 4301 N. 75th St.
Suite 101
Scottsdale, AZ 85251-3504

Phone number: (602) 945-4360/778-3140

INVOICE ATTACHED

ANALYTICAL REPORT

Client ID AFB02768	Lab ID		FA/AA Au oz/ton	Fire Assay Ag oz/ton
UVX Batch 129				
993-1	2768-	1	0.051	1.97
993-2	2768-	2	0.073	2.87
993-3R-1	2768-	3	0.027	1.40

REGISTERED ASSAYER
CERTIFICATE NO.
14315
ROBERT G.
CROOK
Date Signed 7-12-88
ARIZONA, U.S.A.

P.O. Box 56 • Humboldt, Arizona 86329 • Phone (602) 632-7410

Carole

Don White
521 East Willis St.
Prescott, AZ 86301

Date: July 6, 1988

778-3140

Robert Crook / Jim Weatherby
Iron King Assay, Inc.
P.O. Box 56
Humboldt, AZ 86329
(632-7410)

UVX Batch # 129

Hello Bob + Jim + Kati;

Accompanying are three (3) samples for one assay ton gold and silver fire assay with AA followups as appropri[ate]. The samples are numbered:

1 993-1
2 993-2
3 902-3R-1

Please save all pulps + rejects for my pickup.
Please send a copy of the results + billing to Carole (below)

c.c. Carole A. O'Brien
A.F. Budge (Mining) Ltd.
7340 East Shoeman Ln.
Suite 111-B-(E)
Scottsdale, AZ 85251

Thanks,
Don
Don White
Geologist, C.P.G.

IRON KING ASSAY INC.

20-Jul-88

LAB JOB #: AFB02779

ATTN: Carole A. O'Brien

Client name: A.F. Budge (Mining) Ltd.

No. Samples: 12
Date Received: 07-10-88
Submitted by: Don White

Billing address: 4301 N. 75th St.
Suite #101
Scottsdale, AZ 85251-3504

Phone number: (602) 945-4360/778-3140

INVOICE ATTACHED

ANALYTICAL REPORT

Client ID AFB02779	Lab ID	FA/AA Au oz/ton	Fire Assay Ag oz/ton
SQ-1	2779- 1	0.002	0.85
SQ-2	2779- 2	0.003	<.10
SQ-3	2779- 3	<.001	<.10
SQ-4	2779- 4	<.001	1.86
SQ-5	2779- 5	<.001	<.10
SQ-6	2779- 6	0.003	<.10
SQ-7	2779- 7	0.001	0.13
SQ-8	2779- 8	<.001	<.10
SQ-9	2779- 9	0.001	0.12
SQ-10	2779- 10	<.001	<.10
SQ-11	2779- 11	0.006	0.63
SQ-12	2779- 12	0.004	3.53

REGISTERED ASSAYER CERTIFICATE NO. 14316 ROBERT G. CROOK Date Signed 7-20-88 ARIZONA, U.S.A.

Robert G. Crook

P.O. Box 56 • Humboldt, Arizona 86329 • Phone (602) 632-7410

To: Anthony F. Budge
A.F. Budge Limited
Retford, Notts., DN22 7SW

From: DMEA Ltd., Scottsdale, AZ 85251

Date: September 24, 1986

Tony:

Re: UVX

Assuming $400/gold and $0.50/unit for silica above 75% (ignoring silver) cut off flux rock grade will be about 0.16 oz/ton IF reasonably uniform mineable bodies are encountered. This is after a mining cost of $45/ton, since payment for silica should cover most of transportation costs.

On the same basis, 0.30 oz/t should return $50/ton; 0.40 oz/t, around $90/ton. Note that a 33 percent increase in grade raises the return 80 percent. (As an aside, 1.0 oz/t rock would return about $300/ton).

The above approximate figures are provided to give you some feeling for the tonnage of flux ore required, at differing grades, to recoup capital outlay.

"Ore" is a man defined word. However, almost all mineral deposits contain more metal in disseminated form than in concentrated bodies. What this means at the UVX is there is a greater probability of finding 0.20 oz/t "ore" than there is of finding 0.50 oz/t. This doesn't mean that there is no 0.50 oz/t (or better) material, however. It does mean that these smaller bodies are more difficult to locate.

It also means that "high grade" may be more valuable in increasing the tonnage of "low or medium grade" ores than it will in itself.

Costs

Due to the large number of uncertainties involved I have little basis on which to prepare a detailed, step-by-step, breakdown. Any individual stage cost figures would, very probably, mislead both you and myself. I am willing, however, to hazzard the following "educated guesses": cleanout and exploration on 950 and 903 levels, an additional $185,000 to $220,000; if mining ensues, an additional $200,000 to $240,000. The latter range includes skip pocket, new skip, escapeway, surface plant, etc.

Since the smelters do not want the minus 1/4 inch fraction (which may be enriched in gold), we should give some preliminary consideration to a small vat leach plant for additional revenue. I hope to get some additional information on this at the AMC meeting.

If we only find 10,000 tons (1/3 of the Gold Stope) of 0.40 oz. or its equivalent in post mining dollars, at gold prices of $385/oz. or more, I believe that you have quite a good chance of recovering the whole investment, plus a profit. The latter will be dependent on actual prices. I think we have a fairly good chance of finding this many ounces though it may be in several bodies.

UVX

(not scanned)

M E M O

TO: Carole A. O'Brien, Anthony F. Budge
cc: Daniel L. Maxwell

FROM: Don C. White

DATE: November 29, 1987

SUBJECT: U.V.X. Josephine Tunnel and Audrey Shaft

Following Dan Maxwell's visit to the UVX Nov. 12, 1987, there was some discussion about the useability of the Josephine haulage tunnel and the Audrey shaft. What follows is information dug out to aid Dan in his preparation of a proposal to inspect the Josephine and Audrey.

The Josephine was the main haulage tunnel for most of the U.V.X. Mine's life. It was preceded by an aerial tramway used 1914 to 1919 during which time all production was hoisted up the Edith and/or Audrey shafts. The Josephine tunnel was mined during 1917-19 (mainly 1918). Thereafter, the Edith was mainly a man and supply shaft (all the carpentry shops for square set fabrication were where our present mine yard is). The Audrey was a hoisting shaft for ore from the main ore body (1300-1600 levels) up to the Josephine (1300) and the Josephine was the main haulage directly from Audrey shaft ore pockets to the Clemenceau (Cottonwood) U.V.X. smelter (completed 1918).

Ores from the 1300 through 1700 levels were hoisted in the Audrey shaft to about 30 feet above the 1100 level where there is a skip dump. "Dump irons" operated by pneumatic rams on the 1100 level controlled the distribution of the dumped material to either of the twin 650 s.t. pockets between the 1100 and 1200 levels. Those pockets each continued with a 1,000 s.t. pocket between the 1200 and 1300 levels. Generally, one 1,650 s.t. combination was "first class" (thought to be greater than 10% Cu) sulfide ore while the other was "second class" (lower grade) sulfide ore. Ores could be dumped into the pockets directly from the 1100 and 1200 levels without use of the Audrey shaft.

So-called "silica ores" were segregated in a third area, opening adjacent to the sulfide pockets on the 1300 level Josephine tunnel. The silica ore chute runs from the 950 through 1300 level with dump sites on 1100 and 1200 as well. Most of the content of the Gold Stope and silica ore (copper oxide, silica, gold and silver) bodies passed through the silica chute. Standard gauge haulage trains in the Josephine were made up of custom combinations of numbers of cars of first and second class ores and the appropriate number of silica ore cars to flux the others.

Waste was handled by yet another passage containing substantial storage capacity (perhaps 3,000 s.t.) running from the 950 through 1300 levels and opening to the Josephine on a separate spur from the ore pockets. All the sulfide ore, silica ore and waste pockets and chutes are full of P.D. and Budge cleanup and development waste to the 950 level. All such stored waste could be drained from any opening at any level if the need arose.

We are now coping with several circumstances wroght by time and changing needs and plans. For one, the Edith shaft was never provided with skip loading capability. Since the Josephine is caved and the Audrey has no hoist, when all available waste disposal underground was filled early this year, the 80 s.t. pocket was excavated and loading chute installed beneath the 950 level at the Edith shaft. That has been operational for some months and used for hoisting waste to surface, whence it is dumped in a truck and backed over the dump toward Bitter Creek gulch. The same facilities could be utilized for ore hoisting in the future, but there is now no secondary storage site. Thus the small amounts of ore we might otherwise wish to save, have no place to reside other than to be mixed with waste and thus too diluted or contaminated to be worth saving. Pete Flores, Joe Fernandez, and Jose Ontiveros are working toward some scheme to take care of this.

Of the possible ore versus waste segregation schemes, several are interconnected with the other problem we now face, the inability to pass material from the 800 level to the 950 level. All historical production, ore and waste, from the 903 level up was passed via raises and winzes to the 950 or lower levels. Those passes are mostly caved or inaccessible, except the 902-2 transfer (now caved but reopeneable) through the M-3 ore zone and the 903-N raise in the 911 area. None of them are accessible on the 800 level where development waste will be produced in the course of reaching the 809 ore bodies. Two alternatives are most apparent. One is a pass from the 800 to 950 level near the Edith shaft. The other is a pass from 800 to 950 in or near the 809 or M-3 zones. The latter alternative could be a reopened pass (Morgan winze, 902-2 transfer, or others) or a newly excavated raise.

It is discussion about just how to handle 300,000 to 500,000 s.t. of ore expected to be delineated between the 1200 and 600 levels that leads to consideration of the Audrey and Josephine. Were the Josephine reopenable, the Edith could be a service shaft for men and supplies and the Audrey virtually unnecessary except perhaps for ventilation. If the Josephine could not be reopened, perhaps the Audrey could be equipped with a larger hoist than the one now on the Edith.

The 809, M-3, and 902 zones delineated thus far all bottom above the 950 level. The 911 area about to be drilled, may well be minerized down to the 1100 or even 1200 level. Then there is the bottom of the Gold Stope, between the 950 and 1100 levels, and the possibility of a zone on top of the 1205 veins, between the 1100 and 1200 levels. Furthermore, the low grade zone of the Florencia area identified by the 1104 drilling lies between the 950 and 1200 levels. So a definite possibility exists of wanting to mine down to the 1200 level and thus maybe haul on the 1300 level.

Should the Josephine tunnel be considered for reopening, here are some data I was able to find:

1) The Josephine tunnel is 12,300 feet long, presumably measured from Audrey shaft to tunnel portal.

2) It is 10 feet square in section.

3) It cuts varied rock types of differing propensity to slough or cave. The first 6,000 ft. from the Audrey is in Precambrian (p€) rocks (mostly quartz

porphyry) with only 27 timber sets noted on the 1918-19 plan, all at mapped slips or faults. Several of the faults make water, particularly the area cut by several faults about 3,500 ft. from the Audrey.

4) The next approximately 2,500 ft. of tunnel is mainly in the Devonian Martin Limestone (Dls). In that area it dips about 5°NE. The 550 level is in the same rock and we know from there that it forms quite a good back other than slabbing a little. It bolts well. The limestone section occurs between the Bessie and Valley faults, both major faults with thousands of feet of offset like the Verde fault.

5) The approximately 3,800 ft. of tunnel east of the Valley fault is all in Quaternary conglomerate (Qcgl) and gravel. The Valley fault itself is a major water course noted as such on old Josephine plans. The Qcgl/Qal material is very cave prone when the poorly indurated matrix is subject to water. For that reason it was all gunited originally.

6) The portal is open though there is no track and house lots (surface rights) have been sold off adjacent to the portal. Paul Handverger or Verde would have to be contacted to learn what haulage rights were retained or whether any buy-back provisions were made.

7) Most everyone in Jerome has snuck into the Josephine portal for adventure and one may walk only about 1,000 feet in shallow water, they say, before encountering the first cave-in that dams deep water behind it. No one has descended to the Josephine level at the Audrey end since 1947. No report was made then. Rumor has it that a cave-in somewhere in the Josephine trapped an entire haulage train which was abandoned near the Audrey in 1938 when the mine was shut down.

8) Two other shafts apparently connect to the Josephine. One is the Dundee, an exploration shaft (also produced $CuCO_3$ from the upper Qcgl unit) which apparently connects to the Josephine in the p€ rocks about 4,300 ft. from the Audrey. It is now caved to near the surface. The other is the Texas shaft, sunk specificially for ventilation and to make two more working faces on the Josephine tunneling project. The Texas shaft is about 1,700 ft. E of the Dundee and hits the Josephine near the Bessie fault, the area of the p€ to Dls rock change. The Texas shaft appears open from the collar but is not noticeably making or sucking air. The collar is very poor, having coned out broadly in Qcgl.

9) While most of the water in the Josephine is supplied via faults crossing the tunnel, some water is made by the U.V.X. mine area itself and some drains from the United Verde. The U.V. is flooded to its 1,000 level which inter-connects to the U.V.X. 550 level. Water runs from the U.V. 1,000 level, along the Verde fault and U.V.X. workings to the 1300 level. Periodic water level checks by plumbing from the 1100 level in 1986 indicated the water varies seasonally from a little below to a few feet above the 1300 sill.

10) As already discussed, ample storage capacity (total about 7,000 s.t.) exists in already excavated pockets and chutes, all opening to the Josephine and

accessible from all levels of import to as from 950 thru 1200 levels.

Accompanying this memo are several sections, plans, and report extracts with particulars on the Josephine tunnel. The Josephine deserves some involved physical and financial consideration as an alternative to shaft production now that substantial reserves are being delineated.

Some observations concerning the Audrey shaft are:

1) It is apparently the same design and dimensions as the Edith; 3-compartment, (each 4' x 5'6") concrete lined, vertical.

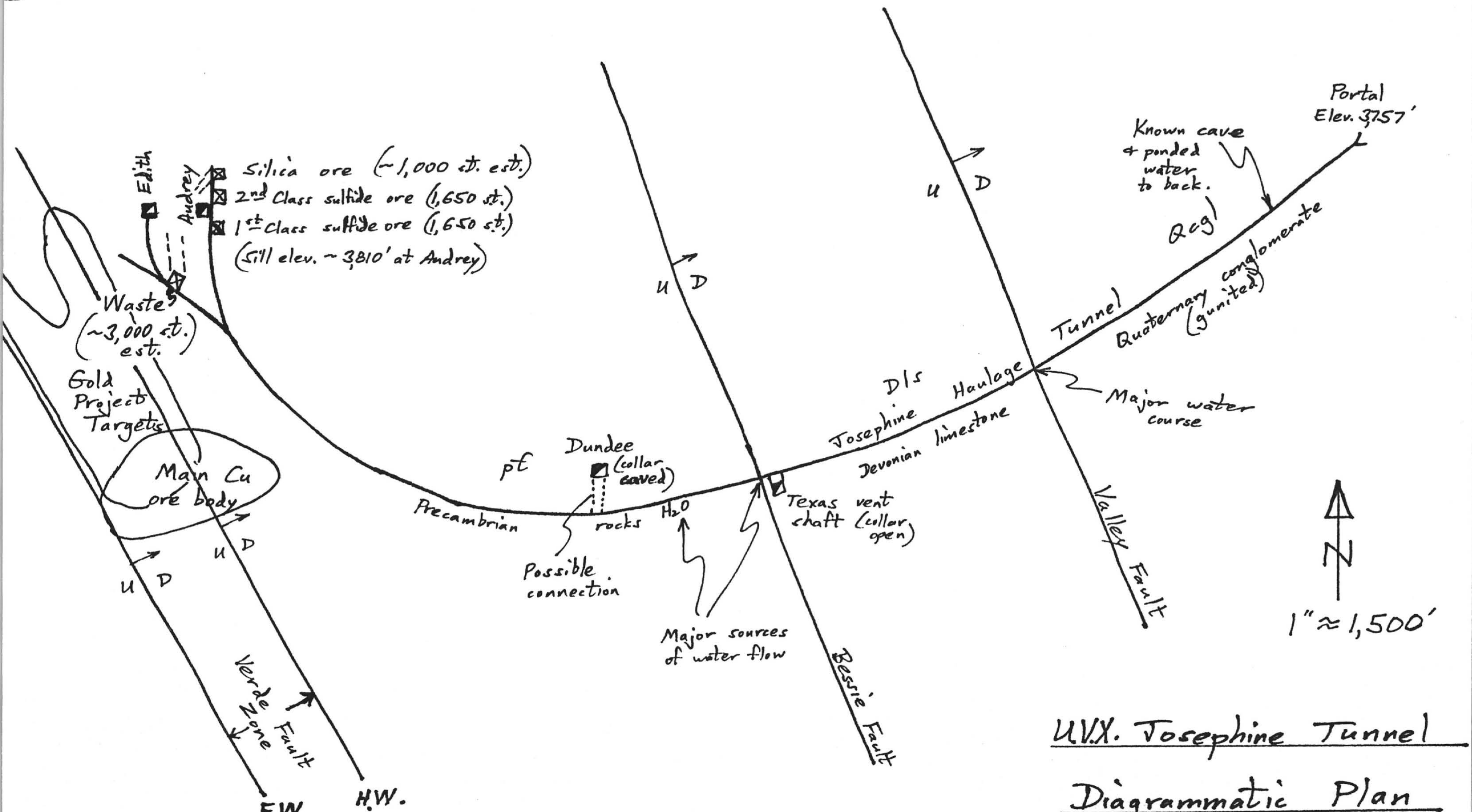
2) The Audrey is 200 ft. E of the Edith and interconnected on 800, 950, 1100, 1200, and 1300 levels.

3) Like the Edith, water level is the 1300 (Josephine) haulage level. Water is being made from a "flat fault" (detachment surface between the Cambrian Tapeats Sandstone and overlying Devonian Martin Limestone) on the 800 level midway between the Edith and Audrey. Because of slushed waste damming flow to the W, that water ponds until it flows E and runs down the Audrey. The 950, 1100, and 1200 levels are dry at the Audrey.

4) Joe Fernandez' surveying effort including hanging piano wire down the Audrey encountered no "hang-ups" from collar through 1100 level. Similarly, visual inspection up and down from each level has indicated no caves or lining breakage. The only exception is the collapsed timber manways stuck at and below the 1200 level of the S. compartment (just like the W. compartment of the Edith jammed by old timbers at the 1200 level).

Accompanying is a chart of level elevations and a 1918 cross section of the Audrey shaft showing the ore handling arrangements. In the event that the Josephine tunnel is not worth reopening but the present Edith shaft hoist and headframe can not meet production demands, the Audrey shaft could be outfitted to fill the projects needs with the Edith serving backup and service functions.

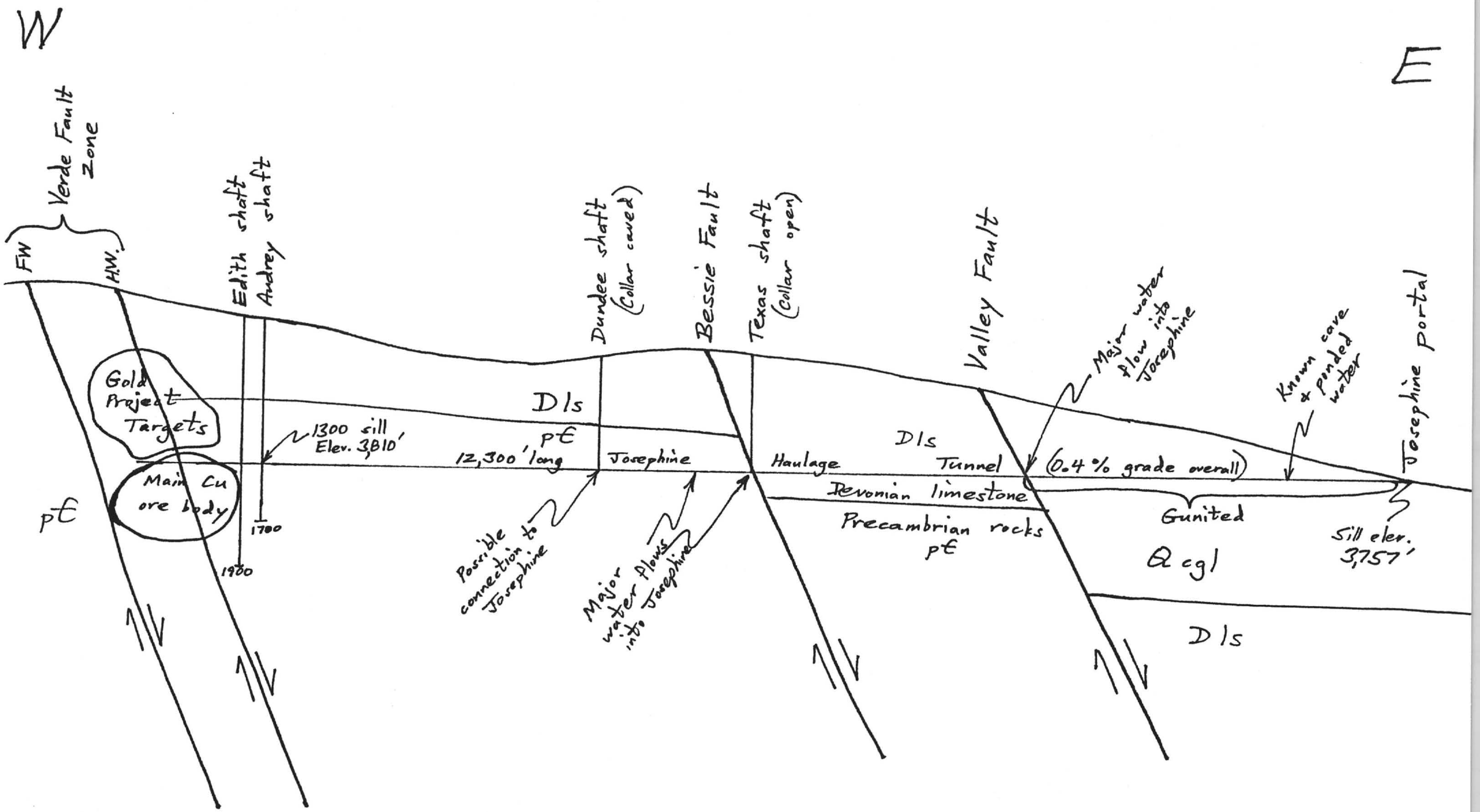
DW:sk



U.V.X. Josephine Tunnel

Diagrammatic Plan

Don White - Nov. 1987



UVX. Josephine Tunnel

Diagrammatic Cross Section

Looking N 1" ≈ 1,500'

Don White November, 1987

(...KEY MTN.)
3553 II NW

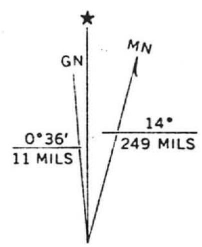
Mapped, edited, and published by the Geological Survey

Control by USGS and NOS/NOAA

Topography by photogrammetric methods from aerial photographs taken 1972. Field checked 1973

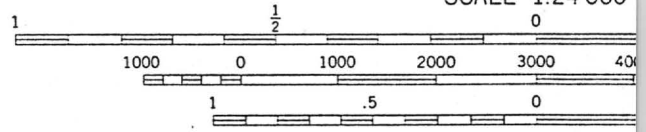
Projection and 10,000-foot grid ticks: Arizona coordinate system, central zone (transverse Mercator)
1000-metre Universal Transverse Mercator grid ticks, zone 12, shown in blue. 1927 North American datum
To place on the predicted North American Datum 1983 move the projection lines 1 meters north and 66 meters east as shown by dashed corner ticks

Where omitted, land lines have not been established



UTM GRID AND 1973 MAGNETIC NORTH DECLINATION AT CENTER OF SHEET

SCALE 1:24 000



CONTOUR INTERVAL 40
DOTTED LINES REPRESENT 20-FO...
NATIONAL GEODETIC VERTICAL D...

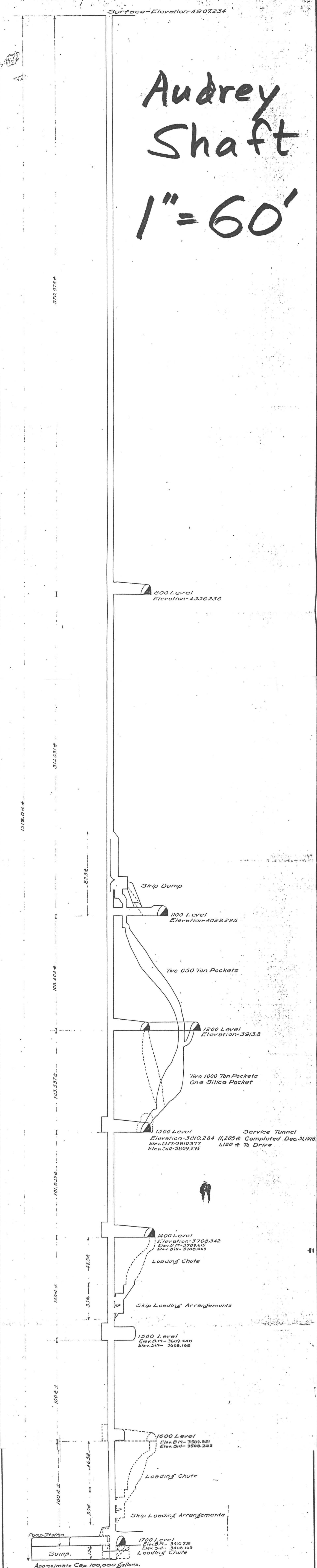
THIS MAP COMPLIES WITH NATIONAL MAP...
FOR SALE BY U. S. GEOLOGICAL SURVEY, DENVER, COLORA...
A FOLDER DESCRIBING TOPOGRAPHIC MAPS AND SYM...

U.V.X. Elevations

Don White
Aug 1986

Level	Elev*	Δ	Floors	Ft/floor	Remarks
Daisy shaft collar	5048				
		140			
Edith shaft collar	4908				
		121			
Bitter Cr. tunnel portal	4787				
		37			
Columbia shaft collar	4750				
		25			
300	4725				
		152			
550	4573				
		72			
600	4501				
		87	11	7.9	
700 (Also called 9th floor of 600 Level)	4414				
		80	8	10.0	
800	4333				
		79	10	7.9	
903 Int. (8th Floor above 950)	4254				
		77	7	11.0	
950	4177				
		157	19	8.3	
1100	4020				
		113	14	8.1	
1200	3907				
		100	12	8.3	
1300	3807				
		99			
1400	3708				
		100			
1500	3608				
		100			
1600	3508				

* Elevation reported for sill floor at Edith shaft station for levels down thru 1300, sill floor Audrey shaft station for 1400 – 1900 levels



Legend
- Portions Completed and Concreted
- Portions to be Driven
- Portions to be Concreted

Section of Audrey Shaft and Ore Handling Arrangements
Scale 1 Inch = 30 Feet. December 31, 1918
M-9

I. C. 6250

February, 1930

Department of Commerce

UNITED STATES BUREAU OF MINES
Scott Turner, Director

INFORMATION CIRCULAR

MINING PRACTICE AND METHODS AT THE UNITED VERDE EXTENSION MINING COMPANY, JEROME, ARIZ.

BY

Richard L. D'Arcy

limestone, and sandstone before encountering the pre-Cambrian rocks about 600 feet below the surface. The general distribution of the pre-Cambrian formations is shown in Figure 3, a plan of the 1400 level. The principal types of rock are diorite, quartz porphyry, greenstone, and schist. Greenstone is a name given to a variety of complex rocks, from fine-grained greenish black basic rocks, to light-colored rocks resembling rhyolites. Probably the schist is mainly altered quartz porphyry and altered greenstones of the more acid types. It is in the schist that most of the ore in the district is found.

METHODS OF DEVELOPMENT AND MINING

Development

The mine is operated through two vertical 3-compartment shafts and a large cross-section haulage adit connecting both shafts on the 1300 level. Both shafts are of concrete, located about 200 feet apart and 1,000 feet north of the main ore-bearing zone. This location has been very satisfactory because the shafts have been in firm rock from collar to bottom; conditions have been ideal for the rather elaborate system of ore and waste pockets, skip-dump pockets, transfer raises, and tunnel-loading pockets immediately adjoining the shafts.

The layout of ore pockets at the Audrey shaft is shown in Figure 4. Ore from below the tunnel level is hoisted in 3-ton skips running in counterbalance to a point above the 1100 level; the skip is dumped by movable guides which show red lights in front of the hoisting engineer when in dumping position and green lights when the shaft is clear. The ore passes from the dumping point to an air-operated deflecting door on the 1100 level, which turns the ore one way or the other as desired. Three converging pockets meet just below this deflector, two for sulphide ore and one for silica converter ore. From these pockets the ore is loaded into trains of standard-gauge cars in the main haulage adit on the 1300 level. Control at this point is by means of finger gates made from bent 70-pound rails operated by air cylinders.

The main tunnel is 2-1/4 miles long and approximately 10 by 10 feet in cross section. Some sections of the tunnel are of solid-concrete arch construction, and others are timbered with 12 by 12 inch sets on 5-foot centers. About 4,000 feet is rock section with gunite coating, and the remainder is unsupported rock section.

From the portal of the tunnel a standard-gauge railroad connects with the smelter at Clemenceau about 5 miles distant (fig. 1). Haulage through the tunnel is with a 25-ton electric motor handling trains of eight 30-ton cars, which are made into trains of 16 cars each at the portal and taken to the smelter by a steam locomotive.

Levels are run on the 550, 800, 950, and 1100 foot elevations and on 100-foot intervals from 1100 to 1900 feet, inclusive. These elevations refer to distances below the collar of the Daisy, an old prospect shaft. The actual depth of each level below the collars of the Edith and Audrey main shafts is about 200 feet less than indicated. The main producing levels in the big ore lens are the 1300, 1400, 1500, and 1600. Production from outlying smaller ore bodies extends from the 550 to the 1700 levels.

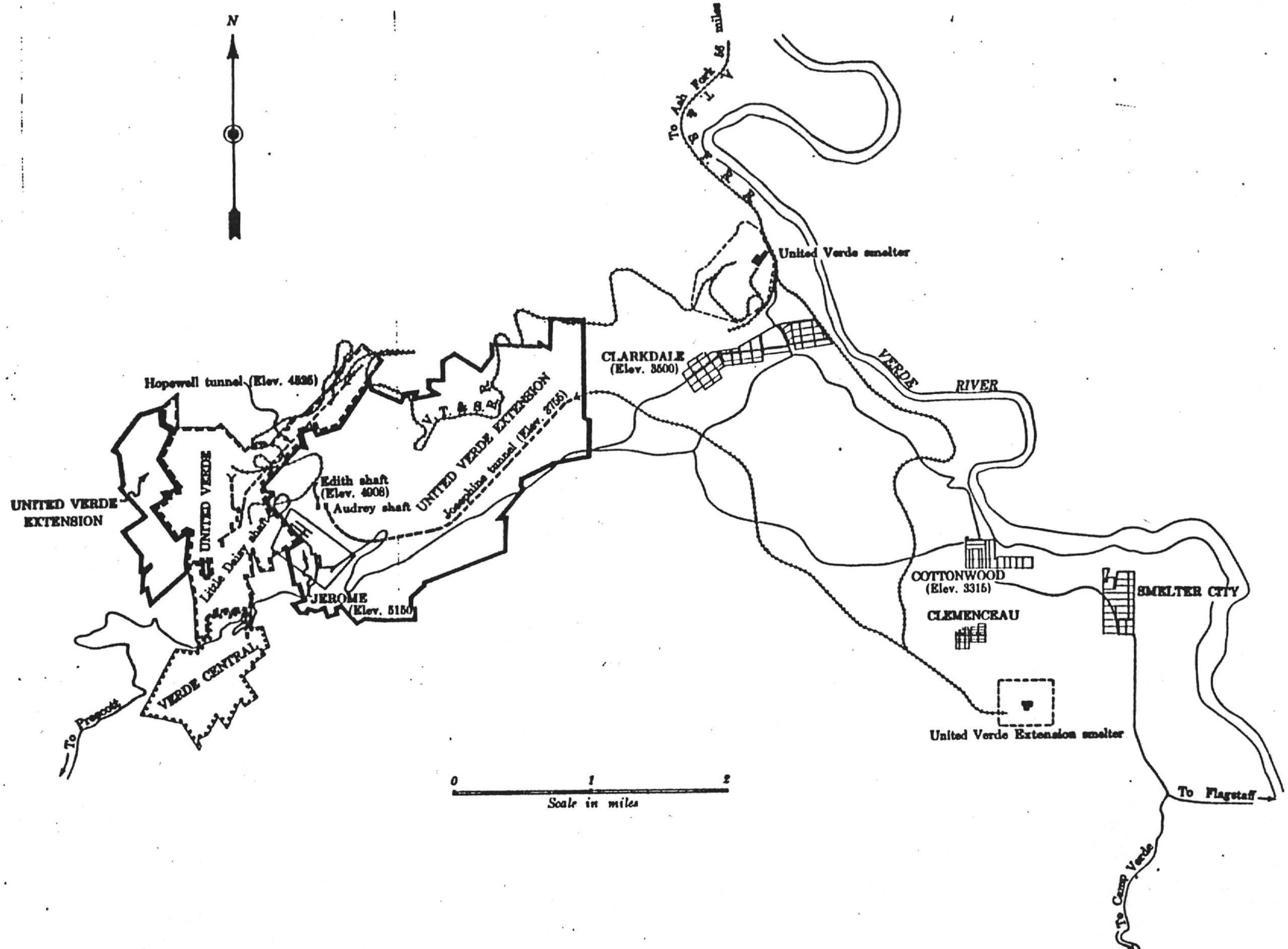


Figure 1.– Map of Jerome district

Development details

Shafts

As stated before, both main shafts, known as the Audrey and Edith, are of solid concrete. The Audrey is the ore-hoisting shaft, while the Edith is used for handling men and supplies and development waste. The Audrey is operated one shift and the Edith three shifts per 24 hours. The Audrey shaft was equipped after the ore was found and was concreted immediately, but the Edith was sunk for prospecting purposes and was at first timbered. Later, it was concreted, and Figure 5 shows a cross section of the completed concrete. The changing of this shaft from timber to concrete was done partly on a cost-plus basis with a contractor in charge of the job, and partly by a picked mine crew working under a bonus agreement. A comparison of these two methods is rather instructive and is favorable to the bonus work, where each man participated in the benefits. Shaft-sinking has since been done under a similar agreement, with very satisfactory results.

Following are details of the shaft concreting costs:

Edith shaft concreting

Three-compartment shaft (2 hoisting compartments 4 feet by 5 feet 6 inches, and 1 manway and pipe compartment 5 feet 2 inches by 5 feet 6 inches), shaft wall containing 6 pipes in sizes varying from 2 to 8 inches.

Shaft concreted from 1400 level to surface, a distance of 1205 feet, including 7 stations.

Work started February 1, 1921; completed July 25, 1921.

Work was done in two sections; first section from 800 to surface, 575 feet on contract basis, second section, 1400 level to 800 level, 630 feet, was done on bonus basis on footage made per day.

The actual cost of mixing and placing the concrete in each section, not considering the preliminary cost of installing the crushing plant, removing old pipe lines, and placing guides and chairs in the concreted sections, was in each instance as follows:

1st section

575 feet, including 2 stations.
Work started February 1, 1921; finished
April 21, 80 days.
Average advance, 7.19 feet per day.

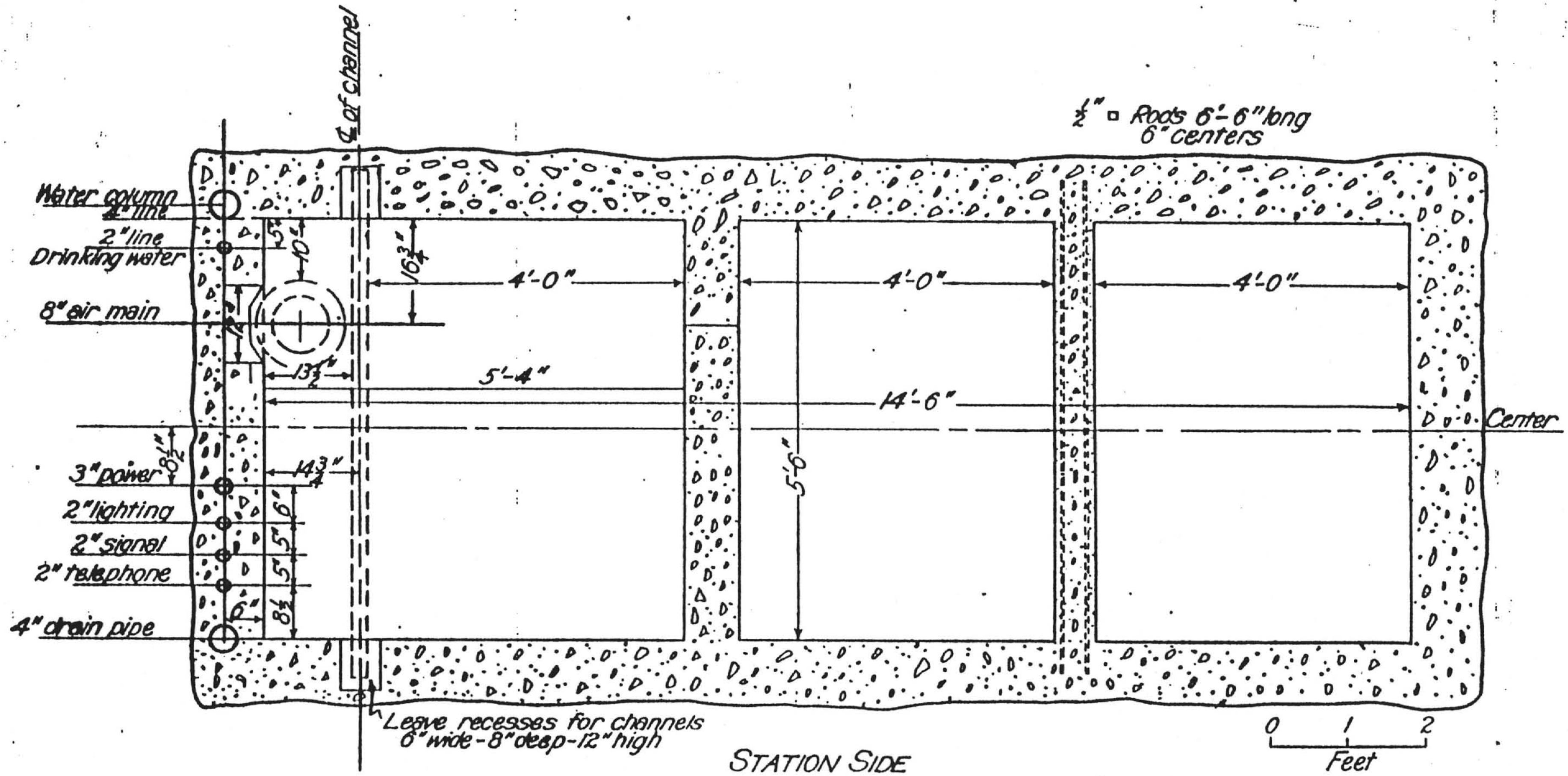
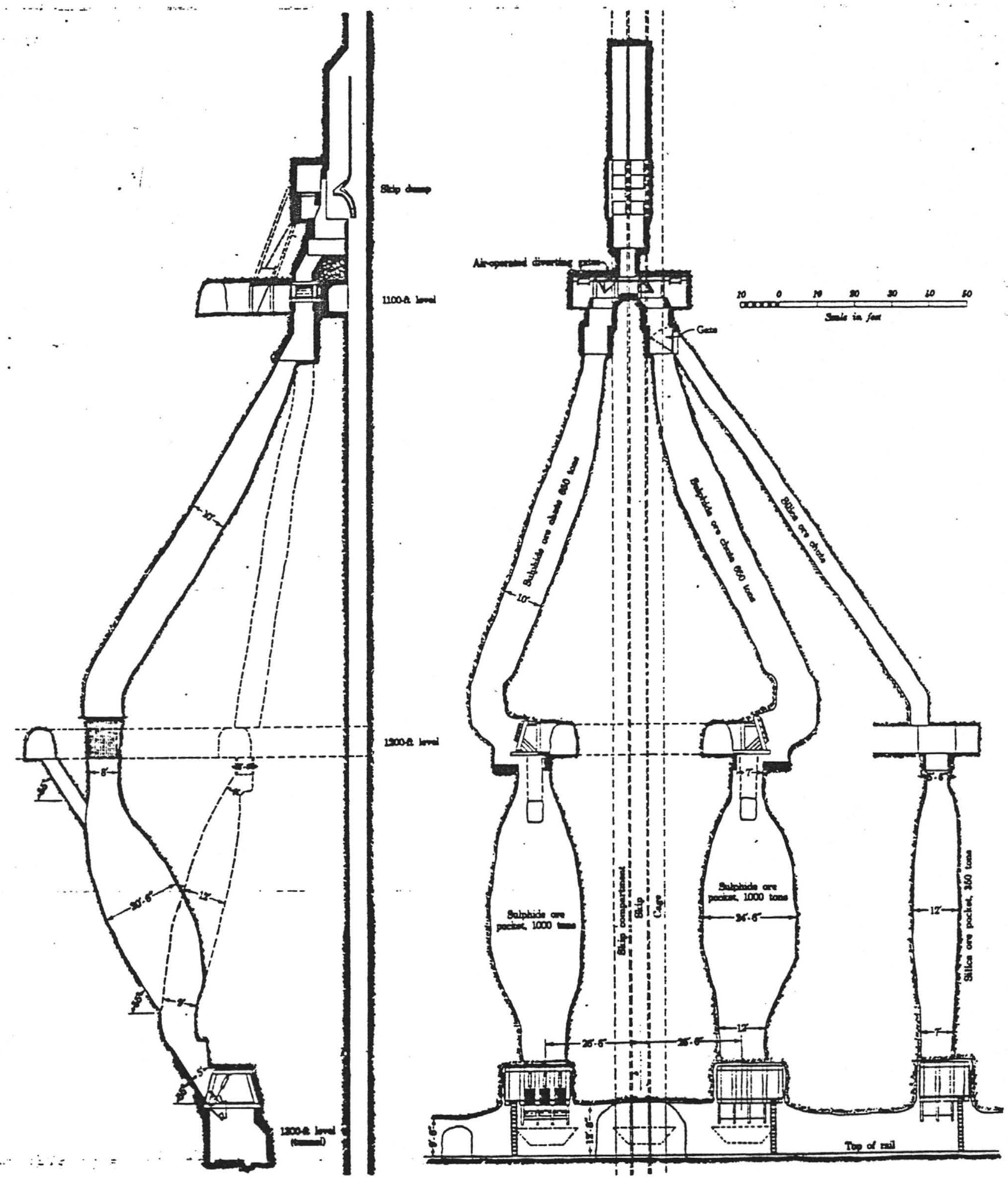


Figure 5.-Section of concrete, Edith Shaft



PROJECTION LOOKING SOUTH

PROJECTION LOOKING WEST

Figure 4. – Loading pockets at Audrey shaft

also (d) shows the use of old rails or pipe in place of lagging in ground that is very soft and inclined to swell. It has been found that by using rail lagging in swelling ground the soft ground squeezes through between the rails, and very little pressure develops on the set itself. Figure 6 (e) shows a method of timbering in soft ground which is not bad enough to require spilling and still needs some support overhead. This is provided by carrying sliding booms over the sets which are pushed ahead as needed.

In the main haulage tunnel several different types of support were used, two of which are shown in Figures 7 (a) and (b).

Guniting

Guniting was used very successfully in a section of the main tunnel 4,000 feet long. This part of the tunnel was through an old recemented river-channel conglomerate, which was comparatively hard when first broken but after exposure to air and moisture tended to slack and slough. Had this not been gunited it would have needed timbering through the entire section. The gunite has now held for over 10 years. If this section had been supported by timber it would have needed at least one complete renewal of the timber. Gunite has been applied in other sections of the mine with little success, due to slight ground movements, that break the gunite and render it useless in a very short time.

A record of the cost of guniting this 4,000-foot section of the main tunnel follows.

Size of tunnel	10 by 10 feet
Footage gunited	4,098
Mixture used	1 cement to 3 sand
Applications	2 coats

Costs

Labor	$2,581.29
Cement (2,056 sacks at $1.10 per sack)	2,250.60
Sand (263 yds. at $2.50 per yd.)	657.50
Machinery repairs and supplies	282.84
Total cost	$5,772.23
Cost per linear foot of tunnel	1.40
Cost per sq. ft., approximately	.046

Bulkhead drift sets

A system of holding extremely heavy gangways through the pillars in the main ore body is shown in Figure 8. It has been found that solid timber bulkhead built as shown, using the waste ends of timber that accumulate in a mine of this kind, will hold a ground pressure that would break ordinary heavy timber sets several times a year. In fact, on one level a section of this kind of bulkheading put in on one side of a drift opposite a solid

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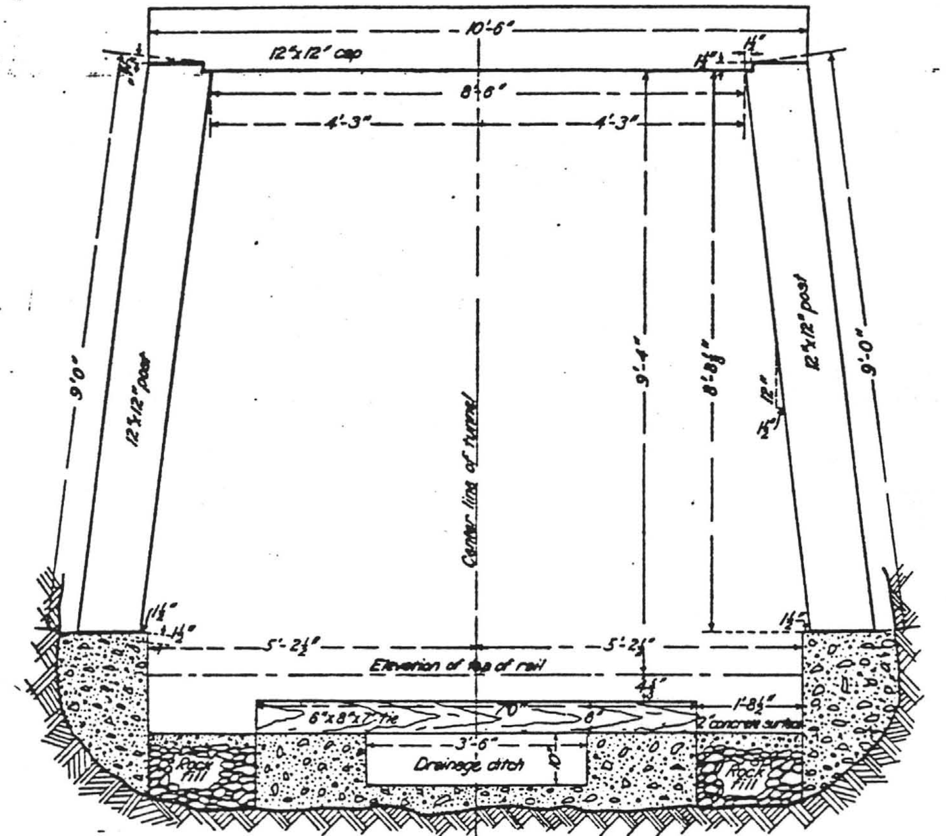


Figure 7-A.-Standard 12"x12" Tunnel Timber

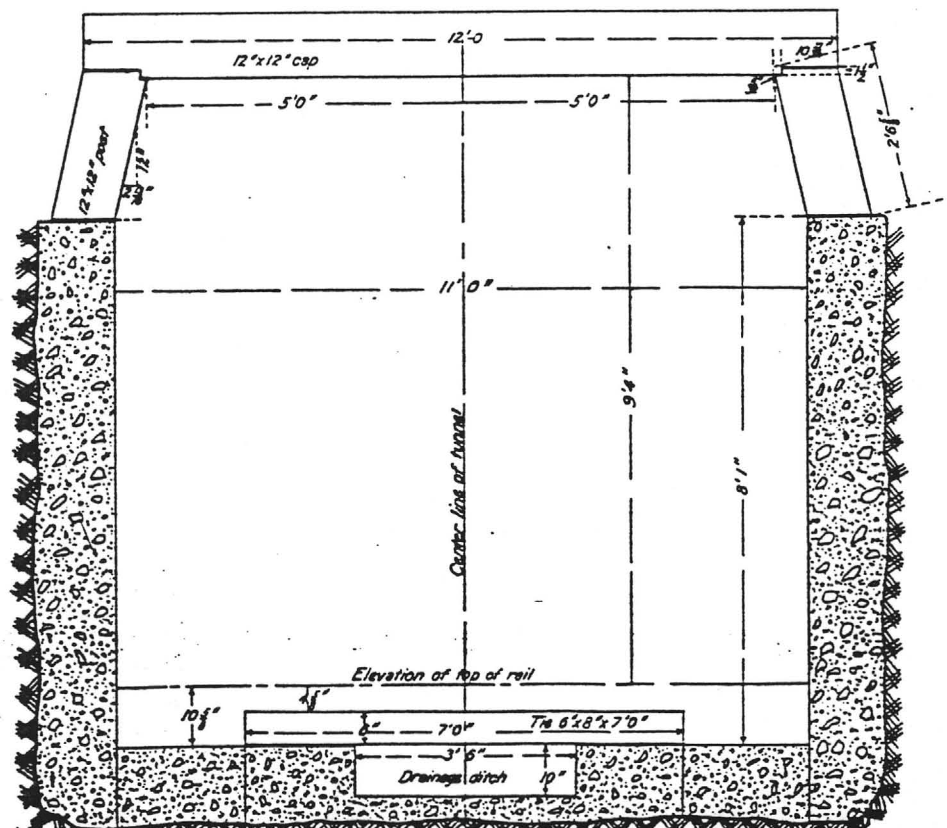


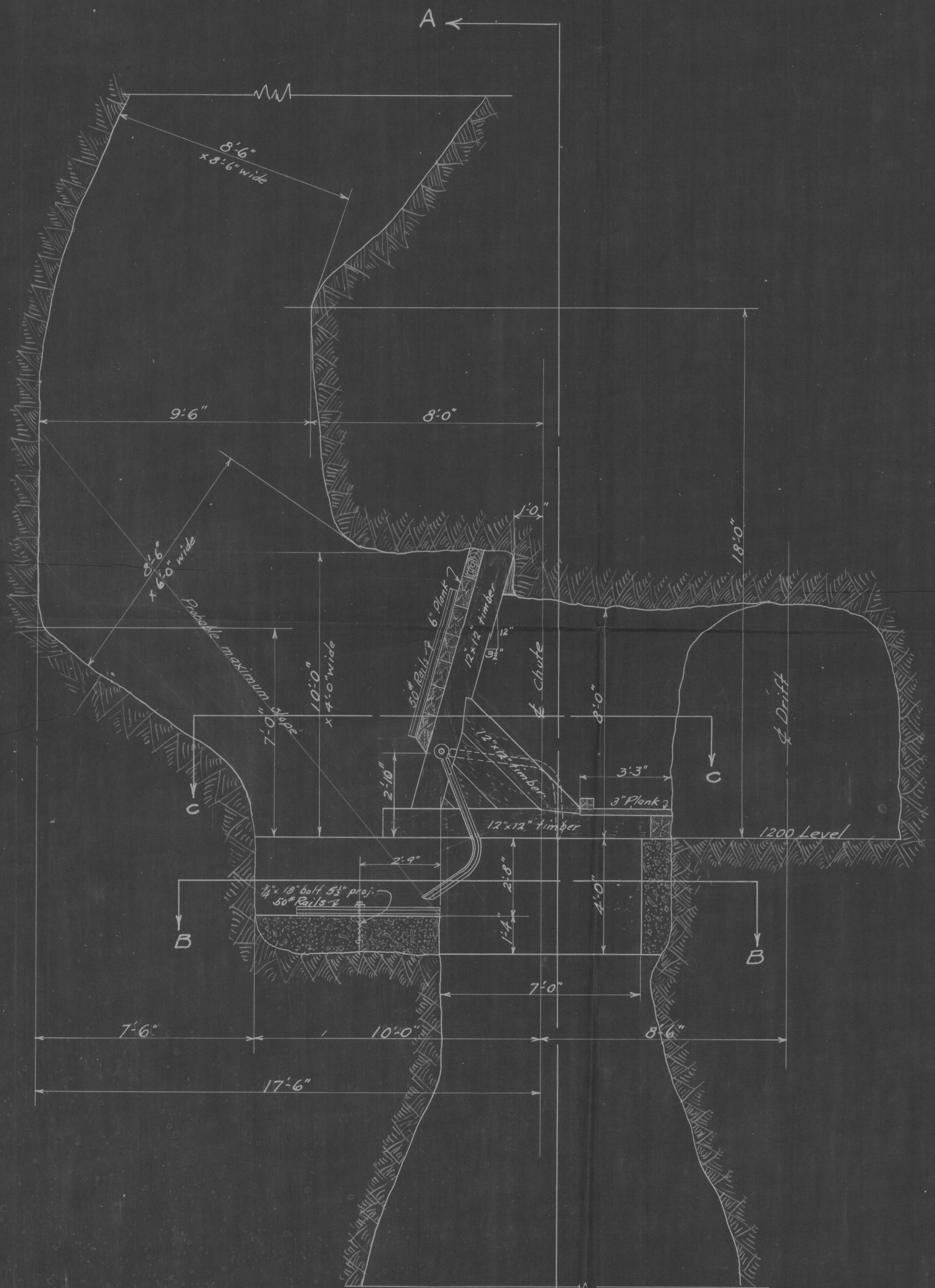
Figure 7-B.-Special 12"x12" Tunnel Timber

ain of
shown,
ground
on one
a soli

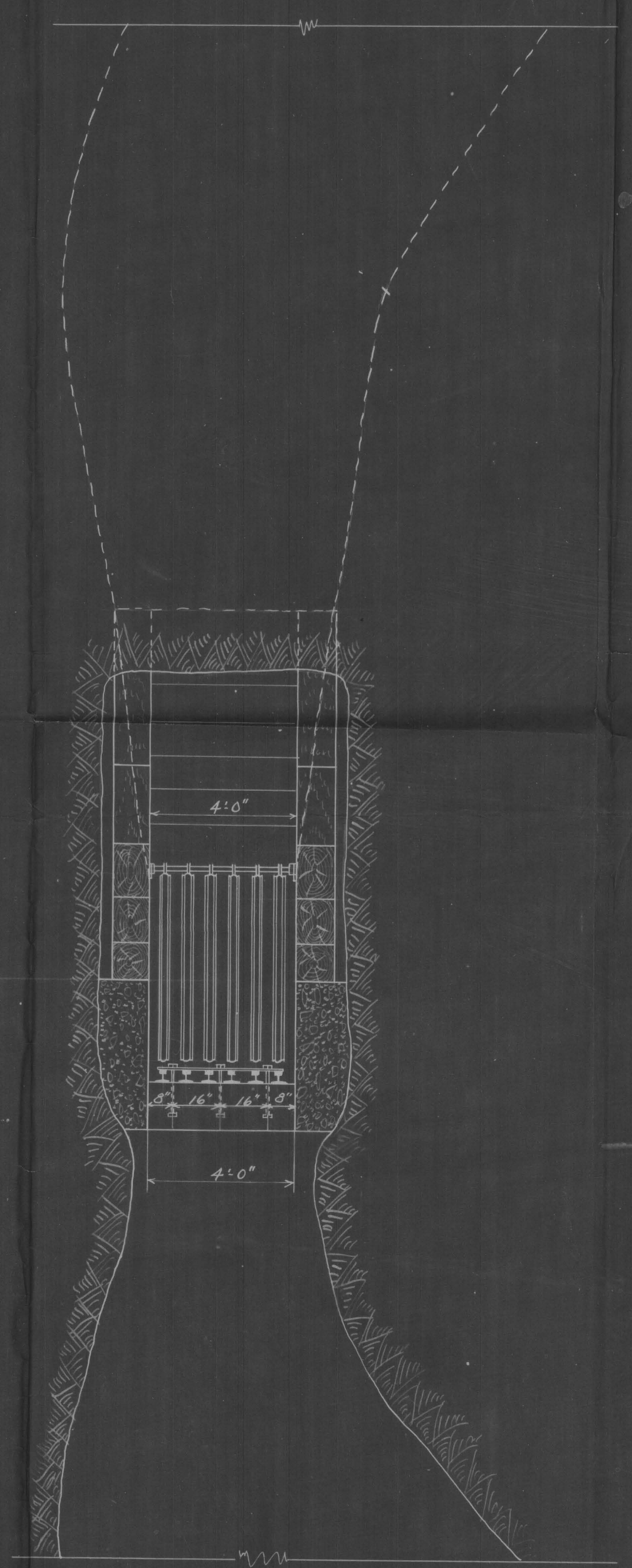
Slope thus over Shaft Openings only
From Pump Station
Pump Station
8x8" Timbers
2" Plank
4" Plank
Skip Signal
Cage Signal
Pump Station
Skip
Cage
Concrete Beam
Turn Sheet
Line of Rock Cut
Ladder
Drift to Sump
PLAN OF STATION
PLAN BELOW STATION
SECTION THRU CONDUIT GROOVE
To be grouted after Pipe is set.
Stop concrete here
Floor Line
DETAIL OF WATER COLUMN
SECTION A-A
SECTION B-B
For Details of Electrical Outlet Boxes See Drwg M-3-2145
" " " Chairs " " M-3-2150
1700 STATION-AUDREY SHAFT
REVISED DRAWING
UNITED VERDE EXTENSION MINING CO.
JEROME ARIZ.
Date: Oct. 1918
Scale 3/8" = 1'-0"
Revisons:
Traced by: do.
Checked by:
Approved by:

~~E-15~~
E-15

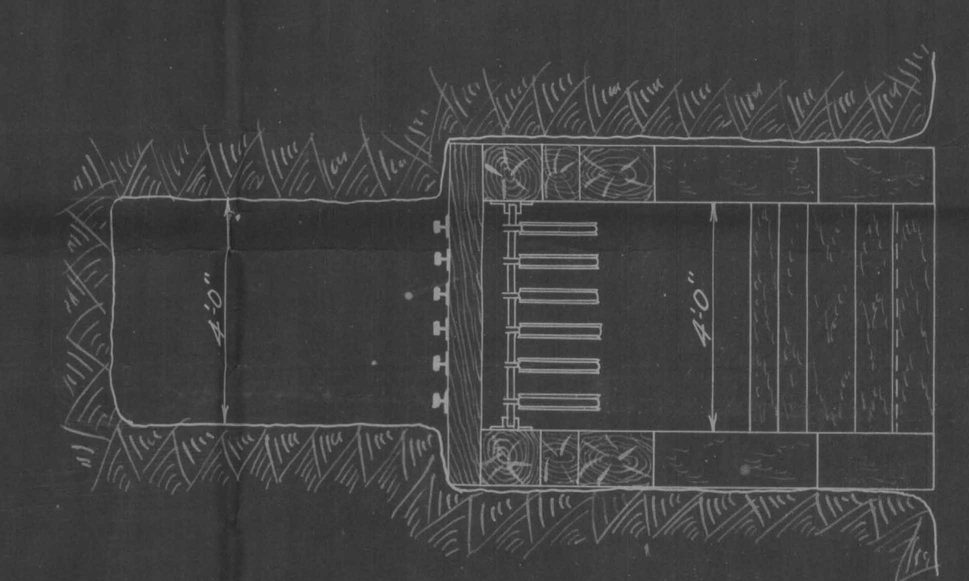
E-15



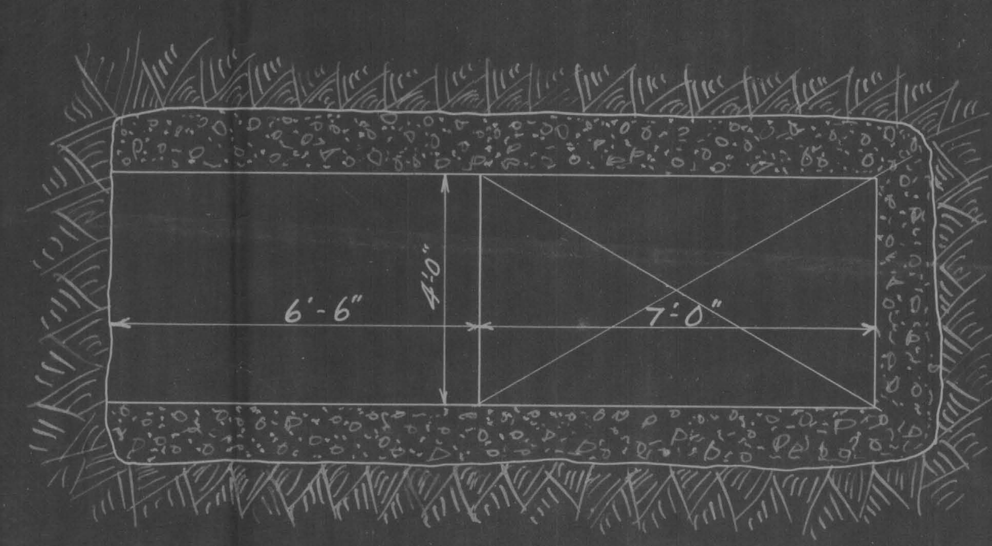
SECTION LOOKING WEST



SECTION A-A



SECTION C-C



SECTION B-B

For General Arrangement see Drwg. M-1-1135

DETAIL OF CHUTES AT
1200 LEVEL - AUDREY SH.

UNITED VERDE EXTENSION MINING CO.
JEROME ARIZ.

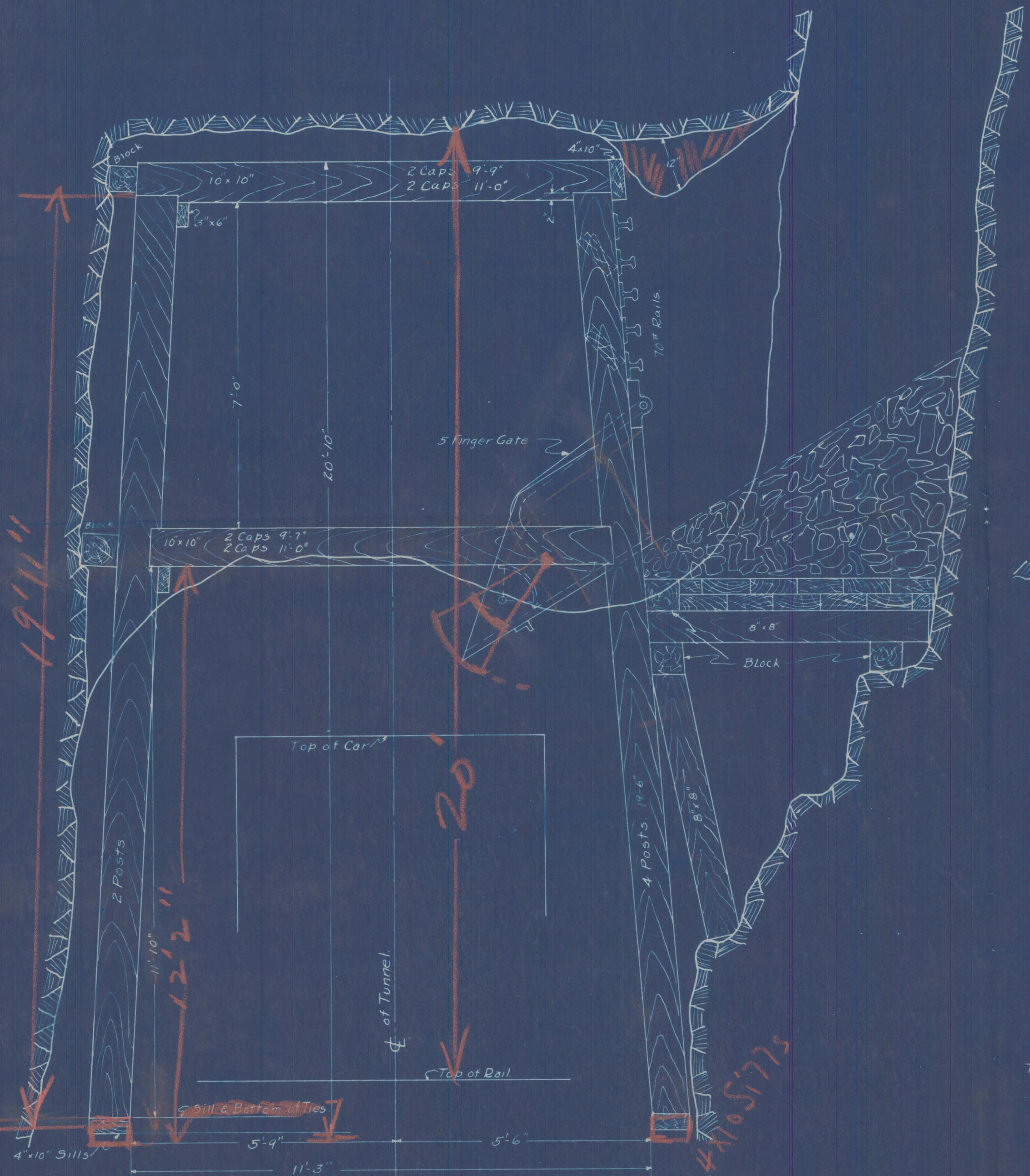
Date: Feb. 1918 Scale: 3/8" = 1'-0"
Drawn by: H.V. Kruse Revisions:
Traced by: H.V. Kruse
Checked by:
Approved by:

M-3-2167 D-27

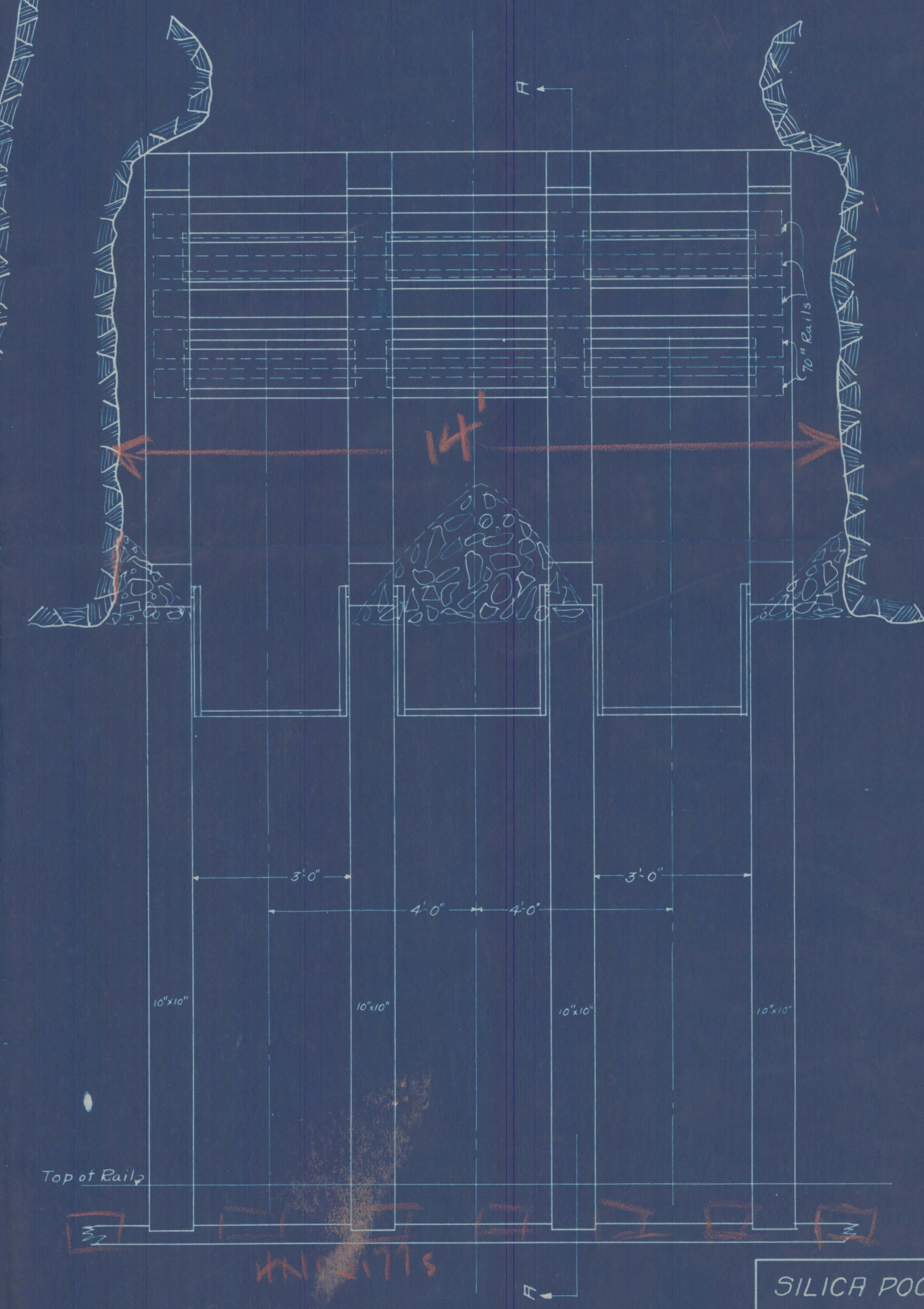
\# 140

D-27

D-27



SECTION THRU A-A.



ELEVATION. CHUTE SIDE.

SILICA POCKET 1300 LEVEL.

UNITED VERDE EXTENSION MINING CO.
JEROME, ARIZ.

Date 12-16-19 Scale 1/4" = 1'-0"
Drawn by H. Revisions
Traced by Y. D.
Checked by
Approved by

C-45

C-45

C-45

Note:-
1400 Station Thus
1200 " " except as noted and piping differs see Drwg. M-3-4159.
1500 " " " " " " " " " " " ".
1600 " " " " ".

For detail of chairs see Drwg. M-3-2150
" " " Outlet Boxes see Drwg. M-3-2145
" Pipe Diagram " " M-3-4159
On 1200 Level, Chairs in Skip Compartments same as for Cage Compartment.

1200 STATION Acct No.		201.12C
1400 " "	" "	201.12D
1500 " "	" "	201.12E
1600 " "	" "	201.12F

1200-1400-1500-1600 STATIONS
AUDREY SHAFT

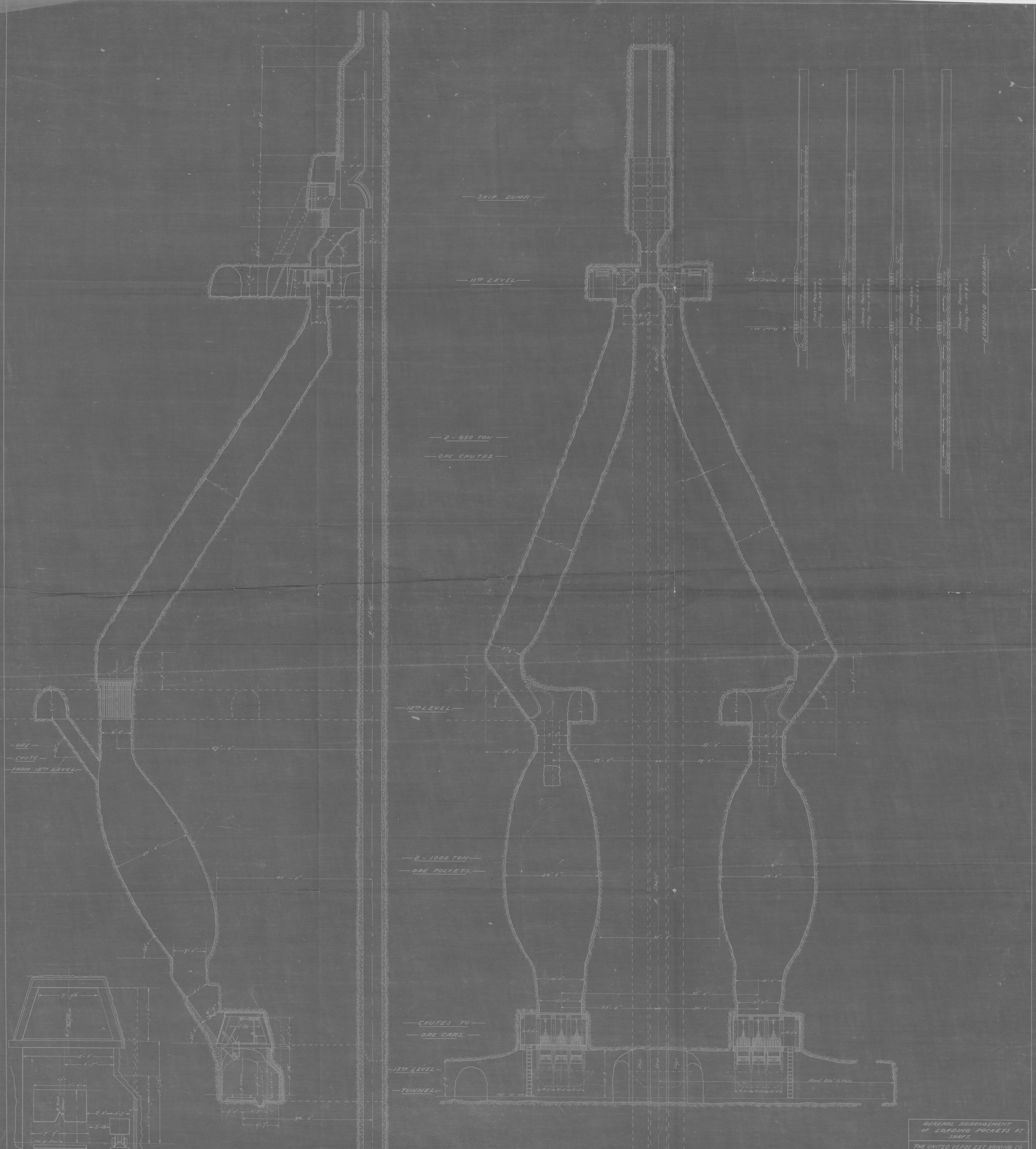
UNITED VERDE EXTENSION MINING CO.
JEROME ARIZ.

Date: Jan. 1918 Scale: Various
Drawn by: H.V. Kruse Revisions:
Traced by: H.V. Kruse
Checked by: H.V. Kruse
Approved by:

M-3-2158

D-26

D-26



GENERAL ARRANGEMENT
OF LOADING POCKETS AT
SHAFT.

THE UNITED VERDE EXT. MINING CO.
JEROME. ARIZ.

Scale 1/8" = 1 Foot. Date Aug. 1917

Drawn by K. Traced by K. Checked by

Approved by File No.

#136 II

E-4

E-4


SECTION "C-C"
Scale 1/2" = 1'-0"
Ore Pocket Gate Signals
Skip Signal
Skip Signal
Cage Signal
Skip
Skip
Cage
SECTION "B-B"
Scale 1/2" = 1'-0"
Cage
Skip
Skip
8'-10"
15'-2"
DETAIL OF PIPE OUTLET
Scale 1" = 1'-0"
Box 4" long
SECTION THRU CONDUIT GROOVE
Top of Rail
SECTION E-E
See Notes
DETAIL OF OUTLET BOX
ORE POCKET GATE SIGNAL
Top of Rail
SECTION "D-D"
To be recessed this over Shaft openings only
12'-0"
Drinking Water
1 1/2" Signal Conduit
7'-6"
7'-8 1/2"
3" Plank Floor
SECTION "A-A"
Scale 1/2" = 1'-0"
Turn Sheet
24'-0"
15'-4"
4'-4" (minimum)
Conduit Groove in Ceiling
Cage
Skip
Skip
Chair Pocket below
Slope of ditch = 1/2 of 1%
PLAN
Scale 1/2" = 1'-0"
Notes:
For details of Outlet Boxes see Drwg. M-3-2145
" " Chairs " " M-3-2150
Chair Pockets in all compartments put in the same as for Cage Compartment.
1300 LEVEL STATION
AUDREY SHAFT
UNITED VERDE EXTENSION MINING CO.
JEROME ARIZ.
Date: Jan. 1918
Scale: Various
Drawn by: H. V. Kruse
Revisions:
Traced by: H. V. Kruse
Acct. No. 20112B
Checked by:
Approved by:
D-20

D20

D-20

GENERAL DRAWING OF SKIP
FOR THE CONCRETE SHAFT.

THE UNITED VERDE EXT. MINING CO.
JEROME. ARIZ.

Scale 1½" = 1 Foot. Date July
Drawn by K. Traced by K. Checked
Approved by File No. M-3-2147

D-23

M-3-2147
Audrey Shaft
General Drwg of
Skip

D-23