THIS DATA WAS COLLECTED BY DAN ADAMS FOR JIM BRISCOE AND ASSOC. AT THEIR TOMBSTONE, ARIZ. PROPERTY ON 4-5-85 AND 4-6-85.

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M A P   UNC NUCLEAR INDUSTRIES

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CONTROL UNIT S/N: AG-001-011
SOFTWARE REV: AG8F97_9

CD	ELEMENT	UNITS	ASSAYER		CALIB DESCRIPTION	
1	SILVER	OZ/TON	FACE	AG-02-02-008	0 TO 300 O/T	032585
2	ANTIMONY	%	FACE	AG-02-02-008	0 TO 3.32%	032785
3	SILVER	OZ/TON	PROBE	AG-01-01-001	0 TO 300 OZ/TON	021485
4	ANTIMONY	%	PROBE	AG-01-01-001	0 TO 3.32%	021585

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Tombstone Silver Mines Inc. Open Pit #1 Control assays in operating Open Pit

DATA ID # 2001

DATA NUMBER	ASSAY	ELEMENT	CD	TIME (SECS)	DEPTH (FT)
1	2.0 OZ/TON	SILVER	1	60.0	0.0
2	2.8 OZ/TON	SILVER	1	60.0	0.0
3	51.4 OZ/TON	SILVER	1	60.0	0.0
4	1.5 OZ/TON	SILVER	1	60.0	0.0
5	7.0 OZ/TON	SILVER	1	60.0	0.0
6	1.3 OZ/TON	SILVER	1	60.0	0.0
7	0.5 OZ/TON	SILVER	1	60.0	0.0
8	0.9 OZ/TON	SILVER	1	60.0	0.0
9	1.3 OZ/TON	SILVER	1	60.0	0.0
10	2.4 OZ/TON	SILVER	1	60.0	0.0
11	12.0 OZ/TON	SILVER	1	60.0	0.0
12	0.0 OZ/TON	SILVER	1	60.0	0.0
13	3.5 OZ/TON	SILVER	1	60.0	0.0
14	161.8 OZ/TON	SILVER	1	60.0	0.0
15	145.9 OZ/TON	SILVER	1	60.0	0.0
16	0.3 OZ/TON	SILVER	1	32.0	0.0
17	2.2 OZ/TON	SILVER	1	32.0	0.0
18	0.6 OZ/TON	SILVER	1	60.0	0.0
19	0.5 OZ/TON	SILVER	1	60.0	0.0
20	3.2 OZ/TON	SILVER	1	60.0	0.0
21	0.2 OZ/TON	SILVER	1	60.0	0.0
22	1.1 OZ/TON	SILVER	1	60.0	0.0
23	1.7 OZ/TON	SILVER	1	60.0	0.0
24	0.3 OZ/TON	SILVER	1	60.0	0.0
25	1.4 OZ/TON	SILVER	1	60.0	0.0
26	0.0 OZ/TON	SILVER	1	60.0	0.0
27	1.5 OZ/TON	SILVER	1	60.0	0.0
28	1.4 OZ/TON	SILVER	1	60.0	0.0
29	0.4 OZ/TON	SILVER	1	60.0	0.0
30	0.3 OZ/TON	SILVER	1	60.0	0.0
31	0.9 OZ/TON	SILVER	1	60.0	0.0
32	0.0 OZ/TON	SILVER	1	60.0	0.0
33	1.5 OZ/TON	SILVER	1	60.0	0.0
34	0.0 OZ/TON	SILVER	1	60.0	0.0
35	0.8 OZ/TON	SILVER	1	60.0	0.0
36	1.4 OZ/TON	SILVER	1	60.0	0.0
37	5.3 OZ/TON	SILVER	1	60.0	0.0
38	12.2 OZ/TON	SILVER	1	60.0	0.0
39	14.7 OZ/TON	SILVER	1	60.0	0.0

Tombstone Silver Mines Inc.

Assays along trench southwest of store building

DATA ID # 2002

DATA NUMBER	ASSAY	ELEMENT	CD	TIME (SECS)	DEPTH (FT)
1	0.5 OZ/TON	SILVER	1	60.0	0.0
2	0.0 OZ/TON	SILVER	1	60.0	0.0
3	0.0 OZ/TON	SILVER	1	60.0	0.0
4	0.7 OZ/TON	SILVER	1	60.0	0.0
5	1.4 OZ/TON	SILVER	1	60.0	0.0

Shaft along side dozer cut S.E. of TDC N. Trench

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DATA ID # 2003

DATA NUMBER	ASSAY	ELEMENT	CD	TIME (SECS)	DEPTH (FT)
1	0.1 OZ/TON	SILVER	1	60.0	0.0
2	1.2 OZ/TON	SILVER	1	60.0	0.0
3	0.9 OZ/TON	SILVER	1	60.0	0.0
4	1.7 OZ/TON	SILVER	1	60.0	0.0
5	0.2 OZ/TON	SILVER	1	60.0	0.0
6	1.0 OZ/TON	SILVER	1	60.0	0.0
7	0.2 OZ/TON	SILVER	1	60.0	0.0
8	0.0 OZ/TON	SILVER	1	60.0	0.0
9	0.3 OZ/TON	SILVER	1	60.0	0.0
10	1.2 OZ/TON	SILVER	1	60.0	0.0
11	0.1 OZ/TON	SILVER	1	60.0	0.0
12	0.0 OZ/TON	SILVER	1	60.0	0.0
13	0.0 OZ/TON	SILVER	1	60.0	0.0
14	1.1 OZ/TON	SILVER	1	60.0	0.0
15	1.4 OZ/TON	SILVER	1	60.0	0.0
16	0.4 OZ/TON	SILVER	1	60.0	0.0

Mustang Mine Area   working from S to N.

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DATA ID # 2004

DATA NUMBER	ASSAY	ELEMENT	CD	TIME (SECS)	DEPTH (FT)
1	1.5 OZ/TON	SILVER	1	60.0	0.0
2	0.9 OZ/TON	SILVER	1	60.0	0.0
3	0.0 OZ/TON	SILVER	1	60.0	0.0
4	1.1 OZ/TON	SILVER	1	60.0	0.0
5	1.1 OZ/TON	SILVER	1	60.0	0.0
6	0.9 OZ/TON	SILVER	1	60.0	0.0
7	0.0 OZ/TON	SILVER	1	60.0	0.0
8	0.0 OZ/TON	SILVER	1	60.0	0.0
9	1.2 OZ/TON	SILVER	1	60.0	0.0
10	0.6 OZ/TON	SILVER	1	60.0	0.0
11	0.7 OZ/TON	SILVER	1	60.0	0.0
12	0.0 OZ/TON	SILVER	1	60.0	0.0
13	1.1 OZ/TON	SILVER	1	60.0	0.0
14	2.7 OZ/TON	SILVER	1	60.0	0.0
15	3.7 OZ/TON	SILVER	1	60.0	0.0
16	0.3 OZ/TON	SILVER	1	60.0	0.0
17	1.3 OZ/TON	SILVER	1	60.0	0.0
18	0.1 OZ/TON	SILVER	1	60.0	0.0

DATA ID # 2005

DATA NUMBER	ASSAY	ELEMENT	CD	TIME (SECS)	DEPTH (FT)
1	3.9 OZ/TON	SILVER	1	60.0	0.0
2	1.6 OZ/TON	SILVER	1	60.0	0.0
3	1.5 OZ/TON	SILVER	1	60.0	0.0
4	1.7 OZ/TON	SILVER	1	60.0	0.0
5	0.0 OZ/TON	SILVER	1	60.0	0.0
6	0.6 OZ/TON	SILVER	1	60.0	0.0
7	0.7 OZ/TON	SILVER	1	60.0	0.0
8	2.0 OZ/TON	SILVER	1	60.0	0.0
9	0.8 OZ/TON	SILVER	1	60.0	0.0
10	1.5 OZ/TON	SILVER	1	30.0	0.0
11	2.2 OZ/TON	SILVER	1	30.0	0.0
12	0.0 OZ/TON	SILVER	1	30.0	0.0
13	0.0 OZ/TON	SILVER	1	30.0	0.0
14	0.6 OZ/TON	SILVER	1	29.0	0.0

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DATA ID # 2006

DATA NUMBER	ASSAY	ELEMENT	CD	TIME (SECS)	DEPTH (FT)
1	1.6 OZ/TON	SILVER	1	60.0	0.0
2	1.3 OZ/TON	SILVER	1	60.0	0.0
3	0.0 OZ/TON	SILVER	1	60.0	0.0
4	0.3 OZ/TON	SILVER	1	60.0	0.0
5	0.2 OZ/TON	SILVER	1	60.0	0.0
6	0.0 OZ/TON	SILVER	1	60.0	0.0
7	0.4 OZ/TON	SILVER	1	60.0	0.0
8	0.7 OZ/TON	SILVER	1	60.0	0.0
9	0.0 OZ/TON	SILVER	1	60.0	0.0
10	0.1 OZ/TON	SILVER	1	60.0	0.0
11	0.7 OZ/TON	SILVER	1	60.0	0.0
12	0.0 OZ/TON	SILVER	1	60.0	0.0
13	0.0 OZ/TON	SILVER	1	60.0	0.0
14	1.7 OZ/TON	SILVER	1	60.0	0.0
15	1.2 OZ/TON	SILVER	1	60.0	0.0
16	1.3 OZ/TON	SILVER	1	60.0	0.0
17	1.7 OZ/TON	SILVER	1	60.0	0.0
18	0.8 OZ/TON	SILVER	1	60.0	0.0
19	1.7 OZ/TON	SILVER	1	60.0	0.0
20	0.8 OZ/TON	SILVER	1	60.0	0.0
21	3.1 OZ/TON	SILVER	1	60.0	0.0
22	2.3 OZ/TON	SILVER	1	60.0	0.0
23	5.0 OZ/TON	SILVER	1	60.0	0.0
24	1.8 OZ/TON	SILVER	1	60.0	0.0
25	0.9 OZ/TON	SILVER	1	60.0	0.0

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DATA ID # 2007

DATA NUMBER	ASSAY	ELEMENT	CD	TIME (SECS)	DEPTH (FT)
1	0.0 OZ/TON	SILVER	1	60.0	0.0
2	1.1 OZ/TON	SILVER	1	60.0	0.0
3	1.7 OZ/TON	SILVER	1	60.0	0.0
4	0.8 OZ/TON	SILVER	0	60.0	0.0
5	0.0 OZ/TON	SILVER	1	60.0	0.0
6	0.4 OZ/TON	SILVER	1	60.0	0.0
7	1.6 OZ/TON	SILVER	0	60.0	0.0

DATA ID # 2008

DATA NUMBER	ASSAY	ELEMENT	CD	TIME (SECS)	DEPTH (FT)
1	0.1 OZ/TON	SILVER	1	60.0	0.0
2	0.8 OZ/TON	SILVER	1	60.0	0.0
3	0.9 OZ/TON	SILVER	1	60.0	0.0
4	0.1 OZ/TON	SILVER	1	60.0	0.0
5	1.3 OZ/TON	SILVER	1	60.0	0.0
6	0.0 OZ/TON	SILVER	1	60.0	0.0
7	0.1 OZ/TON	SILVER	1	60.0	0.0
8	0.0 OZ/TON	SILVER	1	60.0	0.0
9	0.1 OZ/TON	SILVER	1	60.0	0.0
10	1.7 OZ/TON	SILVER	1	60.0	0.0
11	0.9 OZ/TON	SILVER	1	60.0	0.0
12	0.5 OZ/TON	SILVER	1	60.0	0.0
13	0.0 OZ/TON	SILVER	1	60.0	0.0
14	0.5 OZ/TON	SILVER	1	60.0	0.0
15	1.3 OZ/TON	SILVER	1	60.0	0.0
16	1.2 OZ/TON	SILVER	1	60.0	0.0
17	0.6 OZ/TON	SILVER	1	60.0	0.0
18	0.0 OZ/TON	SILVER	1	60.0	0.0
19	0.7 OZ/TON	SILVER	1	60.0	0.0
20	2.0 OZ/TON	SILVER	1	60.0	0.0
21	0.9 OZ/TON	SILVER	1	60.0	0.0
22	0.2 OZ/TON	SILVER	1	60.0	0.0
23	0.6 OZ/TON	SILVER	1	60.0	0.0
24	1.0 OZ/TON	SILVER	1	60.0	0.0
25	2.1 OZ/TON	SILVER	1	60.0	0.0
26	2.4 OZ/TON	SILVER	1	60.0	0.0
27	1.5 OZ/TON	SILVER	1	60.0	0.0
28	1.4 OZ/TON	SILVER	1	60.0	0.0
29	0.0 OZ/TON	SILVER	1	60.0	0.0
30	0.0 OZ/TON	SILVER	1	60.0	0.0

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DATA ID # 2009

DATA NUMBER	ASSAY	ELEMENT	CD	TIME (SECS)	DEPTH (FT)
1	0.9 OZ/TON	SILVER	1	60.0	0.0
2	2.0 OZ/TON	SILVER	1	60.0	0.0
3	1.1 OZ/TON	SILVER	1	60.0	0.0
4	2.0 OZ/TON	SILVER	1	60.0	0.0
5	0.3 OZ/TON	SILVER	1	60.0	0.0
6	0.3 OZ/TON	SILVER	1	60.0	0.0
7	2.9 OZ/TON	SILVER	1	60.0	0.0

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DATA ID # 2010

DATA NUMBER	ASSAY	ELEMENT	CD	TIME (SECS)	DEPTH (FT)
1	1.4 OZ/TON	SILVER	1	60.0	0.0
2	1.6 OZ/TON	SILVER	1	60.0	0.0
3	1.1 OZ/TON	SILVER	1	60.0	0.0
4	0.0 OZ/TON	SILVER	1	60.0	0.0
5	1.1 OZ/TON	SILVER	1	60.0	0.0
6	0.0 OZ/TON	SILVER	1	60.0	0.0
7	1.2 OZ/TON	SILVER	1	60.0	0.0
8	0.9 OZ/TON	SILVER	1	60.0	0.0
9	0.9 OZ/TON	SILVER	1	60.0	0.0
10	0.0 OZ/TON	SILVER	1	60.0	0.0
11	1.7 OZ/TON	SILVER	1	60.0	0.0
12	3.5 OZ/TON	SILVER	1	60.0	0.0
13	1.5 OZ/TON	SILVER	1	60.0	0.0
14	0.7 OZ/TON	SILVER	1	60.0	0.0
15	0.6 OZ/TON	SILVER	1	60.0	0.0

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DATA ID # 2011

DATA NUMBER	ASSAY	ELEMENT	CD	TIME (SECS)	DEPTH (FT)
1	0.6 OZ/TON	SILVER	1	60.0	0.0
2	0.4 OZ/TON	SILVER	1	60.0	0.0
3	2.3 OZ/TON	SILVER	1	60.0	0.0
4	0.0 OZ/TON	SILVER	1	60.0	0.0
5	1.9 OZ/TON	SILVER	1	60.0	0.0
6	1.2 OZ/TON	SILVER	1	60.0	0.0
7	0.6 OZ/TON	SILVER	1	60.0	0.0
8	0.2 OZ/TON	SILVER	1	60.0	0.0
9	0.4 OZ/TON	SILVER	1	60.0	0.0
10	0.0 OZ/TON	SILVER	1	60.0	0.0
11	0.5 OZ/TON	SILVER	1	60.0	0.0
12	1.0 OZ/TON	SILVER	1	60.0	0.0
13	1.6 OZ/TON	SILVER	1	60.0	0.0
14	0.5 OZ/TON	SILVER	1	60.0	0.0
15	0.9 OZ/TON	SILVER	1	60.0	0.0
16	1.2 OZ/TON	SILVER	1	60.0	0.0
17	0.3 OZ/TON	SILVER	1	60.0	0.0

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DATA ID # 2012

DATA NUMBER	ASSAY	ELEMENT	CD	TIME (SECS)	DEPTH (FT)
1	0.9 OZ/TON	SILVER	1	60.0	0.0
2	0.0 OZ/TON	SILVER	1	60.0	0.0
3	0.9 OZ/TON	SILVER	1	60.0	0.0
4	1.2 OZ/TON	SILVER	1	60.0	0.0

DATA ID # 2013

DATA NUMBER	ASSAY	ELEMENT	CD	TIME (SECS)	DEPTH (FT)
1	0.1 OZ/TON	SILVER	1	60.0	0.0
2	0.6 OZ/TON	SILVER	1	60.0	0.0
3	0.0 OZ/TON	SILVER	1	60.0	0.0
4	0.0 OZ/TON	SILVER	1	60.0	0.0
5	1.2 OZ/TON	SILVER	1	60.0	0.0
6	1.7 OZ/TON	SILVER	1	60.0	0.0
7	3.0 OZ/TON	SILVER	1	49.0	0.0
8	2.9 OZ/TON	SILVER	1	52.0	0.0

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DATA ID # 2014

DATA NUMBER	ASSAY	ELEMENT	CD	TIME (SECS)	DEPTH (FT)
1	1.1 OZ/TON	SILVER	1	60.0	0.0
2	0.2 OZ/TON	SILVER	1	60.0	0.0
3	1.3 OZ/TON	SILVER	1	60.0	0.0
4	0.3 OZ/TON	SILVER	1	60.0	0.0
5	0.0 OZ/TON	SILVER	1	60.0	0.0
6	0.4 OZ/TON	SILVER	1	60.0	0.0
7	1.7 OZ/TON	SILVER	1	60.0	0.0
8	0.3 OZ/TON	SILVER	1	60.0	0.0
9	1.2 OZ/TON	SILVER	1	60.0	0.0
10	0.7 OZ/TON	SILVER	1	60.0	0.0
11	1.2 OZ/TON	SILVER	1	60.0	0.0
12	1.1 OZ/TON	SILVER	1	60.0	0.0
13	2.5 OZ/TON	SILVER	1	60.0	0.0
14	0.7 OZ/TON	SILVER	1	60.0	0.0
15	0.2 OZ/TON	SILVER	1	60.0	0.0
16	0.3 OZ/TON	SILVER	1	60.0	0.0
17	1.1 OZ/TON	SILVER	1	60.0	0.0
18	1.9 OZ/TON	SILVER	1	60.0	0.0
19	0.5 OZ/TON	SILVER	1	60.0	0.0
20	0.0 OZ/TON	SILVER	1	60.0	0.0
21	0.7 OZ/TON	SILVER	1	60.0	0.0
22	2.0 OZ/TON	SILVER	1	60.0	0.0
23	1.6 OZ/TON	SILVER	1	60.0	0.0
24	2.3 OZ/TON	SILVER	1	60.0	0.0
25	0.7 OZ/TON	SILVER	1	60.0	0.0
26	1.1 OZ/TON	SILVER	1	60.0	0.0
27	1.5 OZ/TON	SILVER	1	60.0	0.0
28	1.3 OZ/TON	SILVER	1	60.0	0.0

29	0.2 OZ/TON	SILVER	1	60.0	0.0
30	0.2 OZ/TON	SILVER	1	60.0	0.0
31	0.1 OZ/TON	SILVER	1	103.0	0.0
32	1.4 OZ/TON	SILVER	1	62.0	0.0
33	0.0 OZ/TON	SILVER	1	60.0	0.0
34	1.1 OZ/TON	SILVER	1	60.0	0.0
35	2.3 OZ/TON	SILVER	1	60.0	0.0
36	0.5 OZ/TON	SILVER	1	60.0	0.0
37	1.1 OZ/TON	SILVER	1	102.0	0.0
38	1.7 OZ/TON	SILVER	1	60.0	0.0
39	0.9 OZ/TON	SILVER	1	60.0	0.0
40	0.2 OZ/TON	SILVER	1	60.0	0.0
41	0.0 OZ/TON	SILVER	1	60.0	0.0
42	0.6 OZ/TON	SILVER	1	96.0	0.0
43	0.0 OZ/TON	SILVER	1	60.0	0.0
44	2.3 OZ/TON	SILVER	1	60.0	0.0
45	0.0 OZ/TON	SILVER	1	60.0	0.0
46	1.4 OZ/TON	SILVER	1	60.0	0.0
47	0.0 OZ/TON	SILVER	1	60.0	0.0
48	0.0 OZ/TON	SILVER	1	60.0	0.0
49	0.1 OZ/TON	SILVER	1	60.0	0.0
50	1.1 OZ/TON	SILVER	1	60.0	0.0
51	1.2 OZ/TON	SILVER	1	60.0	0.0
52	0.8 OZ/TON	SILVER	1	60.0	0.0
53	0.3 OZ/TON	SILVER	1	60.0	0.0
54	0.6 OZ/TON	SILVER	1	60.0	0.0
55	1.9 OZ/TON	SILVER	1	60.0	0.0
56	0.9 OZ/TON	SILVER	1	60.0	0.0
57	0.8 OZ/TON	SILVER	1	60.0	0.0
58	0.2 OZ/TON	SILVER	1	60.0	0.0
59	0.7 OZ/TON	SILVER	1	60.0	0.0
60	1.9 OZ/TON	SILVER	1	60.0	0.0
61	1.6 OZ/TON	SILVER	1	60.0	0.0
62	0.4 OZ/TON	SILVER	1	60.0	0.0
63	1.1 OZ/TON	SILVER	1	60.0	0.0
64	0.1 OZ/TON	SILVER	1	60.0	0.0
65	1.0 OZ/TON	SILVER	1	60.0	0.0

66	0.0 OZ/TON	SILVER	1	60.0	0.0
67	0.4 OZ/TON	SILVER	1	60.0	0.0
68	0.7 OZ/TON	SILVER	1	60.0	0.0
69	1.6 OZ/TON	SILVER	1	60.0	0.0
70	1.2 OZ/TON	SILVER	1	60.0	0.0
71	0.4 OZ/TON	SILVER	1	60.0	0.0
72	0.7 OZ/TON	SILVER	1	60.0	0.0
73	0.0 OZ/TON	SILVER	1	60.0	0.0
74	1.4 OZ/TON	SILVER	1	60.0	0.0
75	3.0 OZ/TON	SILVER	1	60.0	0.0
76	0.1 OZ/TON	SILVER	1	60.0	0.0
77	0.6 OZ/TON	SILVER	1	60.0	0.0
78	0.8 OZ/TON	SILVER	1	60.0	0.0
79	0.0 OZ/TON	SILVER	1	60.0	0.0
80	0.0 OZ/TON	SILVER	1	60.0	0.0
81	1.0 OZ/TON	SILVER	1	60.0	0.0
82	0.0 OZ/TON	SILVER	1	60.0	0.0
83	0.7 OZ/TON	SILVER	1	60.0	0.0
84	0.0 OZ/TON	SILVER	1	60.0	0.0
85	0.9 OZ/TON	SILVER	1	60.0	0.0
86	1.6 OZ/TON	SILVER	1	60.0	0.0
87	1.0 OZ/TON	SILVER	1	60.0	0.0
88	0.4 OZ/TON	SILVER	1	60.0	0.0
89	0.2 OZ/TON	SILVER	1	60.0	0.0
90	0.4 OZ/TON	SILVER	1	60.0	0.0
91	0.9 OZ/TON	SILVER	1	60.0	0.0
92	0.4 OZ/TON	SILVER	1	60.0	0.0
93	1.0 OZ/TON	SILVER	1	60.0	0.0
94	1.2 OZ/TON	SILVER	1	60.0	0.0
95	0.0 OZ/TON	SILVER	1	60.0	0.0
96	1.2 OZ/TON	SILVER	1	60.0	0.0
97	0.5 OZ/TON	SILVER	1	60.0	0.0
98	0.6 OZ/TON	SILVER	1	60.0	0.0
99	1.1 OZ/TON	SILVER	1	60.0	0.0
100	0.6 OZ/TON	SILVER	1	60.0	0.0
101	0.8 OZ/TON	SILVER	1	60.0	0.0

102	0.2 OZ/TON	SILVER	1	60.0	0.0
103	0.5 OZ/TON	SILVER	1	60.0	0.0
104	0.0 OZ/TON	SILVER	1	60.0	0.0
105	0.3 OZ/TON	SILVER	1	60.0	0.0
106	1.3 OZ/TON	SILVER	1	60.0	0.0
107	0.0 OZ/TON	SILVER	1	60.0	0.0
108	0.0 OZ/TON	SILVER	1	60.0	0.0
109	0.6 OZ/TON	SILVER	1	60.0	0.0
110	0.5 OZ/TON	SILVER	1	60.0	0.0
111	0.7 OZ/TON	SILVER	1	60.0	0.0
112	0.0 OZ/TON	SILVER	1	60.0	0.0
113	0.2 OZ/TON	SILVER	1	60.0	0.0
114	0.4 OZ/TON	SILVER	1	60.0	0.0
115	0.9 OZ/TON	SILVER	1	60.0	0.0
116	1.5 OZ/TON	SILVER	1	60.0	0.0
117	0.0 OZ/TON	SILVER	1	60.0	0.0
118	0.0 OZ/TON	SILVER	1	60.0	0.0
119	1.4 OZ/TON	SILVER	1	60.0	0.0
120	1.1 OZ/TON	SILVER	1	60.0	0.0
121	0.0 OZ/TON	SILVER	1	60.0	0.0
122	1.2 OZ/TON	SILVER	1	60.0	0.0
123	0.0 OZ/TON	SILVER	1	60.0	0.0
124	1.6 OZ/TON	SILVER	1	60.0	0.0
125	0.9 OZ/TON	SILVER	1	60.0	0.0
126	0.0 OZ/TON	SILVER	1	60.0	0.0
127	0.0 OZ/TON	SILVER	1	60.0	0.0
128	0.2 OZ/TON	SILVER	1	60.0	0.0
129	0.6 OZ/TON	SILVER	1	60.0	0.0
130	1.4 OZ/TON	SILVER	1	60.0	0.0
131	0.1 OZ/TON	SILVER	1	60.0	0.0
132	0.0 OZ/TON	SILVER	1	60.0	0.0
133	0.7 OZ/TON	SILVER	1	60.0	0.0
134	0.9 OZ/TON	SILVER	1	60.0	0.0
135	0.2 OZ/TON	SILVER	1	60.0	0.0
136	0.3 OZ/TON	SILVER	1	60.0	0.0

137	0.5 OZ/TON	SILVER	1	60.0	0.0
138	1.1 OZ/TON	SILVER	1	60.0	0.0
139	0.9 OZ/TON	SILVER	1	60.0	0.0
140	0.5 OZ/TON	SILVER	1	60.0	0.0
141	0.7 OZ/TON	SILVER	1	60.0	0.0
142	0.5 OZ/TON	SILVER	1	60.0	0.0
143	0.1 OZ/TON	SILVER	1	60.0	0.0
144	0.7 OZ/TON	SILVER	1	60.0	0.0
145	2.0 OZ/TON	SILVER	1	60.0	0.0
146	1.2 OZ/TON	SILVER	1	60.0	0.0
147	1.8 OZ/TON	SILVER	1	60.0	0.0
148	2.5 OZ/TON	SILVER	1	60.0	0.0
149	0.6 OZ/TON	SILVER	1	60.0	0.0
150	0.0 OZ/TON	SILVER	1	60.0	0.0
151	0.7 OZ/TON	SILVER	1	60.0	0.0
152	0.0 OZ/TON	SILVER	1	60.0	0.0
153	1.9 OZ/TON	SILVER	1	60.0	0.0
154	0.0 OZ/TON	SILVER	1	60.0	0.0
155	1.2 OZ/TON	SILVER	1	60.0	0.0
156	0.6 OZ/TON	SILVER	1	60.0	0.0
157	0.0 OZ/TON	SILVER	1	60.0	0.0
158	1.1 OZ/TON	SILVER	1	60.0	0.0
159	0.3 OZ/TON	SILVER	1	60.0	0.0
160	1.7 OZ/TON	SILVER	1	60.0	0.0
161	1.5 OZ/TON	SILVER	1	60.0	0.0
162	0.7 OZ/TON	SILVER	1	60.0	0.0
163	0.9 OZ/TON	SILVER	1	60.0	0.0
164	2.4 OZ/TON	SILVER	1	60.0	0.0
165	1.1 OZ/TON	SILVER	1	60.0	0.0
166	0.8 OZ/TON	SILVER	1	60.0	0.0
167	1.9 OZ/TON	SILVER	1	60.0	0.0
168	0.2 OZ/TON	SILVER	1	60.0	0.0
169	0.5 OZ/TON	SILVER	1	60.0	0.0
170	0.0 OZ/TON	SILVER	1	60.0	0.0
171	2.0 OZ/TON	SILVER	1	60.0	0.0
172	0.2 OZ/TON	SILVER	1	60.0	0.0
173	1.5 OZ/TON	SILVER	1	60.0	0.0
174	0.2 OZ/TON	SILVER	1	60.0	0.0

175	0.8 OZ/TON	SILVER	1	60.0	0.0
176	0.0 OZ/TON	SILVER	1	60.0	0.0
177	0.3 OZ/TON	SILVER	1	60.0	0.0
178	0.5 OZ/TON	SILVER	1	60.0	0.0
179	0.5 OZ/TON	SILVER	1	60.0	0.0
180	1.1 OZ/TON	SILVER	1	60.0	0.0
181	1.4 OZ/TON	SILVER	1	60.0	0.0
182	0.3 OZ/TON	SILVER	1	60.0	0.0
183	0.9 OZ/TON	SILVER	1	60.0	0.0
184	0.8 OZ/TON	SILVER	1	60.0	0.0
185	0.2 OZ/TON	SILVER	1	60.0	0.0
186	0.7 OZ/TON	SILVER	1	60.0	0.0

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DATA ID # 2015

DATA NUMBER	ASSAY	ELEMENT	CD	TIME (SECS)	DEPTH (FT)
1	0.0 OZ/TON	SILVER	1	60.0	0.0
2	0.0 OZ/TON	SILVER	1	60.0	0.0
3	0.5 OZ/TON	SILVER	1	60.0	0.0
4	1.3 OZ/TON	SILVER	1	60.0	0.0
5	0.5 OZ/TON	SILVER	1	60.0	0.0
6	0.5 OZ/TON	SILVER	1	60.0	0.0
7	0.7 OZ/TON	SILVER	1	60.0	0.0
8	0.0 OZ/TON	SILVER	1	60.0	0.0
9	0.0 OZ/TON	SILVER	1	60.0	0.0
10	0.8 OZ/TON	SILVER	1	60.0	0.0
11	0.1 OZ/TON	SILVER	1	60.0	0.0
12	0.9 OZ/TON	SILVER	1	60.0	0.0
13	0.6 OZ/TON	SILVER	1	60.0	0.0
14	1.1 OZ/TON	SILVER	1	60.0	0.0
15	2.1 OZ/TON	SILVER	1	60.0	0.0
16	1.8 OZ/TON	SILVER	1	60.0	0.0
17	0.2 OZ/TON	SILVER	1	60.0	0.0
18	0.0 OZ/TON	SILVER	1	60.0	0.0
19	0.4 OZ/TON	SILVER	1	60.0	0.0
20	2.2 OZ/TON	SILVER	1	60.0	0.0
21	1.2 OZ/TON	SILVER	1	60.0	0.0
22	0.9 OZ/TON	SILVER	1	60.0	0.0
23	0.8 OZ/TON	SILVER	1	60.0	0.0
24	1.9 OZ/TON	SILVER	1	60.0	0.0
25	0.1 OZ/TON	SILVER	1	60.0	0.0
26	0.1 OZ/TON	SILVER	1	60.0	0.0
27	0.3 OZ/TON	SILVER	1	60.0	0.0

28	0.0 OZ/TON	SILVER	1	60.0	0.0
29	0.0 OZ/TON	SILVER	1	60.0	0.0
30	0.9 OZ/TON	SILVER	1	60.0	0.0
31	0.2 OZ/TON	SILVER	1	60.0	0.0
32	0.0 OZ/TON	SILVER	1	60.0	0.0
33	1.4 OZ/TON	SILVER	1	60.0	0.0
34	0.1 OZ/TON	SILVER	1	60.0	0.0
35	1.7 OZ/TON	SILVER	1	60.0	0.0
36	0.2 OZ/TON	SILVER	1	60.0	0.0
37	0.1 OZ/TON	SILVER	1	60.0	0.0
38	1.2 OZ/TON	SILVER	1	60.0	0.0
39	1.5 OZ/TON	SILVER	1	60.0	0.0
40	1.7 OZ/TON	SILVER	1	60.0	0.0
41	0.2 OZ/TON	SILVER	1	60.0	0.0
42	2.4 OZ/TON	SILVER	1	60.0	0.0
43	0.0 OZ/TON	SILVER	1	60.0	0.0
44	0.0 OZ/TON	SILVER	1	60.0	0.0
45	0.0 OZ/TON	SILVER	1	60.0	0.0
46	0.0 OZ/TON	SILVER	1	60.0	0.0
47	0.0 OZ/TON	SILVER	1	60.0	0.0
48	0.9 OZ/TON	SILVER	1	60.0	0.0
49	0.3 OZ/TON	SILVER	1	60.0	0.0
50	1.8 OZ/TON	SILVER	1	60.0	0.0
51	0.1 OZ/TON	SILVER	1	60.0	0.0
52	1.4 OZ/TON	SILVER	1	60.0	0.0
53	0.0 OZ/TON	SILVER	1	60.0	0.0
54	0.1 OZ/TON	SILVER	1	60.0	0.0
55	0.7 OZ/TON	SILVER	1	60.0	0.0
56	0.9 OZ/TON	SILVER	1	60.0	0.0
57	0.0 OZ/TON	SILVER	1	60.0	0.0
58	1.0 OZ/TON	SILVER	1	60.0	0.0
59	0.2 OZ/TON	SILVER	1	60.0	0.0
60	1.7 OZ/TON	SILVER	1	60.0	0.0
61	1.2 OZ/TON	SILVER	1	60.0	0.0
62	0.0 OZ/TON	SILVER	1	60.0	0.0
63	1.4 OZ/TON	SILVER	1	60.0	0.0
64	0.5 OZ/TON	SILVER	1	60.0	0.0
65	0.0 OZ/TON	SILVER	1	60.0	0.0

66	0.0 OZ/TON	SILVER	1	60.0	0.0
67	0.2 OZ/TON	SILVER	1	60.0	0.0
68	1.0 OZ/TON	SILVER	1	60.0	0.0
69	0.0 OZ/TON	SILVER	1	60.0	0.0
70	0.0 OZ/TON	SILVER	1	60.0	0.0
71	1.5 OZ/TON	SILVER	1	60.0	0.0
72	0.7 OZ/TON	SILVER	1	60.0	0.0
73	0.0 OZ/TON	SILVER	1	60.0	0.0
74	1.4 OZ/TON	SILVER	1	60.0	0.0
75	0.7 OZ/TON	SILVER	1	60.0	0.0
76	0.0 OZ/TON	SILVER	1	60.0	0.0
77	0.3 OZ/TON	SILVER	1	60.0	0.0
78	0.6 OZ/TON	SILVER	1	60.0	0.0
79	0.5 OZ/TON	SILVER	1	60.0	0.0
80	1.1 OZ/TON	SILVER	1	60.0	0.0
81	0.0 OZ/TON	SILVER	1	60.0	0.0
82	2.1 OZ/TON	SILVER	1	60.0	0.0
83	1.0 OZ/TON	SILVER	1	60.0	0.0
84	0.7 OZ/TON	SILVER	1	60.0	0.0
85	0.0 OZ/TON	SILVER	1	60.0	0.0
86	0.0 OZ/TON	SILVER	1	60.0	0.0
87	1.3 OZ/TON	SILVER	1	60.0	0.0
88	0.5 OZ/TON	SILVER	1	60.0	0.0
89	0.6 OZ/TON	SILVER	1	60.0	0.0
90	1.2 OZ/TON	SILVER	1	60.0	0.0
91	0.0 OZ/TON	SILVER	1	60.0	0.0
92	0.8 OZ/TON	SILVER	1	60.0	0.0
93	0.0 OZ/TON	SILVER	1	60.0	0.0
94	0.6 OZ/TON	SILVER	1	60.0	0.0
95	1.0 OZ/TON	SILVER	1	60.0	0.0
96	0.6 OZ/TON	SILVER	1	60.0	0.0
97	0.4 OZ/TON	SILVER	1	60.0	0.0
98	1.3 OZ/TON	SILVER	1	60.0	0.0
99	0.5 OZ/TON	SILVER	1	60.0	0.0

100	0.0 OZ/TON	SILVER	1	60.0	0.0
101	0.2 OZ/TON	SILVER	1	60.0	0.0
102	0.0 OZ/TON	SILVER	1	60.0	0.0
103	0.1 OZ/TON	SILVER	1	60.0	0.0
104	0.0 OZ/TON	SILVER	1	60.0	0.0
105	1.4 OZ/TON	SILVER	1	60.0	0.0
106	1.8 OZ/TON	SILVER	1	60.0	0.0
107	0.0 OZ/TON	SILVER	1	60.0	0.0
108	0.7 OZ/TON	SILVER	1	60.0	0.0
109	1.0 OZ/TON	SILVER	1	60.0	0.0
110	0.2 OZ/TON	SILVER	1	60.0	0.0
111	0.4 OZ/TON	SILVER	1	60.0	0.0
112	0.0 OZ/TON	SILVER	1	60.0	0.0
113	1.0 OZ/TON	SILVER	1	60.0	0.0
114	1.1 OZ/TON	SILVER	1	60.0	0.0
115	1.2 OZ/TON	SILVER	1	60.0	0.0
116	0.3 OZ/TON	SILVER	1	60.0	0.0
117	1.2 OZ/TON	SILVER	1	60.0	0.0
118	0.4 OZ/TON	SILVER	1	60.0	0.0
119	1.7 OZ/TON	SILVER	1	60.0	0.0
120	0.4 OZ/TON	SILVER	1	60.0	0.0
121	1.1 OZ/TON	SILVER	1	60.0	0.0
122	0.0 OZ/TON	SILVER	1	60.0	0.0
123	1.1 OZ/TON	SILVER	1	60.0	0.0
124	0.6 OZ/TON	SILVER	1	60.0	0.0
125	0.0 OZ/TON	SILVER	1	60.0	0.0
126	0.0 OZ/TON	SILVER	1	60.0	0.0
127	0.0 OZ/TON	SILVER	1	60.0	0.0
128	0.2 OZ/TON	SILVER	1	60.0	0.0
129	0.0 OZ/TON	SILVER	1	60.0	0.0

DATA ID # 3016

DATA NUMBER	ASSAY	ELEMENT	CD	TIME (SECS)	DEPTH (FT)
1	0.8 OZ/TON	SILVER	1	60.0	0.0
2	1.3 OZ/TON	SILVER	1	60.0	0.0
3	3.1 OZ/TON	SILVER	1	60.0	0.0
4	0.3 OZ/TON	SILVER	1	60.0	0.0
5	0.8 OZ/TON	SILVER	1	60.0	0.0
6	1.3 OZ/TON	SILVER	1	60.0	0.0
7	0.8 OZ/TON	SILVER	1	60.0	0.0
8	1.0 OZ/TON	SILVER	1	60.0	0.0
9	1.2 OZ/TON	SILVER	1	60.0	0.0
10	1.3 OZ/TON	SILVER	1	60.0	0.0
11	0.4 OZ/TON	SILVER	1	60.0	0.0
12	0.3 OZ/TON	SILVER	1	60.0	0.0
13	1.0 OZ/TON	SILVER	1	60.0	0.0
14	1.8 OZ/TON	SILVER	1	60.0	0.0
15	0.8 OZ/TON	SILVER	1	60.0	0.0
16	1.7 OZ/TON	SILVER	1	60.0	0.0
17	0.5 OZ/TON	SILVER	1	60.0	0.0
18	0.8 OZ/TON	SILVER	1	60.0	0.0
19	2.0 OZ/TON	SILVER	1	60.0	0.0
20	0.0 OZ/TON	SILVER	1	60.0	0.0
21	0.8 OZ/TON	SILVER	1	60.0	0.0
22	0.3 OZ/TON	SILVER	1	60.0	0.0
23	0.0 OZ/TON	SILVER	1	60.0	0.0
24	1.3 OZ/TON	SILVER	1	60.0	0.0
25	0.9 OZ/TON	SILVER	1	60.0	0.0
26	0.9 OZ/TON	SILVER	1	60.0	0.0
27	0.9 OZ/TON	SILVER	1	60.0	0.0
28	1.6 OZ/TON	SILVER	1	60.0	0.0
29	6.1 OZ/TON	SILVER	1	60.0	0.0
30	1.6 OZ/TON	SILVER	1	60.0	0.0
31	1.0 OZ/TON	SILVER	1	60.0	0.0
32	0.8 OZ/TON	SILVER	1	60.0	0.0

Briscoe (6-20-85)

James A. Briscoe & Associates, Inc.

Exploration Consultants:
Base and Precious Metals/Geologic and Land Studies/Regional and Detail Projects

James A. Briscoe
Registered Professional Geologist

Thomas E. Waldrip, Jr.
Geologist/Landman

June 20, 1985

Seth Horne, President
James Stewart Company
3033 North Central
Phoenix, AZ 85012

RE: Report on diamond drill core recovery, and UNC Silver Metal Analysis Probe (UNC Silver MAP) results suggesting geologically indicated reserves of 1 million tons of +2 oz. silver at the Charleston Lead Mine, Tombstone Mining District, Cochise County, Arizona

Dear Mr. Horne:

As of the first part of next week, I believe that we will have completed our "archeological dig" and recovery of vandalized core boxes at the Charleston Mine. All recovered core has been re-boxed in new boxes, and transported to a weather-tight building at the Escapule's State of Maine Mine. At this time, they have made the building available to us rent free. As I have described to you before, much of the core could be identified by a box number and footage blocks, even though the boxes were too weathered to touch, much less move. However, approximately half of the core was simply located on a grid system, and we hope to reconstruct its relationship to the identifiable boxes, and thus its hole number and depth later on. For the present time, though, there is no need to do this, and the core is safely stored until we have the time, money, and need to do further sorting. This recovered core represents an invaluable data base for understanding both the deep subsurface geology, as well as more near surface mineralization. Originally, the core was drilled to explore for deep-seated porphyry copper mineralization, and the upper portions of the holes were not assayed. It is quite conceivable that significant precious metal values were penetrated but not identified in the core.

On April 6 and April 7, 1985, Mr. Dan Adams of Western Exploration, Inc., operator for the United Nuclear Corporation Silver Metal Analyses Probe (Silver MAP), and I took about 156 "channel" sample assays in the Charleston Lead Mine pit and its

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immediate perimeter. We also took samples along the Mustang Vein, now apparently held by Mr. Dennis V. Abbl, which is surrounded by your claims. The Mustang Vein is probably the northeasterly extension of the Charleston Vein exposed in the Charleston Lead Mine pit. Thus, information from the Mustang Vein is pertinent to the understanding and evaluation of the Charleston Lead Mine itself.

The results of this survey I feel are most encouraging. Before describing those results, however, let me first describe the UNC Silver MAP method. Also for your interest. I have copied some of their literature and enclosed it as Appendix 1.

ASSAY PROCEDURE

The "channel" type samples taken in the Charleston Lead Mine and Mustang Vein areas were assayed on April 6 and 7 by geologist Dan Adams of Western Exploration, Inc., using a United Nuclear Corporation Silver Metals Analysis Probe (the UNC Silver MAP). This is a portable x-ray florescence unit which uses a radioactive isotope as a source of radiation to determine element quantities by x-ray floresence. Though various "heads" are avaliable for the instrument, in this case we used only the silver head, and analyzed only for silver. The x-ray florescence method has been used to analyze for a variety of elements for perhaps the last 20 to 30 years. In the past, it has only been usable in a laboratory where electricity to power an x-ray tube and non-portable bulky equipment could be located. Thus, the sample to be analyzed had to be taken to the x-ray florescence machine. With the advent of micro-electronics and micro-computers, as well as the availability of radioactive isotopes, the UNC instrument was made possible. This instrument is described more fully in accompanying data in Appendix 1. In the two days that Dan Adams and I spent channel sampling the Mustang Vein and the Charleston pit, we analyzed 283 samples at an average cost of $6.79 per sample, and a total cost of $1,920. Had we cut standard channel assay samples of sufficient quantity to obtain a representative sample, and analyzed it by fire assay, we probably would have expended approximately $40.00 per sample, at a total cost of $11,320.

When taking channel assays in the trenches, we used the face scanner. Each interval was read for one minute. Therefore, the scanner was held for a few seconds on increments of the channel interval which varied from one spot to as much as 10 feet, so that the total time of 60 seconds was divided porportionally along the sample interval. The average time to read, record, and move on to the next interval was three to four minutes, while another few minutes was necessary to paint the channel sample location on the rock face using spray paint. The Silver MAP also has a drill hole probe attachment that can be exchanged for the face scanner. Using this probe, any drill hole that is open can be analyzed for its silver content (as long as there is no metal casing in the hole) by lowering the probe to the bottom and winching it upwards at a constant, or incremental speed.

The UNC Silver MAP has some very distinct advantages, but may also pose a few unknowns in reliability of its assays. These I will summarize below:

Advantages

1. Speed - the face sampler, which looks like a long pistol, can be held against a rock sample and read for any where from between a few seconds and a minute and one half, at which time the instrument then reads out on a liquid crystal display that contains silver in ounces per ton. It also records the assay along with identifier numbers in its computer memory, which are then printed out at the end of the day. Thus, an entire mining face can be assayed in a matter of minutes, giving the geologist or equipment operator immediate knowledge as to where ore grade material lies in relation to waste material. Drill holes of any depth can be probed with the probe attachment. The probe is lowered to the bottom and winched upward at a known rate, or incrementally. Thus, if only the silver content is desired, no sample need be retrieved when drilling a hole that will be probed with the Silver MAP; and many dollars may be saved, as exemplified in their brochures.

2. No sample collection, transport, preparation, analyses, and archival storage is necessary.

Disadvantages

1. The limit of detection is approximately one ounce. Below one ounce, there may be a degree of variability so that the analyst cannot really tell whether the content is zero or a few tenths of contained silver. For higher grade material, there is less variability. After observing the instruments use over what I consider a good test period, it is not clear to me whether the variability is more related to the typically spotty silver mineralization, i.e., spots of very

high grade and surrounding lower grade material. or wander in the instrument itself. Here we have the age-old problem in getting a representative sample.

2. The hesitation of the mining community to accept "black box instrumentation" versus the old tried and true fire assay method.

The speed and instantaneous results, which allow one to make moment to moment decisions as to where to go or what to assay next, I think far out weighs any disadvantages. Further. the cost savings as a result of these instantaneous answers in combination with not having to take and process a physical sample, makes the instrument so cost effective where numerous samples are to be taken as to prohibit not using it. Through the use of the Silver MAP, we have identified more silver in the exposed walls of the Charleston Lead Mine than appear in any records we are aware of. Now that we have identified the zones of higher grade silver, I think that it is important that we go back in and take check samples to be analyzed by the fire assay method for gold and silver, and geochemically for copper, lead, zinc, molybdenum, and mercury, as well as possibly some other elements. Once this check sampling is done, we will have a better handle on the usefulness of the UNC Silver MAP, and its reliability.

RESULTS

Because we only assayed for silver, we have no knowledge of the contained gold in any of the samples. Since gold is a significant by-product in the low grade ores of Tombstone, before a decision can be made as to whether open pitable ore exists in or around the Charleston Lead Mine, we need further assays for gold, as well as lead and zinc.

Because of cover surrounding the edges of the Charleston Lead Mine, it is not clear what the geometry of the ore bearing zones is. Until we determine what that precise geometry is, we cannot calculate accurate ore reserve projections. Thus, the next step in our work is to perform detailed geologic mapping on a suitable base, so that we can precisely determine that geometry. These steps I will describe a bit later.

In detail. the Charleston Lead Mine pit appears to be sunk on a splay of the Charleston-Mustang Vein. However, in overall aspect, the Charleston-Mustang Vein appears to be a continuous structure that can be followed (though it pinches and swells) for several thousand feet.

One zone at the bottom level on the east side of the pit averaged 2.75 ounces per ton silver over a width of 33'. On the next level up this zone had narrowed and decreased in silver content to 13' of 1.63 ounces per ton silver. This, along with other evidence from the State of Maine mine, suggests that silver grades increase fairly rapidly with depth, due to supergene leaching and enrichment at lower levels.

With the caviat that we cannot be precise about the geometry of the vein system until further technical work is performed, I feel that it may be reasonable to project a 100' width of vein material that could be followed for 500'. The dip is steep, if not vertical. A potential for three ounces per ton silver and a possible 80% recovery seems in order. If these assumptions were to hold true, then we should be able to develop approximately one million tons of 2.4 ounce recoverable silver to a depth of 260'. This would also be at a stripping ratio of about 2.6 to 1, assuming mineral values started at the surface.

If sericite could be processed and recovered, possibly by the use of Richert cones, a new gravity separation device developed by the Australians sometime in the last 10 years to treat beach sands, there may be significant credits for this by-product. If the vein were to continue for 1,000 feet, then the potential ore reserves could double to two million tons.

There is too little data to speculate accurately on what the potential might be. However, I think that it is encouraging enough to justify further work.

PROPOSED FUTURE WORK

With your files organized, and recoverable drill core safely stowed away at the State of Maine mine, I believe that we can move forward into additional work towards testing for an ore zone. My recommendations for additional work are as follows:

I. Cutting new exposures

   A. Trench the Charleston Vein to the northeast and the southwest of the Charleston open pit, using the Escapule track mounted backhoe. This will probably cut to a depth of 4' to 10' or with pre-drilling and blasting to 10' to 12'. 3k

   B. Rehabilitate the road to the bottom of the pit and dig a water sump with the backhoe - draining most of the bottom of the pit. 2k

C. Clean off fresh surfaces in the pit faces with the backhoe, and re-sample the fresh material for fire and geochemical assay check against the UNC Silver MAP assays. 5k

II. Re-establish and re-monument claim corners - aerial mapping.

A. Identify and re-establish re-monument if necessary the corners for the Brother George, Mary Jo, Sweethart. and other claims, which you would like to bring to patent. It would probably also be wise at this time to re-monument and ammend where necessary those claims you wish to retain. 3K
△ base survey on State grid $3k

B. All claim corners should be targeted (paneled) for aerial photography. $3,000

C. Fly color aerial photography for 1" = 200' and 5' contour interval mapping over the large claim area, and 1" = 40' mapping over the Charleston open pit area. ± 700 to fly 3K for 50 scale

III. Detailed geologic mapping and drilling.

A. Plane table mapping on topo base map at 1" = 40' or 1" = 20' to show current samples, check samples, and trenches. 2K

B. Design drill test program. 1K

Tot 23K

C. Drill rotary holes to test for grade and tonnage. 15K drilling 10K sup & interp

IV. Follow up.

I would recommend we start on the above outlined program as soon as possible, as I have my summer crew available. If you agree, let me know and I will work on a more detailed cost estimate.

Very truly yours,

James A Briscoe

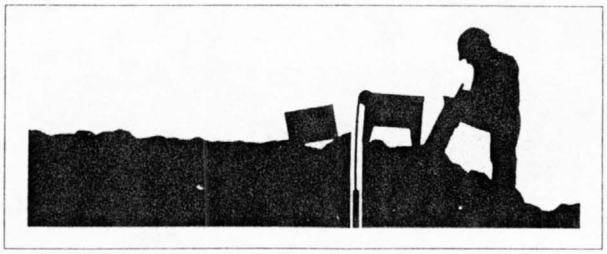
James A. Briscoe

JAB/ms

Attachments

ATTACHMENT 1

UNC NUCLEAR INDUSTRIES APPENDIX I



MAP (Metals Analysis Probe)

ON THE MAP

A quarterly newsletter Vol. I, No. 4, October 1983

SPECIAL EDITION

SILVER MAP ECONOMICS

What does it mean in total dollars to sample an outcrop, a mine face, a muck pile, a trench, a dump, concentrates, tailings, or a stockpile, and immediately know the assay? This special edition illustrates several field-proven ways the **MAP** pays for itself quickly, and at least partially illustrates **MAP's** tremendous economic benefits.

Too many deserving properties and mines are passed by because of prohibitive time and evaluation costs. Headings turn to low grade unnoticed, trenches and ore trains suffer grade dilution, mill feed is spiked high and low, making process control a nightmare, all because assay sample results lag by hours, shifts, or even days.

The **MAP** in the hands of a veteran miner has made one mine an operating reality. Others are putting **MAP** to work in existing operations, and still others are leading their exploration efforts with **MAP**. **MAP** helps to break the vicious circle of high mining and exploration costs that consume budgets and erode profits. The following charts allow you to easily calculate the cost benefits of **MAP** in your operations . . .

LOWER DRILLING COSTS

One 10-hole grid pays for MAP or expands to 50 holes for the same budget!

MAP & Rotary Drilling

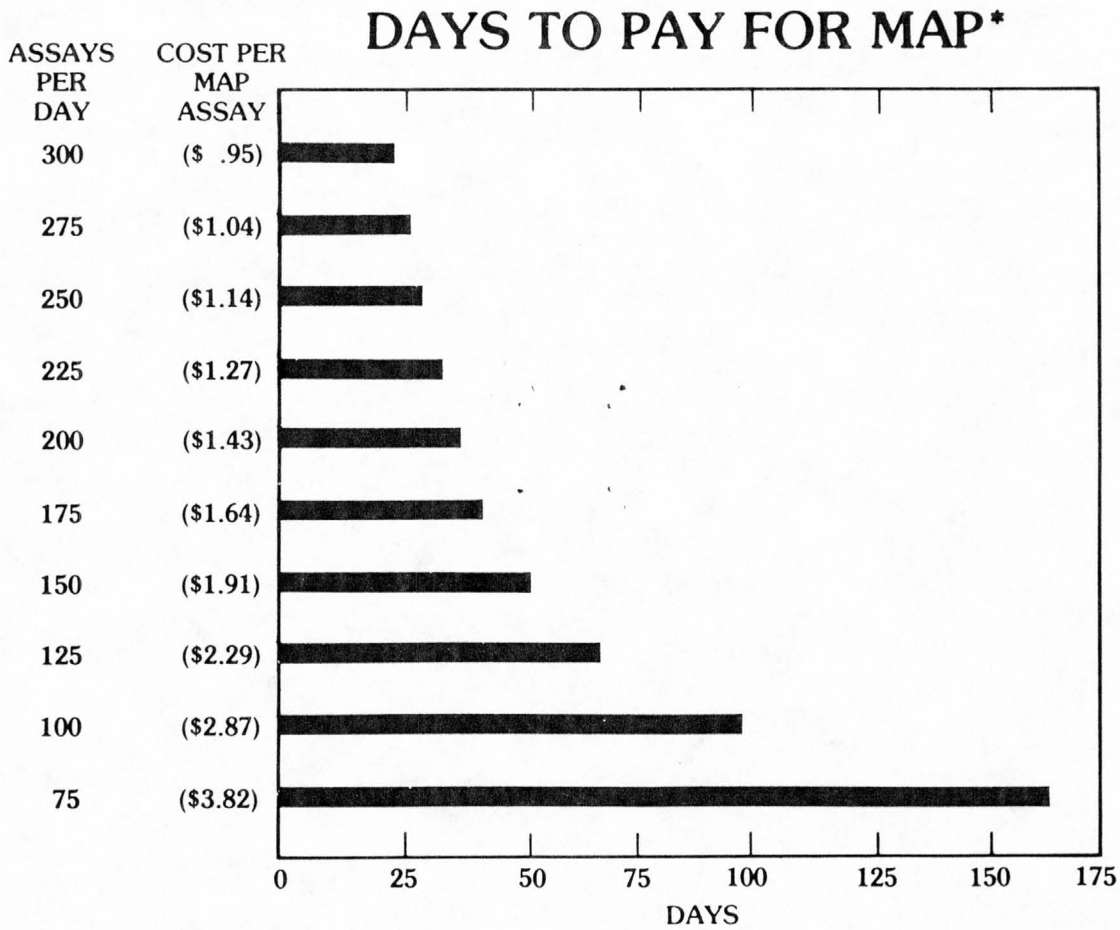
10 holes × 250 ft. @$2/ft.	$ 5,000
Assaying *	1,500
Engineering	3,332
Contingencies @15%	1,474
MAP Total	$11,306

Reverse Circulation Drilling (RCD)

10 holes × 250 ft. @$15/ft.	$37,500
Supervision & Sampling	8,334
Assaying	5,000
Engineering	3,332
Contingencies @15%	8,124
RCD Total	$62,290

* Daily cost of MAP = $287. Operator ($250) + MAP purchase amortized 5 years.

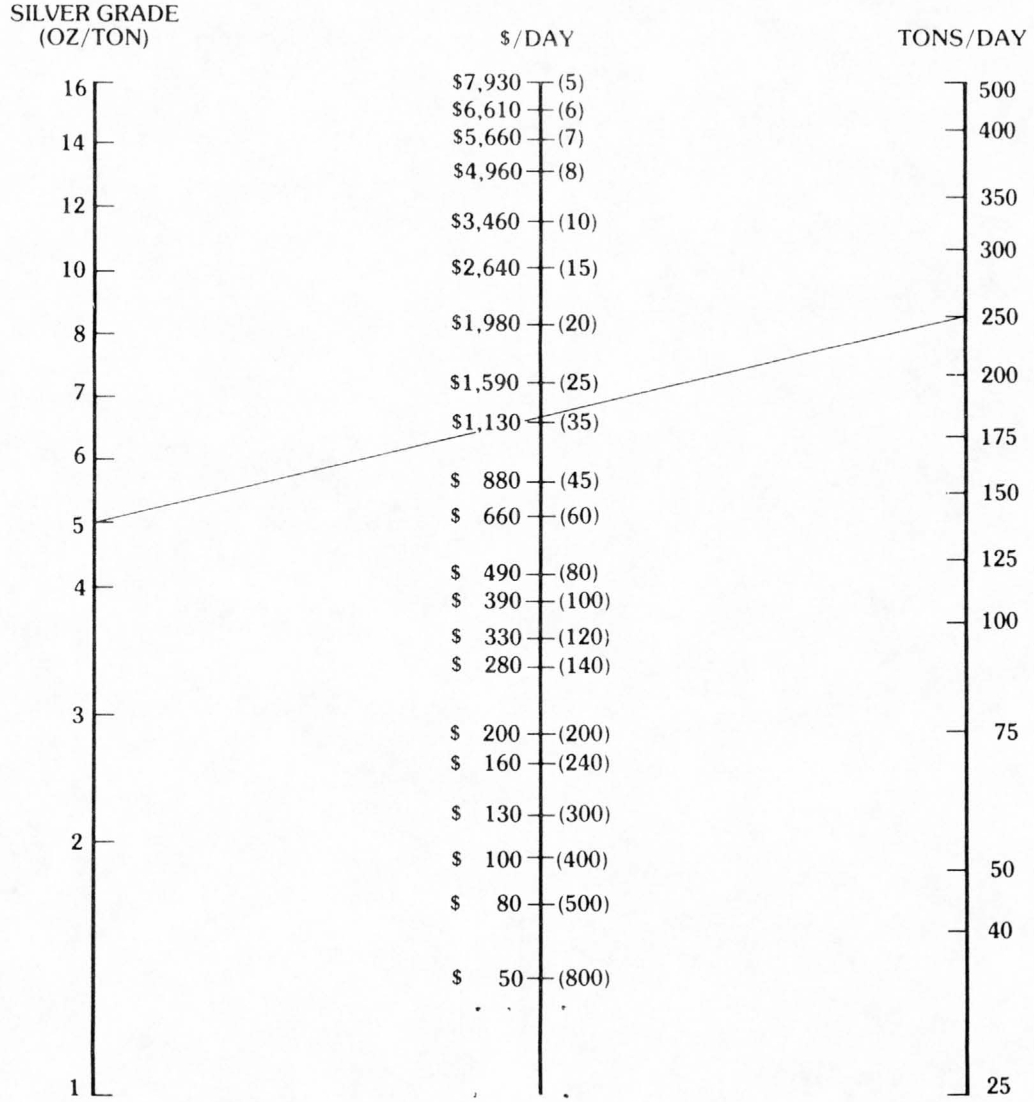
REDUCED ASSAY COSTS



* Based on difference between MAP assay costs and $7 (sampler & lab) conventional assay cost.

GRADE CONTROL PAYS!

Use this graph to determine how quickly your **MAP** system will pay for itself. Draw a line from your average grade to your tons per day. Where it crosses the middle line shows the increased profits and days required to pay for your **MAP**. The example shown earns $1,130/day and recovers the **MAP** purchase price in 35 days.



Graph based on $10 silver price and 10% decrease in dilution using MAP grade control. Both of these assumptions may be conservative. Your payout time may vary.

ON THE MAP

is a quarterly newspaper published for UNC's clients in the mining industry and scientific community. **ON THE MAP** provides articles on the latest technological and economic developments in UNC'S MAP program.

Dan Tyler
EDITOR

UNC NUCLEAR INDUSTRIES

MAP DIVISION

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World Mining

MARCH 1983

SPECIAL REPORT:

[redacted]

ATTACHMENT 2

TOMBSTONE MINING DISTRICT
COCHISE COUNTY, ARIZONA
ASSAY RESULTS USING UNC, INC. SILVER MAP ASSAY UNIT
PERFORMED BY: JAMES A. BRISCOE, JABA, INC.
DAN ADAMS, WESTERN EXPLORATION

APRIL 6, 1985
PROPERTY OWNER: THE JAMES STEWART COMPANY (SETH HORNE)

AREA SAMPLED: THE CHARLESTON LEAD MINE OPEN PIT
NE1/4,NW1/4, SECT. 36, T.20S., R.22E.
DATA ID 3016

SAMPLE NUMBER	IN	ASSAY OZ/TON SILVER	X	SAMPLE LENGTH IN FEET	=	SUM	
1	0.80	OZ/TON	X	1.50	=	1.20	
2	1.30	OZ/TON	X	2.50	=	3.25	5.5' @ 1.65 OZ/TON AG
3	3.10	OZ/TON	X	1.50	=	4.65	
4	0.30	OZ/TON	X	2.50	=	0.75	
5	0.80	OZ/TON	X	2.80	=	2.24	
6	1.30	OZ/TON	X	1.50	=	1.95	
7	0.80	OZ/TON	X	2.00	=	1.60	
8	1.00	OZ/TON	X	0.50	=	0.50	31.1' @ 1.08 OZ/TON AG
9	1.20	OZ/TON	X	0.80	=	0.96	
10	1.30	OZ/TON	X	1.20	=	1.56	
11	0.40	OZ/TON	X	1.00	=	0.40	
12	0.30	OZ/TON	X	2.00	=	0.60	16.8' @ 1.06 OZ/TON AG
13	1.00	OZ/TON	X	4.50	=	4.50	
14	1.80	OZ/TON	X	1.60	=	2.88	
15	0.80	OZ/TON	X	2.70	=	2.16	
16	1.70	OZ/TON	X	2.50	=	4.25	
17	0.50	OZ/TON	X	5.00	=	2.50	
18	0.80	OZ/TON	X	0.60	=	0.48	8.8' @ 1.07 OZ/TON AG
19	2.00	OZ/TON	X	3.20	=	6.40	
20	0.00	OZ/TON	X	4.00	=	0.00	
21	0.80	OZ/TON	X	7.50	=	6.00	
22	0.30	OZ/TON	X	7.00	=	2.10	
23	0.00	OZ/TON	X	5.20	=	0.00	
24	1.30	OZ/TON	X	1.00	=	1.30	
25	0.90	OZ/TON	X	4.00	=	3.60	
26	0.90	OZ/TON	X	2.50	=	2.25	
27	0.90	OZ/TON	X	2.60	=	2.34	
28	1.60	OZ/TON	X	0.40	=	0.64	21.5' @ 1.36 OZ/TON AG
29	6.10	OZ/TON	X	1.50	=	9.15	
30	1.60	OZ/TON	X	1.50	=	2.40	
31	1.00	OZ/TON	X	2.00	=	2.00	
32	0.80	OZ/TON	X	5.00	=	4.00	
33	1.50	OZ/TON	X	1.00	=	1.50	
34	0.00	OZ/TON	X	10.00	=	0.00	
35	0.00	OZ/TON	X	10.00	=	0.00	
36	1.50	OZ/TON	X	6.00	=	9.00	
37	3.80	OZ/TON	X	7.00	=	26.60	
38	0.80	OZ/TON	X	3.50	=	2.80	28.5' @ 1.68 OZ/TON AG
39	0.70	OZ/TON	X	10.00	=	7.00	
40	1.20	OZ/TON	X	2.00	=	2.40	
41	0.00	OZ/TON	X	4.50	=	0.00	
42	0.00	OZ/TON	X	4.00	=	0.00	
43	1.80	OZ/TON	X	0.50	=	0.90	3' @ 2.38 OZ/TON AG
44	2.50	OZ/TON	X	2.50	=	6.25	

TOMBSTONE MINING DISTRICT
COCHISE COUNTY, ARIZONA
ASSAY RESULTS USING UNC, INC. SILVER MAP ASSAY UNIT
PERFORMED BY: JAMES A. BRISCOE, JABA, INC.
DAN ADAMS, WESTERN EXPLORATION
APRIL 6, 1985
PROPERTY OWNER: THE JAMES STEWART COMPANY (SETH HORNE)

AREA SAMPLED: THE CHARLESTON LEAD MINE OPEN PIT
NE1/4.NW1/4, SECT. 36, T.20S., R.22E.
DATA ID 3016

SAMPLE NUMBER	ASSAY IN OZ/TON SILVER	X	SAMPLE LENGTH IN FEET	=	SUM	
45	0.30 OZ/TON	X	2.00	=	0.60	
46	1.70 OZ/TON	X	1.50	=	2.55	5.5' @ 1.92 OZ/TON AG
47	2.00 OZ/TON	X	4.00	=	8.00	
48	0.00 OZ/TON	X	13.00	=	0.00	
49	1.70 OZ/TON	X	3.50	=	5.95	6.5' @ 1.42 OZ/TON AG
50	1.10 OZ/TON	X	3.00	=	3.30	
51	0.30 OZ/TON	X	1.00	=	0.30	
52	0.20 OZ/TON	X	5.00	=	1.00	
53	1.30 OZ/TON	X	5.00	=	6.50	
54	1.60 OZ/TON	X	2.00	=	3.20	
55	1.20 OZ/TON	X	2.50	=	3.00	
56	1.20 OZ/TON	X	5.50	=	6.60	
57	1.60 OZ/TON	X	6.00	=	9.60	
58	0.00 OZ/TON	X	4.50	=	0.00	
59	1.20 OZ/TON	X	2.50	=	3.00	
60	0.00 OZ/TON	X	1.00	=	0.00	
61	1.40 OZ/TON	X	2.00	=	2.80	48' @ 1.31 OZ/TON AG
62	0.60 OZ/TON	X	2.00	=	1.20	
63	0.90 OZ/TON	X	1.00	=	0.90	
64	1.30 OZ/TON	X	0.50	=	0.65	
65	0.60 OZ/TON	X	0.50	=	0.30	
66	4.70 OZ/TON	X	1.00	=	4.70	14' @ 1.87 OZ/TON AG
67	4.90 OZ/TON	X	1.00	=	4.90	
68	1.20 OZ/TON	X	5.00	=	6.00	
69	1.60 OZ/TON	X	6.00	=	9.60	
70	0.00 OZ/TON	X	2.00	=	0.00	
71	1.20 OZ/TON	X	1.50	=	1.80	
72	0.30 OZ/TON	X	5.00	=	1.50	105' @ 1.62 OZ/TON AG
73	0.80 OZ/TON	X	3.00	=	2.40	N & E WALLS OF PIT
74	1.90 OZ/TON	X	5.00	=	9.50	
75	0.70 OZ/TON	X	3.00	=	2.10	
76	3.40 OZ/TON	X	4.00	=	13.60	
77	2.40 OZ/TON	X	3.00	=	7.20	
78	2.50 OZ/TON	X	3.00	=	7.50	
79	4.70 OZ/TON	X	3.00	=	14.10	33' @ 2.75 OZ/TON AG
80	0.10 OZ/TON	X	1.00	=	0.10	BOTTOM LEVEL OF PIT, E SIDE
81	1.40 OZ/TON	X	3.00	=	4.20	
82	5.10 OZ/TON	X	3.00	=	15.30	
83	3.30 OZ/TON	X	2.50	=	8.25	
84	6.10 OZ/TON	X	0.50	=	3.05	
85	2.90 OZ/TON	X	2.00	=	5.80	
86	0.60 OZ/TON	X	1.00	=	0.60	
87	0.50 OZ/TON	X	7.00	=	3.50	
88	1.10 OZ/TON	X	1.00	=	1.10	
89	0.80 OZ/TON	X	2.00	=	1.60	

TOMBSTONE MINING DISTRICT
COCHISE COUNTY, ARIZONA
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PERFORMED BY: JAMES A. BRISCOE, JABA, INC.
DAN ADAMS, WESTERN EXPLORATION

APRIL 6, 1985
PROPERTY OWNER: THE JAMES STEWART COMPANY (SETH HORNE)

AREA SAMPLED: THE CHARLESTON LEAD MINE OPEN PIT
NE1/4,NW1/4, SECT. 36, T.20S., R.22E.
DATA ID 3016

SAMPLE NUMBER	ASSAY IN OZ/TON SILVER		X	SAMPLE LENGTH IN FEET	=	SUM	
90	0.00	OZ/TON	X	0.50	=	0.00	
91	1.30	OZ/TON	X	1.50	=	1.95	
92	0.90	OZ/TON	X	1.00	=	0.90	
93	2.60	OZ/TON	X	3.00	=	7.80	13' @ 1.63 OZ/TON AG
94	1.20	OZ/TON	X	1.50	=	1.80	E SIDE - 2ND LEVEL SAME AS
95	0.60	OZ/TON	X	2.00	=	1.20	SAMPLES 74-85 BUT 20' HIGHER
96	1.90	OZ/TON	X	4.00	=	7.60	
97	0.60	OZ/TON	X	5.00	=	3.00	
98	0.00	OZ/TON	X	5.00	=	0.00	
99	1.00	OZ/TON	X	1.00	=	1.00	
100	0.00	OZ/TON	X	6.00	=	0.00	
101	0.20	OZ/TON	X	4.00	=	0.80	
102	0.00	OZ/TON	X	3.00	=	0.00	
103	2.40	OZ/TON	X	1.00	=	2.40	3' @ 3 OZ/TON AG
104	3.40	OZ/TON	X	2.00	=	6.80	
105	0.00	OZ/TON	X	4.00	=	0.00	
106	0.00	OZ/TON	X	3.00	=	0.00	
107	0.00	OZ/TON	X	7.00	=	0.00	
108	0.50	OZ/TON	X	6.00	=	3.00	
109	1.20	OZ/TON	X	2.00	=	2.40	
110	0.30	OZ/TON	X	3.00	=	0.90	
111	0.00	OZ/TON	X	2.00	=	0.00	
112	0.00	OZ/TON	X	4.00	=	0.00	
113	0.00	OZ/TON	X	2.00	=	0.00	
114	0.10	OZ/TON	X	1.50	=	0.15	
115	0.70	OZ/TON	X	2.00	=	1.40	
116	1.80	OZ/TON	X	1.00	=	1.80	
117	0.10	OZ/TON	X	1.00	=	0.10	
118	0.60	OZ/TON	X	1.50	=	0.90	
119	1.60	OZ/TON	X	0.10	=	0.16	
120	2.20	OZ/TON	X	0.10	=	0.22	
121	0.00	OZ/TON	X	0.10	=	0.00	
122	0.00	OZ/TON	X	3.00	=	0.00	
123	0.00	OZ/TON	X	6.00	=	0.00	
124	1.00	OZ/TON	X	2.50	=	2.50	
125	0.10	OZ/TON	X	3.00	=	0.30	
126	0.50	OZ/TON	X	0.00	=	0.00	Top bench
127	0.60	OZ/TON	X	0.00	=	0.00	
128	0.70	OZ/TON	X	0.00	=	0.00	
129	0.30	OZ/TON	X	0.00	=	0.00	
130	0.30	OZ/TON	X	0.00	=	0.00	
131	1.00	OZ/TON	X	6.00	=	6.00	
132	0.50	OZ/TON	X	0.50	=	0.25	
133	0.30	OZ/TON	X	10.00	=	3.00	
134	0.70	OZ/TON	X	2.00	=	1.40	
135	1.50	OZ/TON	X	6.00	=	9.00	
136	0.00	OZ/TON	X	6.00	=	0.00	
137	0.00	OZ/TON	X	1.50	=	0.00	
138	0.00	OZ/TON	X	5.00	=	0.00	
139	0.80	OZ/TON	X	6.00	=	4.80	
140	0.00	OZ/TON	X	4.00	=	0.00	
141	0.90	OZ/TON	X	2.00	=	1.80	
142	0.90	OZ/TON	X	2.00	=	1.80	

TOMBSTONE MINING DISTRICT
COCHISE COUNTY, ARIZONA
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DAN ADAMS, WESTERN EXPLORATION
APRIL 6, 1985
PROPERTY OWNER: THE JAMES STEWART COMPANY (SETH HORNE)

AREA SAMPLED: THE CHARLESTON LEAD MINE OPEN PIT
NE1/4.NW1/4, SECT. 36, T.20S., R.22E.
DATA ID 3016

SAMPLE NUMBER	IN	ASSAY OZ/TON SILVER	X	SAMPLE LENGTH IN FEET	=	SUM	
143	0.70	OZ/TON	X	3.00	=	2.10	
144	0.80	OZ/TON	X	4.00	=	3.20	
145	0.00	OZ/TON	X	2.00	=	0.00	
146	1.00	OZ/TON	X	2.00	=	2.00	
147	0.30	OZ/TON	X	2.00	=	0.60	
148	0.50	OZ/TON	X	1.00	=	0.50	
149	0.60	OZ/TON	X	2.00	=	1.20	
150	1.20	OZ/TON	X	5.00	=	6.00	
151	0.10	OZ/TON	X	1.00	=	0.10	
152	2.50	OZ/TON	X	1.00	=	2.50	14.5' @ 1.42 OZ/TON AG
153	0.60	OZ/TON	X	2.00	=	1.20	CHARLESTON VEIN AT SURFACE
154	0.70	OZ/TON	X	0.50	=	0.35	NEAR SHAFT
155	2.10	OZ/TON	X	5.00	=	10.50	
156	2.20	OZ/TON	X	0.10	=	0.22	
				458.50		430.51	458.5' @ 0.94 OZ/TON AG

81 assays + 1oz thus

DATA ID # 3016

DATA NUMBER	ASSAY	ELEMENT	CD	TIME (SECS)	DEPTH (FT)
1	0.8 OZ/TON	SILVER	1	60.0	0.0
2	1.3 OZ/TON	SILVER	1	60.0	0.0
3	3.1 OZ/TON	SILVER	1	60.0	0.0
4	0.3 OZ/TON	SILVER	1	60.0	0.0
5	0.8 OZ/TON	SILVER	1	60.0	0.0
6	1.3 OZ/TON	SILVER	1	60.0	0.0
7	0.8 OZ/TON	SILVER	1	60.0	0.0
8	1.0 OZ/TON	SILVER	1	60.0	0.0
9	1.2 OZ/TON	SILVER	1	60.0	0.0
10	1.3 OZ/TON	SILVER	1	60.0	0.0
11	0.4 OZ/TON	SILVER	1	60.0	0.0
12	0.3 OZ/TON	SILVER	1	60.0	0.0
13	1.0 OZ/TON	SILVER	1	60.0	0.0
14	1.8 OZ/TON	SILVER	1	60.0	0.0
15	0.8 OZ/TON	SILVER	1	60.0	0.0
16	1.7 OZ/TON	SILVER	1	60.0	0.0
17	0.5 OZ/TON	SILVER	1	60.0	0.0
18	0.8 OZ/TON	SILVER	1	60.0	0.0
19	2.0 OZ/TON	SILVER	1	60.0	0.0
20	0.0 OZ/TON	SILVER	1	60.0	0.0
21	0.8 OZ/TON	SILVER	1	60.0	0.0
22	0.3 OZ/TON	SILVER	1	60.0	0.0
23	0.0 OZ/TON	SILVER	1	60.0	0.0
24	1.3 OZ/TON	SILVER	1	60.0	0.0
25	0.9 OZ/TON	SILVER	1	60.0	0.0

Charleston Open P. X

26	0.9 OZ/TON	SILVER	1	60.0	0.0
27	0.9 OZ/TON	SILVER	1	60.0	0.0
28	1.6 OZ/TON	SILVER	1	60.0	0.0
29	6.1 OZ/TON	SILVER	1	60.0	0.0
30	1.6 OZ/TON	SILVER	1	60.0	0.0
31	1.0 OZ/TON	SILVER	1	60.0	0.0
32	0.8 OZ/TON	SILVER	1	60.0	0.0
33	1.5 OZ/TON	SILVER	1	60.0	0.0
34	0.0 OZ/TON	SILVER	1	60.0	0.0
35	0.0 OZ/TON	SILVER	1	60.0	0.0
36	1.5 OZ/TON	SILVER	1	60.0	0.0
37	3.8 OZ/TON	SILVER	1	60.0	0.0
38	0.8 OZ/TON	SILVER	1	60.0	0.0
39	0.7 OZ/TON	SILVER	1	60.0	0.0
40	1.2 OZ/TON	SILVER	1	60.0	0.0
41	0.0 OZ/TON	SILVER	1	60.0	0.0
42	0.0 OZ/TON	SILVER	1	60.0	0.0
43	1.8 OZ/TON	SILVER	1	60.0	0.0
44	2.5 OZ/TON	SILVER	1	60.0	0.0
45	0.3 OZ/TON	SILVER	1	60.0	0.0
46	1.7 OZ/TON	SILVER	1	60.0	0.0
47	2.0 OZ/TON	SILVER	1	60.0	0.0
48	0.0 OZ/TON	SILVER	1	60.0	0.0
49	1.7 OZ/TON	SILVER	1	60.0	0.0
50	1.1 OZ/TON	SILVER	1	60.0	0.0
51	0.3 OZ/TON	SILVER	1	60.0	0.0
52	0.2 OZ/TON	SILVER	1	60.0	0.0
53	1.3 OZ/TON	SILVER	1	60.0	0.0
54	1.6 OZ/TON	SILVER	1	60.0	0.0
55	1.2 OZ/TON	SILVER	1	60.0	0.0
56	1.2 OZ/TON	SILVER	1	60.0	0.0
57	1.6 OZ/TON	SILVER	1	60.0	0.0
58	0.0 OZ/TON	SILVER	1	60.0	0.0
59	1.2 OZ/TON	SILVER	1	60.0	0.0
60	0.0 OZ/TON	SILVER	1	60.0	0.0

Charleston Open Pit

61	1.4 OZ/TON	SILVER	1	60.0	0.0
62	0.6 OZ/TON	SILVER	1	60.0	0.0
63	0.9 OZ/TON	SILVER	1	60.0	0.0
64	1.3 OZ/TON	SILVER	1	60.0	0.0
65	0.6 OZ/TON	SILVER	1	60.0	0.0
66	4.7 OZ/TON	SILVER	1	60.0	0.0
67	4.9 OZ/TON	SILVER	1	60.0	0.0
68	1.2 OZ/TON	SILVER	1	60.0	0.0
69	1.6 OZ/TON	SILVER	1	60.0	0.0
70	0.0 OZ/TON	SILVER	1	60.0	0.0
71	1.2 OZ/TON	SILVER	1	60.0	0.0
72	0.3 OZ/TON	SILVER	1	60.0	0.0
73	0.8 OZ/TON	SILVER	1	60.0	0.0
74	1.9 OZ/TON	SILVER	1	60.0	0.0
75	0.7 OZ/TON	SILVER	1	60.0	0.0
76	3.4 OZ/TON	SILVER	1	60.0	0.0
77	2.4 OZ/TON	SILVER	1	60.0	0.0
78	2.5 OZ/TON	SILVER	1	60.0	0.0
79	4.7 OZ/TON	SILVER	1	60.0	0.0
80	0.1 OZ/TON	SILVER	1	60.0	0.0
81	1.4 OZ/TON	SILVER	1	60.0	0.0
82	5.1 OZ/TON	SILVER	1	60.0	0.0
83	3.3 OZ/TON	SILVER	1	60.0	0.0
84	6.1 OZ/TON	SILVER	1	60.0	0.0
85	2.9 OZ/TON	SILVER	1	60.0	0.0
86	0.6 OZ/TON	SILVER	1	60.0	0.0
87	0.5 OZ/TON	SILVER	1	60.0	0.0
88	1.1 OZ/TON	SILVER	1	60.0	0.0
89	0.8 OZ/TON	SILVER	1	60.0	0.0
90	0.0 OZ/TON	SILVER	1	60.0	0.0
91	1.3 OZ/TON	SILVER	1	60.0	0.0
92	0.9 OZ/TON	SILVER	1	60.0	0.0
93	2.6 OZ/TON	SILVER	1	60.0	0.0
94	1.2 OZ/TON	SILVER	1	60.0	0.0
95	0.6 OZ/TON	SILVER	1	60.0	0.0

Charleston Open Pit

96	1.9 OZ/TON	SILVER	1	60.0	0.0
97	0.6 OZ/TON	SILVER	1	60.0	0.0
98	0.0 OZ/TON	SILVER	1	60.0	0.0
99	1.0 OZ/TON	SILVER	1	60.0	0.0
100	0.0 OZ/TON	SILVER	1	60.0	0.0
101	0.2 OZ/TON	SILVER	1	60.0	0.0
102	0.0 OZ/TON	SILVER	1	60.0	0.0
103	2.4 OZ/TON	SILVER	1	60.0	0.0
104	3.4 OZ/TON	SILVER	1	60.0	0.0
105	0.0 OZ/TON	SILVER	1	60.0	0.0
106	0.0 OZ/TON	SILVER	1	60.0	0.0
107	0.0 OZ/TON	SILVER	1	60.0	0.0
108	0.5 OZ/TON	SILVER	1	60.0	0.0
109	1.2 OZ/TON	SILVER	1	60.0	0.0
110	0.3 OZ/TON	SILVER	1	60.0	0.0
111	0.0 OZ/TON	SILVER	1	60.0	0.0
112	0.0 OZ/TON	SILVER	1	60.0	0.0
113	0.0 OZ/TON	SILVER	1	60.0	0.0
114	0.1 OZ/TON	SILVER	1	60.0	0.0
115	0.7 OZ/TON	SILVER	1	60.0	0.0
116	1.8 OZ/TON	SILVER	1	60.0	0.0
117	0.1 OZ/TON	SILVER	1	60.0	0.0
118	0.6 OZ/TON	SILVER	1	60.0	0.0
119	1.6 OZ/TON	SILVER	1	60.0	0.0
120	2.2 OZ/TON	SILVER	1	60.0	0.0
121	0.0 OZ/TON	SILVER	1	60.0	0.0
122	0.0 OZ/TON	SILVER	1	60.0	0.0
123	0.0 OZ/TON	SILVER	1	60.0	0.0
124	1.0 OZ/TON	SILVER	1	60.0	0.0
125	0.1 OZ/TON	SILVER	1	60.0	0.0
126	0.5 OZ/TON	SILVER	1	60.0	0.0
127	0.6 OZ/TON	SILVER	1	60.0	0.0
128	0.7 OZ/TON	SILVER	1	60.0	0.0
129	0.3 OZ/TON	SILVER	1	60.0	0.0
130	0.3 OZ/TON	SILVER	1	60.0	0.0

Charleston Open Pit

131	1.0 OZ/TON	SILVER	1	60.0	0.0
132	0.5 OZ/TON	SILVER	1	60.0	0.0
133	0.3 OZ/TON	SILVER	1	60.0	0.0
134	0.7 OZ/TON	SILVER	1	60.0	0.0
135	1.5 OZ/TON	SILVER	1	60.0	0.0
136	0.0 OZ/TON	SILVER	1	60.0	0.0
137	0.0 OZ/TON	SILVER	1	60.0	0.0
138	0.0 OZ/TON	SILVER	1	60.0	0.0
139	0.8 OZ/TON	SILVER	1	60.0	0.0
140	0.0 OZ/TON	SILVER	1	60.0	0.0
141	0.9 OZ/TON	SILVER	1	60.0	0.0
142	0.9 OZ/TON	SILVER	1	60.0	0.0
143	0.7 OZ/TON	SILVER	1	60.0	0.0
144	0.8 OZ/TON	SILVER	1	60.0	0.0
145	0.0 OZ/TON	SILVER	1	60.0	0.0
146	1.0 OZ/TON	SILVER	1	60.0	0.0
147	0.3 OZ/TON	SILVER	1	60.0	0.0
148	0.5 OZ/TON	SILVER	1	60.0	0.0
149	0.6 OZ/TON	SILVER	1	60.0	0.0
150	1.2 OZ/TON	SILVER	1	60.0	0.0
151	0.1 OZ/TON	SILVER	1	60.0	0.0
152	2.5 OZ/TON	SILVER	1	60.0	0.0
153	0.6 OZ/TON	SILVER	1	60.0	0.0
154	0.7 OZ/TON	SILVER	1	60.0	0.0
155	2.1 OZ/TON	SILVER	1	60.0	0.0
156	2.2 OZ/TON	SILVER	1	60.0	0.0

Charleston Open Pit

ATTACHMENT 3

TOMBSTONE MINING DISTRICT
COCHISE COUNTY, ARIZONA
ASSAY RESULTS USING UNC, INC. SILVER MAP ASSAY UNIT
PERFORMED BY: JAMES A. BRISCOE, JABA, INC.
DAN ADAMS, WESTERN EXPLORATON

APRIL 6, 1985
PROPERTY OWNER: DENNIS V. ABBL (VALIDITY OF CLAIMS OPEN TO QUESTION)

AREA SAMPLED: MUSTANG VEIN WORKING FROM S TO N, SAMPLING TRENCHES CROSS CUTTING THE VEIN. SW1/4, NW1/4, SECT. 30, T.20S., R.22E.
TRENCH #2

DATA ID 2005

SAMPLE NUMBER	IN	ASSAY OZ/TON SILVER	X	SAMPLE LENGTH IN FEET	=	SUM
1	3.90	OZ/TON	X	0.10	=	0.39
2	1.60	OZ/TON	X	3.50	=	5.60
3	1.50	OZ/TON	X	2.50	=	3.75
4	1.70	OZ/TON	X	2.00	=	3.40
5	0.00	OZ/TON	X	2.50	=	0.00
6	0.60	OZ/TON	X	2.00	=	1.20
7	0.70	OZ/TON	X	4.00	=	2.80
8	2.00	OZ/TON	X	2.00	=	4.00
9	0.80	OZ/TON	X		=	0.00
10	1.50	OZ/TON	X		=	0.00
11	2.20	OZ/TON	X		=	0.00
12	0.00	OZ/TON	X		=	0.00
13	0.00	OZ/TON	X		=	0.00
14	0.60	OZ/TON	X		=	0.00

TOMBSTONE MINING DISTRICT
COCHISE COUNTY ARIZONA
ASSAY RESULTS USING UNC, INC. SILVER MAP ASSAY UNIT
PERFORMED BY: JAMES A. BRISCOE, JABA, INC.
DAN ADAMS, WESTERN EXPLORATON
APRIL 6, 1985
PROPERTY OWNER: DENNIS V. ABBL (VALIDITY OF CLAIMS OPEN TO QUESTION)

AREA SAMPLED: MUSTANG VEIN TRENCH #3

DATA ID 2006

SAMPLE NUMBER	IN ASSAY OZ/TON SILVER	X	SAMPLE LENGTH IN FEET	=	SUM	
1	1.60 OZ/TON	X	0.10	=	0.16	0.2' @ 1.45 OZ/TON AG
2	1.30 OZ/TON	X	0.10	=	0.13	
3	0.00 OZ/TON	X	1.00	=	0.00	
4	0.30 OZ/TON	X	0.10	=	0.03	
5	0.20 OZ/TON	X	1.00	=	0.20	
6	0.00 OZ/TON	X	0.10	=	0.00	
7	0.40 OZ/TON	X	6.00	=	2.40	6.1' @ 0.4 OZ/TON AG
8	0.70 OZ/TON	X	0.10	=	0.07	
9	0.00 OZ/TON	X	0.10	=	0.00	
10	0.10 OZ/TON	X	4.00	=	0.40	
11	0.70 OZ/TON	X	6.00	=	4.20	
12	0.00 OZ/TON	X	0.10	=	0.00	
13	0.00 OZ/TON	X	1.50	=	0.00	
14	1.70 OZ/TON	X	4.00	=	6.80	
15	1.20 OZ/TON	X	1.50	=	1.80	
16	1.30 OZ/TON	X	1.00	=	1.30	
17	1.70 OZ/TON	X	6.00	=	10.20	
18	0.80 OZ/TON	X	6.00	=	4.80	
19	1.70 OZ/TON	X	4.00	=	6.80	
20	0.80 OZ/TON	X	2.00	=	1.60	34.2' @ 1.5 OZ/TON AG
21	3.10 OZ/TON	X	1.50	=	4.65	
22	2.30 OZ/TON	X	0.10	=	0.23	
23	5.00 OZ/TON	X	0.10	=	0.50	
24	1.80 OZ/TON	X	6.00	=	10.80	
25	0.90 OZ/TON	X	2.00	=	1.80	
			54.4		58.87	54.4' @ 1.08 OZ/TON AG

James A. Briscoe & Associates, Inc.
Tucson, Arizona

TOMBSTONE MINING DISTRICT
COCHISE COUNTY, ARIZONA
ASSAY RESULTS USING UNC, INC. SILVER MAP ASSAY UNIT
PERFORMED BY: JAMES A. BRISCOE, JABA, INC.
DAN ADAMS, WESTERN EXPLORATON
APRIL 6, 1985
PROPERTY OWNER: DENNIS V. ABBL (VALIDITY OF CLAIMS OPEN TO QUESTION)

AREA SAMPLED: MUSTANG VEIN TRENCH #3

DATA ID 2007

SAMPLE NUMBER	ASSAY IN OZ/TON SILVER	X	SAMPLE LENGTH IN FEET	=	SUM	
1	0.00 OZ/TON	X	2.50	=	0.00	
2	1.10 OZ/TON	X	0.10	=	0.11	1.1' @ 1.65 OZ/TON AG
3	1.70 OZ/TON	X	1.00	=	1.70	
4	0.80 OZ/TON	X	2.00	=	1.60	
5	0.00 OZ/TON	X	2.00	=	0.00	
6	0.40 OZ/TON	X	1.50	=	0.60	
7	1.60 OZ/TON	X	0.10	=	0.16	
			9.20		4.17	9.2' @ 0.45 OZ/TON AG

TOMBSTONE MINING DISTRICT
COCHISE COUNTY, ARIZONA
ASSAY RESULTS USING UNC, INC. SILVER MAP ASSAY UNIT
PERFORMED BY: JAMES A. BRISCOE, JABA, INC.
DAN ADAMS, WESTERN EXPLORATON
APRIL 6, 1985
PROPERTY OWNER: DENNIS V. ABBL (VALIDITY OF CLAIMS OPEN TO QUESTION)

AREA SAMPLED: MUSTANG VEIN TRENCH #4

DATA ID 2008

SAMPLE NUMBER	IN ASSAY OZ/TON SILVER	X	SAMPLE LENGTH IN FEET	=	SUM	
1	0.10 OZ/TON	X	0.10	=	0.01	
2	0.80 OZ/TON	X	1.50	=	1.20	2.5' @ .84 OZ/TON AG
3	0.90 OZ/TON	X	1.00	=	0.90	
4	0.10 OZ/TON	X	1.50	=	0.15	
5	1.30 OZ/TON	X	2.00	=	2.60	
6	0.00 OZ/TON	X	1.00	=	0.00	
7	0.10 OZ/TON	X	1.00	=	0.10	
8	0.00 OZ/TON	X	1.00	=	0.00	
9	0.10 OZ/TON	X	0.50	=	0.05	
10	1.70 OZ/TON	X	1.20	=	2.04	2.7' @ 1.26 OZ/TON AG
11	0.90 OZ/TON	X	1.50	=	1.35	
12	0.50 OZ/TON	X	1.50	=	0.75	
13	0.00 OZ/TON	X	1.20	=	0.00	
14	0.50 OZ/TON	X	1.00	=	0.50	
15	1.30 OZ/TON	X	1.50	=	1.95	6' @ .96 OZ/TON AG
16	1.20 OZ/TON	X	2.00	=	2.40	
17	0.60 OZ/TON	X	1.50	=	0.90	
18	0.00 OZ/TON	X	0.10	=	0.00	
19	0.70 OZ/TON	X	0.10	=	0.07	
20	2.00 OZ/TON	X	0.10	=	0.20	.3' @ 1.2 OZ/TON AG
21	0.90 OZ/TON	X	0.10	=	0.09	
22	0.20 OZ/TON	X	0.10	=	0.02	
23	0.60 OZ/TON	X	2.50	=	1.50	
24	1.00 OZ/TON	X	1.00	=	1.00	
25	2.10 OZ/TON	X	1.00	=	2.10	10' @ 1.45 OZ/TON AG
26	2.40 OZ/TON	X	2.00	=	4.80	
27	1.50 OZ/TON	X	2.00	=	3.00	
28	1.40 OZ/TON	X	1.50	=	2.10	
29	0.00 OZ/TON	X	1.00	=	0.00	
30	0.00 OZ/TON	X	0.50	=	0.00	
			33.00		29.78	33.0' @ 0.9 OZ/TON AG

TOMBSTONE MINING DISTRICT
COCHISE COUNTY, ARIZONA
ASSAY RESULTS USING UNC, INC. SILVER MAP ASSAY UNIT
PERFORMED BY: JAMES A. BRISCOE, JABA, INC.
DAN ADAMS, WESTERN EXPLORATON

APRIL 6, 1985
PROPERTY OWNER: DENNIS V. ABBL (VALIDITY OF CLAIMS OPEN TO QUESTION)

AREA SAMPLED: MUSTANG VEIN TRENCH #5 (BACKHOE)

DATA ID 2009

SAMPLE NUMBER	ASSAY IN OZ/TON SILVER	X	SAMPLE LENGTH IN FEET	=	SUM	
1	0.90 OZ/TON	X	0.10	=	0.09	4.6' @ 1.68 OZ/TON AG
2	2.00 OZ/TON	X	2.00	=	4.00	
3	1.10 OZ/TON	X	1.50	=	1.65	
4	2.00 OZ/TON	X	1.00	=	2.00	
5	0.30 OZ/TON	X	0.10	=	0.03	
6	0.30 OZ/TON	X	2.50	=	0.75	
7	2.90 OZ/TON	X	3.00	=	8.70	
			10.20		17.22	10.2' @ 1.64 OZ/TON AG

TOMBSTONE MINING DISTRICT
COCHISE COUNTY, ARIZONA
ASSAY RESULTS USING UNC, INC. SILVER MAP ASSAY UNIT
PERFORMED BY: JAMES A. BRISCOE, JABA, INC.
DAN ADAMS, WESTERN EXPLORATON

APRIL 6, 1985
PROPERTY OWNER: DENNIS V. ABBL (VALIDITY OF CLAIMS OPEN TO QUESTION)

AREA SAMPLED: MUSTANG VEIN TRENCH #6

DATA ID 2010

SAMPLE NUMBER	IN	ASSAY OZ/TON SILVER	X	SAMPLE LENGTH IN FEET	=	SUM	
1	1.40	OZ/TON	X	0.10	=	0.14	2.1' @ 1.35 OZ/TON AG
2	1.60	OZ/TON	X	1.00	=	1.60	
3	1.10	OZ/TON	X	1.00	=	1.10	
4	0.00	OZ/TON	X	0.10	=	0.00	
5	1.10	OZ/TON	X	1.50	=	1.65	
6	0.00	OZ/TON	X	1.00	=	0.00	
7	1.20	OZ/TON	X	2.00	=	2.40	
8	0.90	OZ/TON	X	0.10	=	0.09	
9	0.90	OZ/TON	X	0.10	=	0.09	
10	0.00	OZ/TON	X	1.50	=	0.00	
11	1.70	OZ/TON	X	2.00	=	3.40	6.1' @ 1.6 OZ/TON AG
12	3.50	OZ/TON	X	0.10	=	0.35	
13	1.50	OZ/TON	X	4.00	=	6.00	
14	0.70	OZ/TON	X	4.00	=	2.80	
15	0.60	OZ/TON	X		=	0.00	

TOMBSTONE MINING DISTRICT
COCHISE COUNTY, ARIZONA
ASSAY RESULTS USING UNC, INC. SILVER MAP ASSAY UNIT
PERFORMED BY: JAMES A. BRISCOE, JABA, INC.
DAN ADAMS, WESTERN EXPLORATON

APRIL 6, 1985
PROPERTY OWNER: DENNIS V. ABBL (VALIDITY OF CLAIMS OPEN TO QUESTION)

AREA SAMPLED: MUSTANG VEIN - 10' VERTICAL PROSPECT
SHAFT IN THE FOOT WALL OF THE MAIN STRUCTURE

DATA ID 2011

SAMPLE NUMBER	ASSAY IN OZ/TON SILVER		X	SAMPLE LENGTH IN FEET	=	SUM	
1	0.60	OZ/TON	X	3.00	=	1.80	
2	0.40	OZ/TON	X	1.00	=	0.40	
3	2.30	OZ/TON	X	1.50	=	3.45	
4	0.00	OZ/TON	X	0.60	=	0.00	
5	1.90	OZ/TON	X	0.60	=	1.14	
6	1.20	OZ/TON	X	0.10	=	0.12	
7	0.60	OZ/TON	X	1.00	=	0.60	
8	0.20	OZ/TON	X	0.10	=	0.02	
9	0.40	OZ/TON	X	0.10	=	0.04	
10	0.00	OZ/TON	X	0.10	=	0.00	
11	0.50	OZ/TON	X	0.10	=	0.05	
12	1.00	OZ/TON	X	0.10	=	0.10	
13	1.60	OZ/TON	X	0.50	=	0.80	
14	0.50	OZ/TON	X	1.50	=	0.75	
15	0.90	OZ/TON	X	1.00	=	0.90	
16	1.20	OZ/TON	X	1.50	=	1.80	
17	0.30	OZ/TON	X	1.50	=	0.45	
				14.30		12.42	14.3' @ .87 OZ/TON AG

TOMBSTONE MINING DISTRICT
COCHISE COUNTY, ARIZONA
ASSAY RESULTS USING UNC, INC. SILVER MAP ASSAY UNIT
PERFORMED BY: JAMES A. BRISCOE, JABA, INC.
DAN ADAMS, WESTERN EXPLORATON

APRIL 6, 1985
PROPERTY OWNER: DENNIS V. ABBL (VALIDITY OF CLAIMS OPEN TO QUESTION)

AREA SAMPLED: MUSTANG VEIN - EXPOSED ROCK IN FRONT OF BULKHEADED DECLINE

DATA ID 2012

SAMPLE NUMBER	ASSAY IN OZ/TON SILVER	X	SAMPLE LENGTH IN FEET	=	SUM	
1	0.90 OZ/TON	X	1.50	=	1.35	
2	0.00 OZ/TON	X	0.10	=	0.00	
3	0.90 OZ/TON	X	2.00	=	1.80	
4	1.20 OZ/TON	X	1.50	=	1.80	
			5.10		4.95	5.1' @ 0.97 OZ/TON AG

TOMBSTONE MINING DISTRICT
COCHISE COUNTY, ARIZONA
ASSAY RESULTS USING UNC, INC. SILVER MAP ASSAY UNIT
PERFORMED BY: JAMES A. BRISCOE, JABA, INC.
DAN ADAMS, WESTERN EXPLORATON

APRIL 6, 1985
PROPERTY OWNER: DENNIS V. ?BBL (VALIDITY OF CLAIMS OPEN TO QUESTION)

AREA SAMPLED: MUSTANG VEIN - CAP MAGAZINE OUTCROP

DATA ID 2013

SAMPLE NUMBER	ASSAY IN OZ/TON SILVER	X	SAMPLE LENGTH IN FEET	=	SUM	
1	0.10 OZ/TON	X	1.50	=	0.15	
2	0.60 OZ/TON	X	1.50	=	0.90	
3	0.00 OZ/TON	X	3.00	=	0.00	
4	0.00 OZ/TON	X	1.00	=	0.00	
5	1.20 OZ/TON	X	1.50	=	1.80	
6	1.70 OZ/TON	X	0.10	=	0.17	1.8' @ 1.09 OZ/TON AG
7	3.00 OZ/TON	X	0.10	=	0.30	
8	2.90 OZ/TON	X	0.10	=	0.29	
			8.80		3.61	8.8' @ 0.41 OZ/TON AG

Mustang Mine area working from S to N.

DATA ID # 2004

DATA NUMBER	ASSAY	ELEMENT	CD	TIME (SECS)	DEPTH (FT)
1	1.5 OZ/TON	SILVER	1	60.0	0.0
2	0.9 OZ/TON	SILVER	1	60.0	0.0
3	0.0 OZ/TON	SILVER	1	60.0	0.0
4	1.1 OZ/TON	SILVER	1	60.0	0.0
5	1.1 OZ/TON	SILVER	1	60.0	0.0
6	0.9 OZ/TON	SILVER	1	60.0	0.0
7	0.0 OZ/TON	SILVER	1	60.0	0.0
8	0.0 OZ/TON	SILVER	1	60.0	0.0
9	1.2 OZ/TON	SILVER	1	60.0	0.0
10	0.6 OZ/TON	SILVER	1	60.0	0.0
11	0.7 OZ/TON	SILVER	1	60.0	0.0
12	0.0 OZ/TON	SILVER	1	60.0	0.0
13	1.1 OZ/TON	SILVER	1	60.0	0.0
14	2.7 OZ/TON	SILVER	1	60.0	0.0
15	3.7 OZ/TON	SILVER	1	60.0	0.0
16	0.3 OZ/TON	SILVER	1	60.0	0.0
17	1.3 OZ/TON	SILVER	1	60.0	0.0
18	0.1 OZ/TON	SILVER	1	60.0	0.0

DATA ID # 2005

DATA NUMBER	ASSAY	ELEMENT	CD	TIME (SECS)	DEPTH (FT)
1	3.9 OZ/TON	SILVER	1	60.0	0.0
2	1.6 OZ/TON	SILVER	1	60.0	0.0
3	1.5 OZ/TON	SILVER	1	60.0	0.0
4	1.7 OZ/TON	SILVER	1	60.0	0.0
5	0.0 OZ/TON	SILVER	1	60.0	0.0
6	0.6 OZ/TON	SILVER	1	60.0	0.0
7	0.7 OZ/TON	SILVER	1	60.0	0.0
8	2.0 OZ/TON	SILVER	1	60.0	0.0
9	0.8 OZ/TON	SILVER	1	60.0	0.0
10	1.5 OZ/TON	SILVER	1	30.0	0.0
11	2.2 OZ/TON	SILVER	1	30.0	0.0
12	0.0 OZ/TON	SILVER	1	30.0	0.0
13	0.0 OZ/TON	SILVER	1	30.0	0.0
14	0.6 OZ/TON	SILVER	1	29.0	0.0

MUSTANG VEIN

DATA ID # 2006

DATA NUMBER	ASSAY	ELEMENT	CD	TIME (SECS)	DEPTH (FT)
1	1.6 OZ/TON	SILVER	1	60.0	0.0
2	1.3 OZ/TON	SILVER	1	60.0	0.0
3	0.0 OZ/TON	SILVER	1	60.0	0.0
4	0.3 OZ/TON	SILVER	1	60.0	0.0
5	0.2 OZ/TON	SILVER	1	60.0	0.0
6	0.0 OZ/TON	SILVER	1	60.0	0.0
7	0.4 OZ/TON	SILVER	1	60.0	0.0
8	0.7 OZ/TON	SILVER	1	60.0	0.0
9	0.0 OZ/TON	SILVER	1	60.0	0.0
10	0.1 OZ/TON	SILVER	1	60.0	0.0
11	0.7 OZ/TON	SILVER	1	60.0	0.0
12	0.0 OZ/TON	SILVER	1	60.0	0.0
13	0.0 OZ/TON	SILVER	1	60.0	0.0
14	1.7 OZ/TON	SILVER	1	60.0	0.0
15	1.2 OZ/TON	SILVER	1	60.0	0.0
16	1.3 OZ/TON	SILVER	1	60.0	0.0
17	1.7 OZ/TON	SILVER	1	60.0	0.0
18	0.8 OZ/TON	SILVER	1	60.0	0.0
19	1.7 OZ/TON	SILVER	1	60.0	0.0
20	0.8 OZ/TON	SILVER	1	60.0	0.0
21	3.1 OZ/TON	SILVER	1	60.0	0.0
22	2.3 OZ/TON	SILVER	1	60.0	0.0
23	5.0 OZ/TON	SILVER	1	60.0	0.0
24	1.8 OZ/TON	SILVER	1	60.0	0.0
25	0.9 OZ/TON	SILVER	1	60.0	0.0

MUSTANG VEIN

DATA ID # 2007

DATA NUMBER	ASSAY	ELEMENT	CD	TIME (SECS)	DEPTH (FT)
1	0.0 OZ/TON	SILVER	1	60.0	0.0
2	1.1 OZ/TON	SILVER	1	60.0	0.0
3	1.7 OZ/TON	SILVER	1	60.0	0.0
4	0.8 OZ/TON	SILVER	0	60.0	0.0
5	0.0 OZ/TON	SILVER	1	60.0	0.0
6	0.4 OZ/TON	SILVER	1	60.0	0.0
7	1.6 OZ/TON	SILVER	0	60.0	0.0

MUSTANG VEIN

DATA ID # 2008

DATA NUMBER	ASSAY	ELEMENT	CD	TIME (SECS)	DEPTH (FT)
1	0.1 OZ/TON	SILVER	1	60.0	0.0
2	0.8 OZ/TON	SILVER	1	60.0	0.0
3	0.9 OZ/TON	SILVER	1	60.0	0.0
4	0.1 OZ/TON	SILVER	1	60.0	0.0
5	1.3 OZ/TON	SILVER	1	60.0	0.0
6	0.0 OZ/TON	SILVER	1	60.0	0.0
7	0.1 OZ/TON	SILVER	1	60.0	0.0
8	0.0 OZ/TON	SILVER	1	60.0	0.0
9	0.1 OZ/TON	SILVER	1	60.0	0.0
10	1.7 OZ/TON	SILVER	1	60.0	0.0
11	0.9 OZ/TON	SILVER	1	60.0	0.0
12	0.5 OZ/TON	SILVER	1	60.0	0.0
13	0.0 OZ/TON	SILVER	1	60.0	0.0
14	0.5 OZ/TON	SILVER	1	60.0	0.0
15	1.3 OZ/TON	SILVER	1	60.0	0.0
16	1.2 OZ/TON	SILVER	1	60.0	0.0
17	0.6 OZ/TON	SILVER	1	60.0	0.0
18	0.0 OZ/TON	SILVER	1	60.0	0.0
19	0.7 OZ/TON	SILVER	1	60.0	0.0
20	2.0 OZ/TON	SILVER	1	60.0	0.0
21	0.9 OZ/TON	SILVER	1	60.0	0.0
22	0.2 OZ/TON	SILVER	1	60.0	0.0
23	0.6 OZ/TON	SILVER	1	60.0	0.0
24	1.0 OZ/TON	SILVER	1	60.0	0.0
25	2.1 OZ/TON	SILVER	1	60.0	0.0
26	2.4 OZ/TON	SILVER	1	60.0	0.0
27	1.5 OZ/TON	SILVER	1	60.0	0.0
28	1.4 OZ/TON	SILVER	1	60.0	0.0
29	0.0 OZ/TON	SILVER	1	60.0	0.0
30	0.0 OZ/TON	SILVER	1	60.0	0.0

MUSTANG VEIN

DATA ID # 2009

DATA NUMBER	ASSAY	ELEMENT	CD	TIME (SECS)	DEPTH (FT)
1	0.9 OZ/TON	SILVER	1	60.0	0.0
2	2.0 OZ/TON	SILVER	1	60.0	0.0
3	1.1 OZ/TON	SILVER	1	60.0	0.0
4	2.0 OZ/TON	SILVER	1	60.0	0.0
5	0.3 OZ/TON	SILVER	1	60.0	0.0
6	0.3 OZ/TON	SILVER	1	60.0	0.0
7	2.9 OZ/TON	SILVER	1	60.0	0.0

MUSTANG VEIN

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DATA ID # 2010

DATA NUMBER	ASSAY	ELEMENT	CD	TIME (SECS)	DEPTH (FT)
1	1.4 OZ/TON	SILVER	1	60.0	0.0
2	1.6 OZ/TON	SILVER	1	60.0	0.0
3	1.1 OZ/TON	SILVER	1	60.0	0.0
4	0.0 OZ/TON	SILVER	1	60.0	0.0
5	1.1 OZ/TON	SILVER	1	60.0	0.0
6	0.0 OZ/TON	SILVER	1	60.0	0.0
7	1.2 OZ/TON	SILVER	1	60.0	0.0
8	0.9 OZ/TON	SILVER	1	60.0	0.0
9	0.9 OZ/TON	SILVER	1	60.0	0.0
10	0.0 OZ/TON	SILVER	1	60.0	0.0
11	1.7 OZ/TON	SILVER	1	60.0	0.0
12	3.5 OZ/TON	SILVER	1	60.0	0.0
13	1.5 OZ/TON	SILVER	1	60.0	0.0
14	0.7 OZ/TON	SILVER	1	60.0	0.0
15	0.6 OZ/TON	SILVER	1	60.0	0.0

MUSTANG VEIN

DATA ID # 2011

DATA NUMBER	ASSAY	ELEMENT	CD	TIME (SECS)	DEPTH (FT)
1	0.6 OZ/TON	SILVER	1	60.0	0.0
2	0.4 OZ/TON	SILVER	1	60.0	0.0
3	2.3 OZ/TON	SILVER	1	60.0	0.0
4	0.0 OZ/TON	SILVER	1	60.0	0.0
5	1.9 OZ/TON	SILVER	1	60.0	0.0
6	1.2 OZ/TON	SILVER	1	60.0	0.0
7	0.6 OZ/TON	SILVER	1	60.0	0.0
8	0.2 OZ/TON	SILVER	1	60.0	0.0
9	0.4 OZ/TON	SILVER	1	60.0	0.0
10	0.0 OZ/TON	SILVER	1	60.0	0.0
11	0.5 OZ/TON	SILVER	1	60.0	0.0
12	1.0 OZ/TON	SILVER	1	60.0	0.0
13	1.6 OZ/TON	SILVER	1	60.0	0.0
14	0.5 OZ/TON	SILVER	1	60.0	0.0
15	0.9 OZ/TON	SILVER	1	60.0	0.0
16	1.2 OZ/TON	SILVER	1	60.0	0.0
17	0.3 OZ/TON	SILVER	1	60.0	0.0

MUSTANG VEIN

:ATA ID # 2012

DATA NUMBER	ASSAY	ELEMENT	CD	TIME (SECS)	DEPTH (FT)
1	0.9 OZ/TON	SILVER	1	60.0	0.0
2	0.0 OZ/TON	SILVER	1	60.0	0.0
3	0.9 OZ/TON	SILVER	1	60.0	0.0
4	1.2 OZ/TON	SILVER	1	60.0	0.0

MUSTANG VEIN

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DATA ID # 2013

DATA NUMBER	ASSAY	ELEMENT	CD	TIME (SECS)	DEPTH (FT)
1	0.1 OZ/TON	SILVER	1	60.0	0.0
2	0.6 OZ/TON	SILVER	1	60.0	0.0
3	0.0 OZ/TON	SILVER	1	60.0	0.0
4	0.0 OZ/TON	SILVER	1	60.0	0.0
5	1.2 OZ/TON	SILVER	1	60.0	0.0
6	1.7 OZ/TON	SILVER	1	60.0	0.0
7	3.0 OZ/TON	SILVER	1	49.0	0.0
8	2.9 OZ/TON	SILVER	1	52.0	0.0

MUSTANG VEIN

Air Photo Notes/Data

AERIAL PHOTO CORDINATES

JAMES A. BRISCOE

PHOTO DATE: 6-18-85 CAS # 850618.3
PHOTO SCALE 1:6000

STRIP RESIDUALS

POINT ID#		X	Y	Z
305	351	-0.01	0.01	-0.04
305	352	0.01	-0.02	-0.00
305	9010	-0.01	0.05	0.02

JAMES A. BRISCOE

CAS # 850618.3

CONTROL RESIDUALS

POINT ID#	CAS	J.A.B	X	Y	Z
FLIGHT LINE # 3					
304	341				0.07
304	342		-0.00	0.00	0.00
304	6002				0.01
304	5001	CP			-0.01
304	9003	S-1	-0.46	0.47	-0.58
304	9004	S-1A	0.35	0.31	0.39
304	5002	CC			-0.06
304	9002	SEC.C	-0.03	-0.47	-0.14
304	4644				-0.05
304	9005	S-18	0.60	0.08	0.54
304	4001	AUST			0.23
304	9016	S-5A	0.26	0.56	-0.03
305	9010	S-3A	0.50	-0.46	-0.03
305	9017	S-5B	0.07	0.47	-0.34
305	5010				1.00
305	9015	S-5	-0.44	0.30	-0.32
305	4002				-0.62
305	9014	S-4B	-0.44	-0.40	-0.00
305	5015	CC			-0.08
305	9012	S-4	-0.41	-0.86	0.19
305	5016				-0.01
305	61				-0.14
305	362		-0.00	0.00	0.00
RMS ERROR			0.398	0.477	0.346

JAMES A. BRISCOE

CAS # 850618.3

COORDINATES

POINT ID #	CAS	J.A.B	EASTING	NORTHING	ELEVATION
FLIGHT LINE # 3					
304	341		516800.30	255373.10	4395.50
304	342		516646.58	253724.36	4516.40
304	6002		516574.08	252254.53	4519.00
304	5001	CP	516575.90	252295.11	4513.82
304	9003	S-1	517664.97	253741.20	4847.87
304	9004	S-1A	517500.80	254037.81	4819.00
304	5002	CC	517145.70	253820.89	4679.50
304	9002	SEC.C	517191.66	255056.86	4429.30
304	4644		517856.82	252241.61	4644.50
304	9005	S-1B	518207.60	252758.59	4709.00
304	4001	AUST	517921.74	253990.25	4739.40
304	9016	S-5A	518199.15	254259.26	4617.50
305	9010	S-3A	518558.47	251667.30	4556.83
305	9017	S-5B	518954.00	254255.74	4534.50
305	5010		519530.29	255056.27	4497.50
305	9015	S-5	519507.88	254929.75	4510.29
305	4002		519554.97	254430.83	4497.50
305	9014	S-4B	519780.69	253804.54	4516.95
305	5015	CC	520530.98	254041.61	4494.20
305	9012	S-4	520094.67	253068.37	4563.50
305	5016		520449.45	251800.14	4478.50
305	61		518541.65	253036.10	4620.20
305	362		520439.67	253336.02	4515.30
304	343		516846.57	252012.97	4591.57
304	6001	DH	516553.99	252274.55	4511.83
304	5102	OXY	516227.01	254651.02	4365.88
304	6101	SH	516150.51	254707.63	4373.22
304	5003	OXY	516464.02	255420.49	4401.78
304	6003	SH	516492.68	255866.72	4445.23
304	5104		518085.47	253030.99	4691.95
304	5005	SH	518514.42	254401.58	4549.04
304	1		518449.15	253985.88	4574.94
304	2		518447.00	253957.89	4574.54
304	3		518427.11	253943.53	4575.89
304	4		518425.31	253902.48	4582.05
304	5	S-94	518416.96	253878.67	4584.83
304	6		518403.21	253989.19	4584.04
304	7		518332.57	253901.76	4604.64
304	8		518300.15	253900.49	4608.73
304	9		518268.36	253885.57	4618.07
304	10		518280.67	253934.95	4617.11
304	11	S-31	518291.64	253956.91	4611.07
304	12	S-26	518301.90	253980.19	4609.45
304	13	S-25	518316.25	253999.53	4604.40
304	14	S-24	518327.06	254022.55	4600.27
304	15	S-30	518281.25	254040.56	4612.48
304	16	S-29	518288.38	254008.50	4614.04
304	17	S-27	518277.03	253985.22	4615.48
304	18		518280.37	253934.55	4617.41
304	19		518268.96	253885.47	4617.85
304	20		518289.18	253764.01	4615.56
304	21		518289.18	253734.24	4613.80

JAMES A. BRISCOE

CAS # 850618.3

COORDINATES

POINT ID # CAS		J.A.B	EASTING	NORTHING	ELEVATION
304	22		518213.87	253746.76	4637.16
304	23		518225.50	253768.75	4634.79
304	24		518232.48	253792.85	4633.74
304	25		518231.12	253818.88	4632.88
304	26		518235.98	253895.92	4630.70
304	27		518247.11	253944.36	4626.17
304	28		518197.82	253814.41	4643.70
304	29		518186.89	253842.51	4647.84
304	30		518173.81	253820.39	4652.72
304	31		518161.61	253799.57	4656.51
304	32	S-89	518127.97	253499.14	4649.55
304	33	S-82	518104.49	253551.86	4657.60
304	34		518088.82	253517.13	4660.34
304	35	S-84	518085.49	253505.57	4661.72
304	36		518082.48	253479.46	4662.86
304	37		518083.35	253451.44	4664.00
304	6102	S-83	518093.64	253529.47	4659.15
304	6103		518081.78	253429.80	4666.08
304	6104	SH	518162.61	253540.30	4636.38
304	38	T-3	518551.42	253340.03	4587.40
304	39	T-2	518507.72	253314.80	4592.13
304	40	T-1	518480.67	253349.00	4594.89
304	41	S-4	518451.62	254259.34	4558.07
304	42	S-11	518432.06	254238.12	4557.61
304	43	S-7	518395.75	254278.90	4570.50
304	44	S-6	518380.41	254212.04	4574.32
304	45	S-5	518380.67	254201.66	4574.95
305	0		518693.50	253412.00	7810.21
305	351		518525.48	255397.18	4473.51
305	352		518572.70	253602.37	4555.25
305	5004	SH	518939.93	252998.59	4576.27
305	6010	TS-2	519184.85	255895.45	4484.81
305	6011		519210.35	255854.00	4484.07
305	5006	SH	519232.13	255805.69	4483.60
305	5007		519266.71	255788.18	4480.68
305	6012	TS-3	519811.34	255927.79	4455.14
305	6013	TS-4	519738.09	255780.58	4464.28
305	5009	SH	519986.43	255838.60	4468.22
305	5008	SH	519866.68	255659.81	4474.04
305	5014		520167.78	255096.12	4466.44
305	5013	SH	519850.35	255221.35	4489.20
305	5011		519849.26	255052.48	4488.63
305	6017	SH	519772.45	254998.63	4492.22
305	46		519810.08	255004.81	4490.56
305	47	M-18	519829.43	255021.66	4489.79
305	48	M-9	519869.81	255052.86	4487.88
305	49	M-7	519830.83	255074.83	4489.41
305	50	M-8	519813.01	255097.97	4489.89
305	51		519800.54	255115.31	4489.99
305	6008	M-4	519189.40	254571.35	4497.52
305	52	M-3	519203.56	254551.82	4497.75
305	53	M-2	519223.96	254515.85	4500.78
305	6009	M-1	519241.27	254486.11	4502.07
305	2001		520600.49	253577.57	4501.39

JAMES A. BRISCOE

CAS # 850618.3

COORDINATES

POINT ID #	CAS	J.A.B	EASTING	NORTHING	ELEVATION
305	5017	5017	520977.73	252278.46	4471.33
305	6007	T-9	518655.63	253399.70	4574.27
305	6006	T-6	518720.74	253337.73	4573.92
305	6004	T-14	518714.80	253434.43	4573.28
305	6005	T-10	518798.61	253349.44	4572.41
305	54	T-8	518676.44	253378.55	4574.43
305	55	T-7	518698.63	253358.09	4573.87
305	56	T-5	518742.95	253317.47	4574.07
305	57	T-4	518763.94	253295.83	4573.62
305	58	T-11	518778.70	253370.09	4572.72
305	59	T-12	518756.61	253392.33	4573.10
305	60	T-13	518736.21	253412.68	4573.32
305	62	M-29	519413.51	254326.01	4502.60
305	63		519383.12	254312.13	4503.54
305	64	M-25	519328.41	254282.34	4504.38
305	65	M-26	519339.52	254258.96	4503.11
305	66	C-16	519612.24	254120.09	4483.22
305	67	C-13	519607.29	254091.60	4483.66
305	68	C-12	519578.81	254104.88	4487.38
305	69	C-10	519566.33	254083.31	4488.36
305	70	C-11	519603.47	254064.88	4484.90
305	71	C-13	519607.19	254091.40	4483.66
305	72	C-15	519635.45	254078.36	4483.64
305	73	C-9	519570.15	254010.16	4497.29
305	74	C-8	519542.33	253968.51	4500.52
305	75		519531.75	253947.74	4501.08
305	76	C-7	519520.95	253923.86	4502.20
305	77	C-3	519519.54	253870.83	4502.38
305	78	C-4	519554.77	253851.22	4499.03
305	79	C-2	519572.63	253899.54	4494.29
305	81	C-1	519546.70	253911.23	4496.14
305	82	C-5	519492.94	253830.27	4505.91
305	83	C-6	519527.08	253809.36	4503.55
305	361		520492.46	255125.30	4456.94
305	363		520529.54	252153.13	4508.07

Tombstone Silver Mines, Inc.
Joe Graves Drill Hile Coordinates

NAME (Arbitrary - given by Cooper Aerial)	E.	N.	Elevation
1	518,459.0	254,283.0	4556.8
2	518,398.3	254,196.8	4558.5
3	518,415.5	254,243.4	4557.3
4	518,473.8	254,329.1	4553.7
5	518,453.0	254,338.6	4555.0
6	440.3	4,316.3	4555.8
7	468.5	4,253.6	4558.3
8	370.6	4,154.9	4569.6
9	376.2	4,129.5	4570.2
10	318.8	4,144.0	4570.6
11	419.2	4,350.7	4557.5
12	412.1	4,326.9	4556.1
13	408.2	4,301.0	4556.6
14	247.0	395.8	4625.1
15	281.2	3,933.0	4616.6
16	278.3	253,908.8	4618.0
17	269.2	3,884.1	4617.2
18	265.4	3,860.8	4616.9
19	518,269.5	253,835.2	4616.0
20	293.9	3,875.6	4610.2
21	301.5	253,899.1	4607.2
22	306.8	3,923.4	4603.0
23	518,248.9	3,942.1	4625.7
24	234.9	3,893.8	4630.7
25	237.1	3,868.5	4629.4
26	424.8	253,947.4	4576.12
27	518,447.4	253,955.7	4579.01
28	469.0	3,969.7	4571.78
29	225.1	3,846.3	4632.8
30	243.9	3,837.5	4626.6
31	518,292.33	253,645.66	4605.7
32	289.5	3,761.24	4614.7
33	288.75	3,731.24	4613.6

34	139.61	3,647.13	4655.8
35	128.54	3,622.84	4656.9
36	121.11	3,599.03	4657.2
37	112.84	3,575.83	4657.8
38	103.76	3,552.01	4658.1
39	093.07	3,528.59	4660.4
40	084.62	3,505.10	4663.8
41	084.6	3,481.0	4663.0
42	084.43	3,454.53	4664.5
43	127.56	3,498.92	4649.84
44	105.61	3,511.16	4650.69
45	134.51	3,548.77	4651.19
46	160.5	3,795.8	4656.0
47	173.5	3,817.2	4652.0
48	186.3	3,838.8	4647.4
49	518,198.0	253,811.5	4643.0
50	230.7	3,816.1	4632.6
51	232.6	3,789.7	4633.5
52	226.7	3,767.8	4633.2
53	214.8	3,742.9	4636.6
54	196.4	3,724.6	4640.3
55	183.1	3,705.7	4645.0
56	167.2	3,686.5	4648.4
57	184.7	3,676.7	4640.0
58	199.6	3,697.1	4637.0
59	214.4	3,717.5	4633.7
60	230.6	3,739.3	4628.4
61	241.2	3,758.9	4626.7
62	248.9	3,781.1	4625.9
63	249.2	3,809.0	4623.8
64	203.6	3,618.23	4629.49
65	163.15	3,610.24	4647.4
66	159.49	3,586.25	4643.5
67	221.39	253,641.7	4630.33
68	279.76	3,613.58	4607.70
69	519,292.8	254,513.6	4510.0

70	519,818.0	5,093.1	4589.6
71	519,849.3	5,036.6	4488.3
72	768.0	5,020.6	4479.2
73	783.8	5,033.9	4477.6
74	797.3	5,022.5	4477.5
75	770.2	5,048.8	4480.9
76	519,756.0	5,062.9	4479.6
77	786.5	5,067.2	4485.8
78	833.0	5,135.9	4489.2
79	810.2	255,005.9	4490.6
80	519,118.4	3,973.28	4510.54
81	519,160.89	254,001.65	4508.01
82	139.37	4,022.96	4523.41
83	296.53	4,242.93	4504.46
84	367.22	4,319.94	4505.57
85	519,382.86	4,301.05	4503.80
86	36.8	3,889.7	4516.30
87	174.7	253,914.7	4512.20
88	519,146.7	3,944.5	4511.1

114-1

James A. Briscoe & Associates, Inc.

Exploration Consultants:
Base and Precious Metals/Geologic and Land Studies/Regional and Detail Projects

James A. Briscoe
Registered Professional Geologist

Thomas E. Waldrip, Jr.
Geologist/Landman

June 28, 1985

Lyle Slater
Cooper Aerial Survey Co.
1692 W. Grant Road
Tucson, AZ 85745

RE: Notes on triangulation grid, Tombstone Mining District

Dear Lyle:

Enclosed are some hand written notes by surveyor Joe Graves, relating to elevation control in the Tombstone area.

Hope these are of some help.

Very truly yours,

James A. Briscoe

JAB/ms

Enclosure

5701 East Glenn Street, Suite 120/Tucson, Arizona 85712/602•721-1375

POINTS PANELED AS OF 6-11-85
(All points at servcaps or stones in place unless otherwise noted)

TRIANGULATION GRID

Coords and Elevs. submitted under separate cover.

Point No.		Dist. from Top of cap to ground	Remarks
5-1		0.0 ft.	
-1A		0.35 ft.	
-1B		0.7	
-2		0.0	
-2A		0.4	
-2B		0.4	
-3		0.0	
3A		0.3	
3B		0.3	
-4		0.0	
4A		0.4	
4B		0.3	
5-5		0.0	
5A		0.85	
5B		0.5	
W Cor 16	Rock	0.6	
W Cor 16	"	0.4	
E Cor 16	"	0.8	
E Cor 16		0.0	No rock in place & No Survcap
North 1/4 16	[illegible]	0.4	

23.70

OTHER POINTS

Point	Dist Top to Ground	Remarks
E 1/4 10	0.3	
SE 10	0.6	
S 1/4 10	0.3	
W Cor City of Tosten	0.6	N & E Panels only Survcap by Wilson
Cor 9 & 10	Ground	No stone or Survcap
~~E 1/4~~ S-30	0.4	SE Cor project
S-31	0.2	See map
S-32	0.6	Below old house
S-33	0.7	Near trenches & West of ranch bldgs.
-34	Ground	Center 2"x2" of five 2"x2" in ⁘ pattern — No servcap.
-35	0.3	Servcap
-36	0.65	± 300' NW of Ruins
-37	0.6	On top small hill
-38	0.35	@ Lowell diggings
7 & 8	0.4	Rock — did not find 1/4 Cor stone
8 & 17	0.3	~~Stone~~ 3 panels E W & N under flagen
17 & 20	1.0'	Top stone to ground
W 17	—	Rock mound - didn't find stone in place or set panel.
17 & 18	—	Searched but not stone or panel.
W 17	0.7	Stone in place on fence line. Marked w/ N, S, & E panels.

May 11, 1985
T 5 :05

Jim;

I discussed the boundries for Cooper's topo coverage of the area with Charlie Escapule. We agreed that the 1" = 200' should cover:

Sections 8, 9, 10
Sections 15, 16, 17
N½ Sections 20, 21, 22
This area is 2½ mi N-S & 3 mi. E-W.

The minimum area to fly for the 1" = 100' should be from the north end of the Free Coinage to the south section 16 line, E-W should be from the west end of the Las Vegas to the east line of Section 16.

As I mentioned over the phone I can get state coords from the County Surveyor for section corners & ¼ corners. If we have too, I can run in spirit levels to a few outlying points.

We have plenty of control in the area of the Escapule patterts & in the SE ~~1/4~~ of 16 around the Randolph & Sunset patents.

Charlie said he can get coords &
elevs. in the area of the Silver Cable
& Baker patents (Petska's project).
TEI had Wickware put in
control in their project area of
the Fox. This will be available
to us via the Fox owners.
Give a call if you need
more info before Wed.

Joel Graun

All Moria Survey except noted as TSM.

ROBERT KENT WICKWARE, INC
1135 TIMBER VALLEY ROAD • COLORADO SPRINGS, COLORADO 80907
(303) 599-7060
United States Mineral Surveyor
Registered Land Surveyors

☐ OFFICE
☐ FIELD
☐ DRAFTING
☐ BOOKKEEPING
☐ MISCELLANEOUS

MESSAGE	REPLY

TO

PROJECT NO.: 84015 FOLDER NO.:
PROJECT NAME: STATE OF MAINE
STATE: ARIZONA COUNTY: COCHISE
LOCATION AREA: TOMBSTONE
CLIENT: TOMBSTONE SILVER MINES, INC.
CLASS. TO CHARGE TO: CONTRACT NO.:

DATE OUT: 15OCT84 DATE IN:

DATE 1.4 5.7

	East	North	
	517195.6583	249773.3242	✓ phone conv. w/ Wickware 10/16/84
0S022E16SWC	~~517,159.4282~~ X	~~249,756.3713~~ Y	4,422.0768 Z
0S022E16SEC	522,506.3793 X	249,749.5221 Y	4,550.5319 Z
N¼ Cor Section 16	519,848.60	255,053.32	4489.11 } by stadia survey

6.7
55.4
1.6

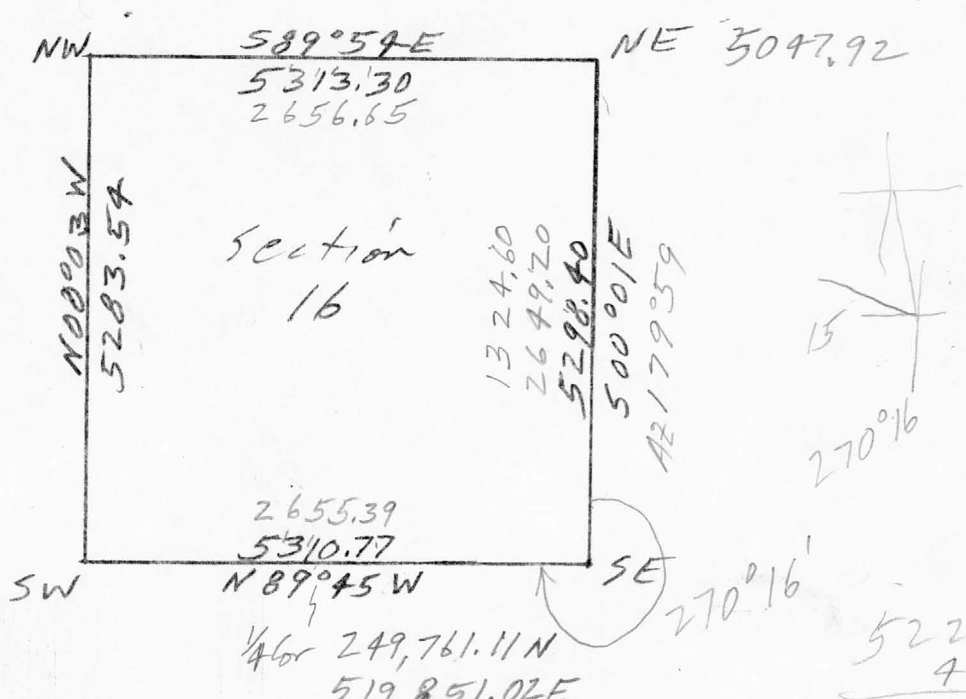
cc; file, memo
BY

SIGNED

INSTRUCTIONS TO SENDER:
KEEP PINK COPY. 2. SEND WHITE AND YELLOW COPIES INTACT.

INSTRUCTIONS TO RECEIVER:
1. WRITE REPLY. 2. KEEP YELLOW COPY, RETURN WHITE COPY TO SENDER.

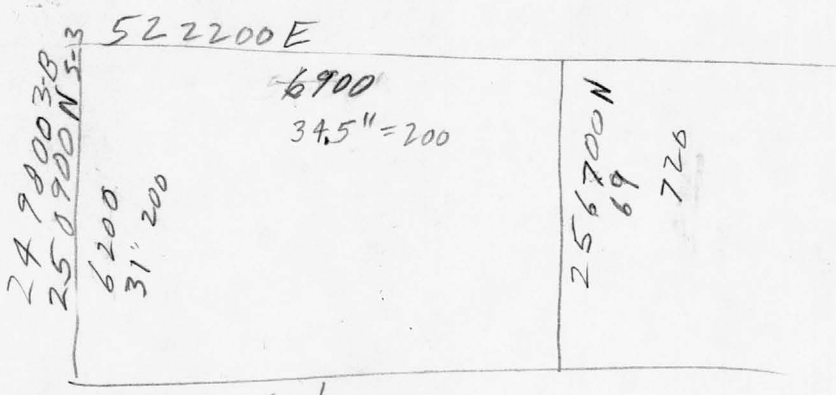
Calc. from Coords:



522500
40
518500

ATION I.D.	EASTING (X)	NORTHING (Y)	ELEVATION (Z)	COMMENTS and/or PERTINENT NOT
0S022E16NEC	522,504.9627	255,047.9223	4,554.2727	scribed stone
022E16NWC	517,191.6654	255,056.8681	4,429,3387	scribed stone
S-1	517,664.9731 (E 5313.29 —??)	253,741.2056	4,847.8798 ✓	brass cap IN CONCRETE
1A ✓	517,500.8064	254,037.8160	4,820.2631 ✓	rebar
✓ 1-B	518,207.6061	252,758.5922	4,710.6293 ✓	rebar
2 ✓	522,143.6041	256,634.0412	4,702.5901	brass cap
2A ✓	521,985.7492	255,037.4525	4,523.8861	rebar
✓ 2B	521,149.9323	255,789.2976	4,480.5083	rebar
3 ✓	516,865.7126	250,982.8324	4,758.8062	brass cap
3A ✓	518,558.4776	251,667.3067	4,556.8379	rebar
3B ✓	516,011.5123	249,816.5773	4,437.6561	rebar~~*In field labeled S-1A, designation per Joe Graves~~
4 ✓	520,094.6792	253,068.3748	4,563.5008	brass cap
4A ✓	519,493.0851	253,254.9625	4,542.8356	rebar
4B ✓ 4B	519,780.6940	253,804.5438	4,516.9561	rebar
S-5 ✓ S-5	519,507.8883	254,929.7581	4,510.2902	brass cap
5A ✓	518,199.1532	254,259.2632	4,617.5069 ✓	rebar
S 5B ✓	518,954.0017	254,255.7450	4,534.5770 ✓	rebar

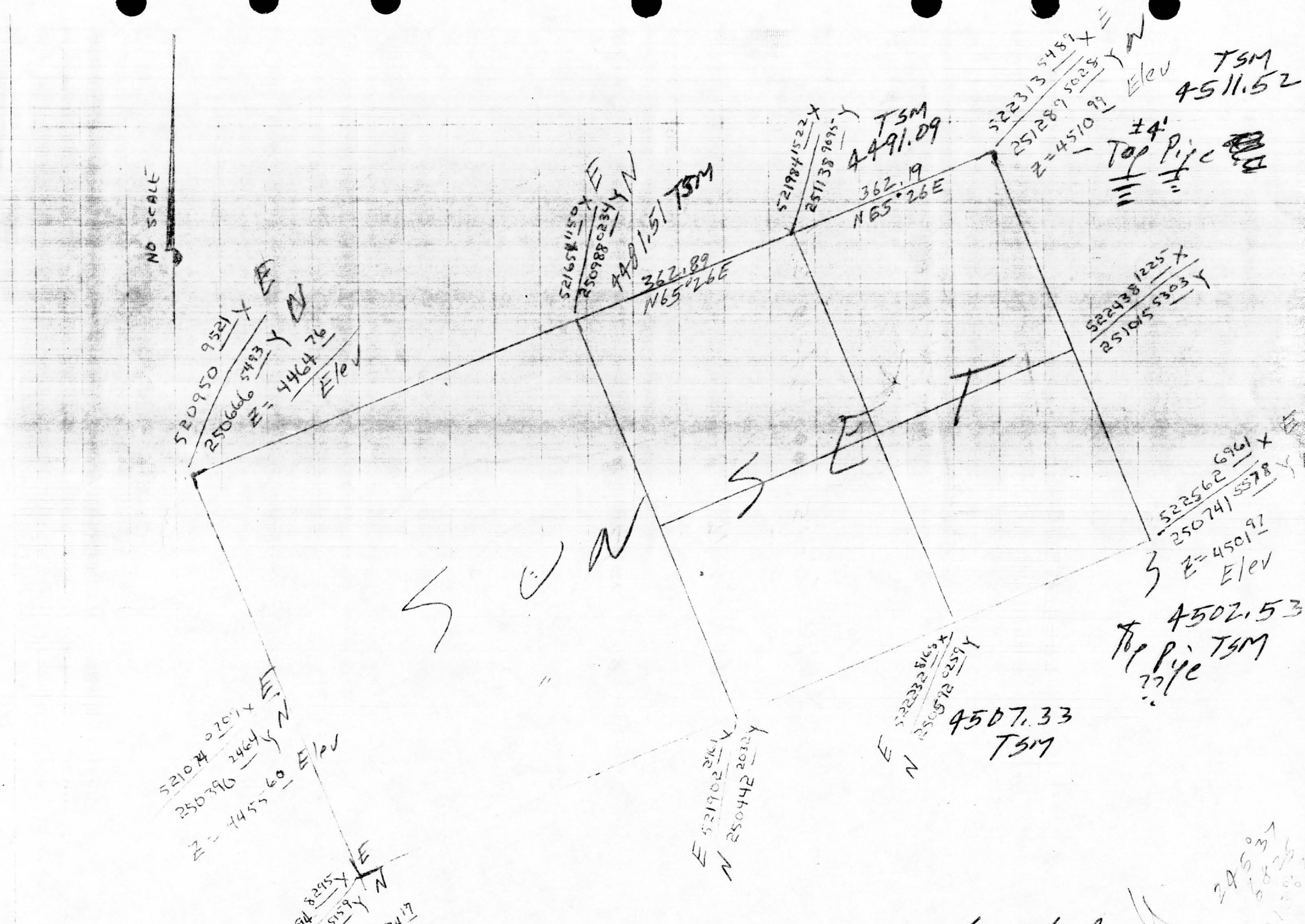
MAKE 1" = 400' plan



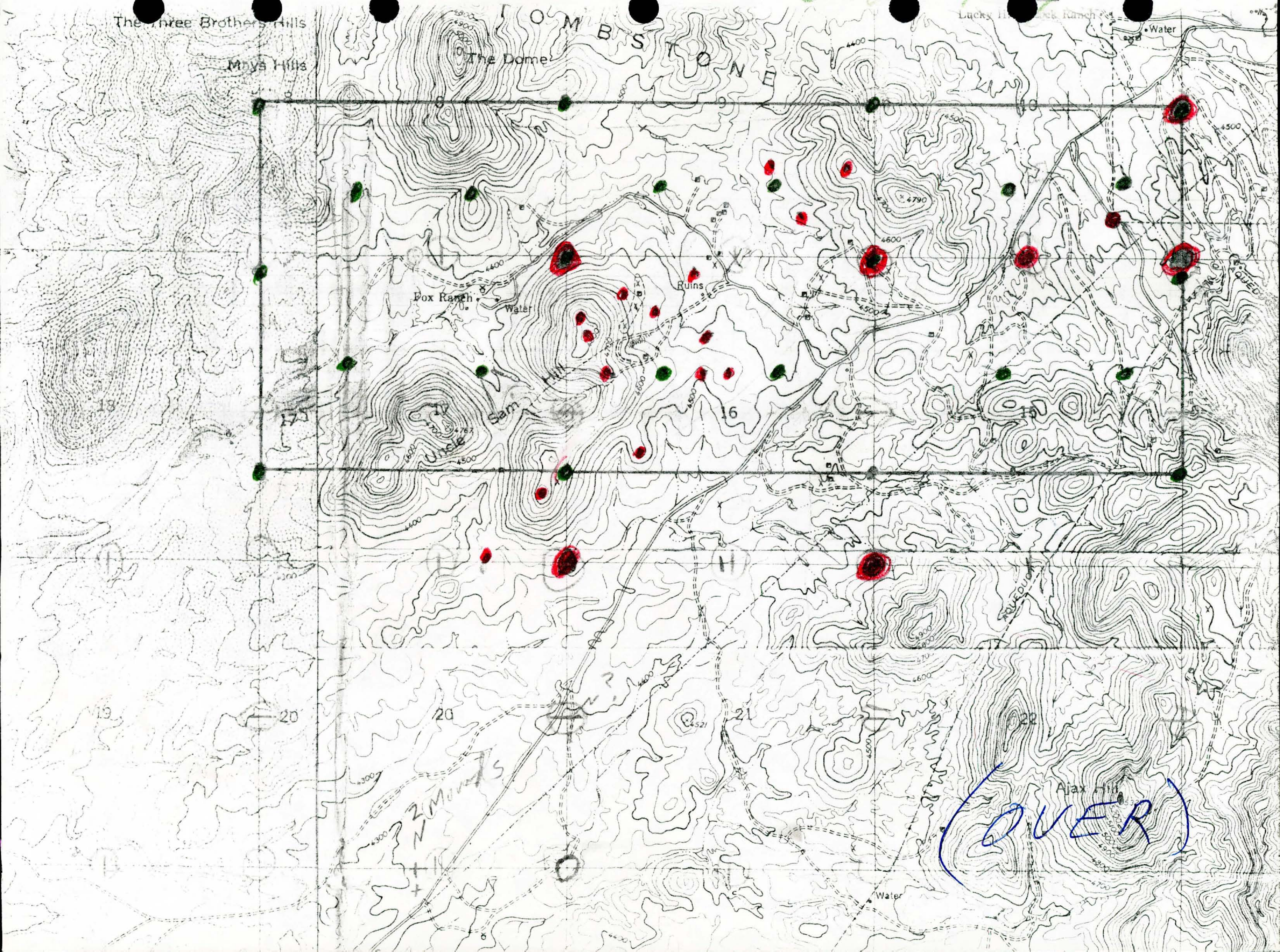
S-3 516800E
3B - 516000
INCLUDES

Moria Surveying

United States Mineral Surveyors • Registered Land Surveyors



All Moria Survey except noted as TSM.



TOMBSTONE
The Three Brothers Hills
Mays Hills
The Dome
Fox Ranch
Water
Ruins
Uncle Sam Hill
Ajax Hill
(OVER)

FIELD NOTES
Septeber 13, 1985

Tombstone Silver Mines, Inc.
Project 114-1
State of Maine mine area, NW1/4 Section 16
Tombstone Mining District, Cochise County, Arizona

NOTES CONCERNING 50 SCALE COLOR PHOTOGRAPHY

Photo #1 (the eastern 30 x 30 print) south of the State of Maine trailer headquarters. GON 1/9-13-85 - geologic observation note - I am doing mappin on the 1" = 50' scale matched color air photo showing the position of veins and alteration. In the area of GON #1, I can differentiate between altered and fresh cretaceous Uncle Sam Tuff by the following criteria:

1. The fresh tuff forms large boulders and cobbles that are visible on this scale photography.

2. The fresh boulders and cobbles are light tan to grayish in color.

3. Altered ground is a rusty color from iron oxide.

4. The alteration creates clay and sericite so that no boulders are visible on the surface.

5. The porosity caused by the alteration causes increased vegetation growth so that larger trees aligned along the structures are noticeable on careful inspection of the photo. This has been verified by backhoe trenching today along the north trending vegetation alignment trending past the northwest corner of the Escapule State of Maine office trailer and exposed partially by the garbage pit near the clump of trees.

6. Prospect pitting on most of these zones further verifies the presence of alteration. However, detailed contacts showing the - tape inaudible.

GON 2/9-13-85. Time is 6:06 p.m., I have spent essentially all day mapping on the 1" = 50' color photo map. A good part of the day was simply mapping in bull dozer cuts, trenches, waste heaps, roads, and other disturbed areas so I could be sure what was outcrop vs. what had been disturbed by man. The remainder of the time was spent in closely examining by eye sight as well as clip on 1 1/2 or 3X spectical magnifiers - mapping vegetation alignments and alteration patterns using the criteria listed above. During the day, Mike Escapule dug three trenches for me. One was 60' north of the office trailer across the projection of the vegetation alignment vein, which exposed 15' of vein material in the predicted place. The second was along the

Clipper claim boundary fence, 130' south of the office trailer. This cut exposed 25' of vein in the predicted location. We then went over to the projection of the Merrimac #2 pit vein, just northeast of the test pond dike, and cut a trench approximately 120' long in an attempt to expose more of the Merrimac #2 vein. A vein was exposed, but a little father west than I had predicted.

After completing that trench, I had Mike walk the excavator back to trench #2's location, 130' south of the office, as I had notice another vegetation alignment. Only about 25' or 30' west of the first vegetation alignment. Feeling this represented a vein, I had Mike continue the cut, and, indeed, it uncovered about 40' of vein apparently cut as oblique to the strike so it is greater than normal thickness - apparent thickness.

This verified that the large scale color air photo, carefully interpreted, could reveal near surface veins and alteration in this terrain. These veins had not been previously suspected or explored by any trench work or prospects.

In the evening, I have performed some ground reconnaisance, and at the above named location, have further shown that my air photo mapping is accurate in relation to pin pointing the outline of altered zones and veins. To the right of this location is an amoeba-shaped alteration zone approximately 40' long and 20' wide with a protrusion going southwest. On ground examination showed that this was indeed altered and mineralized, though no explanation for its odd shape was apparent. Then, just south of the junk cars 30', a prospect was identified with intense sericitic alteration and very good looking silicification along a vertical trending vein zone 10' wide, as annotated in the field, lying in the center of my photo interpretative alteration zone. This feature is probably the vein tested by the prospect pits to the southeast. It is concluded that this large scale color photo mapping is highly successful and certainly justifies the cost of the photos. It would have been impossible to map and locate the new altered zones on the 50 scale topography. I would estimate the detail of mapping for those things that could have easily been identified is 4 to 10 times faster on the color photo than on the 50 scale topographic sheet. Possibly most importantly, some important features would not have been identified at all on the topographic sheet because of the lack of vertical perspective, i.e. vegetation alignments, the alteration zones and so forth.

Concluded - more color photos of this scale covering the entire area of interest are justified.

FIELD NOTES
September 14, 1985

Time: 8:00 a.m.
GON 1/9-14-85

Western vegetation alignment appears verified to south of the new trench dug yesterday. However, it appears much weaker than the alignment a few yards to the east and fades to the south where it disappears in fresh outcrop. The northwesterly trending vegetation alignment with arrow is also verified. However, it appears to represent a small fracture zone probably 2' or less in width. This may simply be a post mineral fault without alteration along it, though no where is it clearly exposed. The vegetation alignment is strong, but narrow. An apparent spreading of alteration where it intersects the northeasterly trending zone is vague but apparently as mapped on the photo.

Time: 8:16 a.m.
GON 2/9-14-85

A traverse from north to south and then east towards the west indicates gradually increasing alteration towards the Clipper vein. A noticeable increase from essentially fresh to weakly proplytized KUT was noticed approximately 200' east of the central portion of the Clipper vein. A close examination of the 50 scale photo showed that this alteration could also be seen on the photo. Photo characteristics included increase in limonite stain, increase in soil cover with a corresponding decrease in boulder outcrop size - something that could also be noticed easily on the ground. Since the Clipper vein dips westerly, this alteration is in the footwall. An examination of the photos suggests that the hanging wall alteration decreases rapidly, perhaps within 20' to 40' of the vein. Thus, the footwall alteration zone may be up to 100' to 200' wide where the hanging wall alteration is only a few feet to a few tens of feet at most.

Time: 8:43 a.m.
GON 3/9-14-85

Most southerly shaft Clipper vein identified by sample stake I-14, taken 11-8-84 - need to try and find out who took these samples and what results were. Exposed in this shaft, which is caved about 10' to 15' below surface, is strongly argillized (sericitized) KUT dipping 55 degrees northwesterly. The hanging wall contact here is very abrupt going into weakly propylitized KUT within a matter of inches. However, the same dip of shearing and fracturing as that of the vein persists. Within about 6' of the surface, the hanging wall vein contact dips at probably 25 degrees, but this may be due to down slope creep or dissolution of material in the vein resulting in slumping and flattening of the vein. The footwall of the vein is no where exposed, but as noted in the last note, alteration grades downwards into a footwall zone fading throughout a distance of perhaps 200' on the horizontal.

Time: 9:00 a.m.
GON 4/9-14-85

Location: East end of 7' wide 10' deep backhoe trench

At this location, the footwall of the clipper vein can be seen grading rapidly into fresh to weakly chlorotized or propylitized KUT just to the left of the scale an apparent post mineral fault which strikes 163 degrees magnetic and dips 71 degrees west, appears to form the primary foot wall. The strong limonite hematite zone within the altered rock, which I assume to be the approximate pre-mineral footwall of the vein, strikes approximately 145 degrees magnetic and dips 50 degrees northwesterly. This is approximately the same situation as we had in the hanging wall in the caved shaft to the south (GON #3). This spot is represented by a sample stake labled I-11, sampled 11-8-84 (again, we need to determine these results). A photo of this outcrop shows the describe relations the photo number is 25, with a more distant shot being #26.

There is approximately 65' of strong alteration exposed by the trench with another 5' to 10' of weak alteration in the foot wall. The hanging wall is poorly exposed but appears to grade abruptly from strong alteration into weak propylitic alteration, as seen in the shaft to the south - GON #3. More time could be spent mapping fracture directions and alteration intensity in this cut - say at a scale of 1" = 20' or even maybe 1" = 5' or 10'. Because of the report deadline, there is no point in this detailed mapping now. Several other stakes were noted in the bottom of the pit. It appears as though vertical channels may have been chipped rather than across the structure sub-horizontally. This isn't clear from the sample stakes, but it could have been a major error. I would suggest that this needs to be re-sampled under my direction. Silver MAP assaying would be helpful here, though this would also be a good spot to test for trace element distribution - i.e., geochemical, lead, zinc, copper, moly, mercury, arsenic?, antimony?.

FIELD NOTES

September 16, 1985

Time: 9:42
Location: GON 1/9-16-85 in a trench northeast of the office trailer.

At this point, a rhyolite dike, which is a measured 18' wide in the ditch, dips 85 degrees northwest. Ten feet in the hanging wall of the dike is a moderately strong vein approximately 15' wide. The contact of the hanging wall of the dike is shown in photo #27 - a close up. The contact is not particularly broken nor disrupted. The contact appears to be irregular with the dike being somewhat contorted. The dike material itself is rhyolite with maybe 10% zenoliths, which weather out into open holes on the surface. But here where the sub-surface is exposed by the backhoe, it is seen that these holes are zenoliths composed of a soft altered? rock that can be cut out with a pocket knife blade. I don't have acid with me so we can't be sure whether this is carbonate or not, but it appears to be too soft and is probably more likely intensely altered clay from the zenoliths. Slicing and thin section examination of these zenoliths might give some information on rock directly below us, carried upwards by the dike material.

Tracing the dike southeastward shows that the two large bushes form a vegetation line along the upper contact of the dike - an apparent aquaclude, that has accumulated moisture on the upslope side. Further examination shows the large trees to actually be growing in the upper side of the dike near the intersection of the projected vein. The eastern or upslope contact of the dike is very precise, probably within a foot or less. The downslope or northwestern side of the dike is less precise and inferred because of downslope float movement. The intersection of the dike with the north trending vein appears to have made a northerly trending bow in the dike. This may suggest the dike is post or late mineral and that it occupied the softened altered vein zone.

Briscoe (11-19-85)

James A. Briscoe & Associates, Inc.

Exploration Consultants:
Base and Precious Metals/Geologic and Land Studies/Regional and Detail Projects

James A. Briscoe
Registered Professional Geologist

Thomas E. Waldrip, Jr.
Geologist/Landman

November 19, 1985

David A. Thomas
#284 Scottsdale House
4800 N. 68th Street
Scottsdale, AZ 85251

RE: Transmittal of the final draft copy of the geologic report on the Tombstone Mining District and State of Maine area

Dear Dave:

Transmitted with this letter are three copies of what I hope may be the final draft of the report. We are also sending one copy to David Howard in Canada. The report turned out to be 208 pages long, including appendicies.

I have spiral bound these copies and would hope that everyone would read and make penciled comments and mark any typographical errors that may have crept through. There are some corrections that need to be made on the computer drafted geologic and property map, Pages 79 and 80 - as soon as we decide what is happening with the Interstrat land.

Most importantly, I am awaiting your thoughts on funding before finalizing recommendations. I think you will see from the report, as well as our various discussions, that there are at least three substantial targets within the Tombstone district, and possibly a half dozen more that might yield a viable mine on the scale that we envisioned. Thus, there is a great deal of flexibility in the amount of money that can be expended. As per my recommendations in this report, on Page 3, I estimate that it will cost approximately $340,000 to perform development drilling and metallurgical testing on the Clipper vein. If this work is successful in delimiting the potential that I believe exists, construction on the mine plant could begin as soon as it was designed.

I am enclosing a xerox copy on Silver States Tonkin Spring mine project in Nevada. It has about the same reserves, though the ore has about 67% more value per ton than I project at Tombstone. Nevertheless, the company made it into production in

5701 East Glenn Street, Suite 120/Tucson, Arizona 85712/602•721-1375

less than four months, and their goal is to have a new mine of the same size in production every two years - which they have met so far. Considering the potential at Tombstone, I think that it might be possible to do the same thing, if the current targets remain available.

Also, I wonder if it might not be possible to fund Phase I and Phase II as a limited partnership and complete part of the work between now and the end of the year, and take advantage of Tombstone Silver Mines, Inc.'s tax loss position.

Regarding a condensed report for the exchange, I think the Summary and Conclusions, Recommendations, Location, Culture and Transportation, Physical Features, Climate and Vegetation, Mineralization and Exploration Proposal Phases I, II, and III could be extracted, and used verbatim. We would have in the range of 30 to 40 pages. Printing both sides (as I plan for the final of the big report), will make it less daunting.

Very truly yours,

James A. Briscoe

JAB/ms

Enclosures

cc: Edmund T. Allen, III
David M. Howard
Charles B. Escapule

ALASKA

ANCHORAGE
ALASKA
NOVEMBER 20-23

THE MINING RECORD

SINCE 1889

THE VOICE OF THE MINING INDUSTRY

WEDNESDAY, NOVEMBER 13, 1985, DENVER, COLORADO 80206

$24 per year, 50 cents per copy

GEOLOGIC REPORT

on the

TOMBSTONE MINING DISTRICT,

COCHISE COUNTY, ARIZONA

With Particular Emphasis on

and Exploration Recommendations for

THE STATE OF MAINE MINE AREA

Submitted to:

Tombstone Silver Mines, Inc.
Tombstone, Arizona

by:

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November 15, 1985

CERTIFICATE

I, James A. Briscoe, Registered Professional Geologist, #9424, State of Arizona, President of James A. Briscoe & Associates, Inc., of Tucson, Arizona, hereby certify that:

1. I am a graduate of the University of Arizona, Tucson, Arizona, B.Sc., 1964, and M.Sc., 1967, and have been practicing my profession for 21 years.

2. I am a practicing Consulting Geologist, and reside at 5701 East Glenn St., #120, Tucson, Arizona 85712.

3. I have no direct or indirect interest whatsoever in Tombstone Silver Mines, Inc., or Charlou Corporation, nor any interest in the State of Maine area mining claims, nor do I expect any interest, direct or indirect, in this organization or property or any affiliate or any security of the company.

4. The findings of the accompanying report are based on my personal examination of the State of Maine mine area claims, Tombstone Mining District, Cochise County, Arizona, in June through September of 1985, and April through August, 1973, and 1978 through 1985.

Dated in Tucson, Arizona this 15th day of November, 1985.

James A. Briscoe
Registered Professional Geologist, AZ
President
James A. Briscoe & Associates, Inc.

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SUMMARY AND CONCLUSIONS

The mineralization and accompanying alteration in the Tombstone Mining District is part of a 72 m.y. to 63 m.y. old Laramide resurgent caldera complex. The first event in the development of the caldera complex was the extrusion of the Bronco volcanics, which included andesitic flows and flow breccias, and possibly lahars of Silverbell type. These were intruded and superposed by rhyolite flows and flow breccias - possibly occurring as coalescing rhyolite domes. The initial phases of the Uncle Sam quartz latite tuff were extruded as a series of nuee ardentes. Caldera collapse followed, and the Ajax fault with a stratigraphic throw of approximately 5,000 feet, formed the eastern boundary of the cauldron. Subsequent to cauldron subsidence, the caldera margin was intruded by additional eruptions of the Uncle Sam tuff, quartz latite porphyry, granophyre, and rhyodacite. Schieffelin Granodiorite - the probable plutonic source for the Uncle Sam tuff, rose and invaded the Cauldron fault; southwest of Tombstone, near the Charleston Crossing, near Fairbank, and on the Ft. Huachuca Military Reservation northwest of the Charleston Crossing. Northeasterly trending fractures, that have characterized the crust in the Arizona area since the Precambrian, re-opened, and andesite porphyry and porphyritic andesite dikes were intruded. Circulating geothermal convection cells around plutonic cupola or apophyses of Schieffelin Granodiorite and more acidic quartz monzonite intrusives that have not been exposed by erosion, altered both the volcanics and the underlying Bisbee Group and Paleozoic sediments, and silver, gold, lead, zinc and copper mineralization was implaced. At about 63 m.y., the Extension quartz monzonite was intruded in the Tombstone Extension area, and possibly the State of Maine and other areas, sending off rhyolite dikes and sills, which intruded the overlying sediments and volcanics. Steam explosions in the Robbers Roost area created fluidized breccia pipes at depth and phreatic explosions on the surface. At the end of the Laramide, mineralizing processes ceased.

During the mid-Tertiary, the Tombstone Hills, along with surrounding ranges in Arizona, were tilted approximately 40 degrees to the northeast, and oxidation of the mineralized veins and erosion of their enclosing volcanic rocks began. Precious and base metals were leached out of the non-reactive Uncle Sam tuff to be re-precipitated below the water table. Eventually, relatively thin distal portions of the tuff were completely eroded from the main part of the Tombstone District, and acidic supergene solutions were neutralized by the basal Bisbee Limestones and underlying Naco Limestone, and precious metals were deposited as secondary bonanza grade mineral zones along porous and chemically receptive horizons. In the State of Maine area, thicker Uncle Sam tuff within the caldera remains to the present time. Acid, supergene solutions removed most precious and base metals from the surface and re-deposited them below the water table to form enriched secondary deposits. Halides, leaching from fresh Uncle Sam tuff in unaltered wall rocks of the veins, acted to precipitate some silver as bromyrite along the hanging and footwall portions of the veins.

In 1877, Ed Schieffelin discovered the exposed bonanza silver-gold mineralization in the Bisbee Limestones, exposed by erosion in the main part of the district. These deposits were mined actively for the next 50 years, and then sporadically for the next 58 years. The silver mineralization in the interior part of the caldera layed hidden and out of reach of the early miners beneath the water table and the leached and uninteresting appearing Uncle Sam tuff. A few small operations mined, in a small way, the minor near-surface precipitations of bromyrite in the hanging and footwall portions of the larger veins in the State of Maine area.

The Clipper vein, averaging 79 feet in width over a 2,000+ foot length, and the other veins in the State of Maine area which average 29 feet in width, contain silver and gold values estimated to average 1.98 ounces and 0.017 ounces, respectively. Using a combination of selective open pit mining and non-selective bulk open pit mining and stripping, these veins can be mined to a depth of approximately 180 feet and heap leached, yielding a gross profit of approximately $9 million per year, over a projected four year life. Deeper enriched ore bodies below the water table are thought to exist in veins and saddle reefs in folded limestone units, as they do in the main part of the district. There is also potential for metal deposition in karsts (caves) in the upper portion of the Naco, and at deeper levels in the Escabrosa and Martin Limestones. At greater depths, near surface mineralization will probably grade into porphyry copper type mineralization, which may be economically attractive in the future.

The same types of targets as are envisioned at the State of Maine mine exist in other mineral centers within the Tombstone caldera, as well as ore bodies in the main part of the district that have not yet been mined out.

RECOMMENDATIONS

Geologic information compiled in this report suggests potential on the Tombstone Silver Mines, Inc. State of Maine area properties for an estimated four years of economically open pitable ore within 180 feet of the surface, at a stripping ratio of 1.72:1, which will yield a gross profit* of approximately $36 million over that period.

Precious metal values leached by supergene solutions from the veins in the Uncle Sam tuff should be precipitated below the water table in the State of Maine area, perhaps forming bonanza grade precious metal ore bodies, similar to those in the main part of the district, mineable by underground methods. Potential for similar open pitable ore as well as high grade ore bodies mineable by underground methods, remain untested in other areas in the district. Leases could probably be obtained from the various owners for small cash payments plus work commitment, at the present time, because of low metal prices.

To take advantage of the opportunities described above, it is recommended that Tombstone Silver Mines, Inc. raise $800,000 in capital for exploration, engineering and initial development. Once the proposed ore zones have been tested, and measured reserves delimited, mine construction financing should be available through lending institutions.

A phased exploration plan for the State of Maine area has been formulated. It is summarized below:

Phase	Objective	Phase Total	Cumm. Total
Phase I	Detailed surface geology mapping & logging & core board construction for existing holes	$ 74,440	$ 74,440
Phase II	Exploration drilling of the Clipper vein at 200' intervals	78,196	152,636
Phase III	Development drilling of the Clipper vein at 20' intervals	146,220	298,856
	Metallurgical testing	40,000	338,856

* Gross profit is defined as profit after deducting all operating costs, including repayment of capital, but not including interest, depletion, depreciation, taxes or royalties.

In all probability, objectives, as well as the exploration plan, will change as information is obtained as the exploration phases progress. Under ideal conditions an open pit mineable ore body on the Clipper vein will be developed after about six months of drilling. If this success is obtained, then remaining funds can be used for engineering and design work. The proforma mine plan suggests that $2 million in working capital and capital equipment will be required to construct and put the Clipper mine into production. Capital and construction costs are amortized over a one year period. Continued exploration for additional reserves is budgeted into the first year mine plan. The exploration may delimit another three years of near surface open pitable ore within the State of Maine area. Based on Tombstone Silver Mines, Inc.'s knowledge of the geology of other areas within the Tombstone district, it is anticipated that if lease-options are acquired on other target areas, that at least another four years of reserves at a similar scale of mining could be delimited by exploration funded by cash flow from the State of Maine area. Further, deeper drilling financed by internally generated funds, would be done to explore for bonanza grade ore mineable by underground methods on the State of Maine area veins. Similar underground potential probably exists on other targets within the district.

The following sequence of activities along with approximate costs is recommended:

Activity	Approximate Cost
* Raise $800,000 in exploration funds	
* Negotiate leases on other remaining exploration targets within the Tombstone district for one year	$200,000
* Initiate and complete Phases I, II, and III at the State of Maine Mine	340,000
* Adjust plans and objectives based on initial results of the above	
* Perform test work, engineering design & obtain financing for mine construction	260,000
	$800,000

Geologic factors at the Tombstone Silver Mines, Inc. property in the State of Maine area appear very favorable. Recognition of the area as a caldera feature, and attendant implications related to the surface geochemical environment, and probable supergene leaching and enrichment of silver bearing veins, suggest potential for the district that has not previously been recognized. By using the experienced personnel and the innovative Merrill-Crowe units and heap leaching technology of the State of Maine Mining Company, as well as contract mining services, geologically "Inferred" potential ore reserves appear to be profitable, even at currently depressed precious metal prices. Cash flow projections show that even at a price of $4.50 silver and $200 gold, the envisioned open pit on the Clipper vein would retire debt on the mine installation and generate a gross profit of $2.8 million.

The goodwill developed by the Escapule family, and in particular Charles and Louis Escapule, over the years, will be a definite asset in obtaining mining leases on surrounding properties. Using the Escapule's highly portable Merrill-Crowe units and some innovative exploration and mining techniques, it is also probable that with the management infrastructure headquartered at Tombstone, small surrounding precious metal properties can be explored and mined at a profit.

GEOLOGIC REPORT ON THE TOMBSTONE MINING DISTRICT,

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with particular emphasis on

THE STATE OF MAINE MINE AREA

INTRODUCTION

In July of this year, the writer was engaged by Mr. Charles B. Escapule, Sr., Vice President & Manager of Operations, Tombstone Silver Mines, Inc., to examine and review geology and current mining operations and ore reserves in the State of Maine area and surrounding properties controlled by Tombstone Silver Mines, Inc. The intention of this study is to determine the potential for the discovery of additional mineralization, and to assess its mining potential. Tombstone Silver Mines, Inc., as of November 15, 1985, owns 8 patented mining claims, totaling 146.66 acres; holds 220.79 acres of state land under prospecting permit; and 68.06 acres of state mineral leases. They lease with option, 2,120.98 acres of federal lode claims, including 49 acres of patented claims. They have a verbal understanding on 130.7 acres of state land and 10 acres of patented ground, and are working on a formal lease agreement. They control a total of 2,766.49 acres, as described above. It is anticipated that Tombstone Silver Mines, Inc. will work toward consolidating the entire Tombstone district in order to facilitate exploration for and production of precious metals.

In 1973, the writer, then working under a contract with Sierra Mineral Management/1971 Minerals, Ltd., who had a lease on the land Tombstone Silver Mines, Inc. now owns, prepared a geologic map, report and exploration proposal. As a first step in the 1973 mapping program, a triangulation survey was put in, claim corners, section corners, etc. targeted, and the area flown using black and white and color aerial photography by Cooper Aerial Photography, Inc.

The area was mapped photogrammetrically, and a topographic map at the scale of 1" = 200' with a five foot contour intervals prepared. This was used as a geologic map base.

In the ensuing 12 years since that initial map and report was prepared, several important events have taken place. Sierra Mineral Management/1971 Minerals, Ltd. never did pursue the Exploration Proposal contained in the writers 1973 report. They did re-treat most of the mine dumps in the main part of the district by heap leaching methods, but a Counter Current Decantation plant moved from the Golden Sunlight Mine in Montana and installed at the State of Maine, failed to operate properly, and was abandoned. The leases reverted to the property owners, and Sierra/'71, Ltd. fell on hard times and is no longer an active entity. Subsequently, Louis and Charles Escapule developed the compact, inexpensive and efficient State of Maine Merrill-Crowe zinc precipitating unit, and began leaching the State of Maine mine dumps. In 1979, the process of agglomerating clay rich precious metal ores to make them permeable was discovered. The recognition of this process has probably been the most important development in precious metal recovery since discovery of the cyanide process in 1890. This technique is now used all over the world, and makes possible heap leaching of low grade, clay rich precious metal ores, and negates the necessity of cyanide aggitation plants, except for very high grade ores, those with unusual characteristics, or those located in very cold climates. The Escapules installed agglomeration at their State of Maine dump leach soon after its recognition. As a result of agglomeration, State of Maine silver recovery (for crushed and treated ore) is about 87%, and gold appears to be 100%. This was confirmed by Newmont Mining's Danbury metallurgical labs (Don Hammer, Newmont Exploration, 1982, pers. comm.).

In July of 1984, the State of Maine Mining Company properties were transferred to Tombstone Silver Mines, Inc., and plans for small tonnage production laid. From October, 1984, to December, 1984, one hundred seventy vertical drill holes were drilled using an Atlas Copco Roc 601 air track drill with a COP-42 down-hole hammer tool. A vacuum dust collector collected all the material from each drill interval. The maximum depth drilled was 120 feet. Total footage of 10,159 feet, an average of 59.8 feet per hole, was drilled. As a result of this drilling, 35,590 tons of low grade silver averaging 2.89 ounces per ton at a stripping ratio of 3.4:1 (Graves, A.J., December, 1984) were outlined. This was thought to be sufficient for a years profitable operation. Continued drilling was planned to sustain reserves a year in advance. Unfortunately, the price of silver dropped from about $9 per ounce, at the inception of the program, to its present price of about $6 per ounce. At $6 silver, the reserves are subeconomic.

The author was called in to evaluate the geology, check the reserves, and make suggestions on how the operation could be put on an economic footing.

Location, Culture and Transportation

The Tombstone Mining District (Figure 1) is located in southeastern Arizona, some twenty-five miles north of the International Boundary with Mexico. It is located in western Cochise County, and is covered by the Tombstone fifteen minute quadrangle sheet of the United States Geological Survey, which is bounded by meridians 110 degrees 15 minutes, and 110 degrees, and parallels 31 degrees 30 minutes, and 31 degrees, 45 minutes. These boundaries are shown on Figures 1, and 2, and Figures 3 through 17. The area controlled by Tombstone Silver Mines, Inc. includes all or parts of the following sections, as shown on Figure 4 and Figure 29: T. 19 S., R. 22 E., SE 1/4 section 33, T. 20S., R. 22 E., sections 4, 5, 8, 9, 10, 15, 16, 17, 18 and 20.

Tombstone is the only town within the quadrangle boundaries, but the bedroom community of Sierra Visa, which services the Army Electronic Proving Ground at Ft. Huachuca, lies just outside the quadrangle, and some 15 miles from Tombstone, via the Charleston Road. Tombstone is well serviced by major paved highways, including U. S. Highway 80, which goes through the center of town and Arizona State Highways 82 and 90. These are all paved, all-weather highways. Many types of supplies are available in Tombstone, and most types of supplies are available in Sierra Vista, a city of some 30,000 inhabitants, and the fastest growing city in Cochise County. A good supply of semi-skilled to skilled labor is available in Tombstone or Sierra Vista. The old mining camp of Bisbee lies about 30 miles south of Tombstone, where the underground copper mines, operated for the last 100 years, were shut down about two years ago. A core work force of skilled underground miners is probably available in Bisbee. The second largest city in Arizona, Tucson, is located approximately 60 miles by U. S. 80 and Interstate 10, to the northeast. Tucson is served by a large, all-weather, international airport, serviced by most of the large domestic carriers. The Tombstone Municipal Airport has a 5,000 foot dirt strip, adequate for light planes, but no fuel or other facilities. Tombstone, at one time, was serviced by a standard gauge branch line of the Southern Pacific Railway from Fairbank (7 miles west of Tombstone). This connection to Fairbank has been dismantled, though the Southern Pacific line which connects with Douglas, Arizona is currently in service.

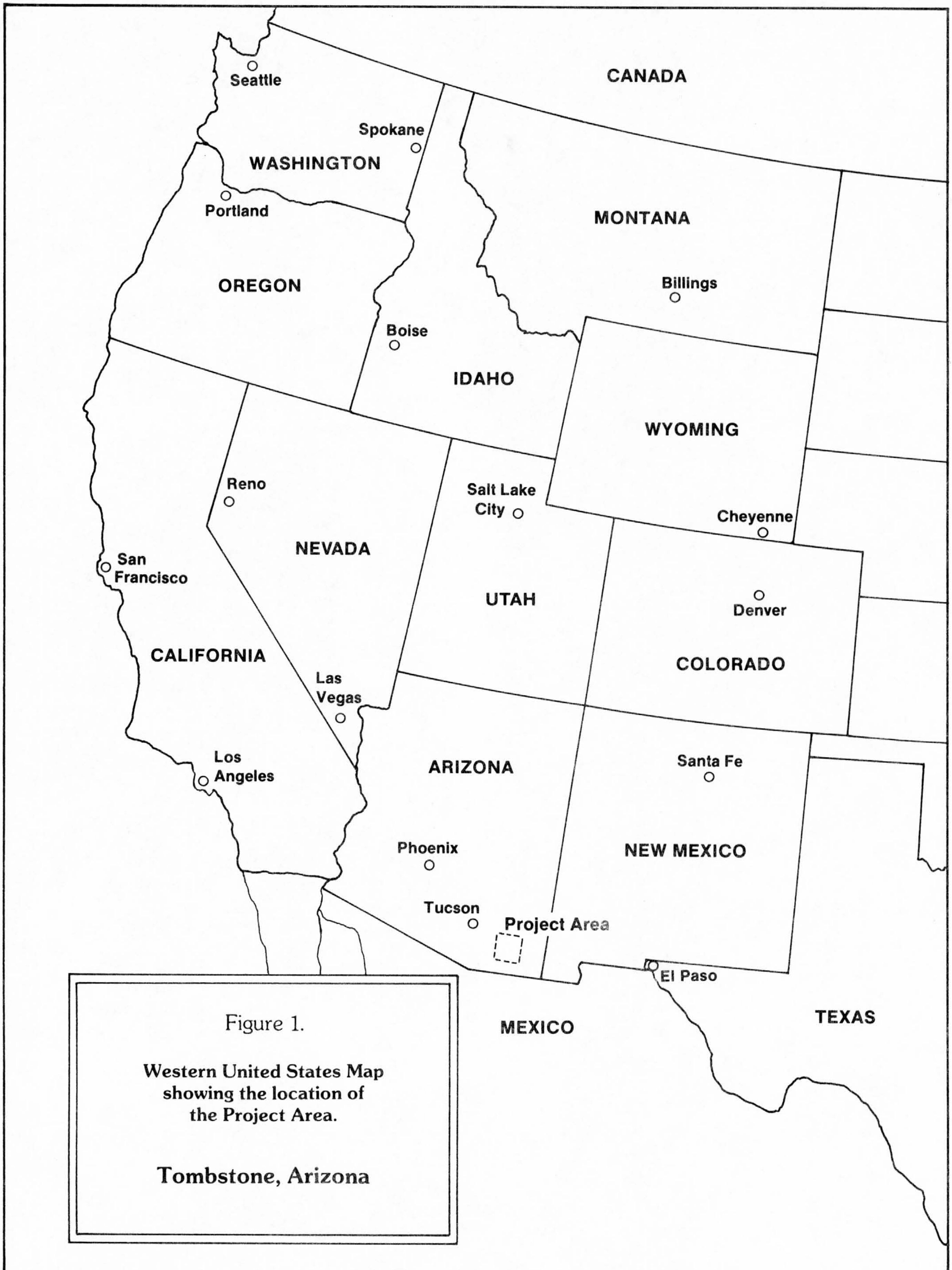


Figure 1.

Western United States Map showing the location of the Project Area.

Tombstone, Arizona

Physical Features

Physical features are quoted directly from Butler, B.S., Wilson, E. D., and Rasor, C. A., 1938:

> The Tombstone district is in the Tombstone Hills, a group of low, scattered mountains that extend northwestward from the Mule Mountains in which the Bisbee district is located. Tombstone is near the northwestern margin of the area, at an altitude of 4,530 feet or 670 feet above the San Pedro River at Fairbank. The Tombstone Hills rise to a maximum altitude of 5,339 feet or some 800 feet above the surrounding plain, which slopes westward to the San Pedro River. In the vicinity of the hills, this plain is a pediment, cut on hard rock.
>
> Even slopes and rounded contours characterize the northern half of the area in contrast to the steep-sided, linear ridges that prevail in the southern half.
>
> There are no perennial streams in the area. Drainage is westward to the San Pedro River through steep-sided gulches or arroyos that dissect the plain. Torrential rains flood these arroyos for short periods, but during most of the year no water flows at the surface.
>
> Water is encountered in the mines of the eastern part of the district at an elevation of 4,120 feet above sea level. This mine water has been used for concentration of ores, but, according to analyses by H. V. Smith, of the University of Arizona, its flourine content makes it unsuitable for drinking. Some water is obtained from shallow wells in the gulches, but the main supply for Tombstone is piped from springs in the Huachuca Mountains, about 25 miles southwest of the town.

Climate and Vegatation

Climate and vegetation is quoted directly from Butler, B.S., Wilson, E. D., and Rasor, C. A., 1938:

> The climate of Tombstone is that of the intermediate altitudes of southern Arizona. The winters are characterized by moderate temperatures and only a few light falls of snow. In summer the days are hot, but the nights are comfortably cool. The average range in temperature for a twenty-seven-year period, prior to 1928, is from an extreme maximum in June of 101.9 degrees to an extreme minimum of 20.8 degrees in January. The average annual precipitation for a thirty-one period prior to 1928 was 14.48 inches. The main rainy season is from July to September, and the driest months are April, May, and June.
>
> The vegetation of the district is likewise characteristic of the intermediate elevations of southern Arizona. It is above the altitudes favorable to abundant cacti and below those favorable to forest trees. Desert shrubs predominate. Cat's-claw and creosote or greasewood bush, together with some mesquite and ocotillo, form thickets on the foothill slopes and pediments. Several species of cacti are present, but prickly pear is most abundant. Mescal and yucca are sparingly present. Along gulches and arroyos mesquite, paloverde, and walnut are common. No trees in the district are suitable for lumber or for ordinary mine timber. On flats and slopes where soil and moisture are favorable, various grasses thrive.

Previous Work

Previous work is quoted directly from Newell, R. A., 1974

Previous Investigations

The geological and mining literature abounds with references to the Tombstone district, and attention will be limited to those which provide significant insight into the geology and the development of the area.

Between the years 1879 and 1886, E/MJ published numerous notes concerning the nature, extent, and progress of underground development work in the district. The interested reader is referred to these references, as many of them lie outside the scope of this dissertation. E/MJ (1881, v. 31, p. 316-317) stated the Tombstone silver ores were mostly of a carbonate or chloride nature, and that production was about 300 tons/day. Recoveries were about 80 percent, and the average yield was about $75/ton. E/MJ (1883, v. 35, p. 267-269) reported that on the third level of the Westside mine the ore was assaying about 40 oz/ton silver and about 0.5 oz/ton gold. Manganese ore from the Lucky Cuss mine at a depth of 100 ft, carried about 25 oz/ton of silver. E/MJ (1883, v. 36, p. 229-230) announced the discovery, between the third and fourth levels, in the Westside mine, of several tons of telluride ore that averaged $1200/ton.

Previous Geological Investigations

Blake (1882a, b, c, d) provided the earliest geologic descriptions of the district, and he recognized that the mineralization was closely associated with north-south trending dikes and cross-cutting northeast-southwest fissures. He also stated that, where either dikes or fissures crossed anticlinal structures, mineralization often developed along crests of the folds as bedded replacement deposits. Comstock (1900, p. 1045, 1089) confirmed that folds were important to ore deposition at Tombstone, and he apparently recognized a possible influence of volcanism in the genesis of the mineralization.

Church (1902) described the location of Tombstone relative to other mining districts in southeastern Arizona and adjacent Mexico. He later attempted the earliest comprehensive description of general geologic features in the district (Church, 1903). Church believed that dikes in the district exercised a relatively minor control on the mineralization, and that the major controls were anticlinal folds and cross-cutting fissures. Lakes (1904) followed the interpretation of Church (1903), and compared anticlinal structures at Tombstone with those at Bendigo, Australia.

Between 1904 and 1920, little was published that dealt with the geology in Tombstone. Clark (1914) published a water analysis from the 1000 ft level of the Contention mine. Ransome (1916) correlated some stratigraphic units with those at Bisbee, and Staunton (1918) described the effects and nature of a relatively severe earthquake he experienced while underground at Tombstone in 1887.

Ransome (1920) described the manganese mineralization at Tombstone. High concentrations of manganese were associated with the Prompter fault, and the principal manganese production was derived from the Oregon, Prompter, Lucky Cuss, Luck Sure, Bunker Hill, and Comet mines. Psilomelane, the major manganese mineral, typically occurred in pipes and chimneys in limestone horizons, and part of the manganese was believed to have been derived from the limestones. Ransome also thought that some of the manganese originally formed upper portions of the associated silver deposits. In either case, supergene processes were considered to have been respondible for forming the present manganese deposits. High grade mineralization contained between 70 and 80 percent MnO_2 after sorting, while low grade mineralization contained about 40 percent MnO_2. Ransome mentioned that in 1917 the manganese ore contained between 7 and 8 oz/ton silver. Wilson and Butler (1930) described many known manganese deposits in Arizona, and these authors simply referred to Ransome's work for their discussion of the Tombstone deposits.

The geology at Tombstone was investigated in more detail during the later 1930's. Butler and Wilson (1937) noted that the mineralization was associated with north-south dike fissures, faults, anticlines, and northeast-southwest fissures. Rasor (1937) investigated the mineralogy and petrography of the district, and he found hypogene silver-bearing minerals to include hessite, tetrahedrite, and galena. Alabandite was found to be the only definitely hypogene manganese mineral. Bromeyrite, embolite, cerargyrite, argentite (acanthite), stromeyrite, native silver (native gold - addition by Briscoe, 1985, see Butler et al. p. 51), and argentojarosite were identified as supergene ore minerals. The zone of oxidation was thought to be at least 600 ft deep (Rasor, 1937, p. 83), and bromeyrite was believed to be the most abundant supergene silver mineral. Butler, Wilson and Rasor (1938), and Butler and Wilson (1938) published detailed studies of the geology and ore deposits at Tombstone. These studies incorporated a considerable amount of previously unpublished data which were originally collected by Ransome. The investigations provided insight into a complex sequence of structural events in the district, and the authors also suggested a broad pattern of mineral zoning. Tenney (1938) reviewed and summarized the findings of Butler, Wilson and Rasor (1938), and noted that their efforts provided a welcome addition to the study of ore deposits. Butler and Wilson (1942), in addition to the above publications, again summarized their work at Tombstone in Newhouse (1942).

Ingerson (1939) measured joint and platy inclusion orientations within the Uncle Sam "porphyry". The Uncle Sam unit lies west of Tombstone, and Ingerson attempted to conform the presence of a suspected thrust fault below the "porphyry". He found that neither the joints nor the inclusions could be used as evidence to confirm a fault at depth. The emplacement of the Uncle Sam "porphyry" was discussed at length by Gilluly (1945), and he considered the body to be either laccolithic or sill-like in form. Furthermore, it was believed that the Uncle Sam unit had followed either a thrust fault plane or an unconformity during emplacement.

Gilluly, Cooper and Williams (1954) described the Late Paleozoic stratigraphy of central Cochise County. For the Tombstone portion of their study, these authors succeeded in subdividing a thick sequence of Pennsylvanian-Permian strata known as the Naco Limestone into six different formations. Later, Gilluly (1956) incorporated his earlier work on the Uncle Sam "porphyry", with the stratigraphy to provide an exhaustive description of the geology of central Cochise County.

In 1941 the United States Bureau of Mines began a study of the manganese deposits at Tombstone. The investigations involved underground sampling at a number of mines in the district, and about 2000 ft of underground drilling at the Oregon mine. Needham and Storms (1956) summarized much of this work, and concluded that only small and scattered deposits of manganese ore were present. Farnham, Stewart and Delong (1961) studied the manganese deposits in eastern Arizona and visited the deposits at Tombstone. They found that manganese concentrations were often between 10 and 30 percent MnO_2, and that silver in the manganese frequently ranged between 5 and 10 oz/ton.

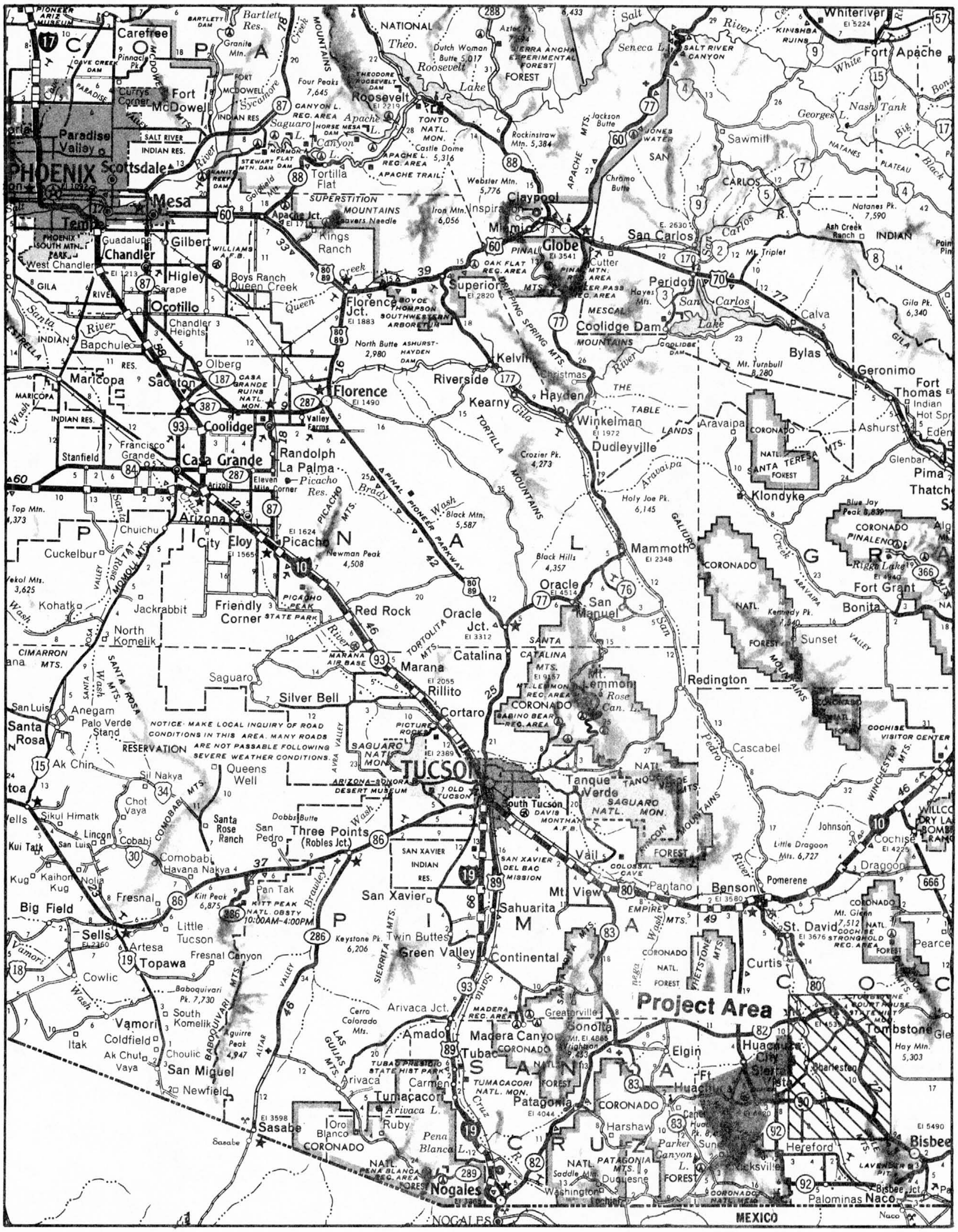


Figure 2. Highway map showing the location of the Project Area in relation to Tucson and Phoenix, Arizona

Burnham (1959) studied trace element abundances in sphalerites and chalcopyrites from many localities in the western United States and northern Mexico. The elements studied included silver, bismuth, cadmium, gallium, germanium, indium, manganese, antimony, and tin. The silver content in three sphalerite samples from Tombstone ranged between 1 and 300 ppm. Burnham (1959) found that all major silver mining districts studied could be idntified by relatively high silver concentrations in sphalerite and chalcopyrite.

Creasey and Kistler (1962) determined radiometric ages for an intrusive rhyolite and the Schieffelin Granodiorite by potassium-argon methods as 63 and 72 m.y. respectively.

Andreason, Mitchell and Tyson (1965) published an aeromagnetic map for the area around and including Tombstone. Background values at Tombstone were about 300 to 400 gammas, but the granodiorite was found to have values between 700 and 1000 gammas. Brant (1966) found the Schieffelin Granodiorite to have a magnetic susceptibility of 1800 x 10 (c.g.s. units). Brant assumed the Schieffelin to be of Tertiary age, and he stated that this relatively high susceptibility was typical for Tertiary intrusives in southern Arizona. In fact the Schieffelin is a Laramide intrusive (Drewes, 1971), and Brant (1966) stated that most Laramide intrusives in southern Arizona have an average susceptibility of only 100 x 10 . Thus, for a Laramide intrusive, the Schieffelin is anomalously magnetic.

Jones (1961, 1963, 1966) studied tectonic deformation patterns in southeastern Arizona. He concluded that the contribution of overthrusting had been greatly exaggerated, and that processes of differential vertical uplift were responsible for much of the observed deformation.

Lee (1967) described the geology of the area surrounding the Charleston and State of Maine mines, both of which lie southwest of Tombstone. He suggested that the mineralization at Charleston and the State of Maine was epithermal and that the mineralization closer to Tombstone was mesothermal.

Patch (1969, 1973) studied the petrology and stratigraphy of the Permian Epitaph Dolomite at Tombstone. She suggested that the Epitaph was most likely a dolomitized facies of the underlying Colina Limestone. Wilt (1969) studied the Colina Limestone, and she agreed with Gilluly et al. (1954) that the limestone ranged in age from Wolfcampian to Leonardian (lower Lower Permian to upper Lower Permian).

Ridge (1972) discussed the general geologic setting of Tombstone. He also speculated that the mineral deposits had formed in an environment which varied from xenothermal to epithermal conditions.

Previous Mineralogical Investigations

E/MJ (1881, v. 31, p. 316-317) reported that the Tombstone silver ores were mainly of chloride varieties, and that the ore contained a little lead. In 1883, E/MJ (v. 36, p. 229-230) reported the discovery of several tons of telluride ore between the third and fourth levels of the Westside mine.

The earliest scientific discussion of the mineralogy at Tombstone was that of Hillebrand (1886). He reported the presence of emmonsite, a hydrated ferric tellurite. Genth (1887) described hessite from the Westside mine. Hillebrand (1889) published an analysis of descloizite from the Lucky Cuss mine. Panrose (1890) noted the presence of manganiferous silver ore at Tombstone, and Moses and Laquer (1892) reported the existence of alabandite at the Lucky Cuss mine. Hewett and Rove (1930) discussed the occurrence of alabandite in the Lucky Cuss mine in association with calcite, quartz, and galena. Occurrences of silver-bearing manganese minerals in Arizona and New Mexico were studied by Hewett and Pardee (1933), and they found that silver was present as silver manganite. These authors observed that black calcite was commonly associated with the manganese deposits, and that the calcite had black manganese oxide intergrowths that could be manganite, but not hausmannite.

Rasor (1937) conducted the first detailed study of the mineralogy at Tombstone. He identified four main stages of hypogene mineralization, and his investigations were summarized by Butler, Wilson and Rasor (1938). Rasor (1938) apparently reported the first United States occurrence of bromeyrite at Tombstone. He specilated that earlier reports of "horn silver" from Tombstone may actually have been mistaken, and that the mineral was possibly bromeyrite. Rasor (1939) stated that psilomelane was the most abundant secondary manganese mineral, but that minor amounts of polianite, pyrolusite, manganite, hetaerolite, and wad were also presnt. He believed the secondary manganese minerals were derived entirely from alabandite; however, Hewett and Radtke (1967) suggested the main source of secondary manganese at Tombstone was black manganiferous calcite. Hewett (1972) reviewed the origin of the manganese minerals manganite, hausmannite, and braunite. He conculded that hausmannite is a hypogene mineral, and that manganite and braunite are supergene minerals. Hewett also noted that neither hausmannite, manganite, nor braunite had been reported at Tombstone. For southern Arizona, Hewett observed that the minerals hollandite, psilomelane, and cryptomelane formed most of the manganese oxide deposits, and he assigned a hypogene origin to all of them. Ridge (1972) believed that sphalerite containing chalcopyrite blebs indicated possible xenothermal conditions, that tetrahedrite with silver-bearing galena suggested a kryptothermal environment, and that hessite with stromeyerite designated epithermal conditions.

Previous Milling and Smelting Investigations

The earliest mention of milling procedures at Tombstone (E/MJ, 1879, v. 27, p. 468) indicated the successful operation of a 10 stamp mill, which yielded a recovery of about 77 percent. In 1881 about 120 stamps were in operation at Tombstone, treating about 300 tons/day (E/MJ, 1881, v. 31, p. 316-317). Austin (1883) described early milling methods and machinery at Tombstone. Church (1887a, b) discussed metallurgical problems which arose during the treatment of sulfide ores and tailing slimes. Goodale (1889, 1890) discussed the treatment of silver-bearing manganese ore. Free milliing methods recovered only 60 percent of the silver, and required more than 7 lb of quicksilver per ton of ore treated. By using a chloride roasting method the recovery increased to about 90 percent, and the amount of quicksilver required was reduced by half.

Thomas G. Chapman, later to become Dean and Dean Emeritus of the College of Mines at the University of Arizona wrote his masters thesis for the University of Arizona, entitled The Metallurgy of Silver Chloride Ore From the State of Maine Mine in the Tombstone District. Chapman stated that the State of Maine mine produced silver valued at between $100,000 and $150,000 from the time of its discovery to the year 1921 (p. 1). He described the genesis of hand coping and retaining gob underground, as well as the source of the State of Maine Mine dump, and pointed out that the ore was not treated at the mine site before 1921. Testing of the dump showed 35,000 tons, averaging 4.85 ounces of silver (p. 2). Chapman made various screen analyses and crushing tests, and compared gravity separation including tabling and jigs, with cyaniding. Chapman found that though gravity methods would work, cyaniding of the finer material after screening off the oversize and de-sliming, would result in the highest recovery. Cyanide consumption was about 3/4 lb. per ton and contact time under laboratory conditions for cyanide was about 48 hours. Screening on a one-half inch screen, rejecting the oversized and treating the undersized, gave the best economies.

Romslo and Ravitz (1947) reported the successful treatment of manganese-silver ore from Tombstone. Very poor results were obtained by direct cyanide and flotation methods, but a calcium dithionate process recovered 80 to 90 percent of the silver and 90 percent of the manganese.

Previous Hydrological Investigations

After water was first encountered in the Sulphurette mine in 1881, pumps with a capacity of 700 gpm were installed at the Contention and Grand Central mines in December 1883 (E/MJ, 1883, v. 36, p. 328, 400). The pumps worked successfully until 1886, when the Grand Central pumphouse burned (Dunning, 1959). E/MJ 1902, v. 73, p. 314-315) reported that new pumps, with a capacity of 1750 gpm, would be installed near the Contention mine. Blake (1904a, b) mentioned that the new pumps had successfully lowered the water level over 100 ft to near the 700 ft level of the Contention mine. E/MJ, 1904, v. 77, p. 334-338) reported that pumping activities at the Contention mine had lowered the water table over 80 ft in the Lucky Cuss mine, which was more than a mile away. The water temperature was reported to be about 80 degrees F.

Walker (1909) stated that water volumes of up to 4500 gpm were not uncommon. He also discussed the nature of the pumping facilities at Tombstone. On June 1, 1909, the pumps failed (Staunton, 1910; Butler, Wilson and Rasor, 1938, p. 47; Dunning, 1959, p. 187-189) on the 1000 ft level. For a period of 10 days prior to the accident the pumps were yielding 4600 gpm. In 1910 larger pumps and new boilers were installed, and operations were resumed on the 1000 ft level. High pumping costs coupled with a low silver price (about $.50/oz) forced abandoning the operations on January 19, 1911. The water pumps still remain on the 1000-, 800-, 700-, and 600-ft levels (Butler, Wilson and Rasor, 1938, p. 47).

Hollyday (1963) considered that mine waters at Tombstone could provide a long term source for moderate amounts of municipal water. The water supply was determined to be sufficient for a town about the size of Tombstone.

Wallace and Cooper (1970) studied the dispersion of calcium, chlorine, magnesium, and sodium in groundwater near Tombtsone. They found that most of the chlorine (10 to 40 ppm) was derived from the Schieffelin Granodiorite, and that sodium (20 to 70 ppm) was derived from granitic rocks at Tombstone as well as from similar rocks in the Dragoon Mountains to the east. Calcium and mangesium (30 to 80 ppm, and 10 to 25 ppm respectively) were derived from carbonate sedimentary rocks. The authors found calcium and magnesium to be excellent tracers of ground wter flow for the Tombstone area, and subsurface flow patterns were established by measuring the calcium and magnesium contents in the groundwater.

Non-technical Publications on History and Human Interest

In addition to the technical publications, the following books emphasize the history and human interest of this early mining camp of Arizona:

F. Becholdt,	When the West Was Young
Wm. M. Breckenridge,	Helldorado
W. N. Burns,	Tombstone
S. Lake,	Wyatt Earp, Frontier Marshal
A. H. Lewis,	Wolfville Days
L. D. Walters,	Tombstone's Yesterday
C. E. Wilson	Mimes and Miners

Explanation

Geology

QTgu — OLDER OR UNDIFFERENTIATED SURFICAL DEPOSITS (HOLOCENE TO OLIGOCENE):—Gravel, sand, and silt (Pleistocene and Pliocene—Mainly alluvium of basins; includes some colluvium and landslide deposits. Generally light-pinkish gray, weakly indurated, and with poorly rounded clasts; locally well indurated. Thickness several meters to hundreds of meters.

QTb — Basalt (Pleistocene to Pliocene)—Lava flows, pyroclastic rocks, and some intercalated gravel. Thickness several meters to a few hundred meters in most places. Radiometrically dated at 0.25, 1.0, and 3.2 m.y. old

Tva — Extensive andesite and dacite (Miocene and Upper Oligocene)—Lava flows, pyroclastic rocks, some intercalated epiclastic rocks, and dikes. Mostly gray, fine-grained, porphyritic rocks; includes some very coarse feldspar porphyry andesite (Turkey track porphyry, an informal term of Cooper, 1961). Thickness mostly several meters to several tens of meters. Dated at 24, 25, 27, 33, and 39 m.y.

Tv — Extrusive rhyolite and rhyodacite (Miocene and Upper Oligocene—Lava flows, welded tuff, pyroclastic rocks, and some intercalated epiclastic rocks. Light-gray to grayish-pink, vitric to fine-grained, porphyritic. Commonly a few tens to a few thousand of meters thick. Dated at 23, 24, 25, 26, 26, 26, and 27 m.y. An additional date of 47 m.y., if substantiated, may indicate the presence of Eocene rocks in the lower member of the S O Volcanics of Cochise Co.

Tlc — Lower conglomerate, gravel, and sand (Oligocene and Eocene?)—Alluvium; commonly grayish-red deposits of small, well rounded, nonvolcanic clasts. Mostly several meters to a few tens of meters thick.

Tlv — UPPER CORDILLERAN (LARAMIDE) IGNEOUS ROCKS (LOWER PALEOCENE):—Lower volcanic rocks—Rhyolite to andesite lava flows, pyroclastic rocks, and some intercalated epiclastic rocks. Dated at 57 m.y. Possibly younger age to east.

TKp — MAIN CORDILLERAN (LARAMIDE) IGNEOUS ROCKS:—Porphyritic and aplitic intrusive rocks (Paleocene and Upper Cretaceous)—Mostly latitic porphyry to dacitic porphyry in small stocks and plugs and aplitic bodies not associated with other granitoid stocks. Dated at 61, 63, 63, 64, and 65 m.y.

Kib — Fluidized intrusive breccia—exact age unknown, but penetrates, and thus younger than Uncle Sam porphyry.

Kr — Rhyodacite tuff and welded tuff.—Includes parts of Salero Formation, Sugarloaf Quartz Latite, and Bronco Volcanics, and all of Red Bay Rhyolite, Cat Mountain Rhyolite of Brown (1939) and Uncle Sam Prophyry. Includes local intrusive bodies and locally contains fragments of exotic rocks. Thickness commonly several tens of meters to several hundreds of meters. Dated at 66(?), 70, 72, 73, and 73 m.y. The Uncle Sam, in the Tombstone area, is dated 72 m.y.

Ka — Andesitic to dacitic volcanic breccia.—Includes parts of Solero Formation, Sugarloaf Quartz Latite, and Bronco Volcanics, and all of Demetrie Volcanics and Silverbell Formation of Courtright (1958). Commonly contains large blocks of exotic rocks and locally includes some sedimentary rocks and intrusive rocks. Several tens of meters to several hundreds of meters thick in most places.

Klq — Lower quartz monzonite and graodiorite—Includes some quartz diorite; appears in small stocks. Locally associated with mineralization. Dated at 70, 71, 72, 73, 74, 74, 74, and 76 m.y. The Schiefflin granodorite at Tombstone is 72 m.y.

Kb — BISBEE FORMATION OR GROUP, UNDIFFERENTIATED (LOWER CRETACEOUS):—Upper part of Bisbee Formation or Group, undifferentiated, and related rocks.—Includes upper part of Bisbee Formation, Mural Limestone, Morita, Cintura, Willow Canyon, Apache Canyon, Shellenberger Canyon and Turney Ranch Formations (not listed in stratigraphic sequence) of the Bisbee Group, Amole Arkose of Bryant and Kinnison (1954), and Angelic Arkose. Consists of brownish- to reddish-arkose, gray siltstone, sandstone, conglomerate, and some fossiliferous gray limestone. Commonly several hundred meters thick

Jg — GRANITE AND QUARTZ MONZONITE (JURASSIC)—Stocks of pinkish-gray coarse-grained rock. Locally associated with mineralization. Dated at 140, 148, 149, 149, 150, 153, 160, 161, 167, 178, 185 m.y.

PPs — Sedimentary rocks (Lower Permian and Upper Pennsylvanian)—consists of Epitaph Dolomite (Lower Permian), Colina Limestone (Lower Permian), and Earp Formation (Lower Permian and Upper Pennsylvanian), undifferentiated. Epitaph Dolomite is a dark- to light-gray slightly cherty dolomite, limestone, marl, siltstone, and gypsum, 120-280 meters thick. Colina Limestone is a medium gray, thick-bedded, sparsely cherty, and sparsely fossiliferous limestone 120-280 meters thick. Earp Formation is a pale-red siltstone, mudstone, shale, and limestone, 120-240 meters thick.

Ph — Horquilla Limestone (Upper and Middle Pennsylvanian)—Light-pinkish-gray, thick- to thin-bedded, cherty, fossiliferous limestone and intercalated pale-brown to pale-reddish-gray siltstone that increases in abundance upward. Typically 300-490 meters thick.

MDs — SEDIMENTARY ROCKS (MISSISSIPPIAN AND DEVONIAN)—Consists mainly of Escabrosa Limestone (Mississippian)—locally (Armstrong and Silberman, 1974) called Escabrosa Group—and Martin Formation (Upper Devonian), undifferentiated. In part of the Chiricahua Mountains also includes Paradise Formation (Upper Mississippian) and Portal Formation of Sabins, 1957a (Upper Devonian). In the Little Dragoon Mountains and some adjacent hills also includes Black Prince Limestone, whose fauna and correlation show strongest affinities with Mississippian rocks but which may include some Pennsylvanian rocks. Escabrosa Limestone is a medium-gray, massive to thick-bedded, commonly crinoidal, cherty, fossiliferous limestone 90-310 meters thick. Martin Formation is thick- to thin-bedded, gray to brown dolomite, gray sparsely fossiliferous, and some siltstone and sandstone, 90-120 meters thick. Paradise Formation is a brown, fossiliferous, shaly limestone. Portal Formation is a black shale and limestone 6-105 meters thick. Black Prince Limestone is pinkish-gray limestone with a basal shale and chert conglomerate, as much as 52 meters thick.

OЄs — SEDIMENTARY ROCKS (LOWER ORDOVICIAN TO MIDDLE CAMBRIAN):—El Paso Limestone (Lower Ordovician and Upper Cambrian), Abrigo Formation (Upper and Middle Cambrian), and Bolsa Quartz (Middle Cambrian), undifferentiated.—El Paso Limestone is a gray, thin-bedded cherty limestone and dolomite 90 meters to about 220 meters thick. Abrigo Formation is a brown, thin-bedded fossiliferous limestone, sandstone, quartzite, and shale, 210-240 meters thick. Bolsa Quartzite is a brown to white or purplish-gray, thick-bedded, coarse-grained quartzite and sandstone with a basal conglomerate, 90-180 meters thick. To the east, equivalents of part of the Abrigo Formation and Bolsa Quartzite are known as the Coronado Sandstone.

Єs — Sedimentary rocks (Upper and Middle Cambrian)—Abrigo Formation (Upper and Middle Cambrian), and Bolsa Quartzite (Middle Cambrian), undifferentiated.

Yg — GRANITOID ROCKS (PRECAMBRIAN Y):—Mainly granodiorite and quartz monsonite, unfoliated to foliated, in part metamorphosed. Generally in stocks, which ahve been little studied.

Xp — PINAL SCHIST (PRECAMBRIAN X)—Chlorite schist, phyllite, and some metavolcanic rocks, metavolcanic rocks, metaquartzite, metaquartzite conglomerate, and gneiss. One metavolcanic rock dated at 1715 m.y.

CONTACT—Dotted where concealed.

MARKER HORIZON—Dotted where concealed.

DIKES—Showing dip.

70 — FAULTS—Showing dip. Dotted where concealed or intruded; ball and bar on downthrown side.

45 — Normal

45 — Reverse

Strike-slip—Arrow couple shows relative displacement. Single arrow shows movement of active block.

Major thrust fault—Sawteeth on upper plate.

Thrust fault—Sawteeth on upper plate.

Anticline.

Syncline.

30 — Inclined strike and dip of beds.

EXOTIC-BLOCK BRECCIA—Rock contains chip or block inclusions of rock different from those of host or other blocks nearby. Typically of volcanic-tectonic or sedimentary-tectonic origin; excludes Tertiary megabreccia deposits.

(QTgu) 157 — Site of well or generalized site of several wells, showing unit penetrated, if known, and depth of well, in feet. 100 feet equals 30.5 meters.

72x — COLLECTION SITE—Radiogenically dated rock showing age in millions of years. Query before symbol where precise location uncertain.

Roads and Highways

Dry wash

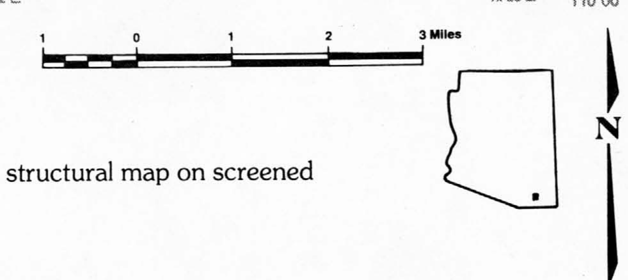
Southern Pacific Railroad

Government Reservation Boundary

Aqueduct

A———A' Cross section line

Tombstone Development Company, Inc.
Tombstone, Arizona



Geology adopted from Drewes, Harold, 1980, and Newell, R.A., 1973.

Figure 3. Generalized geological and structural map on screened topographic base.

By James A. Briscoe
James A. Briscoe and Associates
Tucson, Arizona

Explanation

Land Status

- Public Domain - Mineral and Surface owned by Federal Government.
- State Domain - Mineral and Surface owned by State of Arizona.
- Public Domain Mineral and Surface. Mineral owned by Federal Government; Surface owned by State of Arizona.
- Fee Simple - Mineral and Surface privately owned.
- Fee Simple Surface and Public Domain Mineral Private Surface ownership Mineral owned by Federal Government.
- Spanish Land Grants - Fee Simple. Mineral and Surface privately owned; Reservation of Gold, Silver and Mercury to Federal Government.
- Military Reservation - Restricted Mineral Entry. Not open to Mining.
- Water & Power Resource Service & Various other Withdrawals - Not open to Mineral Entry or Mining.
- Mineral and Surface owned by Federal Government. Mineral Rights privately claimed.
- Mineral and Surface owned by State of Arizona. Mineral leases, prospecting permits or applications privately held.
- Public Domain Mineral and State of Arizona Surface. Mineral rights privately claimed.
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Tombstone Development Company, Inc. Lands

- Public Domain Mineral and Surface. Mineral rights claimed by Tombstone Development Company, Inc.
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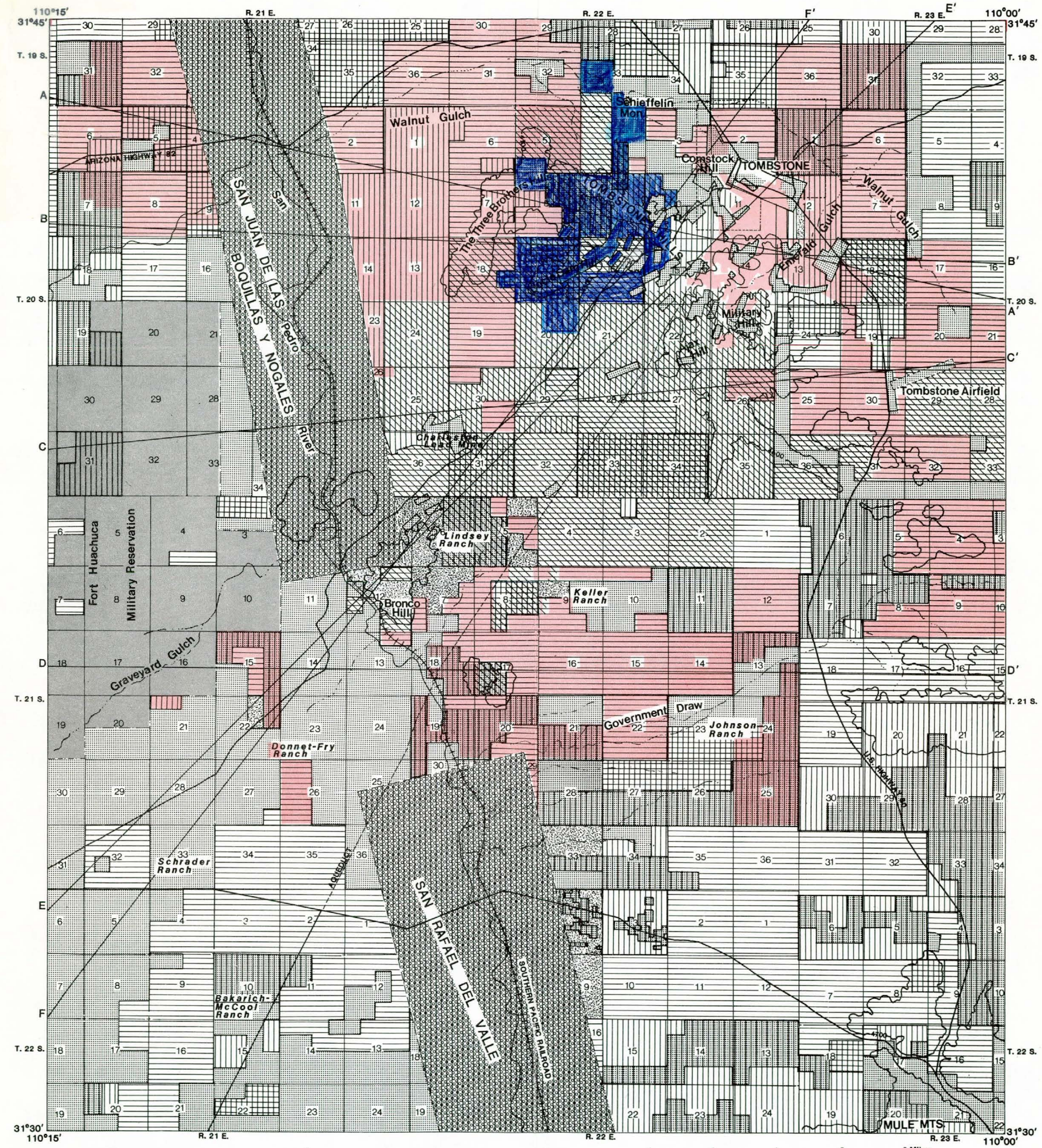
- Fee Simple Surface and State of Arizona Mineral. Prospecting Permit held by Tombstone Development Company, Inc.

- Roads and Highways
- Dry wash
- Southern Pacific Railroad
- Government Reservation Boundary
- Aqueduct
- A——A' Cross section line



Tombstone Development Company, Inc.
Tombstone, Arizona

Land Status Map, Tombstone
15 min. Quadrangle

By Thomas E. Waldrip, Jr.
James A. Briscoe and Associates
Tucson, Arizona

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Figure 5. Property map showing ownership of major holdings of mineral rights in the Tombstone area. Red overprint shows state, federal and private land and lands with mineral rights held by the Tombstone Development Company as of October 15, 1981.

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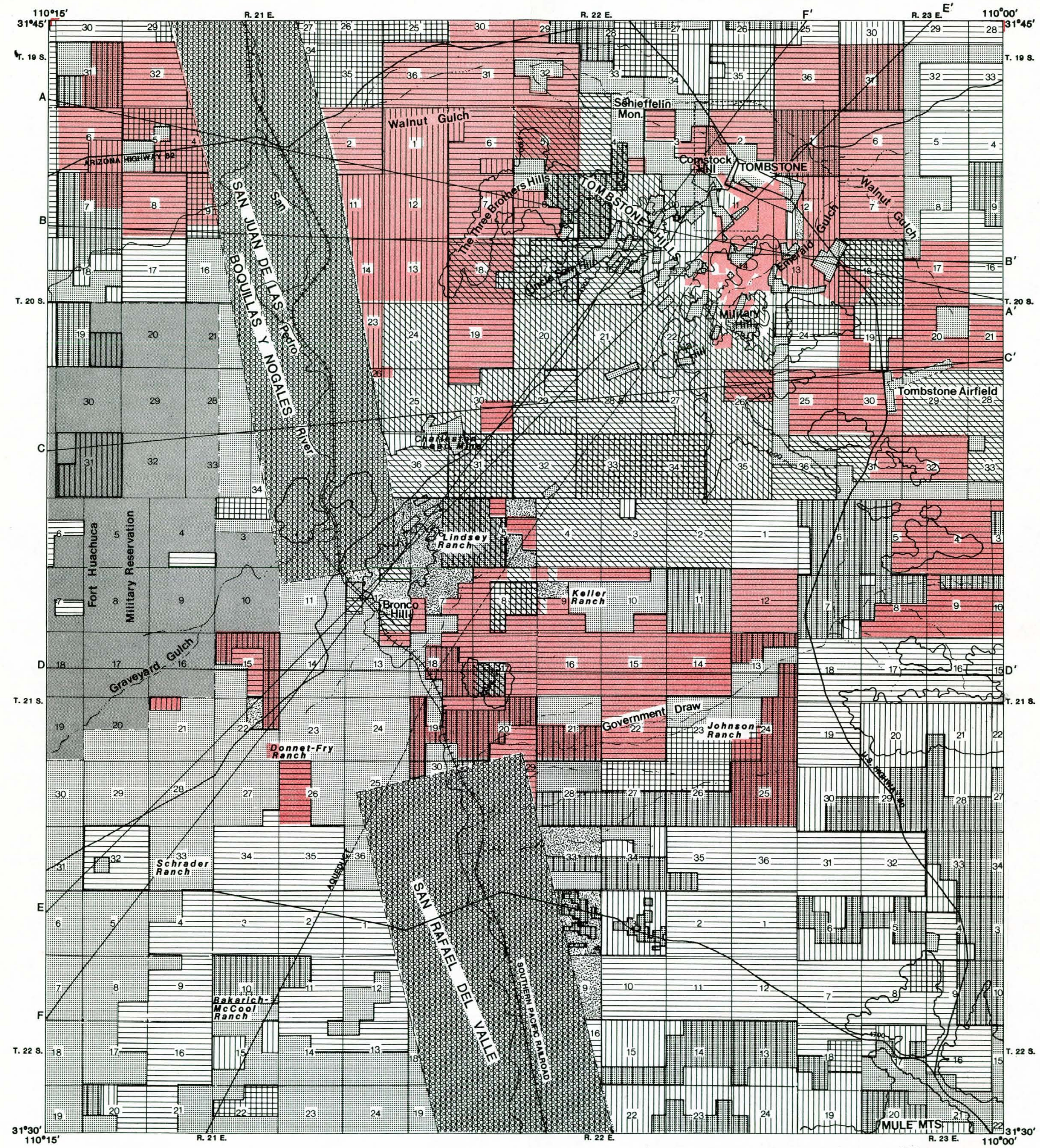

Tombstone Development Company, Inc.

Tombstone, Arizona

Land Status Map, Tombstone
15 min. Quadrangle

James A. Briscoe and Associates
Tucson, Arizona

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MARKER HORIZON—Dotted where concealed.

DIKES—Showing dip.

70 — FAULTS—Showing dip. Dotted where concealed or intruded; ball and bar on downthrown side.

45 — Normal

45 — Reverse

Strike-slip—Arrow couple shows relative displacement. Single arrow shows movement of active block.

Major thrust fault—Sawteeth on upper plate.

Thrust fault—Sawteeth on upper plate.

Anticline.

Syncline.

30 — Inclined strike and dip of beds.

EXOTIC-BLOCK BRECCIA—Rock contains chip or block inclusions of rock different from those of host or other blocks nearby. Typically of volcanic-tectonic or sedimentary-tectonic origin; excludes Tertiary megabreccia deposits.

(QTgu) 157 — Site of well or generalized site of several wells, showing unit penetrated, if known, and depth of well, in feet. 100 feet equals 30.5 meters.

72_x — COLLECTION SITE—Radiogenically dated rock showing age in millions of years. Query before symbol where precise location uncertain.

Roads and Highways

Dry wash

Southern Pacific Railroad

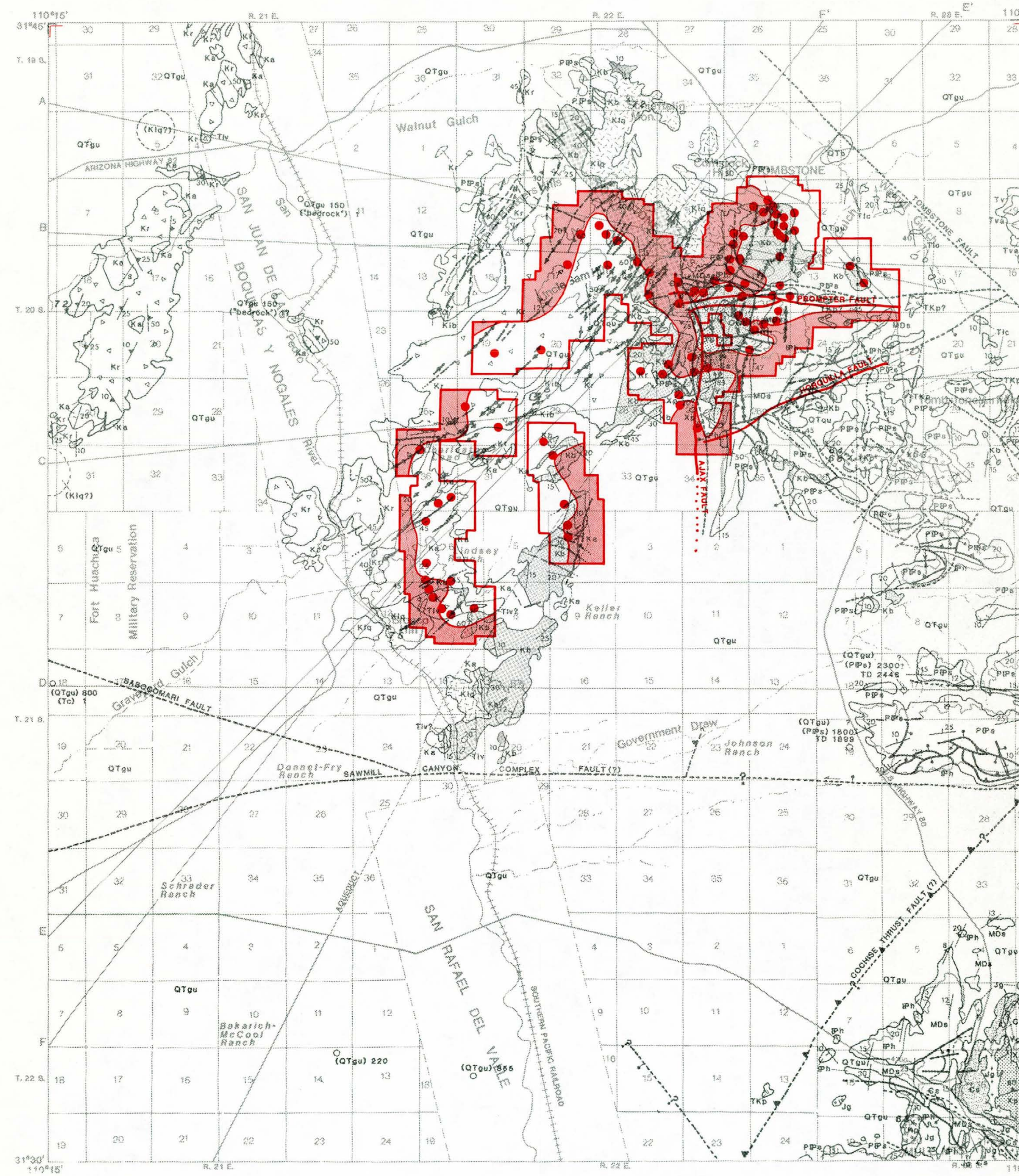
Government Reservation Boundary

Aqueduct

A———A' Cross section line

● Dump sample location

Silver



Tombstone Development Company, Inc.
Tombstone, Arizona

1 0 1 2 3 Miles

N

Geology adopted from Drewes, Harold, 1980, and Newell, R.A., 1973.

By James A. Briscoe
James A. Briscoe and Associates
Tucson, Arizona

Figure 6. Dump sample location map showing area of influence boundaries and the Ajax, Prompter, and Horquilla faults, from Newell, R.A., 1973.

Distribution pattern for high silver ratios in dump samples (in red).

Explanation

Geology

QTgu — OLDER OR UNDIFFERENTIATED SURFICAL DEPOSITS (HOLOCENE TO OLIGOCENE):—Gravel, sand, and silt (Pleistocene and Pliocene—Mainly alluvium of basins; includes some colluvium and landslide deposits. Generally light-pinkish gray, weakly indurated, and with poorly rounded clasts; locally well indurated. Thickness several meters to hundreds of meters.

QTb — Basalt (Pleistocene to Pliocene)—Lava flows, pyroclastic rocks, and some intercalated gravel. Thickness several meters to a few hundred meters in most places. Radiometrically dated at 0.25, 1.0, and 3.2 m.y. old

Tva — Extensive andesite and dacite (Miocene and Upper Oligocene)—Lava flows, pyroclastic rocks, some intercalated epiclastic rocks, and dikes. Mostly gray, fine-grained, porphyritic rocks; includes some very coarse feldspar porphyry andesite (Turkey track porphyry, an informal term of Cooper, 1961). Thickness mostly several meters to several tens of meters. Dated at 24, 25, 27, 33, and 39 m.y.

Tv — Extrusive rhyolite and rhyodacite (Miocene and Upper Oligocene—Lava flows, welded tuff, pyroclastic rocks, and some intercalated epiclastic rocks. Light-gray to grayish-pink, vitric to fine-grained, porphyritic. Commonly a few tens to a few thousand of meters thick. Dated at 23, 24, 25, 26, 26, 26, and 27 m.y. An additional date of 47 m.y., if substantiated, may indicate the presence of Eocene rocks in the lower member of the S O Volcanics of Cochise Co.

Tlc — Lower conglomerate, gravel, and sand (Oligocene and Eocene?)—Alluvium; commonly grayish-red deposits of small, well rounded, nonvolcanic clasts. Mostly several meters to a few tens of meters thick.

Tlv — UPPER CORDILLERAN (LARAMIDE) IGNEOUS ROCKS (LOWER PALEOCENE):—Lower volcanic rocks—Rhyolite to andesite lava flows, pyroclastic rocks, and some intercalated epiclastic rocks. Dated at 57 m.y. Possibly younger age to east.

TKg — MAIN CORDILLERAN (LARAMIDE) IGNEOUS ROCKS:—Porphyritic and aplitic intrusive rocks (Paleocene and Upper Cretaceous)—Mostly latitic porphyry to dacitic porphyry in small stocks and plugs and aplitic bodies not associated with other granitoid stocks. Dated at 61, 63, 63, 64, and 65 m.y.

Kib — Fluidized intrusive breccia—exact age unknown, but penetrates, and thus younger than Uncle Sam porphyry.

Kr — Rhyodacite tuff and welded tuff. —Includes parts of Salero Formation, Sugarloaf Quartz Latite, and Bronco Volcanics, and all of Red Bay Rhyolite, Cat Mountain Rhyolite of Brown (1939) and Uncle Sam Prophyry. Includes local intrusive bodies and locally contains fragments of exotic rocks. Thickness commonly several tens of meters to several hundreds of meters. Dated at 66(?), 70, 72, 73, and 73 m.y. The Uncle Sam, in the Tombstone area, is dated 72 m.y.

Ka — Andesitic to dacitic volcanic breccia.—Includes parts of Solero Formation, Sugarloaf Quartz Latite, and Bronco Volcanics, and all of Demetrie Volcanics and Silverbell Formation of Courtright (1958). Commonly contains large blocks of exotic rocks and locally includes some sedimentary rocks and intrusive rocks. Several tens of meters to several hundreds of meters thick in most places.

Klg — Lower quartz monzonite and graodiorite—Includes some quartz diorite; appears in small stocks. Locally associated with mineralization. Dated at 70, 71, 72, 73, 74, 74, 74, and 76 m.y. The Schiefflin granodorite at Tombstone is 72 m.y.

Kb — BISBEE FORMATION OR GROUP, UNDIFFERENTIATED (LOWER CRETACEOUS):—Upper part of Bisbee Formation or Group, undifferentiated, and related rocks.—Includes upper part of Bisbee Formation, Mural Limestone, Morita, Cintura, Willow Canyon, Apache Canyon, Shellenberger Canyon and Turney Ranch Formations (not listed in stratigraphic sequence) of the Bisbee Group, Amole Arkose of Bryant and Kinnison (1954), and Angelic Arkose. Consists of brownish- to reddish-arkose, gray siltstone, sandstone, conglomerate, and some fossiliferous gray limestone. Commonly several hundred meters thick

Jg — GRANITE AND QUARTZ MONZONITE (JURASSIC)—Stocks of pinkish-gray coarse-grained rock. Locally associated with mineralization. Dated at 140, 148, 149, 149, 150, 153, 160, 161, 167, 178, 185 m.y.

PIPs — Sedimentary rocks (Lower Permian and Upper Pennsylvanian)—consists of Epitaph Dolomite (Lower Permian), Colina Limestone (Lower Permian), and Earp Formation (Lower Permian and Upper Pennsylvanian), undifferentiated. Epitaph Dolomite is a dark- to light-gray slightly cherty dolomite, limestone, marl, siltstone, and gypsum, 120-280 meters thick. Colina Limestone is a medium gray, thick-bedded, sparsely cherty, and sparsely fossiliferous limestone 120-280 meters thick. Earp Formation is a pale-red siltstone, mudstone, shale, and limestone, 120-240 meters thick.

IPh — Horquilla Limestone (Upper and Middle Pennsylvanian)—Light-pinkish-gray, thick- to thin-bedded, cherty, fossiliferous limestone and intercalated pale-brown to pale-reddish-gray siltstone that increases in abundance upward. Typically 300-490 meters thick.

MDs — SEDIMENTARY ROCKS (MISSISSIPPIAN AND DEVONIAN)—Consists mainly of Escabrosa Limestone (Mississippian)—locally (Armstrong and Silberman, 1974) called Escabrosa Group—and Martin Formation (Upper Devonian), undifferentiated. In part of the Chiricahua Mountains also includes Paradise Formation (Upper Mississippian) and Portal Formation of Sabins, 1957a (Upper Devonian). In the Little Dragoon Mountains and some adjacent hills also includes Black Prince Limestone, whose fauna and correlation show strongest affinities with Mississippian rocks but which may include some Pennsylvanian rocks. Escabrosa Limestone is a medium-gray, massive to thick-bedded, commonly crinoidal, cherty, fossiliferous limestone 90-310 meters thick. Martin Formation is thick- to thin-bedded, gray to brown dolomite, gray sparsely fossiliferous, and some siltstone and sandstone, 90-120 meters thick. Paradise Formation is a brown, fossiliferous, shaly limestone. Portal Formation is a black shale and limestone 6-105 meters thick. Black Prince Limestone is pinkish-gray limestone with a basal shale and chert conglomerate, as much as 52 meters thick.

OЄs — SEDIMENTARY ROCKS (LOWER ORDOVICIAN TO MIDDLE CAMBRIAN):—El Paso Limestone (Lower Ordovician and Upper Cambrian), Abrigo Formation (Upper and Middle Cambrian), and Bolsa Quartz (Middle Cambrian), undifferentiated.—El Paso Limestone is a gray, thin-bedded cherty limestone and dolomite 90 meters to about 220 meters thick. Abrigo Formation is a brown, thin-bedded fossiliferous limestone, sandstone, quartzite, and shale, 210-240 meters thick. Bolsa Quartzite is a brown to white or purplish-gray, thick-bedded, coarse-grained quartzite and sandstone with a basal conglomerate, 90-180 meters thick. To the east, equivalents of part of the Abrigo Formation and Bolsa Quartzite are known as the Coronado Sandstone.

Єs — Sedimentary rocks (Upper and Middle Cambrian)—Abrigo Formation (Upper and Middle Cambrian), and Bolsa Quartzite (Middle Cambrian), undifferentiated.

Yg — GRANITOID ROCKS (PRECAMBRIAN Y):—Mainly granodiorite and quartz monsonite, unfoliated to foliated, in part metamorphosed. Generally in stocks, which ahve been little studied.

Xp — PINAL SCHIST (PRECAMBRIAN X)—Chlorite schist, phyllite, and some metavolcanic rocks, metavolcanic rocks, metaquartzite, metaquartzite conglomerate, and gneiss. One metavolcanic rock dated at 1715 m.y.

CONTACT—Dotted where concealed.

MARKER HORIZON—Dotted where concealed.

DIKES—Showing dip.

70 — FAULTS—Showing dip. Dotted where concealed or intruded; ball and bar on downthrown side.

45 — Normal

45 — Reverse

Strike-slip—Arrow couple shows relative displacement. Single arrow shows movement of active block.

Major thrust fault—Sawteeth on upper plate.

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Anticline.

Syncline.

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Roads and Highways

Dry wash

Southern Pacific Railroad

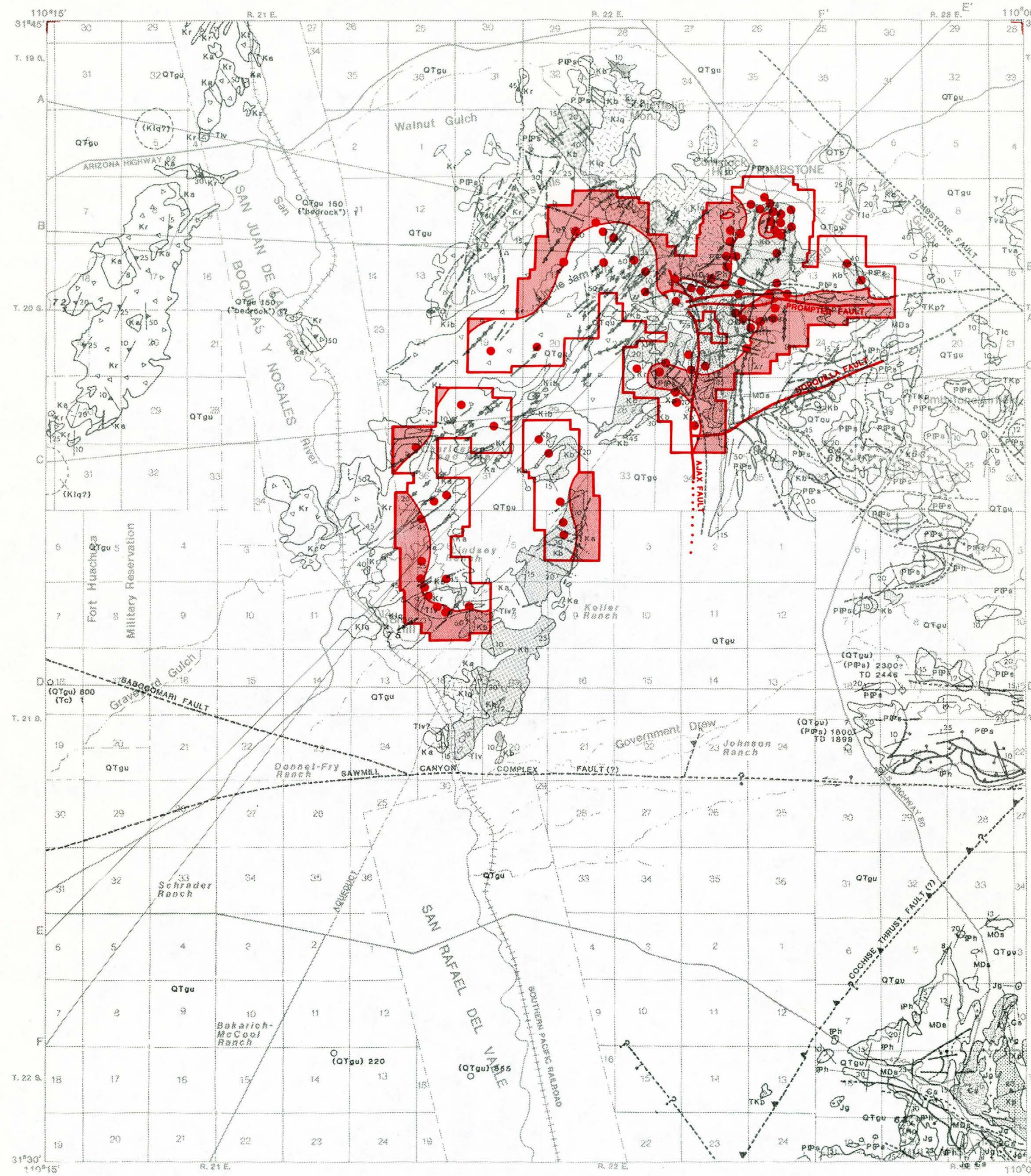
Government Reservation Boundary

Aqueduct

A——A' Cross section line

Dump sample location

Zinc



Tombstone Development Company, Inc.
Tombstone, Arizona

Geology adopted from Drewes, Harold, 1980, and Newell, R.A., 1973.

By James A. Briscoe
James A. Briscoe and Associates
Tucson, Arizona

1 0 1 2 3 Miles

N

Figure 7. Dump sample location map showing area of influence boundaries and the Ajax, Prompter, and Horquilla faults, from Newell, R.A., 1973.

Distribution pattern for high zinc ratio in dump samples (in red).

Explanation

Geology

QTgu — OLDER OR UNDIFFERENTIATED SURFICAL DEPOSITS (HOLOCENE TO OLIGOCENE):—Gravel, sand, and silt (Pleistocene and Pliocene—Mainly alluvium of basins; includes some colluvium and landslide deposits. Generally light-pinkish gray, weakly indurated, and with poorly rounded clasts; locally well indurated. Thickness several meters to hundreds of meters.

QTb — Basalt (Pleistocene to Pliocene)—Lava flows, pyroclastic rocks, and some intercalated gravel. Thickness several meters to a few hundred meters in most places. Radiometrically dated at 0.25, 1.0, and 3.2 m.y. old

Tva — Extensive andesite and dacite (Miocene and Upper Oligocene)—Lava flows, pyroclastic rocks, some intercalated epiclastic rocks, and dikes. Mostly gray, fine-grained, porphyritic rocks; includes some very coarse feldspar porphyry andesite (Turkey track porphyry, an informal term of Cooper, 1961). Thickness mostly several meters to several tens of meters. Dated at 24, 25, 27, 33, and 39 m.y.

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Normal

Reverse

Strike-slip—Arrow couple shows relative displacement. Single arrow shows movement of active block.

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Roads and Highways

Dry wash

Southern Pacific Railroad

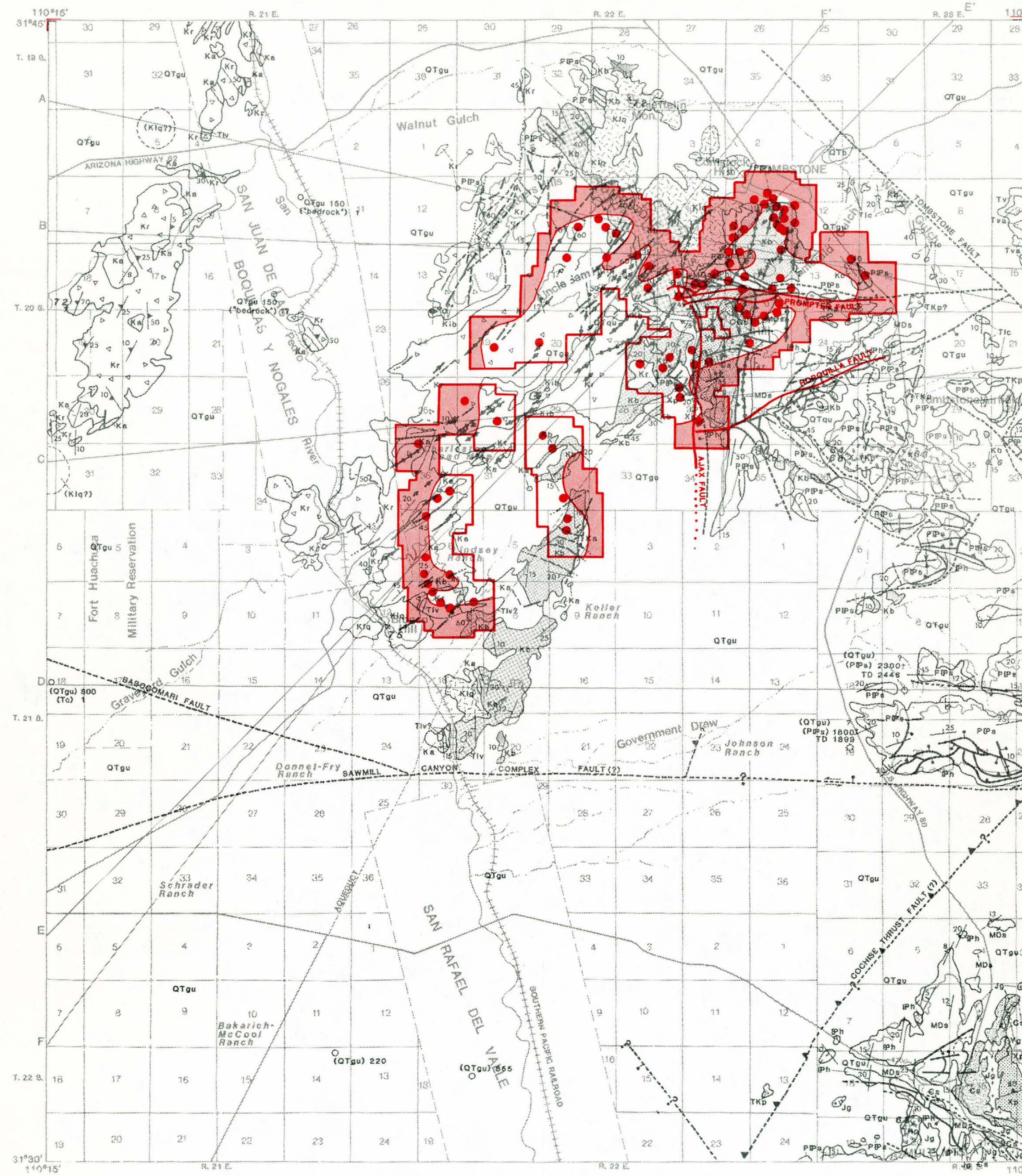
Government Reservation Boundary

Aqueduct

A——A' Cross section line

Dump sample location

Lead



Tombstone Development Company, Inc.
Tombstone, Arizona

1 0 1 2 3 Miles

N

Geology adopted from Drewes, Harold, 1980, and Newell, R.A., 1973.

By James A. Briscoe
James A. Briscoe and Associates
Tucson, Arizona

Figure 8. Dump sample location map showing area of influence boundaries and the Ajax, Prompter, and Horquilla faults, from Newell, R.A., 1973.

Distribution pattern for high lead ratios in dump samples (in red).

Explanation

Geology

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Syncline.

30 Inclined strike and dip of beds.

EXOTIC-BLOCK BRECCIA—Rock contains chip or block inclusions of rock different from those of host or other blocks nearby. Typically of volcanic-tectonic or sedimentary-tectonic origin; excludes Tertiary megabreccia deposits.

(QTgu) 157 — Site of well or generalized site of several wells, showing unit penetrated, if known, and depth of well, in feet. 100 feet equals 30.5 meters.

72x — COLLECTION SITE—Radiogenically dated rock showing age in millions of years. Query before symbol where precise location uncertain.

Roads and Highways

Dry wash

Southern Pacific Railroad

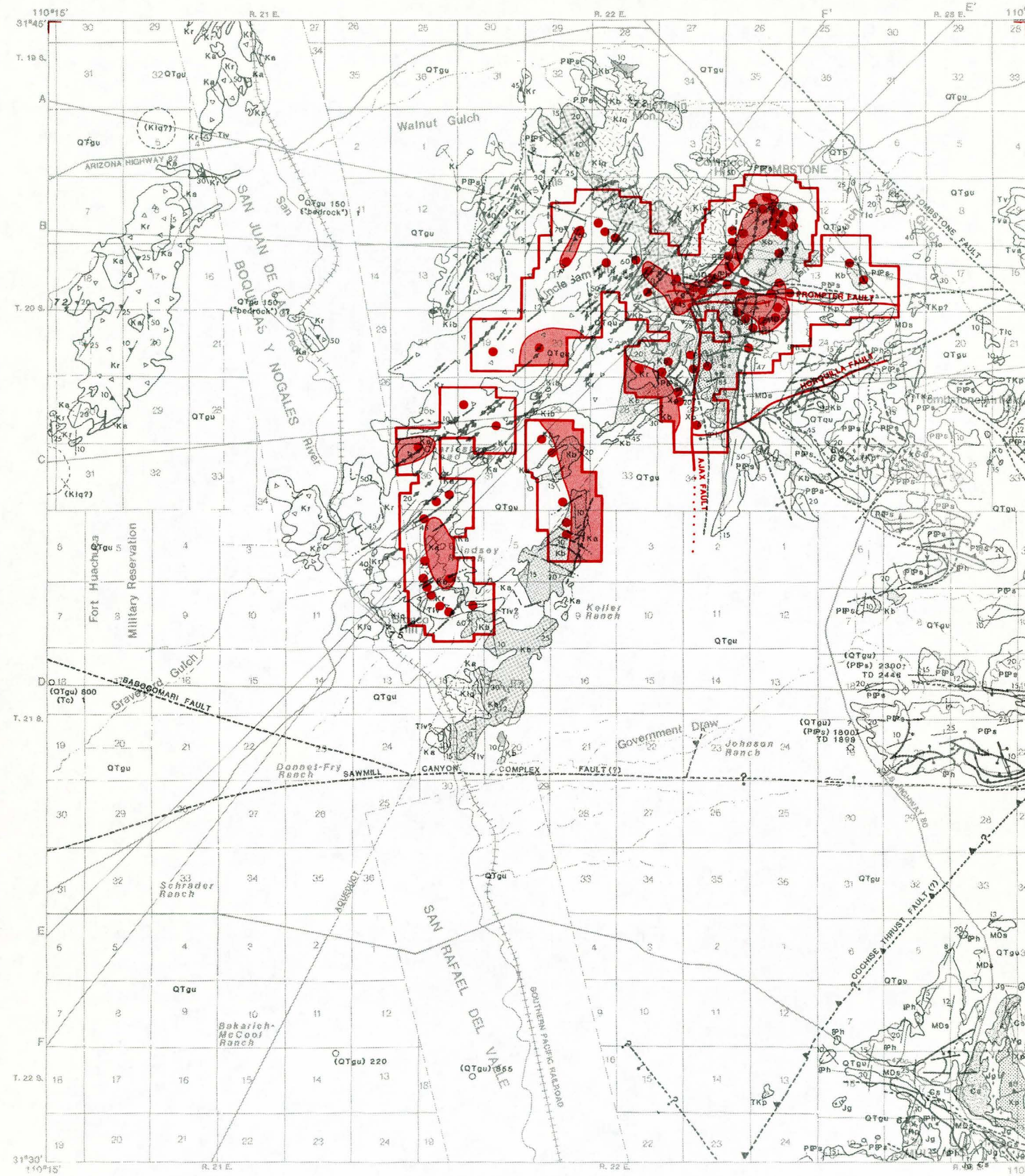
Government Reservation Boundary

Aqueduct

A———A' Cross section line

Dump sample location

Copper



Tombstone Development Company, Inc.
Tombstone, Arizona

1 0 1 2 3 Miles

N

Geology adopted from Drewes, Harold, 1980, and Newell, R.A., 1973.

By James A. Briscoe
James A. Briscoe and Associates
Tucson, Arizona

Figure 9. Dump sample location map showing area of influence boundaries and the Ajax, Prompter, and Horquilla faults, from Newell, R.A., 1973.

Distribution pattern for high copper ratios in dump samples (in red).

Explanation

Geology

QTgu	OLDER OR UNDIFFERENTIATED SURFICAL DEPOSITS (HOLOCENE TO OLIGOCENE):—Gravel, sand, and silt (Pleistocene and Pliocene—Mainly alluvium of basins; includes some colluvium and landslide deposits. Generally light-pinkish gray, weakly indurated, and with poorly rounded clasts; locally well indurated. Thickness several meters to hundreds of meters.
QTb	Basalt (Pleistocene to Pliocene)—Lava flows, pyroclastic rocks, and some intercalated gravel. Thickness several meters to a few hundred meters in most places. Radiometrically dated at 0.25, 1.0, and 3.2 m.y. old
Tva	Extensive andesite and dacite (Miocene and Upper Oligocene)—Lava flows, pyroclastic rocks, some intercalated epiclastic rocks, and dikes. Mostly gray, fine-grained, porphyritic rocks; includes some very coarse feldspar porphyry andesite (Turkey track porphyry, an informal term of Cooper, 1961). Thickness mostly several meters to several tens of meters. Dated at 24, 25, 27, 33, and 39 m.y.
Tv	Extrusive rhyolite and rhyodacite (Miocene and Upper Oligocene—Lava flows, welded tuff, pyroclastic rocks, and some intercalated epiclastic rocks. Light-gray to grayish-pink, vitric to fine-grained, porphyritic. Commonly a few tens to a few thousand of meters thick. Dated at 23, 24, 25, 26, 26, 26, and 27 m.y. An additional date of 47 m.y., if substantiated, may indicate the presence of Eocene rocks in the lower member of the S O Volcanics of Cochise Co.
Tlc	Lower conglomerate, gravel, and sand (Oligocene and Eocene?)—Alluvium; commonly grayish-red deposits of small, well rounded, nonvolcanic clasts. Mostly several meters to a few tens of meters thick.
Tlv	UPPER CORDILLERAN (LARAMIDE) IGNEOUS ROCKS (LOWER PALEOCENE):—Lower volcanic rocks—Rhyolite to andesite lava flows, pyroclastic rocks, and some intercalated epiclastic rocks. Dated at 57 m.y. Possibly younger age to east.
TKg	MAIN CORDILLERAN (LARAMIDE) IGNEOUS ROCKS:—Porphyritic and aplitic intrusive rocks (Paleocene and Upper Cretaceous)—Mostly latitic porphyry to dacitic porphyry in small stocks and plugs and aplitic bodies not associated with other granitoid stocks. Dated at 61, 63, 63, 64, and 65 m.y.
Kib	Fluidized intrusive breccia—exact age unknown, but penetrates, and thus younger than Uncle Sam porphyry.
Kr	Rhyodacite tuff and welded tuff.—Includes parts of Salero Formation, Sugarloaf Quartz Latite, and Bronco Volcanics, and all of Red Bay Rhyolite, Cat Mountain Rhyolite of Brown (1939) and Uncle Sam Prophyry. Includes local intrusive bodies and locally contains fragments of exotic rocks. Thickness commonly several tens of meters to several hundreds of meters. Dated at 66(?), 70, 72, 73, and 73 m.y. The Uncle Sam, in the Tombstone area, is dated 72 m.y.
Ka	Andesitic to dacitic volcanic breccia.—Includes parts of Solero Formation, Sugarloaf Quartz Latite, and Bronco Volcanics, and all of Demetrie Volcanics and Silverbell Formation of Courtright (1958). Commonly contains large blocks of exotic rocks and locally includes some sedimentary rocks and intrusive rocks. Several tens of meters to several hundreds of meters thick in most places.
Klg	Lower quartz monzonite and graodiorite—Includes some quartz diorite; appears in small stocks. Locally associated with mineralization. Dated at 70, 71, 72, 73, 74, 74, 74, and 76 m.y. The Schiefflin granodorite at Tombstone is 72 m.y.
Kb	BISBEE FORMATION OR GROUP, UNDIFFERENTIATED (LOWER CRETACEOUS):—Upper part of Bisbee Formation or Group, undifferentiated, and related rocks.—Includes upper part of Bisbee Formation, Mural Limestone, Morita, Cintura, Willow Canyon, Apache Canyon, Shellenberger Canyon and Turney Ranch Formations (not listed in stratigraphic sequence) of the Bisbee Group, Amole Arkose of Bryant and Kinnison (1954), and Angelic Arkose. Consists of brownish- to reddish-arkose, gray siltstone, sandstone, conglomerate, and some fossiliferous gray limestone. Commonly several hundred meters thick
Jg	GRANITE AND QUARTZ MONZONITE (JURASSIC)—Stocks of pinkish-gray coarse-grained rock. Locally associated with mineralization. Dated at 140, 148, 149, 149, 150, 153, 160, 161, 167, 178, 185 m.y.
PIPs	Sedimentary rocks (Lower Permian and Upper Pennsylvanian)—consists of Epitaph Dolomite (Lower Permian), Colina Limestone (Lower Permian), and Earp Formation (Lower Permian and Upper Pennsylvanian), undifferentiated. Epitaph Dolomite is a dark- to light-gray slightly cherty dolomite, limestone, marl, siltstone, and gypsum, 120-280 meters thick. Colina Limestone is a medium gray, thick-bedded, sparsely cherty, and sparsely fossiliferous limestone 120-280 meters thick. Earp Formation is a pale-red siltstone, mudstone, shale, and limestone, 120-240 meters thick.
IPh	Horquilla Limestone (Upper and Middle Pennsylvanian)—Light-pinkish-gray, thick- to thin-bedded, cherty, fossiliferous limestone and intercalated pale-brown to pale-reddish-gray siltstone that increases in abundance upward. Typically 300-490 meters thick.
MDs	SEDIMENTARY ROCKS (MISSISSIPPIAN AND DEVONIAN)—Consists mainly of Escabrosa Limestone (Mississippian)—locally (Armstrong and Silberman, 1974) called Escabrosa Group—and Martin Formation (Upper Devonian), undifferentiated. In part of the Chiricahua Mountains also includes Paradise Formation (Upper Mississippian) and Portal Formation of Sabins, 1957a (Upper Devonian). In the Little Dragoon Mountains and some adjacent hills also includes Black Prince Limestone, whose fauna and correlation show strongest affinities with Mississippian rocks but which may include some Pennsylvanian rocks. Escabrosa Limestone is a medium-gray, massive to thick-bedded, commonly crinoidal, cherty, fossiliferous limestone 90-310 meters thick. Martin Formation is thick- to thin-bedded, gray to brown dolomite, gray sparsely fossiliferous, and some siltstone and sandstone, 90-120 meters thick. Paradise Formation is a brown, fossiliferous, shaly limestone. Portal Formation is a black shale and limestone 6-105 meters thick. Black Prince Limestone is pinkish-gray limestone with a basal shale and chert conglomerate, as much as 52 meters thick.
OCs	SEDIMENTARY ROCKS (LOWER ORDOVICIAN TO MIDDLE CAMBRIAN):—El Paso Limestone (Lower Ordovician and Upper Cambrian), Abrigo Formation (Upper and Middle Cambrian), and Bolsa Quartz (Middle Cambrian), undifferentiated.—El Paso Limestone is a gray, thin-bedded cherty limestone and dolomite 90 meters to about 220 meters thick. Abrigo Formation is a brown, thin-bedded fossiliferous limestone, sandstone, quartzite, and shale, 210-240 meters thick. Bolsa Quartzite is a brown to white or purplish-gray, thick-bedded, coarse-grained quartzite and sandstone with a basal conglomerate, 90-180 meters thick. To the east, equivalents of part of the Abrigo Formation and Bolsa Quartzite are known as the Coronado Sandstone.
Cs	Sedimentary rocks (Upper and Middle Cambrian)—Abrigo Formation (Upper and Middle Cambrian), and Bolsa Quartzite (Middle Cambrian), undifferentiated.
Yg	GRANITOID ROCKS (PRECAMBRIAN Y):—Mainly granodiorite and quartz monsonite, unfoliated to foliated, in part metamorphosed. Generally in stocks, which ahve been little studied.
Xp	PINAL SCHIST (PRECAMBRIAN X)—Chlorite schist, phyllite, and some metavolcanic rocks, metavolcanic rocks, metaquartzite, metaquartzite conglomerate, and gneiss. One metavolcanic rock dated at 1715 m.y.
	CONTACT—Dotted where concealed.
	MARKER HORIZON—Dotted where concealed.
	DIKES—Showing dip.
70	FAULTS—Showing dip. Dotted where concealed or intruded; ball and bar on downthrown side.
45	Normal
45	Reverse
	Strike-slip—Arrow couple shows relative displacement. Single arrow shows movement of active block.
	Major thrust fault—Sawteeth on upper plate.
	Thrust fault—Sawteeth on upper plate.
	Anticline.
	Syncline.
30	Inclined strike and dip of beds.
	EXOTIC-BLOCK BRECCIA—Rock contains chip or block inclusions of rock different from those of host or other blocks nearby. Typically of volcanic-tectonic or sedimentary-tectonic origin; excludes Tertiary megabreccia deposits.
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72x	COLLECTION SITE—Radiogenically dated rock showing age in millions of years. Query before symbol where precise location uncertain.

Roads and Highways

Dry wash

Southern Pacific Railroad

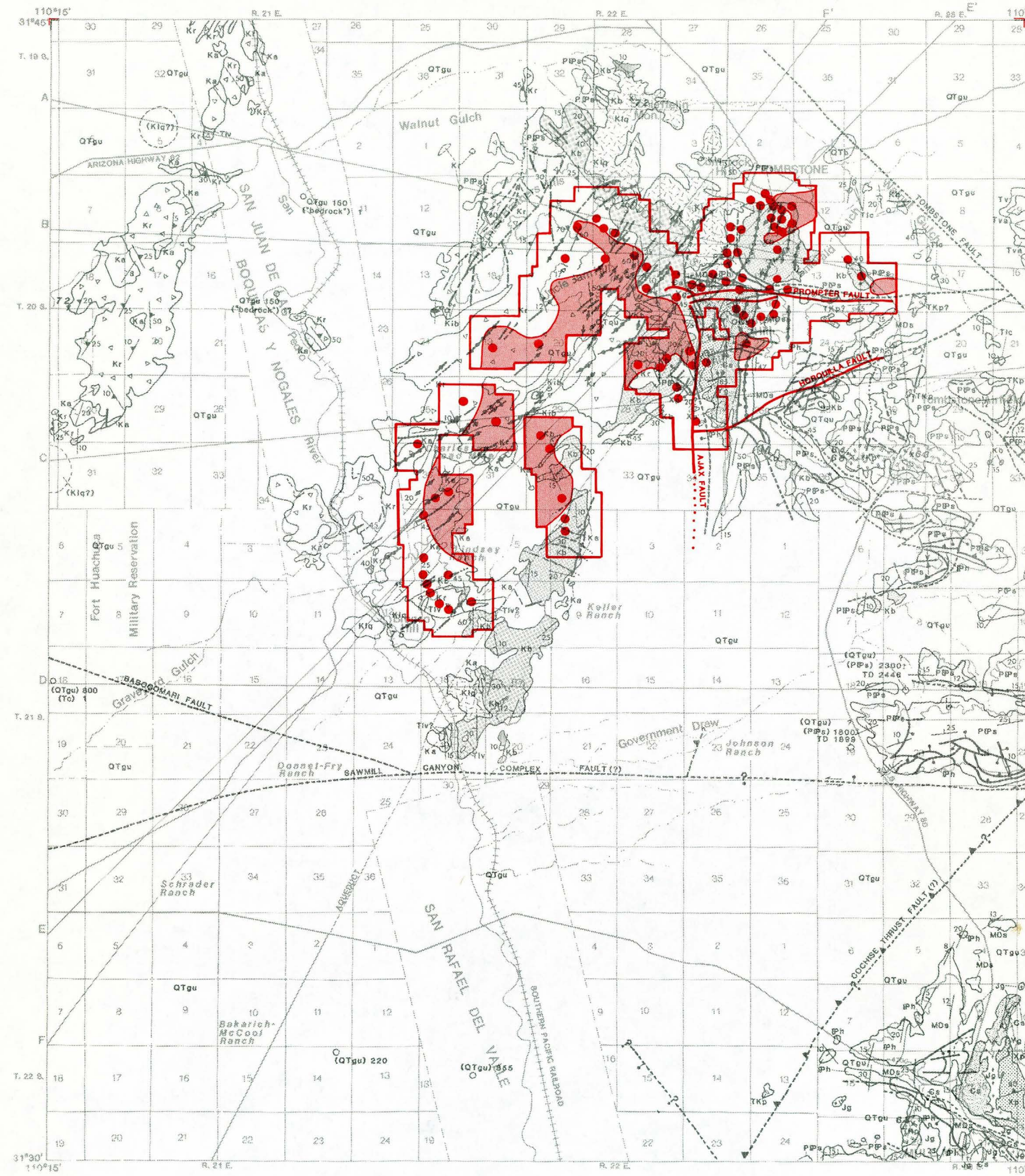
Government Reservation Boundary

Aqueduct

A———A' Cross section line

• Dump sample location

Molybdenum



Tombstone Development Company, Inc.
Tombstone, Arizona

1 0 1 2 3 Miles

N

Geology adopted from Drewes, Harold, 1980, and Newell, R.A., 1973.

By James A. Briscoe
James A. Briscoe and Associates
Tucson, Arizona

Figure 10. Dump sample location map showing area of influence boundaries and the Ajax, Prompter, and Horquilla faults, from Newell, R.A., 1973.

Distribution pattern for high molybdenum ratios in dump samples (in red).

Explanation

Geology

QTgu — OLDER OR UNDIFFERENTIATED SURFICAL DEPOSITS (HOLOCENE TO OLIGOCENE):—Gravel, sand, and silt (Pleistocene and Pliocene—Mainly alluvium of basins; includes some colluvium and landslide deposits. Generally light-pinkish gray, weakly indurated, and with poorly rounded clasts; locally well indurated. Thickness several meters to hundreds of meters.

QTb — Basalt (Pleistocene to Pliocene)—Lava flows, pyroclastic rocks, and some intercalated gravel. Thickness several meters to a few hundred meters in most places. Radiometrically dated at 0.25, 1.0, and 3.2 m.y. old

Tva — Extensive andesite and dacite (Miocene and Upper Oligocene)—Lava flows, pyroclastic rocks, some intercalated epiclastic rocks, and dikes. Mostly gray, fine-grained porphyritic rocks; includes some very coarse feldspar porphyry andesite (Turkey track porphyry, an informal term of Cooper, 1961). Thickness mostly several meters to several tens of meters. Dated at 24, 25, 27, 33, and 39 m.y.

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Tlc — Lower conglomerate, gravel, and sand (Oligocene and Eocene?)—Alluvium; commonly grayish-red deposits of small, well rounded, nonvolcanic clasts. Mostly several meters to a few tens of meters thick.

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Jg — GRANITE AND QUARTZ MONZONITE (JURASSIC)—Stocks of pinkish-gray coarse-grained rock. Locally associated with mineralization. Dated at 140, 148, 149, 149, 150, 153, 160, 161, 167, 178, 185 m.y.

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CONTACT—Dotted where concealed.

MARKER HORIZON—Dotted where concealed.

DIKES—Showing dip.

FAULTS—Showing dip. Dotted where concealed or intruded; ball and bar on downthrown side.

70

45 Normal

Reverse 45

Strike-slip—Arrow couple shows relative displacement. Single arrow shows movement of active block.

Major thrust fault—Sawteeth on upper plate.

Thrust fault—Sawteeth on upper plate.

Anticline.

Syncline.

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Roads and Highways

Dry wash

Southern Pacific Railroad

Government Reservation Boundary

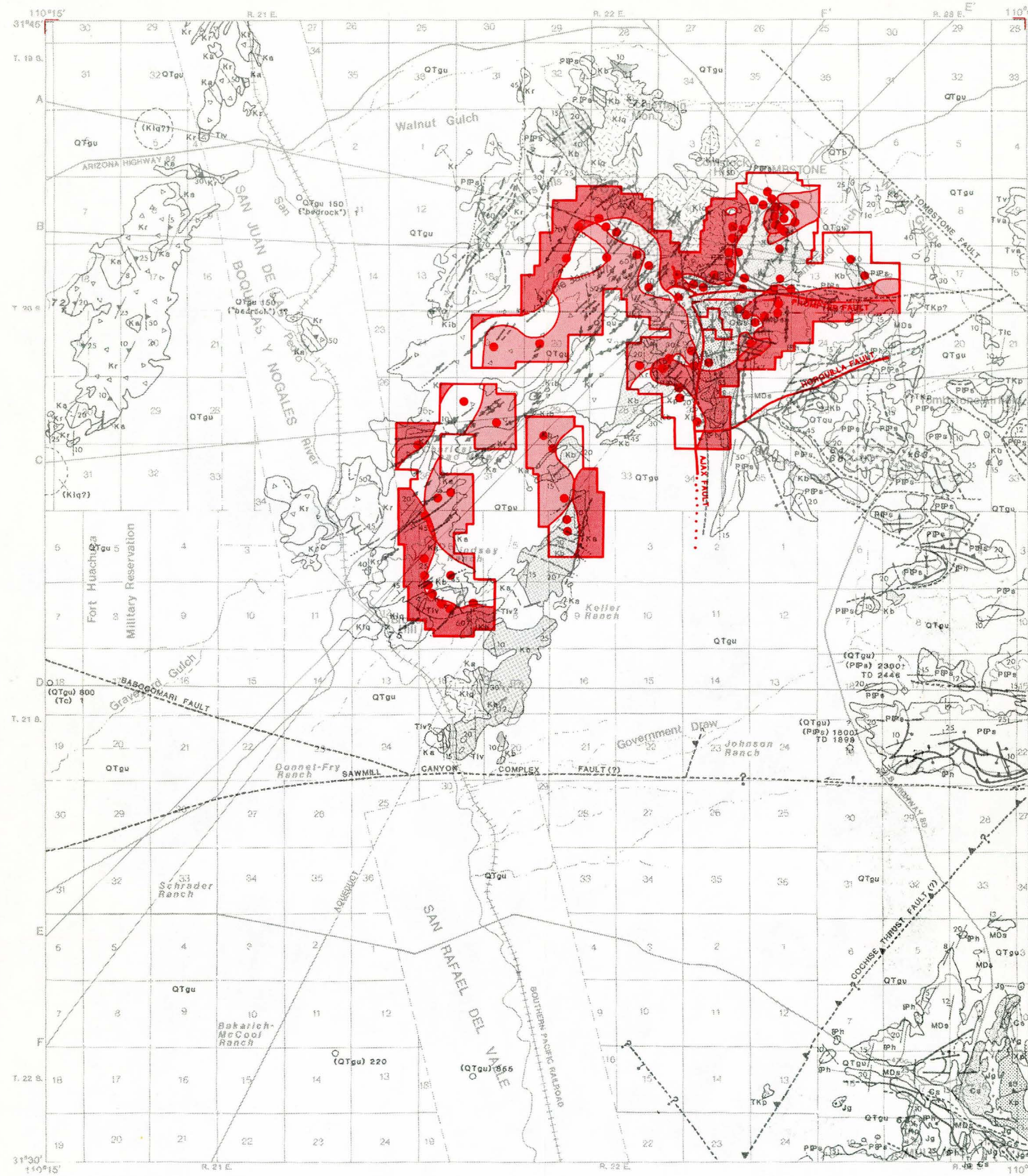
Aqueduct

A———A' Cross section line

Dump sample location

Molybdenum

Zinc



Tombstone Development Company, Inc.
Tombstone, Arizona

Geology adopted from Drewes, Harold, 1980, and Newell, R.A., 1973.

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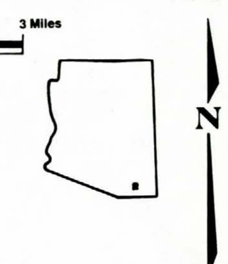
1 0 1 2 3 Miles



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Distribution pattern for high molybdenum and zinc ratios in dump samples (in red).

Explanation

Geology

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Major thrust fault—Sawteeth on upper plate.

Thrust fault—Sawteeth on upper plate.

Anticline.

Syncline.

30 — Inclined strike and dip of beds.

EXOTIC-BLOCK BRECCIA—Rock contains chip or block inclusions of rock different from those of host or other blocks nearby. Typically of volcanic-tectonic or sedimentary-tectonic origin; excludes Tertiary megabreccia deposits

(QTgu) 157 — Site of well or generalized site of several wells, showing unit penetrated, if known, and depth of well, in feet. 100 feet equals 30.5 meters.

72x — COLLECTION SITE—Radiogenically dated rock showing age in millions of years. Query before symbol where precise location uncertain.

Roads and Highways

Dry wash

Southern Pacific Railroad

Government Reservation Boundary

Aqueduct

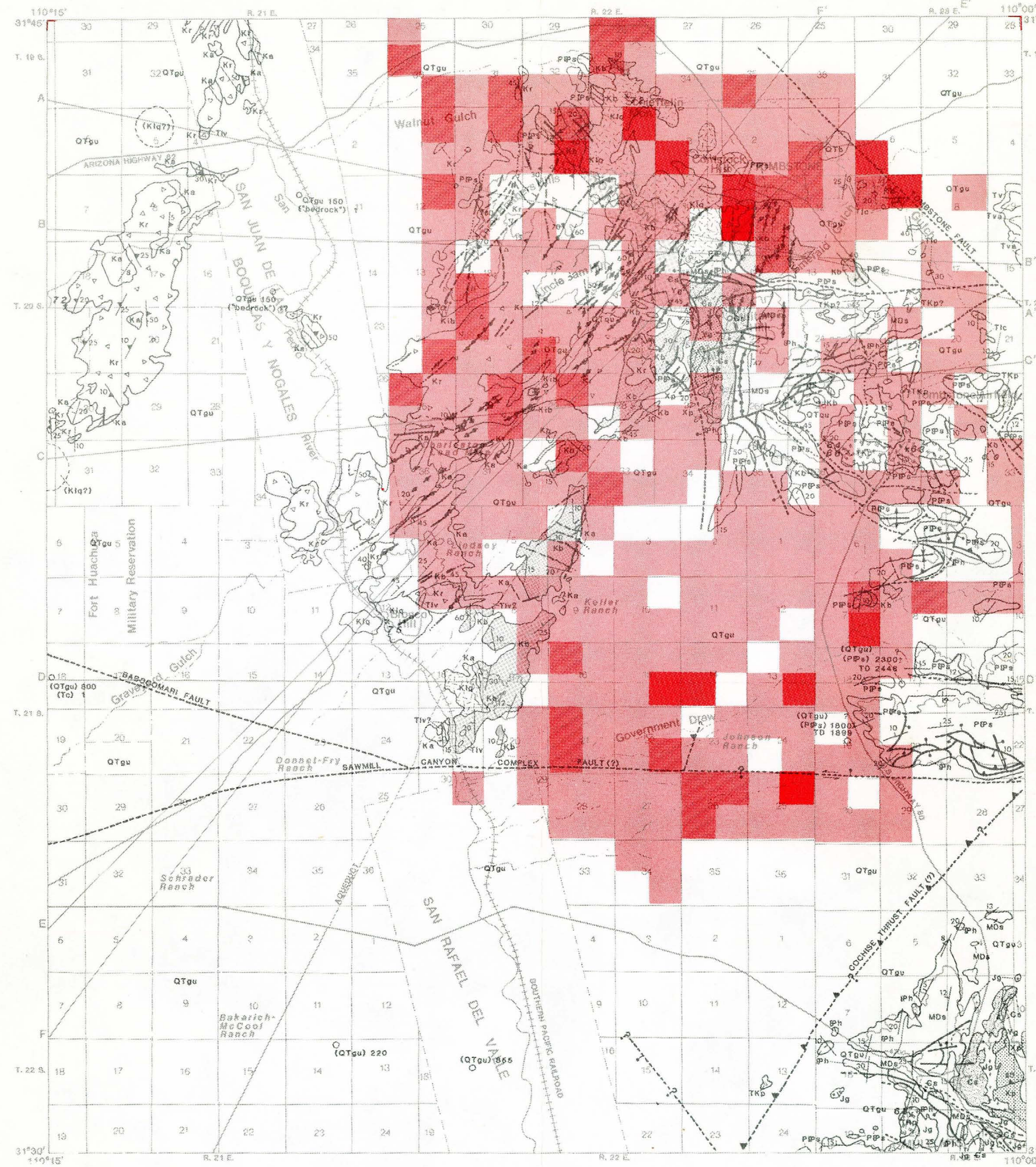
A—A' Cross section line

≤ 1 ppm

1.1 - 2 ppm

2.1 - 3 ppm

≥ 3 ppm



Tombstone Development Company, Inc.
Tombstone, Arizona

Geology adopted from Drewes, Harold, 1980, and Newell, R.A., 1973.

Figure 12. Distribution pattern of silver in mesquite trees (in red), from Newell, R.A., 1973.

By James A. Briscoe
James A. Briscoe and Associates
Tucson, Arizona

Explanation

Geology

- **QTgu** — OLDER OR UNDIFFERENTIATED SURFICAL DEPOSITS (HOLOCENE TO OLIGOCENE):—Gravel, sand, and silt (Pleistocene and Pliocene—Mainly alluvium of basins; includes some colluvium and landslide deposits. Generally light-pinkish gray, weakly indurated, and with poorly rounded clasts; locally well indurated. Thickness several meters to hundreds of meters.
- **QTb** — Basalt (Pleistocene to Pliocene)—Lava flows, pyroclastic rocks, and some intercalated gravel. Thickness several meters to a few hundred meters in most places. Radiometrically dated at 0.25, 1.0, and 3.2 m.y. old
- **Tva** — Extensive andesite and dacite (Miocene and Upper Oligocene)—Lava flows, pyroclastic rocks, some intercalated epiclastic rocks, and dikes. Mostly gray, fine-grained, porphyritic rocks; includes some very coarse feldspar porphyry andesite (Turkey track porphyry, an informal term of Cooper, 1961). Thickness mostly several meters to several tens of meters. Dated at 24, 25, 27, 33, and 39 m.y.
- **Tv** — Extrusive rhyolite and rhyodacite (Miocene and Upper Oligocene—Lava flows, welded tuff, pyroclastic rocks, and some intercalated epiclastic rocks. Light-gray to grayish-pink, vitric to fine-grained, porphyritic. Commonly a few tens to a few thousand of meters thick. Dated at 23, 24, 25, 26, 26, 26, and 27 m.y. An additional date of 47 m.y., if substantiated, may indicate the presence of Eocene rocks in the lower member of the S O Volcanics of Cochise Co.
- **Tlc** — Lower conglomerate, gravel, and sand (Oligocene and Eocene?)—Alluvium; commonly grayish-red deposits of small, well rounded, nonvolcanic clasts. Mostly several meters to a few tens of meters thick.
- **Tiv** — UPPER CORDILLERAN (LARAMIDE) IGNEOUS ROCKS (LOWER PALEOCENE):—Lower volcanic rocks—Rhyolite to andesite lava flows, pyroclastic rocks, and some intercalated epiclastic rocks. Dated at 57 m.y. Possibly younger age to east.
- **TKp** — MAIN CORDILLERAN (LARAMIDE) IGNEOUS ROCKS:—Porphyritic and aplitic intrusive rocks (Paleocene and Upper Cretaceous)—Mostly latitic porphyry to dacitic porphyry in small stocks and plugs and aplitic bodies not associated with other granitoid stocks. Dated at 61, 63, 63, 64, and 65 m.y.
- **Kib** — Fluidized intrusive breccia—exact age unknown, but penetrates, and thus younger than Uncle Sam porphyry.
- **Kr** — Rhyodacite tuff and welded tuff.—Includes parts of Salero Formation, Sugarloaf Quartz Latite, and Bronco Volcanics, and all of Red Bay Rhyolite, Cat Mountain Rhyolite of Brown (1939) and Uncle Sam Prophyry. Includes local intrusive bodies and locally contains fragments of exotic rocks. Thickness commonly several tens of meters to several hundreds of meters. Dated at 66(?), 70, 72, 73, and 73 m.y. The Uncle Sam, in the Tombstone area, is dated 72 m.y.
- **Ka** — Andesitic to dacitic volcanic breccia.—Includes parts of Solero Formation, Sugarloaf Quartz Latite, and Bronco Volcanics, and all of Demetrie Volcanics and Silverbell Formation of Courtright (1958). Commonly contains large blocks of exotic rocks and locally includes some sedimentary rocks and intrusive rocks. Several tens of meters to several hundreds of meters thick in most places.
- **Klg** — Lower quartz monzonite and graodiorite—Includes some quartz diorite; appears in small stocks. Locally associated with mineralization. Dated at 70, 71, 72, 73, 74, 74, 74, and 76 m.y. The Schiefflin granodorite at Tombstone is 72 m.y.
- **Kb** — BISBEE FORMATION OR GROUP, UNDIFFERENTIATED (LOWER CRETACEOUS):—Upper part of Bisbee Formation or Group, undifferentiated, and related rocks.—Includes upper part of Bisbee Formation, Mural Limestone, Morita, Cintura, Willow Canyon, Apache Canyon, Shellenberger Canyon and Turney Ranch Formations (not listed in stratigraphic sequence) of the Bisbee Group, Amole Arkose of Bryant and Kinnison (1954), and Angelic Arkose. Consists of brownish- to reddish-arkose, gray siltstone, sandstone, conglomerate, and some fossiliferous gray limestone. Commonly several hundred meters thick
- **Jg** — GRANITE AND QUARTZ MONZONITE (JURASSIC)—Stocks of pinkish-gray coarse-grained rock. Locally associated with mineralization. Dated at 140, 148, 149, 149, 150, 153, 160, 161, 167, 178, 185 m.y.
- **PIPs** — Sedimentary rocks (Lower Permian and Upper Pennsylvanian)—consists of Epitaph Dolomite (Lower Permian), Colina Limestone (Lower Permian), and Earp Formation (Lower Permian and Upper Pennsylvanian), undifferentiated. Epitaph Dolomite is a dark- to light-gray slightly cherty dolomite, limestone, marl, siltstone, and gypsum, 120-280 meters thick. Colina Limestone is a medium gray, thick-bedded, sparsely cherty, and sparsely fossiliferous limestone 120-280 meters thick. Earp Formation is a pale-red siltstone, mudstone, shale, and limestone, 120-240 meters thick.
- **IPh** — Horquilla Limestone (Upper and Middle Pennsylvanian)—Light-pinkish-gray, thick- to thin-bedded, cherty, fossiliferous limestone and intercalated pale-brown to pale-reddish-gray siltstone that increases in abundance upward. Typically 300-490 meters thick.
- **MDs** — SEDIMENTARY ROCKS (MISSISSIPPIAN AND DEVONIAN)—Consists mainly of Escabrosa Limestone (Mississippian)—locally (Armstrong and Silberman, 1974) called Escabrosa Group—and Martin Formation (Upper Devonian), undifferentiated. In part of the Chiricahua Mountains also includes Paradise Formation (Upper Mississippian) and Portal Formation of Sabins, 1957a (Upper Devonian). In the Little Dragoon Mountains and some adjacent hills also includes Black Prince Limestone, whose fauna and correlation show strongest affinities with Mississippian rocks but which may include some Pennsylvanian rocks. Escabrosa Limestone is a medium-gray, massive to thick-bedded, commonly crinoidal, cherty, fossiliferous limestone 90-310 meters thick. Martin Formation is thick- to thin-bedded, gray to brown dolomite, gray sparsely fossiliferous, and some siltstone and sandstone, 90-120 meters thick. Paradise Formation is a brown, fossiliferous, shaly limestone. Portal Formation is a black shale and limestone 6-105 meters thick. Black Prince Limestone is pinkish-gray limestone with a basal shale and chert conglomerate, as much as 52 meters thick.
- **OCs** — SEDIMENTARY ROCKS (LOWER ORDOVICIAN TO MIDDLE CAMBRIAN):—El Paso Limestone (Lower Ordovician and Upper Cambrian), Abrigo Formation (Upper and Middle Cambrian), and Bolsa Quartz (Middle Cambrian), undifferentiated.—El Paso Limestone is a gray, thin-bedded cherty limestone and dolomite 90 meters to about 220 meters thick. Abrigo Formation is a brown, thin-bedded fossiliferous limestone, sandstone, quartzite, and shale, 210-240 meters thick. Bolsa Quartzite is a brown to white or purplish-gray, thick-bedded, coarse-grained quartzite and sandstone with a basal conglomerate, 90-180 meters thick. To the east, equivalents of part of the Abrigo Formation and Bolsa Quartzite are known as the Coronado Sandstone.
- **Cs** — Sedimentary rocks (Upper and Middle Cambrian)—Abrigo Formation (Upper and Middle Cambrian), and Bolsa Quartzite (Middle Cambrian), undifferentiated.
- **Yg** — GRANITOID ROCKS (PRECAMBRIAN Y):—Mainly granodiorite and quartz monsonite, unfoliated to foliated, in part metamorphosed. Generally in stocks, which ahve been little studied.
- **Xp** — PINAL SCHIST (PRECAMBRIAN X)—Chlorite schist, phyllite, and some metavolcanic rocks, metavolcanic rocks, metaquartzite, metaquartzite conglomerate, and gneiss. One metavolcanic rock dated at 1715 m.y.

CONTACT—Dotted where concealed.

MARKER HORIZON—Dotted where concealed.

DIKES—Showing dip.

70 FAULTS—Showing dip. Dotted where concealed or intruded; ball and bar on downthrown side.

45 Normal

45 Reverse

Strike-slip—Arrow couple shows relative displacement. Single arrow shows movement of active block.

Major thrust fault—Sawteeth on upper plate.

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Anticline.

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Roads and Highways

Dry wash

Southern Pacific Railroad

Government Reservation Boundary

Aqueduct

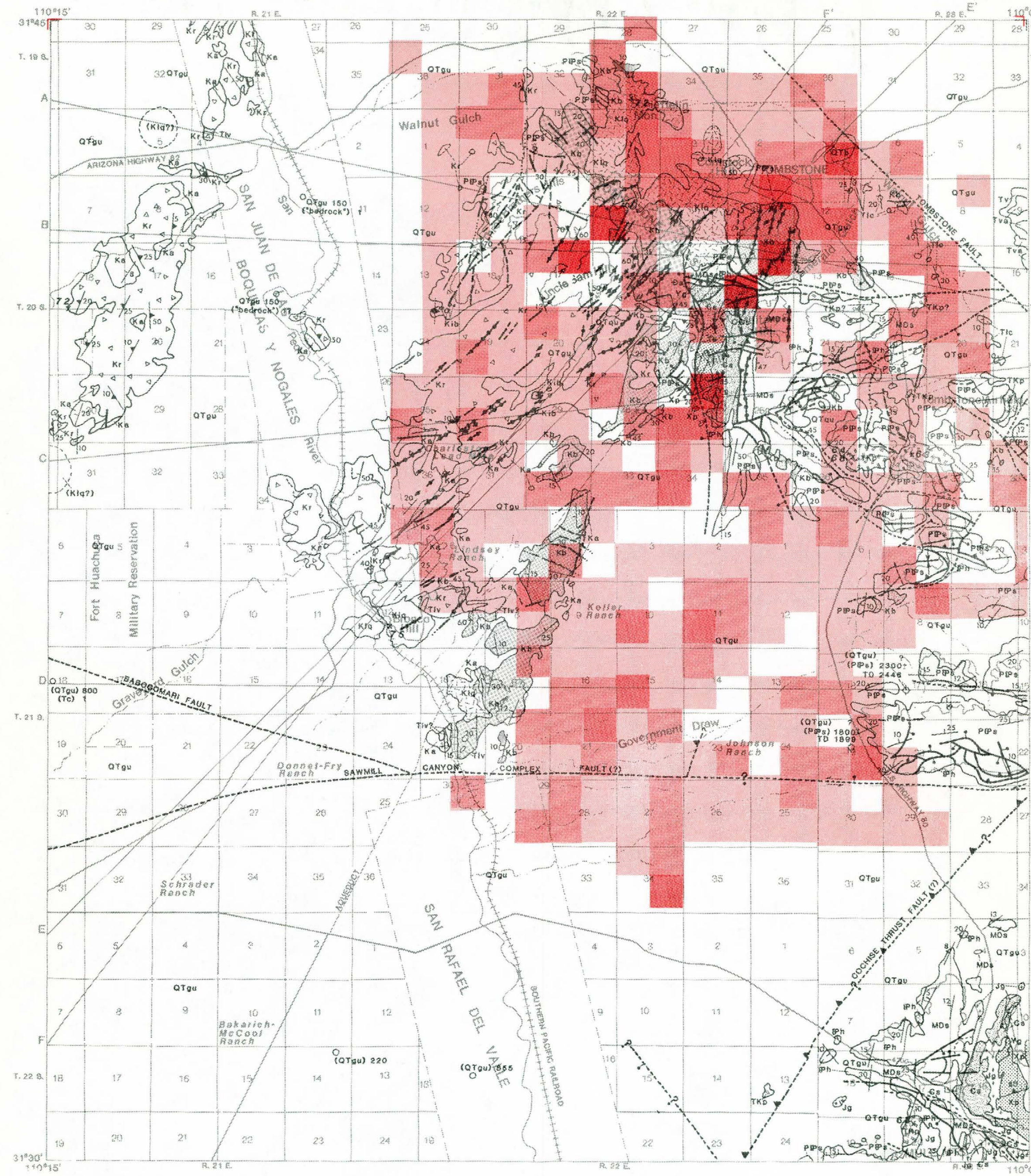
A—A' Cross section line

≤ 400 ppm

401 - 600 ppm

601 - 800 ppm

≥ 800 ppm



0 1 2 3 Miles

N

Tombstone Development Company, Inc.
Tombstone, Arizona

Geology adopted from Drewes, Harold, 1980, and Newell, R.A., 1973.

Figure 13. Distribution pattern of zinc in mesquite trees (in red), from Newell, R.A., 1973.

By James A. Briscoe
James A. Briscoe and Associates
Tucson, Arizona

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Geology

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CONTACT—Dotted where concealed.

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DIKES—Showing dip.

FAULTS—Showing dip. Dotted where concealed or intruded; ball and bar on downthrown side.

70 — Normal (45)

Reverse (45)

Strike-slip—Arrow couple shows relative displacement. Single arrow shows movement of active block.

Major thrust fault—Sawteeth on upper plate.

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Roads and Highways

Dry wash

Southern Pacific Railroad

Government Reservation Boundary

Aqueduct

A——A' Cross section line

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101 - 150 ppm

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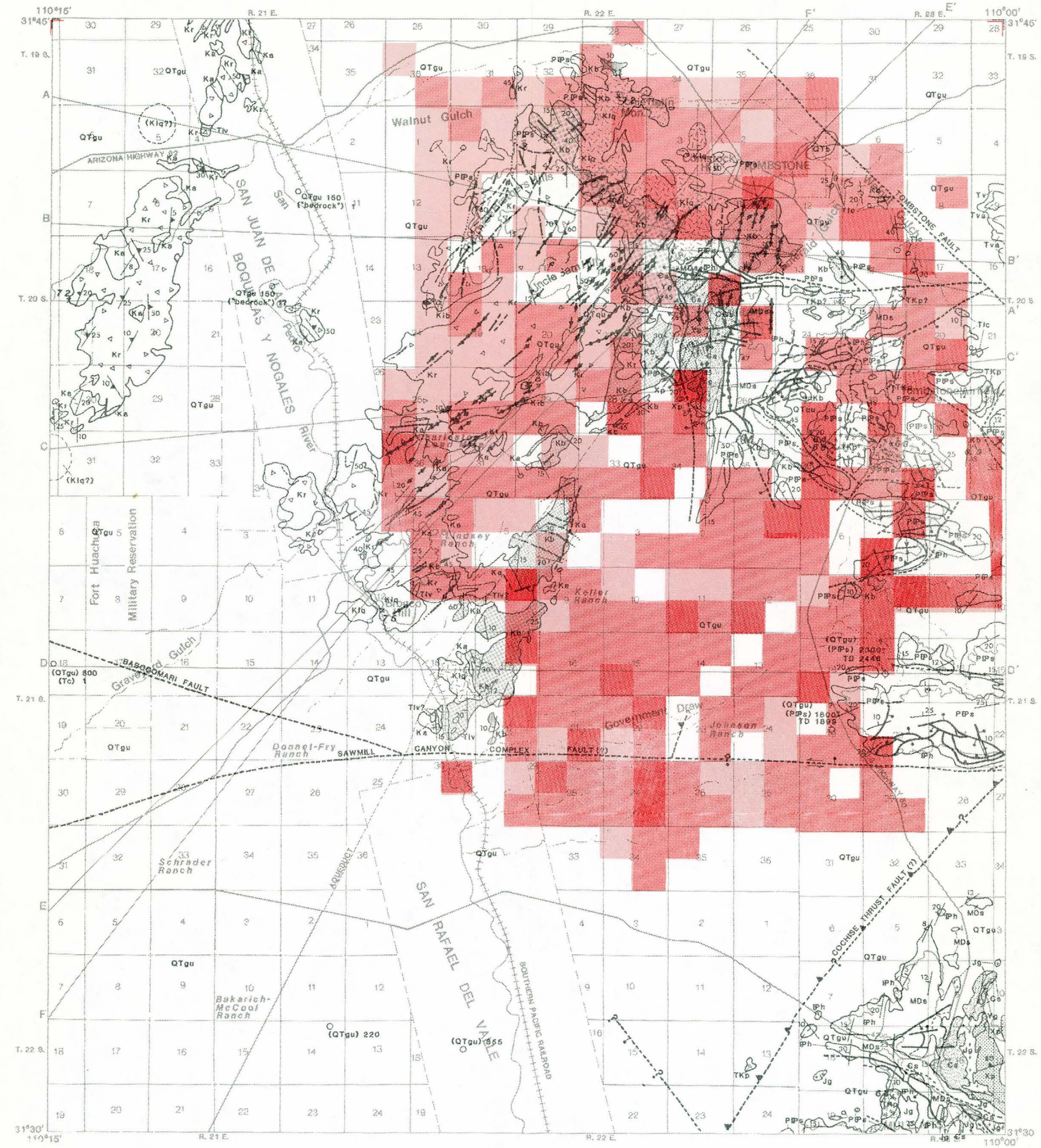

Tombstone Development Company, Inc.
Tombstone, Arizona

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Figure 14. Distribution pattern of copper in mesquite trees (in red), from Newell, R.A., 1973.

1 0 1 2 3 Miles

N

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72x — COLLECTION SITE—Radiogenically dated rock showing age in millions of years. Query before symbol where precise location uncertain.

Roads and Highways

Dry wash

Southern Pacific Railroad

Government Reservation Boundary

Aqueduct

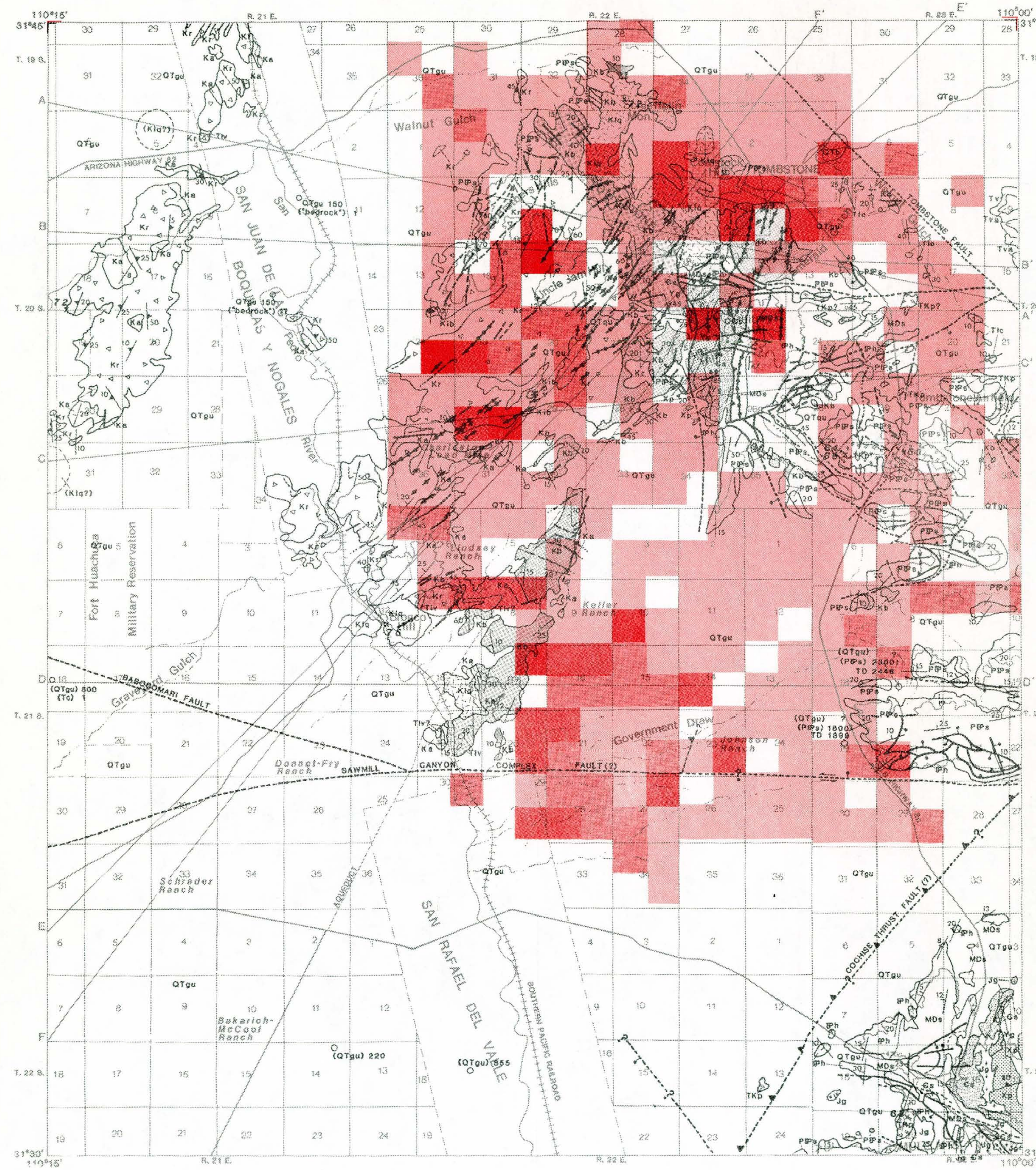
A——A' Cross section line

≤ 5 ppm

5.1 - 9 ppm

9.1 - 14 ppm

≥ 14 ppm



Tombstone Development Company, Inc.
Tombstone, Arizona

Geology adopted from Drewes, Harold, 1980, and Newell, R.A., 1973.

Figure 15. Distribution pattern of molybdenum in mesquite trees (in red), from Newell, R.A., 1973.

By James A. Briscoe
James A. Briscoe and Associates
Tucson, Arizona

Explanation

Geology

- **QTgu** — OLDER OR UNDIFFERENTIATED SURFICAL DEPOSITS (HOLOCENE TO OLIGOCENE):—Gravel, sand, and silt (Pleistocene and Pliocene—Mainly alluvium of basins; includes some colluvium and landslide deposits. Generally light-pinkish gray, weakly indurated, and with poorly rounded clasts; locally well indurated. Thickness several meters to hundreds of meters.
- **QTb** — Basalt (Pleistocene to Pliocene)—Lava flows, pyroclastic rocks, and some intercalated gravel. Thickness several meters to a few hundred meters in most places. Radiometrically dated at 0.25, 1.0, and 3.2 m.y. old
- **Tva** — Extensive andesite and dacite (Miocene and Upper Oligocene)—Lava flows, pyroclastic rocks, some intercalated epiclastic rocks, and dikes. Mostly gray, fine-grained, porphyritic rocks; includes some very coarse feldspar porphyry andesite (Turkey track porphyry, an informal term of Cooper, 1961). Thickness mostly several meters to several tens of meters. Dated at 24, 25, 27, 33, and 39 m.y.
- **Tv** — Extrusive rhyolite and rhyodacite (Miocene and Upper Oligocene—Lava flows, welded tuff, pyroclastic rocks, and some intercalated epiclastic rocks. Light-gray to grayish-pink, vitric to fine-grained, porphyritic. Commonly a few tens to a few thousand of meters thick. Dated at 23, 24, 25, 26, 26, 26, and 27 m.y. An additional date of 47 m.y., if substantiated, may indicate the presence of Eocene rocks in the lower member of the S O Volcanics of Cochise Co.
- **Tlc** — Lower conglomerate, gravel, and sand (Oligocene and Eocene?)—Alluvium; commonly grayish-red deposits of small, well rounded, nonvolcanic clasts. Mostly several meters to a few tens of meters thick.
- **Tlv** — UPPER CORDILLERAN (LARAMIDE) IGNEOUS ROCKS (LOWER PALEOCENE):—Lower volcanic rocks—Rhyolite to andesite lava flows, pyroclastic rocks, and some intercalated epiclastic rocks. Dated at 57 m.y. Possibly younger age to east.
- **TKp** — MAIN CORDILLERAN (LARAMIDE) IGNEOUS ROCKS:—Porphyritic and aplitic intrusive rocks (Paleocene and Upper Cretaceous)—Mostly latitic porphyry to dacitic porphyry in small stocks and plugs and aplitic bodies not associated with other granitoid stocks. Dated at 61, 63, 63, 64, and 65 m.y.
- **Kib** — Fluidized intrusive breccia—exact age unknown, but penetrates, and thus younger than Uncle Sam porphyry.
- **Kr** — Rhyodacite tuff and welded tuff.—Includes parts of Salero Formation, Sugarloaf Quartz Latite, and Bronco Volcanics, and all of Red Bay Rhyolite, Cat Mountain Rhyolite of Brown (1939) and Uncle Sam Prophyry. Includes local intrusive bodies and locally contains fragments of exotic rocks. Thickness commonly several tens of meters to several hundreds of meters. Dated at 66(?), 70, 72, 73, and 73 m.y. The Uncle Sam, in the Tombstone area, is dated 72 m.y.
- **Ka** — Andesitic to dacitic volcanic breccia.—Includes parts of Solero Formation, Sugarloaf Quartz Latite, and Bronco Volcanics, and all of Demetrie Volcanics and Silverbell Formation of Courtright (1958). Commonly contains large blocks of exotic rocks and locally includes some sedimentary rocks and intrusive rocks. Several tens of meters to several hundreds of meters thick in most places.
- **Klg** — Lower quartz monzonite and graodiorite—Includes some quartz diorite; appears in small stocks. Locally associated with mineralization. Dated at 70, 71, 72, 73, 74, 74, 74, and 76 m.y. The Schiefflin granodorite at Tombstone is 72 m.y.
- **Kb** — BISBEE FORMATION OR GROUP, UNDIFFERENTIATED (LOWER CRETACEOUS):—Upper part of Bisbee Formation or Group, undifferentiated, and related rocks.—Includes upper part of Bisbee Formation, Mural Limestone, Morita, Cintura, Willow Canyon, Apache Canyon, Shellenberger Canyon and Turney Ranch Formations (not listed in stratigraphic sequence) of the Bisbee Group, Amole Arkose of Bryant and Kinnison (1954), and Angelic Arkose. Consists of brownish- to reddish-arkose, gray siltstone, sandstone, conglomerate, and some fossiliferous gray limestone. Commonly several hundred meters thick
- **Jg** — GRANITE AND QUARTZ MONZONITE (JURASSIC)—Stocks of pinkish-gray coarse-grained rock. Locally associated with mineralization. Dated at 140, 148, 149, 149, 150, 153, 160, 161, 167, 178, 185 m.y.
- **PIPs** — Sedimentary rocks (Lower Permian and Upper Pennsylvanian)—consists of Epitaph Dolomite (Lower Permian), Colina Limestone (Lower Permian), and Earp Formation (Lower Permian and Upper Pennsylvanian), undifferentiated. Epitaph Dolomite is a dark- to light-gray slightly cherty dolomite, limestone, marl, siltstone, and gypsum, 120-280 meters thick. Colina Limestone is a medium gray, thick-bedded, sparsely cherty, and sparsely fossiliferous limestone 120-280 meters thick. Earp Formation is a pale-red siltstone, mudstone, shale, and limestone, 120-240 meters thick.
- **IPh** — Horquilla Limestone (Upper and Middle Pennsylvanian)—Light-pinkish-gray, thick- to thin-bedded, cherty, fossiliferous limestone and intercalated pale-brown to pale-reddish-gray siltstone that increases in abundance upward. Typically 300-490 meters thick.
- **MDs** — SEDIMENTARY ROCKS (MISSISSIPPIAN AND DEVONIAN)—Consists mainly of Escabrosa Limestone (Mississippian)—locally (Armstrong and Silberman, 1974) called Escabrosa Group—and Martin Formation (Upper Devonian), undifferentiated. In part of the Chiricahua Mountains also includes Paradise Formation (Upper Mississippian) and Portal Formation of Sabins, 1957a (Upper Devonian). In the Little Dragoon Mountains and some adjacent hills also includes Black Prince Limestone, whose fauna and correlation show strongest affinities with Mississippian rocks but which may include some Pennsylvanian rocks. Escabrosa Limestone is a medium-gray, massive to thick-bedded, commonly crinoidal, cherty, fossiliferous limestone 90-310 meters thick. Martin Formation is thick- to thin-bedded, gray to brown dolomite, gray sparsely fossiliferous, and some siltstone and sandstone, 90-120 meters thick. Paradise Formation is a brown, fossiliferous, shaly limestone. Portal Formation is a black shale and limestone 6-105 meters thick. Black Prince Limestone is pinkish-gray limestone with a basal shale and chert conglomerate, as much as 52 meters thick.
- **O€s** — SEDIMENTARY ROCKS (LOWER ORDOVICIAN TO MIDDLE CAMBRIAN):—El Paso Limestone (Lower Ordovician and Upper Cambrian), Abrigo Formation (Upper and Middle Cambrian), and Bolsa Quartz (Middle Cambrian), undifferentiated.—El Paso Limestone is a gray, thin-bedded cherty limestone and dolomite 90 meters to about 220 meters thick. Abrigo Formation is a brown, thin-bedded fossiliferous limestone, sandstone, quartzite, and shale, 210-240 meters thick. Bolsa Quartzite is a brown to white or purplish-gray, thick-bedded, coarse-grained quartzite and sandstone with a basal conglomerate, 90-180 meters thick. To the east, equivalents of part of the Abrigo Formation and Bolsa Quartzite are known as the Coronado Sandstone.
- **€s** — Sedimentary rocks (Upper and Middle Cambrian)—Abrigo Formation (Upper and Middle Cambrian), and Bolsa Quartzite (Middle Cambrian), undifferentiated.
- **Yg** — GRANITOID ROCKS (PRECAMBRIAN Y):—Mainly granodiorite and quartz monsonite, unfoliated to foliated, in part metamorphosed. Generally in stocks, which ahve been little studied.
- **Xp** — PINAL SCHIST (PRECAMBRIAN X)—Chlorite schist, phyllite, and some metavolcanic rocks, metavolcanic rocks, metaquartzite, metaquartzite conglomerate, and gneiss. One metavolcanic rock dated at 1715 m.y.

CONTACT—Dotted where concealed.

MARKER HORIZON—Dotted where concealed.

DIKES—Showing dip.

70 — FAULTS—Showing dip. Dotted where concealed or intruded; ball and bar on downthrown side.

45 — Normal

45 — Reverse

Strike-slip—Arrow couple shows relative displacement. Single arrow shows movement of active block.

Major thrust fault—Sawteeth on upper plate.

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Roads and Highways

Dry wash

Southern Pacific Railroad

Government Reservation Boundary

Aqueduct

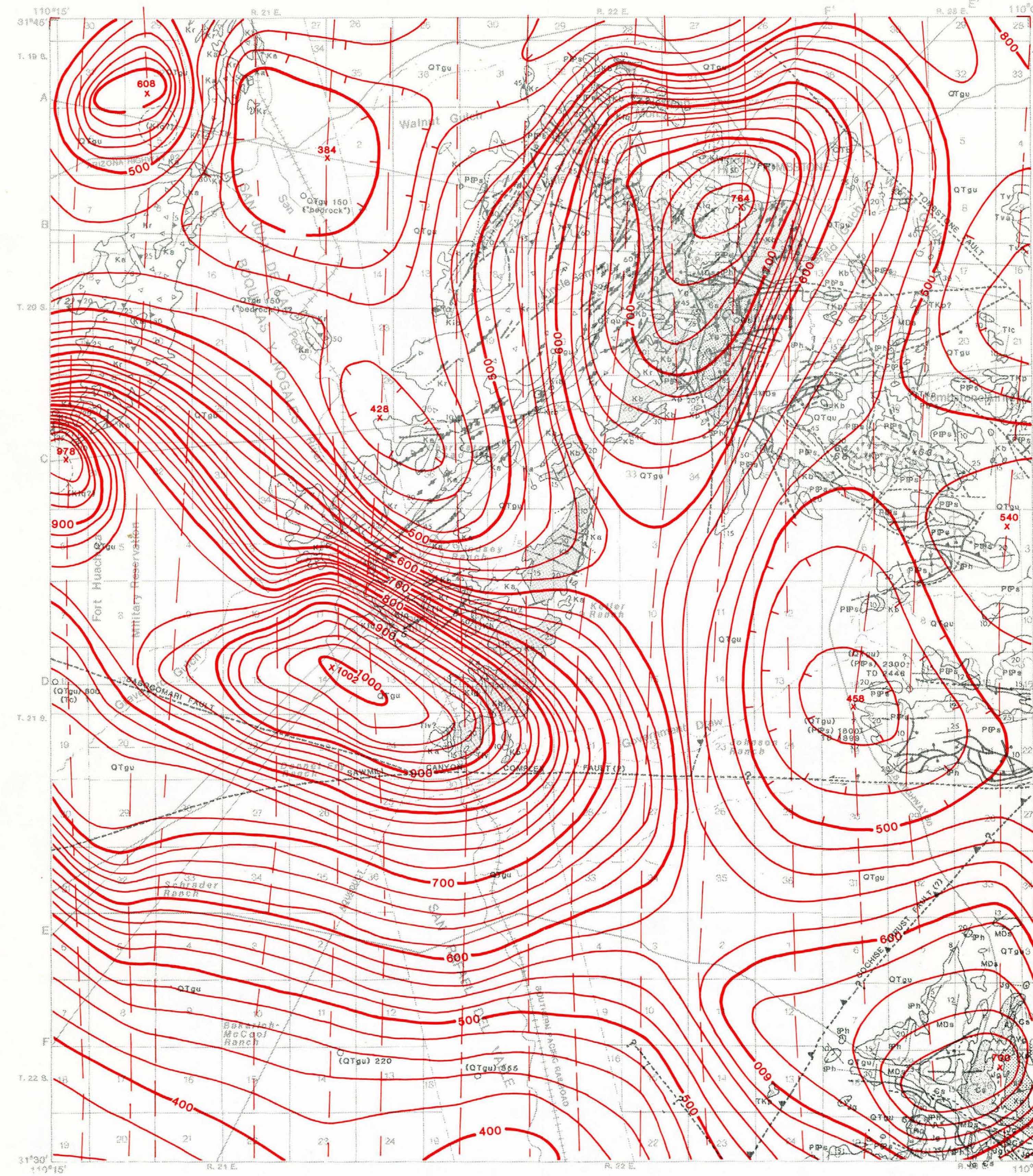
A——A' Cross section line

Flight line

Index contour line

Contour line

Contour interval: 25 gammas



Tombstone Development Company, Inc.
Tombstone, Arizona

Geology adopted from Drewes, Harold, 1980, and Newell, R.A., 1973.

By James A. Briscoe
James A. Briscoe and Associates
Tucson, Arizona

1 0 1 2 3 Miles

N

Figure 16. Aeromagnetic map of the Tombstone area.

From *Residual Aeromagnetic map of Southeastern Arizona*, Sauck, W.A., and Sumner, J.S., 1970. From Andreason, G.E., Mitchell, C.M., and Tyson, N.S., 1965

Explanation

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Major thrust fault—Sawteeth on upper plate.

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Roads and Highways

Dry wash

Southern Pacific Railroad

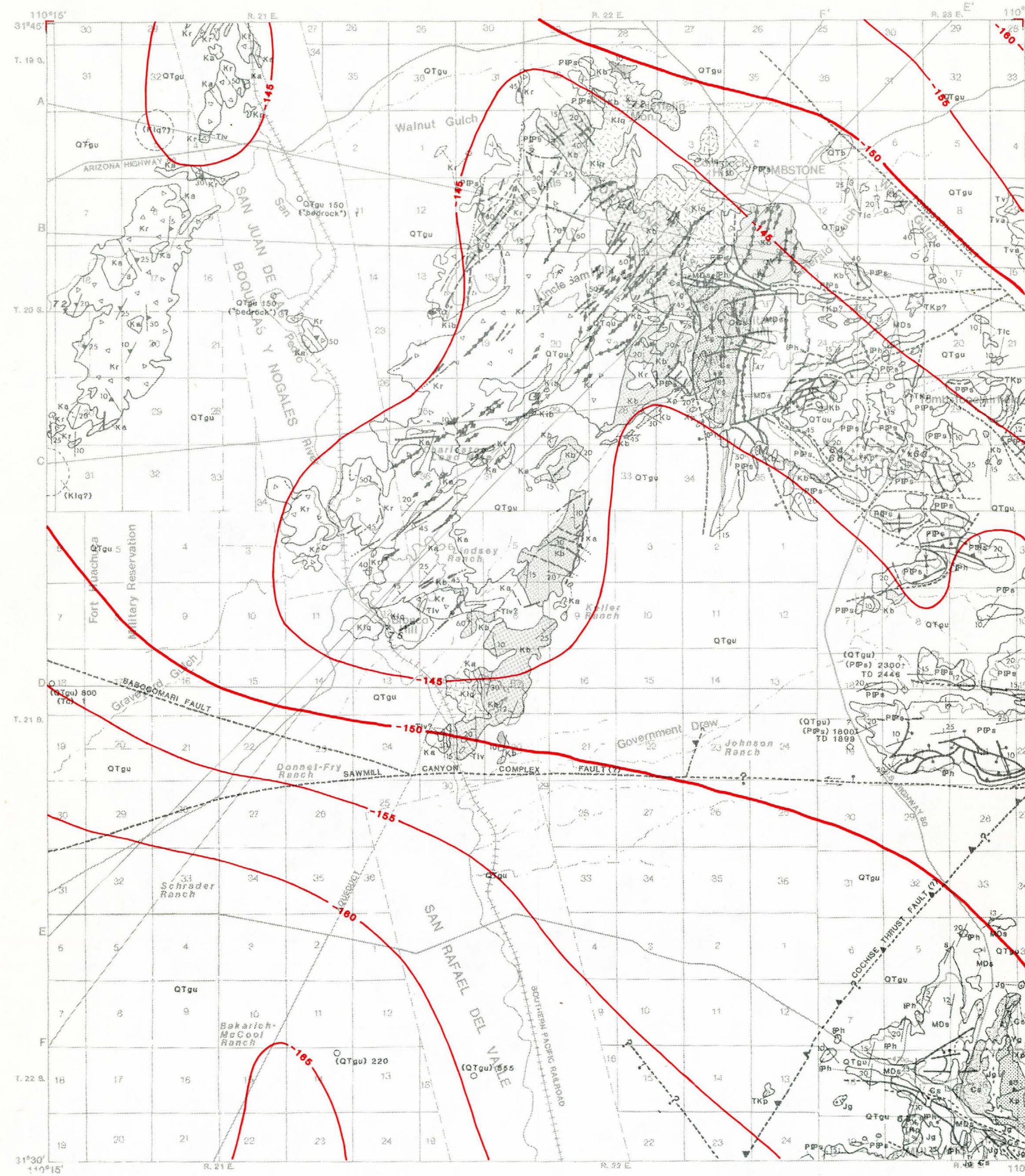
Government Reservation Boundary

Aqueduct

A——A' Cross section line

-150 Gravity contour line

Contour interval: 5 milligals



Tombstone Development Company, Inc.
Tombstone, Arizona

1 0 1 2 3 Miles

N

Geology adopted from Drewes, Harold, 1980, and Newell, R.A., 1973.

By James A. Briscoe
James A. Briscoe and Associates
Tucson, Arizona

Figure 17. Gravity map of the Tombstone area.

From *Bouguer Gravity Anomaly map of Southeastern Arizona,* West, E.E., Sumner, J.S., Aiken, C.L.V., and Conley, J.N., 1973.

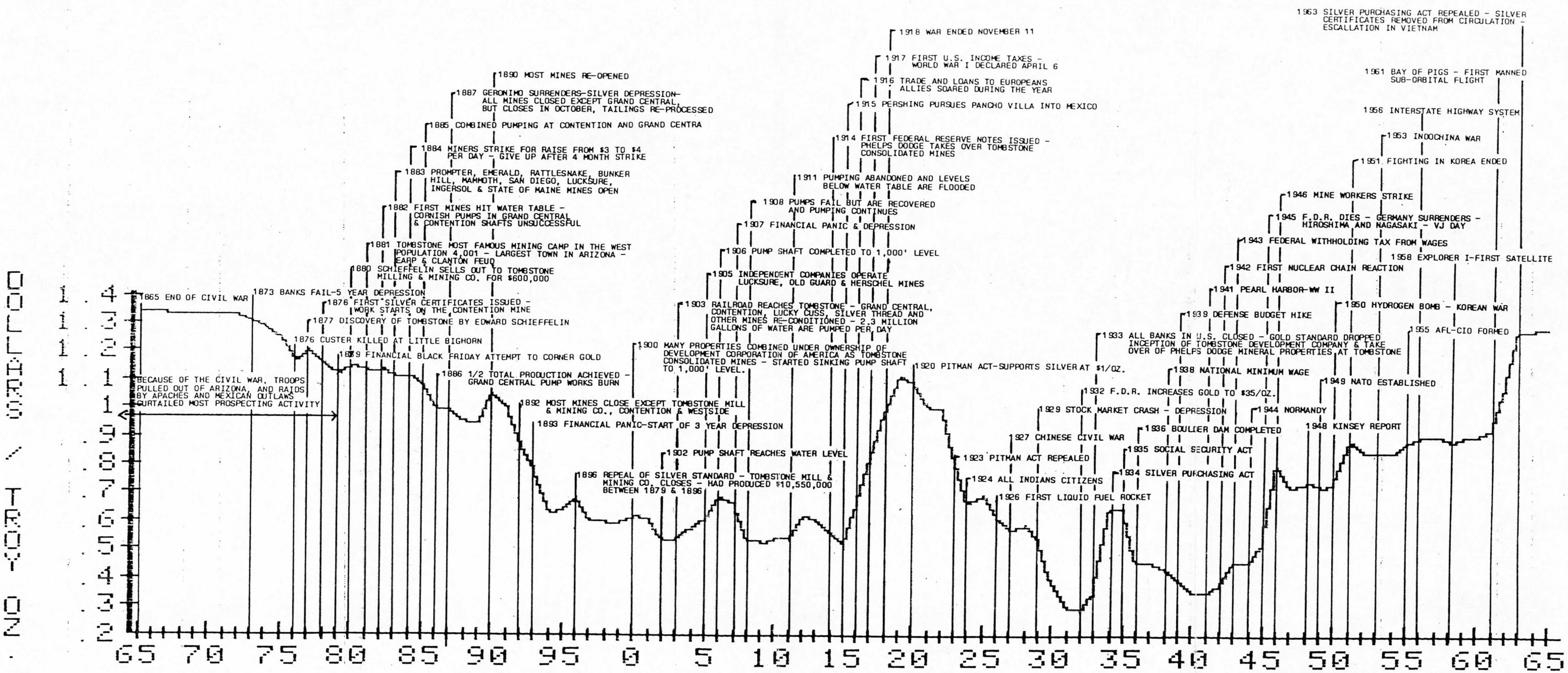
HISTORY

The Tombstone Mining District, then in Arizona Territory, was discovered by the son of a California 49ers, Edward L. Schieffelin in 1877. Tombstone, though isolated and subject to marauding Indians and outlaws in its early days, was affected by world events through their effect on silver prices. Ironically, with Schieffelin's discovery of rich silver mineralization at Tombstone, silver prices began a decline, and the price in 1877 would not be seen again for 86 years (Figure 18). During the thirty-four year period from 1877 to 1915, when most of the ore was produced at Tombstone, declining silver prices, financial panics and the removal of the United States currency from the silver standard, had immeasurably more affect on the mines than the Earp/Clanton fued, Apaches, bandits or underground waters.

The district has generally been divided into the main (eastern) portion and the western portion. The western portion is where the Tombstone Silver Mines, Inc. current property holdings lie. The State of Maine vein was discovered by John Escapule, who came to Tombstone as a photographer for the San Francisco Chronicle in 1878, to report on the silver rush. He caught "silver fever" and remained in Tombstone to prospect. In order to put the mine into operation, he approached financiers from the state of Maine, hence the mine and claim name (Bailey Escapule, 1985, pers. comm.). His decendents are operating his discovery, and are principals in Tombstone Silver Mines, Inc. The patented claims, now held by Tombstone Silver Mines, Inc., including the State of Maine, Brother Jonathan, Lowell, Merrimac, Red Top, Triple X, Clipper and May, were consolidated along with the main part of the district under the Tombstone Consolidated Mining Company.

In 1911, silver prices of approximately $0.55 per ounce (less than half that in effect when Schieffelin discovered Tombstone) brought the demise of efforts to unwater the mines, and the bankruptcy of the Development Corporation of America and its Tombstone Consolidated Mines subsidiary. The Phelps Dodge Corporation, who was a creditor of the Development Corporation of America, took over the Tombstone Consolidated Mines and operated them in a desultory fashion as the Bunker Hill Mining Company from 1914 through 1933. In 1915, the underground workings of the State of Maine mine were thoroughly sampled by Phelps Dodge (Butler, 1938, p. 101). Though 824 samples were taken, markings of which can still be seen on the walls of the State of Maine workings, the only information remaining concerning this sampling was published in the Butler Wilson volume, page 102, reproduced as Figure 34 in this report. In 1904, the Mellgren's, headed by Mr. V. G. Mellgren, a graduate mining and metallurgical engineer (Sarle, C. J., p. 8) began acquiring unpatented claims surrounding the patented ground later to be held by the Bunker Hill Company (Phelps Dodge Corporation subsidiary). The Pittman Act, supporting the price of silver at $1 per ounce between 1920 and 1923, stimulated some production in the main part of the district, primarily in the Bunker Hill mine, and a small amount of production in the western part of the district. During this time, surface mining on the Free Coinage vein and from the Bonanza dump was undertaken. In 1923, the Old Puebla Leasing Company cyanided part of the State of Maine dump and underground mine gob reportedly at a profit (Sarle, p. 8). Also, Chapman (later Dean and Dean Emertris of the College of Mines, University of Arizona, Tucson) undertook a Master's thesis (completed in 1924) to study the metallurgy of potential commercial leaching of the State of Maine mine dump. With the repeal of the Pittman Act in 1923, the price of silver plumeted (Figure 18), and no leaching of the dumps was ever accomplished. In 1933, when the price of silver averaged approximately $0.32 per ounce, the Tombstone Development Company, Inc., was formed by Ed Martin, owner of Tucson Ice, Dr. Roger Kline, founder of the Tucson Clinic, Mr. Moorehead, a retired banker from St. Louis, and Messrs. William Grace, Sr. and William Grace, Jr. (father and son). Lack of sufficient capital forced the Graces out of the deal at the time of incorporation. The purchase price from Phelps Dodge was $75,000 (Bill Grace, 1985, pers. comm.) for all of their patented mining claims in the district, which included essentially all of the producing mines. The company was headed by Ed Holderness, and acquired all the Bunker Hill (Phelps Dodge) properties in the Tombstone Mining District. It was the depths of the Great Depression, and miners were paid $3 per day and were happy to get the work

The higher gold price instituted by Franklin Roosevelt in 1932, stimulated some development, particularly in exploration in the main part of the district. The United States Smelting, Refining and Mining Company did considerable underground work in the northeastern part of the main district from early 1934 to May, 1937, on claims leased from the Tombstone Development Company, and shipped some ore. The Tombstone Extension mine was operated by the American Smelting and Refining Company during fifteen months in 1933 and 1934, and subsequently by its original owners, the Tombstone Mining Company and by lessees (Butler, p. 48). Except for some possible treatment of old stope fillings and dump leaching, there was no significant activity in the western part of the district. Sometime in the early 1940's, the State of Maine, Lowell, Brother Jonathan and the Triple X claims were purchased for back taxes by Mr. William Grace, and were subsequently transferred to Ernest Escapule, Senior. Joe Escapule, Sr., about the same time, acquired the True Blue, San Pedro, Santa Ana and the Free Coinage claims. During World War II, there was some study of the manganese deposits in the



100 YEAR SILVER PRICE CHART

AVERAGE ANNUAL SILVER PRICE
YEARS: 1865 THROUGH 1965

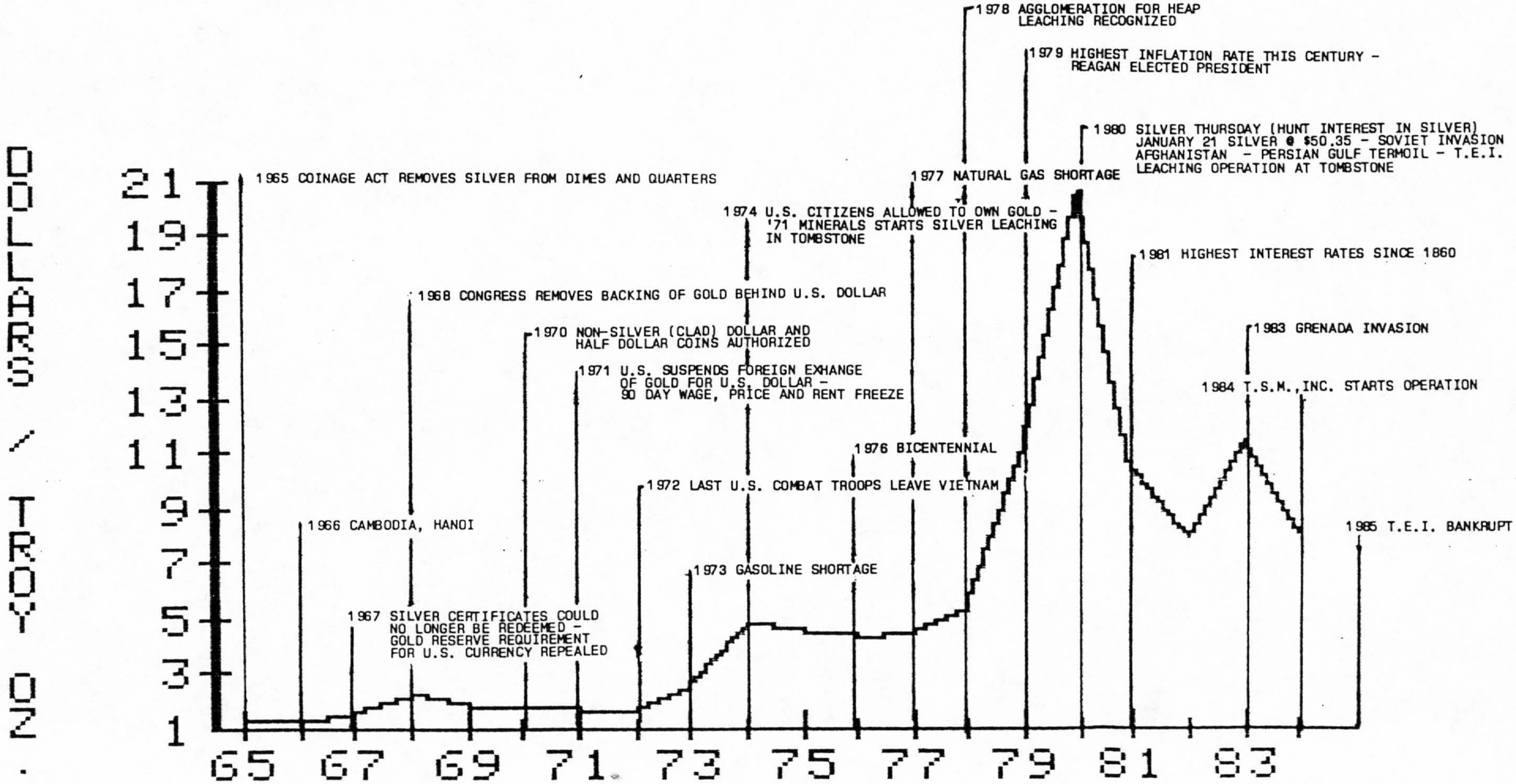
Figure 18

37

HT 85

district in relation to the war effort, and some manganese ores were produced, primarily from the Emerald and Bunker Hill mines, owned by the Tombstone Development Company. After World War II, in the late 1940's (the exact date is uncertain), a controlling interest in the Tombstone Development Company was acquired by the Newmont Mining Company. Fred Searls, then president, had great faith in the potential at Tombstone, and felt that after the war, precious metal prices would increase (William Hight, President, Tombstone Development Co., 1982, pers. comm.). Searls proved wrong, and after holding the property until the late 1950's, Newmont's controlling interest was sold to the current owners, a group of investors from Grand Island, Nebraska. Exploration work was done in the late 1950's by the Eagle Picher Company in the northeastern part of the main district, probably around the Silver Thread workings. Their drilling showed exciting values in lead and zinc (Burton DeVere, Billiton Exploration, 1983, pers. comm.). In 1965, the Duval Corporation drilled several rotary holes in the main part of the district probing for porphyry copper mineralization. Not much is known of the results of this exploration, though data is thought to be in the files of the Tombstone Development Company. In the period 1972-1973, the American Smelting & Refining Company obtained a lease on the Horne claims around the Robbers Roost breccia pipe. They drilled three holes to a maximum depth of 5,000 feet on the porphyry copper alteration zone in the vicinity of the breccia pipes. These holes intersected extensive but low grade mineralization, grading vertically downward from a lead-zinc phase of mineralization into porphyry copper type mineralization, including disseminated pyrite, chalcopyrite and molybdenite, as well as secondary feldspar and purple anhydrite. The Uncle Sam tuff was penetrated, intersecting Bisbee Formation, and at about 4,900 feet, the Bisbee was penetrated and the drill entered the Naco Limestone. Poor copper prices at the time and since have discouraged further exploration for copper at this depth.

In 1973, 1971 Minerals, Ltd. - a limited partnership headed by general partners Richard F. Hewlett (operating as Sierra Mineral Management, Inc.) and Bruce Stevenson and James Bishop (operating as Stevenson, Bishop and McCready, Inc. of New York City, New York), optioned the various holdings of the Escapule family in the western part of the district, and later, the land of the Tombstone Mineral Reserve, Inc. (now ALANCO, Inc.) and the lands belonging to the Tombstone Development Company, Inc. In the spring of 1973, the writer was hired by Mr. Dick Hewlett to prepare a report on the State of Maine area. A topographic map of the State of Maine area was prepared at a scale of 1" = 200' with contour intervals at five feet, detailed mapping on black and white photos later to be transfered onto the topographic base, and geochemical sampling was performed. Previously unrecognized windows exposing sediments beneath the Uncle Sam



RECENT SILVER PRICE CHART

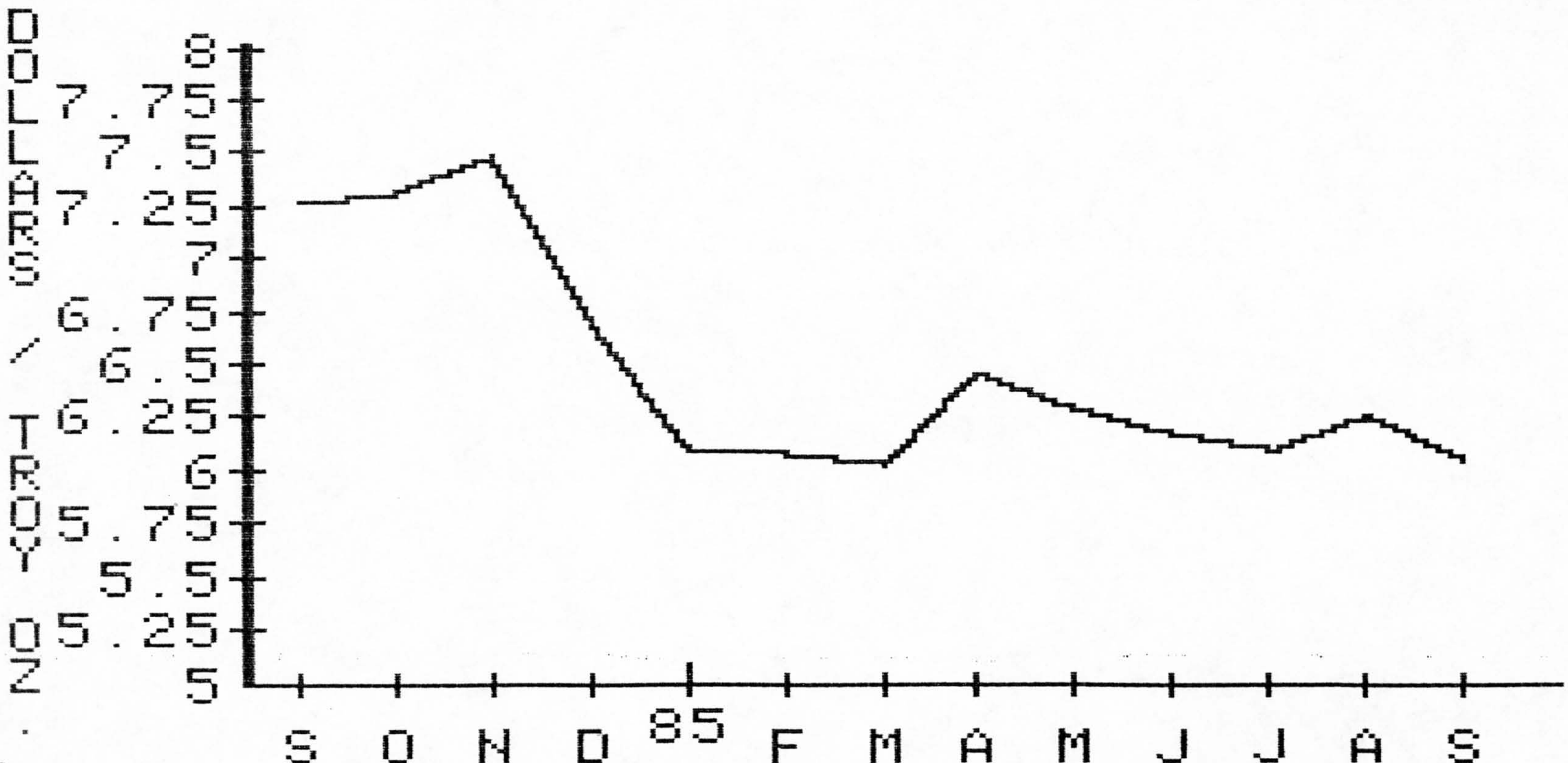
AVERAGE ANNUAL SILVER PRICE

YEARS: 1965 THROUGH 1984

tuff, as well as isoclinal folding in the sediments, were mapped. A comprehensive exporation program was planned and recommended. Also, in October of 1973, just before completion of the detailed report on the State of Maine area, the entire Tombstone District was flown in color aerial photography at a scale of 1" = 2,000' along north-south flight lines. In 1974, a counter-current decantation cyanide mill was moved from the Golden Sunlight mine in Montana, and installed at the State of Maine Mine, in order to treat ore from the State of Maine shaft. Also, the headframe from the #6 shaft at the Cordero mine in northern Nevada was set up on the State of Maine shaft over a newly poured concrete collar. Unfortunately the Golden Sunlight's cyanide mill never operated properly, probably due to underfinancing and poor management. It was later abandoned and the leases relinquished. 1971 Minerals, Ltd. went on to consolidate all of the old mine dumps in the main district on Tombstone Development Co. land into one large heap leach pad, which was operated until 1977, when the Tombstone Development Company lease was relinquished. They subsequently fell upon hard times, and are thought to no longer be a viable entity. None of the exploration program recommended by the writer was ever carried out.

About the same time, Roger A. Newell was completing a Stanford PhD. dissertation covering the area. Newell's maps covering the district as far west as the San Pedro River and as far south as the Bronco Hills, at a scale of 1:31,250 and 1:12,000 (Newell, 1974, Plates 1 & 2), are the most detailed and complete geologic coverage to date. Newell also presented geochemical data from regional sampling of mine dumps within the district (Figures 3 through 17 and Newell, 1974, p. 13-23), which verify mineralization in the district is related to a series of porphyry copper centers.

In 1980, Tombstone Exploration, Inc. (TEI) obtained a lease on the patented Tombstone Development Company lands in the main part of the district. Between 1980 and 1985, TEI operated an open pit mine on the Contention vein, and produced up to 3,000 tons per day of low grade ore averaging in the range of 1.25 ounces silver and .02 ounces gold, from which was recovered approximately 40% of the silver and 60% of the gold. Graves (1985) reports that 2 million ounces of silver and 10,000 ounces of gold were produced in the period from 1970 to 1985, mostly from the Tombstone Exploration, Inc. open pit operation and in a small part by the 1971 Minerals mine dump consolidation. No exploration drilling was ever done, and no ore reserves of significance were measured ahead of mining. Lowered silver and gold prices, poor management and a lack of reserves forced the company into bankruptcy in 1985, and its assets are currently being liquidated.



MONTHLY SILVER PRICE CHART

AVERAGE MONTHLY SILVER PRICE

SEPTEMBER, 1984 THROUGH SEPTEMBER, 1985

A regional map covering southeastern Arizona compiled by Harald Drewes of the United States Geological Survey was published in 1980. In 1982, the writer compiled data and maps from the work of Newell, Drewes and others (Figures 3 through 17). It is concluded from these various data that the volcanic geology and structure in the Tombstone area is related to a Laramide caldera, and mineralization in the district is also related to the caldera and attendant volcanic action and hydrothermal fluids.

Tombstone has primarily been a silver camp, though significant gold, lead, subordinate copper, zinc and manganese have also been produced. The silver to gold production ratio for documented production between 1877 and 1937, is 125.95:1. Production has come mainly from mineralized vein fractures, cutting folded Lower Cretaceous limestones and basal conglomerate of the Bisbee group within the Tombstone Basin (main part of the district). Ninety-five percent or more of the production is from the surface to six hundred feet below, and is primarily from oxide ore minerals.

Between 1879 and 1907, unpublished figures and estimates compiled by J. B. Tenny from old company reports and other sources (Butler, p. 48), indicate that $28,400,000 was produced. Unfortunately, this compilation is based only on dollar production and no information regarding tonnage, grades and ounces or pounds of which specific commodity was produced, is available. From 1908 through 1936, tonnages as well as amounts of gold in dollar value, silver in ounces, copper, lead and zinc in pounds (Butler, p. 49), as well as Tombstone Development Company records through the year 1936, showing the same units, give more specific information on the district. Using this more detailed later information as well as dump tonnages calculated during the period of dump leaching by 1971 Minerals, Ltd. (1972 through 1977 - private company reports for those years), the writer has estimated that 1.25 million tons of ore was produced. Using this estimated tonnage and the recorded production, it is calculated that the average grade for ore produced was 25.89 ounces silver, 0.21 ounces gold, 2.6% lead and 0.10% copper and smaller amounts of zinc and manganese. Not included in these figures are the substantial amounts produced between 1980 and 1985 by Tomstone Exploration, Inc. from its open pit mining operation along the Contention vein.

Total past production at Tombstone, not including that of 1971 Minerals Limited or Tombstone Exploration, Inc., in terms of $400 gold and $10 silver, $.50 lead, $1.00 copper, and $.40 zinc, is approximately $463 million (Figure 21).

GENERAL GEOLOGY OF THE DISTRICT

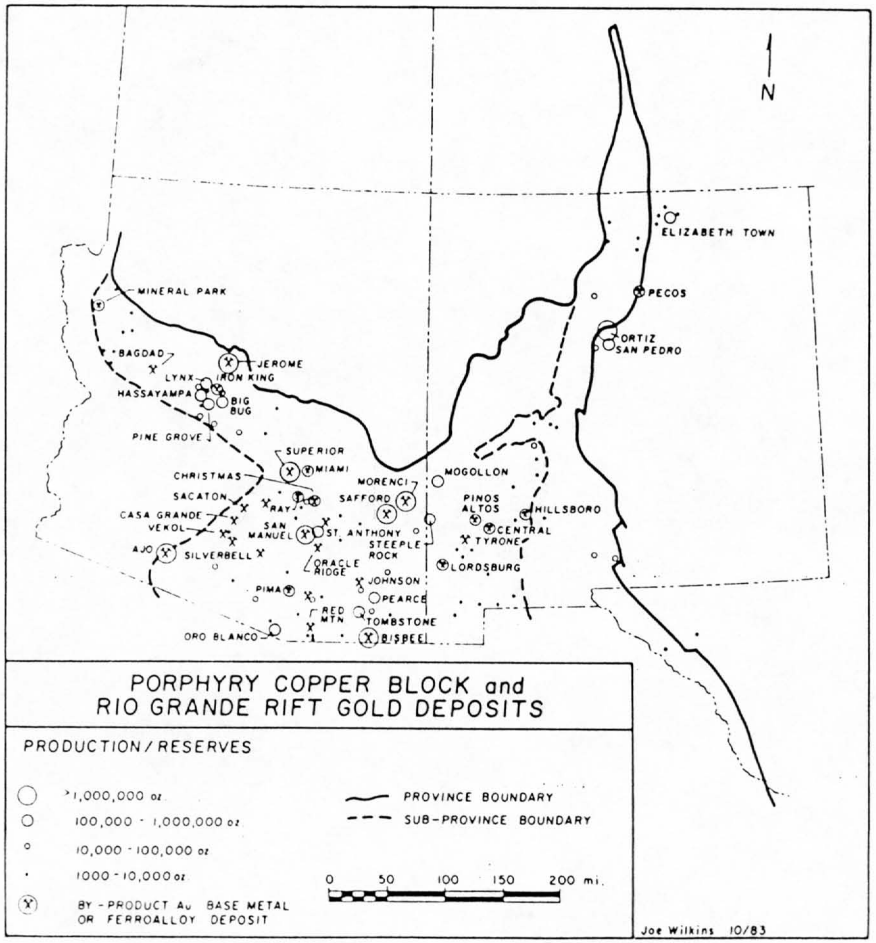
The Tombstone Mining District lies within the southwestern porphyry copper province (Figure 26). Nearby, large porphyry copper deposits are located at Bisbee, some twenty-five miles to the southeast, and the newly discovered deposits at Dragoon are some twenty-five miles to the north. Exploration drilling on a Jurasic porphyry copper system (the same age as Bisbee) at Gleeson, about fifteen miles northeast, was in progress in the early 1970's. However, the drilling disclosed that thrust faulting had broken the original deposit into sub-economic slivers.

The Tombstone area itself has had a complex geologic history, which includes sedimentation, folding, thrust faulting, explosive acid volcanism and caldera formation and resurgence, several stages of intrusion by igneous rocks and mineralization from hydrothermal solutions between 72 m.y. and 63 m.y.

Basement rocks are Precambrian granodiorite and Pinal schist. Over this are deposited approximately 5,000 feet of Paleozoic sediments consisting, for the most part, of limestone. Mesozoic sedimentation includes the Bisbee Formation consisting of plus 3,000 feet of sandstones, shales, mudstones and minor limestones near the base.

The post-Paleozoic tectonic history of the Tombstone area has been complex. At least two episodes of folding and thrust faulting have taken place (Gilluly, p. 122-130). It is apparent (Gilluly, p. 128) that an earlier period of deformation created eastward trending features, and later deformation formed north-trending and oblique features. During the first stage, north-south compression formed east trending folds and minor thrusts, with a north strike and northerly low angle dips. Later, the area underwent southwest-northeast compression, which produced thrust faults of northwesterly trend, and was probably responsible for large features visible in the district today, including the Empire anticline and the north 50 degree east fractures.

There must have been a profound structural weakness at the current location of the Tombstone Hills, because Laramide volcanism appears to form a focus at Tombstone, with relatively smaller effect on the surrounding terrain for a distance of 20 or more miles. Laramide surface volcanism began with the extrusion of the Bronco volcanics, comprised of lower andesite flows and breccias, overlain by rhyolitic tuffs and flows (Newell, R. A., 1974, p. 40-41). Examination by the writer suggests that these rhyolites, at least in part, may be a series of coalescing rhyolite domes, as they exhibit contorted flow, and in places, flow breccia structures. The Bronco andesites, which were



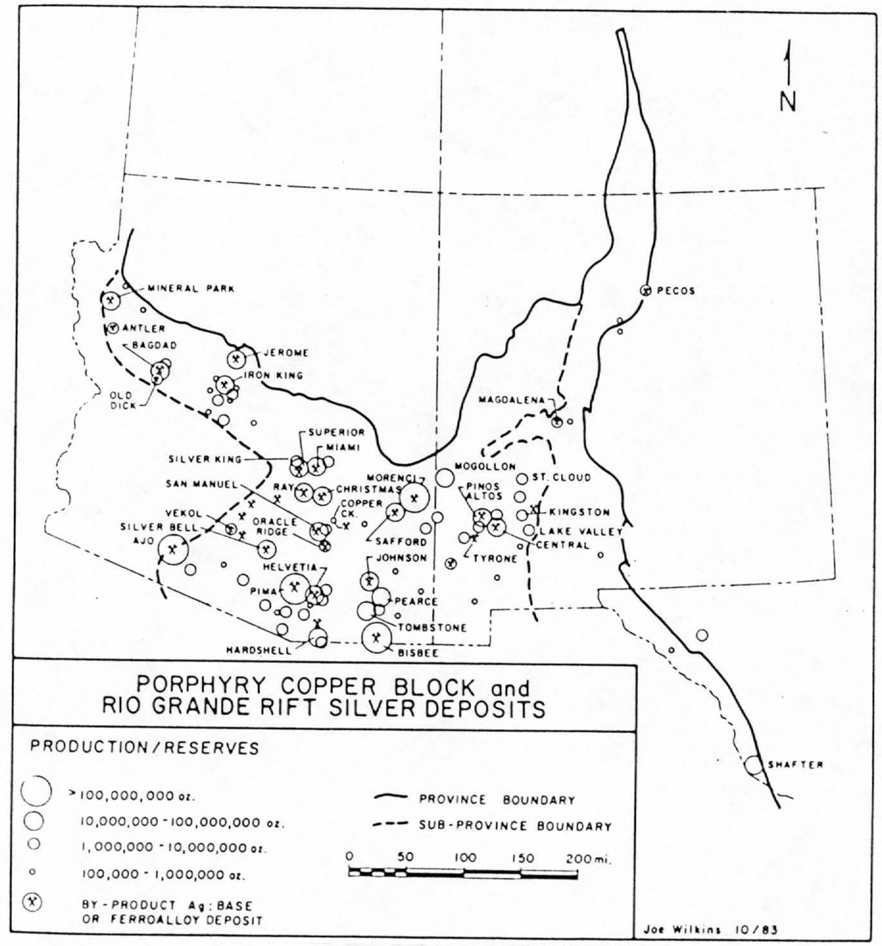


Figure 26
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extruded as flows, flow breccias and probable lahars, are of the Silverbell type. Extruded over the Bronco volcanics is the 71.9 ±2.4 m.y. (Drewes, 1971) old Uncle Sam quartz latite tuff. The extrusion of the tuff, which probably started issuing forth from the area of the Bronco Hills, resulted in partial evacuation of the underlying magma chamber and caldera collapse, with later resurgent exhalation of more quartz latite tuffs. The current Ajax fault, with some 5,000 feet of stratigraphic throw, formed the eastern margin of the caldera, and appears to localize some of the Uncle Sam vents, as well as later intrusives. Apophyses of the parent magma intruded along the northeasterly portion of the caldera, forming the present outcrops of Schieffelin Granodiorite southwest of Tombstone. Additional apophyses of Schieffelin Granodiorite intruded along the caldera margin at Bronco Hill; near Fairbank, and on the west side of the San Pedro River on the Ft. Huachuca Military Reservation. These probable intrusions are thought to be the source of aeromagnetic anomalies prominent on the aeromagnetic map in Figure 16. The Prompter and Horquilla faults may, in part, be radiating expansion fractures due to the initial doming before the extrusion of the Uncle Sam tuff and resurgence thereafter. Several episodes of explosive eruptions are indicated by multiple cooling units of Uncle Sam tuff, best exposed in the Charleston area. Geothermal convection cells circulating along fractures in the cooling volcanic and related plutonic rocks at depth, gave rise to the current copper, molybdenum, lead, zinc, silver and gold mineralization centers within and adjacent to the caldera. Phreatic (steam) explosions and venting probably gave rise to the breccia pipes in the Robbers Roost-Charleston Lead mine area. Deep exploration drill holes in this area confirm unexposed apophyses (cupolas) of porphyritic quartz monzonite below these altered areas - the probable driving mechanism for both hydrothermal fluidization of the breccia pipes as well as mineralization. Interestingly, Mr. David Sawyer, Stanford PhD. candidate, mapping the Silverbell mineral-volcanic complex for his dissertation, has found it to be a caldera complex (1984, pers. comm.). The sequence - Silverbell andesite, dacite, Mt. Lord ignimbrite, is the same type and sequence of extrusives as present at Tombstone, i.e., the Bronco andesites, Bronco rhyolite, and Uncle Sam tuff. At Silverbell, quartz monzonites intrude the cauldron fault, to be later mineralized by copper, molybdenum, silver, lead and zinc bearing hydrothermal solutions. At Silverbell, the volcanic complex is Laramide - approximately 65 m.y. old.

Age dating of samples of altered rock collected by Newell at the Charleston Lead mine (1974, p. 73), show potassium-argon age date of sericite of 74.5 ± 3 m.y., while a sample of the altered Contention dike material collected by Gustafson (Newell, 1974, p. 74) yield an age of about 72 m.y. The age date of 63 m.y. by Creasey, et al. (1962) for potassium-argon on rhyolite intimately associated with manganese south of the Emerald mine, suggests that the age of manganese mineralization (at least in the Military Hill-Emerald mine area south of the Prompter fault) is approximately 10 m.y. younger than mineralization on the Contention dike and at Charleston. The writer, in 1982, mapped a previously unnoticed apophysis of quartz monzonite porphyry in the Tombstone Extension area, and dikes of the same material in the Comstock Hill area, northwest of the Tombstone townsite. Drewes, in 1985, reported this rock had an age of 62.6 $\pm$ 2.8 m.y. (pers. comm.). This intrusive may be the source rock for the rhyolite dated by Creasey intruding the Prompter fault and as dikes south of the Prompter fault, as well as sill-like bodies southwest of Tombstone near the municipal airport. Further, they may be the source of rhyolite dikes associated with mineralization in the State of Maine area. Unfortunately, no age date on the mineralization on the State of Maine mine has been made.

As pointed out by Livingston et al. (1968, p. 30), "15 of the 16 known porphyry copper deposits in Arizona are intimately related to the late-Cretaceous or early-Tertiary plutons of the Laramide (75 to 55 m.y.)", and of these fifteen deposits, ten had dates between 55 and 65 m.y., and only two had dates greater than 70 m.y. The importance of determining the age of the Tombstone mineralization is thus clearly defined (Newell, 1974, p. 73). If the mineralization or at least some of the mineralization centers at Tombstone can be shown to be contemporaneous with other productive porphyry copper deposits in the surrounding area, then the long term potential for deeper mineralization would be enhanced. Confirmation that all or some mineral centers at Tombstone were related to the older 72 m.y. early Laramide phase of mineralization would suggest a lower copper, higher lead-zinc resource, and lower potential for intersecting a copper molybdenum deposit at depth (Keith, 1985). It is thus important that additional samples carefully collected from target mineral zones be taken and accurately age dated to determine the age of the mineralizing system. Additionally, key rock units such as the rhyolite dikes intruding the State of Maine area should also be age dated.

The following is a chronological summary extracted from Newell's 1974 dissertation on the district. The writer, as previously explained, believes that the extrusion of the Uncle Sam tuff through a series of vents, resulted in evacuation of the underlying magma chamber, and caldera collapse. The deepest collapse, documented by geologic mapping so far, is along the Ajax Hill fault, where some 5,000 feet of stratigraphic throw between the Precambrian on the upside and Cretaceous Bisbee on the downside, is also the loci of conduits for various extrusions and intrusions including; the Uncle Sam tuff, the Schieffelin Granodiorite, the quartz latite porphyry, the