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James Doyle Sell Mining Collection

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ASARCO

Southwestern Exploration Division

JDS

February 1, 1990

J.D. Sell

Monthly Report
January 1990
J.D. Rasmussen

Yarnell Section 14 Mapping

Mapping at the 1" to 200' scale continued on Section 23 south of the Yarnell deposit. The geology of the area is dominated by large areas of granite boulders being exposed in place by erosion of deuteric (?) altered granite from about fresh granite cores. The granite is cut by east-west trending altered diorite? dikes which dip from 15° to 25° N, subparallel to the Yarnell fault. Quartz veins (1" to 18" thick) are commonly located adjacent to the dikes (both in the footwall and hanging wall). Analysis of these veins commonly contain concentration of measurable gold (.00X opt Au) with one sample running +0.5 opt Au and 18 inches. Two vertical sheared, felsic dikes 2' to 20' wide also bisect the granite.

Yarnell Mine Area

Results of the geochemical orientation lines over mineralization at the Yarnell Mine were received during the month. A copy of the draft location map for these samples is attached. Preliminary evaluation of the data indicates that gold, silver and copper should be useful in evaluation of deposits similar to Yarnell.

Petrography of Yarnell Mine

Evaluation of petrographic description submitted by Russ Honea indicated observations of host rock alteration made by Mark Miller correspond to alteration of biotite and plagioclase to sericite. The potassic alteration indicated by the sericite and K-spar in the Yarnell vein imply the deposit probably belongs to the quartz-adularia subtype of epithermal gold deposits, although the specularite present is most abundant in detachment related deposits. The occurrence of copper and other trace amounts of base metals in the soils would support either interpretation.

Field Days	Office Days	Travel Days	Expense Acct.	Mileage Charge
9	8	5	$1137.99	$547.19

James D. Rasmussen

JDR:mek

James D. Rasmussen

cc: W.L. Kurtz

Soil Sample Location Map
Yarnell Mine
1" = 200'

Incomplete ◯ e Attached

◯ JDS

GSI GEOCHEMICAL SERVICES INC.

GEOCHEMICAL ANALYSIS REPORT

TO: Mr. James D. Sell
ASARCO Inc.
P. O. Box 5747
Tucson, AZ 85703 tel:602/792-3010

==========

RECEIVED
JAN 18 1999
EXPLORATION DEPARTMENT

Job Number: ASB-OR1722
Analysis Code: SRP30
Digest: 30 gram
Total number of samples: 131

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This report has been reviewed and approved by:

Nancy G. Gonzalez for Date: 1/11/90
Mary Leitch, Quality Assurance Manager

3805 Atherton Road • Rocklin, California 95677 • 916/624-6000 1/800/827-4GSI FAX: 916/624-8986
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GEOCHEMICAL SERVICES INC.

GEOCHEMICAL ANALYSIS REPORT

RECEIVED
JAN 18 1990
EXPLORATION DEPARTMENT

JOB #: ASB-OR1722

SAMPLE ID	#	Ag ppb	Au ppb	As ppm	Bi ppm	Cd ppm	Hg ppm	Sb ppm	Se ppm	Te ppm	Cu ppm	Mo ppm	Pb ppm	Zn ppm	Ga ppm	Tl ppm
YA 200	1	165.	117.	40.3	1.32	.371	.131	3.36	<.246	1.06	35.9	20.7	58.5	160.	2.82	<.493
YA 201	2	233.	614.	31.6	1.31	.324	.121	3.27	<.249	1.29	38.3	21.6	51.0	149.	2.43	<.497
YA 202	3	146.	185.	49.7	.477	.567	.197	.761	.345	.128	29.9	4.19	34.4	181.	4.34	<.497
YA 203	4	144.	157.	12.6	.409	.384	.152	.516	<.248	.06	27.6	1.58	33.9	117.	4.65	<.495
YA 204	5	198.	237.	12.7	.364	.553	.142	.512	.309	.102	32.0	1.93	39.1	100.	2.97	<.492
YA 205	6	171.	549.	10.0	.552	.364	.086	.638	<.247	.145	40.1	2.88	19.8	94.4	4.29	<.494
YA 206	7	186.	130.	9.12	.413	.422	.04	.426	<.247	.074	41.9	1.48	16.3	93.3	4.93	<.494
YA 207	8	268.	188.	8.34	.333	.564	.062	.385	<.249	.074	55.4	1.39	20.6	109.	4.60	<.497
YA 208	9	173.	178.	6.86	.360	1.02	.05	.544	<.247	.055	49.7	1.71	14.5	89.1	3.21	<.494
YA 209	10	201.	188.	7.19	1.01	.375	.042	.370	<.248	.107	54.1	1.90	17.6	76.4	4.21	<.496
YA 210	11	77.5	59.1	5.02	.208	.231	.028	.331	<.248	<.05	28.0	1.29	12.3	62.5	3.46	<.495
YA 211	12	103.	95.3	6.53	.426	.250	.04	.360	<.246	<.049	27.4	1.25	17.0	59.3	3.75	<.493
YA 212	13	100.	127.	5.67	.350	.423	.049	.405	<.248	<.05	25.3	1.39	20.4	65.1	3.00	<.496
YA 213	14	82.4	129.	6.87	.248	.455	.042	.519	<.247	.053	21.6	1.70	15.4	52.3	3.26	<.494
YA 214	15	96.2	593.	5.19	.180	.244	.041	.376	<.249	.074	16.5	2.25	12.5	38.9	3.32	<.498
YA 215	16	73.5	54.5	6.40	.216	.811	.043	.382	.270	<.049	18.1	1.24	13.1	58.7	3.55	<.494
YA 216	17	91.4	26.1	8.62	.327	.792	.111	.516	<.246	<.049	23.4	1.42	21.9	75.9	3.72	<.493
YA 217	18	150.	85.5	11.5	.525	.403	.074	.904	<.248	.145	24.2	2.93	22.7	57.2	2.90	<.496
YA 218	19	82.7	38.7	8.55	.376	.310	.048	.549	<.249	.056	20.1	1.63	20.3	54.6	3.18	<.499
YA 219	20	102.	106.	9.03	.320	.194	.047	.630	<.25	<.05	22.0	1.80	19.3	56.7	4.09	<.499
YA 220	21	72.2	59.9	6.47	.279	.185	.04	.526	<.247	.073	18.5	1.53	16.2	51.1	3.35	<.493
YA 221	22	66.6	53.4	7.36	.284	.136	.025	.524	<.247	<.049	17.7	1.51	16.6	46.2	3.30	<.493
YA 222	23	167.	22.7	13.9	.281	.154	.059	.473	<.248	<.05	17.5	2.01	24.6	67.4	5.18	<.495
YA 226	24	47.6	8.59	5.04	.479	.125	<.02	.359	<.249	<.05	20.4	1.74	22.5	76.0	5.17	<.498
YA 227	25	43.2	19.3	9.68	.332	.139	.023	.743	<.249	<.05	24.3	1.45	17.9	60.8	4.71	<.497
YA 228	26	37.8	30.5	5.17	.291	.140	<.02	.351	<.249	<.05	16.9	1.75	22.1	58.0	4.31	<.498
YA 229	27	96.1	265.	6.23	.316	.214	<.02	.407	<.248	.052	21.2	1.56	18.3	55.3	3.53	<.496
YA 230	28	101.	230.	6.50	.269	.358	.02	.417	<.249	<.05	24.8	1.56	19.7	65.5	4.16	<.498
YA 231	29	71.7	177.	9.56	.309	.339	.051	.635	<.248	.071	20.4	2.41	14.8	48.7	3.45	<.496
YA 232	30	92.0	236.	6.88	.290	.425	.042	.430	<.249	<.05	24.2	2.12	18.9	67.8	4.41	<.498

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GEOCHEMICAL SERVICES INC.

GEOCHEMICAL ANALYSIS REPORT

JOB #: ASB-OR1722

RECEIVED
JAN 18 1990
EXPLORATION DEPARTMENT

SAMPLE ID	#	Ag ppb	Au ppb	As ppm	Bi ppm	Cd ppm	Hg ppm	Sb ppm	Se ppm	Te ppm	Cu ppm	Mo ppm	Pb ppm	Zn ppm	Ga ppm	Tl ppm
YA 233	31	146.	177.	11.6	.404	.261	.048	.408	<.246	<.049	28.2	1.78	27.4	94.2	4.82	<.493
YA 234	32	164.	148.	15.4	.439	.238	.073	.822	<.246	.129	30.0	5.45	26.2	93.2	4.96	<.492
YA 235	33	72.5	98.3	8.72	.334	.211	.031	.507	<.249	<.05	21.2	2.39	20.9	63.5	3.51	<.499
YA 236	34	68.9	42.7	9.73	.304	.168	.041	.483	<.246	<.049	18.7	1.64	19.9	59.0	3.58	<.492
YA 237	35	70.5	66.7	10.1	.337	.197	.037	.528	<.247	<.049	18.3	1.65	21.4	63.7	3.45	<.494
YA 238	36	58.3	89.9	9.30	.320	.165	.03	.539	<.249	<.05	18.7	1.81	20.6	57.7	3.73	<.498
YA 239	37	39.1	14.6	6.77	.285	.186	.022	.323	<.249	<.05	18.1	1.45	22.8	66.4	4.27	<.499
YA 240	38	41.1	25.9	6.39	.212	.121	<.02	.378	<.25	<.05	15.6	1.44	18.2	56.6	3.60	<.5
YA 241	39	65.4	147.	6.57	.245	.110	<.02	.324	<.25	<.05	15.0	1.08	17.5	51.9	3.74	<.5
YA 242	40	60.8	105.	5.31	.926	.135	<.02	.297	<.248	<.05	25.7	1.48	20.8	61.0	4.98	<.496
YA 243	41	56.0	31.6	6.12	.447	.223	.024	.344	<.247	<.049	23.6	1.52	25.0	80.5	5.32	<.494
YA 244	42	30.9	15.3	5.57	.435	.200	<.02	.407	<.25	<.05	18.8	1.91	24.1	69.4	5.00	<.5
YA 245	43	53.9	10.7	5.99	.490	.134	<.02	.340	<.248	<.05	21.3	1.76	23.3	76.6	5.81	<.497
YA 246	44	85.3	297.	9.04	.305	.269	.052	.383	<.247	<.049	28.9	1.43	17.3	97.8	4.38	<.494
YA 247	45	354.	440.	9.04	.301	.389	.024	.340	<.249	.117	55.1	1.42	15.5	93.6	4.34	<.497
YA 248	46	221.	448.	11.3	.306	.415	.049	.337	<.248	.082	44.4	1.75	18.9	114.	5.24	<.495
YA 249	47	187.	363.	13.5	.488	.450	.100	.466	<.249	.113	32.0	2.25	29.0	103.	4.24	<.499
YA 250	48	132.	166.	8.83	.355	.390	.079	.400	<.247	.081	30.6	1.50	22.6	101.	4.76	<.494
YA 251	49	131.	189.	9.19	.365	.398	.059	.416	<.249	<.05	27.4	1.16	24.6	103.	4.65	<.498
YA 252	50	199.	530.	9.66	.362	.386	.134	.464	<.249	<.05	24.7	1.30	27.5	102.	4.58	<.498
YA 253	51	200.	461.	14.3	.397	.816	.176	.608	<.25	<.05	27.3	2.04	43.9	270.	4.02	<.499
YA 254	52	107.	135.	29.2	.541	.386	.104	1.05	<.249	.272	23.6	8.39	31.4	145.	4.03	<.498
YA 255	53	142.	458.	56.2	.507	.322	.110	.907	<.249	.199	31.9	6.05	28.6	111.	4.22	<.499
YA 255 DUP	54	141.	512.	54.7	.472	.329	.120	.907	<.246	.216	31.0	6.19	28.6	102.	3.49	<.493
YA 256	55	98.4	109.	4.73	.353	.315	.043	.407	<.246	<.049	21.6	1.24	20.1	58.7	3.41	<.493
YA 257	56	91.6	166.	9.13	.336	.388	.063	.496	<.249	.057	24.9	1.89	18.8	61.5	4.31	<.499
YA 258	57	127.	832.	10.5	.478	.231	.021	1.16	<.248	.205	16.7	5.96	17.9	41.7	2.16	<.496
YA 259	58	111.	772.	6.74	.368	.451	.038	.453	<.246	.074	23.7	2.98	18.3	62.6	3.35	<.492
YA 260	59	127.	115.	7.07	.350	.394	.052	.355	<.25	<.05	24.3	1.86	24.0	77.1	3.70	<.5
YA 261	60	108.	112.	8.95	.305	.242	.046	.446	<.25	<.05	27.0	1.60	22.8	81.3	4.35	<.5

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GEOCHEMICAL SERVICES INC.

GEOCHEMICAL ANALYSIS REPORT

JOB #: ASB-OR1722

RECEIVED
JAN 18 1990
EXPLORATION DEPARTMENT

SAMPLE ID	#	Ag ppb	Au ppb	As ppm	Bi ppm	Cd ppm	Hg ppm	Sb ppm	Se ppm	Te ppm	Cu ppm	Mo ppm	Pb ppm	Zn ppm	Ga ppm	Tl ppm
YA 262	61	135.	468.	16.0	.440	.234	.054	.795	<.247	<.049	24.2	1.98	26.5	81.9	4.41	<.495
YA 263	62	61.2	54.9	11.2	.307	.166	.046	.563	<.248	<.05	20.1	1.38	23.1	65.7	3.67	<.496
YA 264	63	66.0	95.3	10.0	.335	.169	.036	.592	<.249	<.05	19.2	1.52	19.7	58.0	3.73	<.498
YA 265	64	61.2	20.4	8.14	.343	.172	.031	.474	<.246	<.049	16.1	1.59	19.1	51.6	3.09	<.493
YA 266	65	53.0	53.0	7.80	.418	.189	<.02	.546	<.247	<.049	16.6	1.77	21.4	51.7	3.32	<.494
YA 267	66	39.7	24.8	7.71	.239	.110	<.02	.436	<.249	<.05	17.4	1.38	20.6	81.1	5.50	<.497
YA 268	67	133.	379.	24.4	.519	.266	.088	.453	<.247	.059	20.8	1.81	27.3	95.6	4.63	<.493
YA 269	68	47.0	17.3	18.8	1.76	.156	.046	.495	<.247	<.049	27.3	1.87	28.0	124.	7.00	<.493
YA 270	69	43.2	10.5	5.06	1.07	.130	.035	.315	<.246	<.049	19.2	1.23	16.8	51.6	3.63	<.493
YA 271	70	36.5	30.3	6.14	.672	.151	<.02	.338	<.248	<.05	14.8	1.15	27.9	48.3	3.17	<.495
YA 272	71	37.3	2.39	6.06	.485	.197	<.02	.438	<.246	<.049	20.9	1.83	27.6	84.5	5.76	<.493
YA 273	72	63.7	14.0	6.33	.443	.155	.022	.373	<.249	<.05	20.8	1.30	18.8	78.4	6.00	<.498
YA 274	73	98.1	69.5	4.71	.380	.286	.066	.404	<.249	.059	24.3	1.36	25.0	66.1	4.08	<.498
YA 275	74	133.	523.	5.81	.497	.387	.043	.385	<.247	.083	23.9	1.34	24.1	60.9	3.67	<.494
YA 276	75	131.	718.	6.56	.409	.333	.036	.497	<.247	.100	22.5	1.84	25.8	68.8	4.16	<.493
YA 277	76	157.	280.	5.98	.443	.526	.045	.340	<.248	.113	30.8	1.43	19.9	86.3	3.63	<.496
YA 278	77	222.	307.	9.45	1.63	.523	.073	.435	<.247	.128	31.4	1.81	26.3	109.	3.81	<.493
YA 279	78	197.	318.	19.0	.750	.425	.075	.579	<.247	.118	29.8	2.53	28.7	105.	3.85	<.494
YA 280	79	127.	13.4	10.0	.393	.382	.083	.337	<.247	.096	22.3	1.85	21.2	79.7	2.42	<.495
YA 281	80	126.	5.39	8.38	.439	.373	.120	.437	<.248	.085	31.5	1.42	25.3	84.5	3.61	<.496
YA 282	81	61.4	43.0	4.69	.171	.203	.035	.239	<.247	<.049	16.3	.865	15.8	43.1	2.03	<.494
YA 283	82	239.	603.	9.99	1.33	.496	.139	.316	<.25	<.05	21.1	1.43	30.0	120.	2.17	<.5
YA 284	83	85.3	48.2	38.2	.315	.312	.071	.451	<.247	<.049	17.1	2.08	24.3	104.	2.84	<.494
YA 285	84	93.1	209.	35.6	.277	.263	.059	.486	<.247	.067	20.1	3.15	20.5	62.4	2.44	<.493
YA 285 DUP	85	85.4	144.	33.1	.282	.262	.05	.485	<.246	.054	20.0	3.11	20.2	62.1	2.31	<.493
YA 286	86	66.8	120.	7.59	.289	.261	.028	.482	<.249	<.05	19.6	1.58	20.6	37.3	2.27	<.497
YA 288	87	60.9	104.	4.38	.181	.328	.062	.300	<.25	<.05	19.9	1.41	22.5	46.6	1.82	<.499
YA 289	88	53.6	36.0	4.39	.163	.197	.028	.255	<.247	<.049	19.3	1.16	18.7	42.4	1.92	<.493
YA 290	89	66.0	37.9	5.64	.219	.219	.028	.280	<.247	<.049	18.4	1.36	19.7	38.7	1.94	<.494
YA 291	90	54.1	26.4	6.80	.202	.184	.033	.308	<.247	<.049	15.8	1.79	18.8	38.1	2.06	<.494

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GEOCHEMICAL SERVICES INC.

GEOCHEMICAL ANALYSIS REPORT

JOB #: ASB-OR1722

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JAN 18 1990
EXPLORATION DEPARTMENT

SAMPLE ID	#	Ag ppb	Au ppb	As ppm	Bi ppm	Cd ppm	Hg ppm	Sb ppm	Se ppm	Te ppm	Cu ppm	Mo ppm	Pb ppm	Zn ppm	Ga ppm	Tl ppm
YA 292	91	54.3	60.7	9.32	.281	.155	.048	.431	<.247	<.049	17.3	1.87	18.0	33.5	2.13	<.494
YA 293	92	60.0	45.6	8.14	.301	.176	.058	.394	<.248	<.05	17.9	1.72	20.3	36.4	2.31	<.496
YA 294	93	50.2	27.8	8.28	.355	.175	<.02	.481	<.25	.059	15.0	1.50	19.1	31.4	2.18	<.499
YA 295	94	50.4	17.3	6.82	.327	.145	<.02	.333	<.246	<.049	13.8	1.45	17.5	30.3	2.15	<.493
YA 296	95	48.7	20.7	8.87	.304	.125	.023	.381	<.249	<.05	14.0	1.34	19.9	34.1	2.81	<.499
YA 297	96	97.6	22.5	12.0	.286	.116	.038	.442	<.247	<.049	11.5	1.25	20.8	32.9	3.30	<.494
YA 298	97	68.5	23.7	10.9	.381	.116	.028	.325	<.247	<.049	13.5	1.23	19.1	58.1	4.37	<.494
YA 299	98	31.3	9.08	9.37	.347	.088	<.02	.363	<.248	<.05	13.5	1.50	19.0	59.0	4.93	<.496
YA 300	99	52.7	1.88	3.64	.179	.135	<.02	.204	<.248	<.05	14.4	1.01	15.3	33.3	2.56	<.495
YA 301	100	51.4	13.6	10.0	.463	.174	.033	.295	<.247	<.049	16.6	1.29	24.8	49.2	2.50	<.493
YA 302	101	64.9	13.4	7.34	.360	.120	<.02	.277	<.248	<.05	25.9	1.32	18.8	45.8	4.09	<.495
YA 303	102	74.4	73.0	3.96	.258	.257	.023	.315	<.249	<.05	20.6	1.31	19.0	33.7	1.93	<.499
YA 304	103	90.4	59.8	4.62	.382	.364	.044	.361	<.249	.058	24.2	1.54	22.8	39.4	1.87	<.497
YA 306	104	134.	116.	8.77	.526	.320	.05	.389	<.248	.110	32.4	1.60	25.6	53.9	2.23	<.496
YA 307	105	116.	72.6	6.87	.493	.343	.047	.384	<.249	.111	26.6	1.29	25.4	52.6	2.27	<.499
YA 308	106	99.6	191.	10.0	.460	.317	.054	.494	<.249	.089	24.1	1.24	28.3	59.7	2.44	<.498
YA 309	107	84.0	101.	5.96	.300	.230	.022	.346	<.249	.072	21.0	.964	19.8	52.1	2.82	<.497
YA 310	108	64.5	113.	10.0	.329	.186	.034	.385	<.25	<.05	18.8	3.65	15.7	55.4	2.42	<.5
YA 311	109	60.6	66.2	20.2	.341	.240	.04	.336	<.247	<.049	17.8	1.13	25.4	60.0	2.52	<.494
YA 312	110	65.1	21.2	13.0	.295	.412	.042	.361	<.247	<.049	21.6	1.48	23.8	93.5	2.22	<.494
YA 313	111	79.8	59.1	14.2	.447	.417	.059	.415	<.249	.102	19.0	1.97	25.6	90.2	2.03	<.497
YA 314	112	43.9	5.74	3.96	.290	.144	.028	.230	<.249	<.05	8.51	.526	21.2	61.5	3.90	<.498
YA 315	113	24.1	2.72	4.86	.083	.147	.024	.223	<.249	<.05	8.33	.486	17.2	47.2	3.24	<.498
YA 315 DUP	114	20.5	2.05	4.05	.095	.136	<.02	.201	<.249	<.05	7.47	.429	15.4	40.6	2.74	<.497
YA 316	115	45.1	2.15	3.37	.264	.332	.037	.271	<.249	<.05	19.2	.702	20.2	67.1	3.47	<.497
YA 317	116	43.6	4.04	3.47	.191	.265	.022	.198	<.246	<.049	18.0	.760	22.5	64.6	3.28	<.493
YA 318	117	40.6	4.90	3.16	.175	.241	<.02	.195	<.247	<.049	14.9	.638	17.6	52.5	2.68	<.493
YA 319	118	34.8	2.21	3.69	.154	.102	<.02	.178	<.248	<.05	11.9	.616	15.0	43.7	3.43	<.496
YA 320	119	45.3	7.14	5.22	.279	.216	<.02	.303	<.249	<.05	10.9	.700	30.9	86.9	3.61	<.498
YA 321	120	56.4	11.9	6.49	.310	.314	.029	.403	<.25	<.05	22.5	1.24	73.2	165.	3.84	<.499

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GEOCHEMICAL SERVICES INC.

GEOCHEMICAL ANALYSIS REPORT

JOB #: ASB-OR1722

RECEIVED
JAN 18 1990
EXPLORATION DEPARTMENT

SAMPLE ID	#	Ag ppb	Au ppb	As ppm	Bi ppm	Cd ppm	Hg ppm	Sb ppm	Se ppm	Te ppm	Cu ppm	Mo ppm	Pb ppm	Zn ppm	Ga ppm	Tl ppm
YA 322	121	43.6	16.2	4.29	.171	.103	.031	.287	<.249	<.05	15.8	1.17	17.9	51.0	4.25	<.498
YA 323	122	72.9	22.1	9.19	.238	.345	.03	.391	<.248	<.05	22.9	1.67	28.3	100.	3.85	<.496
YA 326	123	170.	184.	17.8	.305	1.08	.082	.659	<.247	.084	25.6	2.09	73.0	341.	2.16	<.495
YA 327	124	176.	110.	8.34	.270	.551	.08	.405	<.247	.057	28.3	1.33	35.2	179.	2.55	<.494
YA 328	125	114.	111.	7.84	.283	.468	.05	.518	<.248	.116	35.1	1.04	23.6	141.	2.40	<.497
YA 329	126	147.	79.6	9.22	.284	.457	.057	.429	<.248	.076	48.2	1.26	23.8	103.	2.39	<.497
YA 330	127	124.	58.6	11.0	.289	.307	.043	.502	<.248	<.05	34.9	.999	20.1	68.5	2.59	<.495
YA 331	128	83.8	30.1	9.23	.249	.315	.041	.326	<.247	.059	29.9	1.01	17.9	53.7	1.88	<.495
YA 332	129	131.	41.8	21.8	.545	.218	.047	.527	<.249	<.05	31.8	1.22	22.8	40.7	2.32	<.499
YA 333	130	76.9	31.0	11.2	.254	.429	.053	.305	<.248	<.05	30.5	1.07	17.1	57.0	2.00	<.495
YA 334	131	117.	36.6	21.8	.653	.355	.074	.446	<.249	.055	47.2	1.68	25.1	52.2	2.87	<.498

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GEOCHEMICAL SERVICES INC.

Q.A.REPORT

Dear Customer:

In order to assure the quality of our products, we have withheld data on the following sample(s) listed below:

1. YA 223	2. YA 224	3. YA 225
4. YA 225 DUP	5. YA 287	6. YA 305
7. YA 324	8. YA 325	9.
10.	11.	12.

The reason that the data was withheld is checked below:

____ The sample(s) listed above contained unusually high values for one or more elements. In order for us to assure our higher reporting limits, it is necessary to re-run the sample at a higher dilution factor. Rather than hold your report for this data, the report was issued less the sample(s) in question. The data for the delayed sample(s) will be ready no later than _____.

✓ The sample(s) listed above need to be re-run through the normal process. Rather than hold your report for this data, the report was issued less the sample(s) in question. The data for the delayed sample(s) will be ready no later than 1/16/90.

We apologize for any inconvenience that this action may have caused you. If for any reason our scheduled completion date is inadequate for your program please call and let me know.

Sincerely yours,

Nancy G. Gonzalez for

Mary Leitch
Quality Assurance Manager

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Incomplete ◯ Attached

GEOCHEMICAL SERVICES INC.

GEOCHEMICAL ANALYSIS REPORT

TO: Mr. James D. Sell
ASARCO Inc.
P. O. Box 5747
Tucson, AZ 85703 tel:602/792-3010

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EXPLORATION DEPARTMENT

Job Number: ASB-0R1722
Analysis Code: SRP30
Digest: 30 gram
Total number of samples: 131

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This report has been reviewed and approved by:

Nancy G. Gonzalez for Date: 1/11/90
Mary Leitch, Quality Assurance Manager

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GEOCHEMICAL SERVICES INC.

GEOCHEMICAL ANALYSIS REPORT

RECEIVED
JAN 18 1990
EXPLORATION DEPARTMENT

JOB #: ASB-OR1722

SAMPLE ID	#	Ag ppb	Au ppb	As ppm	Bi ppm	Cd ppm	Hg ppm	Sb ppm	Se ppm	Te ppm	Cu ppm	Mo ppm	Pb ppm	Zn ppm	Ga ppm	Tl ppm
YA 200	1	165.	117.	40.3	1.32	.371	.131	3.36	<.246	1.06	35.9	20.7	58.5	160.	2.82	<.493
YA 201	2	233.	614.	31.6	1.31	.324	.121	3.27	<.249	1.29	38.3	21.6	51.0	149.	2.43	<.497
YA 202	3	146.	185.	49.7	.477	.567	.197	.761	.345	.128	29.9	4.19	34.4	181.	4.34	<.497
YA 203	4	144.	157.	12.6	.409	.384	.152	.516	<.248	.06	27.6	1.58	33.9	117.	4.65	<.495
YA 204	5	198.	237.	12.7	.364	.553	.142	.512	.309	.102	32.0	1.93	39.1	100.	2.97	<.492
YA 205	6	171.	549.	10.0	.552	.364	.086	.638	<.247	.145	40.1	2.88	19.8	94.4	4.29	<.494
YA 206	7	186.	130.	9.12	.413	.422	.04	.426	<.247	.074	41.9	1.48	16.3	93.3	4.93	<.494
YA 207	8	268.	188.	8.34	.333	.564	.062	.385	<.249	.074	55.4	1.39	20.6	109.	4.60	<.497
YA 208	9	173.	178.	6.86	.360	1.02	.05	.544	<.247	.055	49.7	1.71	14.5	89.1	3.21	<.494
YA 209	10	201.	188.	7.19	1.01	.375	.042	.370	<.248	.107	54.1	1.90	17.6	76.4	4.21	<.496
YA 210	11	77.5	59.1	5.02	.208	.231	.028	.331	<.248	<.05	28.0	1.29	12.3	62.5	3.46	<.495
YA 211	12	103.	95.3	6.53	.426	.250	.04	.360	<.246	<.049	27.4	1.25	17.0	59.3	3.75	<.493
YA 212	13	100.	127.	5.67	.350	.423	.049	.405	<.248	<.05	25.3	1.39	20.4	65.1	3.00	<.496
YA 213	14	82.4	129.	6.87	.248	.455	.042	.519	<.247	.053	21.6	1.70	15.4	52.3	3.26	<.494
YA 214	15	96.2	593.	5.19	.180	.244	.041	.376	<.249	.074	16.5	2.25	12.5	38.9	3.32	<.498
YA 215	16	73.5	54.5	6.40	.216	.811	.043	.382	.270	<.049	18.1	1.24	13.1	58.7	3.55	<.494
YA 216	17	91.4	26.1	8.62	.327	.792	.111	.516	<.246	<.049	23.4	1.42	21.9	75.9	3.72	<.493
YA 217	18	150.	85.5	11.5	.525	.403	.074	.904	<.248	.145	24.2	2.93	22.7	57.2	2.90	<.496
YA 218	19	82.7	38.7	8.55	.376	.310	.048	.549	<.249	.056	20.1	1.63	20.3	54.6	3.18	<.499
YA 219	20	102.	106.	9.03	.320	.194	.047	.630	<.25	<.05	22.0	1.80	19.3	56.7	4.09	<.499
YA 220	21	72.2	59.9	6.47	.279	.185	.04	.526	<.247	.073	18.5	1.53	16.2	51.1	3.35	<.493
YA 221	22	66.6	53.4	7.36	.284	.136	.025	.524	<.247	<.049	17.7	1.51	16.6	46.2	3.30	<.493
YA 222	23	167.	22.7	13.9	.281	.154	.059	.473	<.248	<.05	17.5	2.01	24.6	67.4	5.18	<.495
YA 226	24	47.6	8.59	5.04	.479	.125	<.02	.359	<.249	<.05	20.4	1.74	22.5	76.0	5.17	<.498
YA 227	25	43.2	19.3	9.68	.332	.139	.023	.743	<.249	<.05	24.3	1.45	17.9	60.8	4.71	<.497
YA 228	26	37.8	30.5	5.17	.291	.140	<.02	.351	<.249	<.05	16.9	1.75	22.1	58.0	4.31	<.498
YA 229	27	96.1	265.	6.23	.316	.214	<.02	.407	<.248	.052	21.2	1.56	18.3	55.3	3.53	<.496
YA 230	28	101.	230.	6.50	.269	.358	.02	.417	<.249	<.05	24.8	1.56	19.7	65.5	4.16	<.498
YA 231	29	71.7	177.	9.56	.309	.339	.051	.635	<.248	.071	20.4	2.41	14.8	48.7	3.45	<.496
YA 232	30	92.0	236.	6.88	.290	.425	.042	.430	<.249	<.05	24.2	2.12	18.9	67.8	4.41	<.498

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GEOCHEMICAL SERVICES INC.

GEOCHEMICAL ANALYSIS REPORT

JOB #: ASB-OR1722

RECEIVED
JAN 18 1990
EXPLORATION DEPARTMENT

SAMPLE ID	#	Ag ppb	Au ppb	As ppm	Bi ppm	Cd ppm	Hg ppm	Sb ppm	Se ppm	Te ppm	Cu ppm	Mo ppm	Pb ppm	Zn ppm	Ga ppm	Tl ppm
YA 233	31	146.	177.	11.6	.404	.261	.048	.408	<.246	<.049	28.2	1.78	27.4	94.2	4.82	<.493
YA 234	32	164.	148.	15.4	.439	.238	.073	.822	<.246	.129	30.0	5.45	26.2	93.2	4.96	<.492
YA 235	33	72.5	98.3	8.72	.334	.211	.031	.507	<.249	<.05	21.2	2.39	20.9	63.5	3.51	<.499
YA 236	34	68.9	42.7	9.73	.304	.168	.041	.483	<.246	<.049	18.7	1.64	19.9	59.0	3.58	<.492
YA 237	35	70.5	66.7	10.1	.337	.197	.037	.528	<.247	<.049	18.3	1.65	21.4	63.7	3.45	<.494
YA 238	36	58.3	89.9	9.30	.320	.165	.03	.539	<.249	<.05	18.7	1.81	20.6	57.7	3.73	<.498
YA 239	37	39.1	14.6	6.77	.285	.186	.022	.323	<.249	<.05	18.1	1.45	22.8	66.4	4.27	<.499
YA 240	38	41.1	25.9	6.39	.212	.121	<.02	.378	<.25	<.05	15.6	1.44	18.2	56.6	3.60	<.5
YA 241	39	65.4	147.	6.57	.245	.110	<.02	.324	<.25	<.05	15.0	1.08	17.5	51.9	3.74	<.5
YA 242	40	60.8	105.	5.31	.926	.135	<.02	.297	<.248	<.05	25.7	1.48	20.8	61.0	4.98	<.496
YA 243	41	56.0	31.6	6.12	.447	.223	.024	.344	<.247	<.049	23.6	1.52	25.0	80.5	5.32	<.494
YA 244	42	30.9	15.3	5.57	.435	.200	<.02	.407	<.25	<.05	18.8	1.91	24.1	69.4	5.00	<.5
YA 245	43	53.9	10.7	5.99	.490	.134	<.02	.340	<.248	<.05	21.3	1.76	23.3	76.6	5.81	<.497
YA 246	44	85.3	297.	9.04	.305	.269	.052	.383	<.247	<.049	28.9	1.43	17.3	97.8	4.38	<.494
YA 247	45	354.	440.	9.04	.301	.389	.024	.340	<.249	.117	55.1	1.42	15.5	93.6	4.34	<.497
YA 248	46	221.	448.	11.3	.306	.415	.049	.337	<.248	.082	44.4	1.75	18.9	114.	5.24	<.495
YA 249	47	187.	363.	13.5	.488	.450	.100	.466	<.249	.113	32.0	2.25	29.0	103.	4.24	<.499
YA 250	48	132.	166.	8.83	.355	.390	.079	.400	<.247	.081	30.6	1.50	22.6	101.	4.76	<.494
YA 251	49	131.	189.	9.19	.365	.398	.059	.416	<.249	<.05	27.4	1.16	24.6	103.	4.65	<.498
YA 252	50	199.	530.	9.66	.362	.386	.134	.464	<.249	<.05	24.7	1.30	27.5	102.	4.58	<.498
YA 253	51	200.	461.	14.3	.397	.816	.176	.608	<.25	<.05	27.3	2.04	43.9	270.	4.02	<.499
YA 254	52	107.	135.	29.2	.541	.386	.104	1.05	<.249	.272	23.6	8.39	31.4	145.	4.03	<.498
YA 255	53	142.	458.	56.2	.507	.322	.110	.907	<.249	.199	31.9	6.05	28.6	111.	4.22	<.499
YA 255 DUP	54	141.	512.	54.7	.472	.329	.120	.907	<.246	.216	31.0	6.19	28.6	102.	3.49	<.493
YA 256	55	98.4	109.	4.73	.353	.315	.043	.407	<.246	<.049	21.6	1.24	20.1	58.7	3.41	<.493
YA 257	56	91.6	166.	9.13	.336	.388	.063	.496	<.249	.057	24.9	1.89	18.8	61.5	4.31	<.499
YA 258	57	127.	832.	10.5	.478	.231	.021	1.16	<.248	.205	16.7	5.96	17.9	41.7	2.16	<.496
YA 259	58	111.	772.	6.74	.368	.451	.038	.453	<.246	.074	23.7	2.98	18.3	62.6	3.35	<.492
YA 260	59	127.	115.	7.07	.350	.394	.052	.355	<.25	<.05	24.3	1.86	24.0	77.1	3.70	<.5
YA 261	60	108.	112.	8.95	.305	.242	.046	.446	<.25	<.05	27.0	1.60	22.8	81.3	4.35	<.5

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GEOCHEMICAL SERVICES INC.

GEOCHEMICAL ANALYSIS REPORT

JOB #: ASB-OR1722

RECEIVED
JAN 18 1990
EXPLORATION DEPARTMENT

SAMPLE ID	#	Ag ppb	Au ppb	As ppm	Bi ppm	Cd ppm	Hg ppm	Sb ppm	Se ppm	Te ppm	Cu ppm	Mo ppm	Pb ppm	Zn ppm	Ga ppm	Tl ppm
YA 262	61	135.	468.	16.0	.440	.234	.054	.795	<.247	<.049	24.2	1.98	26.5	81.9	4.41	<.495
YA 263	62	61.2	54.9	11.2	.307	.166	.046	.563	<.248	<.05	20.1	1.38	23.1	65.7	3.67	<.496
YA 264	63	66.0	95.3	10.0	.335	.169	.036	.592	<.249	<.05	19.2	1.52	19.7	58.0	3.73	<.498
YA 265	64	61.2	20.4	8.14	.343	.172	.031	.474	<.246	<.049	16.1	1.59	19.1	51.6	3.09	<.493
YA 266	65	53.0	53.0	7.80	.418	.189	<.02	.546	<.247	<.049	16.6	1.77	21.4	51.7	3.32	<.494
YA 267	66	39.7	24.8	7.71	.239	.110	<.02	.436	<.249	<.05	17.4	1.38	20.6	81.1	5.50	<.497
YA 268	67	133.	379.	24.4	.519	.266	.088	.453	<.247	.059	20.8	1.81	27.3	95.6	4.63	<.493
YA 269	68	47.0	17.3	18.8	1.76	.156	.046	.495	<.247	<.049	27.3	1.87	28.0	124.	7.00	<.493
YA 270	69	43.2	10.5	5.06	1.07	.130	.035	.315	<.246	<.049	19.2	1.23	16.8	51.6	3.63	<.493
YA 271	70	36.5	30.3	6.14	.672	.151	<.02	.338	<.248	<.05	14.8	1.15	27.9	48.3	3.17	<.495
YA 272	71	37.3	2.39	6.06	.485	.197	<.02	.438	<.246	<.049	20.9	1.83	27.6	84.5	5.76	<.493
YA 273	72	63.7	14.0	6.33	.443	.155	.022	.373	<.249	<.05	20.8	1.30	18.8	78.4	6.00	<.498
YA 274	73	98.1	69.5	4.71	.380	.286	.066	.404	<.249	.059	24.3	1.36	25.0	66.1	4.08	<.498
YA 275	74	133.	523.	5.81	.497	.387	.043	.385	<.247	.083	23.9	1.34	24.1	60.9	3.67	<.494
YA 276	75	131.	718.	6.56	.409	.333	.036	.497	<.247	.100	22.5	1.84	25.8	68.8	4.16	<.493
YA 277	76	157.	280.	5.98	.443	.526	.045	.340	<.248	.113	30.8	1.43	19.9	86.3	3.63	<.496
YA 278	77	222.	307.	9.45	1.63	.523	.073	.435	<.247	.128	31.4	1.81	26.3	109.	3.81	<.493
YA 279	78	197.	318.	19.0	.750	.425	.075	.579	<.247	.118	29.8	2.53	28.7	105.	3.85	<.494
YA 280	79	127.	13.4	10.0	.393	.382	.083	.337	<.247	.096	22.3	1.85	21.2	79.7	2.42	<.495
YA 281	80	126.	5.39	8.38	.439	.373	.120	.437	<.248	.085	31.5	1.42	25.3	84.5	3.61	<.496
YA 282	81	61.4	43.0	4.69	.171	.203	.035	.239	<.247	<.049	16.3	.865	15.8	43.1	2.03	<.494
YA 283	82	239.	603.	9.99	1.33	.496	.139	.316	<.25	<.05	21.1	1.43	30.0	120.	2.17	<.5
YA 284	83	85.3	48.2	38.2	.315	.312	.071	.451	<.247	<.049	17.1	2.08	24.3	104.	2.84	<.494
YA 285	84	93.1	209.	35.6	.277	.263	.059	.486	<.247	.067	20.1	3.15	20.5	62.4	2.44	<.493
YA 285 DUP	85	85.4	144.	33.1	.282	.262	.05	.485	<.246	.054	20.0	3.11	20.2	62.1	2.31	<.493
YA 286	86	66.8	120.	7.59	.289	.261	.028	.482	<.249	<.05	19.6	1.58	20.6	37.3	2.27	<.497
YA 288	87	60.9	104.	4.38	.181	.328	.062	.300	<.25	<.05	19.9	1.41	22.5	46.6	1.82	<.499
YA 289	88	53.6	36.0	4.39	.163	.197	.028	.255	<.247	<.049	19.3	1.16	18.7	42.4	1.92	<.493
YA 290	89	66.0	37.9	5.64	.219	.219	.028	.280	<.247	<.049	18.4	1.36	19.7	38.7	1.94	<.494
YA 291	90	54.1	26.4	6.80	.202	.184	.033	.308	<.247	<.049	15.8	1.79	18.8	38.1	2.06	<.494

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GEOCHEMICAL SERVICES INC.

GEOCHEMICAL ANALYSIS REPORT

JOB #: ASB-OR1722

RECEIVED
JAN 18 1990
EXPLORATION DEPARTMENT

SAMPLE ID	#	Ag ppb	Au ppb	As ppm	Bi ppm	Cd ppm	Hg ppm	Sb ppm	Se ppm	Te ppm	Cu ppm	Mo ppm	Pb ppm	Zn ppm	Ga ppm	Tl ppm
YA 292	91	54.3	60.7	9.32	.281	.155	.048	.431	<.247	<.049	17.3	1.87	18.0	33.5	2.13	<.494
YA 293	92	60.0	45.6	8.14	.301	.176	.058	.394	<.248	<.05	17.9	1.72	20.3	36.4	2.31	<.496
YA 294	93	50.2	27.8	8.28	.355	.175	<.02	.481	<.25	.059	15.0	1.50	19.1	31.4	2.18	<.499
YA 295	94	50.4	17.3	6.82	.327	.145	<.02	.333	<.246	<.049	13.8	1.45	17.5	30.3	2.15	<.493
YA 296	95	48.7	20.7	8.87	.304	.125	.023	.381	<.249	<.05	14.0	1.34	19.9	34.1	2.81	<.499
YA 297	96	97.6	22.5	12.0	.286	.116	.038	.442	<.247	<.049	11.5	1.25	20.8	32.9	3.30	<.494
YA 298	97	68.5	23.7	10.9	.381	.116	.028	.325	<.247	<.049	13.5	1.23	19.1	58.1	4.37	<.494
YA 299	98	31.3	9.08	9.37	.347	.088	<.02	.363	<.248	<.05	13.5	1.50	19.0	59.0	4.93	<.496
YA 300	99	52.7	1.88	3.64	.179	.135	<.02	.204	<.248	<.05	14.4	1.01	15.3	33.3	2.56	<.495
YA 301	100	51.4	13.6	10.0	.463	.174	.033	.295	<.247	<.049	16.6	1.29	24.8	49.2	2.50	<.493
YA 302	101	64.9	13.4	7.34	.360	.120	<.02	.277	<.248	<.05	25.9	1.32	18.8	45.8	4.09	<.495
YA 303	102	74.4	73.0	3.96	.258	.257	.023	.315	<.249	<.05	20.6	1.31	19.0	33.7	1.93	<.499
YA 304	103	90.4	59.8	4.62	.382	.364	.044	.361	<.249	.058	24.2	1.54	22.8	39.4	1.87	<.497
YA 306	104	134.	116.	8.77	.526	.320	.05	.389	<.248	.110	32.4	1.60	25.6	53.9	2.23	<.496
YA 307	105	116.	72.6	6.87	.493	.343	.047	.384	<.249	.111	26.6	1.29	25.4	52.6	2.27	<.499
YA 308	106	99.6	191.	10.0	.460	.317	.054	.494	<.249	.089	24.1	1.24	28.3	59.7	2.44	<.498
YA 309	107	84.0	101.	5.96	.300	.230	.022	.346	<.249	.072	21.0	.964	19.8	52.1	2.82	<.497
YA 310	108	64.5	113.	10.0	.329	.186	.034	.385	<.25	<.05	18.8	3.65	15.7	55.4	2.42	<.5
YA 311	109	60.6	66.2	20.2	.341	.240	.04	.336	<.247	<.049	17.8	1.13	25.4	60.0	2.52	<.494
YA 312	110	65.1	21.2	13.0	.295	.412	.042	.361	<.247	<.049	21.6	1.48	23.8	93.5	2.22	<.494
YA 313	111	79.8	59.1	14.2	.447	.417	.059	.415	<.249	.102	19.0	1.97	25.6	90.2	2.03	<.497
YA 314	112	43.9	5.74	3.96	.290	.144	.028	.230	<.249	<.05	8.51	.526	21.2	61.5	3.90	<.498
YA 315	113	24.1	2.72	4.86	.083	.147	.024	.223	<.249	<.05	8.33	.486	17.2	47.2	3.24	<.498
YA 315 DUP	114	20.5	2.05	4.05	.095	.136	<.02	.201	<.249	<.05	7.47	.429	15.4	40.6	2.74	<.497
YA 316	115	45.1	2.15	3.37	.264	.332	.037	.271	<.249	<.05	19.2	.702	20.2	67.1	3.47	<.497
YA 317	116	43.6	4.04	3.47	.191	.265	.022	.198	<.246	<.049	18.0	.760	22.5	64.6	3.28	<.493
YA 318	117	40.6	4.90	3.16	.175	.241	<.02	.195	<.247	<.049	14.9	.638	17.6	52.5	2.68	<.493
YA 319	118	34.8	2.21	3.69	.154	.102	<.02	.178	<.248	<.05	11.9	.616	15.0	43.7	3.43	<.496
YA 320	119	45.3	7.14	5.22	.279	.216	<.02	.303	<.249	<.05	10.9	.700	30.9	86.9	3.61	<.498
YA 321	120	56.4	11.9	6.49	.310	.314	.029	.403	<.25	<.05	22.5	1.24	73.2	165.	3.84	<.499

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GEOCHEMICAL SERVICES INC.

GEOCHEMICAL ANALYSIS REPORT

JOB #: ASB-OR1722

RECEIVED
JAN 18 1990
EXPLORATION DEPARTMENT

SAMPLE ID	#	Ag ppb	Au ppb	As ppm	Bi ppm	Cd ppm	Hg ppm	Sb ppm	Se ppm	Te ppm	Cu ppm	Mo ppm	Pb ppm	Zn ppm	Ga ppm	Tl ppm
YA 322	121	43.6	16.2	4.29	.171	.103	.031	.287	<.249	<.05	15.8	1.17	17.9	51.0	4.25	<.498
YA 323	122	72.9	22.1	9.19	.238	.345	.03	.391	<.248	<.05	22.9	1.67	28.3	100.	3.85	<.496
YA 326	123	170.	184.	17.8	.305	1.08	.082	.659	<.247	.084	25.6	2.09	73.0	341.	2.16	<.495
YA 327	124	176.	110.	8.34	.270	.551	.08	.405	<.247	.057	28.3	1.33	35.2	179.	2.55	<.494
YA 328	125	114.	111.	7.84	.283	.468	.05	.518	<.248	.116	35.1	1.04	23.6	141.	2.40	<.497
YA 329	126	147.	79.6	9.22	.284	.457	.057	.429	<.248	.076	48.2	1.26	23.8	103.	2.39	<.497
YA 330	127	124.	58.6	11.0	.289	.307	.043	.502	<.248	<.05	34.9	.999	20.1	68.5	2.59	<.495
YA 331	128	83.8	30.1	9.23	.249	.315	.041	.326	<.247	.059	29.9	1.01	17.9	53.7	1.88	<.495
YA 332	129	131.	41.8	21.8	.545	.218	.047	.527	<.249	<.05	31.8	1.22	22.8	40.7	2.32	<.499
YA 333	130	76.9	31.0	11.2	.254	.429	.053	.305	<.248	<.05	30.5	1.07	17.1	57.0	2.00	<.495
YA 334	131	117.	36.6	21.8	.653	.355	.074	.446	<.249	.055	47.2	1.68	25.1	52.2	2.87	<.498

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GEOCHEMICAL SERVICES INC.

Q.A.REPORT

Dear Customer:

In order to assure the quality of our products, we have withheld data on the following sample(s) listed below:

1. YA 223	2. YA 224	3. YA 225
4. YA 225 DUP	5. YA 287	6. YA 305
7. YA 324	8. YA 325	9.
10.	11.	12.

The reason that the data was withheld is checked below:

____ The sample(s) listed above contained unusually high values for one or more elements. In order for us to assure our higher reporting limits, it is necessary to re-run the sample at a higher dilution factor. Rather than hold your report for this data, the report was issued less the sample(s) in question. The data for the delayed sample(s) will be ready no later than _____.

✓ The sample(s) listed above need to be re-run through the normal process. Rather than hold your report for this data, the report was issued less the sample(s) in question. The data for the delayed sample(s) will be ready no later than 1/16/90.

We apologize for any inconvenience that this action may have caused you. If for any reason our scheduled completion date is inadequate for your program please call and let me know.

Sincerely yours,

Nancy G. Gonzalez for

Mary Leitch
Quality Assurance Manager

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Incomplete See Attached

JDS

GEOCHEMICAL SERVICES INC.

GEOCHEMICAL ANALYSIS REPORT

TO: Mr. James D. Sell
ASARCO Inc.
P. O. Box 5747
Tucson, AZ 85703 tel:602/792-3010

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EXPLORATION DEPARTMENT

Job Number: ASB-0S6273
Analysis Code: GXPL10
Digest: 10 gram
Total number of samples: 59

This report has been reviewed and approved by:

Nancy G. Gonzalez for Date: 1/11/90
Mary Leitch, Quality Assurance Manager

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GEOCHEMICAL SERVICES INC.

GEOCHEMICAL ANALYSIS REPORT

JOB #: ASB-OS6273

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JAN 18 1990
EXPLORATION DEPARTMENT

SAMPLE ID	#	Ag ppm	As ppm	Au ppm	Cu ppm	Hg ppm	Mo ppm	Pb ppm	Sb ppm	Tl ppm	Zn ppm	Bi ppm	Cd ppm	Ga ppm	Se ppm	Te ppm
YM26 0 5	1	.109	4.76	.02	27.4	<.099	1.24	10.1	<.246	<.493	70.6	<.246	.109	1.10	<.985	<.493
YM26 25 30	2	.041	2.67	.008	18.6	<.096	2.35	9.01	<.241	<.481	240.	<.241	.108	1.31	<.962	<.481
YM26 50 55	3	.05	17.3	.012	15.5	<.099	1.87	14.2	<.248	<.495	94.7	<.248	<.099	.884	<.99	<.495
YM26 75 80	4	.064	22.9	.014	8.85	<.1	2.08	9.59	<.249	<.498	54.4	<.249	.101	<.498	<.995	<.498
YM26 100 105	5	.065	25.4	.016	10.8	<.099	2.16	21.0	<.248	<.496	141.	<.248	.109	<.496	<.991	<.496
YM26 125 130	6	.099	39.4	.320	15.7	<.099	2.79	20.4	<.248	<.496	163.	<.248	.163	1.36	<.991	<.496
*YM26 175 180	7	.051	8.10	.011	10.0	<.099	2.61	9.57	<.248	<.497	45.1	<.248	.106	1.40	<.993	<.497
YM26 200 205	8	.790	139.	.769	36.8	<.097	14.7	255.	1.01	<.485	124.	1.81	.298	<.485	<.971	1.46
YM26 200 205 DUP	9	.722	124.	.698	33.4	<.099	13.3	231.	1.00	<.496	113.	1.68	.278	<.496	<.991	1.30
YM26 225 230	10	.395	69.4	1.09	5.13	<.099	3.79	9.17	<.247	<.494	43.5	.287	.139	<.494	<.988	<.494
YM26 250 255	11	.518	15.1	.762	5.55	<.099	5.40	7.69	<.248	<.496	34.3	<.248	.189	<.496	<.991	<.496
YM26 275 280	12	.782	11.8	2.44	26.3	<.097	2.76	4.73	<.242	<.483	36.4	.323	.166	<.483	<.966	.509
YM26 300 305	13	.302	5.11	.206	2.46	<.099	2.70	3.71	<.248	<.495	94.2	<.248	.120	<.495	<.99	<.495
YM26 325 330	14	.164	188.	.520	6.85	<.099	4.97	10.1	.414	<.496	36.7	<.248	.169	<.496	<.992	<.496
YM26 350 355	15	.200	58.4	.399	5.29	.187	9.02	6.97	<.249	<.498	90.4	<.249	.257	<.498	<.996	<.498
YM26 375 380	16	.034	3.31	.014	1.19	<.096	1.19	4.19	<.239	<.479	21.4	<.239	.128	<.479	<.958	<.479
YM26 395 400	17	.058	5.13	.015	1.64	<.098	1.09	8.94	<.245	<.489	23.6	<.245	.149	<.489	<.978	<.489
YM26 425 430	18	.069	6.85	.019	12.4	<.099	2.73	10.1	<.247	<.494	54.4	<.247	.114	2.30	<.987	<.494
YM26 445 450	19	.04	4.65	.009	10.6	<.096	1.03	12.6	.289	<.478	52.8	<.239	<.096	2.41	<.957	<.478
YM6 0 5	20	.067	6.78	.025	14.3	<.098	1.58	16.6	.467	<.491	187.	<.246	.108	1.71	<.982	<.491
YM6 25 30	21	.067	2.00	.056	14.5	<.096	2.20	12.8	.559	<.48	113.	<.24	.357	1.00	<.961	<.48
YM6 50 55	22	.071	11.4	.013	12.6	<.097	2.28	10.7	.558	<.487	172.	<.243	.149	.528	<.974	<.487
YM6 75 80	23	.071	17.5	.021	11.7	<.099	2.23	8.82	1.04	<.494	47.1	<.247	.137	<.494	<.987	<.494
YM6 100 105	24	.064	23.0	.143	14.9	<.099	2.94	8.85	1.17	<.496	92.9	<.248	.213	<.496	<.991	<.496
YM6 125 130	25	.580	18.8	2.32	4.99	<.099	2.12	7.12	.679	<.496	36.4	.967	<.099	<.496	<.991	<.496
YM6 150 155	26	.319	19.9	1.11	3.50	<.097	7.53	10.7	.539	<.483	24.1	.742	.141	<.483	<.965	<.483
YM6 175 180	27	.562	22.2	5.22	2.55	<.1	3.89	5.90	.550	<.5	25.8	<.25	.207	<.5	<.999	<.5
YM6 200 205	28	.137	27.9	.472	1.86	<.098	4.28	7.46	.326	<.488	71.0	<.244	.157	<.488	<.976	<.488
YM6 225 230	29	.493	22.2	1.26	2.02	.112	8.43	7.29	1.14	<.48	49.6	<.24	.232	<.48	<.961	.599
YM6 250 255	30	.238	32.6	.164	1.64	<.099	2.32	6.26	.604	<.493	41.7	<.247	.180	<.493	<.986	<.493

* YM 26 150 155 See REP-OS6273 dated 1/15/90

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GEOCHEMICAL SERVICES INC.

GEOCHEMICAL ANALYSIS REPORT

JOB #: ASB-OS6273

RECEIVED
JAN 18 1990
EXPLORATION DEPARTMENT

SAMPLE ID	#	Ag ppm	As ppm	Au ppm	Cu ppm	Hg ppm	Mo ppm	Pb ppm	Sb ppm	Tl ppm	Zn ppm	Bi ppm	Cd ppm	Ga ppm	Se ppm	Te ppm
YM6 275 280	31	.445	42.4	1.39	1.52	.166	11.0	4.42	1.11	<.498	21.2	.775	<.1	<.498	<.996	.753
YM6 300 305	32	.126	3.21	.163	.920	<.099	1.91	5.92	.808	<.495	93.3	<.247	.154	<.495	<.989	<.495
YM6 325 330	33	.022	3.58	.037	.694	<.097	1.94	5.54	.475	<.484	44.8	<.242	.116	.681	<.967	<.484
YM6 350 355	34	.056	17.6	.05	1.62	<.097	1.93	7.59	.317	<.483	43.8	<.241	.119	.502	<.965	<.483
YM6 375 380	35	.045	13.2	.024	1.65	<.096	3.00	6.18	.293	<.48	30.2	<.24	<.096	<.48	<.961	<.48
YM6 395 400	36	.049	3.74	.016	4.42	<.1	1.72	8.15	.365	<.5	32.6	<.25	.136	.950	<.999	<.5
Y50 0 10	37	.131	7.54	.118	26.1	<.099	.983	7.45	.407	<.497	39.5	<.249	.108	1.45	<.994	<.497
Y50 20 30	38	.197	10.6	.261	14.5	<.096	2.33	8.43	.555	<.481	40.4	<.241	.159	.734	<.962	<.481
Y50 40 50	39	.057	10.9	.044	8.71	<.096	.887	7.07	<.24	<.479	34.8	<.24	.135	1.60	<.959	<.479
Y50 60 70	40	.189	26.6	.381	22.0	<.097	3.58	11.7	.401	<.483	57.0	<.242	.307	.626	<.966	<.483
Y50 80 90	41	.077	9.30	.131	13.6	<.096	1.71	7.74	<.239	<.478	37.4	<.239	.180	1.43	<.956	<.478
Y50 100 110	42	.09	17.8	.061	15.7	<.097	2.25	12.2	<.242	<.484	38.2	<.242	.178	.994	<.967	<.484
Y50 100 110 DUP	43	.086	16.1	.051	14.2	<.098	2.01	10.7	<.244	<.489	35.9	<.244	.157	.837	<.978	<.489
Y50 120 130	44	.102	9.85	.054	15.4	<.1	2.23	10.6	<.25	<.499	39.2	<.25	.189	1.21	<.998	<.499
Y50 140 150	45	.368	13.2	2.11	14.0	.151	2.22	5.86	<.238	<.477	36.9	.309	.181	1.30	<.953	1.06
Y50 160 170	46	.255	8.98	.547	11.2	<.097	3.02	8.81	<.243	<.486	27.5	<.243	.251	1.10	<.973	<.486
Y50 180 190	47	.374	12.3	.426	38.4	.119	1.66	10.1	.538	<.481	33.4	<.241	.227	.666	<.962	<.481
Y50 200 210	48	.270	13.4	.210	15.3	.168	1.71	10.8	<.24	<.481	33.5	<.24	.267	.969	<.962	<.481
Y50 220 230	49	.397	21.5	.668	19.6	<.1	1.98	7.39	<.249	<.499	41.5	<.249	.252	.524	<.997	<.499
Y50 240 250	50	.211	19.6	.139	24.2	<.099	1.72	12.5	<.248	<.496	46.6	<.248	.319	1.01	<.991	<.496
Y50 260 270	51	.113	22.6	.326	15.4	.103	2.11	13.6	<.247	<.494	41.2	.279	.250	.670	<.987	<.494
Y50 280 290	52	.517	21.7	.584	20.2	.110	1.56	7.30	.323	<.493	35.6	<.246	.249	1.27	<.985	.869
Y50 300 310	53	.473	20.3	.358	18.7	<.099	2.17	8.09	<.247	<.495	25.7	<.247	.180	.555	<.989	.800
Y50 320 330	54	.364	36.2	.867	14.3	<.097	4.19	7.95	<.242	<.483	43.0	<.242	.246	.789	<.966	.704
Y50 340 350	55	1.39	17.4	2.13	50.8	<.099	1.96	6.60	<.249	<.497	21.9	<.249	.157	.869	<.994	2.94
Y50 360 370	56	.603	16.6	.599	141.	.134	3.71	6.61	<.241	<.481	29.0	<.241	.177	<.481	<.962	<.481
Y50 380 390	57	.087	8.32	.142	20.3	<.1	2.96	8.11	<.249	<.498	25.7	<.249	.356	<.498	<.996	<.498
Y50 400 410	58	.115	6.54	.450	9.49	<.099	4.25	6.77	<.248	<.495	20.3	<.248	.180	.857	<.99	<.495
Y50 420 430	59	.074	14.0	.239	2.72	<.099	2.20	6.01	<.247	<.495	20.0	<.247	.268	.739	<.989	<.495

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GEOCHEMICAL SERVICES INC.

Q.A.REPORT

Dear Customer:

In order to assure the quality of our products, we have withheld data on the following sample(s) listed below:

1. YMZ6 150 155	2. _____	3. _____
4. _____	5. _____	6. _____
7. _____	8. _____	9. _____
10. _____	11. _____	12. _____

The reason that the data was withheld is checked below:

____ The sample(s) listed above contained unusually high values for one or more elements. In order for us to assure our higher reporting limits, it is necessary to re-run the sample at a higher dilution factor. Rather than hold your report for this data, the report was issued less the sample(s) in question. The data for the delayed sample(s) will be ready no later than _____.

✓ The sample(s) listed above need to be re-run through the normal process. Rather than hold your report for this data, the report was issued less the sample(s) in question. The data for the delayed sample(s) will be ready no later than 1/16/90.

We apologize for any inconvenience that this action may have caused you. If for any reason our scheduled completion date is inadequate for your program please call and let me know.

Sincerely yours,

Nancy G. Gonzalez

Mary Leitch
Quality Assurance Manager

RECEIVED
JAN 18 1990
EXPLORATION DEPARTMENT

3805 Atherton Road • Rocklin, California 95677 • 916/624-9701 FAX: 916/624-8986

GEOCHEMICAL SERVICES INC.

GEOCHEMICAL ANALYSIS REPORT

JDS

TO: Mr. James D. Sell
ASARCO Inc.
P. O. Box 5747
Tucson, AZ 85703 tel:602/792-3010

==========

JAN 1 9 1990

SW Exploration

Job Number: REP-0S6273
Analysis Code: GXPL10
Digest: 10 gram
Total number of samples: 1

cc MAMiller
JDRasmussen

==========

This report has been reviewed and approved by:

Nancy G. Gonzalez for Date: 1/15/90
Mary Leitch, Quality Assurance Manager

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GEOCHEMICAL SERVICES INC.

GEOCHEMICAL ANALYSIS REPORT

JOB #: REP-OS6273

SAMPLE ID	#	Ag ppm	As ppm	Au ppm	Cu ppm	Hg ppm	Mo ppm	Pb ppm	Sb ppm	Tl ppm	Zn ppm	Bi ppm	Cd ppm	Ga ppm	Se ppm	Te ppm
YM26 150 155	1	.075	15.4	.012	21.3	<.096	2.03	20.6	.446	<.478	54.7	.545	.186	.998	<.956	<.478

See ASB-OS6273 dated 1/11/90 for previous values in hole.

ASARCO Incorp.

JAN 19 1990

SW Exploration

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GEOCHEMICAL SERVICES INC.

GEOCHEMICAL ANALYSIS REPORT

TO: Mr. James D. Sell
ASARCO Inc.
P. O. Box 5747
Tucson, AZ 85703 tel:602/792-3010

ASARCO Incorporated
JAN 1 8 1990
SW Exploration

Job Number: REP-OR1722
Analysis Code: SRP30
Digest: 30 gram
Total number of samples: 8

cc: M. MILLER
J.D. RASMUSSEN

This report has been reviewed and approved by:

Nancy G. Gonzalez for Date: 1/18/90
Mary Leitch, Quality Assurance Manager

3805 Atherton Road • Rocklin, California 95677 • 916/624-6000 1/800/827-4GSI FAX: 916/624-8986
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GSI
GEOCHEMICAL SERVICES INC

GEOCHEMICAL ANALYSIS REPORT

ASARCO Corporate

JAN 1 8 1990

SW Exploration

JOB #: REP-OR1722

SAMPLE ID	#	Ag ppb	Au ppb	As ppm	Bi ppm	Cd ppm	Hg ppm	Sb ppm	Se ppm	Te ppm	Cu ppm	Mo ppm	Pb ppm	Zn ppm	Ga ppm	Tl ppm
YA 223	1	91.4	56.3	10.7	.573	.279	<.02	.690	<.247	<.049	26.0	2.54	34.9	99.8	6.34	<.494
YA 224	2	36.2	4.25	4.13	.744	.181	<.02	.388	<.249	<.05	16.7	1.51	20.9	50.7	3.59	<.499
YA 225	3	40.9	19.2	4.76	1.21	.166	.022	.361	<.249	.05	17.6	1.56	23.5	59.1	3.94	<.498
YA 225 DUP	4	55.2	19.6	4.77	1.37	.169	.033	.345	<.248	.052	18.1	1.63	24.4	61.4	4.16	<.497
YA 287	5	44.3	13.5	3.98	.312	.137	<.02	.302	<.247	<.049	8.45	.506	21.1	61.2	4.13	<.495
YA 305	6	100.	97.2	6.68	.397	.276	.022	.350	<.25	.051	19.9	1.10	22.6	46.2	2.37	<.5
YA 324	7	84.0	69.2	7.25	.239	.397	.097	.327	<.249	<.05	21.9	1.28	40.3	217.	2.70	<.497
YA 325	8	142.	87.5	9.96	.285	.265	.073	.349	<.247	.063	19.2	1.36	22.4	122.	2.93	<.495

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GEOCHEMICAL SERVICES INC.

GEOCHEMICAL ANALYSIS REPORT

MR. JIM SELL ASARCO ASB-OS6273

UNIVARIATE STATISTICS N= 59

	VARIABLE	MEAN	STD DEV	VAR	MINIMUM	MAXIMUM
1	Ag	.245847	.257272	.661890D-01	.022000	1.390000
2	As	23.739322	32.779849	.107452D+04	2.000000	188.000000
3	Au	.520712	.863724	.746019D+00	.008000	5.220000
4	Cu	15.180746	19.633805	.385486D+03	.694000	141.000000
5	Hg	.056593	.044385	.197004D-02	.000000	.187000
6	Mo	3.262373	2.810571	.789931D+01	.887000	14.700000
7	Pb	16.962034	42.895761	.184005D+04	3.710000	255.000000
8	Sb	.302305	.339580	.115315D+00	.000000	1.170000
9	Tl	.000000	.000000	.000000D+00	.000000	.000000
10	Zn	58.715254	45.896754	.210651D+04	20.000000	240.000000
11	Bi	.157271	.355950	.126700D+00	.000000	1.810000
12	Cd	.177814	.071006	.504184D-02	.069000	.357000
13	Ga	.714831	.549274	.301701D+00	.000000	2.410000
14	Se	.100864	.142297	.202484D-01	.000000	.489000
15	Te	.297051	.479725	.230136D+00	.000000	2.940000

CORRELATION MATRIX

	Ag	As	Au	Cu	Hg	Mo	Pb	Sb	Tl	Zn	Bi	Cd	Ga	Se	Te
Ag	1.0000														
As	.2979	1.0000													
Au	.6518	.1207	1.0000												
Cu	.4234	.0617	.0394	1.0000											
Hg	.2955	.0637	.2245	.1972	1.0000										
Mo	.4253	.6609	.2365	.0626	.3045	1.0000									
Pb	.3496	.6255	.0220	.1938	-.0727	.7102	1.0000								
Sb	.1555	.3206	.1584	-.1200	-.0207	.5192	.3803	1.0000							
Tl	.0000	.0000	.0000	.0000	.0000	.0000	.0000	.0000	1.0000						
Zn	-.1835	.1055	-.2366	.0019	-.3308	.1168	.2853	.1858	.0000	1.0000					
Bi	.4720	.5742	.3070	.0868	.0708	.7769	.8352	.5236	.0000	.1267	1.0000				
Cd	.2105	.2186	.0710	.1756	.3635	.2604	.2950	.0364	.0000	-.0768	.1244	1.0000			
Ga	-.3193	-.3391	-.2768	.0254	-.1753	-.4464	-.2183	-.4269	.0000	.1138	-.3619	-.1801	1.0000		
Se	.0050	-.0885	-.0847	.0438	.3722	-.2610	-.1294	-.3553	.0000	-.3072	-.1966	.4519	.2123	1.0000	
Te	.8918	.3734	.4823	.3339	.2328	.4277	.4088	.1536	.0000	-.1098	.4644	.1673	-.1872	.0144	1.0000

ASARCO Incorporated
JAN 29 1990
SW Exploration

JDS

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JDS

GEOCHEMICAL SERVICES INC.
GSI
3805 Atherton Road
Rocklin, California 95677
916/624-9701 FAX: 916/624-8986

INVOICE

ASR... Corporation
JAN 29 1990
SW Exploration

INVOICE NUMBER: 8214
INVOICE DATE: Jan 24 90
PAGE: 1

SOLD TO:
ASARCO INC.
P.O. BOX 5747
TUCSON, AZ
ATTN: JAMES SELL
85703

SHIP TO:
COPIES TO: MARK MILLER &
JAMES RASMUSSEN

SHIP VIA:
SHIP DATE: Jan 24 90
DUE DATE:
TERMS:

CUST. ID: ASB
P.O. NUMBER:
P.O. DATE: Jan 24 90
OUR ORDER NO.:
SALESMAN:

PRODUCT I.D.	DESCRIPTION	ORDERED	SHIPPED	U/M	UNIT PRICE	AMOUNT	TX
CBSCM	BASIC STATS.&CORR.METRIX S6273		1		25.00	25.00	
	Subtotal					25.00	
	Total					25.00	

```
*************************************************
*       MONTHLY INTEREST OF 1.5 PERCENT         *
*         WILL BE CHARGED ON INVOICES           *
*            UNPAID AFTER 30 DAYS               *
*************************************************
```

This is a professional service — payment is due on receipt.

MBM

2-1-90

Please do 1st

Recal of holes w/ stage

~~△ 71 holes 7, 84, 81~~ NO CHANGE

OLD

.049 △ 82 holes 25, 74, 77 17,777 T @ .058 rounded down scale line 996.2 Tm-Oz

.050 △ 91 holes 7, 37, 78 39905 T @ .050 1995.25 T-OZ used wrong holes!

Good these

101 holes

102

103 holes 24, 52, 75

82 ✓

25	35 × 0.070	=	2.45
76*	40 × 0.059	=	2.35 ✓
77*	73 × 0.057	=	4.18 ✓
	148/3 = 49.3 @ 0.061		8.98

8.93

76* 25 × 0.034 = 0.850
15 × 0.100 = 1.50
40 @ 0.059 = 2.35. ✓

77* 60 × 0.048 = 2.88
13 × 0.100 = 1.30
73 @ 0.057 = 4.18

---

91 ✓

7*	75 × 0.051	=	3.79
37	60 × 0.036	=	2.160
78	55 × 0.070	=	3.850
	190/3 = 63.3 @ 0.052		9.80

7* 70 × 0.047 = 3.29 ✓
5 × 0.100 = 0.50
75 @ 0.051 3.79

		old	new	old oz	new oz
82	17,177 tons	0.049	0.061	841.673	1047.797
91	39,905	0.048	0.052	1,915.440	2075.060

diff

82

1047.797
− 841.673
206.127 oz 24.5% increase

91

2075.060
1915.440
159.620 oz 8.3%

using 230,000 tons at 0.0875 = 20,125 ounces

5'	0.050	= 0.25
15'	0.100	= 1.50
20' ave	0.0875	1.75

250,000 × 0.051 = 12,750

loss of

WKR - JDS

ASARCO

Mineral Beneficiation Department
Tucson, Arizona

February 2, 1990

Mr. S. L. Lakosky
Mine Superintendent
MISSION UNIT

Yarnell Testwork Status

The first phase testwork at McClelland Laboratories has been essentially completed with only assays for the last column pending. A report from McClelland is forthcoming but may be several weeks in preparation, so I have summarized the results for the record below. Also I have listed further testwork which we should initiate as soon as we have authorization.

80% passing size	Column Size	Leach Time (Days)	Head Assay opt	Tail Assay opt	Extraction
6 inch	24-in dia. x 18 ft	111	0.046	0.022	52.2%
2 inch	15-in dia. x 18 ft	102	0.051	0.015	70.6%
3/8" ~~1/2~~ inch	12-in dia. x 18 ft	79	0.055	0.013	76.4%

see 3/19/90 report

Preliminary leach tests on the low grade sample showed only an estimated 25% recovery at the 6-inch size but an estimated 65% recovery at 80% minus 3/8-inch size. Final recovery figures won't be available until tailing assays are received.

On the basis of the above results, we should proceed with plant design based on two-stage crushing to 80% minus 1½-inch size at a recovery of 72%. I feel that the 72% recovery is a conservative figure since the single use leach pad design being used will give far longer leach times than the 102-day leach tested.

We will need further testwork to confirm these results and investigate other leaching parameters such as clay content. A preliminary list of these "Phase 2" tests is given below:

A. Two or three small columns using diamond drill core from different areas of the proposed pit.

B. Two parallel columns at 1½-inch size with and without clay.

C. Possibly a low grade column at 1½-inch size.

D. E. Crowell

DEC:brw
cc: T. E. Scartaccini
R. J. Kupsch
R. L. Brown
W. L. Kurtz/J. D. Sell

RECEIVED
FEB 5 1990
EXPLORATION DEPARTMENT

ASARCO

form 302-MB
of Feb. 5, 1990
(not encrypted)

Southwestern Exploration Division

JDS

February 5, 1990

R.L. Brown
New York

Extension Drilling
Yarnell Project
Yavapai County, AZ

I submit M.A. Miller's report on the mineral potential on two areas outward from the main Yarnell drill indicated reserve.

Eleven holes are recommended to evaluate the southwest extension beyond our last line of drill holes (YM-48, -64, -65).

Two holes are recommended to evaluate the northeast extension.

Both areas have the potential to add up to a million tons at a similar grade to the main Yarnell deposit. The southwest area will have an increased waste/ore ratio while the northeast area will have a reduced waste/ore ratio, as indicated in the attached cross-sections by M.A. Miller.

I submit Form 302-MB for $42,300 to cover the drilling, assaying, and supervision of the recommended drill holes. I look forward to the acceptance of the SEA.

James D. Sell

James D. Sell

JDS:mek
Att.

cc: W.L. Kurtz
S.L. Lakosky
M.A Miller
C.L. Snow (Form 302-MB only)

FORM 302-MB (9/79)

New York No. .....

APPLICATION FOR SUPPLEMENTAL EXPLORATION APPROPRIATION

February 5, 1990 Originating Office Tucson

Application is hereby made for supplemental Appropriation to cover cost, in excess of original estimate, of work authorized by New York.

No. 0444 - Yarnell Project, Arizona

Present total Estimated Cost	$ 1,066,500
Amount previously authorized (date 11/13/89 EA-0444-04)	$ 1,024,200
Balance for which Authorization is now requested	$ 42,300

ADDITIONAL WORK CONTEMPLATED:

Drilling 3000 feet in thirteen rotary reverse circulation holes to evaluate two extensions which will add between 1/2 and 1 million tons of 0.04-0.05 opt gold to the Yarnell inventory.

The present drill indicated inventory is 4.1 million tons at 0.051 opt gold within the main zone of mineralization.

EXPLANATION OF INCREASED COST:

Sampling beyond the present drilled area has indicated extensions which will add to the total tonnage and ounces of gold available to open pit mining.

Reviewed by C. L. Snow
ACC'T. MGR. OR CHIEF ACC'N'T.

Recommended by James D. Sell
James D. Sell
SUPERVISOR

Approved by .....
CONTROLLER

Account Chargeable to .....
TO BE FILLED IN BY CONTROLLER

Approved by .....
VICE PRESIDENT

Approved by Advisory Committee

..... 19.....

Approved by Board of Directors

..... 19.....

.....
SECRETARY

PRINTED IN U.S.A.

January 30, 1990

J.D. Sell

Proposed Drilling
Yarnell Southwest
& Northeast
Yarnell Project
Yavapai County, AZ

Recommendations

Thirteen holes are proposed to test the mineral potential of the SW extension of the Yarnell mineralized zone from the last mineralized drill fence (YM-48, -64, -65) to the southwest towards the highway and mineralization mapped and sampled on the hill northeast of the proposed open pit. A potential of 500,000 - 700,000 tons at 0.04-0.05 opt gold is projected for this area.

Two of the holes are recommended to test the northeast knob where a thin zone of average grade is projected under ore grade surface assays.

Attachment A shows the Yarnell fault and the two proposed drilling extension areas along with the previous drill holes. Cross-section lines indicating the Yarnell fault and expected mineralized zone are expressed in Figures 1 through 8, in the two recommended areas.

Geology

Mapping at 1"=100' and reconnaissance mapping and sampling indicate that the Yarnell Fault Zone (YFZ) is continuous and mineralized for at least 2400' along its length southwest of the last fence of Asarco drill holes. US Highway 89 and its right of way restricts the exploration to 800-1000 feet of this length. Exceptional grade-thickness would be necessary to consider rerouting the highway. Assays taken along the outcrop of the YFZ where exposed have assayed ore grade mineralization. Alteration appears to be continuous along its potential mineable length. The exposed rocks within the potential mineralized zone are moderately altered to sericite with abundant quartz veins typical of the hanging wall rocks. The exact position of the YFZ is not known but based upon the projection from outcrops and drill holes depth to the mineralized horizon is within reach for an

open pit. On the basis of the geologic mapping an assumed dip of 35° NW has been used for the attitude of the mineralized zone. A shallower dip will decrease the overall stripping. The actual attitude of the mineralized zone will be determined upon completion of the first drill fence.

An additional 2 holes are recommended to test the mineral potential on the knob NE of the proposed open pit. They are designed to test the mineralization seen in the trench Y-117 (Figure 9) located along the exploration road and scattered outcrops and quartz veins located on the knob that have assayed +.04 opt Au. We have mapped moderate alteration with abundant silification throughout the knob. Detailed (10' intervals) sampling along the exploration roads have indicated both ore grade and scattered areas of ±.01 opt Au. Drill hole YM-86 was drilled on the hilltop and showed a 20' zone which assayed .013 opt Au. The two holes are designed to test within this zone and the projection of the fault zone which could be the updip portion of the Yarnell Fault. A potential of +200,000T @ .04-.05 opt Au is possible with a low stripping ratio.

Mark A. Miller
Project Geologist

MAM:mek
Atts.

cc: R.L. Brown/F.T. Graybeal
W.L. Kurtz
S.L. Lakosky

Proposed Drilling Yarnell
Southwest & Northeast
Yarnell Project, Yavapai Co., AZ

January 30, 1990

Table 1 - Cost Estimate

3000' RC drilling @ $8.00/ft.	$24,000
Assay costs @ $3.00/ft.	9,000
Surveying	1,000
Expenses	2,000
Site preparation	2,000
Sub total	$38,000
10% Contingency	3,800
TOTAL	$41,800

TRENCH Y-117

Trench Footage		Assay Value (in opt Au)
0	0-2'	.003
10	0-2'	.011
	2-7'	.003
20	0-5'	.009
	5-10'	.004
30	0-5'	.149
	5-10'	.01
40	0-5'	.021
	5-10'	.06
50	0-3'	.004
60	0-3'	.005
70	0-3'	.018
80	0-5'	.061
90	0-3'	.041
100	0-3'	.035

NOTE: "0" starts at top of sampling, not top of trench (see attached section)

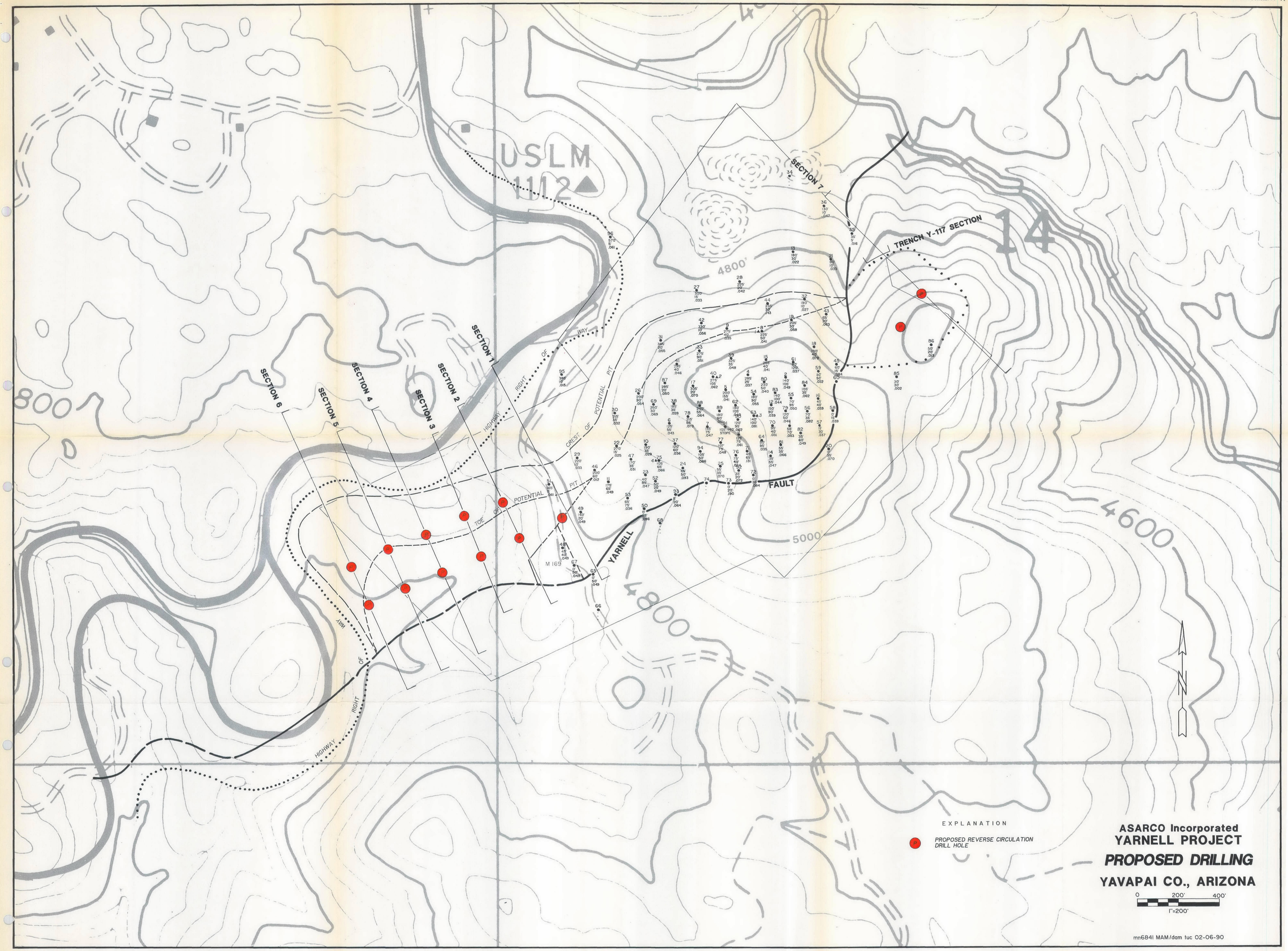
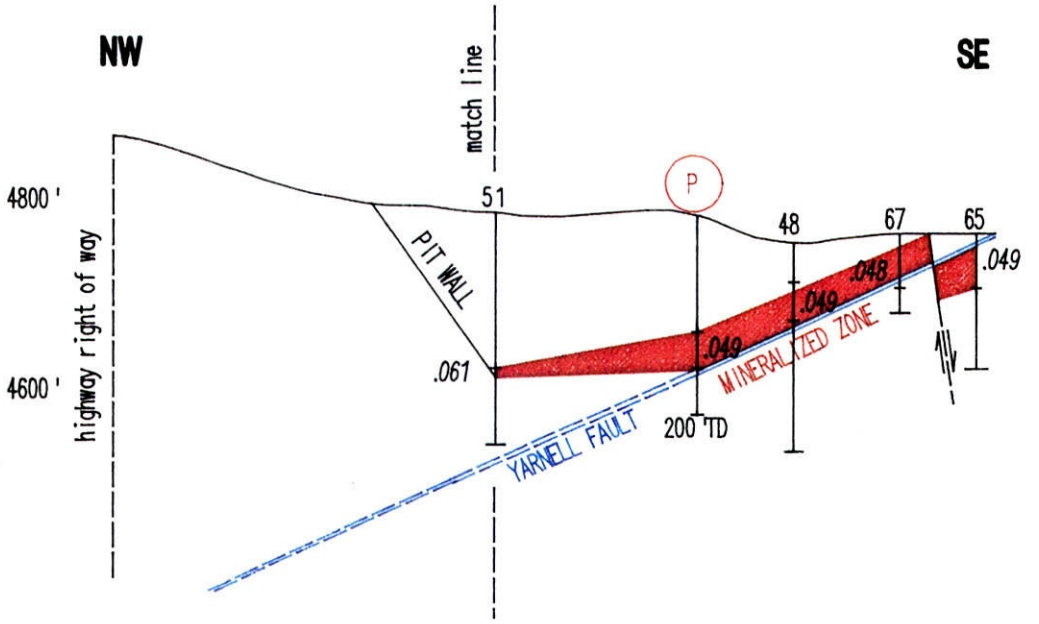

USLM
1112
4800'
5000'
4600
4800
800
14
SECTION 1
SECTION 2
SECTION 3
SECTION 4
SECTION 5
SECTION 6
SECTION 7
TRENCH Y-117 SECTION
YARNELL FAULT
TOP OF POTENTIAL PIT
CREST OF POTENTIAL PIT
RIGHT OF WAY
HIGHWAY
M 169
EXPLANATION
PROPOSED REVERSE CIRCULATION DRILL HOLE
ASARCO Incorporated
YARNELL PROJECT
PROPOSED DRILLING
YAVAPAI CO., ARIZONA
0 200' 400'
1"=200'
mn6841 MAM/dam tuc 02-06-90

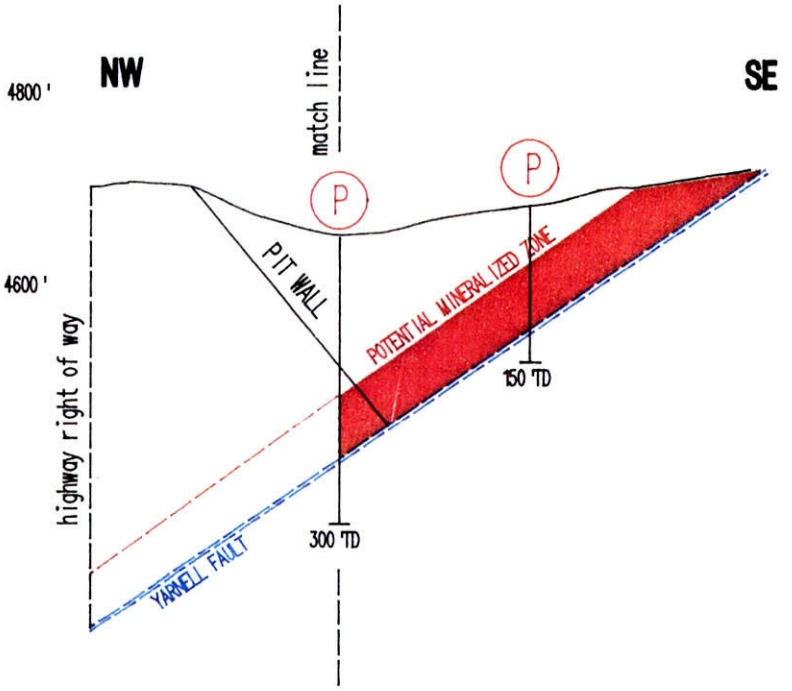
FIGURE 1



ASARCO Incorporated
YARNELL PROJECT
PROPOSED DRILLING
SECTION 1
YAVAPAI CO., ARIZONA
1"-200'

mn 6836 mam/dam tuc 2-2-90
file YPD-SEC1.DWG

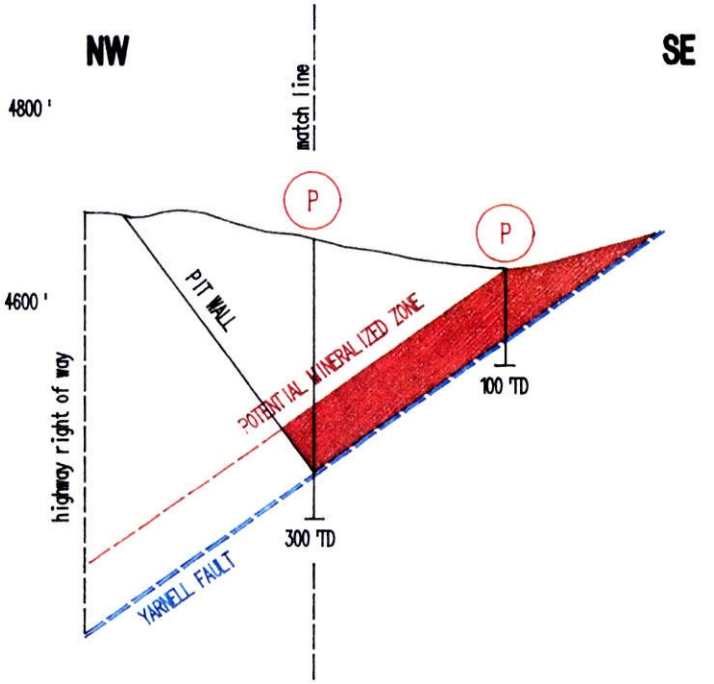
FIGURE 2



ASARCO Incorporated
YARNELL PROJECT
PROPOSED DRILLING
SECTION 2
YAVAPAI CO., ARIZONA
1"-200'

mn 6837 mam/dam tuc 2-2-90
file YPD-SEC2.DWG

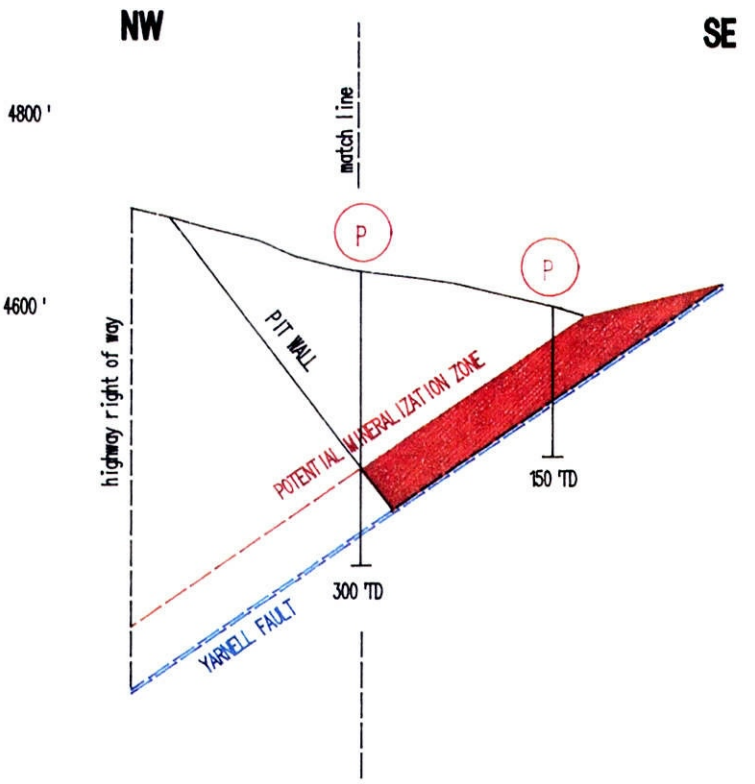
FIGURE 3



ASARCO Incorporated
YARNELL PROJECT
PROPOSED DRILLING
SECTION 3
YAVAPAI CO., ARIZONA
1"-200'

mn 6838 mam/dam tuc 2-29-90
file YPD-SEC4.DWG

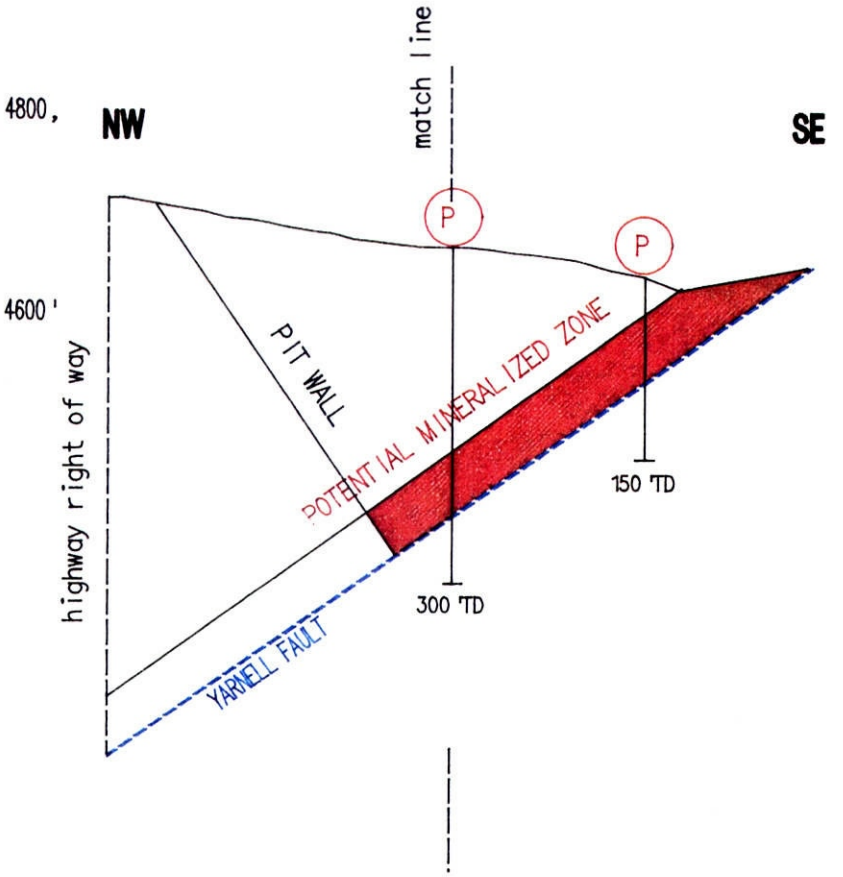
FIGURE 4



ASARCO Incorporated
YARNELL PROJECT
PROPOSED DRILLING
SECTION 4
YAVAPAI CO., ARIZONA
1"-200'

mn 6839 mam/dam tuc 2-2-90
file YPD-SEC4.DWG

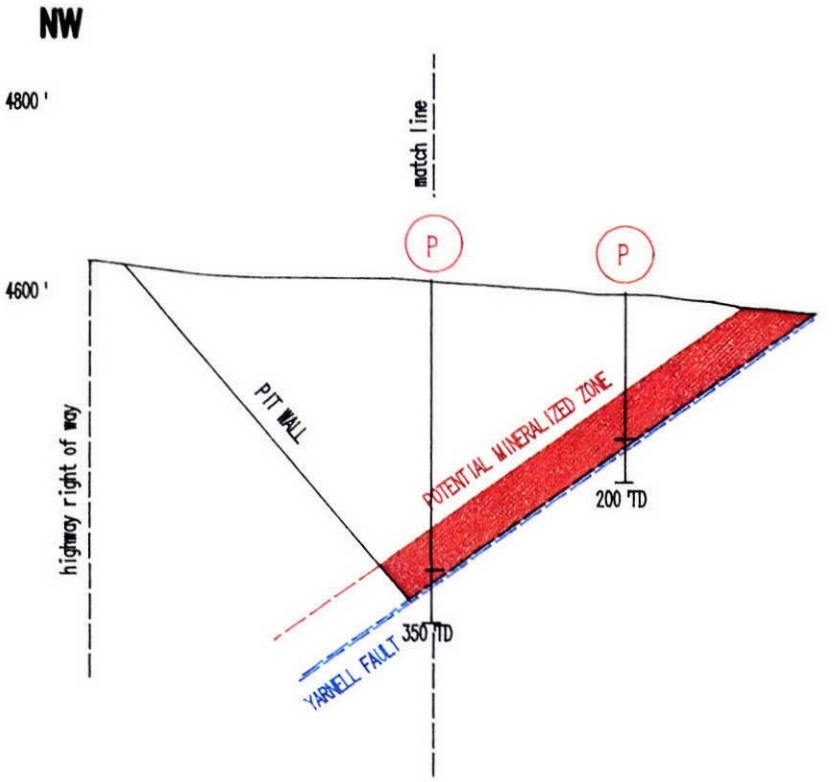
FIGURE 5



ASARCO Incorporated
YARNELL PROJECT
PROPOSED DRILLING
SECTION 5
YAVAPAI CO.,ARIZONA
1"-200'

mn 6835 mam/dam tuc 2-2-90
file YPD-SEC5.DWG

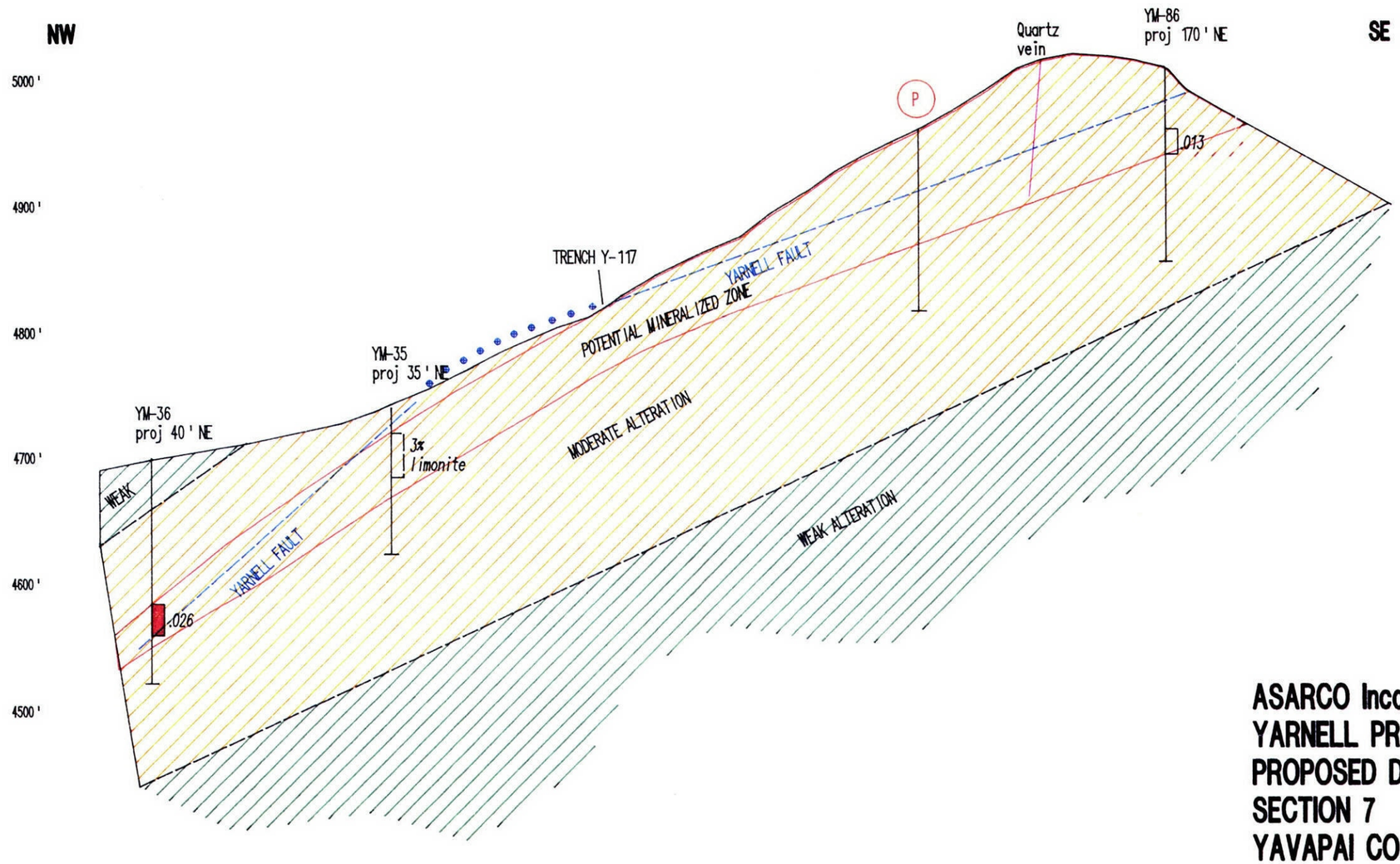
FIGURE 6



ASARCO Incorporated
YARNELL PROJECT
PROPOSED DRILLING
SECTION 6
YAVAPAI CO., ARIZONA
1"-200'

mn 6840 mam/dam tuc 2-5-90
file YPD-SEC6.DWG

FIGURE 7

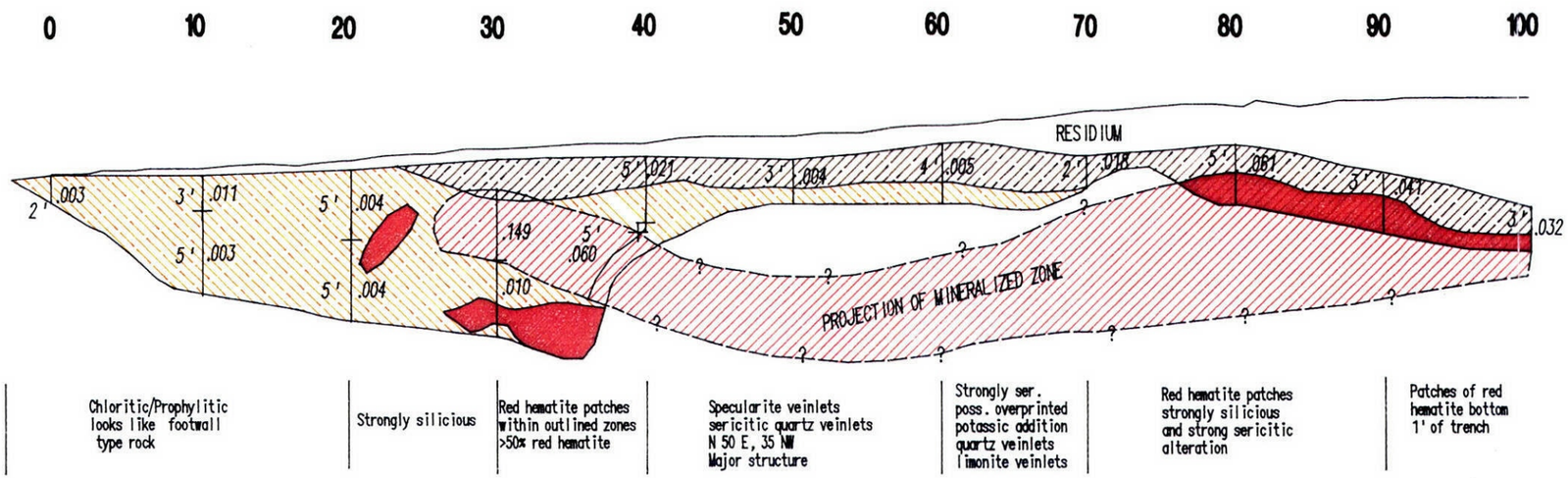


ASARCO Incorporated
YARNELL PROJECT
PROPOSED DRILLING
SECTION 7
YAVAPAI CO., ARIZONA
1"-100'

mn 6843 mcm/dcm tuc 2-6-90
file YPD-SEC7.DWG

FIGURE 8

TRENCH Y-117
LOOKING NORTHWEST



ASARCO Incorporated
YARNELL PROJECT
PROPOSED DRILLING
TRENCH Y-117 SECTION
YAVAPAI CO., ARIZONA
1"-10'

mn 6842 mcm/dcm tuc 2-6-90
file YPD-TREN.DWG

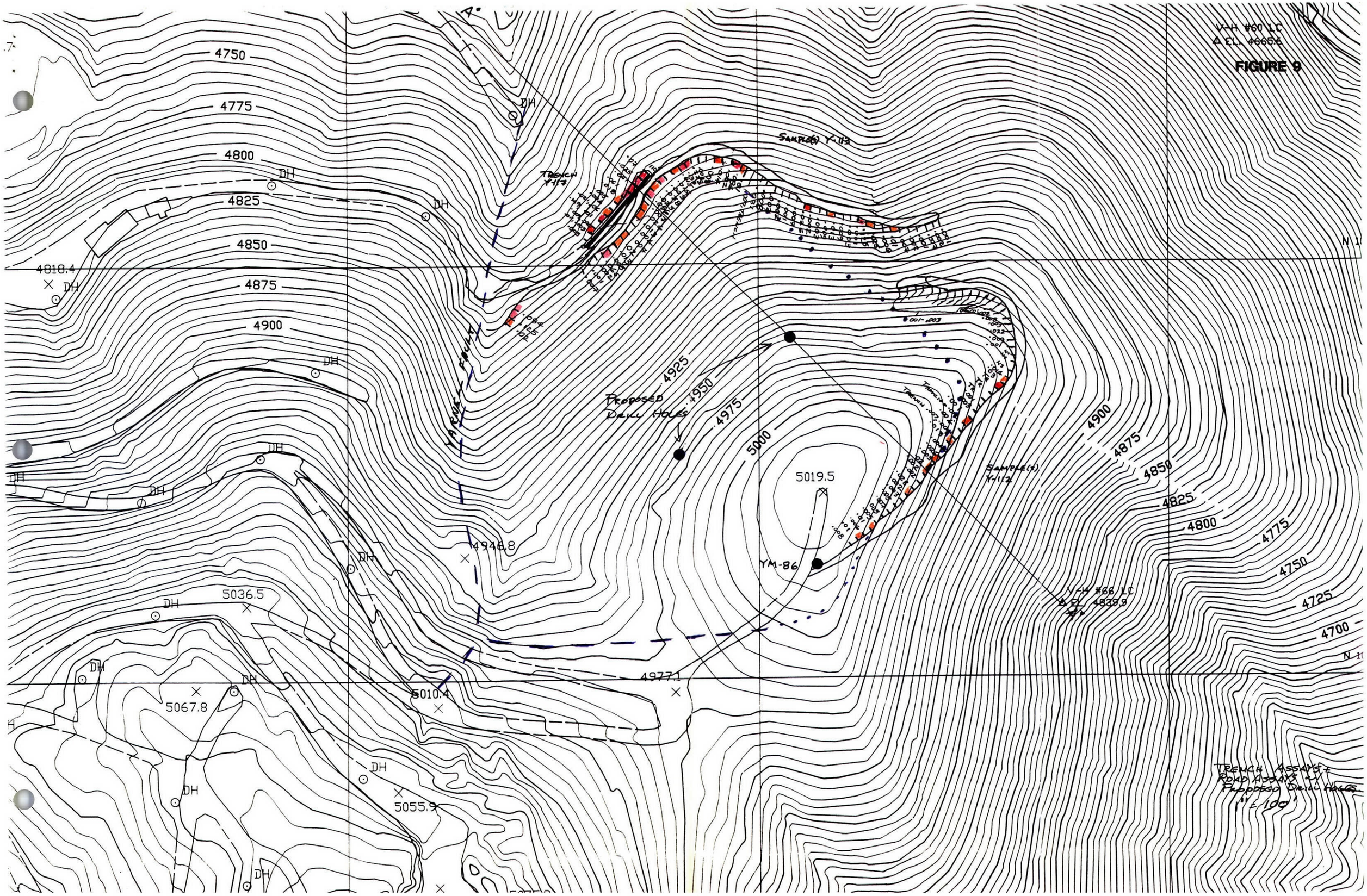


FIGURE 9
V-H #60 LC
@ EL. 4665.8
4750
4775
4800
4825
4850
4875
4900
4925
4950
4975
5000
5019.5
4818.4
DH
SAMPLE(S) Y-112
TRENCH Y-112
YAKUT FAULT
PROPOSED DRILL HOLES
YM-86
4948.8
5036.5
5067.8
5010.4
4977.1
5055.9
V-H #68 LC
@ EL. 4839.9
4725
4700
TRENCH ASSAYS
ROAD ASSAYS
PROPOSED DRILL HOLES
1" = 100'

NORGOLD RESOURCES INC.

U.S. OFFICES:
139[illegible] Chamy Drive
Reno, Nevada
89511
(702) 851-3177
Fax: (702) 851-3177

HEAD OFFICE:
210 - 475 Howe Street
Vancouver, B.C.
V6C 2B3
(604) 681-5566
Fax: (604) 687-8789

February 5, 1990

ASARCO, Inc.
P.O. Box 5747
1150 North 7th Avenue
Tucson, Arizona
85703-0747

Attention: James D. Sell

Dear Jim:

Re: Yarnell Project

For your records, enclosed please find three Notices of Valuation from Western Building and Mining Inc., received in our offices today.

Whilst writing we look forward to receiving ongoing information of exploration work done as per Section 12.3 of the Exploration and Option Agreement.

Yours truly,

Christopher S. Moat
C.E.O. and Chairman

CSM/sjk

cc: R.L. Brown
ASARCO, New York

ASARCO Incorporated

FEB 12 1990

SW Exploration

Party for any announcements or disclosures which the disclosing Party reasonably believes to required by law or regulation, or required by any stock exchange on which the disclosing Party's stock may be listed.

12.3 Notwithstanding the foregoing, the Parties recognize that each is a public company or a wholly owned subsidiary of a public company listed for trading on public exchanges and that a Party shall have the right to issue such announcements as, in the opinion of its counsel, it is obligated by law, regulation and/or exchange rules to so announce; provided, however, that such Party shall furnish to the other Party a copy of such proposed announcement prior to its release. In any such instance, the Party furnished with a proposed release or announcement shall comment on the same within three working days of the receipt thereof from the releasing or announcing Party, unless such law, regulation and/or exchange rule requires a shorter period. Asarco agrees to keep Norgold promptly advised of exploration work done on the Properties by Asarco prior to Asarco's acquiring a vested interest by furnishing to Norgold (i) assay data as it becomes available to Norgold, (ii) weekly drilling reports, and (iii) monthly summary reports of Asarco's work and expenditures upon the Property.

ARTICLE XIII

13.0 NOTICES

13.1 Any notice, election, invoice, statement, billing, payment or other correspondence required or permitted hereunder shall be deemed to have been properly given or delivered when made in writing and delivered personally to the Party to whom directed, or when delivered to such Party by United States mail duly registered, courier service or Western Union telegraph, with all necessary charges fully prepaid (or in the case of a telegram, confirmation of delivery), and addressed to the Party

13-203-13-002B4 NOTICE OF VALUATION 2256

FROM
CLAIR D. BARNETT
YAVAPAI COUNTY ASSESSOR
255 EAST GURLEY ST
PRESCOTT, AZ 86301
(602) 771-3220

PRESORTED
FIRST CLASS MAIL
U.S. POSTAGE
P A I D
PRESCOTT, AZ
PERMIT NO. 219

THIS IS NOT A TAX BILL

TO
WESTERN BUILDING AND MINING INC

BOX 4006
READING PA 19606

See Reverse Side For Definitions and Instructions. Your Appeal Deadline is January 31, 1990

PROPERTY IN COUNTY: YAVAPAI YEAR 1990 PARCEL ID 203-13-002B4 NOTICE DATE 1-1-90

	1989 VALUATION				1990 VALUATION			
	CLASS	VALUE	ASST. RATIO	ASSESSED VALUE	CLASS	VALUE	ASST. RATIO	ASSESSED VALUE
LIMITED VALUE	4	22356	16.0	3577	4	22356	16.0	3577
FULL CASH VALUE	4	22356	16.0	3577	4	22356	16.0	3577

IF PROPERTY IS BEING USED AS A RESIDENTIAL UNIT AND THE CLASS DISPLAYED IS CLASS FIVE OR A PORTION OF THE SAME, THE OWNER MUST NOTIFY THE COUNTY ASSESSOR OF THE RENTAL USE OR MAY BE SUBJECT TO A CIVIL PENALTY.

LEGAL DESCRIPTION
SEC/TR TWNS/BLK RANGE/LOT 19.44 AC
WEAVER DIST EDMOND MINING CLAIM CONT 19.44AC

13-203-13-002A5 NOTICE OF VALUATION 2255

FROM
CLAIR D. BARNETT
YAVAPAI COUNTY ASSESSOR
255 EAST GURLEY ST
PRESCOTT, AZ 86301
(602) 771-3220

PRESORTED
FIRST CLASS MAIL
U.S. POSTAGE
P A I D
PRESCOTT, AZ
PERMIT NO. 219

THIS IS NOT A TAX BILL

TO
WESTERN BUILDING AND MINING INC

BOX 4006
READING PA 19606

See Reverse Side For Definitions and Instructions. Your Appeal Deadline is January 31, 1990

PROPERTY IN COUNTY: YAVAPAI YEAR 1990 PARCEL ID 203-13-002A5 NOTICE DATE 1-1-90

	1989 VALUATION				1990 VALUATION			
	CLASS	VALUE	ASST. RATIO	ASSESSED VALUE	CLASS	VALUE	ASST. RATIO	ASSESSED VALUE
LIMITED VALUE	M	49079	12.3	6037	M	49928	12.3	6141
FULL CASH VALUE	M	49079	12.3	6037	M	49928	12.2	6091

IF PROPERTY IS BEING USED AS A RESIDENTIAL UNIT AND THE CLASS DISPLAYED IS CLASS FIVE OR A PORTION OF THE SAME, THE OWNER MUST NOTIFY THE COUNTY ASSESSOR OF THE RENTAL USE OR MAY BE SUBJECT TO A CIVIL PENALTY.

LEGAL DESCRIPTION
SEC/TR TWNS/BLK RANGE/LOT 17.32 AC
WEAVER DIST TRIANGLE LODE MINING CLAIM 17.32 AC 7
5/862 718/492

13-203-13-002 6 NOTICE OF VALUATION 2254

FROM
CLAIR D. BARNETT
YAVAPAI COUNTY ASSESSOR
255 EAST GURLEY ST
PRESCOTT, AZ 86301
(602) 771-3220

PRESORTED
FIRST CLASS MAIL
U.S. POSTAGE
P A I D
PRESCOTT, AZ
PERMIT NO. 219

THIS IS NOT A TAX BILL

TO
WESTERN BUILDING & MINING CORP

P O BOX 4006
READING PA 19606

See Reverse Side For Definitions and Instructions. Your Appeal Deadline is January 31, 1990

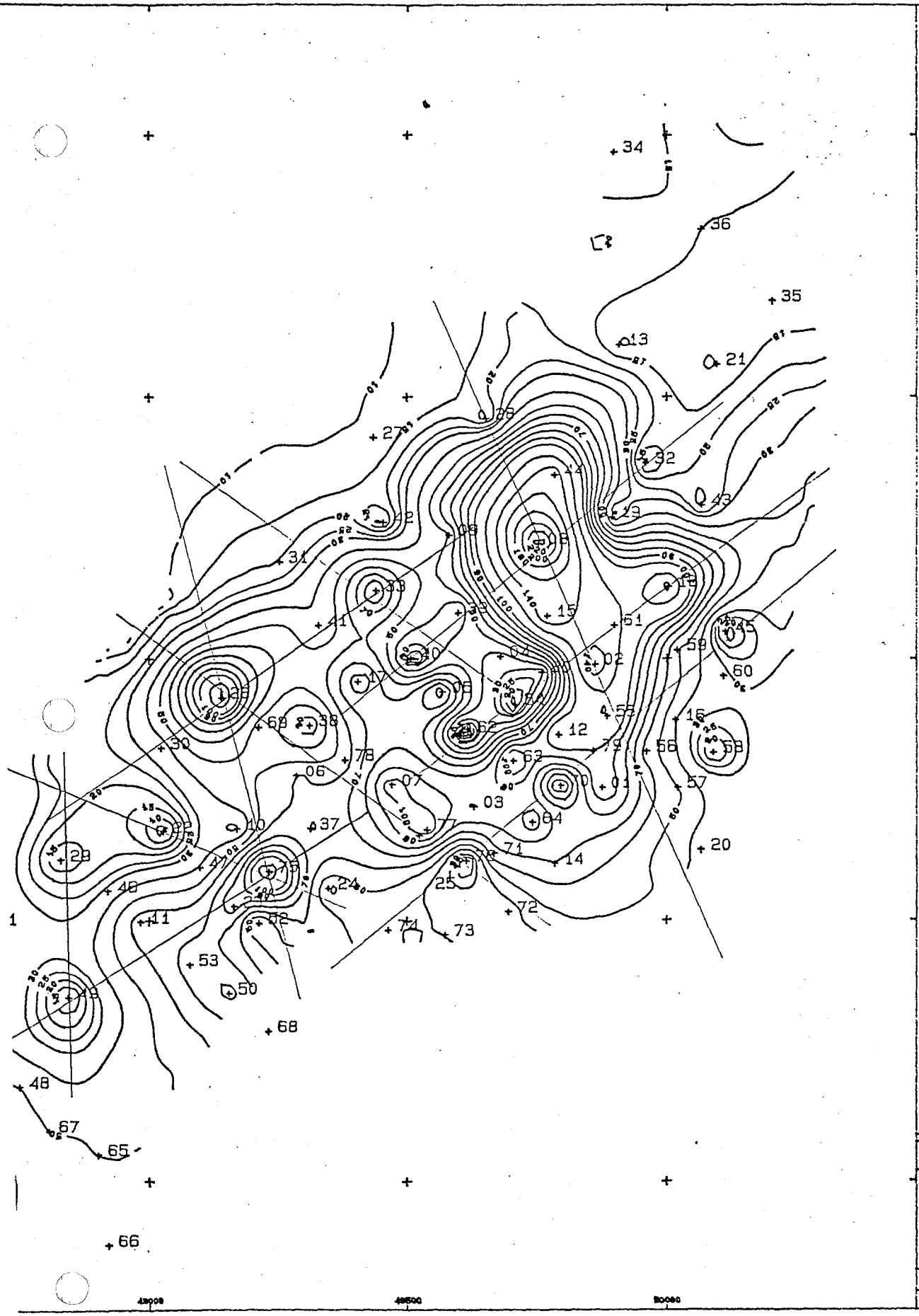
PROPERTY IN COUNTY: YAVAPAI YEAR 1990 PARCEL ID 203-13-002 6 NOTICE DATE 1-1-90

	1989 VALUATION				1990 VALUATION			
	CLASS	VALUE	ASST. RATIO	ASSESSED VALUE	CLASS	VALUE	ASST. RATIO	ASSESSED VALUE
LIMITED VALUE	4	43424	16.0	6948	4	43424	16.0	6948
FULL CASH VALUE	4	43424	16.0	6948	4	43424	16.0	6948

IF PROPERTY IS BEING USED AS A RESIDENTIAL UNIT AND THE CLASS DISPLAYED IS CLASS FIVE OR A PORTION OF THE SAME, THE OWNER MUST NOTIFY THE COUNTY ASSESSOR OF THE RENTAL USE OR MAY BE SUBJECT TO A CIVIL PENALTY.

LEGAL DESCRIPTION
SEC/TR TWNS/BLK RANGE/LOT 37.76 AC
WEAVER DIST. JUNIPER 20.35 AC LESS 1.72 AC TO AT&
F 235 8; EDGAR 19.25 AC TOTAL 37.88 A

GW Sell



NORGOLD RESOURCES INC.

YARNELL PROJECT
YAVAPAI COUNTY, ARIZONA, USA
OREBODY THICKNESS
Scale 1"= 100.0 '

Date: Fall 1989 | Scale: As Shown | Figure No:

SEARCHLIGHT CONSULTANTS INC.

Rec 2/6/90

FDS → mc A

New York, N.Y., February 6, 1990

To: R. L. Brown

RECEIVED
FEB 1 3 1990
EXPLORATION DEPARTMENT

Heap Leach Gold Capital Costs
Yarnell Project, Arizona

I asked Mr. Kurtz to prepare the attached summary which lists reserves and capital costs for 24 heap leach gold mines developed in the U.S. during 1986-89. The purpose was to 1) compare the Kilborn capital cost estimates for Yarnell with costs at other properties and 2) identify properties of a size similar to Yarnell which should be visited as we prepare the Yarnell feasibility.

Mr. Kurtz has listed the mines in order of increasing reserve tonnage. No matter what comparison is made, the Kilborn capital cost estimate for Yarnell seems far too high. Doubling the production rate improves some comparisons (increasing production from 2,000 tpd to 4,000 tpd reduces the Kilborn capital cost/daily ton of ore mined from $7,000/daily ton of ore to $3,500 which is still significantly above the 24 mine average of $2,200/daily ton of ore). Some of the spread in capital cost estimates depends on whether a particular mine contracts for mining and crushing, although the Kilborn estimates assume contract mining and primary crushing for Yarnell.

Of the 24 mines summarized by Mr. Kurtz, 16 have average grades of roughly 20% <u>less</u> than the average grade at Yarnell (using 0.050 oz Au) and 11 have reserve tonnages which are smaller than Yarnell (using 4 million tons). Six of the 11 mines with smaller reserve tonnages also have lower grades than Yarnell. It seems clear that Yarnell will be a profitable operation for someone.

Mr. Lakosky has already identified certain items which can be cut from the Kilborn capital estimates. Because of Asarco's lack of experience with heap leach mine development, it will be particularly important to visit a number of operations similar in size to that proposed for Yarnell. Since Asarco is interested in developing gold mine production, it might be useful to learn what minimum ROI might be acceptable to Asarco, then back-calculate to determine the upper limit on capital investment to generate that ROI, and finally design an operation within that capital estimate. This is the approach used by Placer when they evaluated Kidston.

F. T. Graybeal

F. T. Graybeal

FTG:mc
Att.

cc: W. L. Kurtz (w/o att.)

ASARCO

Southwestern Exploration Division

February 7, 1990

J.D. Sell

State Lease Assessment
Sec. 14, 22, T10N, R5W
Yarnell Project
Yavapai County, Arizona

Per your request, the following costs are estimated as expenditures on the State Leases within the J.V. area for 1989.

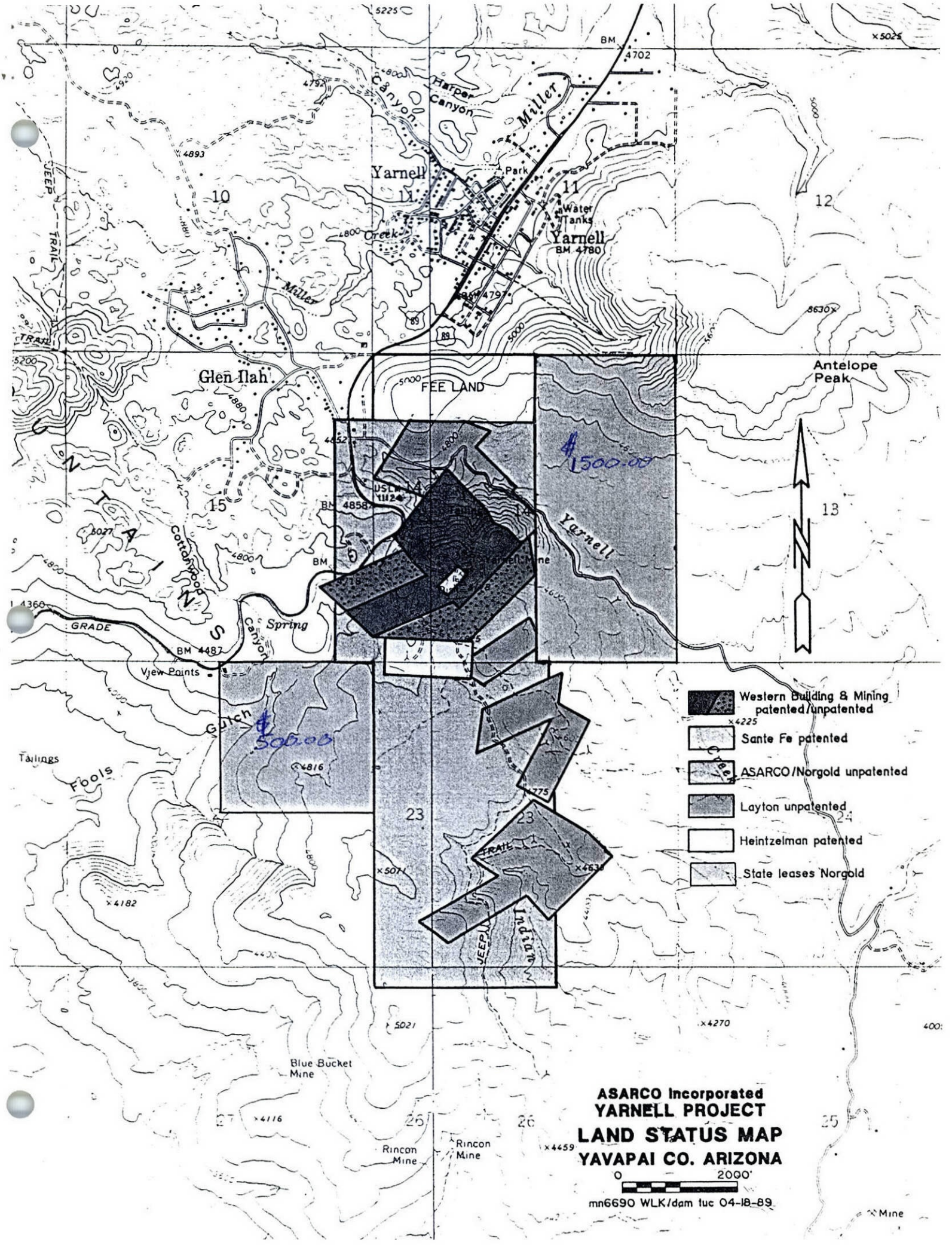
Section 14 - mapping and sampling on this lease would approximate about $1,500 in expenditures.

Section 22 - reconnaissance mapping on this lease would approximate +$500 in expendiutes.

Mark A. Miller
Project Geologist

MAM:mek
Att.

cc: W.L. Kurtz
W.D. Gay


Western Building & Mining patented/unpatented
Sante Fe patented
ASARCO/Norgold unpatented
Layton unpatented
Heintzelman patented
State leases Norgold
FEE LAND
Yarnell
Glen Ilah
Antelope Peak
Harper Canyon
Miller
Cottonwood Canyon
Spring
Fools Gulch
Indian
Blue Bucket Mine
Rincon Mine
View Points
Tailings
Water Tanks
Park
GRADE
JEEP TRAIL
BM 4702
BM 4780
BM 4797
BM 4487
BM 4858
USLM 1124
1500.00
500.00
N
ASARCO Incorporated
YARNELL PROJECT
LAND STATUS MAP
YAVAPAI CO. ARIZONA
0 2000'
mn6690 WLK/dam tuc 04-18-89

JDS

ASARCO

Southwestern Exploration Division

February 12, 1990

W.D. Gay

State Lease Requirement
Yarnell Project
Yavapai County, Arizona

Call Chris Moat, Vancouver, B.C., (phone 604/681-5566) when you learn the full requirements for reviewing and reporting on Arizona State Lease Lands.

M.A. Miller reports $1500 spent on Sec. 14, and $500 on Sec. 22 in reconnaissance mapping and sampling.

James D. Sell

JDS:mek

James D. Sell

cc: W.L. Kurtz

ASARCO

Exploration Department
Southwestern United States Division

February 12, 1990

Mr. Russ Honea
P.O. Box 323
Broomfield, Colorado 80038-0323

Yarnell Project
Sample 1G: 35-40

Dear Russ:

YM-40, ?

Under separate cover we are sending sample # 1G: 35-40' which is a split from our rotary drilling. Please make a heavy mineral concentrate of sample as the previous high grade sample we sent, and report accordingly.

Thanks.

Sincerely yours,

Mark A. Miller
Project Geologist

MAM:mek

cc: J.D. Sell

ASARCO Incorporated P.O. Box 5747 Tucson, Az 85703-0747
1150 North 7th Avenue (602) 792-3010

ASARCO

Exploration Department
Southwestern United States Division

February 12, 1990

Mr. Michael Philpot, President
NORGOLD RESOURCES INC.
206-475 Howe St.
Vancouver, B.C. V6C - 3B3
Canada

Yarnell Project
Yavapai Co., AZ

Dear Mike:

Enclosed are the forms we discussed concerning Arizona Prospecting Permits. Mark Miller reports spending $1500 on Section 14 in reconnaissance mapping and sampling.

If you need anything more from me, please call.

Sincerely yours,

William D. Gay

William D. Gay
Land Engineer, SWED

WDG:mek
Encs.

cc: W.L. Kurtz
J.D. Sell
M.A. Miller
S.L. Lakosky

ASARCO Incorporated P.O. Box 5747 Tucson, Az 85703-0747
1150 North 7th Avenue (602) 792-3010

JDS ~~JDS~~ Thought all data in file plus what Margold recently says Leviathan no good, more work justified? Octave Mine (2" + quart vein)?

ASARCO

Southwestern Exploration Division

February 12, 1990

R.L. Brown
New York Office

Monthly Report
M.A. Miller
January 1990

Only if new work & reevaluation leads to bigger & better. JDS

Yarnell Project, Yavapai County, AZ

Twenty-two days were spent on both field and office work on the Yarnell Project. The 100 scale detail mapping was completed, drafted, and submitted with a geologic report. The 200 scale map of Sections 14 & 23 is still in progress, but has been hampered by the weather (snow). No obvious targets have been identified to date; however, all alteration/mineralization has been sampled. A small scale magnetometer survey was completed over the property (with main emphasis over the deposit) by John Malusa. Preliminary indications are that there appears to be lower gamma values across altered rock (moderate alteration), probably due to magnetic destruction of the ferro-mag minerals.

An orientation soil survey consisting of 4 lines across the deposit was completed by J.D. Rasmussen. Preliminary indications are that Ag, As, Cu are anomalous along with gold. Further work is being done to statistically reduce the data.

A proposal for additional drilling at Yarnell along the NE and SW extensions was submitted. The potential is for ±800-1mt at similar grade to the present mineral inventory with a 2-3:1 w/o ratio.

General Reconnaissance

Two days were spent at the Leviathan Mine located on the SW slope of the Weaver Mountains. The Leviathan consists of two intersecting quartz veins in metasediments and granite. First pass assay values are anomalous, but the downdip extension is under cover. The H.W. is altered and weakly mineralized suggesting a wider zone than is evident. Further sampling and possibly some soil sampling are planned. One day was spent reevaluating the Octave Mine for bulk tonnage potential. There appear to be possibilities of mineralization extending into the H.W. of the structure (2" + quartz vein @ .3 opt Au). Further work is planned. Access to the underground is good for sampling. ?

Field Days	Office Days	Expense Account	Vehicle Expense
11	13	$899.83	$300.00

Mark A. Miller

MAM:mek

cc: J.D. Sell, W.L. Kurtz

JDS

ASARCO

Southwestern Mining Department

February 16, 1990

MEMORANDUM

TO: T. E. Scartaccini

FROM: S. L. Lakosky

RE: Yarnell Project Intermediate Feasibility Study

The following is a summary of the attached Intermediate Feasibility Study:

ORE RESERVES

Due to a recent programming change, the computer generated reserves for the $400 economic pit design now total 5,079,000 tons of ore at 0.049 OPT Au after mining dilution, and 7,221,000 tons of waste after dilution. At the scheduled mining rate of 2,000 tons per day of ore, the project (on a 100 percent basis) will yield 178,257 recoverable ounces over a 7 year mine life at a rate of 25,000 ounces per year.

FINANCIAL SUMMARY (ASARCO'S INTEREST)

1) ASARCO'S 51% INTEREST IF NORGOLD ELECTS AND MAINTAINS A 49% JOINT VENTURE POSITION

GOLD PRICE ($/OZ	ASARCO'S INITIAL CAPITAL INVESTMENT INCLUDING SUNK COSTS ('000s)	AFTER TAX CASH FLOW ('000s)	DCFROI (%)
400	$7,916	$4,556	14.9

2) ASARCO'S INTEREST IF NORGOLD ELECTS A 49% JOINT VENTURE POSITION AND DILUTES IT'S PARTICIPATING INTEREST TO A 15% NET PROFITS ROYALTY

GOLD PRICE ($/OZ)	ASARCO'S INITIAL CAPITAL INVESTMENT INCLUDING SUNK COSTS ('000s)	AFTER TAX CASH FLOW ('000s)	DCFROI (%)
400	$14,538	$ 5,836	11.5

3) ASARCO'S INTEREST IF NORGOLD ELECTS THE MINING LEASE AND RESULTING 25% SHARE OF THE 75/25 JOINT VENTURE

GOLD PRICE ($/OZ)	ASARCO'S INITIAL CAPITAL INVESTMENT INCLUDING SUNK COSTS ('000s)	AFTER TAX CASH FLOW ('000s)	DCFROI (%)
400	$14,538	$ 5,227	10.5

NOTE: Sunk costs (estimated at $1,024,000) are Asarco's total exploration expenditures on the Yarnell Project from January 1989 through delivery of the final feasibility study to Norgold.

SENSITIVITIES

Compared to $400 Economic Pit Design at $400 gold price (Base Case)

VARIABLE	INCREASE (+) OR DECREASE (-) COMPARED TO BASE CASE: INITIAL CAP. INVESTMENT ('000S)	AFTER TAX CASH FLOW ('000s)	DCFROI (%)
$450 Au	0	+$3,335	+ 9.6
$425 Au	0	+$1,675	+ 4.9
$400 Au (Base Case)	0	0	0
$375 Au	0	-$1,735	- 5.3
$350 Au	0	-$3,415	-10.8
10% Reduction in Cap. & Dev. Exp.	-$615	+$428	+ 2.6
10% Reduction in Operating Costs	- $42	+$1,613	+ 4.7
1% Increase in Recovery	0	+$386	+ 1.1
10% Increase in Cap. & Dev. Exp.	+$615	-$427	- 2.3
10% Increase in Operating Costs	+ $42	-$1,723	- 5.2
1% Decrease in Recovery	0	-$ 385	- 1.1

COST PER OUNCE SUMMARY-BOOK BASIS (100%)

$400 ECONOMIC PIT

RECOVERABLE OUNCES	178257
OPERATING COSTS	COST PER OUNCE ($)
CONTRACTOR	
CONTRACT MINING ORE	33.62
CONTRACT MINING WASTE	41.85
CONTRACT CRUSHING ORE	14.25
SUB-TOTAL	89.71
OPERATOR	
SUPERVISION AND ADMINISTRATION	27.97
OPERATIONS AND REPAIR LABOR	17.52
ADDITIONAL LABOR	18.20
MOBILE EQUIPMENT	8.26
SUPPLIES-MAINTENANCE AND REAGENTS	24.50
UTILITIES	11.97
SUB-TOTAL	108.42
MISCELLANEOUS	
ROYALTIES (ATCHINSON & WESTERN)	4.20
SEVERANCE TAX	4.84
PROPERTY TAX	12.35
INSURANCE	12.62
SALES TAX,OTHER	4.45
GENERAL ADMINISTRATIVE	8.81
SUB-TOTAL	47.28
TOTAL OPERATING COSTS (PRODUCTION)	245.41
DEPRECIATION AND DEPLETION	
EXPLORATION DEPT. (SUNK COSTS)	5.74
ADDITIONAL LAND PAYMENTS	4.76
MICROWAVE RELOCATIONS	2.78
PERMITTING & TESTING	4.94
SITE PREP, UTILITIES, DISTRIBUTION	13.79
CRUSHING & CONVEYING SYSTEM	10.94
ADSORPTION, DESORPTION, REFINING	8.89
HEAP PAD & SOLUTION PONDS	9.99
ANCILLARY FACILITIES & MOBILE EQUIPMENT	7.01
CONSTRUCTION OVERHEAD & GENERAL IND.	8.07
OPERATING COST (PRE-PRODUCTION)	4.64
DELAYED CAPITAL EXPENDITURES	11.55
OPERATING COST (POST-PRODUCTION)	4.63
MINE CLOSURE	2.90
DEPRECIATION & DEPLETION - TOTAL	100.64
TOTAL COST PER OUNCE ($)	346.05

NORGOLD'S OPTIONS

Within 180 days of Asarco's delivery to Norgold of: a feasibility study, a written commitment to initiate commercial production on the property within three years, certification that Asarco has performed the required work and has complied with all terms of the agreement, and a work plan and budget, Norgold must elect to either (1) execute and enter into a 49% share of a 51/49 Joint Venture Agreement, or (2) execute and enter into a Mining Lease and subsequent 25% share of a 75/25 Joint Venture Agreement. In either case, Norgold may elect to not participate in work plans and budgets and have its participating interest reduced to a 15% net profits interest.

AMBIGUOUS CONTRACT LANGUAGE

Under Section 6 of the Mining Lease, Norgold's 5% production royalty and Asarco's recovery of exploration and development and capital expenditures are based on net profits as defined in Attachment B to the Mining Lease. As written, "net profits" defined in paragraph (k) of Attachment B are non-existent after sub-paragraph (ii) is applied. The intent implied in Section 6 of the Mining Lease was used in the financial analysis.

ADDITIONAL EXPENDITURES

The intermediate feasibility study assumes that Asarco's total expenditures will not exceed the $1,024,000 budget already appropriated. Additional spending by Asarco increases Norgold's deemed initial contribution. Therefore, if Norgold elects the 51/49 Joint Venture and reduces to a 15% net profits royalty, the amount Asarco must spend in capital and development expenditures to reduce Norgold's deemed and actual interest to 15% will also increase. This has the effect of reducing the amount of Asarco's capital and development expenditures which are subject to payback. As an example, an additional expenditure by Asarco of $100,000 prior to completion of the final feasibility study will decrease the amount of Asarco's capital and development expenditures which are subject to payback by $544,000.

ROYALTIES

The ultimate pit outline for each economic scenario evaluated in the feasibility study falls within the boundaries of three (3) patented and one (1) unpatented mining claim currently owned by Western Building & Mining Co. Western retains a net smelter return royalty of: 2% for the first and second years of commercial production, 1% for the third and fourth years, and 1/2 % thereafter. In addition, Atchinson, Topeka & Santa Fe owns a small parcel of land within Western's Juniper patented claim. Atchinson owns a microwave installation on this site and retains a 5% net smelter return royalty on this land.

PROCESS DESCRIPTION

The proposed Yarnell Project is an open pit-heap leach operation which will mine, crush, place and leach gold ore at the rate of 2,000 tons per day. Overall gold recovery is estimated at 72%.

Ore and waste mining as well as coarse ore crushing will be performed by a contractor who will supply all of the equipment, facilities and supplies necessary to complete those operations.

Asarco personnel will fine crush (to -1 1/2 inches), agglomerate and stack ore on the heap, leach that material with cyanide solution, collect the pregnant solution and recover the gold in the adsorption, desorption and refining (ADR) building. Gold will be recovered using an activated carbon process. The adsorbed gold will then be stripped, electrowon, filtered and refined in an on-site induction furnace. The resulting gold bullion will then be shipped to a refinery for final upgrading.

MANPOWER

The contractor's combined mining and coarse ore crushing manpower is estimated at 50 persons.

Asarco's estimated manpower is 19 salaried and 16 hourly personnel.

PLANT DESIGN

The secondary crushing facility is a trailer mounted mobile unit, the administration/changehouse building and laboratory building are trailer modules, the covered shop area is a pre-engineered "Butler type" building, and most of the ADR process equipment is mounted on easily disassembled structural steel frames.

CAPITAL AND OPERATING COSTS

Capital and operating cost estimates have been refined in-house from information generated from Kilborn Engineering (B.C.) Ltd's pre-feasibility study, from contractor's cost estimates for mining and primary crushing, and from costs at other similar open pit mining and heap leaching operations.

PERMITTING

Two (2) of the major permits requred for this project are the Aquifer Protection Permit (APP) from the Arizona Department of Environmental Quality, and the BLM Plan of Operation Permit from the Bureau of Land Management. Both permits require that detailed operating plans be submitted upon completion of a hydrogeologic characterization of the site and detailed engineering and design work for the operation. Provided that an Environmental Impact Statement is not required for the project, the estimated time frame for obtaining both permits is one year.

OPPORTUNITIES

A) The multiple lift heap pad design might enable re-leaching of previously placed material and improve overall gold recovery to something greater than the estimated 72%.

B) Agglomeration of -1 1/2 inch ore might require a lower cement consumption than the currently estimated figure of 5 pounds per ton of ore. (With cement at $0.05 per pound.)

c) An undrilled extension of the deposit (to the southwest) might add a limited amount of ore to the reserves upon completion of future drilling.

RISKS

A) All operating costs used in the evaluation are based on unescalated fourth quarter 1989 prices.

B) During the last several years, a shortage of sodium cyanide has caused a dramatic increase in cost from a pre-shortage average price of $0.80 to $0.90 per pound to the current $1.20 to $1.40 per pound. If the forecasted increase in sodium cyanide production does not lower the cost as expected, then the $0.85 used in the evaluation is underestimated. (NaCN consumption is estimated at 0.40 pounds per ton.)

C) Open stopes created from previous underground mining may cause greater dilution than the 10% estimate used in the study.

D) It is assumed that sufficient water can be secured from private wells in the Peeples Valley area. If not, then the primary target area for exploratory wells as recommended by the hydrogeologic consulting firm of Errol L. Montgomery & Associates, Inc. is in the Antelope Creek Basin area. In addition to being 1,000 feet lower in elevation than the Peeples Valley area, an additional estimated $1,000,000 in capital will be necessary to secure water from this area.

E) Local opposition from the nearby retirement community of Glen Ilah (approximately 2,500 feet away with an estimated population of 200) may pressure the Bureau of Land Management to require an Environmental Impact Statement for this project. Due to well organized opposition, Phelps Dodge is currently undergoing an EIS study for its proposed Copper Basin project (approximately 30 miles northwest of Yarnell) at an estimated cost of $2.8 million.

S. L. Lakosky
S. L. Lakosky
Yarnell Project Manager

SLL/kh

cc: RJKupsch -w/attach.
RLBrown "
WLKurtz "
JDSell
DECrowell "
File "

JDS

ASARCO

Southwestern Mining Department

February 16, 1990

MEMORANDUM

TO: T. E. Scartaccini

FROM: S. L. Lakosky

RE: Yarnell Project Intermediate Feasibility Study

The following is a summary of the attached Intermediate Feasibility Study:

ORE RESERVES

Due to a recent programming change, the computer generated reserves for the $400 economic pit design now total 5,079,000 tons of ore at 0.049 OPT Au after mining dilution, and 7,221,000 tons of waste after dilution. At the scheduled mining rate of 2,000 tons per day of ore, the project (on a 100 percent basis) will yield 178,257 recoverable ounces over a 7 year mine life at a rate of 25,000 ounces per year.

w/o 1.42/1

3500 tpd = 3.975 year mine life = 45,000 oz/year probably a much better return on investment.

Stope tonnage removed?

FINANCIAL SUMMARY (ASARCO'S INTEREST)

1) ASARCO'S 51% INTEREST IF NORGOLD ELECTS AND MAINTAINS A 49% JOINT VENTURE POSITION

GOLD PRICE ($/OZ	ASARCO'S INITIAL CAPITAL INVESTMENT INCLUDING SUNK COSTS ('000s)	AFTER TAX CASH FLOW ('000s)	DCFROI (%)
400	$7,916	$4,556	14.9

2) ASARCO'S INTEREST IF NORGOLD ELECTS A 49% JOINT VENTURE POSITION AND DILUTES IT'S PARTICIPATING INTEREST TO A 15% NET PROFITS ROYALTY

GOLD PRICE ($/OZ)	ASARCO'S INITIAL CAPITAL INVESTMENT INCLUDING SUNK COSTS ('000s)	AFTER TAX CASH FLOW ('000s)	DCFROI (%)
400	$14,538	$ 5,836	11.5

3) ASARCO'S INTEREST IF NORGOLD ELECTS THE MINING LEASE AND RESULTING 25% SHARE OF THE 75/25 JOINT VENTURE

GOLD PRICE ($/OZ)	ASARCO'S INITIAL CAPITAL INVESTMENT INCLUDING SUNK COSTS ('000s)	AFTER TAX CASH FLOW ('000s)	DCFROI (%)
400	$14,538	$ 5,227	10.5

NOTE: Sunk costs (estimated at $1,024,000) are Asarco's total exploration expenditures on the Yarnell Project from January 1989 through delivery of the final feasibility study to Norgold.

SENSITIVITIES

Compared to $400 Economic Pit Design at $400 gold price (Base Case)

	INCREASE (+) OR DECREASE (-) COMPARED TO BASE CASE		
VARIABLE	INITIAL CAP. INVESTMENT ('000S)	AFTER TAX CASH FLOW ('000s)	DCFROI (%)
$450 Au	0	+$3,335	+ 9.6
$425 Au	0	+$1,675	+ 4.9
$400 Au (Base Case)	0	0	0
$375 Au	0	-$1,735	- 5.3
$350 Au	0	-$3,415	-10.8
10% Reduction in Cap. & Dev. Exp.	-$615	+$428	+ 2.6
10% Reduction in Operating Costs	- $42	+$1,613	+ 4.7
1% Increase in Recovery	0	+$386	+ 1.1
10% Increase in Cap. & Dev. Exp.	+$615	-$427	- 2.3
10% Increase in Operating Costs	+ $42	-$1,723	- 5.2
1% Decrease in Recovery	0	-$ 385	- 1.1

COST PER OUNCE SUMMARY-BOOK BASIS (100%)

$400 ECONOMIC PIT

RECOVERABLE OUNCES	178257
OPERATING COSTS	COST PER OUNCE ($)
CONTRACTOR	
CONTRACT MINING ORE	33.62
CONTRACT MINING WASTE	41.85
CONTRACT CRUSHING ORE	14.25
SUB-TOTAL	89.71
OPERATOR	
SUPERVISION AND ADMINISTRATION	27.97
OPERATIONS AND REPAIR LABOR	17.52
ADDITIONAL LABOR	18.20
MOBILE EQUIPMENT	8.26
SUPPLIES-MAINTENANCE AND REAGENTS	24.50
UTILITIES	11.97
SUB-TOTAL	108.42
MISCELLANEOUS	
ROYALTIES (ATCHINSON & WESTERN)	4.20
SEVERANCE TAX	4.84
PROPERTY TAX	12.35
INSURANCE	12.62
SALES TAX,OTHER	4.45
GENERAL ADMINISTRATIVE	8.81
SUB-TOTAL	47.28
TOTAL OPERATING COSTS (PRODUCTION)	245.41
DEPRECIATION AND DEPLETION	
EXPLORATION DEPT. (SUNK COSTS)	5.74
ADDITIONAL LAND PAYMENTS	4.76
MICROWAVE RELOCATIONS	2.78
PERMITTING & TESTING	4.94
SITE PREP, UTILITIES, DISTRIBUTION	13.79
CRUSHING & CONVEYING SYSTEM	10.94
ADSORPTION, DESORPTION, REFINING	8.89
HEAP PAD & SOLUTION PONDS	9.99
ANCILLARY FACILITIES & MOBILE EQUIPMENT	7.01
CONSTRUCTION OVERHEAD & GENERAL IND.	8.07
OPERATING COST (PRE-PRODUCTION)	4.64
DELAYED CAPITAL EXPENDITURES	11.55
OPERATING COST (POST-PRODUCTION)	4.63
MINE CLOSURE	2.90
DEPRECIATION & DEPLETION - TOTAL	100.64
TOTAL COST PER OUNCE ($)	346.05

NORGOLD'S OPTIONS

Within 180 days of Asarco's delivery to Norgold of: a feasibility study, a written commitment to initiate commercial production on the property within three years, certification that Asarco has performed the required work and has complied with all terms of the agreement, and a work plan and budget, Norgold must elect to either (1) execute and enter into a 49% share of a 51/49 Joint Venture Agreement, or (2) execute and enter into a Mining Lease and subsequent 25% share of a 75/25 Joint Venture Agreement. In either case, Norgold may elect to not participate in work plans and budgets and have its participating interest reduced to a 15% net profits interest.

AMBIGUOUS CONTRACT LANGUAGE

Under Section 6 of the Mining Lease, Norgold's 5% production royalty and Asarco's recovery of exploration and development and capital expenditures are based on net profits as defined in Attachment B to the Mining Lease. As written, "net profits" defined in paragraph (k) of Attachment B are non-existent after sub-paragraph (ii) is applied. The intent implied in Section 6 of the Mining Lease was used in the financial analysis.

ADDITIONAL EXPENDITURES

The intermediate feasibility study assumes that Asarco's total expenditures will not exceed the $1,024,000 budget already appropriated. Additional spending by Asarco increases Norgold's deemed initial contribution. Therefore, if Norgold elects the 51/49 Joint Venture and reduces to a 15% net profits royalty, the amount Asarco must spend in capital and development expenditures to reduce Norgold's deemed and actual interest to 15% will also increase. This has the effect of reducing the amount of Asarco's capital and development expenditures which are subject to payback. As an example, an additional expenditure by Asarco of $100,000 prior to completion of the final feasibility study will decrease the amount of Asarco's capital and development expenditures which are subject to payback by $544,000.

ROYALTIES

The ultimate pit outline for each economic scenario evaluated in the feasibility study falls within the boundaries of three (3) patented and one (1) unpatented mining claim currently owned by Western Building & Mining Co. Western retains a net smelter return royalty of: 2% for the first and second years of commercial production, 1% for the third and fourth years, and 1/2 % thereafter. In addition, Atchinson, Topeka & Santa Fe owns a small parcel of land within Western's Juniper patented claim. Atchinson owns a microwave installation on this site and retains a 5% net smelter return royalty on this land.

PROCESS DESCRIPTION

The proposed Yarnell Project is an open pit-heap leach operation which will mine, crush, place and leach gold ore at the rate of 2,000 tons per day. Overall gold recovery is estimated at 72%.

Ore and waste mining as well as coarse ore crushing will be performed by a contractor who will supply all of the equipment, facilities and supplies necessary to complete those operations.

Asarco personnel will fine crush (to -1 1/2 inches), agglomerate and stack ore on the heap, leach that material with cyanide solution, collect the pregnant solution and recover the gold in the adsorption, desorption and refining (ADR) building. Gold will be recovered using an activated carbon process. The adsorbed gold will then be stripped, electrowon, filtered and refined in an on-site induction furnace. The resulting gold bullion will then be shipped to a refinery for final upgrading.

MANPOWER

The contractor's combined mining and coarse ore crushing manpower is estimated at 50 persons.

Asarco's estimated manpower is 19 salaried and 16 hourly personnel.

PLANT DESIGN

The secondary crushing facility is a trailer mounted mobile unit, the administration/changehouse building and laboratory building are trailer modules, the covered shop area is a pre-engineered "Butler type" building, and most of the ADR process equipment is mounted on easily disassembled structural steel frames.

CAPITAL AND OPERATING COSTS

Capital and operating cost estimates have been refined in-house from information generated from Kilborn Engineering (B.C.) Ltd's pre-feasibility study, from contractor's cost estimates for mining and primary crushing, and from costs at other similar open pit mining and heap leaching operations.

PERMITTING

Two (2) of the major permits requred for this project are the Aquifer Protection Permit (APP) from the Arizona Department of Environmental Quality, and the BLM Plan of Operation Permit from the Bureau of Land Management. Both permits require that detailed operating plans be submitted upon completion of a hydrogeologic characterization of the site and detailed engineering and design work for the operation. Provided that an Environmental Impact Statement is not required for the project, the estimated time frame for obtaining both permits is one year.

OPPORTUNITIES

A) The multiple lift heap pad design might enable re-leaching of previously placed material and improve overall gold recovery to something greater than the estimated 72%.

B) Agglomeration of -1 1/2 inch ore might require a lower cement consumption than the currently estimated figure of 5 pounds per ton of ore. (With cement at $0.05 per pound.)

c) An undrilled extension of the deposit (to the southwest) might add a limited amount of ore to the reserves upon completion of future drilling.

RISKS

A) All operating costs used in the evaluation are based on unescalated fourth quarter 1989 prices.

B) During the last several years, a shortage of sodium cyanide has caused a dramatic increase in cost from a pre-shortage average price of $0.80 to $0.90 per pound to the current $1.20 to $1.40 per pound. If the forecasted increase in sodium cyanide production does not lower the cost as expected, then the $0.85 used in the evaluation is underestimated. (NaCN consumption is estimated at 0.40 pounds per ton.)

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S. L. Lakosky
S. L. Lakosky
Yarnell Project Manager

SLL/kh

cc: RJKupsch -w/attach.
RLBrown "
WLKurtz "
JDSell
DECrowell "
File "

YARNELL PROJECT

INTERMEDIATE FEASIBILITY STUDY

FEBRUARY 16, 1990

YARNEL PROJECT

INTERMEDIATE FEASIBILITY STUDY

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UNLESS OTHERWISE NOTED, ALL CALCULATIONS AND SUMMARIES ARE FOR A $400 ECONOMIC DESIGNED PIT AT A $400 AU PRICE

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A

REV. 2/12/90

SUMMARY OF PARAMETERS USED IN CONE MINER ORE RESERVE CALCULATIONS

COST PARAMETERS	WASTE	ORE
CONTRACT MINING	1.07	1.18
CONTRACT CRUSHING (TO - 6")	–	0.50
SUPERVISION & ADMINISTRATION (INCL. 40%)	–	1.30
LABOR - OPERATIONS & MAINTENANCE (INCL. 40%)	–	0.81
COARSE ORE HANDLING (FRONT-END LOADER)	–	0.25
HEAP LEVELING (TRACK DOZER)	–	0.04
PLANT OPERATING SUPPLIES - REAGENTS	–	0.69
PLANT OPERATING SUPPLIES - FLUXES	–	0.04
PLANT MAINTENANCE SUPPLIES	–	0.13
ELECTRICAL POWER	–	0.36
FRESH WATER	–	0.06
ROYALTY - ATCHINSON AND WESTERN	–	0.21
INSURANCE	–	0.42
SEVERANCE TAX	–	0.19
PROPERTY TAX	–	0.43
SALES TAX	–	0.06
OTHER (EXCL. ROYALTY)	–	0.09
TOTAL OPERATING COST PER TON	$1.07	$6.76

7,221,000 waste / 5,074,000 ore = 1.42 w/o

1.52 (waste)

8.28 Total cash cost/ton of ore

MISCELLANEOUS

GOLD RECOVERY = 72 PERCENT
DENSITY = 12.0 CUBIC FEET PER TON (IN PLACE)
ULTIMATE PIT SLOPE = 50 DEGREES
NO CONSIDERATION GIVEN TO HAUL ROAD DESIGN

YARNELL CONTRACT MINING AND CRUSHING COST ESTIMATES

CONTRACTORS	MINING COST ($/TON ORE)	MINING COST ($/TON WASTE)	COARSE CRUSHING COST ($/TON ORE)
J. D. WELSH & ASSOCIATES (LON ARMSTRONG)	$1.50	$1.38	$0.86
LEDCOR CONSTRUCTION (DEXTER BAKER)	$1.36	$1.28	$1.01
MORRISON - KNUDSEN (JOHN ROBERTS)	$1.65	$1.45	$1.00
N. A. DEGERSTROM (ARMAND HANSEN)	$1.20	$1.20	$1.05
SUNDT CORPORATION (MARVIN HUSTAD)	$1.78	$1.54	$1.15
WASHINGTON CONSTRUCTION (RON KENT)	$1.18	$1.07	$0.50
AVERAGE (ALL CONTRACTORS)	$1.45	$1.32	$0.93

NOTE:

COSTS ARE WITHIN +/- 25% RANGE
COSTS EXCLUDE MOBILIZATION AND DEMOBILIZATION
COSTS ARE 1989 DOLLARS, W/O INFLATION

COST ($/TON ORE)

SUPERVISION & ADMINISTRATION (INCL. 40% BURDEN)

((NUMBER OF SALARIED PERSONNEL)*(AVERAGE YEARLY SALARY)*(140 PERCENT))/(AVERAGE ORE TONNAGE PER YEAR)

((19)*($35,000)*(1.40))/(716,000) = $1.30

LABOR – OPERATIONS & MAINTENANCE (INCL. 40% BURDEN)

((NUMBER OF HOURLY PERSONNEL)*(AVERAGE WAGE PER HOUR)*(AVERAGE HOURS PER YEAR)*(140 PERCENT))/(AVERAGE ORE TONNAGE PER YEAR)

((16)*($12.50)*(2080)*(1.40))/(716,000) = $0.81

COARSE ORE HANDLING (FRONT-END LOADER)

((LOADER COST/HOUR, EXCL. LABOR)*(AVG. OPER. HOURS/SHIFT)*(AVG. SHIFTS/DAY))/(AVG. ORE TONS/DAY)

(($50.00)*(5)*(2))/(2,000) = $0.25

HEAP LEVELING (USED TRACK DOZER)

((DOZER COST/HOUR, EXCL. LABOR)*(AVG. OPER. HOURS/SHIFT)*(AVG. SHIFTS/DAY))/(AVG. ORE TONS/DAY)

(($40.00)*(1.0)*(2))/(2,000) = $0.04

PLANT OPERATING SUPPLIES – REAGENTS

DESCRIPTION	CONSUMPTION (LB./TON)	UNIT COST ($/LB)	COST ($/TON)
CEMENT	5.00	0.05	0.25
SODIUM CYANIDE	0.40	0.85	0.34
CARBON	0.01	1.00	0.01
CAUSTIC SODA	0.20	0.35	0.07
MURIATIC ACID	0.10	0.15	0.02
ANTISCALENT	0.01	0.60	0.01
TOTAL			0.69

$0.69

PLANT OPERATING SUPPLIES – FLUXES

(ESTIMATED FLUX COST PER YEAR)/(AVERAGE ORE TONNAGE PER YEAR)

($25,000)/(716,000) = $0.04

PLANT MAINTENANCE SUPPLIES

(KILBORN'S ESTIMATED PLANT MAINTENANCE COST PER YEAR)/(AVERAGE ORE TONNAGE PER YEAR)

($95,000)/(716,000) = $0.13

ELECTRICAL POWER

(((KILBORN'S ESTIMATED KWH CONSUMPTION PER YEAR)*(A.P.S. POWER COST PER KWH))+ (BASIC SERVICE AND POWER CHARGE PER YEAR))/(AVG. ORE TONNAGE/YEAR)

CONSUMPTION	CONSUMPTION
5145707 KWH/YEAR	428809 KWH/MONTH

AVERAGE MONTHLY BILLING RATE

JUNE-OCTOBER	0.112096	PER KWH FOR THE FIRST 2,500 KWH
NOVEMBER-MAY	0.101201	PER KWH FOR THE FIRST 2,500 KWH
JUNE-OCTOBER	0.077456	PER KWH FOR THE NEXT 42,000 KWH
NOVEMBER-MAY	0.069800	PER KWH FOR THE NEXT 42,000 KWH
JUNE-OCTOBER	0.049571	PER KWH FOR ALL ADDITIONAL KWH
NOVEMBER-MAY	0.044525	PER KWH FOR ALL ADDITIONAL KWH

KWH	AVG. RATE	AVG. COST/MONTH	AVG. COST/YEAR
2500	0.105741	264	3172
42000	0.072990	3066	36787
384309	0.046628	17919	215032
SUB-TOTAL			254992
BASIC SERVICE CHARGE			180
POWER CHARGE			1970
TOTAL			257142

($257,142 PER YEAR)/(716,000 ORE TONS PER YEAR) = $0.36

FRESH WATER

((ESTIMATED WATER COST PER GALLON)*(AVG. GALLONS OF WATER CONSUMED PER DAY)*(365 DAYS PER YEAR))/(AVERAGE ORE TONNAGE PER YEAR)

(($0.0005)*(227,000)*(365))/(716,000) = $0.06

ROYALTY

(AVERAGE ROYALTY PER YEAR AT $400 GOLD PRICE)/(AVERAGE ORE TONNAGE PER YEAR)

($150,000)/(716,000) = $0.21

INSURANCE

(INSURANCE COST PER YEAR)/(AVERAGE ORE TONNAGE PER YEAR)

($300,000)/(716,000) = $0.42

SEVERANCE TAX

(1.25% NSR)*(NSR PER TON OF ORE AT $400 GOLD PRICE)

((0.0125)*(400-4.00)*(0.054)*(0.72)) = $0.19

PROPERTY TAX

((11.42%)*(ESTIMATED CAPITAL - 15% SALVAGE VALUE)*(25% ASSESSMENT))/(AVERAGE ORE TONNAGE PER YEAR)

((.1142)*(12,618,000-1,892,700)*(.25))/ (716,000) = $0.43

SALES TAX

(COST OF CONSUMABLES PER TON ORE)*(5%)

CONSUMABLES	COST/TON ORE
PLANT OPERATING SUPPLIES - REAGENTS	0.69
PLANT OPERATING SUPPLIES - FLUXES	0.04
ELECTRICAL POWER	0.36
FRESH WATER	0.06
TOTAL	1.15 *(.05) =

$0.06

OTHER (EXCL. ROYALTY)

((OPERATING COSTS)*(1.9%))/(AVERAGE ORE TONNAGE PER YEAR)

OPERATING COSTS	COSTS/TON ORE		
SUPERVISION & ADMINISTRATION (INCL. 40% BURDEN)	1.30		
LABOR – OPERATIONS & MAINTENANCE (INCL. 40% BURDEN)	0.81		
COARSE ORE HANDLING (FRONT-END LOADER)	0.25		
HEAP LEVELING (USED TRACK DOZER)	0.04		
PLANT OPERATING SUPPLIES – REAGENTS	0.69		
PLANT OPERATING SUPPLIES – FLUXES	0.04		
PLANT MAINTENANCE SUPPLIES	0.13		
ELECTRICAL POWER	0.36		
FRESH WATER	0.06		
ROYALTY	0.18		
INSURANCE	0.42		
SEVERANCE TAX	0.18		
PROPERTY TAX	0.30		
SALES TAX	0.06		
TOTAL	4.82	*(0.019) =	$0.09

	COST/TON WASTE	COST/TON ORE
GRAND TOTAL OPERATING COSTS FOR CONE MINER ORE RESERVE CALCULATIONS	$1.07	$6.76

at 1.42/1 total costs = $8.28

REV. 2/12/90

CUTOFF GRADES FOR ECONOMIC ORE RESERVES AT VARIOUS GOLD PRICES

ORE CUTOFF GRADE = (OPERATING COST/TON ORE)/((GOLD PRICE/OUNCE)-(SMELTER CHARGE @ 1% OF GOLD PRICE))*(RECOVERY %)

OPERATING COST/TON ORE ($/TON)	6.76
RECOVERY (%)	72

	GOLD PRICE ($/OUNCE)				
	450	425	400	375	350
ORE CUTOFF GRADE (OPT)	0.021	0.022	0.024	0.025	0.027

GREATER THAN WASTE CUTOFF GRADE = ((OPER. COST/TON ORE)-(MINING COST/TON WASTE))/((GOLD PRICE/OUNCE)-(1% SMELTER CHG.))*(REC. %)

OPERATING COST/TON ORE ($/TON)	6.76
MINING COST/TON WASTE ($/TON)	1.07
RECOVERY (%)	72

	GOLD PRICE ($/OUNCE)				
	450	425	400	375	350
G.T. WASTE CUTOFF GRADE (OPT)	0.018	0.019	0.020	0.021	0.023

C

YARNELL ORE RESERVES SUMMARY

$400 ECONOMIC PIT DESIGN

= 12,300,000 total tons within pit limit

WESTERN BUILDING & MINING CO. AND ATCHINSON, TOPEKA & SANTA FE (COMBINED)

GREATER THAN ORE CUTOFF		GREATER THAN WASTE VALUE		COMBINED ORE RESERVES		WASTE	
TONS	GRADE	TONS	GRADE	TONS	GRADE	TONS	GRADE
4021	0.058	596	0.021	4617	0.053	7683	0.007

ATCHINSON, TOPEKA & SANTA FE (ONLY)

GREATER THAN ORE CUTOFF		GREATER THAN WASTE VALUE		COMBINED ORE RESERVES		WASTE	
TONS	GRADE	TONS	GRADE	TONS	GRADE	TONS	GRADE
146	0.068	9	0.021	155	0.065	32	0.003

WESTERN BUILDING & MINING CO. (ONLY)

COMBINED ORE RESERVES		WASTE	
TONS	GRADE	TONS	GRADE
4462	0.053	7651	0.007

WITH 10% ORE DILUTION DURING MINING

TOTAL ORE RESERVES - ATCHINSON & WESTERN COMBINED

waste 1.42/1

ORE		WASTE	
TONS	GRADE	TONS	GRADE
5079	0.049	7221	0.007

ATCHINSON, TOPEKA & SANTA FE (ONLY)

ORE		WASTE	
TONS	GRADE	TONS	GRADE
171	0.059	17	0.003

WESTERN BUILDING & MINING CO. (ONLY)

ORE		WASTE	
TONS	GRADE	TONS	GRADE
4908	0.048	7205	0.007

D

YARNELL PROJECT
12-FEB-90 13:19:01 MST
ALL TONNAGES ARE *1000
20 FOOT BLOCK-MINERALIZATION MODEL

UPPER TOPO ID /1001/ INITIAL YARNELL BLOCK TOPOGRAPHY
LOWER TOPO ID /7226/ $400, SLOPE=50, 2", >WASTE, 12.0 CUFT, 72% RECOVERY, 4796 MODEL, $6.76

ASSAY MODEL /4796/ 0796 DATA WITH CLOSEST 3-D POINTS

COORDINATE LIMITS OF SUMMARY

	MAX	MIN
NORTH	102000	99020
EAST	50700	48400

CUTOFF GRADES:		0.020 TO 0.020 OZ AU			0.020 TO 0.024 OZ AU			GT 0.024 OZ AU			GT 0.020 OZ AU			
BENCH	WASTE	M TONS	OZ AU	OZ AG	M TONS	OZ AU	OZ AG	M TONS	OZ AU	OZ AG	M TONS	OZ AU	OZ AG	STRIP
5100	4	0	0.000	0.000	0	0.021	0.000	9	0.061	0.000	10	0.059	0.000	0.40
5080	28	0	0.000	0.000	16	0.021	0.000	53	0.083	0.000	69	0.069	0.000	0.40
5060	88	0	0.000	0.000	35	0.021	0.000	88	0.085	0.000	123	0.067	0.000	0.71
5040	181	0	0.000	0.000	42	0.021	0.000	106	0.064	0.000	148	0.052	0.000	1.22
5020	265	0	0.000	0.000	44	0.021	0.000	105	0.059	0.000	149	0.048	0.000	1.78
5000	344	0	0.000	0.000	46	0.021	0.000	116	0.049	0.000	163	0.041	0.000	2.11
4980	420	0	0.000	0.000	52	0.022	0.000	126	0.049	0.000	179	0.041	0.000	2.35
4960	514	0	0.000	0.000	50	0.022	0.000	140	0.051	0.000	191	0.044	0.000	2.69
4940	588	0	0.000	0.000	31	0.022	0.000	186	0.057	0.000	217	0.052	0.000	2.71
4920	645	0	0.000	0.000	19	0.022	0.000	209	0.055	0.000	229	0.052	0.000	2.81
4900	676	0	0.000	0.000	4	0.022	0.000	222	0.051	0.000	226	0.051	0.000	2.99
4880	663	0	0.000	0.000	5	0.020	0.000	230	0.053	0.000	236	0.052	0.000	2.80
4860	642	0	0.000	0.000	6	0.021	0.000	249	0.064	0.000	256	0.063	0.000	2.51
4840	578	0	0.000	0.000	13	0.022	0.000	269	0.067	0.000	282	0.065	0.000	2.04
4820	511	0	0.000	0.000	24	0.022	0.000	262	0.059	0.000	286	0.056	0.000	1.79
4800	448	0	0.000	0.000	42	0.022	0.000	236	0.056	0.000	278	0.051	0.000	1.61
4780	382	0	0.000	0.000	45	0.021	0.000	232	0.052	0.000	277	0.047	0.000	1.38
4760	288	0	0.000	0.000	32	0.021	0.000	277	0.048	0.000	310	0.046	0.000	0.93
4740	187	0	0.000	0.000	31	0.021	0.000	300	0.055	0.000	331	0.052	0.000	0.56
4720	126	0	0.000	0.000	30	0.021	0.000	243	0.059	0.000	274	0.055	0.000	0.46
4700	72	0	0.000	0.000	17	0.021	0.000	171	0.066	0.000	189	0.062	0.000	0.38
4680	20	0	0.000	0.000	1	0.023	0.000	112	0.062	0.000	114	0.061	0.000	0.18
4660	2	0	0.000	0.000	0	0.000	0.000	52	0.063	0.000	52	0.063	0.000	0.05
4640	0	0	0.000	0.000	0	0.000	0.000	15	0.058	0.000	15	0.058	0.000	0.00
4620	0	0	0.000	0.000	0	0.000	0.000	1	0.053	0.000	1	0.053	0.000	0.00
TOTAL	7683	0	0.000	0.000	596	0.021	0.000	4021	0.058	0.000	4617	0.053	0.000	1.66

YARNELL PROJECT
12-FEB-90 13:18:14 MST
ALL TONNAGES ARE *1000
20 FOOT BLOCK-MINERALIZATION MODEL

UPPER TOPO ID /1001/ INITIAL YARNELL BLOCK TOPOGRAPHY
LOWER TOPO ID /7226/ $400, SLOPE=50, 2", >WASTE, 12.0 CUFT, 72% RECOVERY, 4796 MODEL, $6.76

ASSAY MODEL /4796/ 0796 DATA WITH CLOSEST 3-D POINTS

COORDINATE LIMITS OF SUMMARY

	MAX	MIN
NORTH	102000	99020
EAST	50700	48400

CUTOFF GRADES:		0.000 TO 0.020 OZ AU			0.020 TO 0.024 OZ AU			GT 0.024 OZ AU			GT 0.000 OZ AU			
BENCH	WASTE	M TONS	OZ AU	OZ AG	M TONS	OZ AU	OZ AG	M TONS	OZ AU	OZ AG	M TONS	OZ AU	OZ AG	STRIP
5100	0	4	0.009	0.000	0	0.021	0.000	9	0.061	0.000	14	0.044	0.000	0.00
5080	0	28	0.010	0.000	16	0.021	0.000	53	0.083	0.000	98	0.052	0.000	0.00
5060	0	88	0.010	0.000	35	0.021	0.000	88	0.085	0.000	211	0.043	0.000	0.00
5040	0	181	0.009	0.000	42	0.021	0.000	106	0.064	0.000	330	0.028	0.000	0.00
5020	0	265	0.009	0.000	44	0.021	0.000	105	0.059	0.000	414	0.023	0.000	0.00
5000	0	344	0.009	0.000	46	0.021	0.000	116	0.049	0.000	507	0.020	0.000	0.00
4980	0	420	0.009	0.000	52	0.022	0.000	126	0.049	0.000	600	0.019	0.000	0.00
4960	0	514	0.009	0.000	50	0.022	0.000	140	0.051	0.000	705	0.019	0.000	0.00
4940	0	588	0.009	0.000	31	0.022	0.000	186	0.057	0.000	806	0.020	0.000	0.00
4920	0	645	0.007	0.000	19	0.022	0.000	209	0.055	0.000	875	0.019	0.000	0.00
4900	0	676	0.007	0.000	4	0.022	0.000	222	0.051	0.000	903	0.018	0.000	0.00
4880	0	663	0.006	0.000	5	0.020	0.000	230	0.053	0.000	900	0.018	0.000	0.00
4860	0	642	0.006	0.000	6	0.021	0.000	249	0.064	0.000	898	0.022	0.000	0.00
4840	0	578	0.006	0.000	13	0.022	0.000	269	0.067	0.000	861	0.025	0.000	0.00
4820	0	511	0.006	0.000	24	0.022	0.000	262	0.059	0.000	797	0.024	0.000	0.00
4800	0	448	0.006	0.000	42	0.022	0.000	236	0.056	0.000	726	0.023	0.000	0.00
4780	0	382	0.006	0.000	45	0.021	0.000	232	0.052	0.000	659	0.023	0.000	0.00
4760	0	288	0.006	0.000	32	0.021	0.000	277	0.048	0.000	599	0.027	0.000	0.00
4740	0	187	0.006	0.000	31	0.021	0.000	300	0.055	0.000	518	0.035	0.000	0.00
4720	0	126	0.006	0.000	30	0.021	0.000	243	0.059	0.000	401	0.039	0.000	0.00
4700	0	72	0.006	0.000	17	0.021	0.000	171	0.066	0.000	262	0.046	0.000	0.00
4680	0	20	0.006	0.000	1	0.023	0.000	112	0.062	0.000	134	0.053	0.000	0.00
4660	0	2	0.008	0.000	0	0.000	0.000	52	0.063	0.000	55	0.061	0.000	0.00
4640	0	0	0.000	0.000	0	0.000	0.000	15	0.058	0.000	15	0.058	0.000	0.00
4620	0	0	0.000	0.000	0	0.000	0.000	1	0.053	0.000	1	0.053	0.000	0.00
TOTAL	0	7683	0.007	0.000	596	0.021	0.000	4021	0.058	0.000	12300	0.024	0.000	0.00

YARNELL PROJECT
12-FEB-90 13:20:07 MST
ALL TONNAGES ARE *1000
20 FOOT BLOCK-MINERALIZATION MODEL

UPPER TOPO ID /1005/ SANTA FE PARTIAL CLAIM BLOCK TOPO. ONLY BLOCKS WITHIN CLAIM HAVE ELEVATIONS
LOWER TOPO ID /7226/ $400, SLOPE=50, 2", >WASTE, 12.0 CUFT, 72% RECOVERY, 4796 MODEL, $6.76

ASSAY MODEL /4796/ 0796 DATA WITH CLOSEST 3-D POINTS

COORDINATE LIMITS OF SUMMARY

	MAX	MIN
NORTH	102000	99020
EAST	50700	48400

CUTOFF GRADES: 0.020 TO 0.020 OZ AU | 0.020 TO 0.024 OZ AU | GT 0.024 OZ AU | GT 0.020 OZ AU

BENCH	WASTE	M TONS	OZ AU	OZ AG	M TONS	OZ AU	OZ AG	M TONS	OZ AU	OZ AG	M TONS	OZ AU	OZ AG	STRIP
5100	1	0	0.000	0.000	0	0.022	0.000	2	0.091	0.000	2	0.088	0.000	0.43
5080	6	0	0.000	0.000	1	0.021	0.000	23	0.083	0.000	25	0.080	0.000	0.26
5060	6	0	0.000	0.000	2	0.020	0.000	39	0.070	0.000	41	0.068	0.000	0.16
5040	7	0	0.000	0.000	5	0.022	0.000	37	0.060	0.000	43	0.056	0.000	0.16
5020	7	0	0.000	0.000	0	0.000	0.000	24	0.072	0.000	24	0.072	0.000	0.32
5000	1	0	0.000	0.000	0	0.000	0.000	16	0.047	0.000	16	0.047	0.000	0.09
4980	1	0	0.000	0.000	0	0.000	0.000	1	0.043	0.000	1	0.043	0.000	0.85
4960	0	0	0.000	0.000	0	0.000	0.000	0	0.000	0.000	0	0.000	0.000	0.00
TOTAL	32	0	0.000	0.000	8	0.021	0.000	146	0.068	0.000	155	0.065	0.000	0.21

YARNELL PROJECT
12-FEB-90 13:19:47 MST
ALL TONNAGES ARE *1000
20 FOOT BLOCK-MINERALIZATION MODEL

UPPER TOPO ID /1005/ SANTA FE PARTIAL CLAIM BLOCK TOPO. ONLY BLOCKS WITHIN CLAIM HAVE ELEVATIONS
LOWER TOPO ID /7226/ $400, SLOPE=50, 2", >WASTE, 12.0 CUFT, 72% RECOVERY, 4796 MODEL, $6.76

ASSAY MODEL /4796/ 0796 DATA WITH CLOSEST 3-D POINTS

COORDINATE LIMITS OF SUMMARY

	MAX	MIN
NORTH	102000	99020
EAST	50700	48400

CUTOFF GRADES: 0.000 TO 0.020 OZ AU; 0.020 TO 0.024 OZ AU; GT 0.024 OZ AU; GT 0.000 OZ AU

BENCH	WASTE	0.000 TO 0.020 OZ AU			0.020 TO 0.024 OZ AU			GT 0.024 OZ AU			GT 0.000 OZ AU			STRIP
		M TONS	OZ AU	OZ AG	M TONS	OZ AU	OZ AG	M TONS	OZ AU	OZ AG	M TONS	OZ AU	OZ AG	
5100	0	1	0.006	0.000	0	0.022	0.000	2	0.091	0.000	4	0.064	0.000	0.00
5080	0	6	0.008	0.000	1	0.021	0.000	23	0.083	0.000	31	0.065	0.000	0.00
5060	0	6	0.002	0.000	2	0.020	0.000	39	0.070	0.000	48	0.059	0.000	0.00
5040	0	7	0.001	0.000	5	0.022	0.000	37	0.060	0.000	50	0.048	0.000	0.00
5020	0	7	0.001	0.000	0	0.000	0.000	24	0.072	0.000	31	0.055	0.000	0.00
5000	0	1	0.000	0.000	0	0.000	0.000	16	0.047	0.000	18	0.043	0.000	0.00
4980	0	1	0.000	0.000	0	0.000	0.000	1	0.043	0.000	2	0.023	0.000	0.00
4960	0	0	0.005	0.000	0	0.000	0.000	0	0.000	0.000	0	0.005	0.000	0.00
TOTAL	0	32	0.003	0.000	8	0.021	0.000	146	0.068	0.000	187	0.054	0.000	0.00

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SUMMARY OF YARNELL OPERATING COSTS

$400 PIT

CONTRACT MINING ORE	$1.18/TON ORE
CONTRACT MINING WASTE	$1.07/TON WASTE
CONTRACT CRUSHING ORE (TO -6")	$0.50/TON ORE
SUPERVISION & ADMINISTRATION (PER MONTH)	$55,400/MONTH
LABOR - OPERATIONS (PER MONTH)	$21,700/MONTH
LABOR - MAINTENANCE (PER MONTH)	$13,000/MONTH
ADDITIONAL LABOR (PER MONTH)	$36,000/MONTH
COARSE ORE HANDLING (FRONT-END LOADER)	$0.25/TON ORE
HEAP LEVELING (USED TRACK DOZER)	$0.04/TON ORE
PLANT OPERATING SUPPLIES - REAGENTS	$0.69/TON ORE
PLANT OPERATING SUPPLIES - FLUXES	$0.04/TON ORE
PLANT MAINTENANCE SUPPLIES	$0.13/TON ORE
ELECTRICAL POWER	$0.36/TON ORE
FRESH WATER	$0.06/TON ORE
ROYALTY - ATCHINSON, TOPEKA & SANTA FE	$0.84/TON ORE
ROYALTY - WESTERN BUILDING & MINING CO.	
YEARS 1 & 2	$0.27/TON ORE
YEARS 3 & 4	$0.14/TON ORE
YEARS 5+	$0.07/TON ORE
INSURANCE	$25,000/MONTH
SEVERANCE TAX	$0.17/TON ORE
PROPERTY TAX	$26,200/MONTH
SALES TAX	$0.06/TON ORE

YARNELL CONTRACT MINING AND CRUSHING COST ESTIMATES

CONTRACTORS	MINING COST ($/TON ORE)	MINING COST ($/TON WASTE)	COARSE CRUSHING COST ($/TON ORE)
J. D. WELSH & ASSOCIATES (LON ARMSTRONG)	$1.50	$1.38	$0.86
LEDCOR CONSTRUCTION (DEXTER BAKER)	$1.36	$1.28	$1.01
MORRISON - KNUDSEN (JOHN ROBERTS)	$1.65	$1.45	$1.00
N. A. DEGERSTROM (ARMAND HANSEN)	$1.20	$1.20	$1.05
SUNDT CORPORATION (MARVIN HUSTAD)	$1.78	$1.54	$1.15
WASHINGTON CONSTRUCTION (RON KENT)	$1.18	$1.07	$0.50
AVERAGE (ALL CONTRACTORS)	**$1.45**	**$1.32**	**$0.93**

NOTE:

COSTS ARE WITHIN +/- 25% RANGE
COSTS EXCLUDE MOBILIZATION AND DEMOBILIZATION
COSTS ARE 1989 DOLLARS, W/O INFLATION

	OPERATING COST
SUPERVISION & ADMINISTRATION (PER MONTH)	
((NUMBER OF SALARIED PERSONNEL)*(AVERAGE YEARLY SALARY))/(12 MONTHS PER YEAR)	
((19)*($35,000))/(12) =	$55,400/MONTH
LABOR - OPERATIONS (PER MONTH)	
((NUMBER OF HOURLY OPERATIONS PERSONNEL)*(AVERAGE WAGE PER HOUR)*(AVERAGE HOURS PER YEAR))/(12 MONTHS PER YEAR)	
((10)*($12.50)*(2080))/(12) =	$21,700/MONTH
LABOR - MAINTENANCE (PER MONTH)	
((NUMBER OF HOURLY MAINTENANCE PERSONNEL)*(AVERAGE WAGE PER HOUR)*(AVERAGE HOURS PER YEAR))/(12 MONTHS PER YEAR)	
((6)*($12.50)*(2080))/(12) =	$13,000/MONTH
ADDITIONAL LABOR (PER MONTH)	
((SUPERVISION & ADMINISTRATION/MONTH)+(OPERATIONS AND MAINTENANCE LABOR/MONTH))*(40% BURDEN)	
((55400)+(21700+13000))*(.40) =	$36,000/MONTH
COARSE ORE HANDLING (FRONT-END LOADER)	
((LOADER COST/HOUR, EXCL. LABOR)*(AVG. OPER. HOURS/SHIFT)*(AVG. SHIFTS/DAY))/(AVG. ORE TONS/DAY)	
(($50.00)*(5)*(2))/(2,000) =	$0.25/TON ORE
HEAP LEVELING (USED TRACK DOZER)	
((DOZER COST/HOUR, EXCL. LABOR)*(AVG. OPER. HOURS/SHIFT)*(AVG. SHIFTS/DAY))/(AVG. ORE TONS/DAY)	
(($40.00)*(1.0)*(2))/(2,000) =	$0.04/TON ORE

PLANT OPERATING SUPPLIES - REAGENTS

DESCRIPTION	CONSUMPTION (LB./TON)	UNIT COST ($/LB)	COST ($/TON)
CEMENT	5.00	0.05	0.25
SODIUM CYANIDE	0.40	0.85	0.34
CARBON	0.01	1.00	0.01
CAUSTIC SODA	0.20	0.35	0.07
MURIATIC ACID	0.10	0.15	0.02
ANTISCALENT	0.01	0.60	0.01
TOTAL			0.69

$0.69/TON ORE

PLANT OPERATING SUPPLIES - FLUXES

(ESTIMATED FLUX COST PER YEAR)/(AVERAGE ORE TONNAGE PER YEAR)

($25,000)/(716,000) = $0.04/TON ORE

PLANT MAINTENANCE SUPPLIES

(KILBORN'S ESTIMATED PLANT MAINTENANCE COST PER YEAR)/(AVERAGE ORE TONNAGE PER YEAR)

($95,000)/(716,000) = $0.13/TON ORE

ELECTRICAL POWER

(((KILBORN'S ESTIMATED KWH CONSUMPTION PER YEAR)*(A.P.S. POWER COST PER KWH))+ (BASIC SERVICE AND POWER CHARGE PER YEAR))/(AVG. ORE TONNAGE/YEAR)

CONSUMPTION	CONSUMPTION
5145707 KWH/YEAR	428809 KWH/MONTH

	AVERAGE MONTHLY BILLING RATE	
JUNE-OCTOBER	0.112096	PER KWH FOR THE FIRST 2,500 KWH
NOVEMBER-MAY	0.101201	PER KWH FOR THE FIRST 2,500 KWH
JUNE-OCTOBER	0.077456	PER KWH FOR THE NEXT 42,000 KWH
NOVEMBER-MAY	0.069800	PER KWH FOR THE NEXT 42,000 KWH
JUNE-OCTOBER	0.049571	PER KWH FOR ALL ADDITIONAL KWH
NOVEMBER-MAY	0.044525	PER KWH FOR ALL ADDITIONAL KWH

KWH	AVG. RATE	AVG. COST/MONTH	AVG. COST/YEAR
2500	0.105741	264	3172
42000	0.072990	3066	36787
384309	0.046628	17919	215032
SUB-TOTAL			254992
BASIC SERVICE CHARGE			180
POWER CHARGE			1970
TOTAL			257142

($257,142 PER YEAR)/(716,000 ORE TONS PER YEAR) = $0.36/TON ORE

FRESH WATER

((ESTIMATED WATER COST PER GALLON)*(AVG. GALLONS OF WATER CONSUMED PER DAY)*(365 DAYS PER YEAR))/(AVERAGE ORE TONNAGE PER YEAR)

(($0.0005)*(227,000)*(365))/(716,000) = $0.06/TON ORE

ROYALTY – ATCHINSON, TOPEKA & SANTA FE

5% NSR	AU PRICE/OZ – SMELT. CHG/OZ		DILUTED GRADE	RECOVERY	ECONOMIC PIT	ROYALTY/TON ORE
0.05	400	4.00	0.059	0.72	$400	$0.84

ROYALTY – WESTERN BUILDING & MINING CO.

MAXIMUM $175,000/YEAR

YEARS 1 & 2

2% NSR	AU PRICE/OZ – SMELT. CHG/OZ		DILUTED GRADE	RECOVERY	ECONOMIC PIT	ROYALTY/TON ORE
0.02	400	4.00	0.048	0.72	$400	$0.27

YEARS 3 & 4

1% NSR	AU PRICE/OZ – SMELT. CHG/OZ		DILUTED GRADE	RECOVERY	ECONOMIC PIT	ROYALTY/TON ORE
0.01	400	4.00	0.048	0.72	$400	$0.14

YEARS 5+

0.5% NSR	AU PRICE/OZ – SMELT. CHG/OZ		DILUTED GRADE	RECOVERY	ECONOMIC PIT	ROYALTY/TON ORE
0.005	400	4.00	0.048	0.72	$400	$0.07

INSURANCE

(INSURANCE COST PER YEAR)/(12 MONTHS/YEAR)

($300,000)/(12) = $25,000/MONTH

SEVERANCE TAX

NSR 1.25%	AU PRICE/OZ – SMELT. CHG/OZ		DILUTED GRADE	RECOVERY	ECONOMIC PIT	SEVERANCE PER TON ORE
0.0125	400	4.00	0.048	0.72	$400	$0.17

PROPERTY TAX

((YAVAPAI CO. TAX RATE)*(ESTIMATED CAPITAL – 15% SALVAGE VALUE)*(25% ASSESSMENT))/(12 MONTHS/YEAR)

MISC. CAPITAL ($'000'S)	
PRIVATE HOME PURCHASE	200
LAND PAYMENTS	846
WATER SUPPLY EQUIP.	500
MONITOR WELL EQUIP.	50
TOTAL	1596

ECONOMIC PIT	TAX RATE	PLANT	MISC.	TOTAL (LESS 15%)	*(25%)	ECONOMIC PIT	PROPERTY TAX PER MONTH
400	0.1142	11373	1596	11024	2756	400	$26,227

SALES TAX

(COST OF CONSUMABLES PER TON ORE)*(5%)

CONSUMABLES	COST/TON ORE		
PLANT OPERATING SUPPLIES – REAGENTS	0.69		
PLANT OPERATING SUPPLIES – FLUXES	0.04		
ELECTRICAL POWER	0.36		
FRESH WATER	0.06		
TOTAL	1.15	*(.05) =	$0.06/TON ORE

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$400

ARNELL

ORE RESERVES AS OF 1/1/91

ATCHINSON, TOPEKA & SANTA FE

ORE TONS	155000
ORE TONS WITH 10% MINING DILUTION	170500
IN-PLACE ORE GRADE	0.065
ORE GRADE WITH 10% MINING DILUTION	0.059
WASTE TONS	32000
WASTE GRADE	0.003
WASTE TONS WITH 10% MINING DILUTION	16500

WESTERN BUILDING & MINING CO.

ORE TONS	4462000
ORE TONS WITH 10% MINING DILUTION	4908200
IN-PLACE ORE GRADE	0.053
ORE GRADE WITH 10% MINING DILUTION	0.048
WASTE TONS	7651000
WASTE GRADE	0.007
WASTE TONS WITH 10% MINING DILUTION	7204800

MINING SCHEDULE

	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	1991 TOTAL
WASTE	30	28	31	30	30	30	30	31	29	31	29	29	358
ATCHINSON, TOPEKA & SANTA FE													
TONS	0	0	0	0	0	0	2750	2750	2750	2750	2750	2748	16500
WESTERN BUILDING & MINING CO.													
TONS	0	0	0	0	100000	150000	44748	47582	41914	47582	41914	41942	515683
ORE													
ATCHINSON, TOPEKA & SANTA FE													
TONS	0	0	0	0	0	0	28420	28420	28420	28420	28420	28400	170500
GRADE	0	0	0	0	0	0	0.059	0.059	0.059	0.059	0.059	0.059	0.059
WESTERN BUILDING & MINING CO.													
TONS	0	0	0	0	0	0	31580	33580	29580	33580	29580	29600	187500
GRADE	0	0	0	0	0	0	0.048	0.048	0.048	0.048	0.048	0.048	0.048
TOTAL ORE TONS	0	0	0	0	0	0	60000	62000	58000	62000	58000	58000	358000
TOTAL WASTE TONS	0	0	0	0	100000	150000	47498	50332	44664	50332	44664	44691	532183

$400

YARNELL

ORE RESERVES AS OF 1/1/92

ATCHINSON, TOPEKA & SANTA FE

ORE TONS WITH 10% MINING DILUTION	0
IN-PLACE ORE GRADE	0.000
ORE GRADE WITH 10% MINING DILUTION	0.000
WASTE TONS WITH 10% MINING DILUTION	0
WASTE GRADE	0.000

WESTERN BUILDING & MINING CO.

ORE TONS WITH 10% MINING DILUTION	4720700
ORE GRADE WITH 10% MINING DILUTION	0.048
WASTE TONS WITH 10% MINING DILUTION	6689117
WASTE GRADE	0.007

MINING SCHEDULE

	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	1992 TOTAL
WASTE	30	27	31	30	30	30	30	31	29	31	29	29	357
ATCHINSON, TOPEKA & SANTA FE													
TONS	0	0	0	0	0	0	0	0	0	0	0	0	0
WESTERN BUILDING & MINING CO.													
TONS	85019	76517	87852	85019	85019	85019	85019	87852	82185	87852	82185	82185	1011721
ORE													
ATCHINSON, TOPEKA & SANTA FE													
TONS	0	0	0	0	0	0	0	0	0	0	0	0	0
GRADE	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
WESTERN BUILDING & MINING CO.													
TONS	60000	54000	62000	60000	60000	60000	60000	62000	58000	62000	58000	58000	714000
GRADE	0.048	0.048	0.048	0.048	0.048	0.048	0.048	0.048	0.048	0.048	0.048	0.048	0.048
TOTAL ORE TONS	60000	54000	62000	60000	60000	60000	60000	62000	58000	62000	58000	58000	714000
TOTAL WASTE TONS	85019	76517	87852	85019	85019	85019	85019	87852	82185	87852	82185	82185	1011721

$400

YARNELL

ORE RESERVES AS OF 1/1/93

ATCHINSON, TOPEKA & SANTA FE

ORE TONS WITH 10% MINING DILUTION	0
IN-PLACE ORE GRADE	0.000
ORE GRADE WITH 10% MINING DILUTION	0.000
WASTE TONS WITH 10% MINING DILUTION	0
WASTE GRADE	0.000

WESTERN BUILDING & MINING CO.

ORE TONS WITH 10% MINING DILUTION	4006700
ORE GRADE WITH 10% MINING DILUTION	0.048
WASTE TONS WITH 10% MINING DILUTION	5677396
WASTE GRADE	0.007

MINING SCHEDULE

	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	1993 TOTAL
WASTE	30	28	31	30	30	30	30	31	29	31	29	29	358
ATCHINSON, TOPEKA & SANTA FE													
TONS	0	0	0	0	0	0	0	0	0	0	0	0	0
WESTERN BUILDING & MINING CO.													
TONS	85019	79351	87852	85019	85019	85019	85019	87852	82185	87852	82185	82185	1014555
ORE													
ATCHINSON, TOPEKA & SANTA FE													
TONS	0	0	0	0	0	0	0	0	0	0	0	0	0
GRADE	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
WESTERN BUILDING & MINING CO.													
TONS	60000	56000	62000	60000	60000	60000	60000	62000	58000	62000	58000	58000	716000
GRADE	0.048	0.048	0.048	0.048	0.048	0.048	0.048	0.048	0.048	0.048	0.048	0.048	0.048
TOTAL ORE TONS	60000	56000	62000	60000	60000	60000	60000	62000	58000	62000	58000	58000	716000
TOTAL WASTE TONS	85019	79351	87852	85019	85019	85019	85019	87852	82185	87852	82185	82185	1014555

$400 F

ARNELL

ORE RESERVES AS OF 1/1/94

ATCHINSON, TOPEKA & SANTA FE

ORE TONS WITH 10% MINING DILUTION	0
IN-PLACE ORE GRADE	0.000
ORE GRADE WITH 10% MINING DILUTION	0.000
WASTE TONS WITH 10% MINING DILUTION	0
WASTE GRADE	0.000

WESTERN BUILDING & MINING CO.

ORE TONS WITH 10% MINING DILUTION	3290700
ORE GRADE WITH 10% MINING DILUTION	0.048
WASTE TONS WITH 10% MINING DILUTION	4662842
WASTE GRADE	0.007

MINING SCHEDULE

	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	1994 TOTAL
WASTE	30	28	31	30	30	30	30	31	29	31	29	29	358
ATCHINSON, TOPEKA & SANTA FE													
TONS	0	0	0	0	0	0	0	0	0	0	0	0	0
WESTERN BUILDING & MINING CO.													
TONS	85019	79351	87852	85019	85019	85019	85019	87852	82185	87852	82185	82185	1014555
ORE													
ATCHINSON, TOPEKA & SANTA FE													
TONS	0	0	0	0	0	0	0	0	0	0	0	0	0
GRADE	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
WESTERN BUILDING & MINING CO.													
TONS	60000	56000	62000	60000	60000	60000	60000	62000	58000	62000	58000	58000	716000
GRADE	0.048	0.048	0.048	0.048	0.048	0.048	0.048	0.048	0.048	0.048	0.048	0.048	0.048
TOTAL ORE TONS	60000	56000	62000	60000	60000	60000	60000	62000	58000	62000	58000	58000	716000
TOTAL WASTE TONS	85019	79351	87852	85019	85019	85019	85019	87852	82185	87852	82185	82185	1014555

$400 K

ARNELL

ORE RESERVES AS OF 1/1/95

ATCHINSON, TOPEKA & SANTA FE

ORE TONS WITH 10% MINING DILUTION	0
IN-PLACE ORE GRADE	0.000
ORE GRADE WITH 10% MINING DILUTION	0.000
WASTE TONS WITH 10% MINING DILUTION	0
WASTE GRADE	0.000

WESTERN BUILDING & MINING CO.

ORE TONS WITH 10% MINING DILUTION	2574700
ORE GRADE WITH 10% MINING DILUTION	0.048
WASTE TONS WITH 10% MINING DILUTION	3648287
WASTE GRADE	0.007

MINING SCHEDULE

	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	1995 TOTAL
WASTE	30	28	31	30	30	30	30	31	29	31	29	29	358
ATCHINSON, TOPEKA & SANTA FE													
TONS	0	0	0	0	0	0	0	0	0	0	0	0	0
WESTERN BUILDING & MINING CO.													
TONS	85019	79351	87852	85019	85019	85019	85019	87852	82185	87852	82185	82185	1014555
ORE													
ATCHINSON, TOPEKA & SANTA FE													
TONS	0	0	0	0	0	0	0	0	0	0	0	0	0
GRADE	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
WESTERN BUILDING & MINING CO.													
TONS	60000	56000	62000	60000	60000	60000	60000	62000	58000	62000	58000	58000	716000
GRADE	0.048	0.048	0.048	0.048	0.048	0.048	0.048	0.048	0.048	0.048	0.048	0.048	0.048
TOTAL ORE TONS	60000	56000	62000	60000	60000	60000	60000	62000	58000	62000	58000	58000	716000
TOTAL WASTE TONS	85019	79351	87852	85019	85019	85019	85019	87852	82185	87852	82185	82185	1014555

$400 Pr.

YARNELL

ORE RESERVES AS OF 1/1/96

ATCHINSON, TOPEKA & SANTA FE

ORE TONS WITH 10% MINING DILUTION	0
IN-PLACE ORE GRADE	0.000
ORE GRADE WITH 10% MINING DILUTION	0.000
WASTE TONS WITH 10% MINING DILUTION	0
WASTE GRADE	0.000

WESTERN BUILDING & MINING CO.

ORE TONS WITH 10% MINING DILUTION	1858700
ORE GRADE WITH 10% MINING DILUTION	0.048
WASTE TONS WITH 10% MINING DILUTION	2633733
WASTE GRADE	0.007

MINING SCHEDULE

	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	1996 TOTAL
WASTE	30	27	31	30	30	30	30	31	29	31	29	29	357
ATCHINSON, TOPEKA & SANTA FE													
TONS	0	0	0	0	0	0	0	0	0	0	0	0	0
WESTERN BUILDING & MINING CO.													
TONS	85019	76517	87852	85019	85019	85019	85019	87852	82185	87852	82185	82185	1011721
ORE													
ATCHINSON, TOPEKA & SANTA FE													
TONS	0	0	0	0	0	0	0	0	0	0	0	0	0
GRADE	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
WESTERN BUILDING & MINING CO.													
TONS	60000	54000	62000	60000	60000	60000	60000	62000	58000	62000	58000	58000	714000
GRADE	0.048	0.048	0.048	0.048	0.048	0.048	0.048	0.048	0.048	0.048	0.048	0.048	0.048
TOTAL ORE TONS	60000	54000	62000	60000	60000	60000	60000	62000	58000	62000	58000	58000	714000
TOTAL WASTE TONS	85019	76517	87852	85019	85019	85019	85019	87852	82185	87852	82185	82185	1011721

$400

ARNELL

ORE RESERVES AS OF 1/1/97

ATCHINSON, TOPEKA & SANTA FE

ORE TONS WITH 10% MINING DILUTION	0
IN-PLACE ORE GRADE	0.000
ORE GRADE WITH 10% MINING DILUTION	0.000
WASTE TONS WITH 10% MINING DILUTION	0
WASTE GRADE	0.000

WESTERN BUILDING & MINING CO.

ORE TONS WITH 10% MINING DILUTION	1144700
ORE GRADE WITH 10% MINING DILUTION	0.048
WASTE TONS WITH 10% MINING DILUTION	1622012
WASTE GRADE	0.007

MINING SCHEDULE

	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	1997 TOTAL
WASTE	30	28	31	30	30	30	30	31	29	31	29	29	358
ATCHINSON, TOPEKA & SANTA FE													
TONS	0	0	0	0	0	0	0	0	0	0	0	0	0
WESTERN BUILDING & MINING CO.													
TONS	85019	79351	87852	85019	85019	85019	85019	87852	82185	87852	82185	82185	1014555
ORE													
ATCHINSON, TOPEKA & SANTA FE													
TONS	0	0	0	0	0	0	0	0	0	0	0	0	0
GRADE	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
WESTERN BUILDING & MINING CO.													
TONS	60000	56000	62000	60000	60000	60000	60000	62000	58000	62000	58000	58000	716000
GRADE	0.048	0.048	0.048	0.048	0.048	0.048	0.048	0.048	0.048	0.048	0.048	0.048	0.048
TOTAL ORE TONS	60000	56000	62000	60000	60000	60000	60000	62000	58000	62000	58000	58000	716000
TOTAL WASTE TONS	85019	79351	87852	85019	85019	85019	85019	87852	82185	87852	82185	82185	1014555

$400 PIT

YARNELL

ORE RESERVES AS OF 1/1/98

ATCHINSON, TOPEKA & SANTA FE

ORE TONS WITH 10% MINING DILUTION	0
IN-PLACE ORE GRADE	0.000
ORE GRADE WITH 10% MINING DILUTION	0.000
WASTE TONS WITH 10% MINING DILUTION	0
WASTE GRADE	0.000

WESTERN BUILDING & MINING CO.

ORE TONS WITH 10% MINING DILUTION	428700
ORE GRADE WITH 10% MINING DILUTION	0.048
WASTE TONS WITH 10% MINING DILUTION	607457
WASTE GRADE	0.007

MINING SCHEDULE

	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	1998 TOTAL
WASTE	30	28	31	30	30	30	30	6	0	0	0	0	215
ATCHINSON, TOPEKA & SANTA FE													
TONS	0	0	0	0	0	0	0	0	0	0	0	0	0
WESTERN BUILDING & MINING CO.													
TONS	85019	79351	87852	85019	85019	85019	85019	15162	0	0	0	0	607457
ORE													
ATCHINSON, TOPEKA & SANTA FE													
TONS	0	0	0	0	0	0	0	0	0	0	0	0	0
GRADE	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
WESTERN BUILDING & MINING CO.													
TONS	60000	56000	62000	60000	60000	60000	60000	10700	0	0	0	0	428700
GRADE	0.048	0.048	0.048	0.048	0.048	0.048	0.048	0.048	0	0	0	0	0.048
TOTAL ORE TONS	60000	56000	62000	60000	60000	60000	60000	10700	0	0	0	0	428700
TOTAL WASTE TONS	85019	79351	87852	85019	85019	85019	85019	15162	0	0	0	0	607457

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$400 PIT

OPERATING COSTS	1991
CONTRACT MINING PER TON ORE	1.18
CONTRACT MINING PER TON WASTE	1.07
CONTRACT CRUSHING (TO -6") PER TON ORE	0.50
SUPERVISION AND ADMINISTRATION PER MONTH	55400
OPERATING LABOR PER MONTH	21700
REPAIR LABOR PER MONTH	13000
ADDITIONAL LABOR PER MONTH @ 40%	36000
FRONT-END LOADER COST PER TON ORE	0.25
DOZER COST PER TON ORE	0.04
SUPPLIES - REAGENTS PER TON ORE	0.69
SUPPLIES - FLUXES PER TON ORE	0.04
PLANT MAINTENANCE SUPPLIES PER TON ORE	0.13
ELECTRICAL POWER COST PER TON ORE	0.36
WATER COST PER TON ORE	0.06
ROYALTY - ATCHINSON, TOPEKA & SANTA FE	0.84
ROYALTY - WESTERN BUILDING & MINING CO.	0.27
INSURANCE COST PER MONTH	25000
TAX - SEVERANCE (PER TON ORE)	0.17
TAX - PROPERTY (PER MONTH)	26200
TAX - SALES (PER TON ORE)	0.06

$400 PIT

MINING SCHEDULE	1991 JAN	1991 FEB	1991 MAR	1991 APR	1991 MAY	1991 JUN	1991 JUL	1991 AUG	1991 SEP	1991 OCT	1991 NOV	1991 DEC	1991 TOTAL
ORE TONS													
ATCHINSON, TOPEKA & SANTA FE	0	0	0	0	0	0	28420	28420	28420	28420	28420	28400	170500
WESTERN BUILDING & MINING CO.	0	0	0	0	0	0	31580	33580	29580	33580	29580	29600	187500
COMBINED	0	0	0	0	0	0	60000	62000	58000	62000	58000	58000	358000
WASTE TONS													
ATCHINSON, TOPEKA & SANTA FE	0	0	0	0	0	0	2750	2750	2750	2750	2750	2750	16500
WESTERN BUILDING & MINING CO.	0	0	0	0	100000	150000	44748	47582	41914	47582	41914	41942	515682
COMBINED	0	0	0	0	100000	150000	47498	50332	44664	50332	44664	44692	532182

$400 PIT OPERATING COSTS	1991 JAN	1991 FEB	1991 MAR	1991 APR	1991 MAY	1991 JUN	1991 JUL	1991 AUG	1991 SEP	1991 OCT	1991 NOV	1991 DEC	1991 TOTAL
CONTRACTOR'S COSTS													
CONTRACT MINING ORE	0	0	0	0	0	0	70800	73160	68440	73160	68440	68440	422440
CONTRACT MINING WASTE	0	0	0	0	107000	160500	50823	53855	47790	53855	47790	47820	569435
CONTRACT CRUSHING ORE	0	0	0	0	0	0	30000	31000	29000	31000	29000	29000	179000
SUB-TOTAL CONTRACTOR'S COSTS	0	0	0	0	107000	160500	151623	158015	145230	158015	145230	145260	1170875
OPERATOR'S COSTS													
SUPER. AND ADMIN.	13850	13850	27700	27700	55400	55400	55400	55400	55400	55400	55400	55400	526300
OPERATING LABOR	0	0	5425	10850	10850	16275	21700	21700	21700	21700	21700	21700	173600
REPAIR LABOR	0	0	3250	6500	6500	9750	13000	13000	13000	13000	13000	13000	104000
ADDITIONAL LABOR	5540	5540	14550	18020	29100	32570	36040	36040	36040	36040	36040	36040	321560
FRONT-END LOADER	0	0	0	0	0	0	15000	15500	14500	15500	14500	14500	89500
DOZER	0	0	0	0	0	0	2400	2480	2320	2480	2320	2320	14320
SUPPLIES - REAGENTS	0	0	0	0	0	0	41400	42780	40020	42780	40020	40020	247020
SUPPLIES - FLUXES	0	0	0	0	0	0	2400	2480	2320	2480	2320	2320	14320
PLANT MAINT. SUPPLIES	0	0	0	0	0	0	7800	8060	7540	8060	7540	7540	46540
ELECTRICAL POWER	0	0	0	0	0	0	21600	22320	20880	22320	20880	20880	128880
WATER	0	0	0	0	0	0	3600	3720	3480	3720	3480	3480	21480
ROYALTY - ATCHINSON	0	0	0	0	0	0	23873	23873	23873	23873	23873	23856	143220
ROYALTY - WESTERN	0	0	0	0	0	0	8527	9067	7987	9067	7987	7992	50625
INSURANCE	25000	25000	25000	25000	25000	25000	25000	25000	25000	25000	25000	25000	300000
TAX - SEVERANCE	0	0	0	0	0	0	10200	10540	9860	10540	9860	9860	60860
TAX - PROPERTY	0	0	0	0	0	0	0	0	0	0	0	0	0
TAX - SALES	0	0	0	0	0	0	3600	3720	3480	3720	3480	3480	21480
OTHER @ 1.9% (OPER.COST)	843	843	1443	1673	2410	2641	5539	5618	5461	5618	5461	5460	43010
SUB-TOTAL OPERATOR'S COSTS	45233	45233	77368	89743	129260	141636	297079	301297	292860	301297	292860	292848	2306715
GENERAL AND ADMINISTRATIVE @ 6%	2714	2714	4642	5385	7756	8498	17825	18078	17572	18078	17572	17571	138403
TOTAL OPERATOR'S COSTS	47947	47947	82010	95128	137016	150134	314903	319375	310432	319375	310432	310419	2445118

	1991 JAN	1991 FEB	1991 MAR	1991 APR	1991 MAY	1991 JUN	1991 JUL	1991 AUG	1991 SEP	1991 OCT	1991 NOV	1991 DEC	1991 TOTAL
TOTAL COSTS - PRE-PROD. ($)	47947	47947	82010	95128	244016	310634	0	0	0	0	0	0	827682
TOTAL COSTS - PRODUCTION ($)	0	0	0	0	0	0	466526	477390	455662	477390	455662	455680	2788311
TOTAL COSTS - CLOSURE ($)	0	0	0	0	0	0	0	0	0	0	0	0	0

$400 PIT

OPERATING COSTS	1992	1993	1994	1995	1996	1997	1998	1999
CONTRACT MINING PER TON ORE	1.18	1.18	1.18	1.18	1.18	1.18	1.18	1.18
CONTRACT MINING PER TON WASTE	1.07	1.07	1.07	1.07	1.07	1.07	1.07	1.07
CONTRACT CRUSHING (TO -6") PER TON ORE	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50
SUPERVISION AND ADMINISTRATION PER MONTH	55400	55400	55400	55400	55400	55400	55400	55400
OPERATING LABOR PER MONTH	21700	21700	21700	21700	21700	21700	21700	21700
REPAIR LABOR PER MONTH	13000	13000	13000	13000	13000	13000	13000	13000
ADDITIONAL LABOR PER MONTH @ 40%	36000	36000	36000	36000	36000	36000	36000	36000
FRONT-END LOADER COST PER TON ORE	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25
DOZER COST PER TON ORE	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04
SUPPLIES - REAGENTS PER TON ORE	0.69	0.69	0.69	0.69	0.69	0.69	0.69	0.69
SUPPLIES - FLUXES PER TON ORE	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04
PLANT MAINTENANCE SUPPLIES PER TON ORE	0.13	0.13	0.13	0.13	0.13	0.13	0.13	0.13
ELECTRICAL POWER COST PER TON ORE	0.36	0.36	0.36	0.36	0.36	0.36	0.36	0.36
WATER COST PER TON ORE	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06
ROYALTY - ATCHINSON, TOPEKA & SANTA FE	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84
ROYALTY - WESTERN BUILDING & MINING CO.	0.27	0.14	0.14	0.07	0.07	0.07	0.07	0.07
INSURANCE COST PER MONTH	25000	25000	25000	25000	25000	25000	25000	25000
TAX - SEVERANCE (PER TON ORE)	0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.17
TAX - PROPERTY (PER MONTH)	26200	26200	26200	26200	26200	26200	26200	26200
TAX - SALES (PER TON ORE)	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06

$400 PIT

MINING SCHEDULE	1991	1992	1993	1994	1995	1996	1997	1998	1999	TOTAL
ORE TONS										
ATCHINSON, TOPEKA & SANTA FE	170500	0	0	0	0	0	0	0	0	170500
WESTERN BUILDING & MINING CO.	187500	714000	716000	716000	716000	714000	716000	428700	0	4908200
COMBINED	358000	714000	716000	716000	716000	714000	716000	428700	0	5078700
WASTE TONS										
ATCHINSON, TOPEKA & SANTA FE	16500	0	0	0	0	0	0	0	0	16500
WESTERN BUILDING & MINING CO.	515682	1011721	1014555	1014555	1014555	1011721	1014555	607456	0	7204800
COMBINED	532182	1011721	1014555	1014555	1014555	1011721	1014555	607456	0	7221300

$400 PIT

OPERATING COSTS

	1991	1992	1993	1994	1995	1996	1997	1998	1999	TOTAL
CONTRACTOR'S COSTS										
CONTRACT MINING ORE	422440	842520	844880	844880	844880	842520	844880	505866	0	5992866
CONTRACT MINING WASTE	569435	1082541	1085574	1085574	1085574	1082541	1085574	649978	0	7726791
CONTRACT CRUSHING ORE	179000	357000	358000	358000	358000	357000	358000	214350	0	2539350
SUB-TOTAL CONTRACTOR'S COSTS	1170875	2282061	2288454	2288454	2288454	2282061	2288454	1370194	0	16259007
OPERATOR'S COSTS										
SUPER. AND ADMIN.	526300	664800	664800	664800	664800	664800	664800	664800	55400	5235300
OPERATING LABOR	173600	260400	260400	260400	260400	260400	260400	260400	32550	2028950
REPAIR LABOR	104000	156000	156000	156000	156000	156000	156000	156000	19500	1215500
ADDITIONAL LABOR	321560	432480	432480	432480	432480	432480	432480	432480	42980	3391900
FRONT-END LOADER	89500	178500	179000	179000	179000	178500	179000	107175	0	1269675
DOZER	14320	28560	28640	28640	28640	28560	28640	17148	0	203148
SUPPLIES - REAGENTS	247020	492660	494040	494040	494040	492660	494040	295803	0	3504303
SUPPLIES - FLUXES	14320	28560	28640	28640	28640	28560	28640	17148	0	203148
PLANT MAINT. SUPPLIES	46540	92820	93080	93080	93080	92820	93080	55731	0	660231
ELECTRICAL POWER	128880	257040	257760	257760	257760	257040	257760	154332	0	1828332
WATER	21480	42840	42960	42960	42960	42840	42960	25722	0	304722
ROYALTY - ATCHINSON	143220	0	0	0	0	0	0	0	0	143220
ROYALTY - WESTERN ($175,000/YR. MAX.)	50625	175000	100240	100240	50120	49980	50120	30009	0	606334
INSURANCE	300000	300000	300000	300000	300000	300000	300000	300000	300000	2700000
TAX - SEVERANCE	60860	121380	121720	121720	121720	121380	121720	72879	0	863379
TAX - PROPERTY	0	314400	314400	314400	314400	314400	314400	314400	314400	2515200
TAX - SALES	21480	42840	42960	42960	42960	42840	42960	25722	0	304722
OTHER @ 1.9% (OPER.COST)	43010	68177	66825	66825	65873	65802	65873	55665	14532	512583
SUB-TOTAL OPERATOR'S COSTS	2306715	3656457	3583945	3583945	3532873	3529062	3532873	2985414	779362	27490647
GENERAL AND ADMINISTRATIVE @ 6%	138403	219387	215037	215037	211972	211744	211972	179125	46762	1649439
TOTAL OPERATOR'S COSTS	2445118	3875845	3798982	3798982	3744845	3740806	3744845	3164539	826123	29140086

	1991	1992	1993	1994	1995	1996	1997	1998	1999	TOTAL
TOTAL COSTS - PRE-PROD. ($)	827682	0	0	0	0	0	0	0	0	827682
TOTAL COSTS - PRODUCTION ($)	2788311	6157906	6087436	6087436	6033299	6022867	6033299	4534733	0	44571411
TOTAL COSTS - CLOSURE ($)	0	0	0	0	0	0	0	0	826123	826123

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YARNELL

$400 PIT

													1991
OUNCES IN HEAP													
ATCHINSON, TOPEKA & SANTA FE	0	0	0	0	0	0	1671	1671	1671	1671	1671	1670	10025
WESTERN BUILDING & MINING CO.	0	0	0	0	0	0	1528	1625	1432	1625	1432	1433	9075
MAXIMUM RECOVERY	0	0	0	0	0	0	0.72	0.72	0.72	0.72	0.72	0.72	0.72
RECOVERABLE OUNCES IN HEAP													
ATCHINSON, TOPEKA & SANTA FE	0	0	0	0	0	0	1203	1203	1203	1203	1203	1202	7218
WESTERN BUILDING & MINING CO.	0	0	0	0	0	0	1100	1170	1031	1170	1031	1032	6534
RECOVERED OUNCES BY MONTH													
FROM ORE STACKED IN PRIOR YEAR													
JANUARY									0	0	0	0	0
FEBRUARY										0	0	0	0
MARCH											0	0	0
APRIL												0	0
FROM ORE STACKED IN CURRENT YEAR													
JANUARY	0												0
FEBRUARY	0	0											0
MARCH	0	0	0										0
APRIL	0	0	0	0									0
MAY	0	0	0	0	0								0
JUNE		0	0	0	0	0							0
JULY			0	0	0	0	1152						1152
AUGUST				0	0	0	461	1187					1647
SEPTEMBER					0	0	346	475	1117				1937
OCTOBER						0	230	356	447	1187			2220
NOVEMBER							115	237	335	475	1117		2279
DECEMBER								119	223	356	447	1117	2262
									112	237	335	447	1131
										119	223	335	677
											112	223	335
												112	112
TOTAL OUNCES RECOVERED IN 1991													11497

YARNELL

$400 PIT

													1992
OUNCES IN HEAP													
ATCHINSON, TOPEKA & SANTA FE	0	0	0	0	0	0	0	0	0	0	0	0	0
WESTERN BUILDING & MINING CO.	2904	2614	3001	2904	2904	2904	2904	3001	2807	3001	2807	2807	34558
MAXIMUM RECOVERY	0.72	0.72	0.72	0.72	0.72	0.72	0.72	0.72	0.72	0.72	0.72	0.72	0.72
RECOVERABLE OUNCES IN HEAP													
ATCHINSON, TOPEKA & SANTA FE	0	0	0	0	0	0	0	0	0	0	0	0	0
WESTERN BUILDING & MINING CO.	2091	1882	2161	2091	2091	2091	2091	2161	2021	2161	2021	2021	24881
RECOVERED OUNCES BY MONTH													
FROM ORE STACKED IN PRIOR YEAR													
JANUARY									112	237	335	447	1131
FEBRUARY										119	223	335	677
MARCH											112	223	335
APRIL												112	112
FROM ORE STACKED IN CURRENT YEAR													
JANUARY	1045												1045
FEBRUARY	418	941											1359
MARCH	314	376	1080										1770
APRIL	209	282	432	1045									1969
MAY	105	188	324	418	1045								2080
JUNE		94	216	314	418	1045							2087
JULY			108	209	314	418	1045						2094
AUGUST				105	209	314	418	1080					2126
SEPTEMBER					105	209	314	432	1011				2070
OCTOBER						105	209	324	404	1080			2122
NOVEMBER							105	216	303	432	1011		2066
DECEMBER								108	202	324	404	1011	2049
									101	216	303	404	1025
										108	202	303	613
											101	202	303
												101	101
TOTAL OUNCES RECOVERED IN 1992													25094

YARNELL

$400 PIT

													1993
OUNCES IN HEAP													
ATCHINSON, TOPEKA & SANTA FE	0	0	0	0	0	0	0	0	0	0	0	0	0
WESTERN BUILDING & MINING CO.	2904	2710	3001	2904	2904	2904	2904	3001	2807	3001	2807	2807	34654
MAXIMUM RECOVERY	0.72	0.72	0.72	0.72	0.72	0.72	0.72	0.72	0.72	0.72	0.72	0.72	0.72
RECOVERABLE OUNCES IN HEAP													
ATCHINSON, TOPEKA & SANTA FE	0	0	0	0	0	0	0	0	0	0	0	0	0
WESTERN BUILDING & MINING CO.	2091	1951	2161	2091	2091	2091	2091	2161	2021	2161	2021	2021	24951
RECOVERED OUNCES BY MONTH													
FROM ORE STACKED IN PRIOR YEAR													
JANUARY									101	216	303	404	1025
FEBRUARY										108	202	303	613
MARCH											101	202	303
APRIL												101	101
FROM ORE STACKED IN CURRENT YEAR													
JANUARY	1045												1045
FEBRUARY	418	976											1394
MARCH	314	390	1080										1784
APRIL	209	293	432	1045									1979
MAY	105	195	324	418	1045								2087
JUNE		98	216	314	418	1045							2091
JULY			108	209	314	418	1045						2094
AUGUST				105	209	314	418	1080					2126
SEPTEMBER					105	209	314	432	1011				2070
OCTOBER						105	209	324	404	1080			2122
NOVEMBER							105	216	303	432	1011		2066
DECEMBER								108	202	324	404	1011	2049
									101	216	303	404	1025
										108	202	303	613
											101	202	303
												101	101
TOTAL OUNCES RECOVERED IN 1993													24951

YARNELL

$400 PIT

													1994
OUNCES IN HEAP													
ATCHINSON, TOPEKA & SANTA FE	0	0	0	0	0	0	0	0	0	0	0	0	0
WESTERN BUILDING & MINING CO.	2904	2710	3001	2904	2904	2904	2904	3001	2807	3001	2807	2807	34654
MAXIMUM RECOVERY	0.72	0.72	0.72	0.72	0.72	0.72	0.72	0.72	0.72	0.72	0.72	0.72	0.72
RECOVERABLE OUNCES IN HEAP													
ATCHINSON, TOPEKA & SANTA FE	0	0	0	0	0	0	0	0	0	0	0	0	0
WESTERN BUILDING & MINING CO.	2091	1951	2161	2091	2091	2091	2091	2161	2021	2161	2021	2021	24951
RECOVERED OUNCES BY MONTH													
FROM ORE STACKED IN PRIOR YEAR													
JANUARY									101	216	303	404	1025
FEBRUARY										108	202	303	613
MARCH											101	202	303
APRIL												101	101
FROM ORE STACKED IN CURRENT YEAR													
JANUARY	1045												1045
FEBRUARY	418	976											1394
MARCH	314	390	1080										1784
APRIL	209	293	432	1045									1979
MAY	105	195	324	418	1045								2087
JUNE		98	216	314	418	1045							2091
JULY			108	209	314	418	1045						2094
AUGUST				105	209	314	418	1080					2126
SEPTEMBER					105	209	314	432	1011				2070
OCTOBER						105	209	324	404	1080			2122
NOVEMBER							105	216	303	432	1011		2066
DECEMBER								108	202	324	404	1011	2049
									101	216	303	404	1025
										108	202	303	613
											101	202	303
												101	101
TOTAL OUNCES RECOVERED IN 1994													24951

YARNELL

$400 PIT

													1995
OUNCES IN HEAP													
ATCHINSON, TOPEKA & SANTA FE	0	0	0	0	0	0	0	0	0	0	0	0	0
WESTERN BUILDING & MINING CO.	2904	2710	3001	2904	2904	2904	2904	3001	2807	3001	2807	2807	34654
MAXIMUM RECOVERY	0.72	0.72	0.72	0.72	0.72	0.72	0.72	0.72	0.72	0.72	0.72	0.72	0.72
RECOVERABLE OUNCES IN HEAP													
ATCHINSON, TOPEKA & SANTA FE	0	0	0	0	0	0	0	0	0	0	0	0	0
WESTERN BUILDING & MINING CO.	2091	1951	2161	2091	2091	2091	2091	2161	2021	2161	2021	2021	24951
RECOVERED OUNCES BY MONTH													
FROM ORE STACKED IN PRIOR YEAR													
JANUARY									101	216	303	404	1025
FEBRUARY										108	202	303	613
MARCH											101	202	303
APRIL												101	101
FROM ORE STACKED IN CURRENT YEAR													
JANUARY	1045												1045
FEBRUARY	418	976											1394
MARCH	314	390	1080										1784
APRIL	209	293	432	1045									1979
MAY	105	195	324	418	1045								2087
JUNE		98	216	314	418	1045							2091
JULY			108	209	314	418	1045						2094
AUGUST				105	209	314	418	1080					2126
SEPTEMBER					105	209	314	432	1011				2070
OCTOBER						105	209	324	404	1080			2122
NOVEMBER							105	216	303	432	1011		2066
DECEMBER								108	202	324	404	1011	2049
									101	216	303	404	1025
										108	202	303	613
											101	202	303
												101	101
TOTAL OUNCES RECOVERED IN 1995													24951

YARNELL

$400 PIT

													1996
OUNCES IN HEAP													
ATCHINSON, TOPEKA & SANTA FE	0	0	0	0	0	0	0	0	0	0	0	0	0
WESTERN BUILDING & MINING CO.	2904	2614	3001	2904	2904	2904	2904	3001	2807	3001	2807	2807	34558
MAXIMUM RECOVERY	0.72	0.72	0.72	0.72	0.72	0.72	0.72	0.72	0.72	0.72	0.72	0.72	0.72
RECOVERABLE OUNCES IN HEAP													
ATCHINSON, TOPEKA & SANTA FE	0	0	0	0	0	0	0	0	0	0	0	0	0
WESTERN BUILDING & MINING CO.	2091	1882	2161	2091	2091	2091	2091	2161	2021	2161	2021	2021	24881
RECOVERED OUNCES BY MONTH													
FROM ORE STACKED IN PRIOR YEAR													
JANUARY									101	216	303	404	1025
FEBRUARY										108	202	303	613
MARCH											101	202	303
APRIL												101	101
FROM ORE STACKED IN CURRENT YEAR													
JANUARY	1045												1045
FEBRUARY	418	941											1359
MARCH	314	376	1080										1770
APRIL	209	282	432	1045									1969
MAY	105	188	324	418	1045								2080
JUNE		94	216	314	418	1045							2087
JULY			108	209	314	418	1045						2094
AUGUST				105	209	314	418	1080					2126
SEPTEMBER					105	209	314	432	1011				2070
OCTOBER						105	209	324	404	1080			2122
NOVEMBER							105	216	303	432	1011		2066
DECEMBER								108	202	324	404	1011	2049
									101	216	303	404	1025
										108	202	303	613
											101	202	303
												101	101
TOTAL OUNCES RECOVERED IN 1996													24881

YARNELL

$400 PIT

													1997
OUNCES IN HEAP													
ATCHINSON, TOPEKA & SANTA FE	0	0	0	0	0	0	0	0	0	0	0	0	0
WESTERN BUILDING & MINING CO.	2904	2710	3001	2904	2904	2904	2904	3001	2807	3001	2807	2807	34654
MAXIMUM RECOVERY	0.72	0.72	0.72	0.72	0.72	0.72	0.72	0.72	0.72	0.72	0.72	0.72	0.72
RECOVERABLE OUNCES IN HEAP													
ATCHINSON, TOPEKA & SANTA FE	0	0	0	0	0	0	0	0	0	0	0	0	0
WESTERN BUILDING & MINING CO.	2091	1951	2161	2091	2091	2091	2091	2161	2021	2161	2021	2021	24951
RECOVERED OUNCES BY MONTH													
FROM ORE STACKED IN PRIOR YEAR													
JANUARY									101	216	303	404	1025
FEBRUARY										108	202	303	613
MARCH											101	202	303
APRIL												101	101
FROM ORE STACKED IN CURRENT YEAR													
JANUARY	1045												1045
FEBRUARY	418	976											1394
MARCH	314	390	1080										1784
APRIL	209	293	432	1045									1979
MAY	105	195	324	418	1045								2087
JUNE		98	216	314	418	1045							2091
JULY			108	209	314	418	1045						2094
AUGUST				105	209	314	418	1080					2126
SEPTEMBER					105	209	314	432	1011				2070
OCTOBER						105	209	324	404	1080			2122
NOVEMBER							105	216	303	432	1011		2066
DECEMBER								108	202	324	404	1011	2049
									101	216	303	404	1025
										108	202	303	613
											101	202	303
												101	101
TOTAL OUNCES RECOVERED IN 1997													24951

YARNELL

$400 PIT													1998
OUNCES IN HEAP													
ATCHINSON, TOPEKA & SANTA FE	0	0	0	0	0	0	0	0	0	0	0	0	0
WESTERN BUILDING & MINING CO.	2904	2710	3001	2904	2904	2904	2904	518	0	0	0	0	20749
MAXIMUM RECOVERY	0.72	0.72	0.72	0.72	0.72	0.72	0.72	0.72	0.72	0.72	0.72	0.72	0.72
RECOVERABLE OUNCES IN HEAP													
ATCHINSON, TOPEKA & SANTA FE	0	0	0	0	0	0	0	0	0	0	0	0	0
WESTERN BUILDING & MINING CO.	2091	1951	2161	2091	2091	2091	2091	373	0	0	0	0	14939
RECOVERED OUNCES BY MONTH													
FROM ORE STACKED IN PRIOR YEAR													
JANUARY									101	216	303	404	1025
FEBRUARY										108	202	303	613
MARCH											101	202	303
APRIL												101	101
FROM ORE STACKED IN CURRENT YEAR													
JANUARY	1045												1045
FEBRUARY	418	976											1394
MARCH	314	390	1080										1784
APRIL	209	293	432	1045									1979
MAY	105	195	324	418	1045								2087
JUNE		98	216	314	418	1045							2091
JULY			108	209	314	418	1045						2094
AUGUST				105	209	314	418	186					1232
SEPTEMBER					105	209	314	75	0				702
OCTOBER						105	209	56	0	0			370
NOVEMBER							105	37	0	0	0		142
DECEMBER								19	0	0	0	0	19
									0	0	0	0	0
										0	0	0	0
											0	0	0
												0	0
TOTAL OUNCES RECOVERED IN 1998													16981

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EXPLORATION, CAPITAL, AND DEVELOPMENT EXPENDITURES ($'000'S)

YARNELL

$400 ECONOMIC PIT DESIGN

	1989-1990 ASARCO	1990 J/V	1991 J/V	1992 J/V	1993 J/V	1994 J/V	1995 J/V	1996 J/V	1997 J/V	1998 J/V	1999 J/V	SUB-TOTAL 1989 - 1990 ASARCO	SUB-TOTAL 1990-1999 J/V	GRAND TOTAL 1989 - 1999 ASARCO & J/V
EXPLORATION														
OPTION AND LAND PAYMENTS	217	32	137	150	210	100	0	0	0	0	0	217	629	846
DRILLING, METALLURGICAL, MISC.	807	0	0	0	0	0	0	0	0	0	0	807	0	807
TOTAL	1024	32	137	150	210	100	0	0	0	0	0	1024	629	1653
CAPITAL AND DEVELOPMENT														
PURCHASE NEARBY HOME	0	200	0	0	0	0	0	0	0	0	0	0	200	200
CONDEMNATION DRILLING	0	100	0	0	0	0	0	0	0	0	0	0	100	100
FINAL METALLURGICAL TESTING	0	50	0	0	0	0	0	0	0	0	0	0	50	50
HYDROGEOLOGIC TESTING	0	300	0	0	0	0	0	0	0	0	0	0	300	300
ENVIRONMENTAL ASSESSMENT	0	200	0	0	0	0	0	0	0	0	0	0	200	200
PERMITTING	0	100	0	0	0	0	0	0	0	0	0	0	100	100
MICROWAVE RELOCATIONS	0	450	0	0	0	0	0	0	0	0	0	0	450	450
WATER SUPPLY	0	0	500 ?	0	0	0	0	0	0	0	0	0	500	500
MONITOR WELL EQUIP.	0	0	50	0	0	0	0	0	0	0	0	0	50	50
TRUCK SHOP FACILITY	0	0	0	0	0	0	0	0	0	0	0	0	0	0
MINE/CRUSH CONTRACTOR MOB.	0	0	150	0	0	0	0	0	0	0	0	0	150	150
SITE PREP., SERVICES, DISTRIBUTION	0	500	1085	0	0	0	0	0	0	0	0	0	1585	1585
PRIMARY CRUSHING FACILITY	0	0	0	0	0	0	0	0	0	0	0	0	0	0
SECONDARY CRUSHING FACILITY	0	0	1193	0	0	0	0	0	0	0	0	0	1193	1193
CONVEYING/STACKING SYSTEM	0	0	581	0	0	0	0	0	0	0	0	0	581	581
ADSORPTION, DESORPTION, REFINING	0	0	1440	0	0	0	0	0	0	0	0	0	1440	1440
HEAP PAD	0	0	1061	0	0	0	0	0	0	0	0	0	1061	1061
PONDS AND SOLUTION DIST.	0	0	558	0	0	0	0	0	0	0	0	0	558	558
ANCILLARY FACILITIES & MOB. EQUIP.	0	0	1135	0	0	0	0	0	0	0	0	0	1135	1135
CONSTRUCTION OVERHEAD & GEN. IND.	0	654	654	0	0	0	0	0	0	0	0	0	1308	1308
SUB-TOTAL	0	2554	8407	0	0	0	0	0	0	0	0	0	10961	10961
CONTINGENCY @ 10%	0	255	841	0	0	0	0	0	0	0	0	0	1096	1096
TOTAL	0	2809	9248	0	0	0	0	0	0	0	0	0	12057	12057
DELAYED/ONGOING CAPITAL EXPENDITURES														
LEACH PAD EXPANSION	0	0	0	0	1214	0	0	0	0	0	0	0	1214	1214
CONVEYOR & SOLUTION DIST. EXTENSION	0	0	0	0	443	0	0	0	0	0	0	0	443	443
YARNELL CREEK ROAD RELOCATION	0	0	0	0	0	45	0	0	0	0	0	0	45	45
CARBON REGENERATION KILN	0	0	0	0	169	0	0	0	0	0	0	0	169	169
SUB-TOTAL	0	0	0	0	1826	45	0	0	0	0	0	0	1871	1871
CONTINGENCY @ 10%	0	0	0	0	183	5	0	0	0	0	0	0	187	187
TOTAL	0	0	0	0	2009	50	0	0	0	0	0	0	2058	2058
MINE CLOSURE COSTS														
MINE/CRUSH CONTRACTOR DEMOB.	0	0	0	0	0	0	0	0	0	150	0	0	150	150
HEAP & POND NEUTRALIZATION	0	0	0	0	0	0	0	0	0	0	50	0	50	50
HEAP CAPPING	0	0	0	0	0	0	0	0	0	0	250	0	250	250
PIT FENCING	0	0	0	0	0	0	0	0	0	0	20	0	20	20
SUB-TOTAL	0	0	0	0	0	0	0	0	0	150	320	0	470	470
CONTINGENCY @ 10%	0	0	0	0	0	0	0	0	0	15	32	0	47	47
TOTAL	0	0	0	0	0	0	0	0	0	165	352	0	517	517
GRAND TOTAL	$1,024	$2,841	$9,385	$150	$2,219	$150	$0	$0	$0	$165	$352	$1,024	$15,261	$16,285

SUMMARY OF PLANT AND PROCESS FACILITIES CAPITAL COSTS ($'000'S)

	INITIAL PIT DESIGN (4260 TONS)			$400 ECONOMIC PIT DESIGN (5079 TONS)		
	INITIAL	ONGOING	COMBINED	INITIAL	ONGOING	COMBINED
SITE PREP, UTILITIES SERVICE, DISTRIBUTION, ETC.	1585	45	1630	1585	45	1630
TRUCK SHOP FACILITY (BY CONTRACTOR)	0	0	0	0	0	0
PRIMARY CRUSHING FACILITY (BY CONTRACTOR)	0	0	0	0	0	0
SECONDARY CRUSHING FACILITY	1193	0	1193	1193	0	1193
CONVEYING / STACKING SYSTEM	581	418	999	581	610	1191
ADSORPTION / DESORPTION / REFINING PLANT	1440	0	1440	1440	0	1440
CARBON REGENERATION KILN	0	169	169	0	169	169
HEAP LEACH PAD	1061	1214	2275	1061	1214	2275
LEACH PONDS AND SOLUTION DISTRIBUTION	558	25	583	558	137	695
ANCILLARY BLDGS., MOBILE EQUIP., SUPPLIES, ETC.	1135	0	1135	1135	0	1135
SUB-TOTAL	7553	1871	9424	7553	2175	9728
SPARE PARTS, STARTUP SUPPLIES	125	0	125	125	0	125
CONSTRUCTION INDIRECTS (@ 5%)	378	94	471	378	109	486
E.P.C.M. (@ 10%)	806	196	1002	806	228	1034
SUB-TOTAL CONST. OVERHEAD & GEN. IND.	1308	290	1598	1308	337	1645
TOTAL (EXCL. CONTINGENCY)	**$8,861**	**$2,161**	**$11,022**	**$8,861**	**$2,512**	**$11,373**

PAD, CONVEYOR, POND AND SOLUTION DISTRIBUTION INITIAL AND ONGOING CAPITAL COSTS

INITIAL PIT DESIGN

4260 TONS

	HEAP PAD	CONVEYORS	PONDS AND SOLUTION DIST.
INITIAL CAPITAL ($'000'S)	1061	581	558
ONGOING CAPITAL ($'000'S)	1214	418	25
TOTAL ($'000'S)	2275	999	583

$400 ECONOMIC PIT DESIGN

5079 TONS

	HEAP PAD	CONVEYORS	PONDS AND SOLUTION DIST.
INITIAL CAPITAL ($'000'S)	1061	581	558
ONGOING CAPITAL ($'000'S)	1214 *	610	137
TOTAL ($'000'S)	2275	1191	695

* NOTE:

PER D. KIVARI (KILBORN), THE HEAP PAD DESIGNED FOR THE THE INITIAL PIT DESIGN WILL ACCOMIDATE THE ADDITIONAL TONNAGE CONTATNED IN THE $400 ECONOMIC PIT DESIGN. CONVEYORS AND THE SOLUTION DISTRIBUTION SYSTEM INCREASE PROPORTIONALLY TO TONNAGE.

8.0 CAPITAL COST ESTIMATE

8.1 BASIS OF ESTIMATE

8.1.1 Scope

The scope of the estimate is based on the project description and drawings included in this report plus information from similar projects. The main estimate excludes the contractor's facilities and equipment, although a separate estimate of the primary crushing circuit is provided at the end of this section.

8.1.2 Material Quantities

Quantities were developed wherever possible from the drawings available and supplemented by historic data which was adjusted where necessary for site specific conditions.

8.2 PRICING

8.2.1 General

The estimate is based on fourth quarter 1989 price levels, excluding escalation, and is expressed in US dollars. Freight, taxes, and import duties on equipment are included as required.

8.2.2 Process Equipment

All equipment has been assumed to be purchased new. The prices were obtained from Kilborn's in-house cost data for similar equipment.

8.2.3 Bulk Materials

Bulk materials were considered to be purchased new, their prices being based on costs from recently completed projects with adjustments for this location.

8.2.4 Construction Labor

The estimate assumes a standard work week of 40 hours. The average construction labor rate was based on current non-union rates of pay in Arizona. Basic rates and fringe benefits used are those described in Table 8.2.4-I overleaf.

Table 8.2.4.-1

Construction Labor Rate

			US $
Base rate for average crew			13.40
Payroll deductions:			
- Federal FICA	7.51%	= $1.01	
- Federal and state unemployment	5.30%	= $0.71	
- Vacation pay (average)	8.00%	= $1.07	
- State workers' compensation insurance	12.10%	= $1.62	
- Liability and payroll insurance (average rate)	4.00%	= $0.54	
	36.91%	$4.95	4.95
Benefit package (average cost) Includes pension, medical & dental			2.00
Subsistence			
@ $25.00 per day			3.13
Small tools & consumable supplies			
@ 10.00% of base rate			1.34
Contractor supervision & overhead			
@ 15.00% of base rate			2.01
Contractor profit			
@ 10.00% of all above costs			2.68
Subtotal			29.51
Allowance for incidental overtime			
@ 5.00% of subtotal			1.48
Total			30.99
For Estimate Use			31.00

8.2.5 Construction Indirect Costs

Construction indirects have been developed based on the construction plan for this project.

8.3 ACCURACY

The estimate, being developed at the pre-feasibility level, is based on preliminary concepts and layouts, not design drawings. Therefore, the cost of all segments of the proposed work must be re-examined after the designs have been further developed. At this stage of project development, the accuracy of the estimate is considered to be within ±30% at the summary level.

The estimate is predicated on a normal continuous progression for design engineering, procurement, construction and start-up. No allowances have been made for any breaks or delays in the project or for an accelerated schedule.

8.4 EXCLUSIONS

Specific exclusions from the main estimate are:

- Mining equipment and facilities;
- Primary crushing facilities and coarse ore conveyor;
- Truckshop/dry, except that the estimate does include the site preparation for it, plus water and power supplies, and sewage disposal;

- Facilities for future production rate expansion;

- Standby equipment, except as indicated in the equipment list;

- Spare parts beyond commissioning spares;

- Cost to-date for studies, testwork, investigations, and consultants' fees;

- Permit application fees;

- Environmental impact studies and environmental monitoring;

- Legal and accounting costs;

- Working capital;

- Owners' administration expenses;

- Cost of financing and interest during construction.

8.5 INITIAL CAPITAL COST ESTIMATE DETAILS

A summary of the estimate of the initial capital cost estimate for Asarco's facilities is presented overleaf, followed by the details arranged by area.

Kilborn Engineering (B.C.) Ltd
1380 Burrard Street
Vancouver, B.C.

ASARCO INCORPORATED
YARNELL PROJECT - 8210-15
PRE-FEASIBILITY CAPITAL COST ESTIMATE
AREA SUMMARY REPORT

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AREA	ITEM	DESCRIPTION	TOTAL MANHOURS	LABOUR COST	MATERIAL COST	SUBCONTRACT COST	TOTAL COST
YARD AND SERVICES							
110		SITE PREPARATION	5,199	161,169	151,125	0	312,294
120		ROADS AND PARKING	760	23,575	36,450	0	60,025
130		FENCING - PLANTSITE	900	27,900	40,000	0	67,900
~~140~~		~~FRESH WATER SUPPLY~~	~~0~~	~~0~~	~~0~~	~~88,000~~	~~88,000~~
145		PLANT POTABLE WATER STORAGE AND DISTRIBUTION	885	27,435	38,125	0	65,560
150		MINE ROAD WATER TANK	324	10,044	23,400	0	33,444
155		FIRE WATER DISTRIBUTION	2,638	81,762	119,106	0	200,868
160		SEWAGE DISPOSAL	545	16,895	40,000	0	56,895
170		ELECTRICAL POWER SUPPLY AND SUBSTATION	637	19,747	208,535	203,636	431,918
175		ELECTRICAL POWER DISTRIBUTION	1,114	34,489	198,525	59,000	292,009
180		YARD LIGHTING	150	4,650	8,000	0	12,650
185		TELEPHONE AND COMMUNICATIONS	0	0	0	51,000	51,000
190		RELOCATION OF MICROWAVE TOWERS (BY ASARCO)	0	0	0	0	0
		SUB - TOTAL	~~13,152~~	~~407,666~~	~~863,266~~	~~401,636~~	~~1,672,563~~ 1,534,563
PRIMARY CRUSHING - IN SEPARATE ESTIMATE							
220		PRIMARY CRUSHING RETAINING WALL - IN SEPARATE ESTIMATE	0	0	0	0	0
230		PRIMARY CRUSHING - IN SEPARATE ESTIMATE	0	0	0	0	0
240		CONVEYING TO STOCKPILE - IN SEPARATE ESTIMATE	0	0	0	0	0
		SUB - TOTAL	0	0	0	0	0
FINE ORE CRUSHING AND HANDLING							
310		FINE ORE CRUSHING & SCREENING STRUCTURE	124	3,844	4,180	36,000	44,024
320		FINE ORE CRUSHING & SCREENING EQUIPMENT AND SERVICES	4,560	141,352	917,775	0	1,059,129
330		CEMENT FEED SYSTEM	310	9,610	80,500	0	90,110

LISTED AS SEPARATE LINE ITEM

Kilborn Engineering (B.C.) Ltd
1380 Burrard Street
Vancouver, B.C.

ASARCO INCORPORATED
YARNELL PROJECT - 8210-15
PRE-FEASIBILITY CAPITAL COST ESTIMATE
AREA SUMMARY REPORT

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AREA	ITEM	DESCRIPTION	TOTAL MANHOURS	LABOUR COST	MATERIAL COST	SUBCONTRACT COST	TOTAL COST	
340		CONVEYORS TO LEACH PAD	~~0~~	~~0~~	~~0~~	~~580,800~~	~~580,800~~	
		SUB - TOTAL	~~4,994~~	~~154,806~~	~~1,002,455~~	~~616,800~~	~~1,774,063~~	
							SEE DETAIL ON FOLLOWING PAGE	
ADR PLANT								
410		REFINERY BUILDING	90	2,790	11,000	393,045	406,835	
430		ADR PROCESS	3,914	121,334	756,650	155,000	1,032,984	
		SUB - TOTAL	4,004	124,124	767,650	548,045	1,439,819	
LEACHING								
510		LEACH SOLUTION DISTRIBUTION SYSTEM	580	17,980	129,700	0	147,680	SEE DETAIL ON FOLLOWING PAGE
520		LEACH PAD	~~0~~	~~0~~	~~0~~	~~1,060,800~~	~~1,060,800~~	
530		PREGNANT AND EMERGENCY PONDS	0	0	0	409,950	409,950	
590		ENVIRONMENTAL MONITORING	0	0	0	0	0	
							557,630	
		SUB - TOTAL	~~580~~	~~17,980~~	~~129,700~~	~~1,470,750~~	~~1,618,430~~	
ANCILLIARY BUILDINGS								
710		TRUCK SHOP AND DRY (INCLUDED IN MINING)	0	0	0	0	0	
720		ADMINISTRATION BUILDING	~~195~~	~~6,045~~	~~10,450~~	~~200,305~~	~~216,800~~ 159,134	REDUCE TRAILERS FROM 6 TO 4
730		TRUCK WASH SUMP - IN SEPARATE ESTIMATE	0	0	0	0	0	
740		TRUCK READY LINE - BY MINING	0	0	0	0	0	
750		FUEL STORAGE AND DISTRIBUTION - BY MINING	0	0	0	0	0	
760		GATEHOUSE	~~3~~	~~93~~	~~90~~	~~16,500~~	~~16,683~~ 12,183	ELIMINATE VEHICLE BARRIER
770		FLAMMABLE STORAGE BUILDING	0	0	0	0	0	
780		LABORATORY	145	4,510	7,925	96,512	108,947	
785		LAB EQUIPMENT	0	0	0	183,373	183,373	
790		WAREHOUSE AND PLANT MAINTENANCE FACILITY	1,047	32,490	46,821	52,000	131,311	
792		SHOP TOOLS AND EQUIPMENT	0	0	0	25,000	25,000	
794		PLANT MOBILE EQUIPMENT	~~0~~	~~0~~	~~319,500~~	~~64,500~~	~~384,000~~ 515,500	980 LOADER D6 DOZER (USED)

Kilborn Engineering (B.C.) Ltd
1380 Burrard Street
Vancouver, B.C.

ASARCO INCORPORATED
YARNELL PROJECT - 8210-15
PRE-FEASIBILITY CAPITAL COST ESTIMATE
AREA SUMMARY REPORT

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AREA	ITEM	DESCRIPTION	TOTAL MANHOURS	LABOUR COST	MATERIAL COST	SUBCONTRACT COST	TOTAL COST	
		SUB - TOTAL	~~1,390~~	~~43,138~~	~~384,786~~	~~638,190~~	~~1,066,114~~ 1,135,448	
CONSTRUCTION OVERHEADS & GENERAL INDIRECTS								7696
810	SPARE PARTS AND STARTUP SUPPLIES		0	0	0	125,000	125,000	
820	CONSTRUCTION INDIRECTS 5%		0	0	0	384,800	384,800	9598
830	E.P.C.M. 10 %		0	0	0	~~831,907~~	831,907	808,100
840	LAND ACQUSITION		0	0	0	0	0	
850	ONWERS COSTS		0	0	0	0	0	
		SUB - TOTAL	~~0~~	~~0~~	~~0~~	~~1,341,707~~	~~1,341,707~~ 1,319,900	
CONTINGENCY								
910	CONTINGENCY		~~0~~	~~0~~	~~0~~	~~715,304~~	~~715,304~~	SEPARATE LINE ITEM
		SUB - TOTAL	~~0~~	~~0~~	~~0~~	~~715,304~~	~~715,304~~	
		PROJECT TOTAL	~~24,120~~	~~747,714~~	~~3,147,857~~	~~5,732,432~~	9,628,000	VARIABLE TOTALS LISTED ON SUMMARY PAGE

AREA	ITEM	DESCRIPTION	QTY	UNIT	LABOUR UNIT MHRS	TOTAL MHRS	LABOUR COST	MATERIAL UNIT COST	MATERIAL COST	SUBCONTRACT UNIT COST	SUBCONTRACT COST	TOTAL COST
SITE PREPARATION												
110	1.00	SURVEY AND LAYOUT	1	SUM	700.000	700	21,700	5,000.00	5,000			26,700
110	2.00	SCARIFICATION & COMPACTION	9	ACRES	55.000	495	15,345	500.00	4,500			19,845
110	3.00	GRUBBING AND STRIPPING OF SITE AREA	9	ACRES	10.000	90	2,790	225.00	2,025			4,815
110	4.00	ROUGH GRADE - COMMON, CUT & FILL (ADR AREA)	50,000	CY	0.040	2,000	62,000	1.50	75,000			137,000
110	4.01	ROUGH GRADE - COMMON, CUT & FILL (TRUCKSHOP AREA)	12,000	CY	0.040	480	14,880	1.50	18,000			32,880
110	4.02	ROUGH GRADE - COMMON, CUT & FILL (PROCESS AND FIRE WATER TANK AREA)	600	CY	0.040	24	744	1.50	900			1,644
110	4.03	ROUGH GRADE - BLASTED ROCK EXCAVATION (ALLOWANCE)	3,000	CY	0.270	810	25,110	5.60	16,800			41,910
110	5.00	STRUCTURAL FILL/IMP.MAT'L	5,000	CY	0.100	500	15,500	5.25	26,250			41,750
110	6.00	DITCHING AND TRENCHING	1,000	CY	0.100	100	3,100	2.65	2,650			5,750
			SITE PREPARATION TOTAL			5,199	161,169		151,125			312,294
ROADS AND PARKING												
120	1.00	RELOCATION OF YARNELL CREEK GRAVEL ROAD (DEFER)										

AREA	ITEM	DESCRIPTION	QTY	UNIT	LABOUR UNIT MHRS	TOTAL MHRS	LABOUR COST	MATERIAL UNIT COST	MATERIAL COST	SUBCONTRACT UNIT COST	SUBCONTRACT COST	TOTAL COST
120	2.00	SIGNS AND BARRICADES	1	SUM	100.000	100	3,100	4,000.00	4,000			7,100
120	3.00	ROAD SURFACING ACCESS ROAD FROM HIGHWAY TO PLANT	1,000	CY	0.150	150	4,650	10.00	10,000			14,650
120	4.00	ROAD CUT & FILL TO PROCESS AND FIRE WATER TANK (CAT TRACK ONLY)	1	SUM	30.000	30	930	3,000.00	3,000			3,930
120	5.00	ROAD SURFACING ROAD TO TRUCK SHOP	170	CY	0.150	25	790	10.00	1,700			2,490
120	6.00	AREA SURFACING (PLANT AREAS) PIT RUN	2,000	CY	0.100	200	6,200	5.00	10,000			16,200
120	6.01	AREA SURFACING (TRUCKSHOP AREA) PIT RUN	550	CY	0.100	55	1,705	5.00	2,750			4,455
120	7.00	CULVERTS AND PIPE DUCTS FOR ROAD CROSSINGS	1	SUM	200.000	200	6,200	5,000.00	5,000			11,200
120	8.00	HAUL ROAD, MINE TO PLANTSITE (BY MINING)										
		ROADS AND PARKING TOTAL				760	23,575		36,450			60,025
FENCING - PLANTSITE												
130	1.00	CATTLE FENCE 50" HIGH C/W 4 STRAND BARBED WIRE AROUND LEACH PAD	4,500	LF	0.080	360	11,160	2.00	9,000			20,160
130	2.00	GATES AND CATTLE CROSSING ALLOWANCE	1	SUM	150.000	150	4,650	5,000.00	5,000			9,650
130	3.00	CHAIN LINK FENCING AROUND SOLUTION PONDS - 8FT HIGH	1,500	LF	0.150	225	6,975	10.00	15,000			21,975

AREA	ITEM	DESCRIPTION	QTY	UNIT	LABOUR UNIT MHRS	TOTAL MHRS	LABOUR COST	MATERIAL UNIT COST	MATERIAL COST	SUBCONTRACT UNIT COST	SUBCONTRACT COST	TOTAL COST
130	4.00	CHAIN LINK FENCING AROUND PLANT ENTRANCES, MILL TRANSFORMERS & MISC. PLANT AREAS - 8 FT HIGH	1,100	LF	0.150	165	5,115	10.00	11,000			16,115
		FENCING - PLANTSITE TOTAL				900	27,900		40,000			67,900
FRESH WATER SUPPLY												
140	1.00	WATER SUPPLY SYSTEM UP TO FRESH/FIREWATER TANK FROM HIGHWAY, 8" DIA PIPE, HDPE 1600	~~5,000~~	~~LF~~						17.60	88,000	88,000
		~~FRESH WATER SUPPLY TOTAL~~									~~88,000~~	~~88,000~~

LISTED AS SEPARATE LINE ITEM ON CAPITAL EXPENDITURES SUMMARY

PLANT POTABLE WATER STORAGE AND DISTRIBUTION												
145	1.00	POTABLE WATER TANK - 10,000 GAL CAPACITY C/W NOZZLES	1	NO	100.000	100	3,100	8,000.00	8,000			11,100
145	2.00	COMPACTED GRANULAR TANK FOUNDATION	10	CY	0.500	5	155	12.50	125			280
145	3.00	WATER TREATMENT SYSTEM INCLUDING HYPOCHLORINATOR	1	NO	30.000	30	930	5,000.00	5,000			5,930
145	4.00	PIPING FOR POTABLE WATER DISTRIBUTION INCLUDING 4INCH PVC PIPE, VALVES, FITTINGS, EXCAVATION, BEDDING AND BACKFILL	5,000	LF	0.150	750	23,250	5.00	25,000			48,250
		PLANT POTABLE WATER STORAGE AND DISTRIBUTION TOTAL				885	27,435		38,125			65,560

AREA	ITEM	DESCRIPTION	QTY	UNIT	LABOUR UNIT MHRS	TOTAL MHRS	LABOUR COST	MATERIAL UNIT COST	MATERIAL COST	SUBCONTRACT UNIT COST	SUBCONTRACT COST	TOTAL COST
MINE ROAD WATER TANK												
150	1.00	MINE ROAD WATER TANK 50,000 GAL CAPACITY	12	TON	27.000	324	10,044	1,950.00	23,400			33,444
		MINE ROAD WATER TANK TOTAL				324	10,044		23,400			33,444
FIRE WATER DISTRIBUTION												
155	1.00	FIRE AND PROCESS WATER STORAGE TANK - 165,000 GAL CAPACITY	34	TON	27.000	909	28,171	1,950.00	65,631			93,802
155	2.00	COMPACTED GRANULAR TANK FOUNDATION	50	CY	0.500	25	775	15.00	750			1,525
155	3.00	PIPING FOR FIRE WATER DISTRIBUTION INCLUDING 8INCH DIA HDPE SERIES 100 PIPE, TRENCHING, BEDDING AND BACKFILL	4,100	LF	0.300	1,230	38,130	8.00	32,800			70,930
155	4.00	PIPING FOR FIRE WATER DISTRIBUTION INCLUDING 6INCH DIA HDPE PIPE, TRENCHING, BEDDING AND BACKFILL	975	LF	0.250	244	7,556	7.00	6,825			14,381
155	5.00	PIPING FOR FIRE WATER DISTRIBUTION INCLUDING 4INCH HDPE PIPE, TRENCHING, BEDDING AND BACKFILL	600	LF	0.250	150	4,650	6.00	3,600			8,250
155	6.00	FIRE HYDRANTS INCLUDING VALVES	2	NO	20.000	40	1,240	1,500.00	3,000			4,240
155	7.00	INSTRUMENTATION -LEVEL MONITORING SYSTEM	1	SUM	40.000	40	1,240	6,500.00	6,500			7,740

AREA	ITEM	DESCRIPTION	QTY	UNIT	LABOUR UNIT MHRS	TOTAL MHRS	LABOUR COST	MATERIAL UNIT COST	MATERIAL COST	SUBCONTRACT UNIT COST	SUBCONTRACT COST	TOTAL COST
		FIRE WATER DISTRIBUTION TOTAL				2,638	81,762		119,106			200,868
SEWAGE DISPOSAL												
160	1.00	EXCAVATION AND BACKFILL FOR SANITARY SEPTIC TANK	1	SUM	40.000	40	1,240	1,000.00	1,000			2,240
160	2.00	SEWAGE SEPTIC TANK -PRECAST CONCRETE	2	NO	20.000	40	1,240	5,000.00	10,000			11,240
160	3.00	PIPING FOR SANITARY SEWER COLLECTION INCLUDING 6INCH PIPE, TRENCHING, BEDDING AND BACKFILL	900	LF	0.250	225	6,975	8.00	7,200			14,175
160	4.00	MANHOLES -36INCH DIA CONCRETE C/W BASE, COVER AND LADDER	4	NO	15.000	60	1,860	1,200.00	4,800			6,660
160	5.00	SEWAGE DISPOSAL TILE FIELD C/W 4" PERFORATED PIPE AND GRANULAR MATERIAL	2	NO	90.000	180	5,580	8,500.00	17,000			22,580
		SEWAGE DISPOSAL TOTAL				545	16,895		40,000			56,895
ELECTRICAL POWER SUPPLY AND SUBSTATION												
170	1.00	HIGH VOLTAGE OVERHEAD LINE FROM YARNELL SUBSTATION	2	MILE						80,000.00	160,000	160,000
170	1.01	ANY WORK REQUIRED ON YARNELL SUBSTATION WILL BE DONE BY POWER AUTHORITY										
170	2.00	MAIN SUBSTATION :=										

AREA	ITEM	DESCRIPTION	QTY	UNIT	LABOUR UNIT MHRS	TOTAL MHRS	LABOUR COST	MATERIAL UNIT COST	MATERIAL COST	SUBCONTRACT UNIT COST	SUBCONTRACT COST	TOTAL COST
170	2.01	INCOMING OVERHEAD LINE STRUCTURE C/W LIGHTNING ARRESTORS & ISOLATING SWITCHES	1	SUM	300.000	300	9,300	32,000.00	32,000			41,300
170	2.02	1200A 72.5 KV CIRCUIT BREAKER C/W STAND (ASSUME UTILITY O/H LINE IS 69 KV)	1	SUM	160.000	160	4,960	41,000.00	41,000			45,960
170	2.03	METERING PACKAGE (SUPPLIED BY UTILITY)	1	SUM	40.000	40	1,240					1,240
170	2.04	2.5 MVA HV-4.16KV 3 PHASE OIL FILLED TRANSFORMER C/W GROUNDING RESISTOR	1	SUM	50.000	50	1,550	35,000.00	35,000			36,550
170	2.05	3C - 500 MCM 5 KV TYPE MC CABLE	50	LF	0.140	7	217	10.70	535			752
170	2.06	5KV METAL CLAD SWITCHGEAR LINE-UP INCLUDING 1-1200A MAIN C.B., 3-1200A FEEDER C.B., 1-TFMR GD RESISTOR, 1-120V D.C. BATTERY & CHARGER	1	SUM	80.000	80	2,480	100,000.00	100,000			102,480
170	2.07	25'0L X 20'0W X 15'0 H (INTERNAL DIMENSIONS) BLOCK WALL, CONCRETE ROOF SUBSTATION, SWITCHGEAR AND CONTROL BUILDING C/W EQPT AND MANDOOR	500	SF						55.00	27,500	27,500
170	2.08	MISC CONCRETE FLOORINGS FOR SWITCHGEAR, CIRCUIT BREAKERS, METERING PACKAGE, TFMR, ETC	1	SUM						9,500.00	9,500	9,500
170	2.09	GRADE, COMPACT, PROVIDE 12" CRUSHED STONE SURFACE FOR SUB STATION AREA 35'0 X 60'0	80	CY						14.20	1,136	1,136
170	2.10	8'0 HIGH CHAINLINK FENCE AROUND SUBSTATION	1	SUM						2,500.00	2,500	2,500
170	2.11	GROUNDING METERING FOR SUBSTATION	1	SUM						3,000.00	3,000	3,000

AREA	ITEM	DESCRIPTION	QTY	UNIT	LABOUR UNIT MHRS	TOTAL MHRS	LABOUR COST	MATERIAL UNIT COST	MATERIAL COST	SUBCONTRACT UNIT COST	SUBCONTRACT COST	TOTAL COST
		ELECTRICAL POWER SUPPLY AND SUBSTATION TOTAL				637	19,747		208,535		203,636	431,918
ELECTRICAL POWER DISTRIBUTION												
175	1.00	DISTRIBUTION TO TRUCKSHOP :=										
175	1.01	3C - #2 AWG 5KV TYPE MC CABLE	100	LF	0.070	7	217	4.00	400			617
175	1.02	4.16 KV O/H LINE	4,250	LF						8.00	34,000	34,000
175	1.03	5KV FUSED CUT OUT	6	NO	10.000	60	1,860	300.00	1,800			3,660
175	1.04	5KV LIGHTNING ARRESTOR	9	NO	10.000	90	2,790	200.00	1,800			4,590
175	1.05	167KVA 4.16KV - 277V OIL FILLED SINGLE PHASE POLE MOUNTED TRANSFORMER	3	NO	30.000	90	2,790	3,500.00	10,500			13,290
175	1.06	3C - 500 MCM 600V TYPE MC CABLE (2 RUNS - TRANSFORMER)	300	LF	0.120	36	1,116			9.00	2,700	3,816
175	1.07	50KVA 4.16KV - 277V OIL FILLED SINGLE PHASE POLE MOUNTED TRANSFORMER	3	NO	15.000	45	1,395	1,750.00	5,250			6,645
175	1.08	3C - 3/0 AWG 600V TYPE MC CABLE (2 RUNS - TRANSFORMER)	150	LF	0.070	11	326	5.10	765			1,090
175	1.09	INCOMING ARRANGEMENTS 480V PANELS	2	NO	15.000	30	930	2,000.00	4,000			4,930
175	2.00	DISTRIBUTION TO CRUSHING :=										

AREA	ITEM	DESCRIPTION	QTY	UNIT	LABOUR UNIT MHRS	TOTAL MHRS	LABOUR COST	MATERIAL UNIT COST	MATERIAL COST	SUBCONTRACT UNIT COST	SUBCONTRACT COST	TOTAL COST
175	2.01	3C - 2/0 AWG 5 KV TYPE MC CABLE	300	LF	0.090	27	837	5.60	1,680			2,517
175	2.02	TRENCHING	250	LF						4.00	1,000	1,000
175	2.03	5KV METAL ENCLOSED SWITCHGEAR LINE-UP INCLUDING 1-MAIN C.B., 2 - CLASS E2 FUSED CONTACTORS	1	NO	50.000	50	1,550	50,000.00	50,000			51,550
175	2.04	3C - #2 AWG 5KV TYPE MC CABLE (PRIMARY CRUSHER FDR)	1,500	LF	0.070	105	3,255	4.00	6,000			9,255
175	2.05	TRENCHING	100	LF						4.00	400	400
175	2.06	4.16KV O/H LINE	250	LF						8.00	2,000	2,000
175	2.07	5 KV CUT OUT	3	NO	10.000	30	930	250.00	750			1,680
175	2.08	5 KV LIGHTNING ARRESTOR	6	NO	10.000	60	1,860	200.00	1,200			3,060
175	2.09	100 KVA OIL - FILLED SINGLE PHASE POLE MOUNTED TRANSFORMER	3	NO	17.000	51	1,581	2,300.00	6,900			8,481
175	2.10	3C - 3/0 AWG 600 V TYPE MC CABLE (2 RUNS PRIMARY CRUSHER)	150	LF	0.070	11	326	5.10	765			1,090
175	2.11	450V PANEL - INCOMING ARRANGEMENTS	1	NO	15.000	15	465	2,000.00	2,000			2,465
175	2.12	3C #2 AWG 5KV TYPE MC CABLE	50	LF	0.070	4	109	4.00	200			308
175	2.13	500 KV INDOOR DRY TYPE 3 PHASE TRANSFORMER	1	NO	15.000	15	465	12,000.00	12,000			12,465
175	2.14	1C - 4/0 AWG 600 V TYPE MC CABLE	500	LF	0.040	20	620	4.50	2,250			2,870

AREA	ITEM	DESCRIPTION	QTY	UNIT	LABOUR UNIT MHRS	TOTAL MHRS	LABOUR COST	MATERIAL UNIT COST	MATERIAL COST	SUBCONTRACT UNIT COST	SUBCONTRACT COST	TOTAL COST
175	2.15	450V MCC INCOMING ARRANGEMENT	1	NO	20.000	20	620	3,000.00	3,000			3,620
175	3.00	DISTRIBUTION TO ADR PLANT AND SOLUTION PUMPS :=										
175	3.01	3C - 2/0 AWG 5 KV TYPE MC CABLE	250	LF	0.090	22	697	5.60	1,400			2,097
175	3.02	5 KV METAL ENCLOSED SWITCHGEAR LINE-UP INCLUDING 1-MAIN L.B. SWITCH, 2- CLASS E2 FUSED CONTACTS	1	NO	50.000	50	1,550	50,000.00	50,000			51,550
175	3.03	3C - 1/0 AWG 5 KV TYPE MC CABLE	50	LF	0.090	4	139	4.50	225			364
175	3.04	1000KVA 4.16 KV - 480 V INDOOR DRY TYPE 3 PHASE TRANSFORMER	1	NO	36.000	36	1,116	18,000.00	18,000			19,116
175	3.05	1C - 300 MCM 600V TYPE MC CABLE	500	LF	0.070	35	1,085	7.00	3,500			4,585
175	3.06	480 MCC - INCOMING ARRANGEMENTS	1	NO	20.000	20	620	3,000.00	3,000			3,620
175	3.07	3C #6 AWG 5 KV TYPE MC CABLE	50	LF	0.070	4	109	3.50	175			283
175	3.08	5KV LIGHTNING ARRESTORS	6	NO	10.000	60	1,860	200.00	1,200			3,060
175	3.09	4.16KV O/H LINE	800	LF						8.00	6,400	6,400
175	3.10	5KV CUT-OUT	3	NO	10.000	30	930	250.00	750			1,680
175	3.11	50 KVA 4.16 KV -277V OIL-FILLED SINGLE PHASE POLE MOUNTED TRANSFORMER	3	NO	15.000	45	1,395	1,750.00	5,250			6,645
175	3.12	3C - 3/0 AWG 600V TYPE MC CABLE	150	LF	0.070	11	326	5.10	765			1,090

AREA	ITEM	DESCRIPTION	QTY	UNIT	LABOUR UNIT MHRS	TOTAL MHRS	LABOUR COST	MATERIAL UNIT COST	MATERIAL COST	SUBCONTRACT UNIT COST	SUBCONTRACT COST	TOTAL COST
175	3.13	480 MCC INCOMING ARRANGEMENT	1	NO	20.000	20	620	3,000.00	3,000			3,620
175	3.14	LOCAL CONTROL PANELS (PLC NOT INCLUDED)	1	SUM						12,500.00	12,500	12,500
		ELECTRICAL POWER DISTRIBUTION TOTAL				1,114	34,489		198,525		59,000	292,009
YARD LIGHTING												
180	1.00	OUTSIDE YARD LIGHTING INCLUDING WALL LIGHT FIXTURES AND BALLASTS, CABLE/WIRE, EXCAVATION AND BACKFILL	1	SUM	150.000	150	4,650	8,000.00	8,000			12,650
		YARD LIGHTING TOTAL				150	4,650		8,000			12,650
TELEPHONE AND COMMUNICATIONS												
185	1.00	ALLOWANCE FOR INCOMING TELEPHONE SYSTEM LINE FROM HIGHWAY	5,000	LF						2.00	10,000	10,000
185	2.00	TELEPHONE WIRING INCLUDED IN BUILDINGS	1	SUM						5,500.00	5,500	5,500
185	3.00	ALLOWANCE FOR INTERCONNECTIONS TO BUILDINGS	1	SUM						6,500.00	6,500	6,500
185	4.00	PABX & TELEPHONE SETS	1	SUM						21,000.00	21,000	21,000
185	5.00	PA & FIRE ALARM SYSTEM	1	SUM						8,000.00	8,000	8,000

AREA	ITEM	DESCRIPTION	QTY	UNIT	LABOUR UNIT MHRS	TOTAL MHRS	LABOUR COST	MATERIAL UNIT COST	MATERIAL COST	SUBCONTRACT UNIT COST	SUBCONTRACT COST	TOTAL COST
		TELEPHONE AND COMMUNICATIONS TOTAL									51,000	51,000
		RELOCATION OF MICROWAVE TOWERS (BY ASARCO)										
190	1.00	ACCESS ROAD TO NEW LOCATION OF TOWERS (CAT TRACK) - BY ASARCO										
190	2.00	SITE PREPARATION INCLUDING CUT AND FILL - BY ASARCO										
190	3.00	CONCRETE FOOTINGS AND BASES - BY ASARCO										
190	4.00	RELOCATION OF MICROWAVE TOWERS AND EQUIPMENT INCLUDING DISMANTLING, TRANSPORT AND RE-ASSEMBLY - BY ASARCO										
190	5.00	ALLOWANCE FOR NEW GUY WIRES AND ROCK ANCHORS - BY ASARCO										
		RELOCATION OF MICROWAVE TOWERS (BY ASARCO) TOTAL										
		PRIMARY CRUSHING RETAINING WALL - IN SEPARATE ESTIMATE										
220	1.00	PRIMARY CRUSHING RETAINING WALL - IN SEPARATE ESTIMATE										
		PRIMARY CRUSHING RETAINING WALL - IN SEPARATE										

AREA	ITEM	DESCRIPTION	QTY	UNIT	LABOUR UNIT MHRS	TOTAL MHRS	LABOUR COST	MATERIAL UNIT COST	MATERIAL COST	SUBCONTRACT UNIT COST	SUBCONTRACT COST	TOTAL COST
		ESTIMATE TOTAL										
PRIMARY CRUSHING - IN SEPARATE ESTIMATE												
230	1.00	PRIMARY CRUSHING - IN SEPARATE ESTIMATE										
		PRIMARY CRUSHING - IN SEPARATE ESTIMATE TOTAL										
CONVEYING TO STOCKPILE - IN SEPARATE ESTIMATE												
240	1.00	CONVEYING TO STOCKPILE - IN SEPARATE ESTIMATE										
		CONVEYING TO STOCKPILE - IN SEPARATE ESTIMATE TOTAL										
FINE ORE CRUSHING & SCREENING STRUCTURE												
310	1.00	ALLOWANCE FOR EARTHWORK, GRAVEL SURFACING AND TIMBER CRIBBING	1	SUM						36,000.00	36,000	36,000
310	2.00	ALLOWANCE FOR CONCRETE CONVEYOR FOUNDATIONS	20	CY	6.200	124	3,844	209.00	4,180			8,024
		FINE ORE CRUSHING & SCREENING STRUCTURE TOTAL				124	3,844		4,180		36,000	44,024

AREA	ITEM	DESCRIPTION	QTY	UNIT	LABOUR UNIT MHRS	TOTAL MHRS	LABOUR COST	MATERIAL UNIT COST	MATERIAL COST	SUBCONTRACT UNIT COST	SUBCONTRACT COST	TOTAL COST
FINE ORE CRUSHING & SCREENING EQUIPMENT AND SERVICES												
320	1.00	FEED HOPPER C/W SUPPORTS AND FOUNDATION	1	SUM	480.000	480	14,880	39,000.00	39,000			53,880
320	2.00	BELT FEEDER 36" X 30"	1	SUM	180.000	180	5,580	46,000.00	46,000			51,580
320	2.01	ELECTRIC MOTOR FOR FEEDER 10 HP	1	NO				380.00	380			380
320	2.02	CHUTEWORK (ALLOWANCE FOR CRUSHING PLANT)	17,000	LBS	0.020	340	10,540	1.30	22,100			32,640
320	3.00	SECONDARY CRUSHER FEED CONVEYOR, 36" WIDE X 72 FT LONG	72	LF	3.500	252	7,812	370.00	26,640			34,452
320	3.01	EXCAVATION FOR CONVEYOR FOUNDATIONS	25	CY	0.060	1	46	2.90	72			119
320	3.02	CONCRETE FOUNDATIONS FOR CONVEYOR BENTS	8	CY	5.200	42	1,290	180.00	1,440			2,730
320	3.03	BACKFILL FOR CONVEYOR FOUNDATIONS	17	CY	0.200	3	105	7.00	119			224
320	3.04	CONVEYOR TRUSS	7	TON	20.000	140	4,340	2,100.00	14,700			19,040
320	3.05	CONVEYOR SUPPORTING BENTS	1	TON	20.000	30	930	2,100.00	3,150			4,080
320	3.06	HANDRAIL WITH KICK PLATE	75	FEET	0.330	25	767	20.50	1,537			2,305
320	3.07	MISCELLANEOUS SUPPORT STEEL	1,400	LBS	0.020	28	868	1.40	1,960			2,828
320	3.08	WALKWAY GRATING - 1-1/4" THICK	190	SF	0.120	23	707	8.65	1,643			2,350

AREA	ITEM	DESCRIPTION	QTY	UNIT	LABOUR UNIT MHRS	TOTAL MHRS	LABOUR COST	MATERIAL UNIT COST	MATERIAL COST	SUBCONTRACT UNIT COST	SUBCONTRACT COST	TOTAL COST
320	3.09	RECEIVING SKIRTS	780	LBS	0.015	12	363	1.27	994			1,357
320	3.10	ELECTRIC MOTOR FOR SECONDARY CRUSHER FEED CONVEYOR, 10 H.P.	1	NO				380.00	380			380
320	4.00	WEIGH SCALE FOR CONVEYOR	1	NO	40.000	40	1,240	8,500.00	8,500			9,740
320	5.00	METAL DETECTOR	1	NO	50.000	50	1,550	5,000.00	5,000			6,550
320	6.00	STANDARD MOBILE CRUSHING PLANT INCLUDING SECONDARY CONE CRUSHER 5.50 FT DIA, 6'0 X 16'0 SCREEN AND CONVEYORS	1	SUM	1,100.000	1,100	34,100	562,500.00	562,500			596,600
320	7.00	WET DUST COLLECTOR	1	NO	220.000	220	6,820	40,000.00	40,000			46,820
320	8.00	COLLECTION AND EXHAUST DUCTWORK	1	NO	220.000	220	6,820	19,500.00	19,500			26,320
320	9.00	DUST SUPPRESSION SYSTEM (CONVEYORS)	1	NO	180.000	180	5,580	45,000.00	45,000			50,580
320	10.00	SCREEN FEED CHUTE	3,200	LBS	0.020	64	1,984	1.30	4,160			6,144
320	11.00	PIPING - SERVICE INCLUDING PIPE, VALVES, FITTINGS, FLANGES, HANGERS, ETC	1	SUM	300.000	300	9,300	9,000.00	9,000			18,300
320	12.00	INSTRUMENTATION INCLUDING INSTRUMENTS, WIRING, TUBING, CONNECTING AND MOUNTING MATERIALS, CALIBRATION & TESTING	1	SUM	130.000	130	4,030	23,000.00	23,000			27,030
320	13.00	ELECTRICAL POWER SERVICE INCLUDING POWER & CONTROL CABLES, TERMINATIONS, CABLE TRAYS, MCC'S, PUSH BUTTON STATIONS, STARTERS, GROUNDING, ETC.	1	SUM	700.000	700	21,700	41,000.00	41,000			62,700

AREA	ITEM	DESCRIPTION	QTY	UNIT	LABOUR UNIT MHRS	TOTAL MHRS	LABOUR COST	MATERIAL UNIT COST	MATERIAL COST	SUBCONTRACT UNIT COST	SUBCONTRACT COST	TOTAL COST
		FINE ORE CRUSHING & SCREENING EQUIPMENT AND SERVICES TOTAL				4,560	141,352		917,775			1,059,129
CEMENT FEED SYSTEM												
330	1.00	CEMENT STORAGE BIN 60TON CAPACITY C/W EXHAUST FAN, DISCHARGE SCREW CONVEYOR, PNEUMATIC FEED PIPE AND SUPPORTS	1	SUM	240.000	240	7,440	71,000.00	71,000			78,440
330	2.00	FOUNDATION FOR CEMENT SILOS	1	SUM	70.000	70	2,170	9,500.00	9,500			11,670
		CEMENT FEED SYSTEM TOTAL				310	9,610		80,500			90,110
CONVEYORS TO LEACH PAD												
340	1.00	MOBILE CONVEYOR 36" X 50'0 C/W MOTOR	16	NO						18,800.00	300,800	300,800
340	2.00	MOBILE RADIAL STACKER CONVEYOR 36" X 150'0	1	NO						170,000.00	170,000	170,000
340	3.00	ELECTRICAL POWER SERVICE TO MOBILE CONVEYORS INCLUDING MOBILE TRANSFORMERS AND 4.16KV SUPPLY	1	NO						110,000.00	110,000	110,000
		CONVEYORS TO LEACH PAD TOTAL									580,800	580,800

AREA	ITEM	DESCRIPTION	QTY	UNIT	LABOUR UNIT MHRS	TOTAL MHRS	LABOUR COST	MATERIAL UNIT COST	MATERIAL COST	SUBCONTRACT UNIT COST	SUBCONTRACT COST	TOTAL COST
REFINERY BUILDING												
410	1.00	BUILDING OVER REFINERY ONLY, CARBON ADSORPTION/DESORPTION AREAS HAVE NO COVER										
410	1.01	BUILDING SIZE: 74'2' X 20' X 18' CLR HT										
410	2.00	EXCAVATION AND BACKFILL	1	SUM						12,000.00	12,000	12,000
410	3.00	CONCRETE - S.O.G. AND CURBS	220	CY						280.00	61,600	61,600
410	3.01	CONCRETE - FOUNDATIONS	30	CY						380.00	11,400	11,400
410	3.02	CONCRETE - GRADE BEAMS *** NOT INCLUDED ***										
410	3.03	CONCRETE - CURBS AND SUMPS (TANKS AND EQUIPMENT)	15	CY						400.00	6,000	6,000
410	3.04	CONCRETE - MISC PADS FOR EQUIPMENT, ETC	40	CY						420.00	16,800	16,800
410	4.00	GROUT TO PROCESS EQUIPMENT, ETC	1	SUM						650.00	650	650
410	5.00	EMBEDDED METALS AND ANCHOR BOLTS - BUILDING	1,200	LB						1.80	2,160	2,160
410	5.01	EMBEDDED METALS AND ANCHOR BOLTS - PROCESS EQUIPMENT, ETC	2,320	LB						1.80	4,176	4,176
410	6.00	PRE-ENGINEERED BUILDING	1,500	SF						35.00	52,500	52,500
410	7.00	STRUCTURAL STEEL, PLATFORMS (INCL ACID WASH PLATFORM)	16	TON						2,750.00	44,000	44,000

AREA	ITEM	DESCRIPTION	QTY	UNIT	LABOUR UNIT MHRS	TOTAL MHRS	LABOUR COST	MATERIAL UNIT COST	MATERIAL COST	SUBCONTRACT UNIT COST	SUBCONTRACT COST	TOTAL COST
410	7.01	MISCELLANEOUS STEEL SUPPORTS	3	TON						3,200.00	9,600	9,600
410	8.00	STAIRS C/W HANDRAIL AND KICK PLATE	26	LF						150.00	3,900	3,900
410	9.00	HANDRAIL C/W KICKPLATE	213	LF						30.00	6,390	6,390
410	10.00	GRATING 1 1/4"	900	SF						11.00	9,900	9,900
410	11.00	LADDERS C/W SAFETY CAGE	26	LF						120.00	3,120	3,120
410	12.00	CONC BLOCK WALLS -MCC ROOM AND FLUX STORAGE ROOM	750	SF						7.50	5,625	5,625
410	13.00	OFFICES -INTERIOR WALLS, CEILINGS FLOOR FINISHES AND DOORS *** DELETED ***										
410	14.00	DRAINAGE AND UNDER SLAB SERVICES	1	SUM						7,000.00	7,000	7,000
410	15.00	LIGHTING AND GROUNDING	4,932	SF						7.00	34,524	34,524
410	16.00	BUILDING HEATING AND VENTILATION	1,300	SF						9.00	11,700	11,700
410	17.00	BUILDING SERVICES, FIRE PROTECTION, ETC	1	SUM						6,000.00	6,000	6,000
410	18.00	SAFETY SHOWER & EYEWASH IN ACID AREA	1	SUM						3,500.00	3,500	3,500
410	19.00	SAFE WITH VAULT DOOR	1	SUM						25,000.00	25,000	25,000
410	20.00	SECURITY SYSTEM INCLUDING SECURITY FENCING, MONITORS, DETECTORS ETC	1	SUM						50,000.00	50,000	50,000

AREA	ITEM	DESCRIPTION	QTY	UNIT	LABOUR UNIT MHRS	TOTAL MHRS	LABOUR COST	MATERIAL UNIT COST	MATERIAL COST	SUBCONTRACT UNIT COST	SUBCONTRACT COST	TOTAL COST
410	21.00	2 TON HOIST -REFINERY (INCL MONORAIL AND SUPPORTS)	1	SUM	90.000	90	2,790	11,000.00	11,000			13,790
410	22.00	PAINTING, TOUCH-UP, MISC	1	SUM						2,000.00	2,000	2,000
410	23.00	COVER FOR SOLUTION HEATER AND HEAT EXCHANGER	1	SUM						3,500.00	3,500	3,500
		REFINERY BUILDING TOTAL				90	2,790		11,000		393,045	406,835
ADR PROCESS												
430	1.00	WATER TREATMENT TANK & PUMP SUPPLIED BY VENDOR	1	NO								
430	2.00	PREGNANT SOLUTION PUMPS, SUBMERSIBLE C/W 60 HP MOTOR	2	NO	40.000	80	2,480	21,500.00	43,000			45,480
430	3.00	EMERGENCY POND PUMP , SUBMERSIBLE C/W 15 HP MOTOR	1	NO	30.000	30	930	10,750.00	10,750			11,680
430	4.00	WIRE SAMPLER	4	NO	10.000	40	1,240	1,250.00	5,000			6,240
430	5.00	STATIONARY TRASH SCREEN	1	NO	50.000	50	1,550	5,600.00	5,600			7,150
430	6.00	TRASH TOTE BOX	1	NO	5.000	5	155	600.00	600			755
430	7.00	CARBON COLUMNS 6'0 DIA X 13'0, C/W LAUNDERS	5	NO	50.000	250	7,750	12,500.00	62,500			70,250
430	8.00	CARBON TRANSFER PUMPS 2" VERT., R. I. C/W MOTOR	2	NO	25.000	50	1,550	3,850.00	7,700			9,250
430	9.00	CARBON COLUMN PERIPHERAL SAFETY SCREEN	5	NO	10.000	50	1,550	2,100.00	10,500			12,050

AREA	ITEM	DESCRIPTION	QTY	UNIT	LABOUR UNIT MHRS	TOTAL MHRS	LABOUR COST	MATERIAL UNIT COST	MATERIAL COST	SUBCONTRACT UNIT COST	SUBCONTRACT COST	TOTAL COST
430	10.00	BARREN SOLUTION SURGE TANK 12'0 DIA X 20'0 (14,000 LBS)	1	SUM	60.000	60	1,860	19,000.00	19,000			20,860
430	11.00	BARREN SOLUTION PUMPS, 6 X 8 C/W 120 HP MOTOR	2	NO	50.000	100	3,100	16,000.00	32,000			35,100
430	12.00	ANTISCALENT SYSTEM (NOT INCLUDED)	1	NO								
430	13.00	LOADED CARBON SCREEN 4'0 DIA C/W 3 HP MOTOR	1	NO	50.000	50	1,550	12,500.00	12,500			14,050
430	14.00	ACID WASH TANK 4'6" DIA X 11'6" HIGH	1	NO	40.000	40	1,240	11,500.00	11,500			12,740
430	15.00	STRIP LOADING PUMP 3 X 3 R.I. C/W 10 HP MOTOR	1	NO	30.000	30	930	4,250.00	4,250			5,180
430	16.00	ACID WASH PUMPBOX	1	NO	20.000	20	620	5,500.00	5,500			6,120
430	17.00	ACID CIRCULATING PUMP 2 X 1.5 C/W 5 HP MOTOR	1	NO	30.000	30	930	3,800.00	3,800			4,730
430	18.00	STRIP VESSEL 4'0 DIA X 16'0 H	1	NO	40.000	40	1,240	15,000.00	15,000			16,240
430	19.00	STRIP UNLOADING PUMP 3 X 3 R.I. C/W 10 HP MOTOR	1	NO	30.000	30	930	4,450.00	4,450			5,380
430	20.00	IN LINE SOLUTION HEATERS, ELECTRIC 150 KW	1	NO	100.000	100	3,100	13,800.00	13,800			16,900
430	21.00	PLATE AND FRAME HEAT EXCHANGER	1	NO	40.000	40	1,240	8,150.00	8,150			9,390
430	22.00	PREGNANT STRIP SOLUTION TANK 8'0 X 8'0	1	NO	40.000	40	1,240	7,500.00	7,500			8,740
430	23.00	PREGNANT STRIP SOLUTION PUMP C/W 5 HP MOTOR	1	NO	30.000	30	930	4,000.00	4,000			4,930
430	24.00	ELECTROWINNING CELLS 75 CF C/W RECTIFIER	1	NO	50.000	50	1,550	26,550.00	26,550			28,100

AREA	ITEM	DESCRIPTION	QTY	UNIT	LABOUR UNIT MHRS	TOTAL MHRS	LABOUR COST	MATERIAL UNIT COST	MATERIAL COST	SUBCONTRACT UNIT COST	SUBCONTRACT COST	TOTAL COST
430	25.00	BARREN STRIP SOLUTION TANK 8' DIA X 8'	1	NO	40.000	40	1,240	7,500.00	7,500			8,740
430	26.00	BARREN STRIP SOLUTION PUMP 2 X 1.5 C/W 25 HP MOTOR	2	NO	30.000	60	1,860	4,500.00	9,000			10,860
430	27.00	CATHODE WASH BOX	1	NO	20.000	20	620	2,000.00	2,000			2,620
430	28.00	CATHODE WASH DISCHARGE PUMP 2 X 1.5 C/W 7.5 HP MOTOR	1	NO	25.000	25	775	3,500.00	3,500			4,275
430	29.00	ELECTROWINNING EXHAUST FAN	1	NO	10.000	10	310	2,100.00	2,100			2,410
430	30.00	GOLD FLAKE AND SLUDGE FILTER PRESS	1	NO	20.000	20	620	16,000.00	16,000			16,620
430	31.00	FURNACE & BULLION MOLDS C/W POWER SUPPLY & WATER COOLING SYSTEM	1	NO	120.000	120	3,720	76,350.00	76,350			80,070
430	32.00	CARBON REACTIVATION DEWATERING SCREEN & MOTOR, 3' X 6' - DEFER										
430	33.00	CARBON REACTIVATION KILN C/W BLOWER AND EXHAUST FAN- DEFER										
430	34.00	CARBON REACTIVATION KILN FEED HOPPER - DEFER										
430	35.00	CARBON REACTIVATION KILN SCREW FEEDER - DEFER										
430	36.00	QUENCH TANK - DEFER										
430	37.00	REACTIVATION CARBON PUMP 3" X 3" R. I. - DEFER										
430	38.00	CARBON ATTRITION TANK 8'DIA X 8'	1	NO	40.000	40	1,240	7,500.00	7,500			8,740

AREA	ITEM	DESCRIPTION	QTY	UNIT	LABOUR UNIT MHRS	TOTAL MHRS	LABOUR COST	MATERIAL UNIT COST	MATERIAL COST	SUBCONTRACT UNIT COST	SUBCONTRACT COST	TOTAL COST
430	39.00	AGITATOR, CARBON ATTRITION TANK C/W MOTOR	1	NO	5.000	5	155	1,600.00	1,600			1,755
430	40.00	FRESH CARBON PUMP 3 X 3 R.I.	1	NO	30.000	30	930	4,150.00	4,150			5,080
430	40.01	MOTOR FOR PUMP 5 HP	1	NO				300.00	300			300
430	41.00	CARBON SIZING SCREEN, 4'0 DIA	1	NO	50.000	50	1,550	16,500.00	16,500			18,050
430	42.00	SUMP PUMP - ABSORPTION AREA 1.5" R.I.	1	NO	30.000	30	930	5,100.00	5,100			6,030
430	42.01	MOTOR FOR SUMP PUMP 5 HP	1	NO				300.00	300			300
430	43.00	SUMP PUMP - ACID WASH AREA 1.5" R.I.	1	NO	30.000	30	930	5,100.00	5,100			6,030
430	43.01	MOTOR FOR SUMP PUMP 5 HP	1	NO				300.00	300			300
430	44.00	SUMP PUMP - REFINERY AREA 1.5" R.I.	1	NO	30.000	30	930	5,100.00	5,100			6,030
430	44.01	MOTOR FOR SUMP PUMP 5 HP	1	NO				300.00	300			300
430	45.00	CYANIDE FLO-BIN (BY VENDOR)	1	NO								
430	46.00	SUPPORT FRAME FOR FLO-BIN	1	NO	20.000	20	620	3,000.00	3,000			3,620
430	47.00	SODIUM HYDROXIDE SYSTEM -TANK 6'0 DIA X 6'0	1	NO	20.000	20	620	4,200.00	4,200			4,820
430	47.01	SODIUM HYDROXIDE SYSTEM -MIXER C/W MOTOR	1	NO	20.000	20	620	3,500.00	3,500			4,120
430	47.02	SODIUM HYDROXIDE SYSTEM - 2 X 1.5 C/W 5 HP MOTOR	1	NO	30.000	30	930	3,800.00	3,800			4,730
430	47.03	SODIUM HYDROXIDE SYSTEM -CHUTE AND BAG BREAKER	1	NO	20.000	20	620	4,500.00	4,500			5,120

AREA	ITEM	DESCRIPTION	QTY	UNIT	LABOUR UNIT MHRS	TOTAL MHRS	LABOUR COST	MATERIAL UNIT COST	MATERIAL COST	SUBCONTRACT UNIT COST	SUBCONTRACT COST	TOTAL COST
430	48.00	GLAND WATER PUMP AND MOTOR	1	NO	25.000	25	775	3,650.00	3,650			4,425
430	49.00	BARREL PUMP -ACID TRANSFER C/W MOTOR	1	NO	20.000	20	620	1,300.00	1,300			1,920
430	50.00	PORTABLE SUMP PUMP C/W MOTOR	1	NO				3,500.00	3,500			3,500
430	51.00	EMERGENCY DIESEL GENERATOR SET C/W TRANSFER SWITCH AND FUEL SYSTEM	1	NO	160.000	160	4,960	35,000.00	35,000			39,960
430	52.00	PIPING -PROCESS AND SERVICE FOR ADR PLANT C/W FITTINGS, VALVES, HANGERS, INSULATION, ETC	1	NO						155,000.00	155,000	155,000
430	53.00	DUCTWORK	1	NO	160.000	160	4,960	17,000.00	17,000			21,960
430	54.00	MISC PLATEWORK, CHUTES, ETC	1	NO	110.000	110	3,410	15,000.00	15,000			18,410
430	55.00	LAUNDERS	1	NO	50.000	50	1,550	6,000.00	6,000			7,550
430	56.00	ELECTRICAL POWER CONNECTION TO PROCESS EQUIPMENT	1	NO	1,350.000	1,350	41,850	143,500.00	143,500			185,350
430	57.00	INSTRUMENTATION -FLOW METER, 8" (FIQ)	2	NO				4,000.00	8,000			8,000
430	57.01	INSTRUMENTATION -PH TRANSMITTER (AIT)	3	NO				2,000.00	6,000			6,000
430	57.02	INSTRUMENTATION -CONTROLLER (AIC)	1	NO				1,800.00	1,800			1,800
430	57.03	INSTRUMENTATION -LEVEL SWITCH	3	NO				700.00	2,100			2,100
430	57.04	INSTRUMENTATION -PRESSURE GAUGE	6	NO				500.00	3,000			3,000
430	57.05	INSTRUMENTATION -TEMPERATURE GAUGE	6	NO				300.00	1,800			1,800

AREA	ITEM	DESCRIPTION	QTY	UNIT	LABOUR UNIT MHRS	TOTAL MHRS	LABOUR COST	MATERIAL UNIT COST	MATERIAL COST	SUBCONTRACT UNIT COST	SUBCONTRACT COST	TOTAL COST
430	57.06	INSTRUMENTATION -PRESSURE CONTROL VALVE	1	NO				1,500.00	1,500			1,500
430	57.07	INSTRUMENTATION -PRESSURE REGULATING VALVE	1	NO				1,000.00	1,000			1,000
430	57.08	INSTRUMENTATION -LEVEL GAUGE	1	NO				300.00	300			300
430	57.09	INSTRUMENTATION -ANNUNCIATOR	1	NO				3,000.00	3,000			3,000
430	57.10	INSTRUMENTATION -INSTALL INSTRUMENTS	1	SUM	104.000	104	3,224					3,224
430	57.11	INSTRUMENTATION -INSTRUMENT CABLES	2,200	LF				1.75	3,850			3,850
430	57.12	INSTRUMENTATION -JUNCTION BOXES, CONNECTORS, SUPPORTS AND TERMINATIONS	1	SUM	60.000	60	1,860	2,000.00	2,000			3,860
430	57.13	INSTRUMENTATION -TESTING, MISC	1	SUM	40.000	40	1,240	2,000.00	2,000			3,240
			ADR PROCESS TOTAL			3,914	121,334		756,650		155,000	1,032,984
LEACH SOLUTION DISTRIBUTION SYSTEM												
510	1.00	MAGNETIC FLOW METER -BARREN SOLUTION	1	NO	20.000	20	620	9,000.00	9,000			9,620
510	2.00	FLOW CONTROL VALVE -BARREN SOLUTION	1	NO	10.000	10	310	2,700.00	2,700			3,010
510	3.00	PIPELINE -10" DIA SDR9&11 ON GRADE INCLUDING PIPE FROM BARREN SOLUTION TANK TO SPRINKLER HEADER	2,000	LF	0.200	400	12,400	25.00	50,000			62,400
510	4.00	PIPELINE -12 INCH DIA SDR26 BARREN SOLUTION OVERFLOW (TO PREGNANT SOLUTION POND FEED DITCH)	400	LF	0.250	100	3,100	24.00	9,600			12,700

AREA	ITEM	DESCRIPTION	QTY	UNIT	LABOUR UNIT MHRS	TOTAL MHRS	LABOUR COST	MATERIAL UNIT COST	MATERIAL COST	SUBCONTRACT UNIT COST	SUBCONTRACT COST	TOTAL COST
510	5.00	DRIP IRRIGATION SYSTEM INCLUDING 6" DIA HEADERS WITH 3/16" DISTRIBUTION LINES AT 2'0 CTRS (INSTALLATION BY OPERATIONS - NOT INCLUDED IN CAPITAL COST)	130,000	SF				0.38	49,400			49,400
510	6.00	ALLOWANCE FOR CULVERTS/PIPE SLEEVES FOR BARREN DISTRIBUTION LINE	1	NO	50.000	50	1,550	9,000.00	9,000			10,550
		LEACH SOLUTION DISTRIBUTION SYSTEM TOTAL				580	17,980		129,700			147,680
LEACH PAD												
520	1.00	PREPARATION OF LEACH PAD :=										
520	1.01	GRUBBING AND STRIPPING	13	ACRES						1,000.00	13,000	13,000
520	1.02	BLAST ROCK OUTCROPPINGS AND USE FOR FILL IN LOW AREAS	3,000	CY						14.00	42,000	42,000
520	1.03	BACKFILL UNDER LINER (USE OLD TAILINGS)	28,000	CY						3.00	84,000	84,000
520	1.04	SUBGRADE -SCARIFY, REGRADING, RECOMPACTING AND FINISHING	500,000	SF						0.20	100,000	100,000
520	1.05	MEMBRANE LINER -80MIL HDPE	500,000	SF						0.90	450,000	450,000
520	1.06	LINER COVER 18" - 1/2" MINUS ORE CRUSH - BY OPERATIONS										

AREA	ITEM	DESCRIPTION	QTY	UNIT	LABOUR UNIT MHRS	TOTAL MHRS	LABOUR COST	MATERIAL UNIT COST	MATERIAL COST	SUBCONTRACT UNIT COST	SUBCONTRACT COST	TOTAL COST
520	1.07	DRAINAGE PIPE UNDER HEAP -6INCH PERFORATED @ 50FT CENTERS	15,800	LF						4.00	63,200	63,200
520	1.08	INTERIOR DRAINAGE DITCH WITH 10 INCH PERFORATED PIPE	1,170	LF						8.00	9,360	9,360
520	1.09	INTERIOR DRAINAGE DITCH WITH 12 INCH PERFORATED PIPE	700	LF						12.00	8,400	8,400
520	1.10	PERIMETER BERM -2FT HIGH -2 SIDES	1,620	LF						2.00	3,240	3,240
520	1.11	LOWER SIDE BERM -15FT HIGH WITH TWO 10INCH DIA PERFORATED PIPES	700	LF						58.00	40,600	40,600
520	1.12	STERILIZATION OF LINER AREA	13	ACRES						200.00	2,600	2,600
520	2.00	ROADWORKS/DIVERSION WORKS/COLLECTION DITCHES :=										
520	2.01	ROADWORKS - ACCESS ROAD CONSTRUCTION INCLUDING CUT/FILL, SUB-BASE AND SURFACING	5,000	LF						16.00	80,000	80,000
520	2.02	ROADWORKS - CULVERTS, CONCRETE BOX, 2 @ 100'0, 1 @ 30'0	360	LF						120.00	43,200	43,200
520	2.03	DIVERSION WORKS -DITCH CONSTRUCTION INCLUDING CUT/FILL AND FINISHING	5,800	LF						8.00	46,400	46,400
520	2.04	DIVERSION WORKS -RIP RAP -RUN OF MINE WASTE	5,800	LF						7.00	40,600	40,600
520	2.05	COLLECTION DITCHES -PREGNANT SOLUTION DITCHES	1,900	LF						18.00	34,200	34,200

AREA	ITEM	DESCRIPTION	QTY	UNIT	LABOUR UNIT MHRS	TOTAL MHRS	LABOUR COST	MATERIAL UNIT COST	MATERIAL COST	SUBCONTRACT UNIT COST	SUBCONTRACT COST	TOTAL COST
		LEACH PAD TOTAL									~~1,060,800~~	~~1,060,800~~
										SEE DETAIL ON FOLLOWING PAGE		
PREGNANT AND EMERGENCY PONDS												
530	1.00	EMERGENCY POND :=										
530	1.01	GRUBBING AND STRIPPING	2	ACRES						1,000.00	2,000	2,000
530	1.02	STERILIZATION	2	ACRES						200.00	400	400
530	1.03	FOUNDATION PREPARATION	20,000	SF						0.10	2,000	2,000
530	1.04	EMBANKMENT FILL	12,000	CY						3.00	36,000	36,000
530	1.05	LINER - 60 MIL HDPE (1 LAYER)	65,000	SF						0.60	39,000	39,000
530	1.06	OUTLET PIPE -2 @ 16" DIA	300	LF						15.00	4,500	4,500
530	1.07	OUTLET CONTROL VALVES	4	NO						2,500.00	10,000	10,000
530	1.08	CREST SURFACING -12INCH GRAVEL	5,000	SF						0.35	1,750	1,750
530	1.09	DOWNSTREAM RIP-RAP	2,000	SF						0.10	200	200
530	1.10	SPILLWAY -20FT WIDE X 12INCH PCC	15	CY						350.00	5,250	5,250
530	2.00	PREGNANT SOLUTION POND :=										
530	2.01	CLEARING, GRUBBING AND STRIPPING	2	ACRES						1,000.00	2,000	2,000

AREA	ITEM	DESCRIPTION	QTY	UNIT	LABOUR UNIT MHRS	TOTAL MHRS	LABOUR COST	MATERIAL UNIT COST	MATERIAL COST	SUBCONTRACT UNIT COST	SUBCONTRACT COST	TOTAL COST
530	2.02	STERILIZATION	2	ACRES						200.00	400	400
530	2.03	POND EXCAVATION	8,000	CY						1.00	8,000	8,000
530	2.04	EMBANKMENT FILL	30,000	CY						3.00	90,000	90,000
530	2.05	FOUNDATION PREPARATION	90,000	SF						0.25	22,500	22,500
530	2.06	POND FINISH GRADING	60,000	SF						0.05	3,000	3,000
530	2.07	SEEPAGE COLLECTION BLANKET -8 OZ/SY GEOTEXTILE	70,000	SF						0.10	7,000	7,000
530	2.08	GRAVEL OR GEO-NET DRAIN BLANKET -BOTTOM ONLY	18,000	SF						0.25	4,500	4,500
530	2.09	SEEPAGE OUTLET WORKS	1	SUM						5,000.00	5,000	5,000
530	2.10	MEMBRANE LINER -60 MIL HDPE (2 LAYERS)	140,000	SF						0.60	84,000	84,000
530	2.11	OUTLET PIPES AND SUMPS (NOT INCLUDING PUMPS)	1	SUM						60,000.00	60,000	60,000
530	2.12	CONTROL VALVES	2	NO						2,500.00	5,000	5,000
530	2.13	MISCELLANEOUS HARDWARE	1	SUM						10,000.00	10,000	10,000
530	2.14	DOWNSTREAM SLOPE PROTECTION RIP RAP	7,000	SF						0.10	700	700
530	2.15	CREST ROADWAY SURFACING -12INCH CRUSHED GRAVEL	6,000	SF						0.25	1,500	1,500
530	2.16	SPILLWAY -20FT WIDE X 12INCH PCC	15	CY						350.00	5,250	5,250
		PREGNANT AND EMERGENCY PONDS TOTAL									409,950	409,950

AREA	ITEM	DESCRIPTION	QTY	UNIT	LABOUR UNIT MHRS	TOTAL MHRS	LABOUR COST	MATERIAL UNIT COST	MATERIAL COST	SUBCONTRACT UNIT COST	SUBCONTRACT COST	TOTAL COST
ENVIRONMENTAL MONITORING												
590	1.00	MONITORING WELLS AND MONUMENTS - BY OWNER										
		ENVIRONMENTAL MONITORING TOTAL										
TRUCK SHOP AND DRY (INCLUDED IN MINING)												
710	1.00	TRUCKSHOP AND DRY INCLUDED IN MINING										
		TRUCK SHOP AND DRY (INCLUDED IN MINING) TOTAL										
ADMINISTRATION BUILDING												
720	1.00	ADMINISTRATION BUILDING 54 FT X 66 FT (3566 SF) :=										
720	2.00	EARTHWORK - FINISH GRADE AND LEVEL SITE	200	CY	0.100	20	620	1.50	300			920
720	2.01	TIMBER CRIBBING	60	NO	0.500	30	930	15.00	900			1,830
720	2.02	ASSEMBLED TRAILERS 54 FT X 66 FT INCLUDING HEATING, PLUMBING, LIGHTING AND FINISHING	3,566	SF						~~45.00~~	~~160,470~~	~~160,470~~ 106,973 REDUCE FROM 6 TRAILERS TO 4
720	2.03	TRAILER SKIRTS	~~700~~	~~SF~~	~~0.050~~	~~35~~	1,085	5.00	~~3,500~~			~~4,585~~ 2/3 3054

AREA	ITEM	DESCRIPTION	QTY	UNIT	LABOUR UNIT MHRS	TOTAL MHRS	LABOUR COST	MATERIAL UNIT COST	MATERIAL COST	SUBCONTRACT UNIT COST	SUBCONTRACT COST	TOTAL COST
720	2.04	UNDER SLAB SERVICES AND HOOKUPS	~~1~~	NO	100.000	100	~~3,100~~	~~4,500.00~~	~~4,500~~		2/3	~~7,600~~ 5062
720	2.05	FIRE PROTECTION - EXTINGUISHERS	5	NO	2.000	10	310	250.00	1,250			1,560
720	2.06	FIRE PROTECTION - SPRINKLER SYSTEM (NOT INCLUDED)										
720	2.07	CHANGE LOCKERS & BENCHES (STACKED)	37	NO						55.00	2,035	2,035
720	2.08	STAIRS AND ENTRANCES (WOOD)	1	SUM						3,800.00	3,800	3,800
720	2.09	COVERED AREA FOR ENTRANCE AND AMBULANCE	400	SF						10.00	4,000	4,000
720	1.00	OFFICE EQUIPMENT, COMPUTER AND FURNISHINGS ALLOWANCE	1	SUM						30,000.00	30,000	30,000
		ADMINISTRATION BUILDING TOTAL				~~195~~	~~6,045~~		~~10,450~~		~~200,305~~	~~216,800~~ 159,134

TRUCK WASH SUMP - IN SEPARATE ESTIMATE

730	1.00	TRUCK WASH SUMP - IN SEPARATE ESTIMATE										
		TRUCK WASH SUMP - IN SEPARATE ESTIMATE TOTAL										

TRUCK READY LINE - BY MINING

740	1.00	READYLINE FOR TRUCKS - BY MINING										

AREA	ITEM	DESCRIPTION	QTY	UNIT	LABOUR UNIT MHRS	TOTAL MHRS	LABOUR COST	MATERIAL UNIT COST	MATERIAL COST	SUBCONTRACT UNIT COST	SUBCONTRACT COST	TOTAL COST
		TRUCK READY LINE - BY MINING TOTAL										
FUEL STORAGE AND DISTRIBUTION - BY MINING												
750	1.00	FUEL STORAGE AND DISTRIBUTION - BY MINING										
		FUEL STORAGE AND DISTRIBUTION - BY MINING TOTAL										
GATEHOUSE												
760	1.00	GATE HOUSE KIOSK 8 FT X 10 FT :=	80	SF						40.00	3,200	3,200
760	2.00	TIMBER CRIBBING	1	SUM	3.000	3	93	90.00	90			183
760	3.00	ALLOWANCE FOR PORTABLE TOILET, BOTTLED WATER, TELEPHONE AND ELECTRICAL HOOKUP	1	SUM						8,000.00	8,000	8,000
760	4.00	FURNITURE AND COUNTERS (ALLOWANCE)	1	SUM						800.00	800	800
760	5.00	AUTOMATIC VEHICLE BARRIER	~~1~~	~~SUM~~			ELIMINATE			~~4,500.00~~	~~4,500~~	~~4,500~~
		GATEHOUSE TOTAL				3	93		90		~~16,500~~	~~16,683~~ 12,183
FLAMMABLE STORAGE BUILDING												
770	1.00	FLAMMABLE STORAGE BUILDING - IN MINING										

AREA	ITEM	DESCRIPTION	QTY	UNIT	LABOUR UNIT MHRS	TOTAL MHRS	LABOUR COST	MATERIAL UNIT COST	MATERIAL COST	SUBCONTRACT UNIT COST	SUBCONTRACT COST	TOTAL COST
		FLAMMABLE STORAGE BUILDING TOTAL										
LABORATORY												
780	1.00	LABORATORY 36 FT X 54 FT (1,944 SQ FT) :=										
780	2.00	EARTHWORK - FINISH GRADE AND LEVEL SITE	150	CY	0.100	15	465	1.50	225			690
780	2.01	TIMBER CRIBBING	30	NO	0.500	15	465	15.00	450			915
780	2.02	ASSEMBLED TRAILERS	1,944	SF						48.00	93,312	93,312
780	2.03	STAIRS AND ENTRANCES (WOOD)	1	SUM						3,200.00	3,200	3,200
780	2.03	TRAILER SKIRTS	550	SF	0.050	27	852	5.00	2,750			3,602
780	2.04	UNDER SLAB SERVICES AND HOOKUPS	1	SUM	80.000	80	2,480	3,500.00	3,500			5,980
780	2.05	FIRE PROTECTION - EXTINGUISHERS	4	NO	2.000	8	248	250.00	1,000			1,248
780	2.06	FIRE PROTECTION - SPRINKLER SYSTEM (NOT INCLUDED)										
			LABORATORY TOTAL			145	4,510		7,925		96,512	108,947
LAB EQUIPMENT												
785	1.00	ASSAY FURNACE-LPG 42GPOT	1	NO						7,700.00	7,700	7,700

AREA	ITEM	DESCRIPTION	QTY	UNIT	LABOUR UNIT MHRS	TOTAL MHRS	LABOUR COST	MATERIAL UNIT COST	MATERIAL COST	SUBCONTRACT UNIT COST	SUBCONTRACT COST	TOTAL COST
785	2.00	GOLD BALANCE-METTLER 240S	1	NO						3,620.00	3,620	3,620
785	3.00	LABORATORY BOTTLE ROLL	1	NO						1,360.00	1,360	1,360
785	4.00	FUME HOODS C/W DUCTING & FANS	2	NO						3,900.00	7,800	7,800
785	5.00	PH METERS-CRISON MODEL 2000	2	NO						960.00	1,920	1,920
785	6.00	BALANCE-TOP PAN SARTORIUS 300G	2	NO						2,180.00	4,360	4,360
785	7.00	BALANCE-TOP PAN SARTORIUS 3KG	1	NO						2,180.00	2,180	2,180
785	8.00	BALANCE-BEAM SOEHNLE MODEL 7751	1	NO						730.00	730	730
785	9.00	VACUUM PUMP-EDWARDS MODEL ECB 8	1	NO						1,180.00	1,180	1,180
785	10.00	RIFFLE-ASSORTED	2	NO						660.00	1,320	1,320
785	11.00	TROLLEY-OXFORD	2	NO						500.00	1,000	1,000
785	12.00	JAW CRUSHER-ESSA 200MM X 160MM	1	NO						11,410.00	11,410	11,410
785	13.00	MAGNETIC STIRRER-CORNING B212	1	NO						910.00	910	910
785	14.00	HOT PLATES-HEAVY DUTY	2	NO						730.00	1,460	1,460
785	15.00	SIEVE SHAKER-ENDECOTT ELF 2 MK II	1	NO						1,720.00	1,720	1,720
785	16.00	SIEVES-ASSORTED SIZES (1 TONNE)	1	SUM						1,810.00	1,810	1,810
785	17.00	SAMPLE PANS-SS 200 & 300MM DIA (150#)	1	SUM						633.00	633	633

AREA	ITEM	DESCRIPTION	QTY	UNIT	LABOUR UNIT MHRS	TOTAL MHRS	LABOUR COST	MATERIAL UNIT COST	MATERIAL COST	SUBCONTRACT UNIT COST	SUBCONTRACT COST	TOTAL COST
785	18.00	DRYING OVEN-QUALTEX	1	NO						2,540.00	2,540	2,540
785	19.00	AAS-VARIAN TECHTRON AA 1080	1	NO						20,640.00	20,640	20,640
785	20.00	CUPELLATION FURNACE-SMALL 'D'	1	NO						5,430.00	5,430	5,430
785	21.00	WATER STILL	1	NO						2,000.00	2,000	2,000
785	22.00	DUST COLLECTOR-TORIT MODEL 20	1	NO						22,810.00	22,810	22,810
785	23.00	DRYING OVEN	1	NO						4,530.00	4,530	4,530
785	24.00	BENCHING ACID PROOF & STEEL	1	SUM						27,150.00	27,150	27,150
785	25.00	WATER HEATER-60 GALLONS	1	NO						820.00	820	820
785	26.00	ACETYLENE ACCESSORIES	1	SUM						1,000.00	1,000	1,000
785	27.00	GLASSWARE-REAGENTS	1	SUM						7,520.00	7,520	7,520
785	28.00	MISCELLANEOUS EQUIPMENT	1	SUM						11,000.00	11,000	11,000
785	29.00	PRESSURE FILTERS,KIRFIELD	1	NO						1,140.00	1,140	1,140
785	30.00	SAFETY SHOWER	1	NO						1,180.00	1,180	1,180
785	31.00	BULLION ROLLS, ASSAY EQUIPMENT (1 TONNE)	1	SUM						4,530.00	4,530	4,530
785	32.00	OFFICE FURNITURE	1	SUM						7,970.00	7,970	7,970
785	33.00	ELECTRICAL WIRING AND INSTALLATION OF LAB EQUIPMENT	1	SUM						12,000.00	12,000	12,000

AREA	ITEM	DESCRIPTION	QTY	UNIT	LABOUR UNIT MHRS	TOTAL MHRS	LABOUR COST	MATERIAL UNIT COST	MATERIAL COST	SUBCONTRACT UNIT COST	SUBCONTRACT COST	TOTAL COST
		LAB EQUIPMENT TOTAL									183,373	183,373
WAREHOUSE AND PLANT MAINTENANCE FACILITY												
790	1.00	BUILDING 30'0 X 40'0 X 24'0 (1200 SF)										
790	2.00	EARTHWORK - FINISH GRADE AND LEVEL SITE	1	SUM	40.000	40	1,240	800.00	800			2,040
790	2.01	EXCAVATION - COMMON FOR FOUNDATIONS - BY MACHINE	300	CY	0.060	18	558	2.90	870			1,428
790	3.00	BACKFILL - COMMON BULK - BY MACHINE INCLUDING COMPACTION	280	CY	0.060	17	521	1.03	288			809
790	3.01	BACKFILL - SAND UNDER SLAB - BY MACHINE INCLUDING COMPACTION	60	CY	0.300	18	558	13.20	792			1,350
790	4.00	REINFORCED CONCRETE - INCLUDING FORMWORK - FOUNDATIONS AND GRADE BEAMS	30	CY	6.200	186	5,766	160.00	4,800			10,566
790	4.01	REINFORCED CONCRETE - INCLUDING FORMWORK - SUMPS PITS AND TRENCHES	3	CY	6.500	19	604	230.00	690			1,294
790	4.02	REINFORCED CONCRETE - INCLUDING FORMWORK - SLAB ON GRADE	26	CY	3.900	101	3,143	125.00	3,250			6,393
790	4.03	REINFORCED CONCRETE - INCLUDING FORMWORK - APRON SLABS - DELETED										

AREA	ITEM	DESCRIPTION	QTY	UNIT	LABOUR UNIT MHRS	TOTAL MHRS	LABOUR COST	MATERIAL UNIT COST	MATERIAL COST	SUBCONTRACT UNIT COST	SUBCONTRACT COST	TOTAL COST
790	5.00	EMBEDDED METALS, ANCHOR BOLTS, ANCHOR PLATES, PIPE SLEEVES ETC.	300	LBS	0.030	9	279	1.26	378			657
790	6.00	CONCRETE FILLED BOLLARDS	4	NO	3.000	12	372	200.00	800			1,172
790	7.00	PRE ENGINEERED BUILDING INSULATED INCLUDING STEEL FRAME AND SIDING	1,200	SF						35.00	42,000	42,000
790	8.00	DOOR - MAN - INTERIOR	3	NO	6.000	18	558	350.00	1,050			1,608
790	8.01	DOOR - MAN - EXTERIOR	2	NO	10.000	20	620	550.00	1,100			1,720
790	8.02	DOOR 16 X 16 ROLLUP	1	NO	30.000	30	930	5,800.00	5,800			6,730
790	8.03	DOOR 8 X 8 ROLLUP	1	NO	20.000	20	620	2,100.00	2,100			2,720
790	9.00	GLAZING	20	SF	0.200	4	124	20.00	400			524
790	10.00	INTERIOR FINISHING - METAL STUD PARTITIONS - GYPROC BOTH SIDES	330	SF	0.080	26	818	3.60	1,188			2,006
790	10.01	INTERIOR FINISHING - SUSPENDED ACOUSTICAL CEILING	75	SF	0.040	3	93	3.00	225			318
790	11.00	PLUMBING AND FIXTURES	4	NO	5.000	20	620	650.00	2,600			3,220
790	12.00	UNDER SLAB SERVICES AND HOOKUPS	1	SUM	60.000	60	1,860	3,500.00	3,500			5,360
790	13.00	FIRE PROTECTION - EXTINGUISHERS	3	NO	2.000	6	186	250.00	750			936
790	13.01	FIRE PROTECTION - SPRINKLER SYSTEM (NOT INCLUDED)										

AREA	ITEM	DESCRIPTION	QTY	UNIT	LABOUR UNIT MHRS	TOTAL MHRS	LABOUR COST	MATERIAL UNIT COST	MATERIAL COST	SUBCONTRACT UNIT COST	SUBCONTRACT COST	TOTAL COST
790	14.00	HEATING AND VENTILATING	1,300	SF	0.100	130	4,030	4.70	6,110			10,140
790	15.00	BUILDING LIGHTING	1,300	SF	0.100	130	4,030	4.10	5,330			9,360
790	16.00	OVERHEAD CRANE - DELETED			200.000			48,000.00				
790	17.00	USED CARGO CONTAINERS 40' LONG ON CRIBBING (FOR ADDITIONAL STORAGE)	2	NO						5,000.00	10,000	10,000
790	18.00	COMPRESSOR ROOM C/W BLOCK WALLS AND METAL ROOFS	80	SF	2.000	160	4,960	50.00	4,000			8,960
		WAREHOUSE AND PLANT MAINTENANCE FACILITY TOTAL				1,047	32,490		46,821		52,000	131,311
SHOP TOOLS AND EQUIPMENT												
792	1.00	SHOP TOOLS AND EQUIPMENT (ALLOWANCE)	1	SUM						25,000.00	25,000	25,000
		SHOP TOOLS AND EQUIPMENT TOTAL									25,000	25,000
PLANT MOBILE EQUIPMENT												
794	1.00	FIRE FIGHTING EQUIPMENT - CART MOUNTED	1	SUM						9,500.00	9,500	9,500
794	2.00	AMBULANCE	1	NO						28,000.00	28,000	28,000
794	3.00	FORKLIFT TRUCK	1	NO						27,000.00	27,000	27,000

AREA	ITEM	DESCRIPTION	QTY	UNIT	LABOUR UNIT MHRS	TOTAL MHRS	LABOUR COST	MATERIAL UNIT COST	MATERIAL COST	SUBCONTRACT UNIT COST	SUBCONTRACT COST	TOTAL COST
794	4.00	DUMP TRUCK - FOR CLEANUP AND ROAD MAINTENANCE (BORROW FROM MINING)										
794	5.00	FRONT END LOADER FOR PLANT FEED - BY CONTRACT 980 C										250,000
794	6.00	D6 BULLDOZER (USED)	1	NO				~~238,500.00~~	~~238,500~~			~~238,500~~ 100,000
794	7.00	PIPE FUSION MACHINE (LEASE)	1	NO								20,000
794	8.00	SITE VEHICLES - 4 WHEEL DRIVE PICKUP	2	NO				18,000.00	36,000			36,000
794	9.00	TRUCK, FLAT BED, WITH 5 TON HIAB	1	NO				45,000.00	45,000			45,000
794	10.00	MOBILE CRANE FOR CRUSHER MAINTENANCE (RENT AS REQUIRED)										
		PLANT MOBILE EQUIPMENT TOTAL							~~319,500~~		~~64,500~~	~~384,000~~ 515,500
SPARE PARTS AND STARTUP SUPPLIES												
810	1.00	SPARE PARTS (ALLOWANCE)	1	SUM						75,000.00	75,000	75,000
810	2.00	STARTUP SUPPLIES, CARBON, CEMENT, REAGENTS,ETC. (ALLOWANCE)	1	SUM						50,000.00	50,000	50,000
		SPARE PARTS AND STARTUP SUPPLIES TOTAL									125,000	125,000

AREA	ITEM	DESCRIPTION	QTY	UNIT	LABOUR UNIT MHRS	TOTAL MHRS	LABOUR COST	MATERIAL UNIT COST	MATERIAL COST	SUBCONTRACT UNIT COST	SUBCONTRACT COST	TOTAL COST
CONSTRUCTION INDIRECTS												
820	1.00	CONSTRUCTION INDIRECT COSTS INCLUDING MOB AND DEMOB, BONDS AND TEMPORARY FACILITIES	1	SUM						384,799.76	384,800	384,800
		CONSTRUCTION INDIRECTS TOTAL									384,800	384,800
E.P.C.M.												
830	1.00	ENGINEERING, PROCUREMENT AND CONSTRUCTION MANAGEMENT	1	SUM	USE: (TOTAL COST - CONTINGENCY) (.10)					831,906.62	~~831,907~~	831,907
		E.P.C.M. TOTAL					450-400 806,000	375 753,000	350 731,000		831,907	~~831,907~~
LAND ACQUSITION												
840	1.00	LAND ACQUISITION AND PERMITS *** NOT INCLUDED ***										
		LAND ACQUSITION TOTAL										
OWNERS COSTS												
850	1.00	OWNERS COSTS INCLUDING WORKING CAPITAL, TRAINING, MANAGEMENT COSTS ETC *** NOT INCLUDED ***										

AREA	ITEM	DESCRIPTION	QTY	UNIT	LABOUR UNIT MHRS	TOTAL MHRS	LABOUR COST	MATERIAL UNIT COST	MATERIAL COST	SUBCONTRACT UNIT COST	SUBCONTRACT COST	TOTAL COST
		ONWERS COSTS TOTAL										
CONTINGENCY												
910	1.00	CONTINGENCY INCLUDING PROVISIONS FOR UNEXPECTED BUT AT THIS TIME UNDEFINED ELEMENTS WITHIN THE PROJECT SCOPE,DOES NOT INCLUDE FOR POTENTIAL ADDITIONS TO THE SCOPE.	1	SUM						~~715,303.52~~	~~715,304~~	715,304
												SEPARATE LINE ITEM
		CONTINGENCY TOTAL									~~715,304~~	~~715,304~~
												VARIABLE TOTAL LISTED ON SUMMARY PAGE
		PROJECT TOTAL				~~24,120~~	~~747,714~~		~~3,147,857~~		5,732,432	9,628,000

8.6 ONGOING CAPITAL COST ESTIMATE

A summary of the estimated ongoing capital costs associated with processing 4,260,000 tons of ore over a 5.9 year mine life is provided in Table 8.6-1 below.

Table 8.6-1

Ongoing Capital Cost Estimate

Leach Pad Expansion	Quantity	Unit Cost $	Total Cost $	Project Time Years
Stripping (from 13 acre to 32 acre)	19 acre	1000	19,000	1 - 3
Subgrade (from 500,000 ft^2 to 1,200,000 ft^2)	700,000 ft^2	0.20	140,000	1 - 3
80 mil liner	700,000 ft^2	0.90	630,000	1 - 3
Drill & blast rock	3,500 yd^3	14.00	49,000	1 - 3
Underliner bedding (old tailings)	38,000 yd^3	3.00	114,000	1 - 3
Under heap drainage pipe	28,700 ft	4.00	114,800	1 - 3
Interior drain ditch with 10 in. pipe	1,830 ft	8.00	14,640	1 - 3
Berms			72,530	1 - 3
Ditching and roadwork			60,000	1 - 3
Subtotal - Leach pad expansion			**1,213,970**	
Extension of solution line to pad	1,000 ft	25.00	25,000	2
Replacement of drip irrigation piping (operating cost)	-		-	
Extension of conveyors to pad (50 ft long)	18 no.	18,800	338,400	2
Extension of electric power to conveyors	1 sum	80,000	80,000	2
Relocation of road near west end of pit (in year 4 or 5) (part of mine development)				
Carbon regeneration kiln and ancillaries			169,320	4
Yarnell Creek road relocation			44,800	3
Total			**1,871,490**	

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FINANCIAL SUMMARY OF ASARCO'S PORTION OF THE YARNELL PROJECT

1) ASARCO'S 51% INTERTEST IF NORGOLD ELECTS AND MAINTAINS A 49% JOINT VENTURE POSITION

GOLD PRICE ($/OZ)	ASARCO'S INITIAL CAPITAL INVESTMENT INCLUDING SUNK COSTS FOR $400 ECONOMIC PIT DESIGN ('000'S)	AFTER TAX CASH FLOW ('000'S)	DCFROI (%)
450	$7,916	$7,891	24.5
425	$7,916	$6,231	19.8
400 (BASE CASE)	$7,916	$4,556	14.9
375	$7,916	$2,821	9.6
350	$7,916	$1,141	4.1

1A) FAVORABLE SENSITIVITIES TO $400 (BASE CASE)

	ASARCO'S INITIAL CAPITAL INVESTMENT INCLUDING SUNK COSTS FOR $400 ECONOMIC PIT DESIGN ('000'S)	AFTER TAX CASH FLOW ('000'S)	DCFROI (%)
10% REDUCTION IN CAP. AND DEV. EXPEND.	$7,301	$4,984	17.5
10% REDUCTION IN OPERATING COSTS	$7,874	$6,169	19.6
5% INCREASE IN RECOVERY	$7,916	$6,417	20.3
1% INCREASE IN RECOVERY	$7,916	$4,942	16.0

1B) UNFAVORABLE SENSITIVITIES TO $400 (BASE CASE)

	ASARCO'S INITIAL CAPITAL INVESTMENT INCLUDING SUNK COSTS FOR $400 ECONOMIC PIT DESIGN ('000'S)	AFTER TAX CASH FLOW ('000'S)	DCFROI (%)
10% INCREASE IN CAP. AND DEV. EXPEND.	$8,531	$4,129	12.6
10% INCREASE IN OPERATING COSTS	$7,958	$2,833	9.7
5% DECREASE IN RECOVERY	$7,916	$2,630	9.0

2) ASARCO'S INTERTEST IF NORGOLD ELECTS A 49% JOINT VENTURE POSITION AND DILUTES IT'S PARTICIPATING INTEREST TO A 15% NET PROFITS ROYALTY

GOLD PRICE ($/OZ)	ASARCO'S INITIAL CAPITAL INVESTMENT INCLUDING SUNK COSTS FOR $400 ECONOMIC PIT DESIGN ('000'S)	AFTER TAX CASH FLOW ('000'S)	DCFROI (%)
400	$14,538	$5,836	11.5

3) ASARCO'S INTERTEST IF NORGOLD ELECTS THE MINING LEASE AND RESULTING 25/75 JOINT VENTURE OPTION

GOLD PRICE ($/OZ)	ASARCO'S INITIAL CAPITAL INVESTMENT INCLUDING SUNK COSTS FOR $400 ECONOMIC PIT DESIGN ('000'S)	AFTER TAX CASH FLOW ('000'S)	DCFROI (%)
400	$14,538	$5,227	10.5

NOTE: SUNK COSTS (ESTIMATED AT $1,024,000) ARE ASARCO'S TOTAL EXPLORATION EXPENDITURES ON THE YARNELL PROJECT FROM JANUARY 1989 THRU DELIVERY OF THE FINAL FEASIBILITY STUDY TO NORGOLD.

COST PER OUNCE SUMMARY
$400 ECONOMIC PIT

RECOVERABLE OUNCES 178257

OPERATING COSTS	COST PER OUNCE ($)
CONTRACTOR	
CONTRACT MINING ORE	33.62
CONTRACT MINING WASTE	41.85
CONTRACT CRUSHING ORE	14.25
SUB-TOTAL	89.71
OPERATOR	
SUPERVISION AND ADMINISTRATION	27.97
OPERATIONS AND REPAIR LABOR	17.52
ADDITIONAL LABOR	18.20
MOBILE EQUIPMENT	8.26
SUPPLIES - MAINTENANCE AND REAGENTS	24.50
UTILITIES	11.97
SUB-TOTAL	108.42
MISCELLANEOUS	
ROYALTIES (ATCHINSON & WESTERN)	4.20
SEVERANCE TAX	4.84
PROPERTY TAX	12.35
INSURANCE	12.62
SALES TAX, OTHER	4.45
GENERAL & ADMINISTRATIVE	8.81
SUB-TOTAL	47.28
TOTAL OPERATING COSTS (PRODUCTION)	245.41
DEPRECIATION & DEPLETION	
EXPLORATION DEPT. (SUNK COSTS)	5.74
ADDITIONAL LAND PAYMENTS	4.76
MICROWAVE RELOCATIONS	2.78
PERMITTING & TESTING	4.94
SITE PREP, UTILITIES, DISTRIBUTION	13.79
CRUSHING & CONVEYING SYSTEM	10.94
ADSORPTION, DESORPTION, REFINING	8.89
HEAP PAD & SOLUTION PONDS	9.99
ANCILLARY FACILITIES & MOBILE EQUIPMENT	7.01
CONSTRUCTION OVERHEAD & GENERAL IND.	8.07
OPERATING COST (PRE-PRODUCTION)	4.64
DELAYED CAPITAL EXPENDITURES	11.55
OPERATING COST (POST-PRODUCTION)	4.63
MINE CLOSURE	2.90
DEPRECIATION & DEPLETION - TOTAL	100.64

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EXPLORATION, CAPITAL, AND DEVELOPMENT EXPENDITURES ($'000'S)

YARNELL

$400 ECONOMIC PIT DESIGN

	1989-1990 ASARCO	1990 J/V	1991 J/V	1992 J/V	1993 J/V	1994 J/V	1995 J/V	1996 J/V	1997 J/V	1998 J/V	1999 J/V	SUB-TOTAL 1989 - 1990 ASARCO	SUB-TOTAL 1990-1999 J/V	GRAND TOTAL 1989 - 1999 ASARCO & J/V
EXPLORATION														
OPTION AND LAND PAYMENTS	217	32	137	150	210	100	0	0	0	0	0	217	629	846
DRILLING, METALLURGICAL, MISC.	807	0	0	0	0	0	0	0	0	0	0	807	0	807
TOTAL	1024	32	137	150	210	100	0	0	0	0	0	1024	629	1653
CAPITAL AND DEVELOPMENT														
PURCHASE NEARBY HOME	0	200	0	0	0	0	0	0	0	0	0	0	200	200
CONDEMNATION DRILLING	0	100	0	0	0	0	0	0	0	0	0	0	100	100
FINAL METALLURGICAL TESTING	0	50	0	0	0	0	0	0	0	0	0	0	50	50
HYDROGEOLOGIC TESTING	0	300	0	0	0	0	0	0	0	0	0	0	300	300
ENVIRONMENTAL ASSESSMENT	0	200	0	0	0	0	0	0	0	0	0	0	200	200
PERMITTING	0	100	0	0	0	0	0	0	0	0	0	0	100	100
MICROWAVE RELOCATIONS	0	450	0	0	0	0	0	0	0	0	0	0	450	450
WATER SUPPLY	0	0	500	0	0	0	0	0	0	0	0	0	500	500
MONITOR WELL EQUIP.	0	0	50	0	0	0	0	0	0	0	0	0	50	50
TRUCK SHOP FACILITY	0	0	0	0	0	0	0	0	0	0	0	0	0	0
MINE/CRUSH CONTRACTOR MOB.	0	0	150	0	0	0	0	0	0	0	0	0	150	150
SITE PREP., SERVICES, DISTRIBUTION	0	500	1085	0	0	0	0	0	0	0	0	0	1585	1585
PRIMARY CRUSHING FACILITY	0	0	0	0	0	0	0	0	0	0	0	0	0	0
SECONDARY CRUSHING FACILITY	0	0	1193	0	0	0	0	0	0	0	0	0	1193	1193
CONVEYING/STACKING SYSTEM	0	0	581	0	0	0	0	0	0	0	0	0	581	581
ADSORPTION, DESORPTION, REFINING	0	0	1440	0	0	0	0	0	0	0	0	0	1440	1440
HEAP PAD	0	0	1061	0	0	0	0	0	0	0	0	0	1061	1061
PONDS AND SOLUTION DIST.	0	0	558	0	0	0	0	0	0	0	0	0	558	558
ANCILLARY FACILITIES & MOB. EQUIP.	0	0	1135	0	0	0	0	0	0	0	0	0	1135	1135
CONSTRUCTION OVERHEAD & GEN. IND.	0	654	654	0	0	0	0	0	0	0	0	0	1308	1308
SUB-TOTAL	0	2554	8407	0	0	0	0	0	0	0	0	0	10961	10961
CONTINGENCY @ 10%	0	255	841	0	0	0	0	0	0	0	0	0	1096	1096
TOTAL	0	2809	9248	0	0	0	0	0	0	0	0	0	12057	12057
DELAYED/ONGOING CAPITAL EXPENDITURES														
LEACH PAD EXPANSION	0	0	0	0	1214	0	0	0	0	0	0	0	1214	1214
CONVEYOR & SOLUTION DIST. EXTENSION	0	0	0	0	443	0	0	0	0	0	0	0	443	443
YARNELL CREEK ROAD RELOCATION	0	0	0	0	0	45	0	0	0	0	0	0	45	45
CARBON REGENERATION KILN	0	0	0	0	169	0	0	0	0	0	0	0	169	169
SUB-TOTAL	0	0	0	0	1826	45	0	0	0	0	0	0	1871	1871
CONTINGENCY @ 10%	0	0	0	0	183	5	0	0	0	0	0	0	187	187
TOTAL	0	0	0	0	2009	50	0	0	0	0	0	0	2058	2058
MINE CLOSURE COSTS														
MINE/CRUSH CONTRACTOR DEMOB.	0	0	0	0	0	0	0	0	0	150	0	0	150	150
HEAP & POND NEUTRALIZATION	0	0	0	0	0	0	0	0	0	0	50	0	50	50
HEAP CAPPING	0	0	0	0	0	0	0	0	0	0	250	0	250	250
PIT FENCING	0	0	0	0	0	0	0	0	0	0	20	0	20	20
SUB-TOTAL	0	0	0	0	0	0	0	0	0	150	320	0	470	470
CONTINGENCY @ 10%	0	0	0	0	0	0	0	0	0	15	32	0	47	47
TOTAL	0	0	0	0	0	0	0	0	0	165	352	0	517	517
GRAND TOTAL	$1,024	$2,841	$9,385	$150	$2,219	$150	$0	$0	$0	$165	$352	$1,024	$15,261	$16,285

YARNELL PROJECT

$400 ECONOMIC PIT DESIGN

72% RECOVERY

GOLD PRICE @ $450	1989-1990	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	1989-1999
	ASARCO	J/V	J/V	J/V	J/V	J/V	J/V	J/V	J/V	J/V	J/V	TOTAL
MINING SCHEDULE												
ORE TONS ('000'S)	0	0	358	714	716	716	716	714	716	429	0	5079
WASTE TONS ('000'S)	0	0	532	1012	1015	1015	1015	1012	1015	607	0	7223
STRIPPING RATIO	0	0	1.49	1.42	1.42	1.42	1.42	1.42	1.42	1.41	0	1.42
ORE GRADE (OPT)	0	0	0.053	0.048	0.048	0.048	0.048	0.048	0.048	0.048	0.000	0.048
RECOVERABLE OUNCES	0	0	11497	25094	24951	24951	24951	24881	24951	16981	0	178257
OPERATING OUTCOME												
REVENUE ($'000'S)	0	0	5122	11179	11116	11116	11116	11084	11116	7565	0	79413
COST ($'000'S)	0	0	2788	6158	6087	6087	6033	6023	6033	4535	0	43744
OPERATING OUTCOME	0	0	$2,334	$5,021	$5,029	$5,029	$5,083	$5,061	$5,083	$3,030	$0	$35,669
TAX BASIS – 100%												
PRE-PROD. COSTS	0	0	828	0	0	0	0	0	0	0	0	828
EXPL./DEV. EXP. (LAND)	217	32	137	150	210	100	0	0	0	0	0	846
EXPL./DEV. EXP. (OTHER)	807	0	0	0	0	0	0	0	0	0	0	807
EXPENSE (ONGOING & CLOSURE)	0	0	0	0	2009	50	0	0	0	165	1179	3402
CAPITAL EXPENDITURES	0	2809	9248	0	0	0	0	0	0	0	0	12057
SALVAGE @ 15%	0	0	0	0	0	0	0	0	0	0	1044	1044
DEPRECIATION	0	0	1723	2953	2109	1506	1077	1077	1077	537	0	12057
NET BEFORE DEPL.	-1024	-32	-354	1919	701	3373	4006	3985	4006	2328	-135	18773
DEPL.	0	0	0	959	351	1667	1667	1663	1667	1135	0	9109
NET BEFORE TAX	-1024	-32	-354	959	351	1706	2339	2322	2339	1194	-135	9663
TAX @ 38%	-389	-12	-135	365	133	648	889	882	889	454	-51	3672
NET AFTER TAX	-635	-20	-220	595	217	1058	1450	1440	1450	740	-84	5991
NET AFTER TAX CASH FLOW	($635)	($2,829)	($7,744)	$4,507	$2,677	$4,231	$4,194	$4,179	$4,194	$2,411	($84)	$15,101
NET AFTER TAX CASH FLOW (1990 COMBINED)		($3,464)	($7,744)	$4,507	$2,677	$4,231	$4,194	$4,179	$4,194	$2,411	($84)	$15,101

$400 ECONOMIC PIT DESIGN

DCFROI %	25.3
NPV @ 0%	$15,101
NPV @ 5%	$9,528
NPV @ 10%	$5,751
NPV @ 15%	$3,149

YARNELL PROJECT

$400 ECONOMIC PIT DESIGN

72% RECOVERY

GOLD PRICE @ $450	1989-1990 ASARCO	1990 J/V	1991 J/V	1992 J/V	1993 J/V	1994 J/V	1995 J/V	1996 J/V	1997 J/V	1998 J/V	1999 J/V	1989-1999 TOTAL
MINING SCHEDULE												
ORE TONS ('000'S)	0	0	358	714	716	716	716	714	716	429	0	5079
WASTE TONS ('000'S)	0	0	532	1012	1015	1015	1015	1012	1015	607	0	7223
STRIPPING RATIO	0	0	1.49	1.42	1.42	1.42	1.42	1.42	1.42	1.41	0.00	1.42
ORE GRADE (OPT)	0	0	0.053	0.048	0.048	0.048	0.048	0.048	0.048	0.048	0	0.048
RECOVERABLE OUNCES	0	0	11497	25094	24951	24951	24951	24881	24951	16981	0	178257
OPERATING OUTCOME												
REVENUE ($'000'S)	0	0	5122	11179	11116	11116	11116	11084	11116	7565	0	79413
COST ($'000'S)	0	0	2788	6158	6087	6087	6033	6023	6033	4535	0	43744
OPERATING OUTCOME	0	0	$2,334	$5,021	$5,029	$5,029	$5,083	$5,061	$5,083	$3,030	$0	$35,669
TAX BASIS – ASARCO @ 51% OF J/V												
PRE-PROD. COSTS	0	0	828	0	0	0	0	0	0	0	0	828
EXPL./DEV. EXP. (LAND)	217	32	137	150	210	100	0	0	0	0	0	846
EXPL./DEV. EXP. (OTHER)	807	0	0	0	0	0	0	0	0	0	0	807
EXPENSE (ONGOING & CLOSURE)	0	0	0	0	2009	50	0	0	0	165	1179	3402
CAPITAL EXPENDITURES	0	2809	9248	0	0	0	0	0	0	0	0	12057
SALVAGE @ 15%	0	0	0	0	0	0	0	0	0	0	1044	1044
DEPRECIATION	0	0	1723	2953	2109	1506	1077	1077	1077	537	0	12057
NET BEFORE DEPL.	-1024	-32	-354	1919	701	3373	4006	3985	4006	2328	-135	18773
DEPL.	0	0	0	959	351	1667	1667	1663	1667	1135	0	9109
NET BEFORE TAX	-1024	-32	-354	959	351	1706	2339	2322	2339	1194	-135	9663
TAX @ 38%	-389	-12	-135	365	133	648	889	882	889	454	-51	3672
NET AFTER TAX	-635	-20	-220	595	217	1058	1450	1440	1450	740	-84	5991
NET AFTER TAX CASH FLOW	-635	-2829	-7744	4507	2677	4231	4194	4179	4194	2411	-84	15101
ASARCO AT 51%		-2078	-3950	2298	1365	2158	2139	2131	2139	1230	-43	7390
ADJUSTMENT FOR G&A	0	0	42	67	65	65	64	64	64	54	14	501
ADJUSTED AFTER TAX CASH FLOW @ 51%	$0	($2,078)	($3,908)	$2,365	$1,430	$2,223	$2,203	$2,196	$2,203	$1,284	($29)	$7,891

$400 ECONOMIC PIT DESIGN

DCFROI %	24.5
NPV @ 0%	$7,891
NPV @ 5%	$4,945
NPV @ 10%	$2,948
NPV @ 15%	$1,573

YARNELL PROJECT

$400 ECONOMIC PIT DESIGN

72% RECOVERY

GOLD PRICE @ $450	1989-1990 ASARCO	1990 J/V	1991 J/V	1992 J/V	1993 J/V	1994 J/V	1995 J/V	1996 J/V	1997 J/V	1998 J/V	1999 J/V	1989-1999 TOTAL
MINING SCHEDULE												
ORE TONS ('000'S)	0	0	358	714	716	716	716	714	716	429	0	5079
WASTE TONS ('000'S)	0	0	532	1012	1015	1015	1015	1012	1015	607	0	7223
STRIPPING RATIO	0	0	1.49	1.42	1.42	1.42	1.42	1.42	1.42	1.41	0.00	1.42
ORE GRADE (OPT)	0	0	0.053	0.048	0.048	0.048	0.048	0.048	0.048	0.048	0	0.048
RECOVERABLE OUNCES	0	0	11497	25094	24951	24951	24951	24881	24951	16981	0	178257
OPERATING OUTCOME												
REVENUE ($'000'S)	0	0	5122	11179	11116	11116	11116	11084	11116	7565	0	79413
COST ($'000'S)	0	0	2788	6158	6087	6087	6033	6023	6033	4535	0	43744
OPERATING OUTCOME	0	0	$2,334	$5,021	$5,029	$5,029	$5,083	$5,061	$5,083	$3,030	$0	$35,669

BOOK BASIS

PROJECT @ 100%												
PRE-PROD. COSTS	0	0	828	0	0	0	0	0	0	0	0	828
EXPL./DEV. EXP. (LAND)	217	32	137	150	210	100	0	0	0	0	0	846
EXPL./DEV. EXP. (OTHER)	807	0	0	0	0	0	0	0	0	0	0	807
CAPITAL EXPENDITURES	0	2809	9248	0	0	0	0	0	0	0	0	12057
ONGOING EXP.	0	0	0	0	2009	50	0	0	0	0	0	2058
CLOSURE EXP.	0	0	0	0	0	0	0	0	0	165	1179	1344
SALVAGE @ 15%	0	0	0	0	0	0	0	0	0	0	1044	1044
DEPL/DEPN (ASARCO)	0	0	72	144	144	144	144	144	144	86	0	1024
DEPRECIATION (J/V)	0	0	908	1811	1816	1816	1816	1811	1816	1088	0	12885
DEPL (J/V)	0	0	12	46	443	476	476	474	476	285	0	2687
DEPL/DEPN TOTAL (J/V)	0	0	920	1858	2259	2292	2292	2286	2292	1373	0	15572
TOTAL PLANT OPER. COST	0	0	3708	8016	8346	8379	8325	8309	8325	5908	0	59316
OPERATING P & L (100% BASIS)	$0	$0	$1,414	$3,164	$2,769	$2,737	$2,791	$2,776	$2,791	$1,492	($135)	$19,797
COST PER OUNCE			$323	$319	$335	$336	$334	$334	$334	$348	-	$333
ASARCO AT 51% OF J/V												
TOTAL PLANT OPER. COST	0	0	1963	4232	4401	4418	4390	4381	4390	3100	0	31275
OPERATING P & L (51% BASIS)	$0	$0	$649	$1,469	$1,268	$1,251	$1,279	$1,272	$1,279	$674	($69)	$9,072
COST PER OUNCE			$335	$331	$346	$347	$345	$345	$345	$358	-	$344
ADJUSTMENT FOR G&A	0	0	68	107	105	105	104	104	104	88	23	808
ADJUSTED OPERATING P & L	0	0	716	1577	1373	1357	1383	1376	1383	762	-46	9880
ASARCO AT 51% OF J/V, W/O SUNK COST												
TOTAL PLANT OPER. COST	0	0	1891	4088	4257	4273	4246	4237	4246	3013	0	30251
OPERATING P & L (51% BASIS)	$0	$0	$721	$1,613	$1,412	$1,396	$1,423	$1,416	$1,423	$761	($69)	$10,096
COST PER OUNCE			$323	$319	$335	$336	$334	$334	$334	$348	-	$333

$400 PIT

SCHEDULE

1989-1990 ASARCO	1990 J/V	1991 J/V	1992 J/V	1993 J/V	1994 J/V	1995 J/V	1996 J/V	1997 J/V	1998 J/V	1999 J/V	1989-1999 TOTAL
0	0	358	714	716	716	716	714	716	429	0	5079
0	0	169	150	2219	150	0	0	0	0	0	2687
		12	24	24	24	24	24	24	14	0	169
			23	23	23	23	23	23	14	0	150
				396	396	396	395	396	238	0	2219
					33	33	32	33	19	0	150
TOTAL		12	46	443	476	476	474	476	285	0	2687

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EXPLORATION, CAPITAL, AND DEVELOPMENT EXPENDITURES ($'000'S)

YARNELL

$400 ECONOMIC PIT DESIGN

	1989-1990 ASARCO	1990 J/V	1991 J/V	1992 J/V	1993 J/V	1994 J/V	1995 J/V	1996 J/V	1997 J/V	1998 J/V	1999 J/V	SUB-TOTAL 1989 - 1990 ASARCO	SUB-TOTAL 1990-1999 J/V	GRAND TOTAL 1989 - 1999 ASARCO & J/V
EXPLORATION														
OPTION AND LAND PAYMENTS	217	32	137	150	210	100	0	0	0	0	0	217	629	846
DRILLING, METALLURGICAL, MISC.	807	0	0	0	0	0	0	0	0	0	0	807	0	807
TOTAL	1024	32	137	150	210	100	0	0	0	0	0	1024	629	1653
CAPITAL AND DEVELOPMENT														
PURCHASE NEARBY HOME	0	200	0	0	0	0	0	0	0	0	0	0	200	200
CONDEMNATION DRILLING	0	100	0	0	0	0	0	0	0	0	0	0	100	100
FINAL METALLURGICAL TESTING	0	50	0	0	0	0	0	0	0	0	0	0	50	50
HYDROGEOLOGIC TESTING	0	300	0	0	0	0	0	0	0	0	0	0	300	300
ENVIRONMENTAL ASSESSMENT	0	200	0	0	0	0	0	0	0	0	0	0	200	200
PERMITTING	0	100	0	0	0	0	0	0	0	0	0	0	100	100
MICROWAVE RELOCATIONS	0	450	0	0	0	0	0	0	0	0	0	0	450	450
WATER SUPPLY	0	0	500	0	0	0	0	0	0	0	0	0	500	500
MONITOR WELL EQUIP.	0	0	50	0	0	0	0	0	0	0	0	0	50	50
TRUCK SHOP FACILITY	0	0	0	0	0	0	0	0	0	0	0	0	0	0
MINE/CRUSH CONTRACTOR MOB.	0	0	150	0	0	0	0	0	0	0	0	0	150	150
SITE PREP., SERVICES, DISTRIBUTION	0	500	1085	0	0	0	0	0	0	0	0	0	1585	1585
PRIMARY CRUSHING FACILITY	0	0	0	0	0	0	0	0	0	0	0	0	0	0
SECONDARY CRUSHING FACILITY	0	0	1193	0	0	0	0	0	0	0	0	0	1193	1193
CONVEYING/STACKING SYSTEM	0	0	581	0	0	0	0	0	0	0	0	0	581	581
ADSORPTION, DESORPTION, REFINING	0	0	1440	0	0	0	0	0	0	0	0	0	1440	1440
HEAP PAD	0	0	1061	0	0	0	0	0	0	0	0	0	1061	1061
PONDS AND SOLUTION DIST.	0	0	558	0	0	0	0	0	0	0	0	0	558	558
ANCILLARY FACILITIES & MOB. EQUIP.	0	0	1135	0	0	0	0	0	0	0	0	0	1135	1135
CONSTRUCTION OVERHEAD & GEN. IND.	0	654	654	0	0	0	0	0	0	0	0	0	1308	1308
SUB-TOTAL	0	2554	8407	0	0	0	0	0	0	0	0	0	10961	10961
CONTINGENCY @ 10%	0	255	841	0	0	0	0	0	0	0	0	0	1096	1096
TOTAL	0	2809	9248	0	0	0	0	0	0	0	0	0	12057	12057
DELAYED/ONGOING CAPITAL EXPENDITURES														
LEACH PAD EXPANSION	0	0	0	0	1214	0	0	0	0	0	0	0	1214	1214
CONVEYOR & SOLUTION DIST. EXTENSION	0	0	0	0	443	0	0	0	0	0	0	0	443	443
YARNELL CREEK ROAD RELOCATION	0	0	0	0	0	45	0	0	0	0	0	0	45	45
CARBON REGENERATION KILN	0	0	0	0	169	0	0	0	0	0	0	0	169	169
SUB-TOTAL	0	0	0	0	1826	45	0	0	0	0	0	0	1871	1871
CONTINGENCY @ 10%	0	0	0	0	183	5	0	0	0	0	0	0	187	187
TOTAL	0	0	0	0	2009	50	0	0	0	0	0	0	2058	2058
MINE CLOSURE COSTS														
MINE/CRUSH CONTRACTOR DEMOB.	0	0	0	0	0	0	0	0	0	150	0	0	150	150
HEAP & POND NEUTRALIZATION	0	0	0	0	0	0	0	0	0	0	50	0	50	50
HEAP CAPPING	0	0	0	0	0	0	0	0	0	0	250	0	250	250
PIT FENCING	0	0	0	0	0	0	0	0	0	0	20	0	20	20
SUB-TOTAL	0	0	0	0	0	0	0	0	0	150	320	0	470	470
CONTINGENCY @ 10%	0	0	0	0	0	0	0	0	0	15	32	0	47	47
TOTAL	0	0	0	0	0	0	0	0	0	165	352	0	517	517
GRAND TOTAL	$1,024	$2,841	$9,385	$150	$2,219	$150	$0	$0	$0	$165	$352	$1,024	$15,261	$16,285

YARNELL PROJECT

$400 ECONOMIC PIT DESIGN

72% RECOVERY

GOLD PRICE @ $425	1989-1990	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	1989-1999
	ASARCO	J/V	J/V	J/V	J/V	J/V	J/V	J/V	J/V	J/V	J/V	TOTAL
MINING SCHEDULE												
ORE TONS ('000'S)	0	0	358	714	716	716	716	714	716	429	0	5079
WASTE TONS ('000'S)	0	0	532	1012	1015	1015	1015	1012	1015	607	0	7223
STRIPPING RATIO	0	0	1.49	1.42	1.42	1.42	1.42	1.42	1.42	1.41	0	1.42
ORE GRADE (OPT)	0	0	0.053	0.048	0.048	0.048	0.048	0.048	0.048	0.048	0.000	0.048
RECOVERABLE OUNCES	0	0	11497	25094	24951	24951	24951	24881	24951	16981	0	178257
OPERATING OUTCOME												
REVENUE ($'000'S)	0	0	4837	10558	10498	10498	10498	10469	10498	7145	0	75002
COST ($'000'S)	0	0	2788	6158	6087	6087	6033	6023	6033	4535	0	43744
OPERATING OUTCOME	0	0	$2,049	$4,400	$4,411	$4,411	$4,465	$4,446	$4,465	$2,610	$0	$31,258
TAX BASIS – 100%												
PRE-PROD COSTS	0	0	828	0	0	0	0	0	0	0	0	828
EXPL./DEV. EXP. (LAND)	217	32	137	150	210	100	0	0	0	0	0	846
EXPL./DEV. EXP. (OTHER)	807	0	0	0	0	0	0	0	0	0	0	807
EXPENSE (ONGOING & CLOSURE)	0	0	0	0	2009	50	0	0	0	165	1179	3402
CAPITAL EXPENDITURES	0	2809	9248	0	0	0	0	0	0	0	0	12057
SALVAGE @ 15%	0	0	0	0	0	0	0	0	0	0	1044	1044
DEPRECIATION	0	0	1723	2953	2109	1506	1077	1077	1077	537	0	12057
NET BEFORE DEPL.	-1024	-32	-639	1298	84	2756	3388	3369	3388	1908	-135	14381
DEPL.	0	0	0	649	42	1378	1575	1570	1575	954	0	7742
NET BEFORE TAX	-1024	-32	-639	649	42	1378	1814	1799	1814	954	-135	6619
TAX @ 38%	-389	-12	-243	247	16	524	689	683	689	363	-51	2515
NET AFTER TAX	-635	-20	-396	402	26	854	1125	1115	1125	592	-84	4104
NET AFTER TAX CASH FLOW	($635)	($2,829)	($7,921)	$4,004	$2,177	$3,738	$3,776	$3,762	$3,776	$2,082	($84)	$11,846
NET AFTER TAX CASH FLOW (1990 COMBINED)		($3,464)	($7,921)	$4,004	$2,177	$3,738	$3,776	$3,762	$3,776	$2,082	($84)	$11,846

$400 ECONOMIC PIT DESIGN

DCFROI %	20.3
NPV @ 0%	$11,846
NPV @ 5%	$7,032
NPV @ 10%	$3,795
NPV @ 15%	$1,586

YARNELL PROJECT

$400 ECONOMIC PIT DESIGN

72% RECOVERY

GOLD PRICE @ $425	1989-1990	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	1989-1999
	ASARCO	J/V	J/V	J/V	J/V	J/V	J/V	J/V	J/V	J/V	J/V	TOTAL
MINING SCHEDULE												
ORE TONS ('000'S)	0	0	358	714	716	716	716	714	716	429	0	5079
WASTE TONS ('000'S)	0	0	532	1012	1015	1015	1015	1012	1015	607	0	7223
STRIPPING RATIO	0	0	1.49	1.42	1.42	1.42	1.42	1.42	1.42	1.41	0.00	1.42
ORE GRADE (OPT)	0	0	0.053	0.048	0.048	0.048	0.048	0.048	0.048	0.048	0	0.048
RECOVERABLE OUNCES	0	0	11497	25094	24951	24951	24951	24881	24951	16981	0	178257
OPERATING OUTCOME												
REVENUE ($'000'S)	0	0	4837	10558	10498	10498	10498	10469	10498	7145	0	75002
COST ($'000'S)	0	0	2788	6158	6087	6087	6033	6023	6033	4535	0	43744
OPERATING OUTCOME	0	0	$2,049	$4,400	$4,411	$4,411	$4,465	$4,446	$4,465	$2,610	$0	$31,258

TAX BASIS – ASARCO @ 51% OF J/V

PRE-PROD. COSTS	0	0	828	0	0	0	0	0	0	0	0	828
EXPL./DEV. EXP. (LAND)	217	32	137	150	210	100	0	0	0	0	0	848
EXPL./DEV. EXP. (OTHER)	807	0	0	0	0	0	0	0	0	0	0	807
EXPENSE (ONGOING & CLOSURE)	0	0	0	0	2009	50	0	0	0	165	1179	3402
CAPITAL EXPENDITURES	0	2809	9248	0	0	0	0	0	0	0	0	12057
SALVAGE @ 15%	0	0	0	0	0	0	0	0	0	0	1044	1044
DEPRECIATION	0	0	1723	2953	2109	1506	1077	1077	1077	537	0	12057
NET BEFORE DEPL.	-1024	-32	-639	1298	84	2758	3388	3369	3388	1908	-135	14361
DEPL.	0	0	0	649	42	1378	1575	1570	1575	954	0	7742
NET BEFORE TAX	-1024	-32	-639	649	42	1378	1814	1799	1814	954	-135	6619
TAX @ 38%	-389	-12	-243	247	16	524	689	683	689	363	-51	2515
NET AFTER TAX	-635	-20	-396	402	26	854	1125	1115	1125	592	-84	4104
NET AFTER TAX CASH FLOW	-635	-2829	-7921	4004	2177	3738	3776	3762	3776	2082	-84	11846
ASARCO AT 51%		-2078	-4040	2042	1110	1906	1928	1919	1926	1062	-43	5730
ADJUSTMENT FOR G&A	0	0	42	67	65	65	64	64	64	54	14	501
ADJUSTED AFTER TAX CASH FLOW @ 51%	$0	($2,078)	($3,998)	$2,108	$1,175	$1,972	$1,990	$1,983	$1,990	$1,116	($29)	$6,231

$400 ECONOMIC PIT DESIGN

DCFROI %	19.8
NPV @ 0%	$6,231
NPV @ 5%	$3,672
NPV @ 10%	$1,950
NPV @ 15%	$776

YARNELL PROJECT

$400 ECONOMIC PIT DESIGN

72% RECOVERY

GOLD PRICE @ $425	1989-1990	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	1989-1999
	ASARCO	J/V	J/V	J/V	J/V	J/V	J/V	J/V	J/V	J/V	J/V	TOTAL
MINING SCHEDULE												
ORE TONS ('000'S)	0	0	358	714	716	716	716	714	716	429	0	5079
WASTE TONS ('000'S)	0	0	532	1012	1015	1015	1015	1012	1015	607	0	7223
STRIPPING RATIO	0	0	1.49	1.42	1.42	1.42	1.42	1.42	1.42	1.41	0.00	1.42
ORE GRADE (OPT)	0	0	0.053	0.048	0.048	0.048	0.048	0.048	0.048	0.048	0	0.048
RECOVERABLE OUNCES	0	0	11497	25094	24951	24951	24951	24881	24951	16981	0	178257
OPERATING OUTCOME												
REVENUE ($'000'S)	0	0	4837	10558	10498	10498	10498	10469	10498	7145	0	75002
COST ($'000'S)	0	0	2788	6158	6087	6087	6033	6023	6033	4535	0	43744
OPERATING OUTCOME	0	0	$2,049	$4,400	$4,411	$4,411	$4,465	$4,446	$4,465	$2,610	$0	$31,258
BOOK BASIS												
PROJECT @ 100%												
PRE-PROD. COSTS	0	0	828	0	0	0	0	0	0	0	0	828
EXPL./DEV. EXP. (LAND)	217	32	137	150	210	100	0	0	0	0	0	846
EXPL./DEV. EXP. (OTHER)	807	0	0	0	0	0	0	0	0	0	0	807
CAPITAL EXPENDITURES	0	2809	9248	0	0	0	0	0	0	0	0	12057
ONGOING EXP.	0	0	0	0	2009	50	0	0	0	0	0	2058
CLOSURE EXP.	0	0	0	0	0	0	0	0	0	165	1179	1344
SALVAGE @ 15%	0	0	0	0	0	0	0	0	0	0	1044	1044
DEPL/DEPN (ASARCO)	0	0	72	144	144	144	144	144	144	86	0	1024
DEPRECIATION (J/V)	0	0	908	1811	1816	1816	1816	1811	1816	1088	0	12885
DEPL (J/V)	0	0	12	46	443	476	476	474	476	285	0	2687
DEPL/DEPN TOTAL (J/V)	0	0	920	1858	2259	2292	2292	2286	2292	1373	0	15572
TOTAL PLANT OPER COST	0	0	3708	8016	8346	8379	8325	8309	8325	5908	0	59316
OPERATING P & L (100% BASIS)	$0	$0	$1,129	$2,542	$2,152	$2,119	$2,173	$2,160	$2,173	$1,071	($135)	$15,385
COST PER OUNCE			$323	$319	$335	$336	$334	$334	$334	$348	-	$333
ASARCO AT 51% OF J/V												
TOTAL PLANT OPER. COST	0	0	1963	4232	4401	4418	4390	4381	4390	3100	0	31275
OPERATING P & L (51% BASIS)	$0	$0	$504	$1,153	$953	$936	$964	$958	$964	$460	($69)	$6,822
COST PER OUNCE			$335	$331	$346	$347	$345	$345	$345	$358	-	$344
ADJUSTMENT FOR G&A	0	0	68	107	105	105	104	104	104	88	23	808
ADJUSTED OPERATING P & L	0	0	571	1260	1058	1042	1068	1062	1068	548	-46	7630
ASARCO AT 51% OF J/V, W/O SUNK COST												
TOTAL PLANT OPER. COST	0	0	1891	4088	4257	4273	4246	4237	4246	3013	0	30251
OPERATING P & L (51% BASIS)	$0	$0	$576	$1,297	$1,097	$1,081	$1,108	$1,102	$1,108	$546	($69)	$7,846
COST PER OUNCE			$323	$319	$335	$336	$334	$334	$334	$348	-	$333

$400 PIT

SCHEDULE

1989-1990 ASARCO	1990 J/V	1991 J/V	1992 J/V	1993 J/V	1994 J/V	1995 J/V	1996 J/V	1997 J/V	1998 J/V	1999 J/V	1989-1999 TOTAL
0	0	358	714	716	716	716	714	716	429	0	5079
0	0	169	150	2219	150	0	0	0	0	0	2687
		12	24	24	24	24	24	24	14	0	169
			23	23	23	23	23	23	14	0	150
				396	396	396	395	396	238	0	2219
					33	33	32	33	19	0	150
TOTAL		12	46	443	476	476	474	476	285	0	2687

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EXPLORATION, CAPITAL, AND DEVELOPMENT EXPENDITURES ($'000'S)

YARNELL

$400 ECONOMIC PIT DESIGN

	1989-1990 ASARCO	1990 J/V	1991 J/V	1992 J/V	1993 J/V	1994 J/V	1995 J/V	1996 J/V	1997 J/V	1998 J/V	1999 J/V	SUB-TOTAL 1989 - 1990 ASARCO	SUB-TOTAL 1990-1999 J/V	GRAND TOTAL 1989 - 1999 ASARCO & J/V
EXPLORATION														
OPTION AND LAND PAYMENTS	217	32	137	150	210	100	0	0	0	0	0	217	629	846
DRILLING, METALLURGICAL, MISC.	807	0	0	0	0	0	0	0	0	0	0	807	0	807
TOTAL	1024	32	137	150	210	100	0	0	0	0	0	1024	629	1653
CAPITAL AND DEVELOPMENT														
PURCHASE NEARBY HOME	0	200	0	0	0	0	0	0	0	0	0	0	200	200
CONDEMNATION DRILLING	0	100	0	0	0	0	0	0	0	0	0	0	100	100
FINAL METALLURGICAL TESTING	0	50	0	0	0	0	0	0	0	0	0	0	50	50
HYDROGEOLOGIC TESTING	0	300	0	0	0	0	0	0	0	0	0	0	300	300
ENVIRONMENTAL ASSESSMENT	0	200	0	0	0	0	0	0	0	0	0	0	200	200
PERMITTING	0	100	0	0	0	0	0	0	0	0	0	0	100	100
MICROWAVE RELOCATIONS	0	450	0	0	0	0	0	0	0	0	0	0	450	450
WATER SUPPLY	0	0	500	0	0	0	0	0	0	0	0	0	500	500
MONITOR WELL EQUIP.	0	0	50	0	0	0	0	0	0	0	0	0	50	50
TRUCK SHOP FACILITY	0	0	0	0	0	0	0	0	0	0	0	0	0	0
MINE/CRUSH CONTRACTOR MOB.	0	0	150	0	0	0	0	0	0	0	0	0	150	150
SITE PREP., SERVICES, DISTRIBUTION	0	500	1085	0	0	0	0	0	0	0	0	0	1585	1585
PRIMARY CRUSHING FACILITY	0	0	0	0	0	0	0	0	0	0	0	0	0	0
SECONDARY CRUSHING FACILITY	0	0	1193	0	0	0	0	0	0	0	0	0	1193	1193
CONVEYING/STACKING SYSTEM	0	0	581	0	0	0	0	0	0	0	0	0	581	581
ADSORPTION, DESORPTION, REFINING	0	0	1440	0	0	0	0	0	0	0	0	0	1440	1440
HEAP PAD	0	0	1061	0	0	0	0	0	0	0	0	0	1061	1061
PONDS AND SOLUTION DIST.	0	0	558	0	0	0	0	0	0	0	0	0	558	558
ANCILLARY FACILITIES & MOB. EQUIP.	0	0	1135	0	0	0	0	0	0	0	0	0	1135	1135
CONSTRUCTION OVERHEAD & GEN. IND.	0	654	654	0	0	0	0	0	0	0	0	0	1308	1308
SUB-TOTAL	0	2554	8407	0	0	0	0	0	0	0	0	0	10961	10961
CONTINGENCY @ 10%	0	255	841	0	0	0	0	0	0	0	0	0	1096	1096
TOTAL	0	2809	9248	0	0	0	0	0	0	0	0	0	12057	12057
DELAYED/ONGOING CAPITAL EXPENDITURES														
LEACH PAD EXPANSION	0	0	0	0	1214	0	0	0	0	0	0	0	1214	1214
CONVEYOR & SOLUTION DIST. EXTENSION	0	0	0	0	443	0	0	0	0	0	0	0	443	443
YARNELL CREEK ROAD RELOCATION	0	0	0	0	0	45	0	0	0	0	0	0	45	45
CARBON REGENERATION KILN	0	0	0	0	169	0	0	0	0	0	0	0	169	169
SUB-TOTAL	0	0	0	0	1826	45	0	0	0	0	0	0	1871	1871
CONTINGENCY @ 10%	0	0	0	0	183	5	0	0	0	0	0	0	187	187
TOTAL	0	0	0	0	2009	50	0	0	0	0	0	0	2058	2058
MINE CLOSURE COSTS														
MINE/CRUSH CONTRACTOR DEMOB.	0	0	0	0	0	0	0	0	0	150	0	0	150	150
HEAP & POND NEUTRALIZATION	0	0	0	0	0	0	0	0	0	0	50	0	50	50
HEAP CAPPING	0	0	0	0	0	0	0	0	0	0	250	0	250	250
PIT FENCING	0	0	0	0	0	0	0	0	0	0	20	0	20	20
SUB-TOTAL	0	0	0	0	0	0	0	0	0	150	320	0	470	470
CONTINGENCY @ 10%	0	0	0	0	0	0	0	0	0	15	32	0	47	47
TOTAL	0	0	0	0	0	0	0	0	0	165	352	0	517	517
GRAND TOTAL	$1,024	$2,841	$9,385	$150	$2,219	$150	$0	$0	$0	$165	$352	$1,024	$15,261	$16,285

YARNELL PROJECT

$400 ECONOMIC PIT DESIGN

72% RECOVERY

GOLD PRICE @ $400	1989-1990	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	1989-1999
	ASARCO	J/V	J/V	J/V	J/V	J/V	J/V	J/V	J/V	J/V	J/V	TOTAL
MINING SCHEDULE												
ORE TONS ('000'S)	0	0	358	714	716	716	716	714	716	429	0	5079
WASTE TONS ('000'S)	0	0	532	1012	1015	1015	1015	1012	1015	607	0	7223
STRIPPING RATIO	0	0	1.49	1.42	1.42	1.42	1.42	1.42	1.42	1.41	0	1.42
ORE GRADE (OPT)	0	0	0.053	0.048	0.048	0.048	0.048	0.048	0.048	0.048	0.000	0.048
RECOVERABLE OUNCES	0	0	11497	25094	24951	24951	24951	24881	24951	16981	0	178257
OPERATING OUTCOME												
REVENUE ($'000'S)	0	0	4553	9937	9881	9881	9881	9853	9881	6724	0	70590
COST ($'000'S)	0	0	2788	6158	6087	6087	6033	6023	6033	4535	0	43744
OPERATING OUTCOME	0	0	$1,765	$3,779	$3,794	$3,794	$3,848	$3,830	$3,848	$2,189	$0	$26,846
TAX BASIS – 100%												
PRE-PROD. COSTS	0	0	828	0	0	0	0	0	0	0	0	828
EXPL./DEV. EXP. (LAND)	217	32	137	150	210	100	0	0	0	0	0	846
EXPL./DEV. EXP. (OTHER)	807	0	0	0	0	0	0	0	0	0	0	807
EXPENSE (ONGOING & CLOSURE)	0	0	0	0	2009	50	0	0	0	165	1179	3402
CAPITAL EXPENDITURES	0	2809	9248	0	0	0	0	0	0	0	0	12057
SALVAGE @ 15%	0	0	0	0	0	0	0	0	0	0	1044	1044
DEPRECIATION	0	0	1723	2953	2109	1506	1077	1077	1077	537	0	12057
NET BEFORE DEPL.	-1024	-32	-923	676	-534	2138	2771	2753	2771	1488	-135	9949
DEPL.	0	0	0	338	0	1069	1385	1377	1385	744	0	6299
NET BEFORE TAX	-1024	-32	-923	338	-534	1069	1385	1377	1385	744	-135	3650
TAX @ 38%	-389	-12	-351	129	-203	406	526	523	526	283	-51	1387
NET AFTER TAX	-635	-20	-572	210	-331	663	859	853	859	461	-84	2263
NET AFTER TAX CASH FLOW	($635)	($2,829)	($8,097)	$3,501	$1,778	$3,238	$3,321	$3,307	$3,321	$1,742	($84)	$8,562
NET AFTER TAX CASH FLOW (1990 COMBINED)		($3,464)	($8,097)	$3,501	$1,778	$3,238	$3,321	$3,307	$3,321	$1,742	($84)	$8,562

$400 ECONOMIC PIT DESIGN

DCFROI %	15.1
NPV @ 0%	$8,562
NPV @ 5%	$4,528
NPV @ 10%	$1,841
NPV @ 15%	$32

YARNELL PROJECT

$400 ECONOMIC PIT DESIGN

72% RECOVERY

GOLD PRICE @ $400	1989-1990	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	1989-1999
	ASARCO	J/V	J/V	J/V	J/V	J/V	J/V	J/V	J/V	J/V	J/V	TOTAL
MINING SCHEDULE												
ORE TONS ('000'S)	0	0	358	714	716	716	716	714	716	429	0	5079
WASTE TONS ('000'S)	0	0	532	1012	1015	1015	1015	1012	1015	607	0	7223
STRIPPING RATIO	0	0	1.49	1.42	1.42	1.42	1.42	1.42	1.42	1.41	0.00	1.42
ORE GRADE (OPT)	0	0	0.053	0.048	0.048	0.048	0.048	0.048	0.048	0.048	0	0.048
RECOVERABLE OUNCES	0	0	11497	25094	24951	24951	24951	24881	24951	16981	0	178257
OPERATING OUTCOME												
REVENUE ($'000'S)	0	0	4553	9937	9881	9881	9881	9853	9881	6724	0	70590
COST ($'000'S)	0	0	2788	6158	6087	6087	6033	6023	6033	4535	0	43744
OPERATING OUTCOME	0	0	$1,765	$3,779	$3,794	$3,794	$3,848	$3,830	$3,848	$2,189	$0	$26,846
TAX BASIS – ASARCO @ 51% OF J/V												
PRE-PROD. COSTS	0	0	828	0	0	0	0	0	0	0	0	828
EXPL./DEV. EXP. (LAND)	217	32	137	150	210	100	0	0	0	0	0	846
EXPL./DEV. EXP. (OTHER)	807	0	0	0	0	0	0	0	0	0	0	807
EXPENSE (ONGOING & CLOSURE)	0	0	0	0	2009	50	0	0	0	165	1179	3402
CAPITAL EXPENDITURES	0	2809	9248	0	0	0	0	0	0	0	0	12057
SALVAGE @ 15%	0	0	0	0	0	0	0	0	0	0	1044	1044
DEPRECIATION	0	0	1723	2953	2109	1506	1077	1077	1077	537	0	12057
NET BEFORE DEPL.	-1024	-32	-923	676	-534	2138	2771	2753	2771	1488	-135	9949
DEPL.	0	0	0	338	0	1069	1385	1377	1385	744	0	6299
NET BEFORE TAX	-1024	-32	-923	338	-534	1069	1385	1377	1385	744	-135	3650
TAX @ 38%	-389	-12	-351	129	-203	406	526	523	526	283	-51	1387
NET AFTER TAX	-635	-20	-572	210	-331	663	859	853	859	461	-84	2263
NET AFTER TAX CASH FLOW	-635	-2829	-8097	3501	1778	3238	3321	3307	3321	1742	-84	8562
ASARCO AT 51%		-2078	-4130	1785	907	1651	1694	1686	1694	888	-43	4056
ADJUSTMENT FOR G&A	0	0	42	67	65	65	64	64	64	54	14	501
ADJUSTED AFTER TAX CASH FLOW @ 51%	$0	($2,078)	($4,088)	$1,852	$972	$1,717	$1,758	$1,751	$1,758	$943	($29)	$4,556

$400 ECONOMIC PIT DESIGN

DCFROI %	14.9
NPV @ 0%	$4,556
NPV @ 5%	$2,394
NPV @ 10%	$954
NPV @ 15%	($17)

YARNELL PROJECT

$400 ECONOMIC PIT DESIGN

72% RECOVERY

GOLD PRICE @ $400	1989-1990 ASARCO	1990 J/V	1991 J/V	1992 J/V	1993 J/V	1994 J/V	1995 J/V	1996 J/V	1997 J/V	1998 J/V	1999 J/V	1989-1999 TOTAL
MINING SCHEDULE												
ORE TONS ('000'S)	0	0	358	714	716	716	716	714	716	429	0	5079
WASTE TONS ('000'S)	0	0	532	1012	1015	1015	1015	1012	1015	607	0	7223
STRIPPING RATIO	0	0	1.49	1.42	1.42	1.42	1.42	1.42	1.42	1.41	0.00	1.42
ORE GRADE (OPT)	0	0	0.053	0.048	0.048	0.048	0.048	0.048	0.048	0.048	0	0.048
RECOVERABLE OUNCES	0	0	11497	25094	24951	24951	24951	24881	24951	16981	0	178257
OPERATING OUTCOME												
REVENUE ($'000'S)	0	0	4553	9937	9881	9881	9881	9853	9881	6724	0	70590
COST ($'000'S)	0	0	2788	6158	6087	6087	6033	6023	6033	4535	0	43744
OPERATING OUTCOME	0	0	$1,765	$3,779	$3,794	$3,794	$3,848	$3,830	$3,848	$2,189	$0	$26,846

BOOK BASIS

PROJECT @ 100%												
PRE-PROD. COSTS	0	0	828	0	0	0	0	0	0	0	0	828
EXPL./DEV. EXP. (LAND)	217	32	137	150	210	100	0	0	0	0	0	846
EXPL./DEV. EXP. (OTHER)	807	0	0	0	0	0	0	0	0	0	0	807
CAPITAL EXPENDITURES	0	2809	9248	0	0	0	0	0	0	0	0	12057
ONGOING EXP.	0	0	0	0	2009	50	0	0	0	0	0	2058
CLOSURE EXP.	0	0	0	0	0	0	0	0	0	165	1179	1344
SALVAGE @ 15%	0	0	0	0	0	0	0	0	0	0	1044	1044
DEPL/DEPN (ASARCO)	0	0	72	144	144	144	144	144	144	86	0	1024
DEPRECIATION (J/V)	0	0	908	1811	1816	1816	1816	1811	1816	1088	0	12885
DEPL (J/V)	0	0	12	46	443	476	476	474	476	285	0	2687
DEPL/DEPN TOTAL (J/V)	0	0	920	1858	2259	2292	2292	2286	2292	1373	0	15572
TOTAL PLANT OPER. COST	0	0	3708	6016	6346	6379	6325	6309	6325	5908	0	59316
OPERATING P & L (100% BASIS)	$0	$0	$845	$1,921	$1,534	$1,502	$1,556	$1,544	$1,556	$651	($135)	$10,973
COST PER OUNCE			$323	$319	$335	$336	$334	$334	$334	$348	-	$333
ASARCO AT 51% OF J/V												
TOTAL PLANT OPER. COST	0	0	1963	4232	4401	4418	4390	4381	4390	3100	0	31275
OPERATING P & L (51% BASIS)	$0	$0	$359	$836	$638	$621	$649	$644	$649	$246	($69)	$4,572
COST PER OUNCE			$335	$331	$346	$347	$345	$345	$345	$358	-	$344
ADJUSTMENT FOR G&A	0	0	68	107	105	105	104	104	104	88	23	808
ADJUSTED OPERATING P & L	0	0	426	943	743	727	753	748	753	333	-46	5380
ASARCO AT 51% OF J/V, W/O SUNK COST												
TOTAL PLANT OPER. COST	0	0	1891	4088	4257	4273	4246	4237	4246	3013	0	30251
OPERATING P & L (51% BASIS)	$0	$0	$431	$980	$782	$766	$793	$788	$793	$332	($69)	$5,596
COST PER OUNCE			$323	$319	$335	$336	$334	$334	$334	$348	-	$333

$400 PIT

SCHEDULE

1989-1990 ASARCO	1990 J/V	1991 J/V	1992 J/V	1993 J/V	1994 J/V	1995 J/V	1996 J/V	1997 J/V	1998 J/V	1999 J/V	1989-1999 TOTAL
0	0	358	714	716	716	716	714	716	429	0	5079
0	0	169	150	2219	150	0	0	0	0	0	2687
		12	24	24	24	24	24	24	14	0	169
			23	23	23	23	23	23	14	0	150
				396	396	396	395	396	238	0	2219
					33	33	32	33	19	0	150
TOTAL		12	46	443	476	476	474	476	285	0	2687

EXPLORATION, CAPITAL, AND DEVELOPMENT EXPENDITURES ($'000'S)

YARNELL

$400 ECONOMIC PIT DESIGN

	1989-1990 ASARCO	1990 J/V	1991 J/V	1992 J/V	1993 J/V	1994 J/V	1995 J/V	1996 J/V	1997 J/V	1998 J/V	1999 J/V	SUB-TOTAL 1989 - 1990 ASARCO	SUB-TOTAL 1990-1999 J/V	GRAND TOTAL 1989 - 1999 ASARCO & J/V
EXPLORATION														
OPTION AND LAND PAYMENTS	217	32	137	150	210	100	0	0	0	0	0	217	629	846
DRILLING, METALLURGICAL, MISC.	807	0	0	0	0	0	0	0	0	0	0	807	0	807
TOTAL	1024	32	137	150	210	100	0	0	0	0	0	1024	629	1653
CAPITAL AND DEVELOPMENT														
PURCHASE NEARBY HOME	0	200	0	0	0	0	0	0	0	0	0	0	200	200
CONDEMNATION DRILLING	0	100	0	0	0	0	0	0	0	0	0	0	100	100
FINAL METALLURGICAL TESTING	0	50	0	0	0	0	0	0	0	0	0	0	50	50
HYDROGEOLOGIC TESTING	0	300	0	0	0	0	0	0	0	0	0	0	300	300
ENVIRONMENTAL ASSESSMENT	0	200	0	0	0	0	0	0	0	0	0	0	200	200
PERMITTING	0	100	0	0	0	0	0	0	0	0	0	0	100	100
MICROWAVE RELOCATIONS	0	450	0	0	0	0	0	0	0	0	0	0	450	450
WATER SUPPLY	0	0	500	0	0	0	0	0	0	0	0	0	500	500
MONITOR WELL EQUIP.	0	0	50	0	0	0	0	0	0	0	0	0	50	50
TRUCK SHOP FACILITY	0	0	0	0	0	0	0	0	0	0	0	0	0	0
MINE/CRUSH CONTRACTOR MOB.	0	0	150	0	0	0	0	0	0	0	0	0	150	150
SITE PREP., SERVICES, DISTRIBUTION	0	500	1085	0	0	0	0	0	0	0	0	0	1585	1585
PRIMARY CRUSHING FACILITY	0	0	0	0	0	0	0	0	0	0	0	0	0	0
SECONDARY CRUSHING FACILITY	0	0	1193	0	0	0	0	0	0	0	0	0	1193	1193
CONVEYING/STACKING SYSTEM	0	0	581	0	0	0	0	0	0	0	0	0	581	581
ADSORPTION, DESORPTION, REFINING	0	0	1440	0	0	0	0	0	0	0	0	0	1440	1440
HEAP PAD	0	0	1061	0	0	0	0	0	0	0	0	0	1061	1061
PONDS AND SOLUTION DIST.	0	0	558	0	0	0	0	0	0	0	0	0	558	558
ANCILLARY FACILITIES & MOB. EQUIP.	0	0	1135	0	0	0	0	0	0	0	0	0	1135	1135
CONSTRUCTION OVERHEAD & GEN. IND.	0	654	654	0	0	0	0	0	0	0	0	0	1308	1308
SUB-TOTAL	0	2554	8407	0	0	0	0	0	0	0	0	0	10961	10961
CONTINGENCY @ 10%	0	255	841	0	0	0	0	0	0	0	0	0	1096	1096
TOTAL	0	2809	9248	0	0	0	0	0	0	0	0	0	12057	12057
DELAYED/ONGOING CAPITAL EXPENDITURES														
LEACH PAD EXPANSION	0	0	0	0	1214	0	0	0	0	0	0	0	1214	1214
CONVEYOR & SOLUTION DIST. EXTENSION	0	0	0	0	443	0	0	0	0	0	0	0	443	443
YARNELL CREEK ROAD RELOCATION	0	0	0	0	0	45	0	0	0	0	0	0	45	45
CARBON REGENERATION KILN	0	0	0	0	169	0	0	0	0	0	0	0	169	169
SUB-TOTAL	0	0	0	0	1826	45	0	0	0	0	0	0	1871	1871
CONTINGENCY @ 10%	0	0	0	0	183	5	0	0	0	0	0	0	187	187
TOTAL	0	0	0	0	2009	50	0	0	0	0	0	0	2058	2058
MINE CLOSURE COSTS														
MINE/CRUSH CONTRACTOR DEMOB.	0	0	0	0	0	0	0	0	0	150	0	0	150	150
HEAP & POND NEUTRALIZATION	0	0	0	0	0	0	0	0	0	0	50	0	50	50
HEAP CAPPING	0	0	0	0	0	0	0	0	0	0	250	0	250	250
PIT FENCING	0	0	0	0	0	0	0	0	0	0	20	0	20	20
SUB-TOTAL	0	0	0	0	0	0	0	0	0	150	320	0	470	470
CONTINGENCY @ 10%	0	0	0	0	0	0	0	0	0	15	32	0	47	47
TOTAL	0	0	0	0	0	0	0	0	0	165	352	0	517	517
GRAND TOTAL	$1,024	$2,841	$9,385	$150	$2,219	$150	$0	$0	$0	$165	$352	$1,024	$15,261	$16,285

YARNELL PROJECT

$400 ECONOMIC PIT DESIGN

72% RECOVERY

GOLD PRICE @ $375	1989-1990	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	1989-1999
	ASARCO	J/V	J/V	J/V	J/V	J/V	J/V	J/V	J/V	J/V	J/V	TOTAL
MINING SCHEDULE												
ORE TONS ('000'S)	0	0	358	714	716	716	716	714	716	429	0	5079
WASTE TONS ('000'S)	0	0	532	1012	1015	1015	1015	1012	1015	607	0	7223
STRIPPING RATIO	0	0	1.49	1.42	1.42	1.42	1.42	1.42	1.42	1.41	0	1.42
ORE GRADE (OPT)	0	0	0.053	0.048	0.048	0.048	0.048	0.048	0.048	0.048	0.000	0.048
RECOVERABLE OUNCES	0	0	11497	25094	24951	24951	24951	24881	24951	16981	0	178257
OPERATING OUTCOME												
REVENUE ($'000'S)	0	0	4268	9316	9263	9263	9263	9237	9263	6304	0	66178
COST ($'000'S)	0	0	2788	6158	6087	6087	6033	6023	6033	4535	0	43744
OPERATING OUTCOME	0	0	$1,480	$3,158	$3,176	$3,176	$3,230	$3,214	$3,230	$1,769	$0	$22,434
TAX BASIS - 100%												
PRE-PROD. COSTS	0	0	828	0	0	0	0	0	0	0	0	828
EXPL./DEV. EXP. (LAND)	217	32	137	150	210	100	0	0	0	0	0	846
EXPL./DEV. EXP. (OTHER)	807	0	0	0	0	0	0	0	0	0	0	807
EXPENSE (ONGOING & CLOSURE)	0	0	0	0	2009	50	0	0	0	165	1179	3402
CAPITAL EXPENDITURES	0	2809	9248	0	0	0	0	0	0	0	0	12057
SALVAGE @ 15%	0	0	0	0	0	0	0	0	0	0	1044	1044
DEPRECIATION	0	0	1723	2953	2109	1506	1077	1077	1077	537	0	12057
NET BEFORE DEPL.	-1024	-32	-1208	55	-1151	1521	2153	2137	2153	1068	-135	5537
DEPL.	0	0	0	28	0	760	1077	1069	1077	534	0	4544
NET BEFORE TAX	-1024	-32	-1208	28	-1151	760	1077	1069	1077	534	-135	993
TAX @ 38%	-389	-12	-459	11	-438	289	409	406	409	203	-51	378
NET AFTER TAX	-635	-20	-749	17	-714	471	668	663	668	331	-84	616
NET AFTER TAX CASH FLOW	($635)	($2,829)	($8,274)	$2,998	$1,395	$2,738	$2,821	$2,808	$2,821	$1,401	($84)	$5,160
NET AFTER TAX CASH FLOW (1990 COMBINED)		($3,464)	($8,274)	$2,998	$1,395	$2,738	$2,821	$2,808	$2,821	$1,401	($84)	$5,160

$400 ECONOMIC PIT DESIGN

DCFROI %	9.5
NPV @ 0%	$5,160
NPV @ 5%	$1,940
NPV @ 10%	($171)
NPV @ 15%	($1,564)

YARNELL PROJECT

$400 ECONOMIC PIT DESIGN

72% RECOVERY

GOLD PRICE @ $375	1989-1990 ASARCO	1990 J/V	1991 J/V	1992 J/V	1993 J/V	1994 J/V	1995 J/V	1996 J/V	1997 J/V	1998 J/V	1999 J/V	1989-1999 TOTAL
MINING SCHEDULE												
ORE TONS ('000'S)	0	0	358	714	716	716	716	714	716	429	0	5079
WASTE TONS ('000'S)	0	0	532	1012	1015	1015	1015	1012	1015	607	0	7223
STRIPPING RATIO	0	0	1.49	1.42	1.42	1.42	1.42	1.42	1.42	1.41	0.00	1.42
ORE GRADE (OPT)	0	0	0.053	0.048	0.048	0.048	0.048	0.048	0.048	0.048	0	0.048
RECOVERABLE OUNCES	0	0	11497	25094	24951	24951	24951	24881	24951	16981	0	178257
OPERATING OUTCOME												
REVENUE ($'000'S)	0	0	4268	9316	9263	9263	9263	9237	9263	6304	0	66178
COST ($'000'S)	0	0	2788	6158	6087	6087	6033	6023	6033	4535	0	43744
OPERATING OUTCOME	0	0	$1,480	$3,158	$3,176	$3,176	$3,230	$3,214	$3,230	$1,769	$0	$22,434
TAX BASIS – ASARCO @ 51% OF J/V												
PRE-PROD. COSTS	0	0	828	0	0	0	0	0	0	0	0	828
EXPL./DEV. EXP. (LAND)	217	32	137	150	210	100	0	0	0	0	0	846
EXPL./DEV. EXP. (OTHER)	807	0	0	0	0	0	0	0	0	0	0	807
EXPENSE (ONGOING & CLOSURE)	0	0	0	0	2009	50	0	0	0	165	1179	3402
CAPITAL EXPENDITURES	0	2809	9248	0	0	0	0	0	0	0	0	12057
SALVAGE @ 15%	0	0	0	0	0	0	0	0	0	0	1044	1044
DEPRECIATION	0	0	1723	2953	2109	1506	1077	1077	1077	537	0	12057
NET BEFORE DEPL.	-1024	-32	-1208	55	-1151	1521	2153	2137	2153	1068	-135	5537
DEPL.	0	0	0	28	0	760	1077	1069	1077	534	0	4544
NET BEFORE TAX	-1024	-32	-1208	28	-1151	760	1077	1069	1077	534	-135	993
TAX @ 38%	-389	-12	-459	11	-438	289	409	406	409	203	-51	378
NET AFTER TAX	-635	-20	-749	17	-714	471	668	663	668	331	-84	616
NET AFTER TAX CASH FLOW	-635	-2829	-8274	2998	1395	2738	2821	2808	2821	1401	-84	5160
ASARCO AT 51%		-2078	-4219	1529	711	1396	1439	1432	1439	715	-43	2320
ADJUSTMENT FOR G&A	0	0	42	67	65	65	64	64	64	54	14	501
ADJUSTED AFTER TAX CASH FLOW @ 51%	$0	($2,078)	($4,178)	$1,595	$777	$1,462	$1,503	$1,496	$1,503	$769	($29)	$2,821

$400 ECONOMIC PIT DESIGN

DCFROI %	9.6
NPV @ 0%	$2,621
NPV @ 5%	$1,075
NPV @ 10%	($72)
NPV @ 15%	($831)

YARNELL PROJECT

$400 ECONOMIC PIT DESIGN

72% RECOVERY

GOLD PRICE @ $375	1989-1990	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	1989-1999
	ASARCO	J/V	J/V	J/V	J/V	J/V	J/V	J/V	J/V	J/V	J/V	TOTAL
MINING SCHEDULE												
ORE TONS ('000'S)	0	0	358	714	716	716	716	714	716	429	0	5079
WASTE TONS ('000'S)	0	0	532	1012	1015	1015	1015	1012	1015	607	0	7223
STRIPPING RATIO	0	0	1.49	1.42	1.42	1.42	1.42	1.42	1.42	1.41	0.00	1.42
ORE GRADE (OPT)	0	0	0.053	0.048	0.048	0.048	0.048	0.048	0.048	0.048	0	0.048
RECOVERABLE OUNCES	0	0	11497	25094	24951	24951	24951	24881	24951	16981	0	178257
OPERATING OUTCOME												
REVENUE ($'000'S)	0	0	4268	9316	9263	9263	9263	9237	9263	6304	0	66178
COST ($'000'S)	0	0	2788	6158	6087	6087	6033	6023	6033	4535	0	43744
OPERATING OUTCOME	0	0	$1,480	$3,158	$3,176	$3,176	$3,230	$3,214	$3,230	$1,769	$0	$22,434
BOOK BASIS												
PROJECT @ 100%												
PRE-PROD. COSTS	0	0	828	0	0	0	0	0	0	0	0	828
EXPL./DEV. EXP. (LAND)	217	32	137	150	210	100	0	0	0	0	0	846
EXPL./DEV. EXP. (OTHER)	807	0	0	0	0	0	0	0	0	0	0	807
CAPITAL EXPENDITURES	0	2809	9248	0	0	0	0	0	0	0	0	12057
ONGOING EXP.	0	0	0	0	2009	50	0	0	0	0	0	2058
CLOSURE EXP.	0	0	0	0	0	0	0	0	0	165	1179	1344
SALVAGE @ 15%	0	0	0	0	0	0	0	0	0	0	1044	1044
DEPL/DEPN (ASARCO)	0	0	72	144	144	144	144	144	144	86	0	1024
DEPRECIATION (J/V)	0	0	908	1811	1816	1816	1816	1811	1816	1088	0	12885
DEPL (J/V)	0	0	12	46	443	476	476	474	476	285	0	2687
DEPL/DEPN TOTAL (J/V)	0	0	920	1858	2259	2292	2292	2286	2292	1373	0	15572
TOTAL PLANT OPER. COST	0	0	3708	8016	8346	8379	8325	8309	8325	5908	0	59316
OPERATING P & L (100% BASIS)	$0	$0	$560	$1,300	$917	$884	$938	$928	$938	$231	($135)	$6,561
COST PER OUNCE			$323	$319	$335	$336	$334	$334	$334	$348	-	$333
ASARCO AT 51% OF J/V												
TOTAL PLANT OPER. COST	0	0	1963	4232	4401	4418	4390	4381	4390	3100	0	31275
OPERATING P & L (51% BASIS)	$0	$0	$213	$519	$323	$307	$334	$330	$334	$31	($69)	$2,322
COST PER OUNCE			$335	$331	$346	$347	$345	$345	$345	$358	-	$344
ADJUSTMENT FOR G&A	0	0	68	107	105	105	104	104	104	88	23	808
ADJUSTED OPERATING P & L	0	0	281	627	428	412	438	433	438	119	-46	3130
ASARCO AT 51% OF J/V, W/O SUNK COST												
TOTAL PLANT OPER. COST	0	0	1891	4088	4257	4273	4246	4237	4246	3013	0	30251
OPERATING P & L (51% BASIS)	$0	$0	$286	$663	$467	$451	$478	$474	$478	$118	($69)	$3,346
COST PER OUNCE			$323	$319	$335	$336	$334	$334	$334	$348	-	$333

$400 PIT

SCHEDULE

1989-1990 ASARCO	1990 J/V	1991 J/V	1992 J/V	1993 J/V	1994 J/V	1995 J/V	1996 J/V	1997 J/V	1998 J/V	1999 J/V	1989-1999 TOTAL
0	0	358	714	716	716	716	714	716	429	0	5079
0	0	169	150	2219	150	0	0	0	0	0	2687
		12	24	24	24	24	24	24	14	0	169
			23	23	23	23	23	23	14	0	150
				396	396	396	395	396	238	0	2219
					33	33	32	33	19	0	150
TOTAL		12	46	443	476	476	474	476	285	0	2687

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EXPLORATION, CAPITAL, AND DEVELOPMENT EXPENDITURES ($'000'S)

YARNELL

$400 ECONOMIC PIT DESIGN

	1989-1990 ASARCO	1990 J/V	1991 J/V	1992 J/V	1993 J/V	1994 J/V	1995 J/V	1996 J/V	1997 J/V	1998 J/V	1999 J/V	SUB-TOTAL 1989 - 1990 ASARCO	SUB-TOTAL 1990-1999 J/V	GRAND TOTAL 1989 - 1999 ASARCO & J/V
EXPLORATION														
OPTION AND LAND PAYMENTS	217	32	137	150	210	100	0	0	0	0	0	217	629	846
DRILLING, METALLURGICAL, MISC.	807	0	0	0	0	0	0	0	0	0	0	807	0	807
TOTAL	1024	32	137	150	210	100	0	0	0	0	0	1024	629	1653
CAPITAL AND DEVELOPMENT														
PURCHASE NEARBY HOME	0	200	0	0	0	0	0	0	0	0	0	0	200	200
CONDEMNATION DRILLING	0	100	0	0	0	0	0	0	0	0	0	0	100	100
FINAL METALLURGICAL TESTING	0	50	0	0	0	0	0	0	0	0	0	0	50	50
HYDROGEOLOGIC TESTING	0	300	0	0	0	0	0	0	0	0	0	0	300	300
ENVIRONMENTAL ASSESSMENT	0	200	0	0	0	0	0	0	0	0	0	0	200	200
PERMITTING	0	100	0	0	0	0	0	0	0	0	0	0	100	100
MICROWAVE RELOCATIONS	0	450	0	0	0	0	0	0	0	0	0	0	450	450
WATER SUPPLY	0	0	500	0	0	0	0	0	0	0	0	0	500	500
MONITOR WELL EQUIP.	0	0	50	0	0	0	0	0	0	0	0	0	50	50
TRUCK SHOP FACILITY	0	0	0	0	0	0	0	0	0	0	0	0	0	0
MINE/CRUSH CONTRACTOR MOB.	0	0	150	0	0	0	0	0	0	0	0	0	150	150
SITE PREP., SERVICES, DISTRIBUTION	0	500	1085	0	0	0	0	0	0	0	0	0	1585	1585
PRIMARY CRUSHING FACILITY	0	0	0	0	0	0	0	0	0	0	0	0	0	0
SECONDARY CRUSHING FACILITY	0	0	1193	0	0	0	0	0	0	0	0	0	1193	1193
CONVEYING/STACKING SYSTEM	0	0	581	0	0	0	0	0	0	0	0	0	581	581
ADSORPTION, DESORPTION, REFINING	0	0	1440	0	0	0	0	0	0	0	0	0	1440	1440
HEAP PAD	0	0	1061	0	0	0	0	0	0	0	0	0	1061	1061
PONDS AND SOLUTION DIST.	0	0	558	0	0	0	0	0	0	0	0	0	558	558
ANCILLARY FACILITIES & MOB. EQUIP.	0	0	1135	0	0	0	0	0	0	0	0	0	1135	1135
CONSTRUCTION OVERHEAD & GEN. IND.	0	654	654	0	0	0	0	0	0	0	0	0	1308	1308
SUB-TOTAL	0	2554	8407	0	0	0	0	0	0	0	0	0	10961	10961
CONTINGENCY @ 10%	0	255	841	0	0	0	0	0	0	0	0	0	1096	1096
TOTAL	0	2809	9248	0	0	0	0	0	0	0	0	0	12057	12057
DELAYED/ONGOING CAPITAL EXPENDITURES														
LEACH PAD EXPANSION	0	0	0	0	1214	0	0	0	0	0	0	0	1214	1214
CONVEYOR & SOLUTION DIST. EXTENSION	0	0	0	0	443	0	0	0	0	0	0	0	443	443
YARNELL CREEK ROAD RELOCATION	0	0	0	0	0	45	0	0	0	0	0	0	45	45
CARBON REGENERATION KILN	0	0	0	0	169	0	0	0	0	0	0	0	169	169
SUB-TOTAL	0	0	0	0	1826	45	0	0	0	0	0	0	1871	1871
CONTINGENCY @ 10%	0	0	0	0	183	5	0	0	0	0	0	0	187	187
TOTAL	0	0	0	0	2009	50	0	0	0	0	0	0	2058	2058
MINE CLOSURE COSTS														
MINE/CRUSH CONTRACTOR DEMOB.	0	0	0	0	0	0	0	0	0	150	0	0	150	150
HEAP & POND NEUTRALIZATION	0	0	0	0	0	0	0	0	0	0	50	0	50	50
HEAP CAPPING	0	0	0	0	0	0	0	0	0	0	250	0	250	250
PIT FENCING	0	0	0	0	0	0	0	0	0	0	20	0	20	20
SUB-TOTAL	0	0	0	0	0	0	0	0	0	150	320	0	470	470
CONTINGENCY @ 10%	0	0	0	0	0	0	0	0	0	15	32	0	47	47
TOTAL	0	0	0	0	0	0	0	0	0	165	352	0	517	517
GRAND TOTAL	$1,024	$2,841	$9,385	$150	$2,219	$150	$0	$0	$0	$165	$352	$1,024	$15,261	$16,285

YARNELL PROJECT

$400 ECONOMIC PIT DESIGN

72% RECOVERY

GOLD PRICE @ $350	1989-1990	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	1989-1999
	ASARCO	J/V	J/V	J/V	J/V	J/V	J/V	J/V	J/V	J/V	J/V	TOTAL
MINING SCHEDULE												
ORE TONS ('000'S)	0	0	358	714	716	716	716	714	716	429	0	5079
WASTE TONS ('000'S)	0	0	532	1012	1015	1015	1015	1012	1015	607	0	7223
STRIPPING RATIO	0	0	1.49	1.42	1.42	1.42	1.42	1.42	1.42	1.41	0	1.42
ORE GRADE (OPT)	0	0	0.053	0.048	0.048	0.048	0.048	0.048	0.048	0.048	0.000	0.048
RECOVERABLE OUNCES	0	0	11497	25094	24951	24951	24951	24881	24951	16981	0	178257
OPERATING OUTCOME												
REVENUE ($'000'S)	0	0	3984	8695	8646	8646	8646	8621	8646	5884	0	61766
COST ($'000'S)	0	0	2788	6158	6087	6087	6033	6023	6033	4535	0	43744
OPERATING OUTCOME	0	0	$1,196	$2,537	$2,559	$2,559	$2,613	$2,598	$2,613	$1,349	$0	$18,022
TAX BASIS – 100%												
PRE-PROD. COSTS	0	0	828	0	0	0	0	0	0	0	0	828
EXPL./DEV. EXP. (LAND)	217	32	137	150	210	100	0	0	0	0	0	846
EXPL./DEV. EXP. (OTHER)	807	0	0	0	0	0	0	0	0	0	0	807
EXPENSE (ONGOING & CLOSURE)	0	0	0	0	2009	50	0	0	0	165	1179	3402
CAPITAL EXPENDITURES	0	2809	9248	0	0	0	0	0	0	0	0	12057
SALVAGE @ 15%	0	0	0	0	0	0	0	0	0	0	1044	1044
DEPRECIATION	0	0	1723	2953	2109	1506	1077	1077	1077	537	0	12057
NET BEFORE DEPL.	-1024	-32	-1492	-566	-1769	903	1536	1522	1536	647	-135	1125
DEPL.	0	0	0	0	0	452	768	761	768	324	0	3072
NET BEFORE TAX	-1024	-32	-1492	-566	-1769	452	768	761	768	324	-135	-1946
TAX @ 38%	-389	-12	-567	-215	-672	172	292	289	292	123	-51	-740
NET AFTER TAX	-635	-20	-925	-351	-1097	280	476	472	476	201	-84	-1207
NET AFTER TAX CASH FLOW	($635)	($2,829)	($8,450)	$2,602	$1,012	$2,237	$2,321	$2,309	$2,321	$1,061	($84)	$1,865
NET AFTER TAX CASH FLOW (1990 COMBINED)		($3,464)	($8,450)	$2,602	$1,012	$2,237	$2,321	$2,309	$2,321	$1,061	($84)	$1,865

$400 ECONOMIC PIT DESIGN

DCFROI %	3.6
NPV @ 0%	$1,865
NPV @ 5%	($554)
NPV @ 10%	($2,102)
NPV @ 15%	($3,089)

YARNELL PROJECT

$400 ECONOMIC PIT DESIGN

72% RECOVERY

GOLD PRICE @ $350	1989-1990 ASARCO	1990 J/V	1991 J/V	1992 J/V	1993 J/V	1994 J/V	1995 J/V	1996 J/V	1997 J/V	1998 J/V	1999 J/V	1989-1999 TOTAL
MINING SCHEDULE												
ORE TONS ('000'S)	0	0	358	714	716	716	716	714	716	429	0	5079
WASTE TONS ('000'S)	0	0	532	1012	1015	1015	1015	1012	1015	607	0	7223
STRIPPING RATIO	0	0	1.49	1.42	1.42	1.42	1.42	1.42	1.42	1.41	0.00	1.42
ORE GRADE (OPT)	0	0	0.053	0.048	0.048	0.048	0.048	0.048	0.048	0.048	0	0.048
RECOVERABLE OUNCES	0	0	11497	25094	24951	24951	24951	24881	24951	16981	0	178257
OPERATING OUTCOME												
REVENUE ($'000'S)	0	0	3984	8695	8646	8646	8646	8621	8646	5884	0	61766
COST ($'000'S)	0	0	2788	6158	6087	6087	6033	6023	6033	4535	0	43744
OPERATING OUTCOME	0	0	$1,196	$2,537	$2,559	$2,559	$2,613	$2,598	$2,613	$1,349	$0	$18,022

TAX BASIS – ASARCO @ 51% OF J/V

PRE-PROD. COSTS	0	0	828	0	0	0	0	0	0	0	0	828
EXPL./DEV. EXP. (LAND)	217	32	137	150	210	100	0	0	0	0	0	846
EXPL./DEV. EXP. (OTHER)	807	0	0	0	0	0	0	0	0	0	0	807
EXPENSE (ONGOING & CLOSURE)	0	0	0	0	2009	50	0	0	0	165	1179	3402
CAPITAL EXPENDITURES	0	2809	9248	0	0	0	0	0	0	0	0	12057
SALVAGE @ 15%	0	0	0	0	0	0	0	0	0	0	1044	1044
DEPRECIATION	0	0	1723	2953	2109	1506	1077	1077	1077	537	0	12057
NET BEFORE DEPL.	-1024	-32	-1492	-566	-1769	903	1536	1522	1536	647	-135	1125
DEPL.	0	0	0	0	0	452	768	761	768	324	0	3072
NET BEFORE TAX	-1024	-32	-1492	-566	-1769	452	768	761	768	324	-135	-1946
TAX @ 38%	-389	-12	-567	-215	-672	172	292	289	292	123	-51	-740
NET AFTER TAX	-635	-20	-925	-351	-1097	280	476	472	476	201	-84	-1207
NET AFTER TAX CASH FLOW	-635	-2829	-8450	2602	1012	2237	2321	2309	2321	1061	-84	1865
ASARCO AT 51%		-2078	-4309	1327	516	1141	1184	1178	1184	541	-43	840
ADJUSTMENT FOR G&A	0	0	42	67	65	65	64	64	64	54	14	501
ADJUSTED AFTER TAX CASH FLOW @ 51%	$0	($2,078)	($4,268)	$1,394	$581	$1,206	$1,248	$1,242	$1,248	$595	($29)	$1,141

$400 ECONOMIC PIT DESIGN

DCFROI %	4.1
NPV @ 0%	$1,141
NPV @ 5%	($197)
NPV @ 10%	($1,057)
NPV @ 15%	($1,608)

YARNELL PROJECT

$400 ECONOMIC PIT DESIGN

72% RECOVERY

GOLD PRICE @ $350	1989-1990	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	1989-1999
	ASARCO	J/V	J/V	J/V	J/V	J/V	J/V	J/V	J/V	J/V	J/V	TOTAL
MINING SCHEDULE												
ORE TONS ('000'S)	0	0	358	714	716	716	716	714	716	429	0	5079
WASTE TONS ('000'S)	0	0	532	1012	1015	1015	1015	1012	1015	607	0	7223
STRIPPING RATIO	0	0	1.49	1.42	1.42	1.42	1.42	1.42	1.42	1.41	0.00	1.42
ORE GRADE (OPT)	0	0	0.053	0.048	0.048	0.048	0.048	0.048	0.048	0.048	0	0.048
RECOVERABLE OUNCES	0	0	11497	25094	24951	24951	24951	24881	24951	16981	0	178257
OPERATING OUTCOME												
REVENUE ($'000'S)	0	0	3984	8695	8646	8646	8646	8621	8646	5884	0	61766
COST ($'000'S)	0	0	2788	6158	6087	6087	6033	6023	6033	4535	0	43744
OPERATING OUTCOME	0	0	$1,196	$2,537	$2,559	$2,559	$2,613	$2,598	$2,613	$1,349	$0	$18,022
BOOK BASIS												
PROJECT @ 100%												
PRE-PROD. COSTS	0	0	828	0	0	0	0	0	0	0	0	828
EXPL./DEV. EXP. (LAND)	217	32	137	150	210	100	0	0	0	0	0	846
EXPL./DEV. EXP. (OTHER)	807	0	0	0	0	0	0	0	0	0	0	807
CAPITAL EXPENDITURES	0	2809	9248	0	0	0	0	0	0	0	0	12057
ONGOING EXP.	0	0	0	0	2009	50	0	0	0	0	0	2058
CLOSURE EXP.	0	0	0	0	0	0	0	0	0	165	1179	1344
SALVAGE @ 15%	0	0	0	0	0	0	0	0	0	0	1044	1044
DEPL/DEPN (ASARCO)	0	0	72	144	144	144	144	144	144	86	0	1024
DEPRECIATION (J/V)	0	0	908	1811	1816	1816	1816	1811	1816	1088	0	12885
DEPL (J/V)	0	0	12	46	443	476	476	474	476	285	0	2687
DEPL/DEPN TOTAL (J/V)	0	0	920	1858	2259	2292	2292	2286	2292	1373	0	15572
TOTAL PLANT OPER. COST	0	0	3708	8016	8346	8379	8325	8309	8325	5908	0	59316
OPERATING P & L (100% BASIS)	$0	$0	$276	$679	$299	$267	$321	$313	$321	($189)	($135)	$2,149
COST PER OUNCE			$323	$319	$335	$336	$334	$334	$334	$348	-	$333
ASARCO AT 51% OF J/V												
TOTAL PLANT OPER. COST	0	0	1963	4232	4401	4418	4390	4381	4390	3100	0	31275
OPERATING P & L (51% BASIS)	$0	$0	$68	$202	$8	($8)	$19	$16	$19	($183)	($69)	$72
COST PER OUNCE			$335	$331	$346	$347	$345	$345	$345	$358	-	$344
ADJUSTMENT FOR G&A	0	0	68	107	105	105	104	104	104	88	23	808
ADJUSTED OPERATING P & L	0	0	136	310	114	97	123	119	123	-95	-46	880
ASARCO AT 51% OF J/V, W/O SUNK COST												
TOTAL PLANT OPER. COST	0	0	1891	4088	4257	4273	4246	4237	4246	3013	0	30251
OPERATING P & L (51% BASIS)	$0	$0	$141	$346	$153	$138	$163	$159	$163	($97)	($69)	$1,096
COST PER OUNCE			$323	$319	$335	$336	$334	$334	$334	$348	-	$333

$400 PIT

SCHEDULE

1989-1990 ASARCO	1990 J/V	1991 J/V	1992 J/V	1993 J/V	1994 J/V	1995 J/V	1996 J/V	1997 J/V	1998 J/V	1999 J/V	1989-1999 TOTAL
0	0	358	714	716	716	716	714	716	429	0	5079
0	0	169	150	2219	150	0	0	0	0	0	2687
		12	24	24	24	24	24	24	14	0	169
			23	23	23	23	23	23	14	0	150
				396	396	396	395	396	238	0	2219
					33	33	32	33	19	0	150
TOTAL		12	48	443	476	476	474	476	285	0	2687

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EXPLORATION, CAPITAL, AND DEVELOPMENT EXPENDITURES ($'000'S) YARNELL

$400 ECONOMIC PIT DESIGN

10% REDUCTION IN CAP. AND DEV. EXP.	1989-1990 ASARCO	1990 J/V	1991 J/V	1992 J/V	1993 J/V	1994 J/V	1995 J/V	1996 J/V	1997 J/V	1998 J/V	1999 J/V	SUB-TOTAL 1989 - 1990 ASARCO	SUB-TOTAL 1990-1999 J/V	GRAND TOTAL 1989 - 1999 ASARCO & J/V
EXPLORATION														
OPTION AND LAND PAYMENTS	217	32	137	150	210	100	0	0	0	0	0	217	629	846
DRILLING, METALLURGICAL, MISC.	807	0	0	0	0	0	0	0	0	0	0	807	0	807
TOTAL	1024	32	137	150	210	100	0	0	0	0	0	1024	629	1653
CAPITAL AND DEVELOPMENT														
PURCHASE NEARBY HOME	0	200	0	0	0	0	0	0	0	0	0	0	200	200
CONDEMNATION DRILLING	0	100	0	0	0	0	0	0	0	0	0	0	100	100
FINAL METALLURGICAL TESTING	0	50	0	0	0	0	0	0	0	0	0	0	50	50
HYDROGEOLOGIC TESTING	0	300	0	0	0	0	0	0	0	0	0	0	300	300
ENVIRONMENTAL ASSESSMENT	0	200	0	0	0	0	0	0	0	0	0	0	200	200
PERMITTING	0	100	0	0	0	0	0	0	0	0	0	0	100	100
MICROWAVE RELOCATIONS	0	450	0	0	0	0	0	0	0	0	0	0	450	450
WATER SUPPLY	0	0	500	0	0	0	0	0	0	0	0	0	500	500
MONITOR WELL EQUIP.	0	0	50	0	0	0	0	0	0	0	0	0	50	50
TRUCK SHOP FACILITY	0	0	0	0	0	0	0	0	0	0	0	0	0	0
MINE/CRUSH CONTRACTOR MOB.	0	0	150	0	0	0	0	0	0	0	0	0	150	150
SITE PREP., SERVICES, DISTRIBUTION	0	500	1085	0	0	0	0	0	0	0	0	0	1585	1585
PRIMARY CRUSHING FACILITY	0	0	0	0	0	0	0	0	0	0	0	0	0	0
SECONDARY CRUSHING FACILITY	0	0	1193	0	0	0	0	0	0	0	0	0	1193	1193
CONVEYING/STACKING SYSTEM	0	0	581	0	0	0	0	0	0	0	0	0	581	581
ADSORPTION, DESORPTION, REFINING	0	0	1440	0	0	0	0	0	0	0	0	0	1440	1440
HEAP PAD	0	0	1061	0	0	0	0	0	0	0	0	0	1061	1061
PONDS AND SOLUTION DIST.	0	0	558	0	0	0	0	0	0	0	0	0	558	558
ANCILLARY FACILITIES & MOB. EQUIP.	0	0	1135	0	0	0	0	0	0	0	0	0	1135	1135
CONSTRUCTION OVERHEAD & GEN. IND.	0	654	654	0	0	0	0	0	0	0	0	0	1308	1308
SUB-TOTAL	0	2554	8407	0	0	0	0	0	0	0	0	0	10961	10961
CONTINGENCY @ 10%	0	255	841	0	0	0	0	0	0	0	0	0	1096	1096
TOTAL TOTAL*.90 >>	0	2528	8323	0	0	0	0	0	0	0	0	0	10851	10851
DELAYED/ONGOING CAPITAL EXPENDITURES														
LEACH PAD EXPANSION	0	0	0	0	1214	0	0	0	0	0	0	0	1214	1214
CONVEYOR & SOLUTION DIST. EXTENSION	0	0	0	0	443	0	0	0	0	0	0	0	443	443
YARNELL CREEK ROAD RELOCATION	0	0	0	0	0	45	0	0	0	0	0	0	45	45
CARBON REGENERATION KILN	0	0	0	0	169	0	0	0	0	0	0	0	169	169
SUB-TOTAL	0	0	0	0	1826	45	0	0	0	0	0	0	1871	1871
CONTINGENCY @ 10%	0	0	0	0	183	5	0	0	0	0	0	0	187	187
TOTAL	0	0	0	0	2009	50	0	0	0	0	0	0	2058	2058
MINE CLOSURE COSTS														
MINE/CRUSH CONTRACTOR DEMOB.	0	0	0	0	0	0	0	0	0	150	0	0	150	150
HEAP & POND NEUTRALIZATION	0	0	0	0	0	0	0	0	0	0	50	0	50	50
HEAP CAPPING	0	0	0	0	0	0	0	0	0	0	250	0	250	250
PIT FENCING	0	0	0	0	0	0	0	0	0	0	20	0	20	20
SUB-TOTAL	0	0	0	0	0	0	0	0	0	150	320	0	470	470
CONTINGENCY @ 10%	0	0	0	0	0	0	0	0	0	15	32	0	47	47
TOTAL	0	0	0	0	0	0	0	0	0	165	352	0	517	517
GRAND TOTAL	$1,024	$2,560	$8,460	$150	$2,219	$150	$0	$0	$0	$165	$352	$1,024	$14,055	$15,079

YARNELL PROJECT

$400 ECONOMIC PIT DESIGN

72% RECOVERY

GOLD PRICE @ $400	1989-1990	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	1989-1999
	ASARCO	J/V	J/V	J/V	J/V	J/V	J/V	J/V	J/V	J/V	J/V	TOTAL
MINING SCHEDULE (10% REDUCTION IN CAP. AND DEV. EXP.)												
ORE TONS ('000'S)	0	0	358	714	716	716	716	714	716	429	0	5079
WASTE TONS ('000'S)	0	0	532	1012	1015	1015	1015	1012	1015	607	0	7223
STRIPPING RATIO	0	0	1.49	1.42	1.42	1.42	1 42	1.42	1.42	1.41	0	1.42
ORE GRADE (OPT)	0	0	0.053	0.048	0.048	0.048	0.048	0.048	0.048	0.048	0.000	0.048
RECOVERABLE OUNCES	0	0	11497	25094	24951	24951	24951	24881	24951	16981	0	178257
OPERATING OUTCOME												
REVENUE ($'000'S)	0	0	4553	9937	9881	9881	9881	9853	9881	6724	0	70590
COST ($'000'S)	0	0	2788	6158	6087	6087	6033	6023	6033	4535	0	43744
OPERATING OUTCOME	0	0	$1,765	$3,779	$3,794	$3,794	$3,848	$3,830	$3,848	$2,189	$0	$26,846
TAX BASIS – 100%												
PRE-PROD. COSTS	0	0	828	0	0	0	0	0	0	0	0	828
EXPL./DEV. EXP. (LAND)	217	32	137	150	210	100	0	0	0	0	0	846
EXPL./DEV. EXP. (OTHER)	807	0	0	0	0	0	0	0	0	0	0	807
EXPENSE (ONGOING & CLOSURE)	0	0	0	0	2009	50	0	0	0	165	1179	3402
CAPITAL EXPENDITURES	0	2528	8323	0	0	0	0	0	0	0	0	10851
SALVAGE @ 15% TOTAL*.90 >>	0	0	0	0	0	0	0	0	0	0	939	939
DEPRECIATION	0	0	1551	2658	1898	1355	969	969	969	483	0	10851
NET BEFORE DEPL.	-1024	-32	-751	972	-323	2289	2879	2861	2879	1542	-240	11051
DEPL.	0	0	0	486	0	1144	1439	1430	1439	771	0	6710
NET BEFORE TAX	-1024	-32	-751	486	-323	1144	1439	1430	1439	771	-240	4340
TAX @ 38%	-389	-12	-285	185	-123	435	547	544	547	293	-91	1649
NET AFTER TAX	-635	-20	-466	301	-200	710	892	887	892	478	-149	2691
NET AFTER TAX CASH FLOW	($635)	($2,548)	($7,238)	$3,445	$1,698	$3,209	$3,301	$3,286	$3,301	$1,732	($149)	$9,401
NET AFTER TAX CASH FLOW (1990 COMBINED)		($3,183)	($7,238)	$3,445	$1,698	$3,209	$3,301	$3,286	$3,301	$1,732	($149)	$9,401

$400 ECONOMIC PIT DESIGN

DCFROI %	17.9
NPV @ 0%	$9,401
NPV @ 5%	$5,348
NPV @ 10%	$2,631
NPV @ 15%	$787

YARNELL PROJECT
$400 ECONOMIC PIT DESIGN
72% RECOVERY

GOLD PRICE @ $400	1989-1990	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	1989-1999
	ASARCO	J/V	J/V	J/V	J/V	J/V	J/V	J/V	J/V	J/V	J/V	TOTAL
MINING SCHEDULE (10% REDUCTION IN CAP. AND DEV. EXP.)												
ORE TONS ('000'S)	0	0	358	714	716	716	716	714	716	429	0	5079
WASTE TONS ('000'S)	0	0	532	1012	1015	1015	1015	1012	1015	607	0	7223
STRIPPING RATIO	0	0	1.49	1.42	1.42	1.42	1.42	1.42	1.42	1.41	0.00	1.42
ORE GRADE (OPT)	0	0	0.053	0.048	0.048	0.048	0.048	0.048	0.048	0.048	0	0.048
RECOVERABLE OUNCES	0	0	11497	25094	24951	24951	24951	24881	24951	16981	0	178257
OPERATING OUTCOME												
REVENUE ($'000'S)	0	0	4553	9937	9881	9881	9881	9853	9881	6724	0	70590
COST ($'000'S)	0	0	2788	6158	6087	6087	6033	6023	6033	4535	0	43744
OPERATING OUTCOME	0	0	$1,765	$3,779	$3,794	$3,794	$3,848	$3,830	$3,848	$2,189	$0	$26,846
TAX BASIS – ASARCO @ 51% OF J/V												
PRE-PROD. COSTS	0	0	828	0	0	0	0	0	0	0	0	828
EXPL./DEV. EXP. (LAND)	217	32	137	150	210	100	0	0	0	0	0	846
EXPL./DEV. EXP. (OTHER)	807	0	0	0	0	0	0	0	0	0	0	807
EXPENSE (ONGOING & CLOSURE)	0	0	0	0	2009	50	0	0	0	165	1179	3402
CAPITAL EXPENDITURES	0	2528	8323	0	0	0	0	0	0	0	0	10851
SALVAGE @ 15%	0	0	0	0	0	0	0	0	0	0	939	939
DEPRECIATION	0	0	1551	2658	1898	1355	969	969	969	483	0	10851
NET BEFORE DEPL.	-1024	-32	-751	972	-323	2289	2879	2861	2879	1542	-240	11051
DEPL.	0	0	0	486	0	1144	1439	1430	1439	771	0	6710
NET BEFORE TAX	-1024	-32	-751	486	-323	1144	1439	1430	1439	771	-240	4340
TAX @ 38%	-389	-12	-285	185	-123	435	547	544	547	293	-91	1649
NET AFTER TAX	-635	-20	-466	301	-200	710	892	887	892	478	-149	2691
NET AFTER TAX CASH FLOW	-635	-2548	-7238	3445	1698	3209	3301	3286	3301	1732	-149	9401
ASARCO AT 51%		-1935	-3691	1757	866	1637	1683	1676	1683	883	-76	4483
ADJUSTMENT FOR G&A	0	0	42	67	65	65	64	64	64	54	14	501
ADJUSTED AFTER TAX CASH FLOW @ 51%	$0	($1,935)	($3,649)	$1,823	$931	$1,702	$1,748	$1,740	$1,748	$937	($62)	$4,984

$400 ECONOMIC PIT DESIGN

DCFROI %	17.5
NPV @ 0%	$4,984
NPV @ 5%	$2,813
NPV @ 10%	$1,357
NPV @ 15%	$368

YARNELL PROJECT

$400 ECONOMIC PIT DESIGN

72% RECOVERY

GOLD PRICE @ $400	1989-1990	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	1989-1999
	ASARCO	J/V	J/V	J/V	J/V	J/V	J/V	J/V	J/V	J/V	J/V	TOTAL
MINING SCHEDULE (10% REDUCTION IN CAP. AND DEV. EXP.)												
ORE TONS ('000'S)	0	0	358	714	716	716	716	714	716	429	0	5079
WASTE TONS ('000'S)	0	0	532	1012	1015	1015	1015	1012	1015	607	0	7223
STRIPPING RATIO	0	0	1.49	1.42	1.42	1.42	1.42	1.42	1.42	1.41	0.00	1.42
ORE GRADE (OPT)	0	0	0.053	0.048	0.048	0.048	0.048	0.048	0.048	0.048	0	0.048
RECOVERABLE OUNCES	0	0	11497	25094	24951	24951	24951	24881	24951	16981	0	178257
OPERATING OUTCOME												
REVENUE ($'000'S)	0	0	4553	9937	9881	9881	9881	9853	9881	6724	0	70590
COST ($'000'S)	0	0	2788	6158	6087	6087	6033	6023	6033	4535	0	43744
OPERATING OUTCOME	0	0	$1,765	$3,779	$3,794	$3,794	$3,848	$3,830	$3,848	$2,189	$0	$26,846
BOOK BASIS												
PROJECT @ 100%												
PRE-PROD. COSTS	0	0	828	0	0	0	0	0	0	0	0	828
EXPL./DEV. EXP. (LAND)	217	32	137	150	210	100	0	0	0	0	0	846
EXPL./DEV. EXP. (OTHER)	807	0	0	0	0	0	0	0	0	0	0	807
CAPITAL EXPENDITURES	0	2528	8323	0	0	0	0	0	0	0	0	10851
ONGOING EXP.	0	0	0	0	2009	50	0	0	0	0	0	2058
CLOSURE EXP.	0	0	0	0	0	0	0	0	0	165	1179	1344
SALVAGE @ 15%	0	0	0	0	0	0	0	0	0	0	939	939
DEPL/DEPN (ASARCO)	0	0	72	144	144	144	144	144	144	86	0	1024
DEPRECIATION (J/V)	0	0	823	1642	1646	1646	1646	1642	1646	987	0	11679
DEPL (J/V)	0	0	12	46	443	476	476	474	476	285	0	2687
DEPL/DEPN TOTAL (J/V)	0	0	835	1688	2089	2122	2122	2116	2122	1271	0	14366
TOTAL PLANT OPER. COST	0	0	3623	7846	8176	8209	8155	8139	8155	5806	0	58110
OPERATING P & L (100% BASIS)	$0	$0	$930	$2,091	$1,704	$1,672	$1,726	$1,714	$1,726	$753	($240)	$12,075
COST PER OUNCE			$315	$313	$328	$329	$327	$327	$327	$342	-	$326
ASARCO AT 51% OF J/V												
TOTAL PLANT OPER. COST	0	0	1920	4146	4314	4331	4303	4295	4303	3048	0	30660
OPERATING P & L (51% BASIS)	$0	$0	$402	$922	$725	$708	$736	$730	$736	$298	($122)	$5,134
COST PER OUNCE			$327	$324	$339	$340	$338	$338	$338	$352	-	$337
ADJUSTMENT FOR G&A	0	0	68	107	105	105	104	104	104	88	23	808
ADJUSTED OPERATING P & L	0	0	470	1030	830	814	840	834	840	385	-99	5942
ASARCO AT 51% OF J/V, W/O SUNK COST												
TOTAL PLANT OPER. COST	0	0	1848	4002	4170	4187	4159	4151	4159	2961	0	29636
OPERATING P & L (51% BASIS)	$0	$0	$474	$1,066	$869	$853	$880	$874	$880	$384	($122)	$6,158
COST PER OUNCE			$315	$313	$328	$329	$327	$327	$327	$342	-	$326

$400 PIT

SCHEDULE

1989-1990 ASARCO	1990 J/V	1991 J/V	1992 J/V	1993 J/V	1994 J/V	1995 J/V	1996 J/V	1997 J/V	1998 J/V	1999 J/V	1989-1999 TOTAL
0	0	358	714	716	716	716	714	716	429	0	5079
0	0	169	150	2219	150	0	0	0	0	0	2687
		12	24	24	24	24	24	24	14	0	169
			23	23	23	23	23	23	14	0	150
				396	396	396	395	396	238	0	2219
					33	33	32	33	19	0	150
TOTAL		12	46	443	476	476	474	476	285	0	2687

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EXPLORATION, CAPITAL, AND DEVELOPMENT EXPENDITURES ($'000'S)

YARNELL

$400 ECONOMIC PIT DESIGN

10% REDUCTION IN OPERATING COSTS	1989-1990 ASARCO	1990 J/V	1991 J/V	1992 J/V	1993 J/V	1994 J/V	1995 J/V	1996 J/V	1997 J/V	1998 J/V	1999 J/V	SUB-TOTAL 1989 - 1990 ASARCO	SUB-TOTAL 1990-1999 J/V	GRAND TOTAL 1989 - 1999 ASARCO & J/V
EXPLORATION														
OPTION AND LAND PAYMENTS	217	32	137	150	210	100	0	0	0	0	0	217	629	846
DRILLING, METALLURGICAL, MISC.	807	0	0	0	0	0	0	0	0	0	0	807	0	807
TOTAL	1024	32	137	150	210	100	0	0	0	0	0	1024	629	1653
CAPITAL AND DEVELOPMENT														
PURCHASE NEARBY HOME	0	200	0	0	0	0	0	0	0	0	0	0	200	200
CONDEMNATION DRILLING	0	100	0	0	0	0	0	0	0	0	0	0	100	100
FINAL METALLURGICAL TESTING	0	50	0	0	0	0	0	0	0	0	0	0	50	50
HYDROGEOLOGIC TESTING	0	300	0	0	0	0	0	0	0	0	0	0	300	300
ENVIRONMENTAL ASSESSMENT	0	200	0	0	0	0	0	0	0	0	0	0	200	200
PERMITTING	0	100	0	0	0	0	0	0	0	0	0	0	100	100
MICROWAVE RELOCATIONS	0	450	0	0	0	0	0	0	0	0	0	0	450	450
WATER SUPPLY	0	0	500	0	0	0	0	0	0	0	0	0	500	500
MONITOR WELL EQUIP.	0	0	50	0	0	0	0	0	0	0	0	0	50	50
TRUCK SHOP FACILITY	0	0	0	0	0	0	0	0	0	0	0	0	0	0
MINE/CRUSH CONTRACTOR MOB.	0	0	150	0	0	0	0	0	0	0	0	0	150	150
SITE PREP., SERVICES, DISTRIBUTION	0	500	1085	0	0	0	0	0	0	0	0	0	1585	1585
PRIMARY CRUSHING FACILITY	0	0	0	0	0	0	0	0	0	0	0	0	0	0
SECONDARY CRUSHING FACILITY	0	0	1193	0	0	0	0	0	0	0	0	0	1193	1193
CONVEYING/STACKING SYSTEM	0	0	581	0	0	0	0	0	0	0	0	0	581	581
ADSORPTION, DESORPTION, REFINING	0	0	1440	0	0	0	0	0	0	0	0	0	1440	1440
HEAP PAD	0	0	1061	0	0	0	0	0	0	0	0	0	1061	1061
PONDS AND SOLUTION DIST.	0	0	558	0	0	0	0	0	0	0	0	0	558	558
ANCILLARY FACILITIES & MOB. EQUIP.	0	0	1135	0	0	0	0	0	0	0	0	0	1135	1135
CONSTRUCTION OVERHEAD & GEN. IND.	0	654	654	0	0	0	0	0	0	0	0	0	1308	1308
SUB-TOTAL	0	2554	8407	0	0	0	0	0	0	0	0	0	10961	10961
CONTINGENCY @ 10%	0	255	841	0	0	0	0	0	0	0	0	0	1096	1096
TOTAL	0	2809	9248	0	0	0	0	0	0	0	0	0	12057	12057
DELAYED/ONGOING CAPITAL EXPENDITURES														
LEACH PAD EXPANSION	0	0	0	0	1214	0	0	0	0	0	0	0	1214	1214
CONVEYOR & SOLUTION DIST. EXTENSION	0	0	0	0	443	0	0	0	0	0	0	0	443	443
YARNELL CREEK ROAD RELOCATION	0	0	0	0	0	45	0	0	0	0	0	0	45	45
CARBON REGENERATION KILN	0	0	0	0	169	0	0	0	0	0	0	0	169	169
SUB-TOTAL	0	0	0	0	1826	45	0	0	0	0	0	0	1871	1871
CONTINGENCY @ 10%	0	0	0	0	183	5	0	0	0	0	0	0	187	187
TOTAL	0	0	0	0	2009	50	0	0	0	0	0	0	2058	2058
MINE CLOSURE COSTS														
MINE/CRUSH CONTRACTOR DEMOB.	0	0	0	0	0	0	0	0	0	150	0	0	150	150
HEAP & POND NEUTRALIZATION	0	0	0	0	0	0	0	0	0	0	50	0	50	50
HEAP CAPPING	0	0	0	0	0	0	0	0	0	0	250	0	250	250
PIT FENCING	0	0	0	0	0	0	0	0	0	0	20	0	20	20
SUB-TOTAL	0	0	0	0	0	0	0	0	0	150	320	0	470	470
CONTINGENCY @ 10%	0	0	0	0	0	0	0	0	0	15	32	0	47	47
TOTAL	0	0	0	0	0	0	0	0	0	165	352	0	517	517
GRAND TOTAL	$1,024	$2,841	$9,385	$150	$2,219	$150	$0	$0	$0	$165	$352	$1,024	$15,261	$16,285

YARNELL PROJECT

$400 ECONOMIC PIT DESIGN

72% RECOVERY

GOLD PRICE @ $400		1989-1990	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	1989-1999
		ASARCO	J/V	J/V	J/V	J/V	J/V	J/V	J/V	J/V	J/V	J/V	TOTAL
MINING SCHEDULE	10% REDUCTION IN OPERATING COSTS												
ORE TONS ('000'S)		0	0	358	714	716	716	716	714	716	429	0	5079
WASTE TONS ('000'S)		0	0	532	1012	1015	1015	1015	1012	1015	607	0	7223
STRIPPING RATIO		0	0	1.49	1.42	1.42	1.42	1.42	1.42	1.42	1.41	0	1.42
ORE GRADE (OPT)		0	0	0.053	0.048	0.048	0.048	0.048	0.048	0.048	0.048	0.000	0.048
RECOVERABLE OUNCES		0	0	11497	25094	24951	24951	24951	24881	24951	16981	0	178257
OPERATING OUTCOME													
REVENUE ($'000'S)		0	0	4553	9937	9881	9881	9881	9853	9881	6724	0	70590
COST ($'000'S)	TOTAL*(0.90) >>	0	0	2509	5542	5478	5478	5430	5421	5430	4082	0	39370
OPERATING OUTCOME		0	0	$2,044	$4,395	$4,402	$4,402	$4,451	$4,432	$4,451	$2,643	$0	$31,220
TAX BASIS – 100%													
PRE-PROD. COSTS	TOTAL*(0.90) >>	0	0	745	0	0	0	0	0	0	0	0	745
EXPL./DEV. EXP. (LAND)		217	32	137	150	210	100	0	0	0	0	0	846
EXPL./DEV. EXP. (OTHER)		807	0	0	0	0	0	0	0	0	0	0	807
EXPENSE (ONGOING & CLOSUR	OP. COSTS*(.9) >>	0	0	0	0	2009	50	0	0	0	165	1096	3319
CAPITAL EXPENDITURES		0	2809	9248	0	0	0	0	0	0	0	0	12057
SALVAGE @ 15%		0	0	0	0	0	0	0	0	0	0	1044	1044
DEPRECIATION		0	0	1723	2953	2109	1506	1077	1077	1077	537	0	12057
NET BEFORE DEPL.		-1024	-32	-562	1292	75	2747	3374	3355	3374	1941	-53	14489
DEPL.		0	0	0	646	37	1373	1482	1478	1482	971	0	7470
NET BEFORE TAX		-1024	-32	-562	646	37	1373	1892	1878	1892	971	-53	7019
TAX @ 38%		-389	-12	-213	246	14	522	719	713	719	369	-20	2667
NET AFTER TAX		-635	-20	-348	401	23	852	1173	1164	1173	602	-33	4352
NET AFTER TAX CASH FLOW		($635)	($2,829)	($7,873)	$3,999	$2,169	$3,731	$3,732	$3,719	$3,732	$2,109	($33)	$11,822
NET AFTER TAX CASH FLOW (1990 COMBINED)			($3,464)	($7,873)	$3,999	$2,169	$3,731	$3,732	$3,719	$3,732	$2,109	($33)	$11,822

$400 ECONOMIC PIT DESIGN

DCFROI %	20.3
NPV @ 0%	$11,822
NPV @ 5%	$7,016
NPV @ 10%	$3,785
NPV @ 15%	$1,583

YARNELL PROJECT

$400 ECONOMIC PIT DESIGN

72% RECOVERY

GOLD PRICE @ $400	1989-1990	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	1989-1999
	ASARCO	J/V	J/V	J/V	J/V	J/V	J/V	J/V	J/V	J/V	J/V	TOTAL
MINING SCHEDULE — 10% REDUCTION IN OPERATING COSTS												
ORE TONS ('000'S)	0	0	358	714	716	716	716	714	716	429	0	5079
WASTE TONS ('000'S)	0	0	532	1012	1015	1015	1015	1012	1015	607	0	7223
STRIPPING RATIO	0	0	1.49	1.42	1.42	1.42	1.42	1.42	1.42	1.41	0.00	1.42
ORE GRADE (OPT)	0	0	0.053	0.048	0.048	0.048	0.048	0.048	0.048	0.048	0	0.048
RECOVERABLE OUNCES	0	0	11497	25094	24951	24951	24951	24881	24951	16981	0	178257
OPERATING OUTCOME												
REVENUE ($'000'S)	0	0	4553	9937	9881	9881	9881	9853	9881	6724	0	70590
COST ($'000'S)	0	0	2509	5542	5478	5478	5430	5421	5430	4082	0	39370
OPERATING OUTCOME	0	0	$2,044	$4,395	$4,402	$4,402	$4,451	$4,432	$4,451	$2,643	$0	$31,220
TAX BASIS – ASARCO @ 51% OF J/V												
PRE-PROD. COSTS	0	0	745	0	0	0	0	0	0	0	0	745
EXPL./DEV. EXP. (LAND)	217	32	137	150	210	100	0	0	0	0	0	846
EXPL./DEV. EXP. (OTHER)	807	0	0	0	0	0	0	0	0	0	0	807
EXPENSE (ONGOING & CLOSURE)	0	0	0	0	2009	50	0	0	0	165	1096	3319
CAPITAL EXPENDITURES	0	2809	9248	0	0	0	0	0	0	0	0	12057
SALVAGE @ 15%	0	0	0	0	0	0	0	0	0	0	1044	1044
DEPRECIATION	0	0	1723	2953	2109	1506	1077	1077	1077	537	0	12057
NET BEFORE DEPL.	-1024	-32	-562	1292	75	2747	3374	3355	3374	1941	-53	14489
DEPL.	0	0	0	646	37	1373	1482	1478	1482	971	0	7470
NET BEFORE TAX	-1024	-32	-562	646	37	1373	1892	1878	1892	971	-53	7019
TAX @ 38%	-389	-12	-213	246	14	522	719	713	719	369	-20	2667
NET AFTER TAX	-635	-20	-348	401	23	852	1173	1164	1173	602	-33	4352
NET AFTER TAX CASH FLOW	-635	-2629	-7873	3999	2169	3731	3732	3719	3732	2109	-33	11822
ASARCO AT 51%		-2078	-4015	2040	1106	1903	1903	1897	1903	1076	-17	5718
ADJUSTMENT FOR G&A TOTAL*(0.90) >>	0	0	38	60	59	59	58	58	58	49	13	451
ADJUSTED AFTER TAX CASH FLOW @ 51%	**$0**	**($2,078)**	**($3,977)**	**$2,100**	**$1,165**	**$1,962**	**$1,961**	**$1,955**	**$1,961**	**$1,125**	**($4)**	**$6,169**

$400 ECONOMIC PIT DESIGN

DCFROI %	19.6
NPV @ 0%	$6,169
NPV @ 5%	$3,625
NPV @ 10%	$1,916
NPV @ 15%	$750

YARNELL PROJECT

$400 ECONOMIC PIT DESIGN

72% RECOVERY

GOLD PRICE @ $400	1989-1990	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	1989-1999
	ASARCO	J/V	J/V	J/V	J/V	J/V	J/V	J/V	J/V	J/V	J/V	TOTAL
MINING SCHEDULE (10% REDUCTION IN OPERATING COSTS)												
ORE TONS ('000'S)	0	0	358	714	716	716	716	714	716	429	0	5079
WASTE TONS ('000'S)	0	0	532	1012	1015	1015	1015	1012	1015	607	0	7223
STRIPPING RATIO	0	0	1.49	1.42	1.42	1.42	1.42	1.42	1.42	1.41	0.00	1.42
ORE GRADE (OPT)	0	0	0.053	0.048	0.048	0.048	0.048	0.048	0.048	0.048	0	0.048
RECOVERABLE OUNCES	0	0	11497	25094	24951	24951	24951	24881	24951	16981	0	178257
OPERATING OUTCOME												
REVENUE ($'000'S)	0	0	4553	9937	9881	9881	9881	9853	9881	6724	0	70590
COST ($'000'S)	0	0	2509	5542	5478	5478	5430	5421	5430	4082	0	39370
OPERATING OUTCOME	0	0	$2,044	$4,395	$4,402	$4,402	$4,451	$4,432	$4,451	$2,643	$0	$31,220
BOOK BASIS												
PROJECT @ 100%												
PRE-PROD. COSTS	0	0	745.2	0	0	0	0	0	0	0	0	745.2
EXPL./DEV. EXP. (LAND)	217	32	137	150	210	100	0	0	0	0	0	846
EXPL./DEV. EXP. (OTHER)	807	0	0	0	0	0	0	0	0	0	0	807
CAPITAL EXPENDITURES	0	2809	9248	0	0	0	0	0	0	0	0	12057
ONGOING EXP.	0	0	0	0	2009	50	0	0	0	0	0	2058
CLOSURE EXP.	0	0	0	0	0	0	0	0	0	165	1179	1344
SALVAGE @ 15%	0	0	0	0	0	0	0	0	0	0	1044	1044
DEPL/DEPN (ASARCO)	0	0	72	144	144	144	144	144	144	86	0	1024
DEPRECIATION (J/V)	0	0	902	1800	1805	1805	1805	1800	1805	1081	0	12802
DEPL (J/V)	0	0	12	46	443	476	476	474	476	285	0	2687
DEPL/DEPN TOTAL (J/V)	0	0	914	1846	2248	2280	2280	2274	2280	1366	0	15489
TOTAL PLANT OPER. COST	0	0	3423	7388	7726	7759	7710	7695	7710	5448	0	54859
OPERATING P & L (100% BASIS)	$0	$0	$1,129	$2,549	$2,155	$2,122	$2,171	$2,158	$2,171	$1,112	($135)	$15,430
COST PER OUNCE			$298	$294	$310	$311	$309	$309	$309	$321	–	$308
ASARCO AT 51% OF J/V												
TOTAL PLANT OPER. COST	0	0	1818	3912	4085	4101	4076	4068	4076	2865	0	29002
OPERATING P & L (51% BASIS)	$0	$0	$504	$1,156	$954	$938	$963	$957	$963	$480	($69)	$6,845
COST PER OUNCE			$310	$306	$321	$322	$320	$321	$320	$331	–	$319
ADJUSTMENT FOR G&A	0	0	61	97	95	95	93	93	93	79	21	727
ADJUSTED OPERATING P & L	0	0	565	1253	1049	1033	1056	1050	1056	559	-48	7573
ASARCO AT 51% OF J/V, W/O SUNK COST												
TOTAL PLANT OPER. COST	0	0	1746	3768	3940	3957	3932	3924	3932	2778	0	27978
OPERATING P & L (51% BASIS)	$0	$0	$576	$1,300	$1,099	$1,082	$1,107	$1,101	$1,107	$567	($69)	$7,869
COST PER OUNCE			$298	$294	$310	$311	$309	$309	$309	$321	–	$308

$400 PIT

SCHEDULE

1989-1990 ASARCO	1990 J/V	1991 J/V	1992 J/V	1993 J/V	1994 J/V	1995 J/V	1996 J/V	1997 J/V	1998 J/V	1999 J/V	1989-1999 TOTAL
0	0	358	714	716	716	716	714	716	429	0	5079
0	0	169	150	2219	150	0	0	0	0	0	2687
		12	24	24	24	24	24	24	14	0	169
			23	23	23	23	23	23	14	0	150
				396	396	396	395	396	238	0	2219
					33	33	32	33	19	0	150
TOTAL		12	46	443	476	476	474	476	285	0	2687

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EXPLORATION, CAPITAL, AND DEVELOPMENT EXPENDITURES ($'000'S) — YARNELL

$400 ECONOMIC PIT DESIGN

1% INCREASE IN RECOVERY	1989-1990 ASARCO	1990 J/V	1991 J/V	1992 J/V	1993 J/V	1994 J/V	1995 J/V	1996 J/V	1997 J/V	1998 J/V	1999 J/V	SUB-TOTAL 1989 - 1990 ASARCO	SUB-TOTAL 1990-1999 J/V	GRAND TOTAL 1989 - 1999 ASARCO & J/V
EXPLORATION														
OPTION AND LAND PAYMENTS	217	32	137	150	210	100	0	0	0	0	0	217	629	846
DRILLING, METALLURGICAL, MISC.	807	0	0	0	0	0	0	0	0	0	0	807	0	807
TOTAL	1024	32	137	150	210	100	0	0	0	0	0	1024	629	1653
CAPITAL AND DEVELOPMENT														
PURCHASE NEARBY HOME	0	200	0	0	0	0	0	0	0	0	0	0	200	200
CONDEMNATION DRILLING	0	100	0	0	0	0	0	0	0	0	0	0	100	100
FINAL METALLURGICAL TESTING	0	50	0	0	0	0	0	0	0	0	0	0	50	50
HYDROGEOLOGIC TESTING	0	300	0	0	0	0	0	0	0	0	0	0	300	300
ENVIRONMENTAL ASSESSMENT	0	200	0	0	0	0	0	0	0	0	0	0	200	200
PERMITTING	0	100	0	0	0	0	0	0	0	0	0	0	100	100
MICROWAVE RELOCATIONS	0	450	0	0	0	0	0	0	0	0	0	0	450	450
WATER SUPPLY	0	0	500	0	0	0	0	0	0	0	0	0	500	500
MONITOR WELL EQUIP.	0	0	50	0	0	0	0	0	0	0	0	0	50	50
TRUCK SHOP FACILITY	0	0	0	0	0	0	0	0	0	0	0	0	0	0
MINE/CRUSH CONTRACTOR MOB.	0	0	150	0	0	0	0	0	0	0	0	0	150	150
SITE PREP., SERVICES, DISTRIBUTION	0	500	1085	0	0	0	0	0	0	0	0	0	1585	1585
PRIMARY CRUSHING FACILITY	0	0	0	0	0	0	0	0	0	0	0	0	0	0
SECONDARY CRUSHING FACILITY	0	0	1193	0	0	0	0	0	0	0	0	0	1193	1193
CONVEYING/STACKING SYSTEM	0	0	581	0	0	0	0	0	0	0	0	0	581	581
ADSORPTION, DESORPTION, REFINING	0	0	1440	0	0	0	0	0	0	0	0	0	1440	1440
HEAP PAD	0	0	1061	0	0	0	0	0	0	0	0	0	1061	1061
PONDS AND SOLUTION DIST.	0	0	558	0	0	0	0	0	0	0	0	0	558	558
ANCILLARY FACILITIES & MOB. EQUIP.	0	0	1135	0	0	0	0	0	0	0	0	0	1135	1135
CONSTRUCTION OVERHEAD & GEN. IND.	0	654	654	0	0	0	0	0	0	0	0	0	1308	1308
SUB-TOTAL	0	2554	8407	0	0	0	0	0	0	0	0	0	10961	10961
CONTINGENCY @ 10%	0	255	841	0	0	0	0	0	0	0	0	0	1096	1096
TOTAL	0	2809	9248	0	0	0	0	0	0	0	0	0	12057	12057
DELAYED/ONGOING CAPITAL EXPENDITURES														
LEACH PAD EXPANSION	0	0	0	0	1214	0	0	0	0	0	0	0	1214	1214
CONVEYOR & SOLUTION DIST. EXTENSION	0	0	0	0	443	0	0	0	0	0	0	0	443	443
YARNELL CREEK ROAD RELOCATION	0	0	0	0	0	45	0	0	0	0	0	0	45	45
CARBON REGENERATION KILN	0	0	0	0	169	0	0	0	0	0	0	0	169	169
SUB-TOTAL	0	0	0	0	1826	45	0	0	0	0	0	0	1871	1871
CONTINGENCY @ 10%	0	0	0	0	183	5	0	0	0	0	0	0	187	187
TOTAL	0	0	0	0	2009	50	0	0	0	0	0	0	2058	2058
MINE CLOSURE COSTS														
MINE/CRUSH CONTRACTOR DEMOB.	0	0	0	0	0	0	0	0	0	150	0	0	150	150
HEAP & POND NEUTRALIZATION	0	0	0	0	0	0	0	0	0	0	50	0	50	50
HEAP CAPPING	0	0	0	0	0	0	0	0	0	0	250	0	250	250
PIT FENCING	0	0	0	0	0	0	0	0	0	0	20	0	20	20
SUB-TOTAL	0	0	0	0	0	0	0	0	0	150	320	0	470	470
CONTINGENCY @ 10%	0	0	0	0	0	0	0	0	0	15	32	0	47	47
TOTAL	0	0	0	0	0	0	0	0	0	165	352	0	517	517
GRAND TOTAL	$1,024	$2,841	$9,385	$150	$2,219	$150	$0	$0	$0	$165	$352	$1,024	$15,261	$16,285

YARNELL PROJECT

$400 ECONOMIC PIT DESIGN

72% RECOVERY

GOLD PRICE @ $400		1989-1990	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	1989-1999
		ASARCO	J/V	J/V	J/V	J/V	J/V	J/V	J/V	J/V	J/V	J/V	TOTAL
MINING SCHEDULE	1% INCREASE IN RECOVERY												
ORE TONS ('000'S)		0	0	358	714	716	716	716	714	716	429	0	5079
WASTE TONS ('000'S)		0	0	532	1012	1015	1015	1015	1012	1015	607	0	7223
STRIPPING RATIO		0	0	1.49	1.42	1.42	1.42	1.42	1.42	1.42	1.41	0	1.42
ORE GRADE (OPT)		0	0	0.053	0.048	0.048	0.048	0.048	0.048	0.048	0.048	0.000	0.048
RECOVERABLE OUNCES	TOTAL*(.73/.72) >>	0	0	11657	25443	25298	25298	25298	25227	25298	17217	0	180733
OPERATING OUTCOME													
REVENUE ($'000'S)		0	0	4616	10075	10018	10018	10018	9990	10018	6818	0	71570
COST ($'000'S)		0	0	2788	6158	6087	6087	6033	6023	6033	4535	0	43744
OPERATING OUTCOME		0	0	$1,828	$3,917	$3,931	$3,931	$3,985	$3,967	$3,985	$2,283	$0	$27,826
TAX BASIS – 100%													
PRE-PROD. COSTS		0	0	828	0	0	0	0	0	0	0	0	828
EXPL./DEV. EXP. (LAND)		217	32	137	150	210	100	0	0	0	0	0	846
EXPL./DEV. EXP. (OTHER)		807	0	0	0	0	0	0	0	0	0	0	807
EXPENSE (ONGOING & CLOSURE)		0	0	0	0	2009	50	0	0	0	165	1179	3402
CAPITAL EXPENDITURES		0	2809	9248	0	0	0	0	0	0	0	0	12057
SALVAGE @ 15%		0	0	0	0	0	0	0	0	0	0	1044	1044
DEPRECIATION		0	0	1723	2953	2109	1508	1077	1077	1077	537	0	12057
NET BEFORE DEPL.		-1024	-32	-860	814	-397	2275	2908	2890	2908	1581	-135	10930
DEPL.		0	0	0	407	0	1138	1454	1445	1454	791	0	6689
NET BEFORE TAX		-1024	-32	-860	407	-397	1138	1454	1445	1454	791	-135	4241
TAX @ 38%		-389	-12	-327	155	-151	432	553	549	553	300	-51	1612
NET AFTER TAX		-635	-20	-533	252	-246	705	902	896	902	490	-84	2629
NET AFTER TAX CASH FLOW		($635)	($2,829)	($8,058)	$3,612	$1,863	$3,349	$3,432	$3,418	$3,432	$1,817	($84)	$9,318
NET AFTER TAX CASH FLOW (1990 COMBINED)			($3,464)	($8,058)	$3,612	$1,863	$3,349	$3,432	$3,418	$3,432	$1,817	($84)	$9,318

$400 ECONOMIC PIT DESIGN

DCFROI %	16.3
NPV @ 0%	$9,318
NPV @ 5%	$5,103
NPV @ 10%	$2,288
NPV @ 15%	$387

YARNELL PROJECT

$400 ECONOMIC PIT DESIGN

72% RECOVERY

GOLD PRICE @ $400	1989-1990	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	1989-1999
	ASARCO	J/V	J/V	J/V	J/V	J/V	J/V	J/V	J/V	J/V	J/V	TOTAL
MINING SCHEDULE (1% INCREASE IN RECOVERY)												
ORE TONS ('000'S)	0	0	358	714	716	716	716	714	716	429	0	5079
WASTE TONS ('000'S)	0	0	532	1012	1015	1015	1015	1012	1015	607	0	7223
STRIPPING RATIO	0	0	1.49	1.42	1.42	1.42	1.42	1.42	1.42	1.41	0.00	1.42
ORE GRADE (OPT)	0	0	0.053	0.048	0.048	0.048	0.048	0.048	0.048	0.048	0	0.048
RECOVERABLE OUNCES	0	0	11657	25443	25298	25298	25298	25227	25298	17217	0	180733
OPERATING OUTCOME												
REVENUE ($'000'S)	0	0	4616	10075	10018	10018	10018	9990	10018	6818	0	71570
COST ($'000'S)	0	0	2788	6158	6087	6087	6033	6023	6033	4535	0	43744
OPERATING OUTCOME	0	0	$1,828	$3,917	$3,931	$3,931	$3,985	$3,967	$3,985	$2,283	$0	$27,826
TAX BASIS – ASARCO @ 51% OF J/V												
PRE-PROD. COSTS	0	0	828	0	0	0	0	0	0	0	0	828
EXPL./DEV. EXP. (LAND)	217	32	137	150	210	100	0	0	0	0	0	846
EXPL./DEV. EXP. (OTHER)	807	0	0	0	0	0	0	0	0	0	0	807
EXPENSE (ONGOING & CLOSURE)	0	0	0	0	2009	50	0	0	0	165	1179	3402
CAPITAL EXPENDITURES	0	2809	9248	0	0	0	0	0	0	0	0	12057
SALVAGE @ 15%	0	0	0	0	0	0	0	0	0	0	1044	1044
DEPRECIATION	0	0	1723	2953	2109	1506	1077	1077	1077	537	0	12057
NET BEFORE DEPL.	-1024	-32	-860	814	-397	2275	2908	2890	2908	1581	-135	10930
DEPL.	0	0	0	407	0	1138	1454	1445	1454	791	0	6689
NET BEFORE TAX	-1024	-32	-860	407	-397	1138	1454	1445	1454	791	-135	4241
TAX @ 38%	-389	-12	-327	155	-151	432	553	549	553	300	-51	1612
NET AFTER TAX	-635	-20	-533	252	-246	705	902	896	902	490	-84	2629
NET AFTER TAX CASH FLOW	-635	-2829	-8058	3612	1863	3349	3432	3418	3432	1817	-84	9318
ASARCO AT 51%		-2078	-4110	1842	950	1708	1750	1743	1750	927	-43	4441
ADJUSTMENT FOR G&A	0	0	42	67	65	65	64	64	64	54	14	501
ADJUSTED AFTER TAX CASH FLOW @ 51%	$0	($2,078)	($4,068)	$1,909	$1,015	$1,773	$1,815	$1,807	$1,815	$981	($29)	$4,942

$400 ECONOMIC PIT DESIGN

DCFROI %	16.0
NPV @ 0%	$4,942
NPV @ 5%	$2,688
NPV @ 10%	$1,182
NPV @ 15%	$164

YARNELL PROJECT

$400 ECONOMIC PIT DESIGN

72% RECOVERY

GOLD PRICE @ $400	1989-1990	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	1989-1999
	ASARCO	J/V	J/V	J/V	J/V	J/V	J/V	J/V	J/V	J/V	J/V	TOTAL
MINING SCHEDULE (1% INCREASE IN RECOVERY)												
ORE TONS ('000'S)	0	0	358	714	716	716	716	714	716	429	0	5079
WASTE TONS ('000'S)	0	0	532	1012	1015	1015	1015	1012	1015	607	0	7223
STRIPPING RATIO	0	0	1.49	1.42	1.42	1.42	1.42	1.42	1.42	1.41	0.00	1.42
ORE GRADE (OPT)	0	0	0.053	0.048	0.048	0.048	0.048	0.048	0.048	0.048	0	0.048
RECOVERABLE OUNCES	0	0	11657	25443	25298	25298	25298	25227	25298	17217	0	180733
OPERATING OUTCOME												
REVENUE ($'000'S)	0	0	4616	10075	10018	10018	10018	9990	10018	6818	0	71570
COST ($'000'S)	0	0	2788	6158	6087	6087	6033	6023	6033	4535	0	43744
OPERATING OUTCOME	0	0	$1,828	$3,917	$3,931	$3,931	$3,985	$3,967	$3,985	$2,283	$0	$27,826
BOOK BASIS												
PROJECT @ 100%												
PRE-PROD. COSTS	0	0	828	0	0	0	0	0	0	0	0	828
EXPL./DEV. EXP. (LAND)	217	32	137	150	210	100	0	0	0	0	0	846
EXPL./DEV. EXP. (OTHER)	807	0	0	0	0	0	0	0	0	0	0	807
CAPITAL EXPENDITURES	0	2809	9248	0	0	0	0	0	0	0	0	12057
ONGOING EXP.	0	0	0	0	2009	50	0	0	0	0	0	2058
CLOSURE EXP.	0	0	0	0	0	0	0	0	0	165	1179	1344
SALVAGE @ 15%	0	0	0	0	0	0	0	0	0	0	1044	1044
DEPL/DEPN (ASARCO)	0	0	72	144	144	144	144	144	144	86	0	1024
DEPRECIATION (J/V)	0	0	908	1811	1816	1816	1816	1811	1816	1088	0	12885
DEPL (J/V)	0	0	12	46	443	476	476	474	476	285	0	2687
DEPL/DEPN TOTAL (J/V)	0	0	920	1858	2259	2292	2292	2286	2292	1373	0	15572
TOTAL PLANT OPER COST	0	0	3708	8016	8346	8379	8325	8309	8325	5908	0	59316
OPERATING P & L (100% BASIS)	$0	$0	$908	$2,059	$1,671	$1,639	$1,693	$1,681	$1,693	$745	($135)	$11,954
COST PER OUNCE			$318	$315	$330	$331	$329	$329	$329	$343	-	$328
ASARCO AT 51% OF J/V												
TOTAL PLANT OPER. COST	0	0	1963	4232	4401	4418	4390	4381	4390	3100	0	31275
OPERATING P & L (51% BASIS)	$0	$0	$391	$906	$708	$691	$719	$713	$719	$293	($69)	$5,072
COST PER OUNCE			$330	$326	$341	$342	$340	$341	$340	$353	-	$339
ADJUSTMENT FOR G&A	0	0	68	107	105	105	104	104	104	88	23	808
ADJUSTED OPERATING P & L	0	0	458	1014	813	797	823	817	823	381	-46	5880
ASARCO AT 51% OF J/V, W/O SUNK COST												
TOTAL PLANT OPER. COST	0	0	1891	4088	4257	4273	4246	4237	4246	3013	0	30251
OPERATING P & L (51% BASIS)	$0	$0	$463	$1,050	$852	$836	$863	$857	$863	$380	($69)	$6,096
COST PER OUNCE			$318	$315	$330	$331	$329	$329	$329	$343	-	$328

$400 PIT

SCHEDULE

1989-1990 ASARCO	1990 J/V	1991 J/V	1992 J/V	1993 J/V	1994 J/V	1995 J/V	1996 J/V	1997 J/V	1998 J/V	1999 J/V	1989-1999 TOTAL
0	0	358	714	718	716	716	714	716	429	0	5079
0	0	169	150	2219	150	0	0	0	0	0	2687
		12	24	24	24	24	24	24	14	0	169
			23	23	23	23	23	23	14	0	150
				396	396	396	395	396	238	0	2219
					33	33	32	33	19	0	150
TOTAL		12	46	443	476	476	474	476	285	0	2687

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EXPLORATION, CAPITAL, AND DEVELOPMENT EXPENDITURES ($'000'S)

YARNELL

$400 ECONOMIC PIT DESIGN

10% INCREASE IN CAP. AND DEV. EXP.	1989-1990 ASARCO	1990 J/V	1991 J/V	1992 J/V	1993 J/V	1994 J/V	1995 J/V	1996 J/V	1997 J/V	1998 J/V	1999 J/V	SUB-TOTAL 1989 - 1990 ASARCO	SUB-TOTAL 1990-1999 J/V	GRAND TOTAL 1989 - 1999 ASARCO & J/V
EXPLORATION														
OPTION AND LAND PAYMENTS	217	32	137	150	210	100	0	0	0	0	0	217	629	846
DRILLING, METALLURGICAL, MISC.	807	0	0	0	0	0	0	0	0	0	0	807	0	807
TOTAL	1024	32	137	150	210	100	0	0	0	0	0	1024	629	1653
CAPITAL AND DEVELOPMENT														
PURCHASE NEARBY HOME	0	200	0	0	0	0	0	0	0	0	0	0	200	200
CONDEMNATION DRILLING	0	100	0	0	0	0	0	0	0	0	0	0	100	100
FINAL METALLURGICAL TESTING	0	50	0	0	0	0	0	0	0	0	0	0	50	50
HYDROGEOLOGIC TESTING	0	300	0	0	0	0	0	0	0	0	0	0	300	300
ENVIRONMENTAL ASSESSMENT	0	200	0	0	0	0	0	0	0	0	0	0	200	200
PERMITTING	0	100	0	0	0	0	0	0	0	0	0	0	100	100
MICROWAVE RELOCATIONS	0	450	0	0	0	0	0	0	0	0	0	0	450	450
WATER SUPPLY	0	0	500	0	0	0	0	0	0	0	0	0	500	500
MONITOR WELL EQUIP.	0	0	50	0	0	0	0	0	0	0	0	0	50	50
TRUCK SHOP FACILITY	0	0	0	0	0	0	0	0	0	0	0	0	0	0
MINE/CRUSH CONTRACTOR MOB.	0	0	150	0	0	0	0	0	0	0	0	0	150	150
SITE PREP., SERVICES, DISTRIBUTION	0	500	1085	0	0	0	0	0	0	0	0	0	1585	1585
PRIMARY CRUSHING FACILITY	0	0	0	0	0	0	0	0	0	0	0	0	0	0
SECONDARY CRUSHING FACILITY	0	0	1193	0	0	0	0	0	0	0	0	0	1193	1193
CONVEYING/STACKING SYSTEM	0	0	581	0	0	0	0	0	0	0	0	0	581	581
ADSORPTION, DESORPTION, REFINING	0	0	1440	0	0	0	0	0	0	0	0	0	1440	1440
HEAP PAD	0	0	1061	0	0	0	0	0	0	0	0	0	1061	1061
PONDS AND SOLUTION DIST.	0	0	558	0	0	0	0	0	0	0	0	0	558	558
ANCILLARY FACILITIES & MOB. EQUIP.	0	0	1135	0	0	0	0	0	0	0	0	0	1135	1135
CONSTRUCTION OVERHEAD & GEN. IND.	0	654	654	0	0	0	0	0	0	0	0	0	1308	1308
SUB-TOTAL	0	2554	8407	0	0	0	0	0	0	0	0	0	10961	10961
CONTINGENCY @ 10%	0	255	841	0	0	0	0	0	0	0	0	0	1096	1096
TOTAL TOTAL*1.10 >>	0	3090	10172	0	0	0	0	0	0	0	0	0	13263	13263
DELAYED/ONGOING CAPITAL EXPENDITURES														
LEACH PAD EXPANSION	0	0	0	0	1214	0	0	0	0	0	0	0	1214	1214
CONVEYOR & SOLUTION DIST. EXTENSION	0	0	0	0	443	0	0	0	0	0	0	0	443	443
YARNELL CREEK ROAD RELOCATION	0	0	0	0	0	45	0	0	0	0	0	0	45	45
CARBON REGENERATION KILN	0	0	0	0	169	0	0	0	0	0	0	0	169	169
SUB-TOTAL	0	0	0	0	1826	45	0	0	0	0	0	0	1871	1871
CONTINGENCY @ 10%	0	0	0	0	183	5	0	0	0	0	0	0	187	187
TOTAL	0	0	0	0	2009	50	0	0	0	0	0	0	2058	2058
MINE CLOSURE COSTS														
MINE/CRUSH CONTRACTOR DEMOB.	0	0	0	0	0	0	0	0	0	150	0	0	150	150
HEAP & POND NEUTRALIZATION	0	0	0	0	0	0	0	0	0	0	50	0	50	50
HEAP CAPPING	0	0	0	0	0	0	0	0	0	0	250	0	250	250
PIT FENCING	0	0	0	0	0	0	0	0	0	0	20	0	20	20
SUB-TOTAL	0	0	0	0	0	0	0	0	0	150	320	0	470	470
CONTINGENCY @ 10%	0	0	0	0	0	0	0	0	0	15	32	0	47	47
TOTAL	0	0	0	0	0	0	0	0	0	165	352	0	517	517
GRAND TOTAL	$1,024	$3,122	$10,309	$150	$2,219	$150	$0	$0	$0	$165	$352	$1,024	$16,467	$17,491

YARNELL PROJECT

$400 ECONOMIC PIT DESIGN

72% RECOVERY

GOLD PRICE @ $400	1989-1990	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	1989-1999
	ASARCO	J/V	J/V	J/V	J/V	J/V	J/V	J/V	J/V	J/V	J/V	TOTAL
MINING SCHEDULE (10% INCREASE IN CAP. AND DEV. EXP.)												
ORE TONS ('000'S)	0	0	358	714	716	716	716	714	716	429	0	5079
WASTE TONS ('000'S)	0	0	532	1012	1015	1015	1015	1012	1015	607	0	7223
STRIPPING RATIO	0	0	1.49	1.42	1.42	1.42	1.42	1.42	1.42	1.41	0	1.42
ORE GRADE (OPT)	0	0	0.053	0.048	0.048	0.048	0.048	0.048	0.048	0.048	0.000	0.048
RECOVERABLE OUNCES	0	0	11497	25094	24951	24951	24951	24881	24951	18981	0	178257
OPERATING OUTCOME												
REVENUE ($'000'S)	0	0	4553	9937	9881	9881	9881	9853	9881	6724	0	70590
COST ($'000'S)	0	0	2788	6158	6087	6087	6033	6023	6033	4535	0	43744
OPERATING OUTCOME	0	0	$1,765	$3,779	$3,794	$3,794	$3,848	$3,830	$3,848	$2,189	$0	$26,846
TAX BASIS - 100%												
PRE-PROD. COSTS	0	0	828	0	0	0	0	0	0	0	0	828
EXPL./DEV. EXP. (LAND)	217	32	137	150	210	100	0	0	0	0	0	846
EXPL./DEV. EXP. (OTHER)	807	0	0	0	0	0	0	0	0	0	0	807
EXPENSE (ONGOING & CLOSURE)	0	0	0	0	2009	50	0	0	0	165	1179	3402
CAPITAL EXPENDITURES	0	3090	10172	0	0	0	0	0	0	0	0	13263
SALVAGE @ 15% TOTAL*1.10 >>	0	0	0	0	0	0	0	0	0	0	1148	1148
DEPRECIATION	0	0	1895	3248	2320	1657	1184	1184	1184	590	0	13263
NET BEFORE DEPL.	-1024	-32	-1095	381	-745	1988	2663	2646	2663	1434	-31	8848
DEPL.	0	0	0	191	0	994	1332	1323	1332	717	0	5887
NET BEFORE TAX	-1024	-32	-1095	191	-745	994	1332	1323	1332	717	-31	2960
TAX @ 38%	-389	-12	-416	72	-283	378	506	503	506	273	-12	1125
NET AFTER TAX	-635	-20	-679	118	-462	616	826	820	826	445	-19	1835
NET AFTER TAX CASH FLOW	($635)	($3,110)	($8,956)	$3,557	$1,858	$3,266	$3,342	$3,327	$3,342	$1,752	($19)	$7,723
NET AFTER TAX CASH FLOW (1990 COMBINED)		($3,745)	($8,956)	$3,557	$1,858	$3,266	$3,342	$3,327	$3,342	$1,752	($19)	$7,723

$400 ECONOMIC PIT DESIGN

DCFROI %	12.7
NPV @ 0%	$7,723
NPV @ 5%	$3,707
NPV @ 10%	$1,051
NPV @ 15%	($723)

YARNELL PROJECT

$400 ECONOMIC PIT DESIGN

72% RECOVERY

GOLD PRICE @ $400	1989-1990	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	1989-1999
	ASARCO	J/V	J/V	J/V	J/V	J/V	J/V	J/V	J/V	J/V	J/V	TOTAL
MINING SCHEDULE (10% INCREASE IN CAP. AND DEV. EXP.)												
ORE TONS ('000'S)	0	0	358	714	716	716	716	714	716	429	0	5079
WASTE TONS ('000'S)	0	0	532	1012	1015	1015	1015	1012	1015	607	0	7223
STRIPPING RATIO	0	0	1.49	1.42	1.42	1.42	1.42	1.42	1.42	1.41	0.00	1.42
ORE GRADE (OPT)	0	0	0.053	0.048	0.048	0.048	0.048	0.048	0.048	0.048	0	0.048
RECOVERABLE OUNCES	0	0	11497	25094	24951	24951	24951	24881	24951	16981	0	178257
OPERATING OUTCOME												
REVENUE ($'000'S)	0	0	4553	9937	9881	9881	9881	9853	9881	6724	0	70590
COST ($'000'S)	0	0	2788	6158	6087	6087	6033	6023	6033	4535	0	43744
OPERATING OUTCOME	0	0	$1,765	$3,779	$3,794	$3,794	$3,848	$3,830	$3,848	$2,189	$0	$26,846
TAX BASIS – ASARCO @ 51% OF J/V												
PRE-PROD. COSTS	0	0	828	0	0	0	0	0	0	0	0	828
EXPL./DEV. EXP. (LAND)	217	32	137	150	210	100	0	0	0	0	0	846
EXPL./DEV. EXP. (OTHER)	807	0	0	0	0	0	0	0	0	0	0	807
EXPENSE (ONGOING & CLOSURE)	0	0	0	0	2009	50	0	0	0	165	1179	3402
CAPITAL EXPENDITURES	0	3090	10172	0	0	0	0	0	0	0	0	13263
SALVAGE @ 15%	0	0	0	0	0	0	0	0	0	0	1148	1148
DEPRECIATION	0	0	1895	3248	2320	1657	1184	1184	1184	590	0	13263
NET BEFORE DEPL.	-1024	-32	-1095	381	-745	1988	2663	2646	2663	1434	-31	8848
DEPL.	0	0	0	191	0	994	1332	1323	1332	717	0	5887
NET BEFORE TAX	-1024	-32	-1095	191	-745	994	1332	1323	1332	717	-31	2960
TAX @ 38%	-389	-12	-416	72	-283	378	506	503	506	273	-12	1125
NET AFTER TAX	-635	-20	-679	118	-462	616	826	820	826	445	-19	1835
NET AFTER TAX CASH FLOW	-635	-3110	-8956	3557	1858	3266	3342	3327	3342	1752	-19	7723
ASARCO AT 51%		-2221	-4568	1814	948	1666	1704	1697	1704	894	-10	3628
ADJUSTMENT FOR G&A	0	0	42	67	65	65	64	64	64	54	14	501
ADJUSTED AFTER TAX CASH FLOW @ 51%	$0	($2,221)	($4,526)	$1,881	$1,013	$1,731	$1,769	$1,761	$1,769	$948	$4	$4,129

$400 ECONOMIC PIT DESIGN

DCFROI %	12.6
NPV @ 0%	$4,129
NPV @ 5%	$1,876
NPV @ 10%	$551
NPV @ 15%	($402)

YARNELL PROJECT

$400 ECONOMIC PIT DESIGN

72% RECOVERY

GOLD PRICE @ $400	1989-1990	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	1989-1999
	ASARCO	J/V	J/V	J/V	J/V	J/V	J/V	J/V	J/V	J/V	J/V	TOTAL
MINING SCHEDULE (10% INCREASE IN CAP. AND DEV. EXP.)												
ORE TONS ('000'S)	0	0	358	714	716	716	716	714	716	429	0	5079
WASTE TONS ('000'S)	0	0	532	1012	1015	1015	1015	1012	1015	607	0	7223
STRIPPING RATIO	0	0	1.49	1.42	1.42	1.42	1.42	1.42	1.42	1.41	0.00	1.42
ORE GRADE (OPT)	0	0	0.053	0.048	0.048	0.048	0.048	0.048	0.048	0.048	0	0.048
RECOVERABLE OUNCES	0	0	11497	25094	24951	24951	24951	24881	24951	16981	0	178257
OPERATING OUTCOME												
REVENUE ($'000'S)	0	0	4553	9937	9881	9881	9881	9853	9881	6724	0	70590
COST ($'000'S)	0	0	2788	6158	6087	6087	6033	6023	6033	4535	0	43744
OPERATING OUTCOME	0	0	$1,765	$3,779	$3,794	$3,794	$3,848	$3,830	$3,848	$2,189	$0	$26,846
BOOK BASIS												
PROJECT @ 100%												
PRE-PROD. COSTS	0	0	828	0	0	0	0	0	0	0	0	828
EXPL./DEV. EXP. (LAND)	217	32	137	150	210	100	0	0	0	0	0	846
EXPL./DEV. EXP. (OTHER)	807	0	0	0	0	0	0	0	0	0	0	807
CAPITAL EXPENDITURES	0	3090	10172	0	0	0	0	0	0	0	0	13263
ONGOING EXP.	0	0	0	0	2009	50	0	0	0	0	0	2058
CLOSURE EXP.	0	0	0	0	0	0	0	0	0	165	1179	1344
SALVAGE @ 15%	0	0	0	0	0	0	0	0	0	0	1148	1148
DEPL/DEPN (ASARCO)	0	0	72	144	144	144	144	144	144	86	0	1024
DEPRECIATION (J/V)	0	0	993	1981	1986	1986	1986	1981	1986	1190	0	14091
DEPL (J/V)	0	0	12	46	443	476	476	474	476	285	0	2687
DEPL/DEPN TOTAL (J/V)	0	0	1005	2027	2429	2462	2462	2455	2462	1475	0	16778
TOTAL PLANT OPER. COST	0	0	3793	8185	8516	8549	8495	8478	8495	6010	0	60522
OPERATING P & L (100% BASIS)	$0	$0	$760	$1,752	$1,364	$1,332	$1,386	$1,375	$1,386	$549	($31)	$9,872
COST PER OUNCE			$330	$326	$341	$343	$340	$341	$340	$354	–	$340
ASARCO AT 51% OF J/V												
TOTAL PLANT OPER. COST	0	0	2007	4318	4488	4504	4477	4468	4477	3152	0	31890
OPERATING P & L (51% BASIS)	$0	$0	$315	$750	$551	$535	$562	$557	$562	$194	($16)	$4,011
COST PER OUNCE			$342	$337	$353	$354	$352	$352	$352	$364	–	$351
ADJUSTMENT FOR G&A	0	0	68	107	105	105	104	104	104	88	23	808
ADJUSTED OPERATING P & L	0	0	383	857	657	640	666	661	666	281	7	4819
ASARCO AT 51% OF J/V, W/O SUNK COST												
TOTAL PLANT OPER. COST	0	0	1934	4175	4343	4360	4332	4324	4332	3065	0	30866
OPERATING P & L (51% BASIS)	$0	$0	$387	$893	$696	$679	$707	$701	$707	$280	($16)	$5,035
COST PER OUNCE			$330	$326	$341	$343	$340	$341	$340	$354	–	$340

$400 PIT

SCHEDULE

1989-1990 ASARCO	1990 J/V	1991 J/V	1992 J/V	1993 J/V	1994 J/V	1995 J/V	1996 J/V	1997 J/V	1998 J/V	1999 J/V	1989-1999 TOTAL
0	0	358	714	716	716	716	714	716	429	0	5079
0	0	169	150	2219	150	0	0	0	0	0	2687
		12	24	24	24	24	24	24	14	0	169
			23	23	23	23	23	23	14	0	150
				396	396	396	395	396	238	0	2219
					33	33	32	33	19	0	150
TOTAL		12	46	443	476	476	474	476	285	0	2687

EXPLORATION, CAPITAL, AND DEVELOPMENT EXPENDITURES ($'000'S)

YARNELL

$400 ECONOMIC PIT DESIGN

10% INCREASE IN OPERATING COSTS	1989-1990 ASARCO	1990 J/V	1991 J/V	1992 J/V	1993 J/V	1994 J/V	1995 J/V	1996 J/V	1997 J/V	1998 J/V	1999 J/V	SUB-TOTAL 1989 - 1990 ASARCO	SUB-TOTAL 1990-1999 J/V	GRAND TOTAL 1989 - 1999 ASARCO & J/V
EXPLORATION														
OPTION AND LAND PAYMENTS	217	32	137	150	210	100	0	0	0	0	0	217	629	846
DRILLING, METALLURGICAL, MISC.	807	0	0	0	0	0	0	0	0	0	0	807	0	807
TOTAL	1024	32	137	150	210	100	0	0	0	0	0	1024	629	1653
CAPITAL AND DEVELOPMENT														
PURCHASE NEARBY HOME	0	200	0	0	0	0	0	0	0	0	0	0	200	200
CONDEMNATION DRILLING	0	100	0	0	0	0	0	0	0	0	0	0	100	100
FINAL METALLURGICAL TESTING	0	50	0	0	0	0	0	0	0	0	0	0	50	50
HYDROGEOLOGIC TESTING	0	300	0	0	0	0	0	0	0	0	0	0	300	300
ENVIRONMENTAL ASSESSMENT	0	200	0	0	0	0	0	0	0	0	0	0	200	200
PERMITTING	0	100	0	0	0	0	0	0	0	0	0	0	100	100
MICROWAVE RELOCATIONS	0	450	0	0	0	0	0	0	0	0	0	0	450	450
WATER SUPPLY	0	0	500	0	0	0	0	0	0	0	0	0	500	500
MONITOR WELL EQUIP.	0	0	50	0	0	0	0	0	0	0	0	0	50	50
TRUCK SHOP FACILITY	0	0	0	0	0	0	0	0	0	0	0	0	0	0
MINE/CRUSH CONTRACTOR MOB.	0	0	150	0	0	0	0	0	0	0	0	0	150	150
SITE PREP., SERVICES, DISTRIBUTION	0	500	1085	0	0	0	0	0	0	0	0	0	1585	1585
PRIMARY CRUSHING FACILITY	0	0	0	0	0	0	0	0	0	0	0	0	0	0
SECONDARY CRUSHING FACILITY	0	0	1193	0	0	0	0	0	0	0	0	0	1193	1193
CONVEYING/STACKING SYSTEM	0	0	581	0	0	0	0	0	0	0	0	0	581	581
ADSORPTION, DESORPTION, REFINING	0	0	1440	0	0	0	0	0	0	0	0	0	1440	1440
HEAP PAD	0	0	1061	0	0	0	0	0	0	0	0	0	1061	1061
PONDS AND SOLUTION DIST.	0	0	558	0	0	0	0	0	0	0	0	0	558	558
ANCILLARY FACILITIES & MOB. EQUIP.	0	0	1135	0	0	0	0	0	0	0	0	0	1135	1135
CONSTRUCTION OVERHEAD & GEN. IND.	0	654	654	0	0	0	0	0	0	0	0	0	1308	1308
SUB-TOTAL	0	2554	8407	0	0	0	0	0	0	0	0	0	10961	10961
CONTINGENCY @ 10%	0	255	841	0	0	0	0	0	0	0	0	0	1096	1096
TOTAL	0	2809	9248	0	0	0	0	0	0	0	0	0	12057	12057
DELAYED/ONGOING CAPITAL EXPENDITURES														
LEACH PAD EXPANSION	0	0	0	0	1214	0	0	0	0	0	0	0	1214	1214
CONVEYOR & SOLUTION DIST. EXTENSION	0	0	0	0	443	0	0	0	0	0	0	0	443	443
YARNELL CREEK ROAD RELOCATION	0	0	0	0	0	45	0	0	0	0	0	0	45	45
CARBON REGENERATION KILN	0	0	0	0	169	0	0	0	0	0	0	0	169	169
SUB-TOTAL	0	0	0	0	1826	45	0	0	0	0	0	0	1871	1871
CONTINGENCY @ 10%	0	0	0	0	183	5	0	0	0	0	0	0	187	187
TOTAL	0	0	0	0	2009	50	0	0	0	0	0	0	2058	2058
MINE CLOSURE COSTS														
MINE/CRUSH CONTRACTOR DEMOB.	0	0	0	0	0	0	0	0	0	150	0	0	150	150
HEAP & POND NEUTRALIZATION	0	0	0	0	0	0	0	0	0	0	50	0	50	50
HEAP CAPPING	0	0	0	0	0	0	0	0	0	0	250	0	250	250
PIT FENCING	0	0	0	0	0	0	0	0	0	0	20	0	20	20
SUB-TOTAL	0	0	0	0	0	0	0	0	0	150	320	0	470	470
CONTINGENCY @ 10%	0	0	0	0	0	0	0	0	0	15	32	0	47	47
TOTAL	0	0	0	0	0	0	0	0	0	165	352	0	517	517
GRAND TOTAL	$1,024	$2,841	$9,385	$150	$2,219	$150	$0	$0	$0	$165	$352	$1,024	$15,261	$16,285

YARNELL PROJECT

$400 ECONOMIC PIT DESIGN

72% RECOVERY

GOLD PRICE @ $400		1989-1990	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	1989-1999
		ASARCO	J/V	J/V	J/V	J/V	J/V	J/V	J/V	J/V	J/V	J/V	TOTAL
MINING SCHEDULE	10% INCREASE IN OPERATING COSTS												
ORE TONS ('000'S)		0	0	358	714	716	716	716	714	716	429	0	5079
WASTE TONS ('000'S)		0	0	532	1012	1015	1015	1015	1012	1015	607	0	7223
STRIPPING RATIO		0	0	1.49	1.42	1.42	1.42	1.42	1.42	1.42	1.41	0	1.42
ORE GRADE (OPT)		0	0	0.053	0.048	0.048	0.048	0.048	0.048	0.048	0.048	0.000	0.048
RECOVERABLE OUNCES		0	0	11497	25094	24951	24951	24951	24881	24951	16981	0	178257
OPERATING OUTCOME													
REVENUE ($'000'S)		0	0	4553	9937	9881	9881	9881	9853	9881	6724	0	70590
COST ($'000'S)	TOTAL*(1.10) >>	0	0	3067	6774	6696	6696	6636	6625	6636	4989	0	48118
OPERATING OUTCOME		0	0	$1,486	$3,163	$3,185	$3,185	$3,244	$3,228	$3,244	$1,736	$0	$22,471
TAX BASIS – 100%													
PRE-PROD. COSTS	TOTAL*(1.10) >>	0	0	911	0	0	0	0	0	0	0	0	911
EXPL./DEV. EXP. (LAND)		217	32	137	150	210	100	0	0	0	0	0	846
EXPL./DEV. EXP. (OTHER)		807	0	0	0	0	0	0	0	0	0	0	807
EXP. (ONGOING & CLOSURE)	OP. COSTS*(1.1) >>	0	0	0	0	2009	50	0	0	0	165	1262	3485
CAPITAL EXPENDITURES		0	2809	9248	0	0	0	0	0	0	0	0	12057
SALVAGE @ 15%		0	0	0	0	0	0	0	0	0	0	1044	1044
DEPRECIATION		0	0	1723	2953	2109	1506	1077	1077	1077	537	0	12057
NET BEFORE DEPL.		-1024	-32	-1285	61	-1142	1529	2168	2151	2168	1034	-218	5409
DEPL.		0	0	0	30	0	765	1084	1075	1084	517	0	4555
NET BEFORE TAX		-1024	-32	-1285	30	-1142	765	1084	1075	1084	517	-218	854
TAX @ 38%		-389	-12	-488	12	-434	291	412	409	412	197	-83	325
NET AFTER TAX		-635	-20	-797	19	-708	474	672	667	672	321	-135	529
NET AFTER TAX CASH FLOW		($635)	($2,829)	($8,321)	$3,002	$1,400	$2,745	$2,832	$2,819	$2,832	$1,374	($135)	$5,085
NET AFTER TAX CASH FLOW (1990 COMBINED)			($3,464)	($8,321)	$3,002	$1,400	$2,745	$2,832	$2,819	$2,832	$1,374	($135)	$5,085

$400 ECONOMIC PIT DESIGN

DCFROI %	9.4
NPV @ 0%	$5,085
NPV @ 5%	$1,886
NPV @ 10%	($213)
NPV @ 15%	($1,598)

YARNELL PROJECT

$400 ECONOMIC PIT DESIGN

72% RECOVERY

GOLD PRICE @ $400	1989-1990	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	1989-1999
	ASARCO	J/V	J/V	J/V	J/V	J/V	J/V	J/V	J/V	J/V	J/V	TOTAL
MINING SCHEDULE (10% INCREASE IN OPERATING COSTS)												
ORE TONS ('000'S)	0	0	358	714	716	716	716	714	716	429	0	5079
WASTE TONS ('000'S)	0	0	532	1012	1015	1015	1015	1012	1015	607	0	7223
STRIPPING RATIO	0	0	1.49	1.42	1.42	1.42	1.42	1.42	1.42	1.41	0.00	1.42
ORE GRADE (OPT)	0	0	0.053	0.048	0.048	0.048	0.048	0.048	0.048	0.048	0	0.048
RECOVERABLE OUNCES	0	0	11497	25094	24951	24951	24951	24881	24951	16981	0	178257
OPERATING OUTCOME												
REVENUE ($'000'S)	0	0	4553	9937	9881	9881	9881	9853	9881	6724	0	70590
COST ($'000'S)	0	0	3067	6774	6696	6696	6636	6625	6636	4989	0	48118
OPERATING OUTCOME	0	0	$1,486	$3,163	$3,185	$3,185	$3,244	$3,228	$3,244	$1,736	$0	$22,471
TAX BASIS - ASARCO @ 51% OF J/V												
PRE-PROD. COSTS	0	0	911	0	0	0	0	0	0	0	0	911
EXPL./DEV. EXP. (LAND)	217	32	137	150	210	100	0	0	0	0	0	846
EXPL./DEV. EXP. (OTHER)	807	0	0	0	0	0	0	0	0	0	0	807
EXPENSE (ONGOING & CLOSURE)	0	0	0	0	2009	50	0	0	0	165	1262	3485
CAPITAL EXPENDITURES	0	2809	9248	0	0	0	0	0	0	0	0	12057
SALVAGE @ 15%	0	0	0	0	0	0	0	0	0	0	1044	1044
DEPRECIATION	0	0	1723	2953	2109	1506	1077	1077	1077	537	0	12057
NET BEFORE DEPL.	-1024	-32	-1285	61	-1142	1529	2168	2151	2168	1034	-218	5409
DEPL.	0	0	0	30	0	765	1084	1075	1084	517	0	4555
NET BEFORE TAX	-1024	-32	-1285	30	-1142	765	1084	1075	1084	517	-218	854
TAX @ 38%	-389	-12	-488	12	-434	291	412	409	412	197	-83	325
NET AFTER TAX	-635	-20	-797	19	-708	474	672	667	672	321	-135	529
NET AFTER TAX CASH FLOW	-635	-2829	-8321	3002	1400	2745	2832	2819	2832	1374	-135	5085
ASARCO AT 51%		-2078	-4244	1531	714	1400	1445	1438	1445	701	-69	2282
ADJUSTMENT FOR G&A TOTAL*(1.10) >>	0	0	46	73	72	72	71	71	71	60	16	551
ADJUSTED AFTER TAX CASH FLOW @ 51%	$0	($2,078)	($4,198)	$1,604	$786	$1,472	$1,515	$1,508	$1,515	$761	($53)	$2,833

$400 ECONOMIC PIT DESIGN

DCFROI %	9.7
NPV @ 0%	$2,833
NPV @ 5%	$1,085
NPV @ 10%	($64)
NPV @ 15%	($824)

YARNELL PROJECT

$400 ECONOMIC PIT DESIGN

72% RECOVERY

GOLD PRICE @ $400

10% INCREASE IN OPERATING COSTS

	1989-1990	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	1989-1999
	ASARCO	J/V	J/V	J/V	J/V	J/V	J/V	J/V	J/V	J/V	J/V	TOTAL
MINING SCHEDULE												
ORE TONS ('000'S)	0	0	358	714	716	716	716	714	716	429	0	5079
WASTE TONS ('000'S)	0	0	532	1012	1015	1015	1015	1012	1015	607	0	7223
STRIPPING RATIO	0	0	1.49	1.42	1.42	1.42	1.42	1.42	1.42	1.41	0.00	1.42
ORE GRADE (OPT)	0	0	0.053	0.048	0.048	0.048	0.048	0.048	0.048	0.048	0	0.048
RECOVERABLE OUNCES	0	0	11497	25094	24951	24951	24951	24881	24951	16981	0	178257
OPERATING OUTCOME												
REVENUE ($'000'S)	0	0	4553	9937	9881	9881	9881	9853	9881	6724	0	70590
COST ($'000'S)	0	0	3067	6774	6696	6696	6636	6625	6636	4989	0	48119
OPERATING OUTCOME	0	0	$1,486	$3,163	$3,185	$3,185	$3,244	$3,228	$3,244	$1,736	$0	$22,471
BOOK BASIS												
PROJECT @ 100%												
PRE-PROD. COSTS	0	0	910.8	0	0	0	0	0	0	0	0	910.8
EXPL./DEV. EXP. (LAND)	217	32	137	150	210	100	0	0	0	0	0	846
EXPL./DEV. EXP. (OTHER)	807	0	0	0	0	0	0	0	0	0	0	807
CAPITAL EXPENDITURES	0	2809	9248	0	0	0	0	0	0	0	0	12057
ONGOING EXP.	0	0	0	0	2009	50	0	0	0	0	0	2058
CLOSURE EXP.	0	0	0	0	0	0	0	0	0	165	1179	1344
SALVAGE @ 15%	0	0	0	0	0	0	0	0	0	0	1044	1044
DEPL/DEPN (ASARCO)	0	0	72	144	144	144	144	144	144	86	0	1024
DEPRECIATION (J/V)	0	0	914	1823	1828	1828	1828	1823	1828	1095	0	12968
DEPL (J/V)	0	0	12	46	443	476	476	474	476	285	0	2687
DEPL/DEPN TOTAL (J/V)	0	0	926	1869	2271	2304	2304	2297	2304	1380	0	15655
TOTAL PLANT OPER. COST	0	0	3993	8643	8967	8999	8940	8923	8940	6369	0	63773
OPERATING P & L (100% BASIS)	**$0**	**$0**	**$560**	**$1,294**	**$914**	**$881**	**$941**	**$930**	**$941**	**$191**	**($135)**	**$6,516**
COST PER OUNCE			$347	$344	$359	$361	$358	$359	$358	$375	-	$358
ASARCO AT 51% OF J/V												
TOTAL PLANT OPER. COST	0	0	2108	4552	4717	4734	4704	4694	4704	3335	0	33548
OPERATING P & L (51% BASIS)	**$0**	**$0**	**$213**	**$516**	**$322**	**$305**	**$335**	**$331**	**$335**	**$11**	**($69)**	**$2,299**
COST PER OUNCE			$360	$356	$371	$372	$370	$370	$370	$385	-	$369
ADJUSTMENT FOR G&A	0	0	74	118	116	116	114	114	114	96	25	889
ADJUSTED OPERATING P & L	0	0	288	634	438	421	450	445	450	107	-44	3188
ASARCO AT 51% OF J/V, W/O SUNK COST												
TOTAL PLANT OPER. COST	0	0	2036	4408	4573	4590	4559	4550	4559	3248	0	32524
OPERATING P & L (51% BASIS)	**$0**	**$0**	**$288**	**$660**	**$466**	**$449**	**$480**	**$474**	**$480**	**$97**	**($69)**	**$3,323**
COST PER OUNCE			$347	$344	$359	$361	$358	$359	$358	$375	-	$358

$400 PIT

SCHEDULE

1989-1990 ASARCO	1990 J/V	1991 J/V	1992 J/V	1993 J/V	1994 J/V	1995 J/V	1996 J/V	1997 J/V	1998 J/V	1999 J/V	1989-1999 TOTAL
0	0	358	714	716	716	716	714	716	429	0	5079
0	0	169	150	2219	150	0	0	0	0	0	2687
		12	24	24	24	24	24	24	14	0	169
			23	23	23	23	23	23	14	0	150
				396	396	396	395	396	238	0	2219
					33	33	32	33	19	0	150
TOTAL		12	46	443	476	476	474	476	285	0	2687

EXPLORATION, CAPITAL, AND DEVELOPMENT EXPENDITURES ($'000'S)

YARNELL

$400 ECONOMIC PIT DESIGN

1% DECREASE IN RECOVERY	1989-1990 ASARCO	1990 J/V	1991 J/V	1992 J/V	1993 J/V	1994 J/V	1995 J/V	1996 J/V	1997 J/V	1998 J/V	1999 J/V	SUB-TOTAL 1989 - 1990 ASARCO	SUB-TOTAL 1990-1999 J/V	GRAND TOTAL 1989 - 1999 ASARCO & J/V
EXPLORATION														
OPTION AND LAND PAYMENTS	217	32	137	150	210	100	0	0	0	0	0	217	629	846
DRILLING, METALLURGICAL, MISC.	807	0	0	0	0	0	0	0	0	0	0	807	0	807
TOTAL	1024	32	137	150	210	100	0	0	0	0	0	1024	629	1653
CAPITAL AND DEVELOPMENT														
PURCHASE NEARBY HOME	0	200	0	0	0	0	0	0	0	0	0	0	200	200
CONDEMNATION DRILLING	0	100	0	0	0	0	0	0	0	0	0	0	100	100
FINAL METALLURGICAL TESTING	0	50	0	0	0	0	0	0	0	0	0	0	50	50
HYDROGEOLOGIC TESTING	0	300	0	0	0	0	0	0	0	0	0	0	300	300
ENVIRONMENTAL ASSESSMENT	0	200	0	0	0	0	0	0	0	0	0	0	200	200
PERMITTING	0	100	0	0	0	0	0	0	0	0	0	0	100	100
MICROWAVE RELOCATIONS	0	450	0	0	0	0	0	0	0	0	0	0	450	450
WATER SUPPLY	0	0	500	0	0	0	0	0	0	0	0	0	500	500
MONITOR WELL EQUIP.	0	0	50	0	0	0	0	0	0	0	0	0	50	50
TRUCK SHOP FACILITY	0	0	0	0	0	0	0	0	0	0	0	0	0	0
MINE/CRUSH CONTRACTOR MOB.	0	0	150	0	0	0	0	0	0	0	0	0	150	150
SITE PREP., SERVICES, DISTRIBUTION	0	500	1085	0	0	0	0	0	0	0	0	0	1585	1585
PRIMARY CRUSHING FACILITY	0	0	0	0	0	0	0	0	0	0	0	0	0	0
SECONDARY CRUSHING FACILITY	0	0	1193	0	0	0	0	0	0	0	0	0	1193	1193
CONVEYING/STACKING SYSTEM	0	0	581	0	0	0	0	0	0	0	0	0	581	581
ADSORPTION, DESORPTION, REFINING	0	0	1440	0	0	0	0	0	0	0	0	0	1440	1440
HEAP PAD	0	0	1061	0	0	0	0	0	0	0	0	0	1061	1061
PONDS AND SOLUTION DIST.	0	0	558	0	0	0	0	0	0	0	0	0	558	558
ANCILLARY FACILITIES & MOB. EQUIP.	0	0	1135	0	0	0	0	0	0	0	0	0	1135	1135
CONSTRUCTION OVERHEAD & GEN. IND.	0	654	654	0	0	0	0	0	0	0	0	0	1308	1308
SUB-TOTAL	0	2554	8407	0	0	0	0	0	0	0	0	0	10961	10961
CONTINGENCY @ 10%	0	255	841	0	0	0	0	0	0	0	0	0	1096	1096
TOTAL	0	2809	9248	0	0	0	0	0	0	0	0	0	12057	12057
DELAYED/ONGOING CAPITAL EXPENDITURES														
LEACH PAD EXPANSION	0	0	0	0	1214	0	0	0	0	0	0	0	1214	1214
CONVEYOR & SOLUTION DIST. EXTENSION	0	0	0	0	443	0	0	0	0	0	0	0	443	443
YARNELL CREEK ROAD RELOCATION	0	0	0	0	0	45	0	0	0	0	0	0	45	45
CARBON REGENERATION KILN	0	0	0	0	169	0	0	0	0	0	0	0	169	169
SUB-TOTAL	0	0	0	0	1826	45	0	0	0	0	0	0	1871	1871
CONTINGENCY @ 10%	0	0	0	0	183	5	0	0	0	0	0	0	187	187
TOTAL	0	0	0	0	2009	50	0	0	0	0	0	0	2058	2058
MINE CLOSURE COSTS														
MINE/CRUSH CONTRACTOR DEMOB.	0	0	0	0	0	0	0	0	0	150	0	0	150	150
HEAP & POND NEUTRALIZATION	0	0	0	0	0	0	0	0	0	0	50	0	50	50
HEAP CAPPING	0	0	0	0	0	0	0	0	0	0	250	0	250	250
PIT FENCING	0	0	0	0	0	0	0	0	0	0	20	0	20	20
SUB-TOTAL	0	0	0	0	0	0	0	0	0	150	320	0	470	470
CONTINGENCY @ 10%	0	0	0	0	0	0	0	0	0	15	32	0	47	47
TOTAL	0	0	0	0	0	0	0	0	0	165	352	0	517	517
GRAND TOTAL	$1,024	$2,841	$9,385	$150	$2,219	$150	$0	$0	$0	$165	$352	$1,024	$15,261	$16,285

YARNELL PROJECT

$400 ECONOMIC PIT DESIGN

72% RECOVERY

GOLD PRICE @ $400		1989-1990	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	1989-1999
		ASARCO	J/V	J/V	J/V	J/V	J/V	J/V	J/V	J/V	J/V	J/V	TOTAL
MINING SCHEDULE	1% DECREASE IN RECOVERY												
ORE TONS ('000'S)		0	0	358	714	716	716	716	714	716	429	0	5079
WASTE TONS ('000'S)		0	0	532	1012	1015	1015	1015	1012	1015	607	0	7223
STRIPPING RATIO		*0*	*0*	*1.49*	*1.42*	*1.42*	*1.42*	*1.42*	*1.42*	*1.42*	*1.41*	*0*	*1.42*
ORE GRADE (OPT)		0	0	0.053	0.048	0.048	0.048	0.048	0.048	0.048	0.048	0.000	0.048
RECOVERABLE OUNCES	TOTAL*(.71/.72) >>	0	0	11337	24745	24604	24604	24604	24535	24604	16745	0	175781
OPERATING OUTCOME													
REVENUE ($'000'S)		0	0	4490	9799	9743	9743	9743	9716	9743	6631	0	69609
COST ($'000'S)		0	0	2788	6158	6087	6087	6033	6023	6033	4535	0	43744
OPERATING OUTCOME		0	0	$1,702	$3,641	$3,656	$3,656	$3,710	$3,693	$3,710	$2,096	$0	$25,865
TAX BASIS – 100%													
PRE-PROD. COSTS		0	0	828	0	0	0	0	0	0	0	0	828
EXPL./DEV. EXP. (LAND)		217	32	137	150	210	100	0	0	0	0	0	846
EXPL./DEV. EXP. (OTHER)		807	0	0	0	0	0	0	0	0	0	0	807
EXPENSE (ONGOING & CLOSURE)		0	0	0	0	2009	50	0	0	0	165	1179	3402
CAPITAL EXPENDITURES		0	2809	9248	0	0	0	0	0	0	0	0	12057
SALVAGE @ 15%		0	0	0	0	0	0	0	0	0	0	1044	1044
DEPRECIATION		0	0	1723	2953	2109	1506	1077	1077	1077	537	0	12057
NET BEFORE DEPL.		-1024	-32	-986	538	-671	2001	2634	2616	2634	1395	-135	8969
DEPL.		0	0	0	269	0	1000	1317	1308	1317	697	0	5909
NET BEFORE TAX		-1024	-32	-986	269	-671	1000	1317	1308	1317	697	-135	3060
TAX @ 38%		-389	-12	-375	102	-255	380	500	497	500	265	-51	1163
NET AFTER TAX		-635	-20	-612	167	-416	620	816	811	816	432	-84	1897
NET AFTER TAX CASH FLOW		($635)	($2,829)	($8,136)	$3,389	$1,693	$3,127	$3,210	$3,196	$3,210	$1,666	($84)	$7,806
NET AFTER TAX CASH FLOW (1990 COMBINED)			**($3,464)**	**($8,136)**	**$3,389**	**$1,693**	**$3,127**	**$3,210**	**$3,196**	**$3,210**	**$1,666**	**($84)**	**$7,806**

$400 ECONOMIC PIT DESIGN

DCFROI %	13.9
NPV @ 0%	$7,806
NPV @ 5%	$3,953
NPV @ 10%	$1,394
NPV @ 15%	($322)

YARNELL PROJECT

$400 ECONOMIC PIT DESIGN

72% RECOVERY

GOLD PRICE @ $400	1989-1990	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	1989-1999
	ASARCO	J/V	J/V	J/V	J/V	J/V	J/V	J/V	J/V	J/V	J/V	TOTAL
MINING SCHEDULE (1% DECREASE IN RECOVERY)												
ORE TONS ('000'S)	0	0	358	714	716	716	716	714	716	429	0	5079
WASTE TONS ('000'S)	0	0	532	1012	1015	1015	1015	1012	1015	607	0	7223
STRIPPING RATIO	0	0	1.49	1.42	1.42	1.42	1.42	1.42	1.42	1.41	0.00	1.42
ORE GRADE (OPT)	0	0	0.053	0.048	0.048	0.048	0.048	0.048	0.048	0.048	0	0.048
RECOVERABLE OUNCES	0	0	11337	24745	24604	24604	24604	24535	24604	16745	0	175781
OPERATING OUTCOME												
REVENUE ($'000'S)	0	0	4490	9799	9743	9743	9743	9716	9743	6631	0	69609
COST ($'000'S)	0	0	2788	6158	6087	6087	6033	6023	6033	4535	0	43744
OPERATING OUTCOME	0	0	$1,702	$3,641	$3,656	$3,656	$3,710	$3,693	$3,710	$2,096	$0	$25,865
TAX BASIS - ASARCO @ 51% OF J/V												
PRE-PROD. COSTS	0	0	828	0	0	0	0	0	0	0	0	828
EXPL./DEV. EXP. (LAND)	217	32	137	150	210	100	0	0	0	0	0	846
EXPL./DEV. EXP. (OTHER)	807	0	0	0	0	0	0	0	0	0	0	807
EXPENSE (ONGOING & CLOSURE)	0	0	0	0	2009	50	0	0	0	165	1179	3402
CAPITAL EXPENDITURES	0	2809	9248	0	0	0	0	0	0	0	0	12057
SALVAGE @ 15%	0	0	0	0	0	0	0	0	0	0	1044	1044
DEPRECIATION	0	0	1723	2953	2109	1506	1077	1077	1077	537	0	12057
NET BEFORE DEPL.	-1024	-32	-986	538	-671	2001	2634	2616	2634	1395	-135	8969
DEPL.	0	0	0	269	0	1000	1317	1308	1317	697	0	5909
NET BEFORE TAX	-1024	-32	-986	269	-671	1000	1317	1308	1317	697	-135	3060
TAX @ 38%	-389	-12	-375	102	-255	380	500	497	500	265	-51	1163
NET AFTER TAX	-635	-20	-612	167	-416	620	816	811	816	432	-84	1897
NET AFTER TAX CASH FLOW	-635	-2829	-8136	3389	1693	3127	3210	3196	3210	1666	-84	7806
ASARCO AT 51%		-2078	-4150	1728	863	1595	1637	1630	1637	850	-43	3870
ADJUSTMENT FOR G&A	0	0	42	67	65	65	64	64	64	54	14	501
ADJUSTED AFTER TAX CASH FLOW @ 51%	$0	($2,078)	($4,108)	$1,795	$929	$1,660	$1,701	$1,694	$1,701	$904	($29)	$4,171

$400 ECONOMIC PIT DESIGN

DCFROI %	13.8
NPV @ 0%	$4,171
NPV @ 5%	$2,101
NPV @ 10%	$726
NPV @ 15%	($198)

YARNELL PROJECT

$400 ECONOMIC PIT DESIGN

72% RECOVERY

GOLD PRICE @ $400

1% DECREASE IN RECOVERY

	1989-1990 ASARCO	1990 J/V	1991 J/V	1992 J/V	1993 J/V	1994 J/V	1995 J/V	1996 J/V	1997 J/V	1998 J/V	1999 J/V	1989-1999 TOTAL
MINING SCHEDULE												
ORE TONS ('000'S)	0	0	358	714	716	716	716	714	716	429	0	5079
WASTE TONS ('000'S)	0	0	532	1012	1015	1015	1015	1012	1015	607	0	7223
STRIPPING RATIO	0	0	1.49	1.42	1.42	1.42	1.42	1.42	1.42	1.41	0.00	1.42
ORE GRADE (OPT)	0	0	0.053	0.048	0.048	0.048	0.048	0.048	0.048	0.048	0	0.048
RECOVERABLE OUNCES	0	0	11337	24745	24604	24604	24604	24535	24604	16745	0	175781
OPERATING OUTCOME												
REVENUE ($'000'S)	0	0	4490	9799	9743	9743	9743	9716	9743	6631	0	69609
COST ($'000'S)	0	0	2788	6158	6087	6087	6033	6023	6033	4535	0	43744
OPERATING OUTCOME	0	0	$1,702	$3,641	$3,656	$3,656	$3,710	$3,693	$3,710	$2,096	$0	$25,865
BOOK BASIS												
PROJECT @ 100%												
PRE-PROD. COSTS	0	0	828	0	0	0	0	0	0	0	0	828
EXPL./DEV. EXP. (LAND)	217	32	137	150	210	100	0	0	0	0	0	846
EXPL./DEV. EXP. (OTHER)	807	0	0	0	0	0	0	0	0	0	0	807
CAPITAL EXPENDITURES	0	2809	9248	0	0	0	0	0	0	0	0	12057
ONGOING EXP.	0	0	0	0	2009	50	0	0	0	0	0	2058
CLOSURE EXP.	0	0	0	0	0	0	0	0	0	165	1179	1344
SALVAGE @ 15%	0	0	0	0	0	0	0	0	0	0	1044	1044
DEPL/DEPN (ASARCO)	0	0	72	144	144	144	144	144	144	86	0	1024
DEPRECIATION (J/V)	0	0	908	1811	1816	1816	1816	1811	1816	1088	0	12885
DEPL (J/V)	0	0	12	46	443	476	476	474	476	285	0	2687
DEPL/DEPN TOTAL (J/V)	0	0	920	1858	2259	2292	2292	2286	2292	1373	0	15572
TOTAL PLANT OPER. COST	0	0	3708	8016	8346	8379	8325	8309	8325	5908	0	59316
OPERATING P & L (100% BASIS)	$0	$0	$781	$1,783	$1,397	$1,364	$1,418	$1,407	$1,418	$558	($135)	$9,993
COST PER OUNCE			$327	$324	$339	$341	$338	$339	$338	$353	–	$337
ASARCO AT 51% OF J/V												
TOTAL PLANT OPER. COST	0	0	1963	4232	4401	4418	4390	4381	4390	3100	0	31275
OPERATING P & L (51% BASIS)	$0	$0	$326	$766	$568	$551	$579	$574	$579	$198	($69)	$4,072
COST PER OUNCE			$340	$335	$351	$352	$350	$350	$350	$363	–	$349
ADJUSTMENT FOR G&A	0	0	68	107	105	105	104	104	104	88	23	808
ADJUSTED OPERATING P & L	0	0	394	873	673	657	683	678	683	286	-46	4880
ASARCO AT 51% OF J/V, W/O SUNK COST												
TOTAL PLANT OPER. COST	0	0	1891	4088	4257	4273	4246	4237	4246	3013	0	30251
OPERATING P & L (51% BASIS)	$0	$0	$399	$910	$712	$696	$723	$718	$723	$284	($69)	$5,096
COST PER OUNCE			$327	$324	$339	$341	$338	$339	$338	$353	–	$337

$400 PIT

SCHEDULE

1989-1990 ASARCO	1990 J/V	1991 J/V	1992 J/V	1993 J/V	1994 J/V	1995 J/V	1996 J/V	1997 J/V	1998 J/V	1999 J/V	1989-1999 TOTAL
0	0	358	714	716	716	716	714	716	429	0	5079
0	0	169	150	2219	150	0	0	0	0	0	2687
		12	24	24	24	24	24	24	14	0	169
			23	23	23	23	23	23	14	0	150
				396	396	396	395	396	238	0	2219
					33	33	32	33	19	0	150
TOTAL		12	46	443	476	476	474	476	285	0	2687

W

EXPLORATION, CAPITAL, AND DEVELOPMENT EXPENDITURES ($'000'S)

YARNELL

$400 ECONOMIC PIT DESIGN

	1989-1990 ASARCO	1990 J/V	1991 J/V	1992 J/V	1993 J/V	1994 J/V	1995 J/V	1996 J/V	1997 J/V	1998 J/V	1999 J/V	SUB-TOTAL 1989 - 1990 ASARCO	SUB-TOTAL 1990-1999 J/V	GRAND TOTAL 1989 - 1996 ASARCO & J/V
EXPLORATION														
OPTION AND LAND PAYMENTS	217	32	137	150	210	100	0	0	0	0	0	217	629	846
DRILLING, METALLURGICAL, MISC.	807	0	0	0	0	0	0	0	0	0	0	807	0	807
TOTAL	1024	32	137	150	210	100	0	0	0	0	0	1024	629	1653
CAPITAL AND DEVELOPMENT														
PURCHASE NEARBY HOME	0	200	0	0	0	0	0	0	0	0	0	0	200	200
CONDEMNATION DRILLING	0	100	0	0	0	0	0	0	0	0	0	0	100	100
FINAL METALLURGICAL TESTING	0	50	0	0	0	0	0	0	0	0	0	0	50	50
HYDROGEOLOGIC TESTING	0	300	0	0	0	0	0	0	0	0	0	0	300	300
ENVIRONMENTAL ASSESSMENT	0	200	0	0	0	0	0	0	0	0	0	0	200	200
PERMITTING	0	100	0	0	0	0	0	0	0	0	0	0	100	100
MICROWAVE RELOCATIONS	0	450	0	0	0	0	0	0	0	0	0	0	450	450
WATER SUPPLY	0	0	500	0	0	0	0	0	0	0	0	0	500	500
MONITOR WELL EQUIP.	0	0	50	0	0	0	0	0	0	0	0	0	50	50
TRUCK SHOP FACILITY	0	0	0	0	0	0	0	0	0	0	0	0	0	0
MINE/CRUSH CONTRACTOR MOB.	0	0	150	0	0	0	0	0	0	0	0	0	150	150
SITE PREP., SERVICES, DISTRIBUTION	0	500	1085	0	0	0	0	0	0	0	0	0	1585	1585
PRIMARY CRUSHING FACILITY	0	0	0	0	0	0	0	0	0	0	0	0	0	0
SECONDARY CRUSHING FACILITY	0	0	1193	0	0	0	0	0	0	0	0	0	1193	1193
CONVEYING/STACKING SYSTEM	0	0	581	0	0	0	0	0	0	0	0	0	581	581
ADSORPTION, DESORPTION, REFINING	0	0	1440	0	0	0	0	0	0	0	0	0	1440	1440
HEAP PAD	0	0	1061	0	0	0	0	0	0	0	0	0	1061	1061
PONDS AND SOLUTION DIST.	0	0	558	0	0	0	0	0	0	0	0	0	558	558
ANCILLARY FACILITIES & MOB. EQUIP.	0	0	1135	0	0	0	0	0	0	0	0	0	1135	1135
CONSTRUCTION OVERHEAD & GEN. IND.	0	654	654	0	0	0	0	0	0	0	0	0	1308	1308
SUB-TOTAL	0	2554	8407	0	0	0	0	0	0	0	0	0	10961	10961
CONTINGENCY @ 10%	0	255	841	0	0	0	0	0	0	0	0	0	1096	1096
TOTAL	0	2809	9248	0	0	0	0	0	0	0	0	0	12057	12057
DELAYED/ONGOING CAPITAL EXPENDITURES														
LEACH PAD EXPANSION	0	0	0	0	1214	0	0	0	0	0	0	0	1214	1214
CONVEYOR EXTENSION	0	0	0	0	443	0	0	0	0	0	0	0	443	443
YARNELL CREEK ROAD RELOCATION	0	0	0	0	0	45	0	0	0	0	0	0	45	45
CARBON REGENERATION KILN	0	0	0	0	169	0	0	0	0	0	0	0	169	169
SUB-TOTAL	0	0	0	0	1826	45	0	0	0	0	0	0	1871	1871
CONTINGENCY @ 10%	0	0	0	0	183	5	0	0	0	0	0	0	187	187
TOTAL	0	0	0	0	2009	50	0	0	0	0	0	0	2058	2058
MINE CLOSURE COSTS														
MINE/CRUSH CONTRACTOR DEMOB.	0	0	0	0	0	0	0	0	0	150	0	0	150	150
HEAP & POND NEUTRALIZATION	0	0	0	0	0	0	0	0	0	0	50	0	50	50
HEAP CAPPING	0	0	0	0	0	0	0	0	0	0	250	0	250	250
PIT FENCING	0	0	0	0	0	0	0	0	0	0	20	0	20	20
SUB-TOTAL	0	0	0	0	0	0	0	0	0	150	320	0	470	470
CONTINGENCY @ 10%	0	0	0	0	0	0	0	0	0	15	32	0	47	47
TOTAL	0	0	0	0	0	0	0	0	0	165	352	0	517	517
GRAND TOTAL	$1,024	$2,841	$9,385	$150	$2,219	$150	$0	$0	$0	$165	$352	$1,024	$15,261	$16,285

YARNELL PROJECT

$400 ECONOMIC PIT DESIGN

72% RECOVERY

GOLD PRICE @ $400	1989-1990 ASARCO	1990 J/V	1991 J/V	1992 J/V	1993 J/V	1994 J/V	1995 J/V	1996 J/V	1997 J/V	1998 J/V	1999 J/V	1989-1999 TOTAL
MINING SCHEDULE												
ORE TONS ('000'S)	0	0	358	714	716	716	716	714	716	429	0	5079
WASTE TONS ('000'S)	0	0	532	1012	1015	1015	1015	1012	1015	607	0	7223
STRIPPING RATIO	0	0	1.49	1.42	1.42	1.42	1.42	1.42	1.42	1.41	-	1.42
ORE GRADE (OPT)	0	0	0.053	0.048	0.048	0.048	0.048	0.048	0.048	0.048	0.000	0.048
RECOVERABLE OUNCES	0	0	11497	25094	24951	24951	24951	24881	24951	16981	0	178257
OPERATING OUTCOME												
REVENUE ($'000'S)	0	0	4553	9937	9881	9881	9881	9853	9881	6724	0	70590
COST ($'000'S)	0	0	2788	6158	6087	6087	6033	6023	6033	4535	0	43744
OPERATING OUTCOME	0	0	$1,765	$3,779	$3,794	$3,794	$3,848	$3,830	$3,848	$2,189	$0	$26,846
TAX BASIS - 100%												
PRE-PROD. COSTS	0	0	828	0	0	0	0	0	0	0	0	828
EXPL./DEV. EXP. (LAND)	217	32	137	150	210	100	0	0	0	0	0	846
EXPL./DEV. EXP. (OTHER)	807	0	0	0	0	0	0	0	0	0	0	807
EXPENSE (ONGOING & CLOSURE)	0	0	0	0	2009	50	0	0	0	165	1179	3402
CAPITAL EXPENDITURES	0	2809	9248	0	0	0	0	0	0	0	0	12057
SALVAGE @ 15%	0	0	0	0	0	0	0	0	0	0	1044	1044
DEPRECIATION	0	0	1723	2953	2109	1506	1077	1077	1077	537	0	12057
NET BEFORE DEPL.	-1024	-32	-923	676	-534	2138	2771	2753	2771	1488	-135	9949
DEPL.	0	0	0	338	0	1069	1385	1377	1385	744	0	6299
NET BEFORE TAX	-1024	-32	-923	338	-534	1069	1385	1377	1385	744	-135	3650
TAX @ 38%	-389	-12	-351	129	-203	406	526	523	526	283	-51	1387
NET AFTER TAX	-635	-20	-572	210	-331	663	859	853	859	461	-84	2263
NET AFTER TAX CASH FLOW	($635)	($2,829)	($8,097)	$3,501	$1,778	$3,238	$3,321	$3,307	$3,321	$1,742	($84)	$8,562
NET AFTER TAX CASH FLOW (1990 COMBINED)		($3,464)	($8,097)	$3,501	$1,778	$3,238	$3,321	$3,307	$3,321	$1,742	($84)	$8,562

$400 ECONOMIC PIT DESIGN

DCFROI %	15.1
NPV @ 0%	$8,562
NPV @ 5%	$4,528
NPV @ 10%	$1,841
NPV @ 15%	$32

ASARCO WITH NORGOLD IN 15% NET PROFITS OPTION

$400 ECONOMIC PIT DESIGN

72% RECOVERY — GOLD PRICE @ $400

AFTER CONVERSION DATE PER AGREEMENT

MINING SCHEDULE — BOOK (100%)	1991	1992	1993	1994	1995	1996	1997	1998	1999	1989-1999 TOTAL
ORE TONS ('000'S)	358	714	716	716	716	714	716	429	0	5079
WASTE TONS ('000'S)	532	1012	1015	1015	1015	1012	1015	607	0	7223
STRIPPING RATIO	1.49	1.42	1.42	1.42	1.42	1.42	1.42	1.41	-	1.42
ORE GRADE (OPT)	0.053	0.048	0.048	0.048	0.048	0.048	0.048	0.048	0	0.048
RECOVERABLE OUNCES	11497	25094	24951	24951	24951	24881	24951	16981	0	178257
OPERATING OUTCOME ($'000'S)										
GROSS SALES	4553	9937	9881	9881	9881	9853	9881	6724	0	70590
OPERATING COST	2788	6158	6087	6087	6033	6023	6033	4535	0	43744
G & A	138	219	215	215	212	212	212	179	47	1649
OPERATING COST (LESS G&A)	2650	5939	5872	5872	5821	5811	5821	4356	-47	42095
ALLOWABLE DEPRECIATION	0	0	359	370	370	369	370	221	0	2058
CLOSURE COST	0	0	0	0	0	0	0	0	1179	1179
NET RETURNS	1903	3998	3650	3639	3690	3673	3690	2147	-1132	25258
ASARCO RECOUP	1903	3998	3062	0	0	0	0	0	0	8963
NET PROFITS ($'000's)	0	0	588	3639	3690	3673	3690	2147	-1132	16295
15% (NORGOLD)	0	0	88	546	553	551	553	322	-170	2444
85% (ASARCO)	0	0	500	3093	3136	3122	3136	1825	-962	13850
TOTAL ASARCO ($'000's)	1903	3998	3562	3093	3136	3122	3136	1825	-962	22813
SALVAGE @ 15%	0	0	0	0	0	0	0	0	1044	1044
PRE-MINE	828	0	0	0	0	0	0	0	0	828
CAPITAL EXP.	8135	0	2009	50	0	0	0	0	0	10193

BOOK BASIS (ASARCO)

	1989-1990 ASARCO	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	1989-1999 TOTAL
EXPL./DEV./LAND EXPEND.	217	32	597	0	0	0	0	0	0	0	0	846
EXPL./DEV. EXP.	807	0	0	0	0	0	0	0	0	0	0	807
CAPITAL EXP.	0	2809	1113	0	0	0	0	0	0	0	0	3922
SUB-TOTAL	1024	2841	1710	0	0	0	0	0	0	0	0	5575
TOTAL D & D			1170	2333	2340	2340	2340	2333	2340	1402	0	16596
G & A COST			138	219	215	215	212	212	212	179	47	1649
OPERATING P & L ($'000's)			$595	$1,446	$1,007	$538	$585	$577	$585	$244	$34	$5,612
COST PER OZ.			$348	$342	$360	$378	$377	$377	$377	$386	-	$369
WITHOUT SUNK COSTS												
TOTAL D & D			1098	2189	2195	2195	2195	2189	2195	1315	0	15572
G & A COST			138	219	215	215	212	212	212	179	47	1649
OPERATING P & L ($'000's)			$667	$1,590	$1,151	$683	$729	$721	$729	$331	$34	6636
COST PER OZ.			$342	$337	$354	$373	$371	$371	$371	$381	-	$363

ASARCO WITH NORGOLD IN 15% NET PROFITS OPTION

$400 ECONOMIC PIT DESIGN

72% RECOVERY — GOLD PRICE @ $400

AFTER CONVERSION DATE PER AGREEMENT

MINING SCHEDULE — AFTER TAX CASH BASIS	1991	1992	1993	1994	1995	1996	1997	1998	1999	1989-1999 TOTAL
ORE TONS ('000'S)	358	714	716	716	716	714	716	429	0	5079
WASTE TONS ('000'S)	532	1012	1015	1015	1015	1012	1015	607	0	7223
STRIPPING RATIO	1.49	1.42	1.42	1.42	1.42	1.42	1.42	1.41	--	1.42
ORE GRADE (OPT)	0.053	0.048	0.048	0.048	0.048	0.048	0.048	0.048	0	0.048
RECOVERABLE OUNCES	11497	25094	24951	24951	24951	24881	24951	16981	0	178257
OPERATING OUTCOME ($'000'S)										
GROSS SALES	4553	9937	9881	9881	9881	9853	9881	6724	0	70590
OPERATING COST (W/O G&A)	2650	5939	5872	5872	5821	5811	5821	4356	-47	42095
ALLOWABLE DEPRECIATION	0	0	359	370	370	369	370	221	0	2058
CLOSURE COST	0	0	0	0	0	0	0	0	1179	1179
NET RETURNS	1903	3998	3650	3639	3690	3673	3690	2147	-1132	25258
ASARCO RECOUP	1903	3998	3062	0	0	0	0	0	0	8963
NET PROFITS ($'000's)	0	0	588	3639	3690	3673	3690	2147	-1132	16295
15% (NORGOLD)	0	0	88	546	553	551	553	322	-170	2444
85% (ASARCO)	0	0	500	3093	3136	3122	3136	1825	-962	13850
ALLOWABLE DEPR. CREDIT	0	0	359	370	370	369	370	221	0	2058
TOTAL ASARCO	1903	3998	3920	3463	3506	3491	3506	2046	-962	24872

AFTER TAX CASH BASIS - ASARCO

	1989-1990 ASARCO	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	1989-1999 TOTAL
G & A COST	0	0	138	219	215	215	212	212	212	179	47	1649
PRE-PROD. COSTS	0	0	828	0	0	0	0	0	0	0	0	828
EXPL./DEV. EXP. (LAND)	217	32	137	150	210	100	0	0	0	0	0	846
EXPL./DEV. EXP. (OTHER)	807	0	0	0	0	0	0	0	0	0	0	807
EXPENSE (ONGOING & OTHER)	0	0	0	0	2009	50	0	0	0	165	1179	3402
CAPITAL EXPENDITURES	0	2809	9248	0	0	0	0	0	0	0	0	12057
SALVAGE @ 15%	0	0	0	0	0	0	0	0	0	0	1044	1044
DEPRECIATION	0	0	1723	2953	2109	1506	1077	1077	1077	537	0	12057
NET BEFORE DEPL.	-1024	-32	-923	676	-622	1592	2217	2202	2217	1166	-1145	6326
DEPL.	0	0	0	338	0	796	1109	1101	1109	583	0	5036
NET BEFORE TAX	-1024	-32	-923	338	-622	796	1109	1101	1109	583	-1145	1290
TAX @ 38%	-389	-12	-351	129	-236	303	421	418	421	222	-435	490
NET AFTER TAX	-635	-20	-572	210	-386	494	687	683	687	361	-710	800
NET AFTER TAX CASH FLOW	-635	-2829	-8097	3501	1723	2796	2873	2860	2873	1481	-710	5836
NET AFTER TAX CASH FLOW (1990 COMBINED)		($3,464)	($8,097)	$3,501	$1,723	$2,796	$2,873	$2,860	$2,873	$1,481	($710)	$5,836

ASARCO WITH NORGOLD IN 15% NET PROFITS OPTION

$400 ECONOMIC PIT DESIGN	
DCFROI %	11.5
NPV @ 0%	$5,836
NPV @ 5%	$2,629
NPV @ 10%	$486
NPV @ 15%	($956)

NET AFTER TAX CASH FLOW W/O SUNK COSTS	($2,829)	($8,097)	$3,501	$1,723	$2,796	$2,873	$2,860	$2,873	$1,481	($710)	$8,471

$400 ECONOMIC PIT DESIGN	
DCFROI %	13.4
NPV @ 0%	$8,471
NPV @ 5%	$3,233
NPV @ 10%	$1,063
NPV @ 15%	($404)

15% NET PROFITS OPTION

DEPRECIATION SCHEDULE

ONGOING EXPEND.

1991	1992	X	1993	1994	1995	1996	1997	1998	1999	1989-1999 TOTAL
		X								
		X								
		X								
358	714	X	716	716	716	714	716	429	0	4007
		X								
0	0	X	2009	50	0	0	0	0	0	2058
		X	359	359	359	358	359	215	0	2009
				11	11	11	11	6	0	50
TOTAL			$359	$370	$370	$369	$370	$221	$0	$2,058

ASARCO 85% CONTRIB.

1024	X	>>	$984	NORGOLD'S DEEMED 49% INITIAL CONTRIBUTION
0.51	0.49			
984	Y	>>	$5,575	ASARCO'S TOTAL CONTRIBUTION TO DILUTE NORGOLD TO 15%
0.15	0.85			

ASARCO RECOUP

	TOTALS	
	EXPLORATION	1653
+	CAP. & DEV. (INITIAL)	12057
+	PRE-PROD.	828
	SUB-TOTAL	14538
-	ASARCO 85% CONTRIB.	5575
	TOTAL ASARCO RECOUF	$8,963

CAPITAL EXP.

	TOTALS	
	EXPLORATION	1653
+	CAP. & DEV. (INITIAL)	12057
	SUB-TOTAL	13710
-	ASARCO 85% CONTRIB.	5575
	CAPITAL EXP.	$8,135

X

EXPLORATION, CAPITAL, AND DEVELOPMENT EXPENDITURES ($'000'S)

YARNELL

$400 ECONOMIC PIT DESIGN

	1989-1990 ASARCO	1990 J/V	1991 J/V	1992 J/V	1993 J/V	1994 J/V	1995 J/V	1996 J/V	1997 J/V	1998 J/V	1999 J/V	SUB-TOTAL 1989 - 1990 ASARCO	SUB-TOTAL 1990-1999 J/V	GRAND TOTAL 1989 - 1996 ASARCO & J/V
EXPLORATION														
OPTION AND LAND PAYMENTS	217	32	137	150	210	100	0	0	0	0	0	217	629	846
DRILLING, METALLURGICAL, MISC.	807	0	0	0	0	0	0	0	0	0	0	807	0	807
TOTAL	1024	32	137	150	210	100	0	0	0	0	0	1024	629	1653
CAPITAL AND DEVELOPMENT														
PURCHASE NEARBY HOME	0	200	0	0	0	0	0	0	0	0	0	0	200	200
CONDEMNATION DRILLING	0	100	0	0	0	0	0	0	0	0	0	0	100	100
FINAL METALLURGICAL TESTING	0	50	0	0	0	0	0	0	0	0	0	0	50	50
HYDROGEOLOGIC TESTING	0	300	0	0	0	0	0	0	0	0	0	0	300	300
ENVIRONMENTAL ASSESSMENT	0	200	0	0	0	0	0	0	0	0	0	0	200	200
PERMITTING	0	100	0	0	0	0	0	0	0	0	0	0	100	100
MICROWAVE RELOCATIONS	0	450	0	0	0	0	0	0	0	0	0	0	450	450
WATER SUPPLY	0	0	500	0	0	0	0	0	0	0	0	0	500	500
MONITOR WELL EQUIP.	0	0	50	0	0	0	0	0	0	0	0	0	50	50
TRUCK SHOP FACILITY	0	0	0	0	0	0	0	0	0	0	0	0	0	0
MINE/CRUSH CONTRACTOR MOB.	0	0	150	0	0	0	0	0	0	0	0	0	150	150
SITE PREP., SERVICES, DISTRIBUTION	0	500	1085	0	0	0	0	0	0	0	0	0	1585	1585
PRIMARY CRUSHING FACILITY	0	0	0	0	0	0	0	0	0	0	0	0	0	0
SECONDARY CRUSHING FACILITY	0	0	1193	0	0	0	0	0	0	0	0	0	1193	1193
CONVEYING/STACKING SYSTEM	0	0	581	0	0	0	0	0	0	0	0	0	581	581
ADSORPTION, DESORPTION, REFINING	0	0	1440	0	0	0	0	0	0	0	0	0	1440	1440
HEAP PAD	0	0	1061	0	0	0	0	0	0	0	0	0	1061	1061
PONDS AND SOLUTION DIST.	0	0	558	0	0	0	0	0	0	0	0	0	558	558
ANCILLARY FACILITIES & MOB. EQUIP.	0	0	1135	0	0	0	0	0	0	0	0	0	1135	1135
CONSTRUCTION OVERHEAD & GEN. IND.	0	654	654	0	0	0	0	0	0	0	0	0	1308	1308
SUB-TOTAL	0	2554	8407	0	0	0	0	0	0	0	0	0	10961	10961
CONTINGENCY @ 10%	0	255	841	0	0	0	0	0	0	0	0	0	1096	1096
TOTAL	0	2809	9248	0	0	0	0	0	0	0	0	0	12057	12057
DELAYED/ONGOING CAPITAL EXPENDITURES														
LEACH PAD EXPANSION	0	0	0	0	1214	0	0	0	0	0	0	0	1214	1214
CONVEYOR EXTENSION	0	0	0	0	443	0	0	0	0	0	0	0	443	443
YARNELL CREEK ROAD RELOCATION	0	0	0	0	0	45	0	0	0	0	0	0	45	45
CARBON REGENERATION KILN	0	0	0	0	169	0	0	0	0	0	0	0	169	169
SUB-TOTAL	0	0	0	0	1826	45	0	0	0	0	0	0	1871	1871
CONTINGENCY @ 10%	0	0	0	0	183	5	0	0	0	0	0	0	187	187
TOTAL	0	0	0	0	2009	50	0	0	0	0	0	0	2058	2058
MINE CLOSURE COSTS														
MINE/CRUSH CONTRACTOR DEMOB.	0	0	0	0	0	0	0	0	0	150	0	0	150	150
HEAP & POND NEUTRALIZATION	0	0	0	0	0	0	0	0	0	0	50	0	50	50
HEAP CAPPING	0	0	0	0	0	0	0	0	0	0	250	0	250	250
PIT FENCING	0	0	0	0	0	0	0	0	0	0	20	0	20	20
SUB-TOTAL	0	0	0	0	0	0	0	0	0	150	320	0	470	470
CONTINGENCY @ 10%	0	0	0	0	0	0	0	0	0	15	32	0	47	47
TOTAL	0	0	0	0	0	0	0	0	0	165	352	0	517	517
GRAND TOTAL	$1,024	$2,841	$9,385	$150	$2,219	$150	$0	$0	$0	$165	$352	$1,024	$15,261	$16,285

YARNELL PROJECT

$400 ECONOMIC PIT DESIGN

72% RECOVERY

GOLD PRICE @ $400	1989-1990 ASARCO	1990 J/V	1991 J/V	1992 J/V	1993 J/V	1994 J/V	1995 J/V	1996 J/V	1997 J/V	1998 J/V	1999 J/V	1989-1999 TOTAL
MINING SCHEDULE												
ORE TONS ('000'S)	0	0	358	714	716	716	716	714	716	429	0	5079
WASTE TONS ('000'S)	0	0	532	1012	1015	1015	1015	1012	1015	607	0	7223
STRIPPING RATIO	0	0	1.49	1.42	1.42	1.42	1.42	1.42	1.42	1.41	-	1.42
ORE GRADE (OPT)	0	0	0.053	0.048	0.048	0.048	0.048	0.048	0.048	0.048	0.000	0.048
RECOVERABLE OUNCES	0	0	11497	25094	24951	24951	24951	24881	24951	16981	0	178257
OPERATING OUTCOME												
REVENUE ($'000'S)	0	0	4553	9937	9881	9881	9881	9853	9881	6724	0	70590
COST ($'000'S)	0	0	2788	6158	6087	6087	6033	6023	6033	4535	0	43744
OPERATING OUTCOME	0	0	$1,765	$3,779	$3,794	$3,794	$3,848	$3,830	$3,848	$2,189	$0	$26,846
TAX BASIS – 100%												
PRE-PROD COSTS	0	0	828	0	0	0	0	0	0	0	0	828
EXPL./DEV. EXP. (LAND)	217	32	137	150	210	100	0	0	0	0	0	846
EXPL./DEV. EXP. (OTHER)	807	0	0	0	0	0	0	0	0	0	0	807
EXPENSE (ONGOING & CLOSURE)	0	0	0	0	2009	50	0	0	0	165	1179	3402
CAPITAL EXPENDITURES	0	2809	9248	0	0	0	0	0	0	0	0	12057
SALVAGE @ 15%	0	0	0	0	0	0	0	0	0	0	1044	1044
DEPRECIATION	0	0	1723	2953	2109	1506	1077	1077	1077	537	0	12057
NET BEFORE DEPL.	-1024	-32	-923	676	-534	2138	2771	2753	2771	1488	-135	9949
DEPL.	0	0	0	338	0	1069	1385	1377	1385	744	0	6299
NET BEFORE TAX	-1024	-32	-923	338	-534	1069	1385	1377	1385	744	-135	3650
TAX @ 38%	-389	-12	-351	129	-203	406	526	523	526	283	-51	1387
NET AFTER TAX	-635	-20	-572	210	-331	663	859	853	859	461	-84	2263
NET AFTER TAX CASH FLOW	($635)	($2,829)	($8,097)	$3,501	$1,778	$3,238	$3,321	$3,307	$3,321	$1,742	($84)	$8,562
NET AFTER TAX CASH FLOW (1990 COMBINED)		($3,464)	($8,097)	$3,501	$1,778	$3,238	$3,321	$3,307	$3,321	$1,742	($84)	$8,562

$400 ECONOMIC PIT DESIGN

DCFROI %	15.1
NPV @ 0%	$8,562
NPV @ 5%	$4,528
NPV @ 10%	$1,841
NPV @ 15%	$32

ASARCO WITH NORGOLD IN MINING LEASE OPTION
$400 ECONOMIC PIT DESIGN
72% RECOVERY

GOLD PRICE @ $400

AFTER CONVERSION DATE PER AGREEMENT

MINING SCHEDULE — BOOK (100%)	1991	1992	1993	1994	1995	1996	1997	1998	1999	1989-1999 TOTAL
ORE TONS ('000'S)	358	714	716	716	716	714	716	429	0	5079
WASTE TONS ('000'S)	532	1012	1015	1015	1015	1012	1015	607	0	7223
STRIPPING RATIO	1.49	1.42	1.42	1.42	1.42	1.42	1.42	1.41	-	1.42
ORE GRADE (OPT)	0.053	0.048	0.048	0.048	0.048	0.048	0.048	0.048	0	0.048
RECOVERABLE OUNCES	11497	25094	24951	24951	24951	24881	24951	16981	0	178257
OPERATING OUTCOME ($'000'S)										
GROSS SALES	4553	9937	9881	9881	9881	9853	9881	6724	0	70590
OPERATING COST	2788	6158	6087	6087	6033	6023	6033	4535	0	43744
G & A	138	219	215	215	212	212	212	179	47	1649
OPERATING COST (LESS G&A)	2650	5939	5872	5872	5821	5811	5821	4356	-47	42095
ALLOWABLE DEPRECIATION	0	0	359	370	370	369	370	221	0	2058
CLOSURE COST	0	0	0	0	0	0	0	0	1179	1179
NET PROFITS (BEFORE ASARCO PAYBACK)	1903	3998	3650	3639	3690	3673	3690	2147	-1132	25258
NET PROFITS (AFTER ASARCO PAYBACK & NORGOLD ROYALTY)	0	0	0	0	1373	3673	3690	2147	-1132	9751
NORGOLD ROYALTY FROM 5% OF NET PROFITS	95	200	182	182	116	0	0	0	0	775
ASARCO PAYBACK FROM 95% OF NET PROFITS	1808	3798	3467	3457	2201	0	0	0	0	14731
ASARCO @ 75% OF NET PROFITS AFTER PAYBACK	0	0	0	0	1030	2755	2767	1610	-849	7313
TOTAL ASARCO ($'000's)	1808	3798	3467	3457	3231	2755	2767	1610	-849	22044
SALVAGE @ 15%	0	0	0	0	0	0	0	0	1044	1044
PRE-MINE	828	0	0	0	0	0	0	0	0	828
CAPITAL EXP.	8135	0	2009	50	0	0	0	0	0	10193

BOOK BASIS (ASARCO)

	1989-1990 ASARCO	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	1989-1999 TOTAL
EXPL./DEV./LAND EXPEND.	217	32	597	0	0	0	0	0	0	0	0	846
EXPL./DEV. EXP.	807	0	0	0	0	0	0	0	0	0	0	807
CAPITAL EXP.	0	2809	1113	0	0	0	0	0	0	0	0	3922
SUB-TOTAL	1024	2841	1710	0	0	0	0	0	0	0	0	5575
TOTAL D & D			1170	2333	2340	2340	2340	2333	2340	1402	0	16596
G & A COST			138	219	215	215	212	212	212	179	47	1649
OPERATING P & L ($'000's)			$500	$1,248	$913	$902	$679	$210	$216	$29	$148	$4,843
COST PER OZ.			$357	$350	$363	$364	$373	$392	$391	$398	-	$373
WITHOUT SUNK COSTS												
TOTAL D & D			1098	2189	2195	2195	2195	2189	2195	1315	0	15572
G & A COST			138	219	215	215	212	212	212	179	47	1649
OPERATING P & L ($'000's)			$572	$1,390	$1,057	$1,047	$823	$354	$360	$116	$148	5867
COST PER OZ.			$350	$345	$358	$358	$367	$386	$386	$393	-	$367

ASARCO WITH NORGOLD IN MINING LEASE OPTION

$400 ECONOMIC PIT DESIGN

72% RECOVERY — GOLD PRICE @ $400

AFTER CONVERSION DATE PER AGREEMENT

MINING SCHEDULE — AFTER TAX CASH BASIS	1991	1992	1993	1994	1995	1996	1997	1998	1999	1989-1999 TOTAL
ORE TONS ('000'S)	358	714	716	716	716	714	716	429	0	5079
WASTE TONS ('000'S)	532	1012	1015	1015	1015	1012	1015	607	0	7223
STRIPPING RATIO	1.49	1.42	1.42	1.42	1.42	1.42	1.42	1.41	-	1.42
ORE GRADE (OPT)	0.053	0.048	0.048	0.048	0.048	0.048	0.048	0.048	0	0.048
RECOVERABLE OUNCES	11497	25094	24951	24951	24951	24881	24951	16981	0	178257
OPERATING OUTCOME ($'000'S)										
GROSS SALES	4553	9937	9881	9881	9881	9853	9881	6724	0	70590
OPERATING COST (W/O G&A)	2650	5939	5872	5872	5821	5811	5821	4356	-47	42095
ALLOWABLE DEPRECIATION	0	0	359	370	370	369	370	221	0	2058
CLOSURE COST	0	0	0	0	0	0	0	0	1179	1179
NET PROFITS (BEFORE ASARCO PAYBACK)	1903	3998	3650	3639	3690	3673	3690	2147	-1132	25258
ASARCO PAYBACK FROM 95% OF NET PROFITS	1808	3798	3467	3457	2201	0	0	0	0	14731
NET PROFITS (AFTER ASARCO PAYBACK & NORGOLD ROYALTY)	0	0	0	0	1373	3673	3690	2147	-1132	9751
NORGOLD ROYALTY FROM 5% OF NET PROFITS	95	3798	3467	3457	2201	0	0	0	0	13019
ASARCO @ 75% OF NET PROFITS AFTER PAYBACK	0	0	0	0	1030	2755	2767	1610	-849	7313
ALLOWABLE DEPR. CREDIT	0	0	359	370	370	369	370	221	0	2058
TOTAL ASARCO ($'000'S)	1808	3798	3826	3827	3600	3124	3137	1832	-849	24103

AFTER TAX CASH BASIS – ASARCO

	1989-1990 ASARCO	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	1989-1999 TOTAL
G & A COST	0	0	138	219	215	215	212	212	212	179	47	1649
PRE-PROD COSTS	0	0	828	0	0	0	0	0	0	0	0	828
EXPL./DEV. EXP. (LAND)	217	32	137	150	210	100	0	0	0	0	0	846
EXPL./DEV. EXP. (OTHER)	807	0	0	0	0	0	0	0	0	0	0	807
EXPENSE (ONGOING & OTHER)	0	0	0	0	2009	50	0	0	0	165	1179	3402
CAPITAL EXPENDITURES	0	2809	9248	0	0	0	0	0	0	0	0	12057
SALVAGE @ 15%	0	0	0	0	0	0	0	0	0	0	1044	1044
DEPRECIATION	0	0	1723	2953	2109	1506	1077	1077	1077	537	0	12057
NET BEFORE DEPL.	-1024	-32	-1018	477	-716	1956	2312	1835	1848	951	-1031	5557
DEPL.	0	0	0	238	0	978	1156	917	924	476	0	4689
NET BEFORE TAX	-1024	-32	-1018	238	-716	978	1156	917	924	476	-1031	867
TAX @ 38%	-389	-12	-387	91	-272	372	439	349	351	181	-392	330
NET AFTER TAX	-635	-20	-631	148	-444	606	717	569	573	295	-639	538
NET AFTER TAX CASH FLOW	-635	-2829	-8156	3339	1665	3090	2949	2563	2574	1307	-639	5227
NET AFTER TAX CASH FLOW (1990 COMBINED)		($3,464)	($8,156)	$3,339	$1,665	$3,090	$2,949	$2,563	$2,574	$1,307	($639)	$5,227

ASARCO WITH NORGOLD IN MINING LEASE OPTION

$400 ECONOMIC PIT DESIGN	
DCFROI %	10.5
NPV @ 0%	$5,227
NPV @ 5%	$2,192
NPV @ 10%	$163
NPV @ 15%	($1,202)

NET AFTER TAX CASH FLOW W/O SUNK COSTS	($2,829)	($8,156)	$3,339	$1,665	$3,090	$2,949	$2,563	$2,574	$1,307	($639)	$5,862

$400 ECONOMIC PIT DESIGN	
DCFROI %	12.4
NPV @ 0%	$5,862
NPV @ 5%	$2,797
NPV @ 10%	$740
NPV @ 15%	($650)

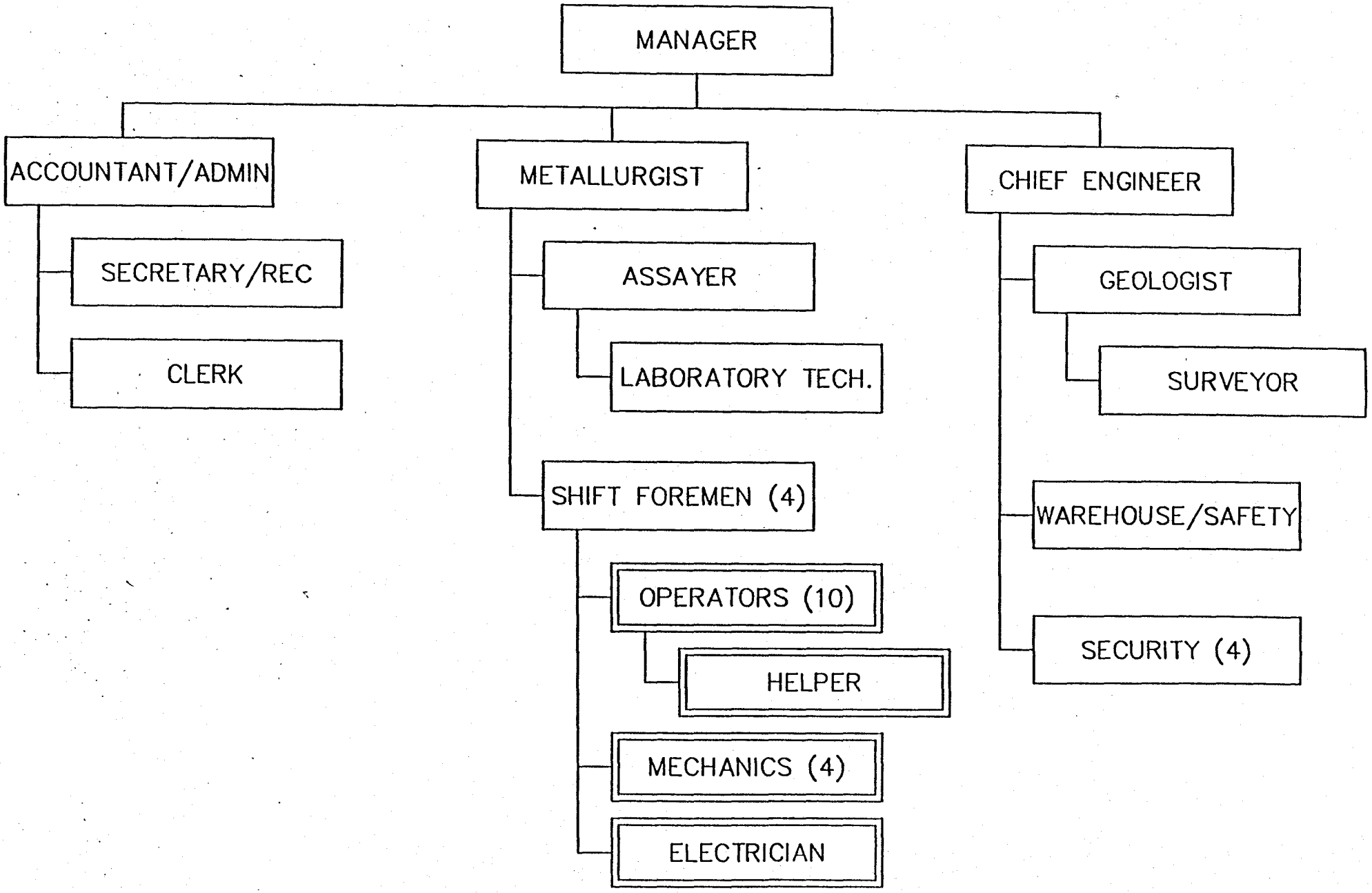
MINING LEASE OPTION

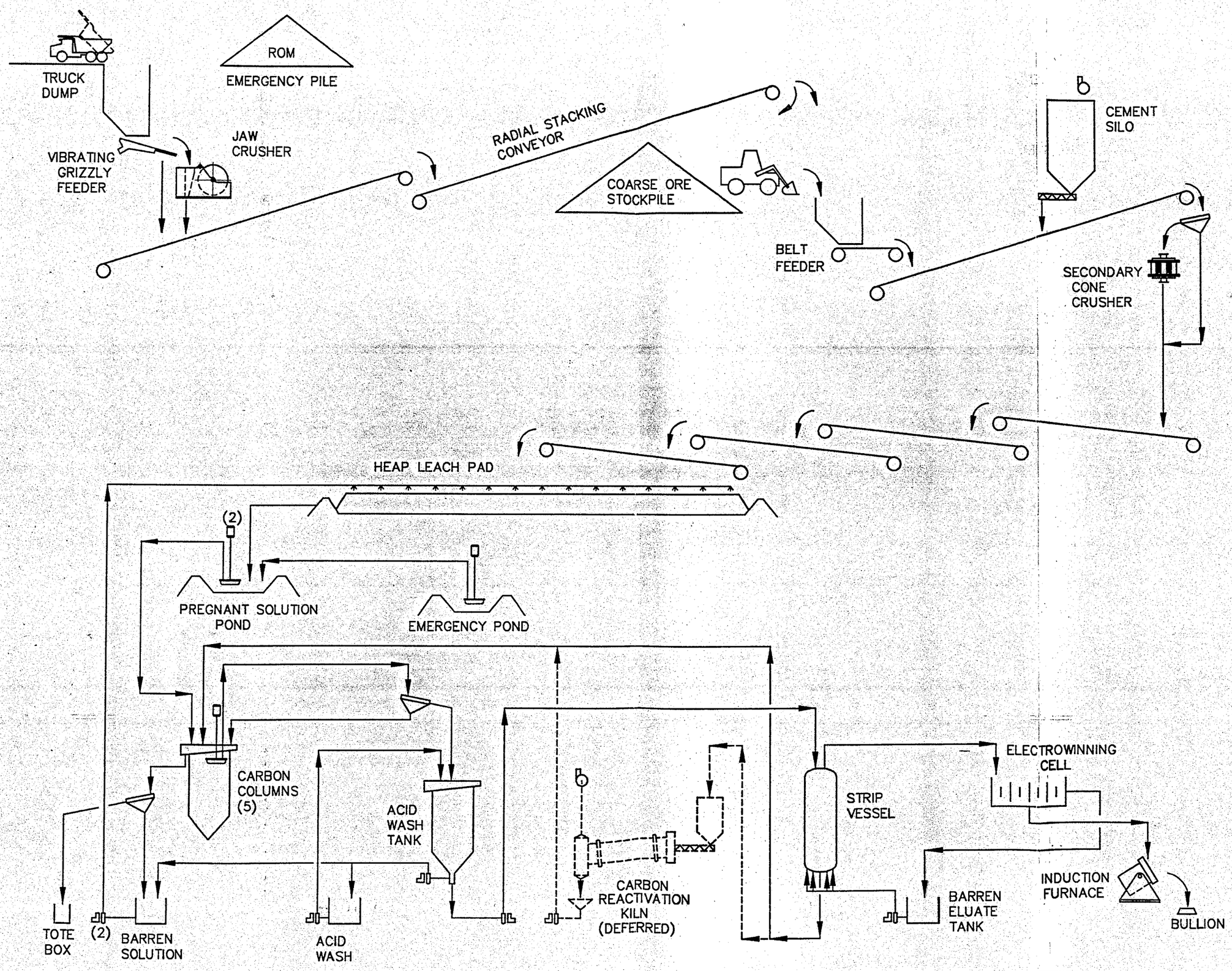
PAYBACK

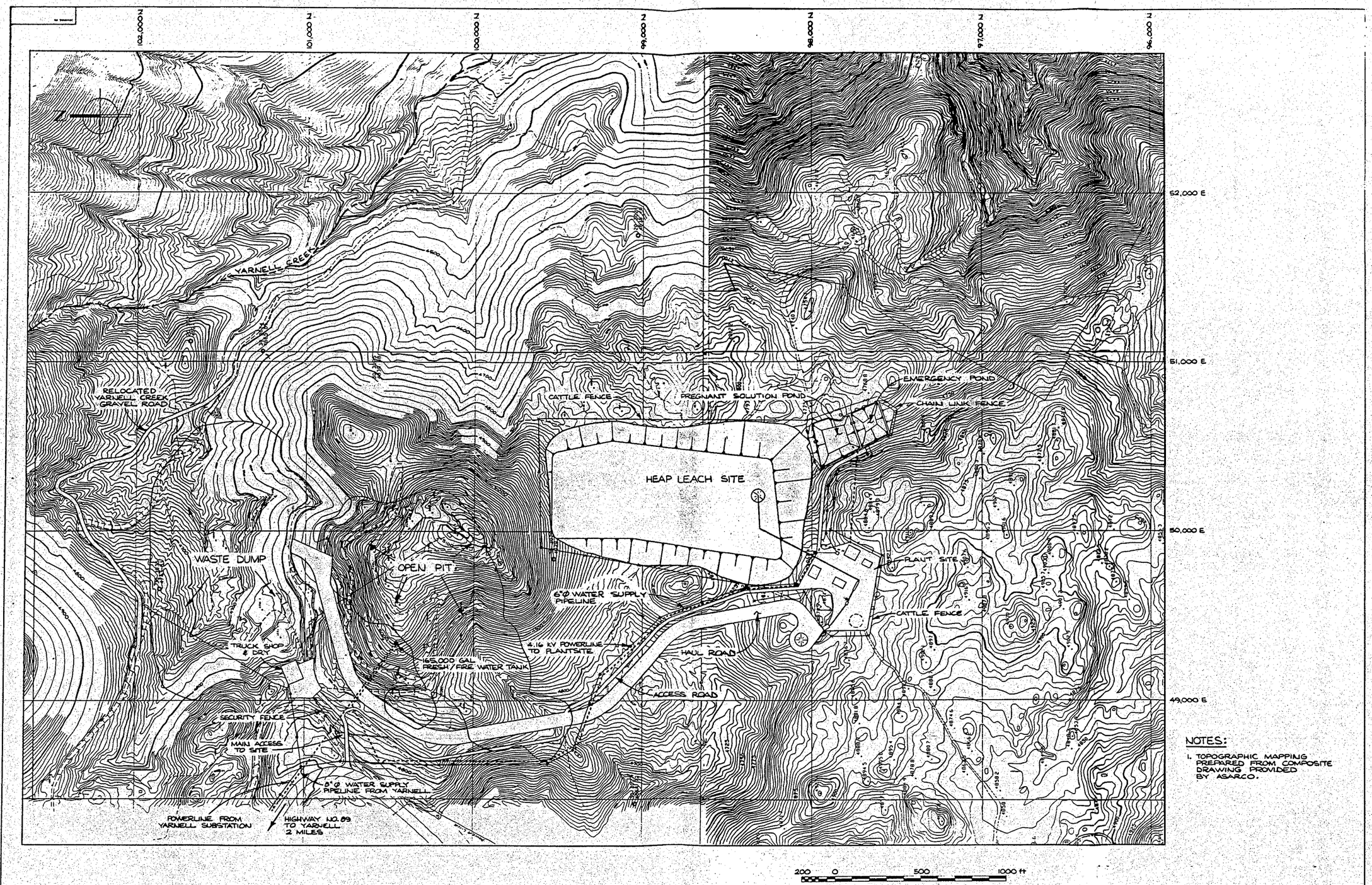
	1989-1990 ASARCO	1990 J/V	1991 J/V	TOTAL 1990-1991 J/V
PRE-MINE STRIPPING	0	0	828	828
EXPL./DEV. EXP. (LAND)	217	32	137	169
EXPL./DEV. EXP. (OTHER)	807	0	0	0
EXPENSE (ONGOING & CLOSURE)	0	0	0	0
CAPITAL EXPENDITURES	0	2809	9248	12057
SUB-TOTAL	1024	2841	10213	13054
EXPLORATION W/O INTEREST	$1,024			
CAPITAL & DEV. W/ INTEREST				$13,054
INTEREST (1992 ONLY) @ 5%				$653
TOTAL PAYBACK				$14,731

YZ

Personnel Organization Chart




TRUCK DUMP
ROM
EMERGENCY PILE
VIBRATING GRIZZLY FEEDER
JAW CRUSHER
RADIAL STACKING CONVEYOR
COARSE ORE STOCKPILE
BELT FEEDER
CEMENT SILO
SECONDARY CONE CRUSHER
HEAP LEACH PAD
(2)
PREGNANT SOLUTION POND
EMERGENCY POND
CARBON COLUMNS (5)
ACID WASH TANK
CARBON REACTIVATION KILN (DEFERRED)
STRIP VESSEL
ELECTROWINNING CELL
INDUCTION FURNACE
BULLION
BARREN ELUATE TANK
TOTE BOX
(2)
BARREN SOLUTION
ACID WASH



NOTES:

1. TOPOGRAPHIC MAPPING PREPARED FROM COMPOSITE DRAWING PROVIDED BY ASARCO.

B	ISSUED FOR FEASIBILITY STUDY	90.01.19	CN		
A	ISSUED FOR PRELIMINARY STUDY	89-12-21	CN		

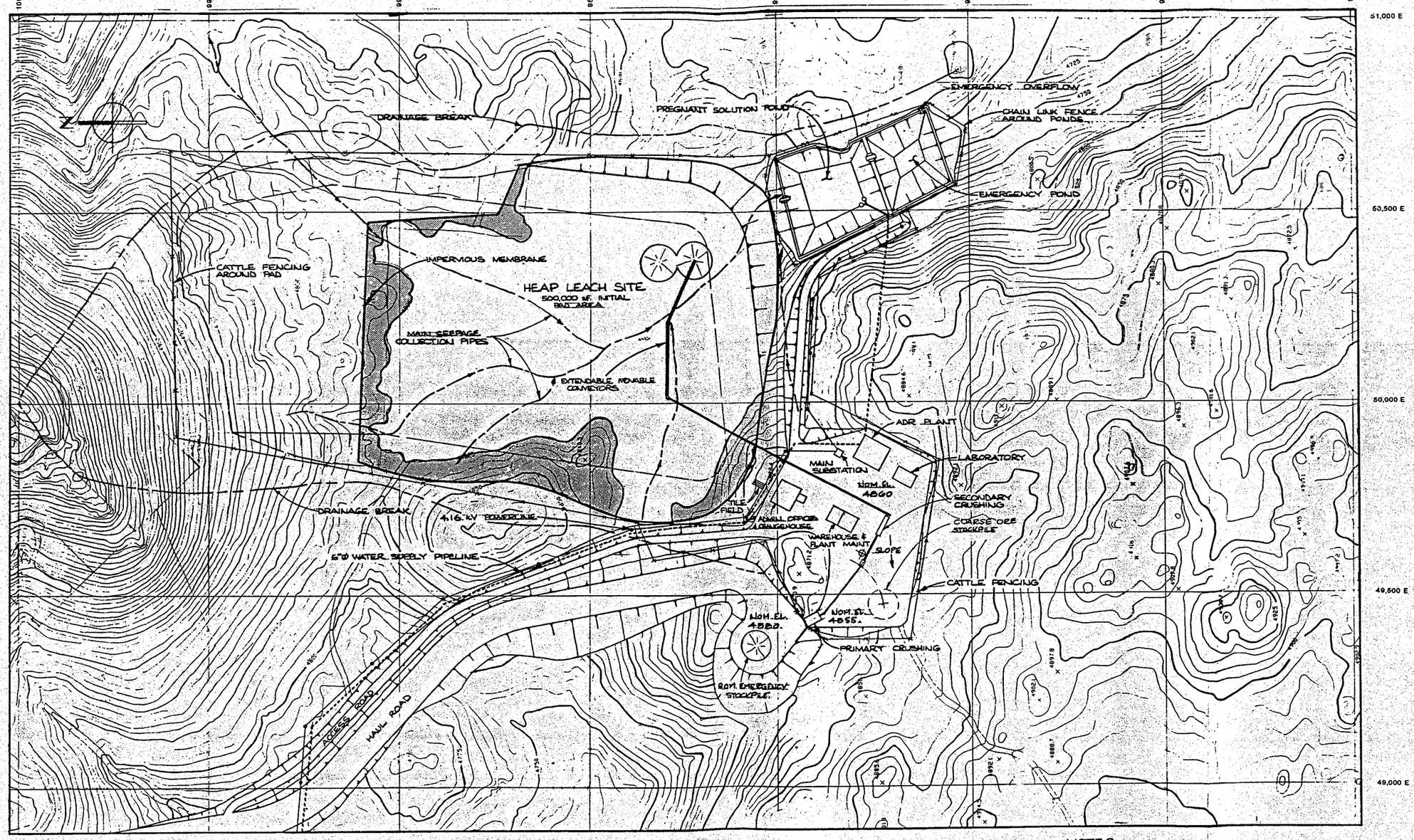
SECTION CIVIL
SCALE 1" = 200'
DESIGNED BY ABW/CN 89-12-21
DRAWN BY CN 89-12-21
CHECKED BY 90-01-24
APPROVED BY 90-01-24

CLIENT ASARCO INCORPORATED
LOCATION YARNELL, ARIZONA
KILBORN

TITLE
YARNELL PROJECT
OVERALL SITE PLAN

PROJECT NO 8210
DIVISION NO 15
DRAWING NUMBER 100-10-F01
REV. B

100-10-F02 PLANTSITE LAYOUT, PLAN
DWG. No REFERENCE DRAWINGS
REVISIONS



NOTES:

1. TOPOGRAPHIC MAPPING PREPARED FROM COMPOSITE DRAWING PROVIDED BY ASARCO.

100-10-F01	OVERALL SITE PLAN		
DWG. NO.	REFERENCE DRAWINGS		

NO.	DESCRIPTION	DATE	BY
	REVISIONS		

NO.	DESCRIPTION	DATE	BY
	REVISIONS		

NO.	DESCRIPTION	DATE	BY
E	ISSUED FOR PREFEASIBILITY STUDY	90-01-19	RC
A	ISSUED FOR PREFEASIBILITY SURV.	89-12-21	CN
	REVISIONS		

SECTION	CIVIL	
SCALE	1" = 100'	
DESIGNED BY	ARW/CN	89-12-21
DRAWN BY	CN	89-12-21
CHECKED BY	RC	90-01-24
APPROVED BY		90-01-26

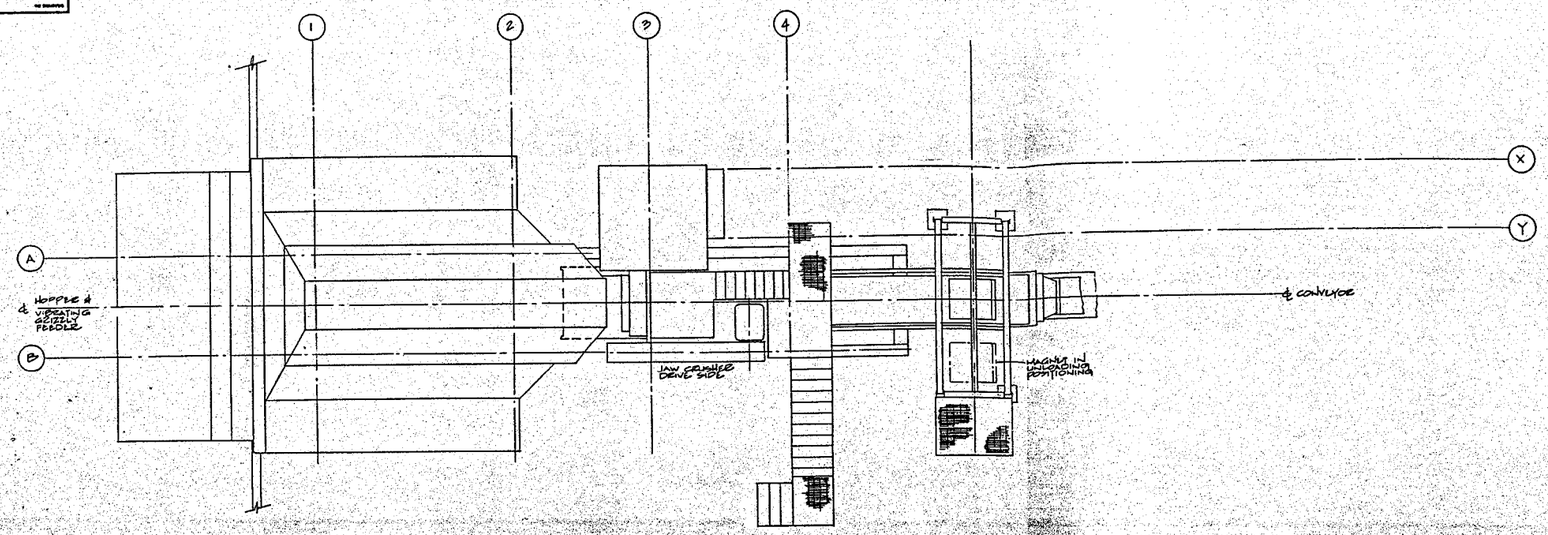
CLIENT: ASARCO INCORPORATED

LOCATION: YARNELL, ARIZONA

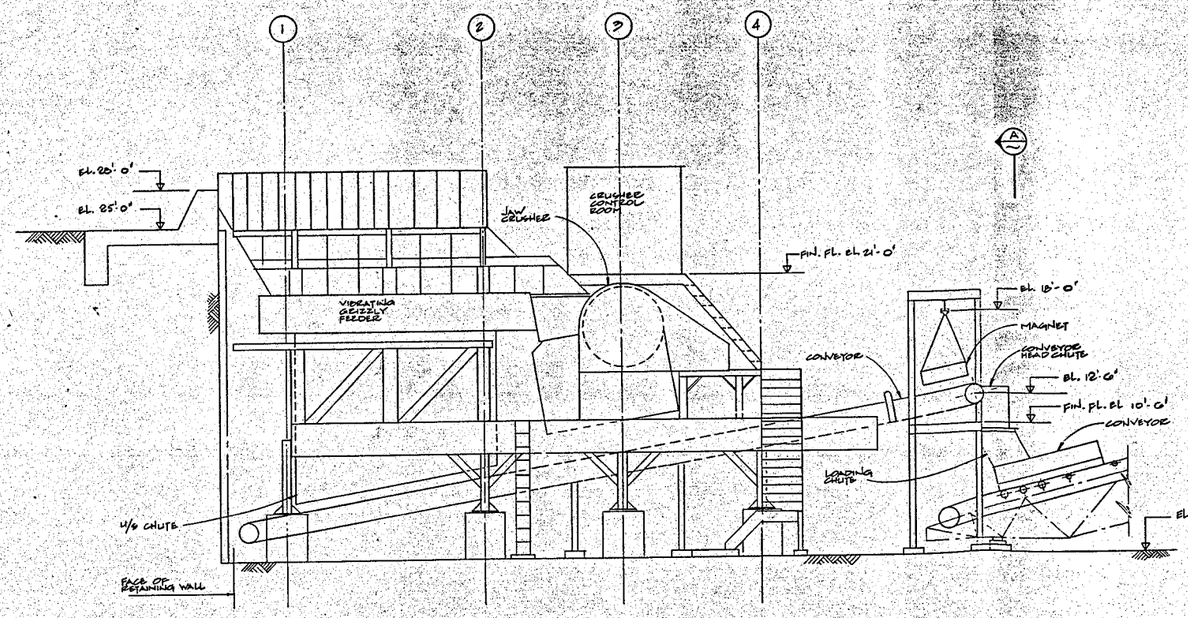
KILBORN

TITLE: YARNELL PROJECT PLANTSITE LAYOUT PLAN

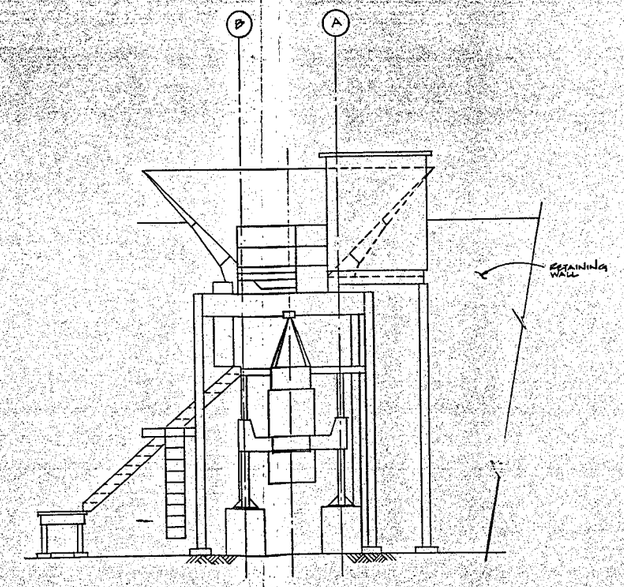
SECT. NO.	
PROJECT NO.	DIVISION NO.
8210	15
DRAWING NUMBER	
100-10-F02	REV. B



PLAN



ELEVATION



SECTION A

NOTE
EL. 0'-0" = PLANT DATUM 4855'-0"

REV	DESCRIPTION	DATE	BY
B	ISSUED FOR PREFEASIBILITY STUDY	90.01.12	PC
A	ISSUED FOR PREFEASIBILITY STUDY	89.01.19	PC

REVISIONS

SECTION	GENERAL	
SCALE	—	DATE
DESIGNED BY	P.A.G.	NOV.'89
DRAWN BY	G.E.H.	NOV.'89
CHECKED BY	D.K.	DEC.'89
APPROVED BY	M.H.	DEC.'89

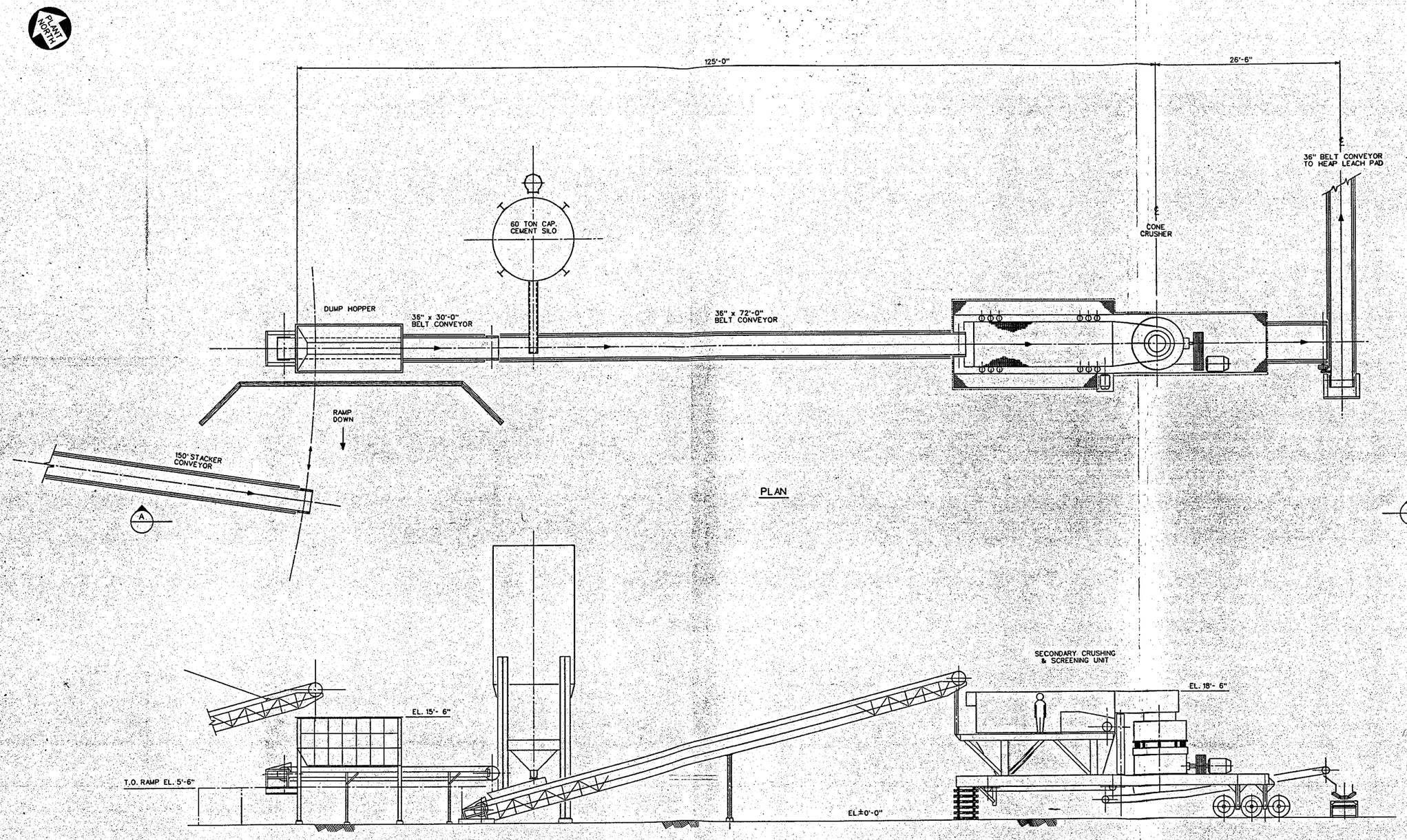
CLIENT: NYNECO INCORPORATED
LOCATION: YARNELL ARIZONA

KILBORN

TITLE
YARNELL PROJECT
PRIMARY CRUSHING
GENERAL ARRANGEMENT
PLAN & SECTIONS

KCCI No.	
PROJECT No. 8210	DIVISION No. 15
DRAWING NUMBER 100-20-F01	REV. B

DWG No. | REFERENCE DRAWINGS



NOTE
EL.±0'-0" = PLANT DATUM EL.4860'-0"

No	DESCRIPTION	DATE	BY
B	ISSUED WITH PREFEASIBILITY STUDY	01/19/90	PC
A	ISSUED WITH PREFEASIBILITY STUDY	12/21/89	PC

REVISIONS

SECTION: GENERAL
SCALE: 3/8"=1'-0"
DESIGNED:
DRAWN: PAC DEC/89
CHECKED: ILK
APPROVED:

CLIENT: ASARCO INCORPORATED
LOCATION: YARNELL, ARIZONA

KILBORN

TITLE
YARNELL PROJECT
SECONDARY CRUSHING PLANT
GENERAL ARRANGEMENT
PLAN & SECTION

ACCT. No.
PROJECT No 8210
DIVISION 15
DRAWING NUMBER 100-20-F02

DWG. NO. REFERENCE DRAWINGS

CLIENT PROLIAN PROLIFIC MET. CHECK ELECTR. MSTR. PPING AUX. CONCR. STEEL SERVICES ARCH. CEM. LAT.

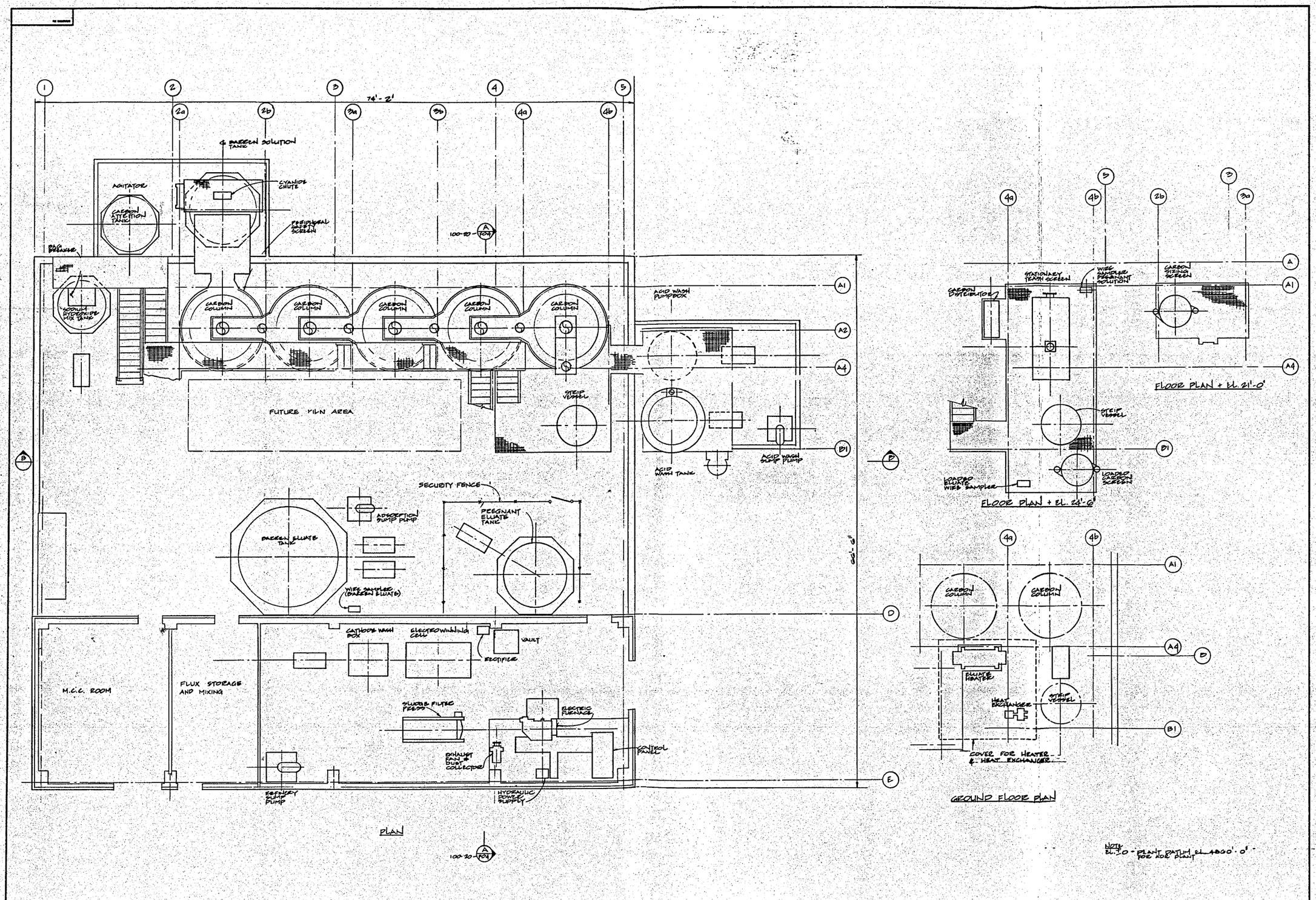
DATE BY

CLIENT PROLIAN PROLIFIC MET. CHECK ELECTR. MSTR. PPING AUX. CONCR. STEEL SERVICES ARCH. CEM. LAT.

DATE BY

CLIENT PROLIAN PROLIFIC MET. CHECK ELECTR. MSTR. PPING AUX. CONCR. STEEL SERVICES ARCH. CEM. LAT.

D:\8210\100-20F02.DGN Jan 24, 1990 08:37:09



NO	DESCRIPTION	DATE	BY
B	ISSUED FOR FEASIBILITY STUDY	20.01.1982	
A	ISSUED FOR PRELIMINARY STUDY	23.7.81	

REVISIONS

DWG. NO. — REFERENCE DRAWINGS

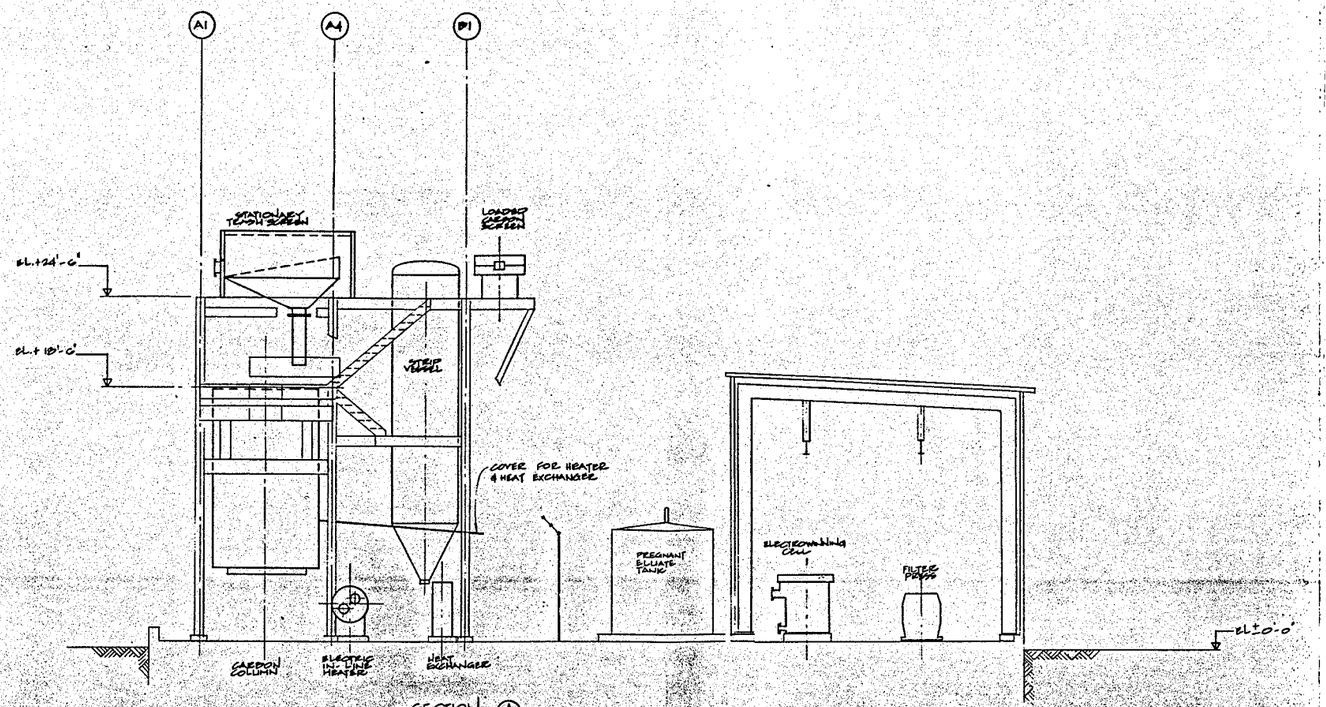
SECTION: GENERAL
SCALE: —
DRAWN BY: P.A.G. — DATE: NOV. 81
CHECKED BY: D.K. — DATE: DEC. 81
APPROVED BY: M.H. — DATE: DEC. 81

CLIENT: ASARCO INCORPORATED
LOCATION: YARNELL, ARIZONA

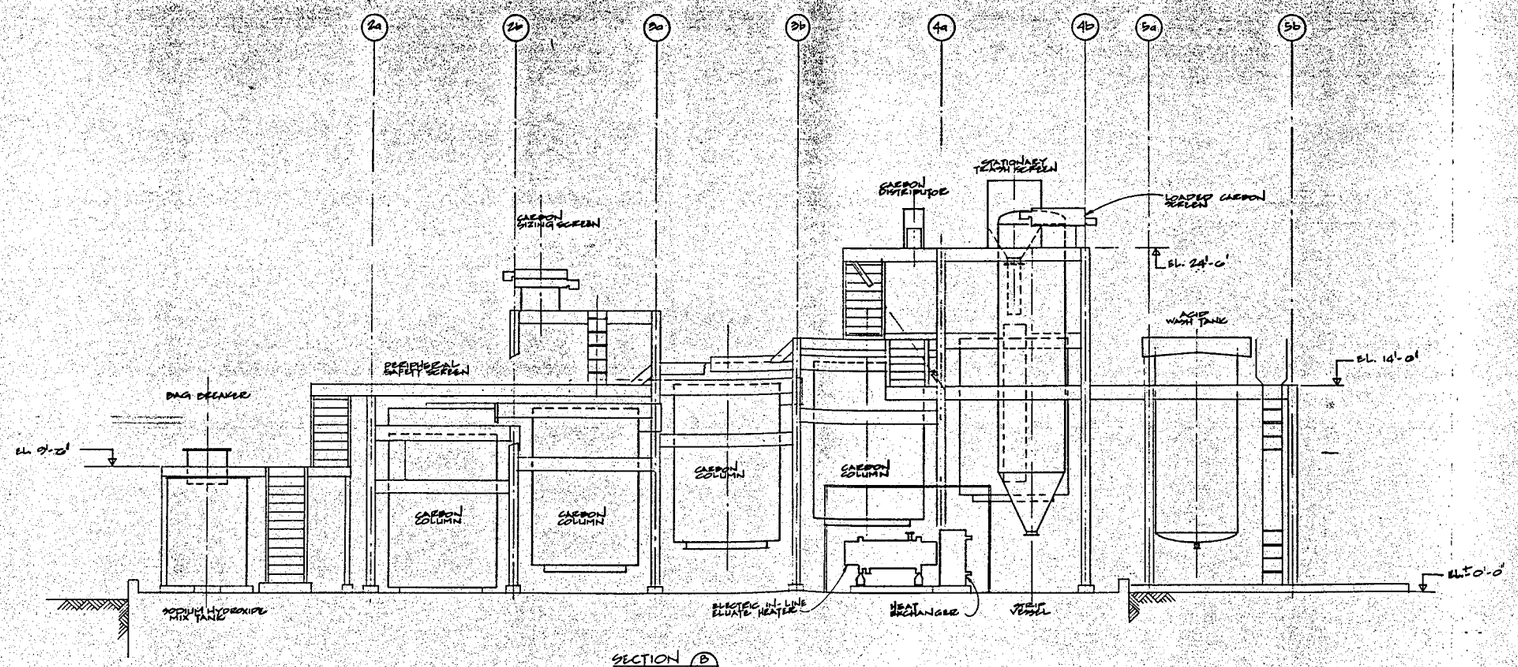
KILBORN

TITLE: YARNELL PROJECT ADR PLANT GENERAL ARRANGEMENT PLANS

KCT No.	
PROJECT No.	8210
DIVISION No.	15
DRAWING NUMBER	100-20-R03
REV.	B



SECTION A 100-20-F03



SECTION B 100-20-F03

NOTE
EL. ±0'-0" = PLANT DATUM EL. 4000'-0"

REV. NO.	DESCRIPTION	DATE	BY
B	ISSUED FOR PREFEASIBILITY STUDY	90-01-26	R.C.
A	ISSUED FOR PREFEASIBILITY STUDY	90-11-01	R.C.

REVISIONS

REFERENCE DRAWINGS

SECTION	ADR/LEACH	
SCALE	—	DATE
DESIGNED BY	F.A.C.	NOV. 89
DRAWN BY	S.S.H.	NOV. 89
CHECKED BY	D.K.	DEC. 89
APPROVED BY	M.H.	DEC. 89

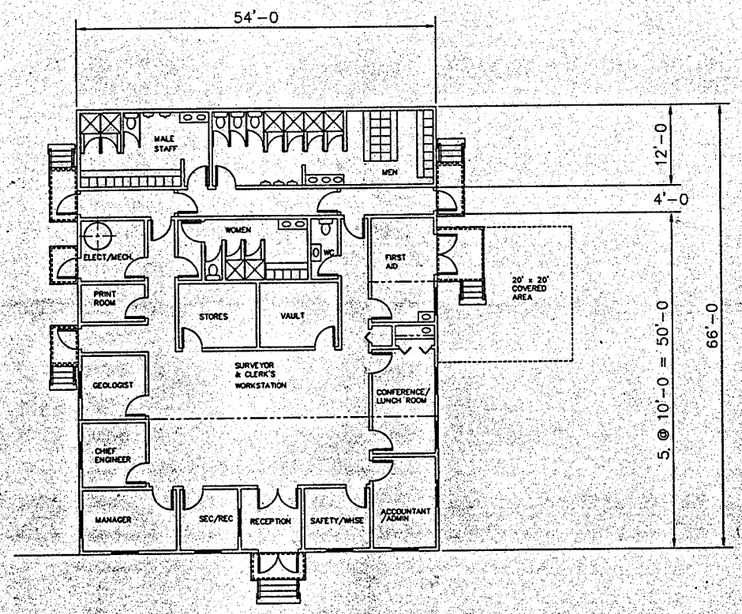
CLIENT: AMARCO INCORPORATED
LOCATION: YARNELL, ARIZONA

KILBORN

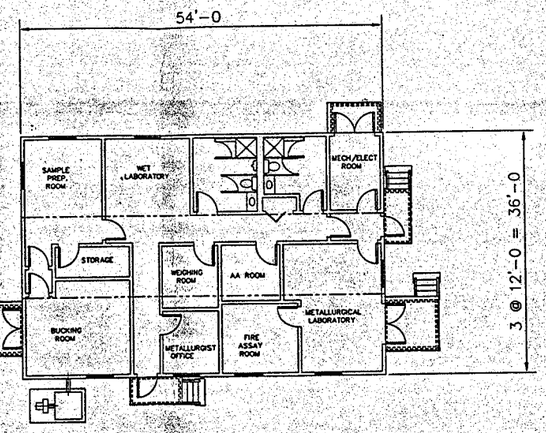
TITLE
YARNELL PROJECT
ADR PLANT
GENERAL ARRANGEMENT
SECTIONS

PROJECT NO.	DIVISION NO.
8210	15

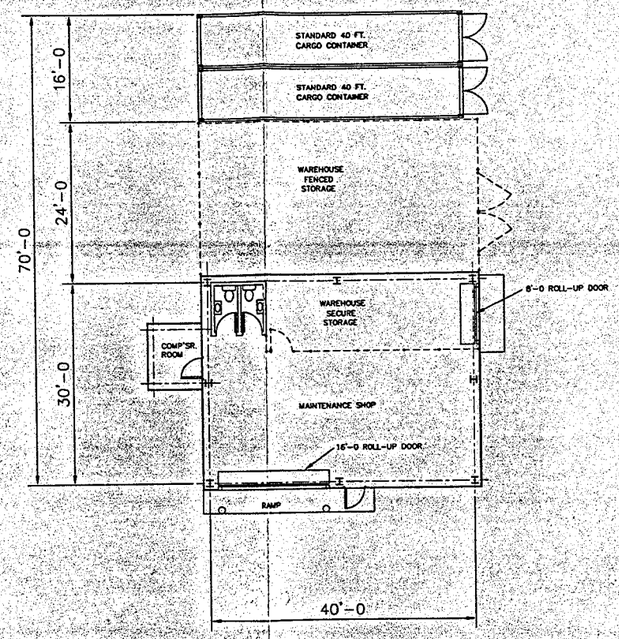
DRAWING NUMBER: 100-20-F04
REV. B



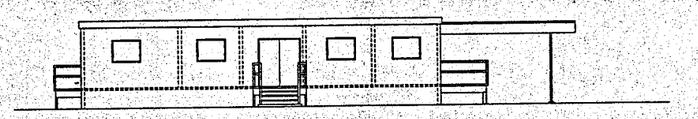
ADMINISTRATION OFFICES & CHANGEHOUSE



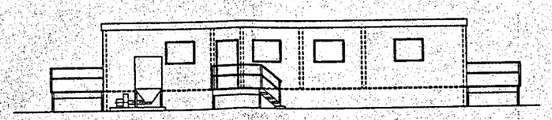
LABORATORY



WAREHOUSE & PLANT MAINTENANCE FACILITY



ELEVATION



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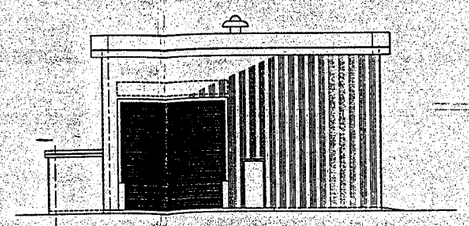
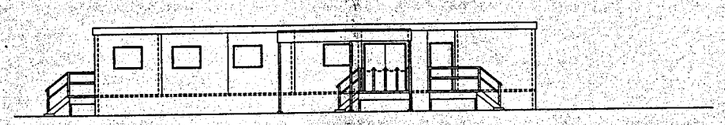
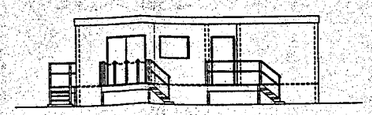


ELEVATION



SIDE VIEW



SIDE VIEW

SCALE

0 8 16 32 FT

No	DESCRIPTION	DATE	BY
B	ISSUED FOR PRE-FEASIBILITY STUDY	90/01/26	JBB
A	ISSUED FOR PRE-FEASIBILITY STUDY	89/12/21	JBB

REVISIONS

SECTION:	LAYOUT	
SCALE:	1/8"=1'	DATE
DESIGNED:	JBB	89/12/1
DRAWN:	JBB	89/12/1
CHECKED:	MPAH	89/12/21
APPROVED:	MPAH	89/12/21

CLIENT: ASARCO INCORPORATED

LOCATION: YARNELL, ARIZONA

KILBORN

TITLE
YARNELL PROJECT
ANCILLARY FACILITIES
GENERAL ARRANGEMENT
ADMIN, LAB, WHSE & MTCE

ANCIL.DWG

ACCT. No.	
PROJECT No.	DIVISION No.
8210	15
DRAWING NUMBER	REV
100-30-F01	B

DWG. NO. | REFERENCE DRAWINGS

JDS

ASARCO

Exploration Department
Southwestern United States Division

James D. Sell
Manager

February 16, 1990

Mr. Michael Philpot, President
Norgold Resources Inc.
206-475 Howe St.
Vancouver, B.C., V6C-3B3
Canada

Yarnell Project
Yavapai Co., AZ

Dear Mr. Philpot:

Clean-up mapping at 1" = 200' is being completed.

Further bottle-roll tests are being collected from drill cuttings throughout the deposit for further confirmation.

Sincerely yours,

James D. Sell

JDS:mek

cc: W.L. Kurtz

ASARCO Incorporated P. O. Box 5747 Tucson, Az 85703-0747
1150 North 7th Avenue (602) 792-3010

JDS

ASARCO

Southwestern Exploration Division

February 16, 1990

C.L. Snow
Tucson Office

Property Tax Payer
Yarnell Project
Yavapai County, AZ

It appears that Asarco is the ultimate payee of the taxes under the various agreements at Yarnell.

Norgold sent down the three attached Notice of Valuation for the Triangle, Edmond and Juniper patented claims.

James D. Sell

James D. Sell

JDS:mek
Att.

cc: W.L. Kurtz (w/o att.)

13-203-13-002 6 NOTICE OF VALUATION 2254

FROM
CLAIR D. BARNETT
YAVAPAI COUNTY ASSESSOR
255 EAST GURLEY ST
PRESCOTT, AZ 86301
(602) 771-3220

PRESORTED
FIRST CLASS MAIL
U.S. POSTAGE
P A I D
PRESCOTT, AZ
PERMIT NO. 219

THIS IS NOT A TAX BILL

TO
WESTERN BUILDING & MINING CORP

P O BOX 4006
READING PA 19606

See Reverse Side For Definitions and Instructions. Your Appeal Deadline is January 31, 1990

PROPERTY IN COUNTY: YAVAPAI YEAR 1990 PARCEL ID 203-13-002 6 NOTICE DATE 1-1-90

	1989 VALUATION				1990 VALUATION			
	CLASS	VALUE	ASST. RATIO	ASSESSED VALUE	CLASS	VALUE	ASST. RATIO	ASSESSED VALUE
LIMITED VALUE	4	43424	16.0	6948	4	43424	16.0	6948
FULL CASH VALUE	4	43424	16.0	6948	4	43424	16.0	6948

IF PROPERTY IS BEING USED AS A RESIDENTIAL UNIT AND THE CLASS DISPLAYED IS CLASS FIVE OR A PORTION OF THE SAME, THE OWNER MUST NOTIFY THE COUNTY ASSESSOR OF THE RENTAL USE OR MAY BE SUBJECT TO A CIVIL PENALTY.

LEGAL DESCRIPTION
SEC/TR TWNS/BLK RANGE/LOT 37.76 AC
WEAVER DIST: JUNIPER 20.35 AC LESS 1.72 AC TO AT6
F 235 8; EDGAR 19.25 AC TOTAL 37.88 A

13-203-13-002B4 NOTICE OF VALUATION 2256

FROM
CLAIR D. BARNETT
YAVAPAI COUNTY ASSESSOR
255 EAST GURLEY ST
PRESCOTT, AZ 86301
(602) 771-3220

PRESORTED
FIRST CLASS MAIL
U.S. POSTAGE
P A I D
PRESCOTT, AZ
PERMIT NO. 219

THIS IS NOT A TAX BILL

TO
WESTERN BUILDING AND MINING INC

BOX 4006
READING PA 19606

See Reverse Side For Definitions and Instructions. Your Appeal Deadline is January 31, 1990

PROPERTY IN COUNTY: YAVAPAI YEAR 1990 PARCEL ID 203-13-002B4 NOTICE DATE 1-1-90

	1989 VALUATION				1990 VALUATION			
	CLASS	VALUE	ASST. RATIO	ASSESSED VALUE	CLASS	VALUE	ASST. RATIO	ASSESSED VALUE
LIMITED VALUE	4	22356	16.0	3577	4	22356	16.0	3577
FULL CASH VALUE	4	22356	16.0	3577	4	22356	16.0	3577

IF PROPERTY IS BEING USED AS A RESIDENTIAL UNIT AND THE CLASS DISPLAYED IS CLASS FIVE OR A PORTION OF THE SAME, THE OWNER MUST NOTIFY THE COUNTY ASSESSOR OF THE RENTAL USE OR MAY BE SUBJECT TO A CIVIL PENALTY.

LEGAL DESCRIPTION
SEC/TR TWNS/BLK RANGE/LOT 19.44 AC
WEAVER DIST EDMOND MINING CLAIM CONT 19.44AC

13-203-13-002A5 NOTICE OF VALUATION 2255

FROM
CLAIR D. BARNETT
YAVAPAI COUNTY ASSESSOR
255 EAST GURLEY ST
PRESCOTT, AZ 86301
(602) 771-3220

PRESORTED
FIRST CLASS MAIL
U.S. POSTAGE
P A I D
PRESCOTT, AZ
PERMIT NO. 219

THIS IS NOT A TAX BILL

TO
WESTERN BUILDING AND MINING INC

BOX 4006
READING PA 19606

See Reverse Side For Definitions and Instructions. Your Appeal Deadline is January 31, 1990

PROPERTY IN COUNTY: YAVAPAI YEAR 1990 PARCEL ID 203-13-002A5 NOTICE DATE 1-1-90

	1989 VALUATION				1990 VALUATION			
	CLASS	VALUE	ASST. RATIO	ASSESSED VALUE	CLASS	VALUE	ASST. RATIO	ASSESSED VALUE
LIMITED VALUE	M	49079	12.3	6037	M	49928	12.3	6141
FULL CASH VALUE	M	49079	12.3	6037	M	49928	12.2	6091

IF PROPERTY IS BEING USED AS A RESIDENTIAL UNIT AND THE CLASS DISPLAYED IS CLASS FIVE OR A PORTION OF THE SAME, THE OWNER MUST NOTIFY THE COUNTY ASSESSOR OF THE RENTAL USE OR MAY BE SUBJECT TO A CIVIL PENALTY.

LEGAL DESCRIPTION
SEC/TR TWNS/BLK RANGE/LOT 17.32 AC
WEAVER DIST TRIANGLE LODE MINING CLAIM 17.32 AC 7
5/862 718/492

FILE

ASARCO

Exploration Department
Western USA

February 23, 1990

J.D. Sell
Tucson Office

Yarnell Ore Reserve

As I have discussed with you, you must critically review the Yarnell drill hole assays, the "Sellian Reserve," and the newly created computer inventory and economic ($400) pit reserve. You must generate a new ore reserve that the exploration department can sign off on.

Your review and work should take into consideration, as a minimum, what assays, if any, should be cut and how much; should any changes be made in the projection of values, if so, in all the deposit or in just certain places; and should assign the geologically most realistic values to the drill holes passing through stopes and rubble. These changes should be incorporated into calculating your final reserve and should be used in the computer inventory and economic pit calculations.

I believe the data already generated by Jansen (cross section data; 20' level plans) can be edited to speed up your work, but if not, so be it. You should call upon anyone necessary to help complete this work, since the Mining Department hopes to complete a feasibility at the end of March. You should certainly consult with Mr. Anzalone on the cutting of values and assignment of values to the stopes, and Mr. Lakosky should be kept informed and understand the reasons for any changes.

If you run into any computer scheduling problems, please inform Mr. Brown or Mr. Graybeal.

W. L. Kurtz /mek

W.L. Kurtz

WLK:mek

cc: R.L. Brown
F.T. Graybeal
T.E. Scartaccini
S.L. Lakosky
S.A. Anzalone
L.J. Jansen

ASARCO

Southwestern Mining Department

FEB 23 1990

SW Exploration

February 23, 1990

MEMORANDUM

TO: T. E. Scartaccini

FROM: S. L. Lakosky

RE: Yarnell Project Progress Report - February 1990

INTERMEDIATE FEASIBILITY STUDY

In early February 1990, Asarco's Engineering and Computer Services group implemented a programming change with regard to the computer generated ore reserves. The effect of this change increased the Yarnell economic ore reserves 85% (on a tonnage basis). The new reserves were incorporated into the Yarnell Intermediate Feasibility Study, which was completed on February 16, 1990.

FINAL FEASIBILITY STUDY

Completion Date:

The Final Feasibility Study is currently targeted for completion at the end of March 1990.

Additional Expenditures:

Sufficient ore reserve and metallurgical information has already been obtained to prepare the Final Feasibility Study. It is in Asarco's best financial interest that final ore reserve delineation drilling, condemnation drilling and continued metallurgical testing be initiated after delivery of the Final Feasibility Study to Norgold.

Remaining Work:

The main items which will be addressed as part of the Final Feasibility Study are: 1) Yarnell municipal leaders will be approached to find out if water for the Yarnell Project can be secured from the Yarnell municipal water system; 2) Refined contractor's mining and crushing budgetary cost estimates (with

a range of ± 10%) will be obtained through a more detailed scope of work description; and 3) Mine scheduling will be completed to yield the most economic tonnage and grade delivery schedule.

Project Development Schedule:

The attached schedule briefly summarizes the development work remaining on the Yarnell Project. Please note that the position Asarco takes with regard to the timing of procurement, site preparation and construction expenditures (approximately $9.7 million total) as they relate to the permitting process, affects the start-up date for commercial production.

Under the three (3) alternate development scenarios, start-up could range from July, 1991 to May, 1993.

S. L. Lakosky

S. L. Lakosky
Yarnell Project Manager

SLL/kh

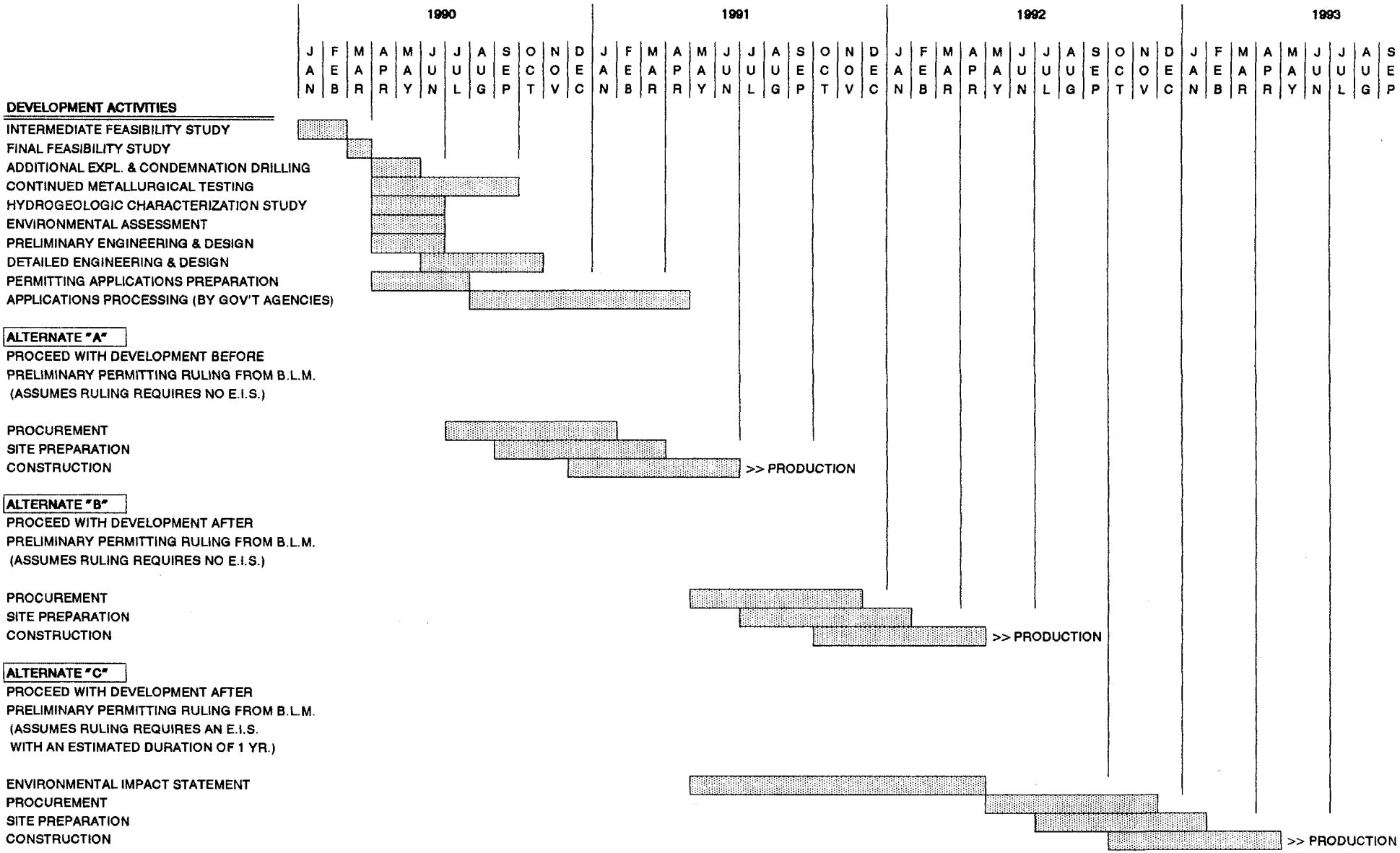
Attach.

cc: RJKupsch
RLBrown
DECrowell
WLKurtz
JDSell
File

2/23/90

YARNELL PROJECT DEVELOPMENT SCHEDULE

2/23/90



BULK ASSAY REPORT

TRIAD MINERALS CO.
ASSAYING & CONSULTING
P.O. Box 2754 - Mile Post 115, Hwy. 89
Wickenburg, Arizona 85358
602-684-3816

DATE 2-23-90

COMPANY ASARCO LAB # 022290-6

ROCK CHIP

PAGE 1

Sample Description	Ounces per ton AU (gold)	AG (silver)	Remarks
Y - 267	.015		
Y - 268	NIL		
Y - 269	NIL		

Certified Assays When Signed And Dated

2-23-90 [signature]

DATE SIGNATURE

JDS

TRIAD MINERALS CO.

Assaying & Consulting

TO: ASARCO

ATTN V. D. SELL

MARK MILLER

TOTAL NUMBER OF PAGES INCLUDING THIS PAGE: 2

FAX #: 792-3934

DATE: 2-26-90

TIME: 12:00

COMMENTS: THANK YOU.

Corey

COREY B. EDDINGTON
METALLURGIST

MILE POST 115 HWY. 89 P.O. BOX 2754 WICKENBURG, AZ 85358
(602) 684-3816 FAX (602) 684-3013

ASARCO

Southwestern Exploration Division

February 23, 1990

FILE NOTE

Yarnell Project
Layton Claims

This is a follow-up to my letter of 12/5/89 to Mrs. Priscilla A. Layton concerning the amending of her Victoria No. 2, 3, 4 and 5 claims. Amending these claims was recommended by Mr. Haggard's 6/23/89 Title Opinion.

Mrs. Layton called me to discuss the letter, but she sounded confused about the ramifications of amending the claims. She also confused the amending with assessment. I told her to contact her lawyer or discuss the amending with her sons and then get back with me. She has not contacted me.

William D. Gay

WDG:mek

William D. Gay

cc: J.D. Sell
S.L. Lakosky
M.A. Miller

JDS

FROM: J. D. SELL 2-23-90

To: WD Gay

I'd say hold off tl other things are cleared up.

Jim

From: W. D. Gay 1-25-90

To: J.D. Sell

Jim:

This is a letter ~~in~~ from J. Haggard that goes into the complexities of amending the Layton claims re Vic. 1, 2, 3, 4 & 5. Do we want to fuss with it or pass it on to Norgold?

Bill

FILE.

LAW OFFICES OF
APKER, APKER, HAGGARD & KURTZ, P.C.
A PROFESSIONAL CORPORATION
PARK ONE
2111 EAST HIGHLAND AVENUE, SUITE 230
PHOENIX, ARIZONA 85016
AREA CODE 602 TELEPHONE 381-0085

BURTON M. APKER*
JERRY L. HAGGARD**
DAVID B. APKER***
GERRIE APKER KURTZ
JOHN R. FITZPATRICK

*ALSO ADMITTED IN WISCONSIN
**ALSO ADMITTED IN DISTRICT OF COLUMBIA AND KANSAS
***ALSO ADMITTED IN COLORADO

MAILING ADDRESS
P. O. BOX 10280
PHOENIX, ARIZONA 85064-0280

TELECOPIER
(602) 956-3457

January 16, 1990

Mr. W. D. Gay
Land Engineer
Southwestern Exploration Department
ASARCO Incorporated
P.O. Box 5747
Tucson, Arizona 85703

ASARCO Incorporated
JAN 17 1990
SW Exploration

Re: Yarnell Project

Dear Mr. Gay:

This is in response to your January 11, 1990 letter concerning the amendments to the Victoria Nos. 2 through 5 lode mining claims. For convenience of illustration, I have written on the draft Amended Notice of Location for Victoria No. 2 which you sent, our suggestions for revisions. You will note that the Agreement between Norgold and Mr. and Mrs. Layton does not expressly provide Norgold with the right to amend the mining claims subject to that Agreement. Therefore, it would be advisable to obtain the consent of Mr. and Mrs. Layton in writing prior to amending the claims.

The second and fifth paragraphs of the Amended Notices for the Victoria No. 2 and Victoria No. 3 claims describe the end lines as not being parallel. I recognize that the land covered by Victoria Nos. 2 and 3 is planned to be used for waste dumps. However, if there is any possibility that ASARCO may want to assert extralateral rights from the Victoria Nos. 2 and 3 claims in the future, it would be necessary for the end lines of those claims to be parallel. The end lines may be moved over prior unpatented or patented claims in order to make them parallel and obtain extralateral rights even though the new land which may be taken in by the Victoria No. 2 or Victoria No. 3 claims would remain with the prior claims.

Finally, I have inserted other information which needs to be added to the sketch on the bottom of the Amended Notices.

Although it may appear to be ultra-technical to add this information because it is already contained in the body of the Amended Notices, the statute requires that information to be placed on the map or sketch (A.R.S. § 27-203). It is also noted that the BLM serial number for the original Location Notice for each claim should be included in the Amended Notices.

Please be reminded that, commencing January 3, 1990, there is a filing fee of $5.00 for each Amended Location Notice which is filed in the BLM.

Sincerely,

Jerry L. Haggard

Jerry L. Haggard
For APKER, APKER, HAGGARD
& KURTZ, P.C.

JLH/jb
Enclosures

cc: Mr. W. L. Kurtz
Mr. J. D. Sell

AMENDED NOTICE OF LOCATION
(Lode Claim)

amended

Notice is hereby given that D.C. Layton and Priscilla A. Layton, by undersigned agent, makes this location of the VICTORIA-2 lode mining claim, in the WEAVER Mining District, County of YAVAPAI, State of Arizona.

See letter

The claim is 1266 feet in length along the vein or deposit of mineral bearing rock in place and 439 NE 263 SW feet in width (131 SW 220 NE feet on either side of the center line of the claim), forming a claim in the shape of a parallelogram. The general course of said claim is from NE to SW.

See Letter

This Notice is posted on the centerline of the claim which location monument is in Section 14, Township 10N, Range 5W, GSRB&M.

The location monument of said claim is located approx. N 12°31'E 2878 ft from the SW corner of Section 14, Township 10N, Range 5W, GSRB&M, Arizona and said claim lies within the NW1/4 Sec. 14, T10N, R5W. GSRB&M.

See Letter

The surface boundaries of the claim are described as follows: Beginning at the discovery monument and running thence S20°W 50 ft. to the center of the end line and the true point of beginning thence (clockwise) N72°W 132' to corner 1, thence N16°E 1279' to corner 2, ~~thence S68°E 220'~~ to center end line, thence S68°E 220' to corner 3, thence S24°W 1258' to corner 4, thence N72°W 132' to point of beginning.

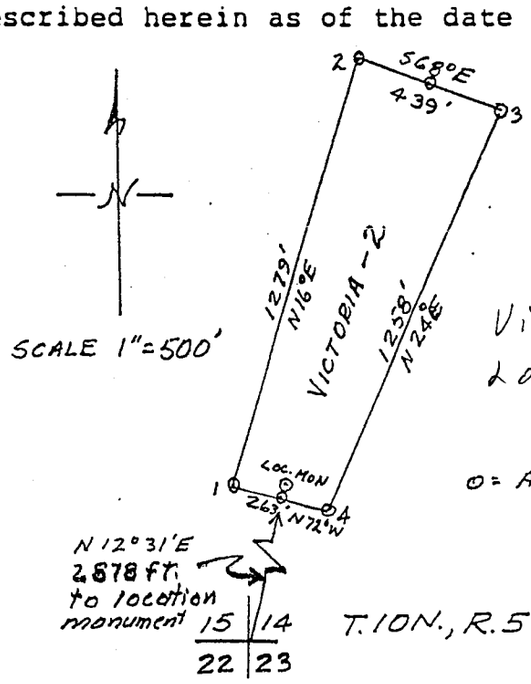
There are seven substantial posts, projecting at least 4 feet above the surface of the ground, or stone monuments, at least 3 feet high, one for the location monument, one at each of the four corners and one at the center of each end line as prescribed by A.R.S. §27-204.

Located, dated and posted on the ground this _____ day of _____, 19__.

The original Notice of Location of this claim is recorded in the official records of Yavapai County, Arizona, as follows:

Name of Claim	Recorded Book	Recorded Page	Recorded Date	BLM Serial No
VICTORIA-2	1287	765 & 766	3-2-80	98902

This amendment is made for purposes of more accurately describing the boundries hereof and correcting errors or ommissions (if any) contained in the original location notice. This amendment is made without waiver of the rights previously acquired under the location hereof. If for any reason it is determined that this notice is ineffective as an amendment of the location of this claim, the undersigned intends that this amendment shall serve as an original location of the area described herein as of the date of posting hereof.



By _____
Agent

Victoria-2 is a Lode Claim Located in Yavapai County, Arizona

o = ALL POSTS 4' - 2x2 OR 2" PVC. PIPE

state which type of monuments they are

AMENDED NOTICE OF LOCATION
(Lode Claim)

Notice is hereby given that _____, by undersigned agent, makes this location of the VICTORIA - 3 lode mining claim, in the WEAVER Mining District, County of YAVAPAI, State of Arizona.

The claim is 1225 feet in length along the vein or deposit of mineral bearing rock in place and 322 NE 187 SW feet in width (161 NE 94 SW feet on either side of the center line of the claim), forming a claim in the shape of a parallelogram. The general course of said claim is from NE to SW.

This Notice is posted on the centerline of the claim which location monument is in Section 14, Township 10 N, Range 5 W, GSRB&M.

The location monument of said claim is located approx. N17°07'E 2867 ft. from the SW corner of Section 14, Township 10 N, Range 5 W, GSRB&M, Arizona and said claim lies within the NW1/4 Sec. 14, T10N, R5W GSRB&M.

The surface boundaries of the claim are described as follows: Beginning at the discovery monument and running thence S 28°W 50 ft. to the center of the end line and the true point of beginning thence (clockwise) N74°W 94' to corner 1, thence N24°E 1258' to corner 2, thence S58°E 161' to center end line, thence S58°E 160' to corner 3, thence S31°W 1197' to corner 4, thence N74°W 94' to point of beginning.

There are seven substantial posts, projecting at least 4 feet above the surface of the ground, or stone monuments, at least 3 feet high, one for the location monument, one at each of the four corners and one at the center of each end line as prescribed by A.R.S. §27-204.

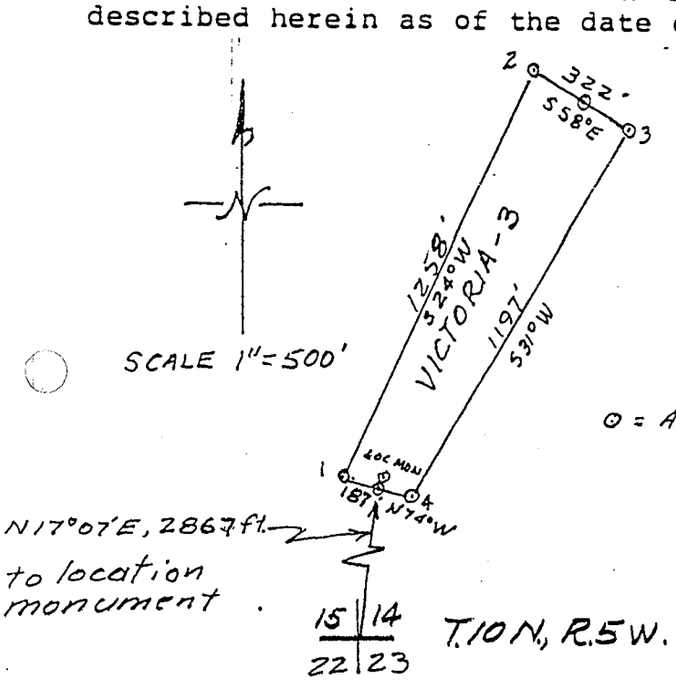
Located, dated and posted on the ground this _____ day of _____, 19__.

The original Notice of Location of this claim is recorded in the official records of _____ County, Arizona, as follows:

Name of Claim	Recorded Book	Recorded Page	Recorded Date
VICTORIA - 3	1287	767 & 768	3-2-80

This amendment is made for purposes of more accurately describing the boundries hereof and correcting errors or ommissions (if any) contained in the original location notice. This amendment is made without waiver of the rights previously acquired under the location hereof. If for any reason it is determined that this notice is ineffective as an amendment of the location of this claim, the undersigned intends that this amendment shall serve as an original location of the area described herein as of the date of posting hereof.

By _____
Agent



⊙ = ALL ~~CORNER~~ POSTS 4'-2x2 (OR) 2" PVC. PIPE.

AMENDED NOTICE OF LOCATION
(Lode Claim)

Notice is hereby given that _____, by undersigned agent, makes this location of the VICTORIA-4 lode mining claim, in the WEAVER Mining District, County of YAVAPAI, State of Arizona.

The claim is 1500 feet in length along the vein or deposit of mineral bearing rock in place and 478 feet in width (239 feet on either side of the center line of the claim), forming a claim in the shape of a parallelogram. The general course of said claim is from NW to SE.

This Notice is posted on the centerline of the claim which location monument is in Section 14, Township 10N, Range 5W, GSRB&M.

The location monument of said claim is located approx. N26°05'E 3585' from the SW corner of Section 14, Township 10N, Range 5W, GSRB&M, Arizona and said claim lies within the W½ & SE¼ Sec. 14, T.10N., R.5W. GSRB&M.

The surface boundaries of the claim are described as follows: Beginning at the discovery monument and running thence N44°W 50 feet to the center of the end line and the true point of beginning thence (clockwise) N30°E 250' to corner 1, thence S44°E 1500' to corner 2, thence S30°W 250' to center end line, thence S30°W 250' to corner 3, thence N44°W 1500' to corner 4, thence N30°E 250' to point of beginning.

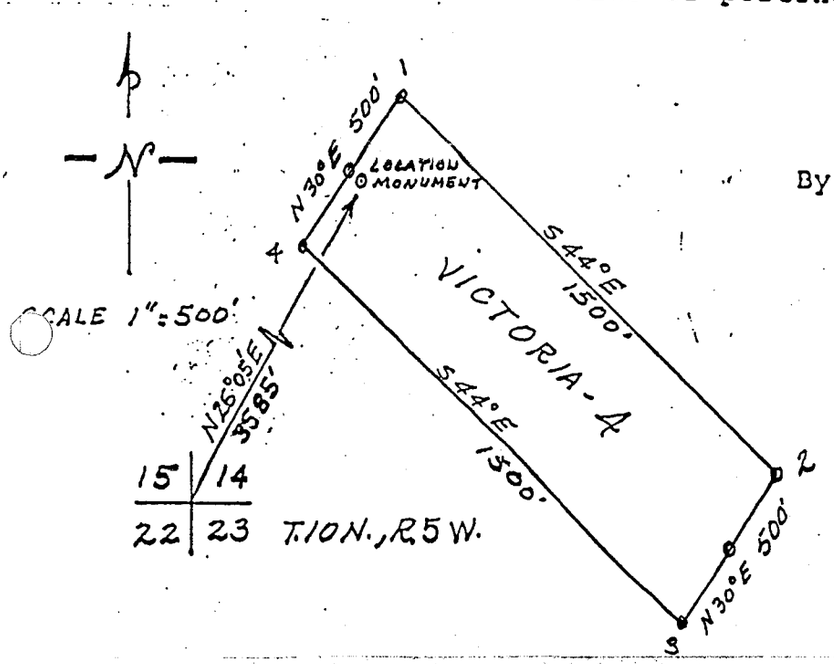
There are seven substantial posts, projecting at least 4 feet above the surface of the ground, or stone monuments, at least 3 feet high, one for the location monument, one at each of the four corners and one at the center of each end line as prescribed by A.R.S. §27-204.

Located, dated and posted on the ground this _____ day of _____, 19___.

The original Notice of Location of this claim is recorded in the official records of County, Arizona, as follows:

Name of Claim	Recorded Book	Recorded Page	Recorded Date
VICTORIA-4	1287	769 & 770	3-2-80

This amendment is made for purposes of more accurately describing the boundries hereof and correcting errors or ommissions (if any) contained in the original location notice. This amendment is made without waiver of the rights previously acquired under the location hereof. If for any reason it is determined that this notice is ineffective as an amendment of the location of this claim, the undersigned intends that this amendment shall serve as an original location of the area described herein as of the date of posting hereof.



By _____
Agent

O = ALL POSTS 4' – 2X2 OR 2" PVC PIPE.

AMENDED NOTICE OF LOCATION
(Lode Claim)

Notice is hereby given that _____, undersigned agent, makes this location of the VICTORIA-5 lode mining claim, in the WEAVER Mining District, County of YAVAPAI, State of Arizona.

The claim is 1500 feet in length along the vein or deposit of mineral bearing rock in place and 600 feet in width (300 feet on either side of the center line of the claim), forming a claim in the shape of a parallelogram. The general course of said claim is from NW to SE.

This Notice is posted on the centerline of the claim which location monument is in Section 14, Township 10N, Range 5W, GSRB&M.

The location monument of said claim is located approx. N24°41'E 3684' from the SW corner of Section 14, Township 10N, Range 5W, GSRB&M, Arizona and said claim lies within the W1/4, Sec. 14, T.10N., R.5W. GSRB&M.

The surface boundaries of the claim are described as follows: Beginning at the discovery monument and running thence N43°35'W 660 ft. to the center of the end line and the true point of beginning thence (clockwise) N46°E 300' to corner 1, thence S44°E 1500' to corner 2, thence S46°W 300' to center end line, thence S46°W 300' to corner 3, thence N44°W 1500' to corner 4, thence N46°E 300' to point of beginning.

There are seven substantial posts, projecting at least 4 feet above the surface of the ground, or stone monuments, at least 3 feet high, one for the location monument, one at each of the four corners and one at the center of each end line as prescribed by A.R.S. §27-204.

Located, dated and posted on the ground this _____ day of _____, 19___.

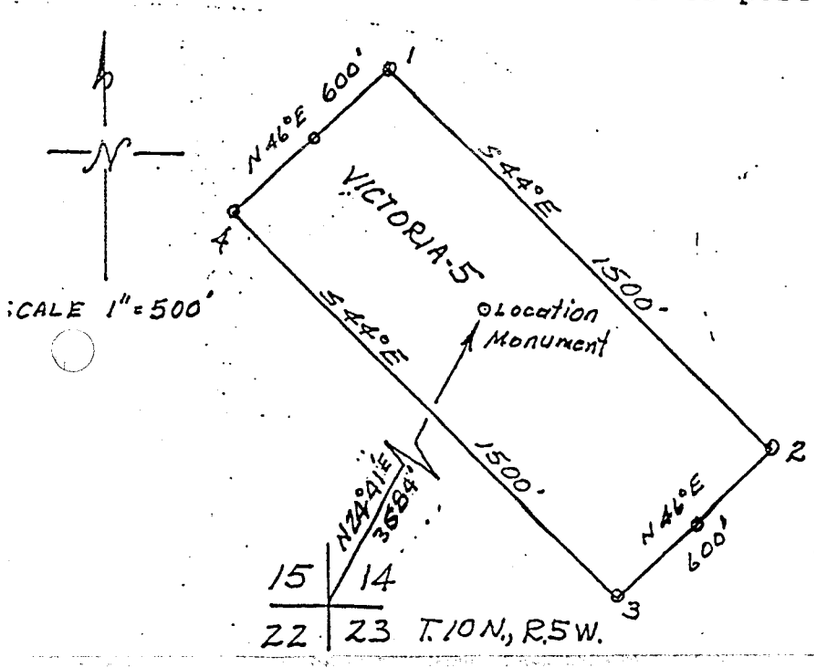
The original Notice of Location of this claim is recorded in the official records of _____ County, Arizona, as follows:

Name of Claim	Recorded Book	Recorded Page	Recorded Date
VICTORIA-5	1751	484 & 485	9-4-85

BLM SD

This amendment is made for purposes of more accurately describing the boundries hereof and correcting errors or ommissions (if any) contained in the original location notice. This amendment is made without waiver of the rights previously acquired under the location hereof. If for any reason it is determined that this notice is ineffective as an amendment of the location of this claim, the undersigned intends that this amendment shall serve as an original location of the area described herein as of the date of posting hereof.

By _____
Agent



⊙ = ALL POSTS 4' - 2x2 OR PVC PIPE.

ASARCO

Southwestern Exploration Division

JDS

February 28, 1990

J.D. Sell

YM-Series
Bottle Roll CN
Yarnell Project
Yavapai County, AZ

Between the dates of February 15 and February 19, 1990 twenty-four samples were prepared for individual preliminary cyanide bottle roll leach testing for gold. These samples have been submitted to Skyline Labs (Job # TAJ 627) where they will be crushed to 10 mesh and have a duplicate split made for a head assay. The samples will then be sent to Met-Con Research to have a 72 hour bottle roll leach test conducted.

Information regarding the sampling is compiled in Attachment A. All sample intervals used were A samples containing greater than 30% of the bag volume unless otherwise noted in the comment column of Attachment A.

Intervals sampled from reverse circulation drill holes consist of the B ore zone. The entire B ore zone of the sampled holes were representatively sampled from each 5 ft. interval by weight and combined into a single bag for analysis. The weight taken from each 5 ft. interval remained the same for the entire B zone of each hole. However, the weight taken from each 5 ft. interval varied from hole-to-hole due to the final representative sample being combined into one bag whether the B zone was 20 ft. or 200 ft. in length.

John J. Malusa

John J. Malusa

JJM:mek
Att.

cc: W.L. Kurtz
M.A. Miller
J.D. Sell

ATTACHMENT A

YARNELL PROJECT

Yavapai County, AZ

Preliminary Cyanide Bottle Roll Leach Test Sample List

Sample No.	Interval (feet)	Total Sample Wt.(lbs.)	Weight from each 5 foot Interval (lbs.)	Comments*
6	125-180	16 3/4	1 1/2	
8	225-275	19 3/4	2	230-235 B
14	15-90	14 3/4	1	25-30 → 10% 65-70 B
15	140-295	17 3/4	0.66	All B samples
18	100-140	16	2	
25	55-90	17	2 1/2	60-65 → 20%
33	275-365	17 1/2	1	360-365 B 295-300 B
40	275-380	18	1	
43	65-85	12	3	All B samples
47	170-205	18	2 1/2	
48	45-85	16 1/2	2	45-50 large interval the rest of 55-60 bags ≥30%
49	140-160	12	3	
53	65-140	14	1	
54	180-270	17 1/4	1	
63	140-240	19	1	185-190 → 20% The rest of sample ≈30%
71	45-110	13 5/8	1 1/8	
75	105-170	19	1 1/2	
79	120-170	15	1 1/2	
82	35-95	18	1 1/2	
84	105-140	18	2 1/2	
87	285-305	12	3	
88	240-295	16 1/2	1 1/2	
90	120-215	18 1/2	1	
93	5-25	12	3	

*i.e., intervals where B. samples are used and volume % of material in bags with little sample.

Circle RSC No. 117

3-1-90

JDS

ASARCO

Mineral Beneficiation Department
Tucson, Arizona

March 2, 1990

ASARCO Incorp.

MAR 2 - 1990

SW Exploration

Mr. S. L. Lakosky
Mine Superintendent
MISSION UNIT

Yarnell Metallurgical Testwork
Final McClelland Billing

Enclosed is the final billing for the Phase 1 Yarnell Metallurgical testwork done at McClelland. The total bill of $26,757 is significantly higher than the estimated cost of $16,035 in McClelland's proposal of June 16, 1989. This is due to the additional work performed at Asarco's request as follows:

1.	Environmental work on first column	$ 2,150
2.	Longer leach times on all columns (90+ days vs. 60)	1,800
3.	Low grade 3/8-inch column	2,800
4.	Low grade 6-inch vat leach	1,500
5.	Additional tail assays (requested by Exploration Dept.)	1,050
6.	Miscellaneous sampling/assaying/reporting	442
7.	Added bottle roll tests (requested by Exploration Dept.)	980
	TOTAL	$10,722

D. E. Crowell

DEC:brw

cc: T. E. Scartaccini
J. D. Sell

McCLELLAND LABORATORIES, INC.

1016 Greg Street, Sparks, Nevada 89431 702 / 356-1300
FAX 702 / 356-8917

Invoice To: Mr. Don Crowell
Company Name: ASARCO, INC.
Address 1150 North 7th Ave.
Tucson, AZ 85703

Invoice No. 1378/1039
Invoice Date: 1/31/90
Lab Order No. 1378
Client P.O. No.

TERMS: Due Upon Receipt

Item Number	Description	Charges
1.	Column Percolation Leach Tests - H.G./L.G. Comp, 18' high columns - standard procedure (0-60 days) with carbon circuits.	
	a) 6" feed, 6000 lbs, 24" I.D. x 18' column, additional 6 solution sampling days 6 @ $15.00 per day	$ 90.00
	b) 2" feed, 2000 lbs, 15" I.D. x 18' column, additional 7 solution sampling days 7 @ $15.00 per day	$ 105.00
2.	Environmental Work - 3/8" Feed Column Residue Credit for total cyanide analysis not run	$ <600.00>
3.	Column Leach Test Tail Splits - Four 100 lb bulk sample splits from each tail for 5 assay samples each.	
	a) Labor $100.00 x 3 columns	$ 300.00
	b) 20 tail assays x 3 columns x $12.50 each	$ 750.00
4.	Tail Screens, Column Residues same size fractions as head screens (6" feed - $500.00, 2" feed - $400.00, 3/8" feed - $300.00)	$ 1,200.00
	<u>Additional Work on U.G. Low-Grade</u>	
1.	Column Leach Test - U.G/L.G 3/8" Feed, 12" x 19' I.D. high column - standard procedure (0-60 days), including solution assays, additional 1/2 of leach $2,500.00 x 0.50	$ 1,250.00
2.	Vat Leach - ROM feed - standard procedure, including solution assays. Additional 1/2 of leach $1,500.00 x 0.50	$ 750.00
	For services rendered through December, 1989.	
	Total Amount Due This Invoice	$ 3,845.00
	Amounts Previously Invoiced	$ 22,912.60
	Less Payments/Deposits Applied	$<13,059.95>
	Balance Due	$ 13,697.65

All services are subject to the terms and conditions as specified in the MLI Laboratory Order.

ORIGINAL

McCLELLAND LABORATORIES, INC.

1016 Greg Street, Sparks, Nevada 89431 702 / 356-1300
FAX 702 / 356-8917

Invoice To: Mr. Don Crowell
Company Name: ASARCO, INC.
Address 1150 North 7th Ave.
Tucson, AZ 85703

Invoice No. 1378/1048
Invoice Date: 2/20/90
Lab Order No. 1378
Client P.O. No.

TERMS: Due Upon Receipt

Item Number	Description	Charges
1.	Report Preparation and Typing	$ 1,500.00
	<u>Additional Work on U.G. Low-Grade</u>	
1.	Column Leach Test - U.G/L.G 3/8" Feed, 12" x 19' I.D. high column - standard procedure (0-60 days), including solution assays.	
	a) Remaining 1/4 of leach $2,500.00 x 0.25	$ 625.00
	b) Additional solution sampling days 15 @ $15.00 each	$ 225.00
2.	Vat Leach - ROM feed - standard procedure, including solution assays. Remaining 1/4 of leach $1,500.00 x 0.25	$ 375.00
	For services rendered through January, 1990.	
	Total Amount Due This Invoice	$ 2,725.00
	Amounts Previously Invoiced	$ 26,757.60
	Less Payments/Deposits Applied	$<13,059.95>
	Balance Due	$ 16,422.65

All services are subject to the terms and conditions as specified in the MLI Laboratory Order.

ORIGINAL

JDS

ASARCO

Southwestern Exploration Division

March 6, 1990

J.D. Sell

Assaying of Diamond Drill Holes
YDDH 2, 3, 4
Yarnell Project
Yavapai County, Arizona

As discussed, we plan to use Triad Minerals for the assaying of the remaining diamond drill core. We also plan to use the rejects for the corresponding R.C. holes as check assays. This is the same procedure used in the assaying of our first diamond drill hole YDDH-1 with the corresponding R.C. hole YM-8. The core has been sawed in half and one half will be sent for assay. Initial crush will be 1/4 - 3/8" in size. This will then be split and downsized accordingly. The reject will be in the 1/4-3/8" size for metallurgical work, if needed.

Please let me know if you have any questions about the proceedings described above, as the core will be ready to go to Triad next week.

Mark A. Miller
Project Geologist

MAM:mek

cc: W.L. Kurtz

JDS

SKYLINE LABS, INC.
1775 W. Sahuaro Dr. • P.O. Box 50106
Tucson, Arizona 85703
(602) 622-4836 FAX 622-6065

REPORT OF ANALYSIS

JOB NO. TAJ 627
March 7, 1990
YM-6 TO YM-93
PAGE 1 OF 1

ASARCO Incorporated
MAR 7 - 1990
SW Exploration

ASARCO INCORPORATED
Attn: Mr. James D. Sell
Southwestern Exploration
P.O. Box 5747
Tucson, AZ 85703

Analysis of 24 Drill Cutting Samples

ITEM	SAMPLE NO.	SPLIT A FIRE ASSAY Au (oz/t)	SPLIT A FIRE ASSAY Ag (oz/t)	SPLIT B FIRE ASSAY Au (oz/t)	SPLIT B FIRE ASSAY Ag (oz/t)	diff
1	YM-6	.075	<.01	.046	<.01	.029
2	YM-8	.055	<.01	.050	<.01	.005
3	YM-14	.036	<.01	.034	<.01	.002
4	YM-15	.028	<.01	.024	<.01	.004
5	YM-18	.080	<.01	.080	<.01	0
6	YM-25	.065	<.01	.065	<.01	0
7	YM-33	.050	<.01	.040	<.01	.010
8	YM-40	.060	<.01	.050	<.01	.010
9	YM-43	.055	.06	.048	.06	.007
10	YM-47	.020	<.01	.022	.02	.002
11	YM-48	.036	<.01	.032	<.01	.004
12	YM-49	.034	<.01	.044	<.01	.010
13	YM-53	.034	<.01	.036	<.01	.002
14	YM-54	.055	<.01	.050	<.01	.005
15	YM-63	.046	.01	.050	<.01	.004
16	YM-71	.120	.01	.145	.03	.025
17	YM-75	.055	<.01	.065	.01	.010
18	YM-79	.032	<.01	.038	<.01	.006
19	YM-82	.040	<.01	.040	<.01	0
20	YM-84	.120	<.01	.075	<.01	.045
21	YM-87	.036	<.01	.040	<.01	.004
22	YM-88	.085	<.01	.075	<.01	.010
23	YM-90	.055	<.01	.042	<.01	.013
24	YM-93	.065	<.01	.065	<.01	0

cc: Eugene Salazar

ccc WLK
MAM
DEC

William L. Lehmbeck
Manager

REGISTERED ASSAYER CERTIFICATE NO. 9425 WILLIAM L. LEHMBECK ARIZONA

Charles E. Thompson
Arizona Registered Assayer No. 9427

William L. Lehmbeck
Arizona Registered Assayer No. 9425

James A. Martin
Arizona Registered Assayer No. 11122

ORDER FOR ANALYTICAL SERVICES

3-7-90

Samples Sent to:

SKYLINE LABS, INC.
1775 W. SAHUARO • P.O. BOX 50106
TUCSON, ARIZONA 85703
(602) 622-4836 FAX (602) 622-6065

(Report and invoice in duplicate will be sent to address below unless otherwise instructed)
Address Report To:

JAMES D. SELL
SWED - ASARCO
PO BOX 5747
TUCSON, AZ 85703

TEL 883-4684 FAX

PROJ. NO. TAJ-427 YM-
P.O. NO.:
SHIPMENT NO.: You have pulps and
DATE SHIPPED: rejects in house
SHIPPED VIA:
NO. OF CARTONS:
NO. OF SAMPLES:
(Information above helps us trace lost shipments)

Send Invoice To:

Send Copy of Report To:

LIST SAMPLE NOS.	DESCRIBE MATERIAL* (ROCK CHIP, SOIL, WATER, DRILL CORE, ETC.)	Au & Ag STANDARD FIRE ASSAY (OZ/TON) Au .002	Ag .01	Au FRE ASSAY AA FINISH (PPM) Au .002	Au .01	Au GEOCHEM AA (PPM) Au .002	Au .02	✓ Appropriate Box For Au and Ag Analysis LIST ADDITIONAL ELEMENTS TO BE DETERMINED (Give anticipated range of values, if possible)	Indicate Method of Analysis** (*See Below)	✓ If 31 — Element Emission Spec Scan Desired
YM-6	cuttings	X	X					Use up entire pulp in multiple-duplicate assay.		
-8										
-63										
-71										
-84										
-90								Take reject of same samples, cut out portion for screen metallic and duplicate assay minus material "Gold/Metallics Assay"		

PAYMENT FOR SERVICES REQUESTED MUST ACCOMPANY ORDER UNLESS CREDIT ARRANGED

Signature of person authorizing work: James D. Sell
(Use Continuation Sheet If Necessary)

INSTRUCTIONS

***If other than standard preparation is desired, please advise.**

METHOD OF ANALYSIS FOR ADDITIONAL ELEMENTS:
G - Geochem, A - Routine Quantitative Assay

†SAMPLE STORAGE: Pulps stored 90 days pending instructions, bulk rejects stored 30 days pending instructions.

INDICATE DESIRED DISPOSITION OF SAMPLES AFTER ANALYSIS	Bulk Rejects	Pulp
Return at customer's expense via:		
Store temporarily pending instructions†	who is left!	
Discard immediately		

Enclose yellow original with samples, send white copy by mail, retain pink copy. White copy will be returned to shipper as an acknowledgement that shipment has been received.

CLIENT

+ NO.47(MARCH 7, 1990) + OWNED, PUBLISHED AND COPYRIGHTED BY GEORGE CROSS NEWS LETTER LTD. +

cc JCB PGV

JDS
1st

ASARCO

Southwestern Exploration Division

March 7, 1990

J.D. Sell

Amended State Lease
Assessment
Sec. 14, & 22, T10N, R5W
Yarnell Project
Yavapai County, Arizona

This is an amended estimate to my memo of 2/7/90 on the same subject. The estimates did not account for additional personnel used during the program.

The revised estimates are as follows for 1990 expenditures:

Section 14 - mapping and sampling on this permit would approximate $2,200 in expenditures.

Section 22 - reconnaissance mapping and sampling on this permit would approximate $1,200 in expenditures.

Mark A. Miller

MAM:mek

cc: W.L. Kurtz
W.D. Gay

ASARCO

Southwestern Exploration Division

JDS
2nd

March 7, 1990

J.D. Sell

Amended State Lease
Assessment
Sec. 14, & 22, T10N, R5W
Yarnell Project
Yavapai County, Arizona

This is an amended amount to my memo of 2/7/90 on the same subject. The expenditures did not account for additional personnel used during the program.

The revised amounts are as follows for 1989 expenditures:

Section 14 - mapping and sampling on this permit would approximate $2,200 in expenditures.

Section 22 - reconnaissance mapping and sampling on this permit would approximate $1,200 in expenditures.

Mark A. Miller

MAM:mek

cc: W.L. Kurtz
W.D. Gay

ASARCO

Exploration Department
Southwestern United States Division

FEDERAL EXPRESS

March 9, 1990

Mr. Michael D. Philpot
NORGOLD RESOURCES INC.
206-475 Howe St.
Vancouver, B.C. V6C-3B3
Canada

Property Permit Renewal
Yarnell Project
Yavapai County, AZ

Dear Mike:

Enclosed are the completed Plan of Operations for prospecting permits 08 96868-00, 08 96869-00 for the Yarnell Project.

I have also attached a statement of expenditures for 1989 work.

Hope this covers everything. Please send completed copies back to us for our records.

Thanks.

Regards,

Mark A. Miller
Project Geologist

MAM:mek
Encs.

cc: J.D. Sell
W.L. Kurtz

ASARCO Incorporated P.O. Box 5747 Tucson, Az 85703-0747
1150 North 7th Avenue (602) 792-3010

NORGOLD RESOURCES INC.

U.S. OFFICES:
13935 Damy Drive
Reno, Nevada
89511
(702) 851-3177
Fax: (702) 851-3177

HEAD OFFICE:
210 - 475 Howe Street
Vancouver, B.C.
V6C 2B3
(604) 681-5566
Fax: (604) 687-8789

March 2, 1990

Mr. Mark Miller
ASARCO Incorporated
Exploration Department
P.O. Box 5747
1150 North 7th Avenue
Tucson, Arizona
85703-0747

Dear Mark:

Please find enclosed application for renewal of prospecting permit 96868-0 (Sec 14) and 96869-00 (Sec 22). These have been filled out and signed by Christopher Moat. I have also enclosed two signed Plan of Operations which are partly executed. I have also enclosed an invoice documenting work performed by Norgold personnel during the period April 15, 1989 to December 15, 1989.

Please complete the Plan of Operations and return the forms to Norgold along with ASARCO's invoice for work performed so we can notarize the forms and submit, with fees, to the State of Arizona.

Should you have any difficulties filling out or filing the forms, please give me a call. Thank you for your assistance.

Yours truly,

Michael D. Philpot
President

MDP/sjk

Enclosures

NORGOLD RESOURCES INC.

U.S. OFFICES:
3935 Chamy Drive
Reno, Nevada
89511
(702) 851-3177
Fax: (702) 851-3177

HEAD OFFIC
210 - 475 Howe S
Vancouver, B.
V6C 2B3
(604) 681-556
Fax: (604) 687-8

March 6, 1990

With regards to prospecting permit 96868-0 TWN 10N, RNG 5W, Sec 14 and 96869-0 TWN 10N, RNG 5W, Sec 22 Norgold employees, Michael Philpot and Tench Page spent one day on each prospecting permit conducting preliminary geological mapping and reconnaissance between the period April 15, 1989 and December 15, 1989. Messrs. Philpot and Page daily rates accrue to $500 U.S. per day.

Michael D. Philpot
President & C.E.O.
Norgold Resources Inc.

ARIZONA STATE LAND DEPARTMENT
Nonrenewable Resources & Minerals

Plan of Operation

The following information must be submitted to, and approved by the Department prior to initiating exploration or mining activities on State land. The plan is approved for a period of one year beginning on the date approved. Any change in the below described operations must first be approved by the Department.

Plan evaluation and approval may require 30 days.

PROSPECTING PERMIT OR MINERAL LEASE NUMBER(S) 08 96868 00

NAME IN WHICH ISSUED NORGOLD RESOURCES (US) INC

NAME OF OPERATOR NORGOLD RESOURCES INC TELEPHONE 604 681 5566

ADDRESS OF OPERATOR 210 - 475 Howe Street, Vancouver, B.C. V6C 2B3

NAME OF FIELD REPRESENTATIVE Tench Page - U.S. Expl. Manager
(If different than operator include address and telephone)
(702) 851 3177

1) LAND DESCRIPTION AND MAP
Attach as Exhibit A to this Plan a topographic map of the referenced property.

County Yavapai Township 10N Range 5W Section(s) 14

2) PERIOD OF OPERATION
The operation is proposed to begin on _____ and end on _____.
If operations are proposed to exceed one year, an addendum to this plan must be filed prior to the plan expiration date.

3) ACCESS
Show on Exhibit A existing and proposed routes. Describe in detail the extent of all improved or newly constructed access. Note any locked gates.
ACCESS IS SHOWN IN ORANGE ON EXHIBIT A. ACCESS WILL BE FROM THE MINA/STANTON RD.

4) VEHICLES AND EQUIPMENT
List by type and size all vehicles and equipment which will be used in connection with the operation. Include the capacity of concentrators for placer operations. 4 W.D. VEHICLES - (MAXIMUM 2)

5) SCOPE AND TYPE OF OPERATION
Describe the type and extent of the operation to be performed. Include the estimated area of disturbance and provide detailed information for any earth moving or site clearance operations. For placer type exploration include the amount of material to be processed from each test site, and the dimension of test sites.
Estimated area of disturbance: MINIMAL - SEE BELOW
RECONNAISSANCE GEOLOGIC MAPPING & SAMPLING WILL CONTINUE W/IN THE PERMIT AREA. THIS IS FOLLOW UP OF THE 1989 WORK PROGRAM. MINIMAL DISTURBANCE IS EXPECTED. AS EXPLORATION WILL BE MAPPING + ROCK CHIP SAMPLING

6) AFFECTED LAND
Indicate to the nearest 300 feet the location of all proposed prospecting sites (Exhibit A). If necessary complete Exhibit B or provide coordinate description (topographic grid or distance from section corner). For placer type exploration include the location of concentrators.

Coordinate description: Submit as an attachment.

7) DRILLING
For all drilling operations indicate the type of drilling operation, drilling medium (air, water e.g.), hole diameter, and proposed total depth.
No Drilling Planned

* Hole I.D.	Total Depth	Hole I.D.	Total Depth	Hole I.D.	Total Depth

If drilling is anticipated indicate the method of plugging and abandonment. Indicate the marsh funnel viscosity if applicable.

8) WATER USE
If the use of water is required, describe the location and quantity to be used. No Water Use

9) RECLAMATION
Describe actions taken to minimize environmental impacts and state plans for reclamation of disturbed areas. If applicable include measures for erosion control, recontouring, seed bed preparation, method of seeding, seed species, etc. Unless otherwise approved reclamation is to be completed within the approved plan period of one year.
No Disturbance

10) ANTIQUITIES AND NATIVE PLANTS
If required, the applicant agrees to obtain archaeological clearance prior to the following surface disturbance:

A. Prospecting Permit: All land surface affected by exploration activities including access roads.

B. Mineral Lease: All acreage under application. The applicant will be directly contacted by the Arizona State Museum.

Archaeological clearance must be obtained through the Arizona State Museum.

* Hole I.D. - Identification number

10) ANTIQUITIES AND NATIVE PLANTS (cont.)
If the destruction or removal of protected plants is necessary to enjoy the privileges of a permit or lease, the applicant agrees to obtain written permission from the Arizona Commission of Agriculture and Horticulture. The applicant also agrees to purchase said plants from the Arizona State Land Department. Native plants are as described under the Arizona Native Plant Law.

APPLICANT: [signature] MARCH 1/90
Signature and Date
Michael Philpot, President

Applicant must be the permit holder or duly authorized representative.

Following the Department's evaluation of this plan, two copies will be sent to the applicant noting any conditions which may be required by the Department. The applicant shall sign and return one copy which will attach to, and become a part of, the permit or lease.

CONDITIONS OF APPROVAL: _____

Applicant agrees to abide by the methods and extent of the operations described herein. Applicant also agrees to abide by the above listed CONDITIONS OF APPROVAL.

APPLICANT: [signature] MARCH 1/90
Signature and Date
Michael Philpot, President

FOR DEPARTMENT USE ONLY

PLAN NUMBER _____

BOND AMOUNT _____

APPROVED FOR THE PERIOD: BEGINNING _____ EXPIRING _____

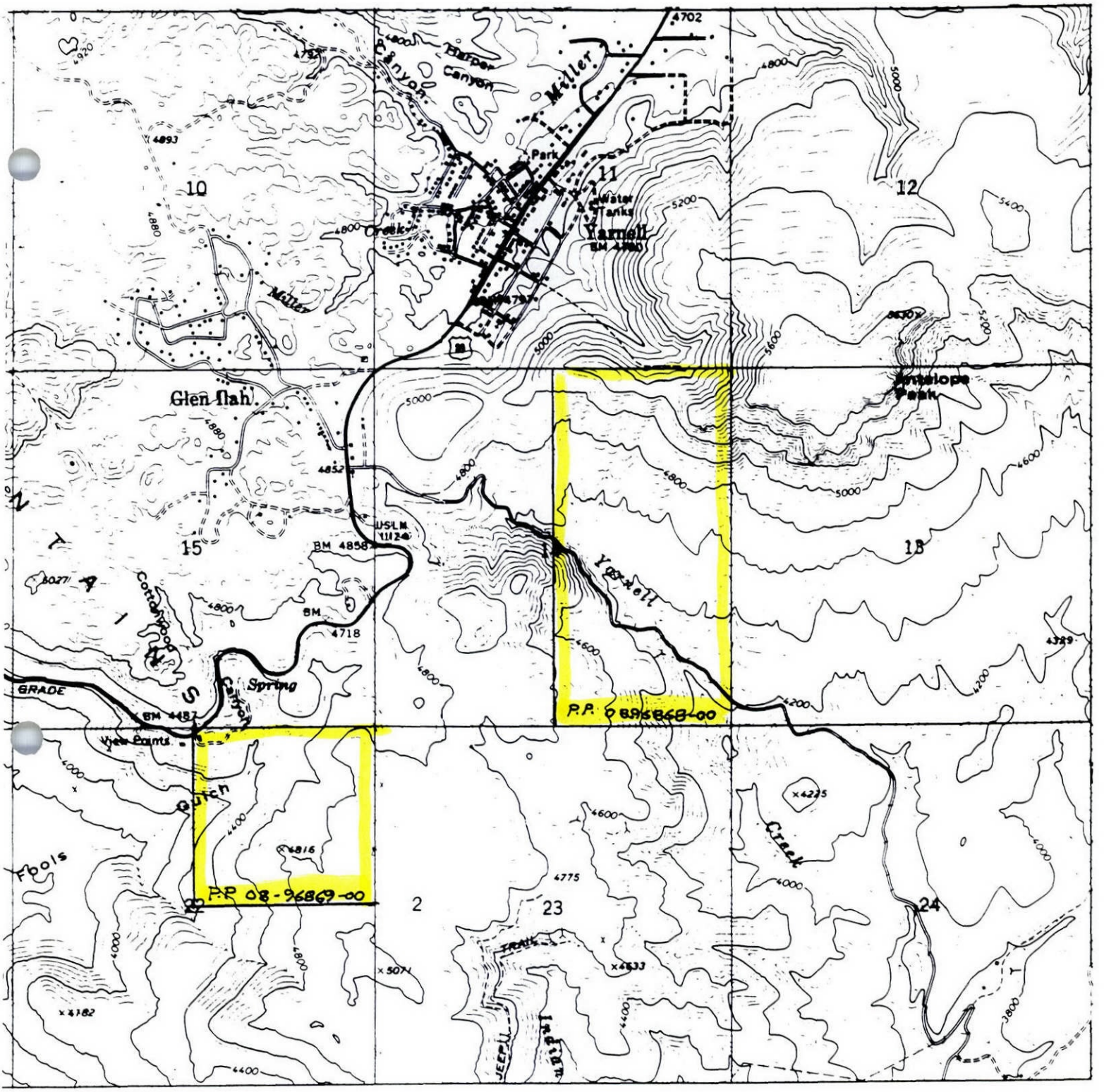
APPROVED BY: _____

REASONS FOR DENIAL: _____

DATE OF PERMIT OR LEASE ISSUE: _____

DATE LAST PLAN SUBMITTED: _____ PLAN NUMBER _____

REMARKS: _____



1" = 2000'

YARNELL/CONGRESS
QUADS 7.5'
EXHIBIT A

ASARCO

Southwestern Exploration Division

March 7, 1990

J.D. Sell

Amended State Lease
Assessment
Sec. 14, & 22, T10N, R5W
Yarnell Project
Yavapai County, Arizona

This is an amended amount to my memo of 2/7/90 on the same subject. The expenditures did not account for additional personnel used during the program.

The revised amounts are as follows for 1989 expenditures:

Section 14 - mapping and sampling on this permit would approximate $2,200 in expenditures.

Section 22 - reconnaissance mapping and sampling on this permit would approximate $1,200 in expenditures.

Mark A. Miller

MAM:mek

cc: W.L. Kurtz
W.D. Gay

To avoid payment of penalty and interest this payment must be [illegible] the OFFICE OF the State Land Department ON or BE[illegible]RE the DUE DATE. Date of POSTAL STAMP will not be accepted as time of payment.

NORGOLD RESOURCES INC
2380 HARBOUR CENTRE
555 W HASTINGS ST
VANCOUVER BC V6B-4N6

STATE OF ARIZONA
STATE LAND DEPARTMENT
1616 WEST ADAMS
PHOENIX, ARIZONA 85007

01-0071

KIND ENTRY	LEASE OR C[illegible] REFERENCE N[illegible]
08	968680

SEC	TOWNSHIP	RANGE

STATEMENT
INCLUDE ABOVE
NO 's WITH PAYMEN

	ACCOUNT NO GRANT FUND	SUB		BILLING DESCRIPTION	RATE	ACRES	$ AMOUNT
10	300	35		APP FEE PROSPECTING PERMITS			50 00

YOUR PERMIT TERMINATES ON THE DATE DUE NOTED BELOW. TO RENEW THIS PERMIT, THE ENCLOSED APPLICATION IS TO BE COMPLETED AND FILED WITH THIS DEPARTMENT PRIOR TO 5:00 PM ON THE DUE DATE, TOGETHER WITH REQUIRED MONIES. INSTRUCTIONS ON THE APPLICATION MUST BE STRICTLY ADHERED TO SO THAT ANY RIGHTS GRANTED BY THE PERMI ARE PROTECTED.

CERTIFICATE OF PURCHASE $ UNPAID BALANCE	BILLING PERIOD FROM MO	FROM DAY	FROM YR	TO MO	TO DAY	TO YR	DATE BILLED MO	DAY	YR	DATE DUE MO	DAY	YR	TOTAL ACRES	$ TOTAL AMOUNT
							01	31	90	04	25	90	00	50 00

IF PAYMENT IS MADE ON OR BEFORE THIS DATE → PAY THIS AMOUN

AMOUNT DELINQUENT SUBJECT TO PENALTY & INTEREST $

PENALTY & INTEREST			DISTRIBUTION
		$	

5% PENALTY OF RENTAL.	$	
TOTAL RENTAL AMOUNT PLUS PENALTY.	$	TOTAL PENALTY & INTER
* INTEREST PER ANNUM ON RENTAL. AMOUNT AND PENALTY— NUMBER OF DAYS DELINQUENT ( )	$	$
TOTAL AMOUNT DUE INCLUDING PENALTY AND INTEREST		$
CASH RECEIVED		$
BALANCE DUE OR OVERPAYMENT		$

* INTEREST SET BY TREASURER UNDER ARS 37-288. ANY PROTEST OF THIS RENTAL AMOUNT MUST BE IN WRITING, RECEIVED BY THE STATE LAND DEPARTMENT WITHIN 30 DAYS FROM THE DATE BILLE

o avoid payment of penalty and interest this payment must e l e OFFICE OF the State Land Department ON or EFO the DUE DATE. Date of POSTAL STAMP will not e accepted as time of payment.

NORGOLD RESOURCES INC
2380 HARBOUR CENTRE
555 W HASTINGS ST
VANCOUVER BC V6B-4N6

STATE OF ARIZONA
STATE LAND DEPARTMENT
1616 WEST ADAMS
PHOENIX, ARIZONA 85007

01-0072

KIND ENTRY	LEASE OR C P REFERENCE NO	
08	9686	00

STATEMENT
INCLUDE ABOVE
NO 's WITH PAYMENT

SEC	TOWNSHIP	RANGE

ACCOUNT NO GRANT FUND	SUB	BILLING DESCRIPTION	RATE	ACRES	$ AMOUNT
10 300	35	APP FEE PROSPECTING PERMITS			50 00

YOUR PERMIT TERMINATES ON THE DATE DUE NOTED BELOW. TO RENEW THIS PERMIT, THE ENCLOSED APPLICATION IS TO BE COMPLETED AND FILED WITH THIS DEPARTMENT PRIOR TO 5:00 PM ON THE DUE DATE, TOGETHER WITH REQUIRED MONIES. INSTRUCTIONS ON THE APPLICATION MUST BE STRICTLY ADHERED TO SO THAT ANY RIGHTS GRANTED BY THE PERMIT ARE PROTECTED.

CERTIFICATE OF PURCHASE $ UNPAID BALANCE	BILLING PERIOD FROM MO DAY YR	BILLING PERIOD TO MO DAY YR	DATE BILLED MO DAY YR	DATE DUE MO DAY YR	TOTAL ACRES	TOTAL $ AMOUNT
			01 31 90	04 25 90	00	50 00

IF PAYMENT IS MADE ON OR BEFORE THIS DATE → PAY THIS AMOUNT

AMOUNT DELINQUENT SUBJECT TO PENALTY & INTEREST $

PENALTY & INTEREST	DISTRIBUTION
	$

5% PENALTY OF RENTAL.	$	
TOTAL RENTAL AMOUNT PLUS PENALTY.	$	TOTAL PENALTY & INTEREST
* INTEREST PER ANNUM ON RENTAL. AMOUNT AND PENALTY— NUMBER OF DAYS DELINQUENT ( )	$	$
TOTAL AMOUNT DUE INCLUDING PENALTY AND INTEREST		$
CASH RECEIVED		$
BALANCE DUE OR OVERPAYMENT		$

* INTEREST SET BY TREASURER UNDER ARS 37-288. ANY PROTEST OF THIS RENTAL AMOUNT MUST BE IN WRITING, RECEIVED BY THE STATE LAND DEPARTMENT WITHIN 30 DAYS FROM THE DATE BILLED.

12/18/86

DEPARTMENTAL USE ONLY			
ACCOUNTING	DATA MGMT	DISPOSITION/INITIAL	DATE
Fee: $ 50.00	EXAM:	APPROVED	
	RE-ASSIGN:	DENIED	
$	RE-ASSIGN:	REJECTED	
	APP TYPE: Renewal P.P.	WITHDRAWN	
Date	NO. OF APPS: 1		

PERMIT NUMBER 08 - 96868 - 00

APPLICATION FOR RENEWAL OF PROSPECTING PERMIT

ARIZONA STATE LAND DEPARTMENT
1616 WEST ADAMS
PHOENIX, ARIZONA 85007

The State Land Commissioner:

I/We NORGOLD RESOURCES (US) INC.
(Applicant Name)

210 - 475 HOWE STREET VANCOUVER B.C. V6C 2B3 (604) 681-5566
(Address) (Zip) (Phone Number)

hereby make application for the renewal of mineral exploration or prospecting permit on the lands described below, in accordance with the laws of the State of Arizona, provisions of Title 27, Chapter 2, Article 4, and the rules and regulations of the State Land Department.

1. Check and Complete either A or B (Not both)

✓ A. RENEWAL OF ALL LAND described in Prospecting Permit Number 08- 96868 - 00.

___ B. RENEWAL OF ONLY THAT PART OF THE LAND in Prospecting Permit Number 08-_____. decribed below:

TWN.	RNG.	SEC.	LEGAL DESCRIPTION	ACRES	SLD USE ONLY CTY	GRT	PARCEL
10N	5W	14	E2 EX MIN LSE 11-31009	299.34			

I hereby certify that this application is for renewal of only a part of the land previously under permit, I hereby relinquish all acreage presently held in the prospecting permit which has not been described in 1 B.

I hereby certify under the penalty of perjury that, to the best of my knowledge and belief, the information contained herein, together with all exhibits, attachments, and financial statements are true, correct, and complete.

Dated this 7th day of FEBRUARY A.D., 19 90.

(APPLICANT)

CHRISTOPHER S. NOAT
CHAIRMAN & CEO

Revised 12/89

12/18/86

DEPARTMENTAL USE ONLY			
ACCOUNTING	DATA MGMT	DISPOSITION/INITIAL	DATE
Fee: $ 50.00	EXAM:	APPROVED	
	RE-ASSIGN:	DENIED	
$	RE-ASSIGN:	REJECTED	
	APP TYPE: Renewal P.P.	WITHDRAWN	
Date	NO. OF APPS: 1		

PERMIT NUMBER 08- 96869 - 00

APPLICATION FOR RENEWAL OF PROSPECTING PERMIT

ARIZONA STATE LAND DEPARTMENT
1616 WEST ADAMS
PHOENIX, ARIZONA 85007

The State Land Commissioner:

I/We NORGOLD RESOURCES (US) INC.
(Applicant Name)

210 - 475 HOWE STREET VANCOUVER B.C. V6C 2B3 (604) 681-5566
(Address) (Zip) (Phone Number)

hereby make application for the renewal of mineral exploration or prospecting permit on the lands described below, in accordance with the laws of the State of Arizona, provisions of Title 27, Chapter 2, Article 4, and the rules and regulations of the State Land Department.

1. Check and Complete either A or B (Not both)

✓ A. RENEWAL OF ALL LAND described in Prospecting Permit Number 08- 96869 - 00.

___ B. RENEWAL OF ONLY THAT PART OF THE LAND in Prospecting Permit Number 08-_____. decribed below:

TWN.	RNG.	SEC.	LEGAL DESCRIPTION	ACRES	SLD USE ONLY CTY	GRT	PARCEL
10N	5W	22	LOT 3 NENE S2NE	154.74			

I hereby certify that this application is for renewal of only a part of the land previously under permit, I hereby relinquish all acreage presently held in the prospecting permit which has not been described in 1 B.

I hereby certify under the penalty of perjury that, to the best of my knowledge and belief, the information contained herein, together with all exhibits, attachments, and financial statements are true, correct, and complete.

Dated this 4TH day of FEBRUARY A.D., 1990.

(APPLICANT)

CHRISTOPHER S. HART
CHAIRMAN + CEO

Revised 12/89

ARIZONA STATE LAND DEPARTMENT
Nonrenewable Resources & Minerals

Plan of Operation

The following information must be submitted to, and approved by the Department prior to initiating exploration or mining activities on State land. The plan is approved for a period of one year beginning on the date approved. Any change in the below described operations must first be approved by the Department.

Plan evaluation and approval may require 30 days.

PROSPECTING PERMIT OR MINERAL LEASE NUMBER(S) 08 96869 00

NAME IN WHICH ISSUED NORGOLD RESOURCES (US) INC

NAME OF OPERATOR NORGOLD RESOURCES INC TELEPHONE 604 681 5566

ADDRESS OF OPERATOR 210-475 HOWE ST. VANCOUVER B.C V6C 2B3

NAME OF FIELD REPRESENTATIVE Tench Page
(If different than operator include address and telephone)
(702) 851-3177

1) LAND DESCRIPTION AND MAP
Attach as Exhibit A to this Plan a topographic map of the referenced property.

County Yavapai Township 10N Range 5W Section(s) 22

2) PERIOD OF OPERATION
The operation is proposed to begin on _____ and end on _____.
If operations are proposed to exceed one year, an addendum to this plan must be filed prior to the plan expiration date.

3) ACCESS
Show on Exhibit A existing and proposed routes. Describe in detail the extent of all improved or newly constructed access. Note any locked gates.
ACCESS WILL BE FROM U.S. HWY 89.

4) VEHICLES AND EQUIPMENT
List by type and size all vehicles and equipment which will be used in connection with the operation. Include the capacity of concentrators for placer operations. 4 W.D. VEHICLES (MAXIMUM 2)

5) SCOPE AND TYPE OF OPERATION
Describe the type and extent of the operation to be performed. Include the estimated area of disturbance and provide detailed information for any earth moving or site clearance operations. For placer type exploration include the amount of material to be processed from each test site, and the dimension of test sites.
Estimated area of disturbance: MINIMAL-SEE BELOW
CONTINUED RECONNAISSANCE & GEOLOGIC MAPPING/ SAMPLING
SURFACE DISTURBANCE RESTRICTED TO INDIVIDUAL ROCK CHIP
SAMPLE SITES AND IS EXTREMELY MINIMAL

6) AFFECTED LAND
Indicate to the nearest 300 feet the location of all proposed prospecting sites (Exhibit A). If necessary complete Exhibit B or provide coordinate description (topographic grid or distance from section corner). For placer type exploration include the location of concentrators.

Coordinate description: Submit as an attachment.

7) DRILLING
For all drilling operations indicate the type of drilling operation, drilling medium (air, water e.g.), hole diameter, and proposed total depth.
No Drilling Contemplated @ This Time

* Hole I.D.	Total Depth	Hole I.D.	Total Depth	Hole I.D.	Total Depth

If drilling is anticipated indicate the method of plugging and abandonment. Indicate the marsh funnel viscosity if applicable.

8) WATER USE
If the use of water is required, describe the location and quantity to be used. No Water Use

9) RECLAMATION
Describe actions taken to minimize environmental impacts and state plans for reclamation of disturbed areas. If applicable include measures for erosion control, recontouring, seed bed preparation, method of seeding, seed species, etc. Unless otherwise approved reclamation is to be completed within the approved plan period of one year.
No Disturbance

10) ANTIQUITIES AND NATIVE PLANTS
If required, the applicant agrees to obtain archaeological clearance prior to the following surface disturbance:

A. Prospecting Permit: All land surface affected by exploration activities including access roads.

B. Mineral Lease: All acreage under application. The applicant will be directly contacted by the Arizona State Museum.

Archaeological clearance must be obtained through the Arizona State Museum.

* Hole I.D. - Identification number

10) ANTIQUITIES AND NATIVE PLANTS (cont.)
If the destruction or removal of protected plants is necessary to enjoy the privileges of a permit or lease, the applicant agrees to obtain written permission from the Arizona Commission of Agriculture and Horticulture. The applicant also agrees to purchase said plants from the Arizona State Land Department. Native plants are as described under the Arizona Native Plant Law.

APPLICANT: M. L. Philpot March 1/90
Signature and Date
President Michael Philpot

Applicant must be the permit holder or duly authorized representative.

Following the Department's evaluation of this plan, two copies will be sent to the applicant noting any conditions which may be required by the Department. The applicant shall sign and return one copy which will attach to, and become a part of, the permit or lease.

CONDITIONS OF APPROVAL: _____

Applicant agrees to abide by the methods and extent of the operations described herein. Applicant also agrees to abide by the above listed CONDITIONS OF APPROVAL.

APPLICANT: M. L. Philpot March 1/90
Signature and Date
President Michael Philpot

FOR DEPARTMENT USE ONLY

PLAN NUMBER _____

BOND AMOUNT _____

APPROVED FOR THE PERIOD: BEGINNING _____ EXPIRING _____

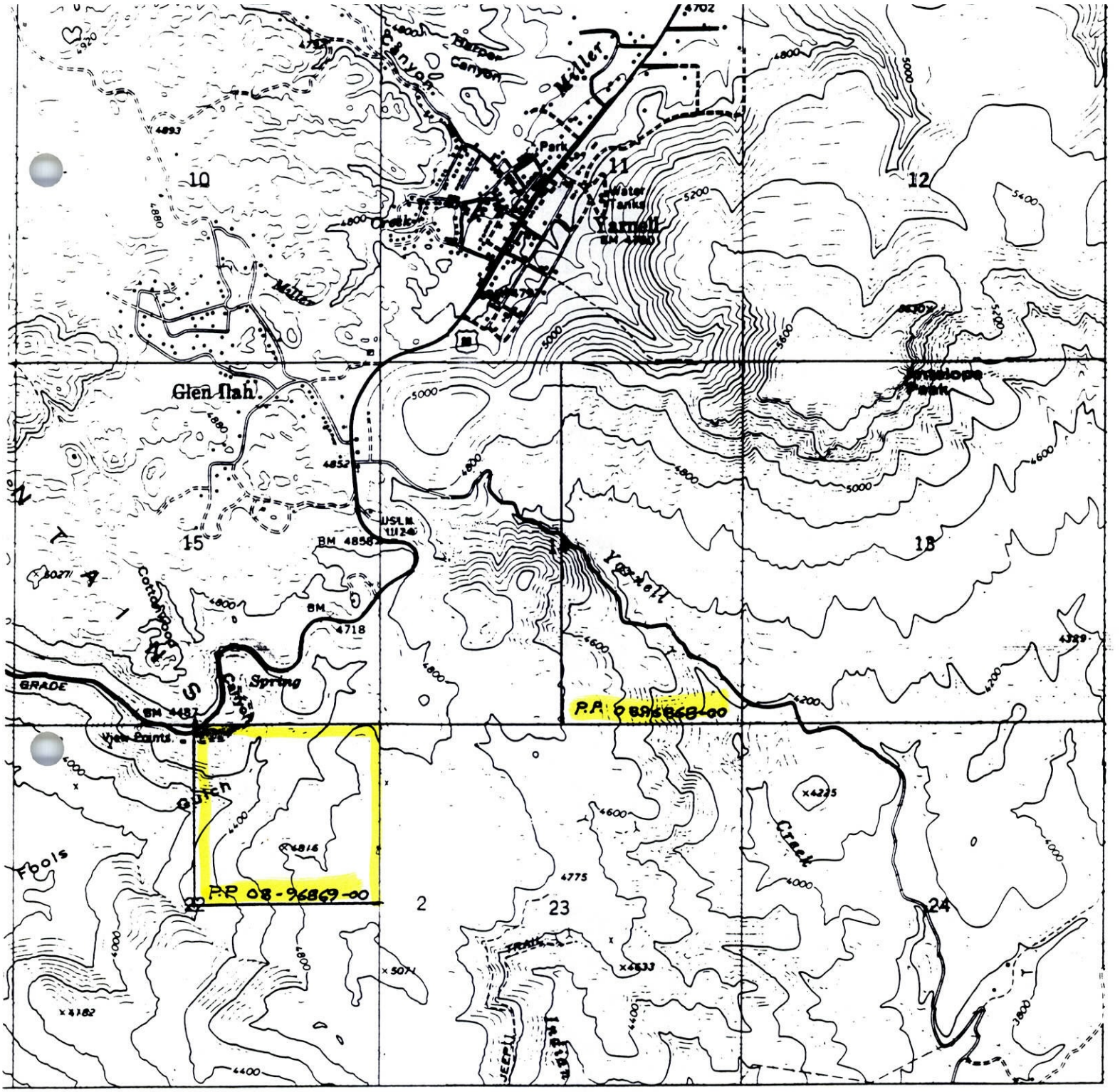
APPROVED BY: _____

REASONS FOR DENIAL: _____

DATE OF PERMIT OR LEASE ISSUE: _____

DATE LAST PLAN SUBMITTED: _____ PLAN NUMBER _____

REMARKS: _____



ACCESS ROUTE

1" = 2000'

YARNELL/CONGRESS
QUADS 7.5'
EXHIBIT A

ASARCO

Southwestern Exploration Division

March 7, 1990

J.D. Sell

Amended State Lease
Assessment
Sec. 14, & 22, T10N, R5W
Yarnell Project
Yavapai County, Arizona

This is an amended amount to my memo of 2/7/90 on the same subject. The expenditures did not account for additional personnel used during the program.

The revised amounts are as follows for 1989 expenditures:

Section 14 - mapping and sampling on this permit would approximate $2,200 in expenditures.

Section 22 - reconnaissance mapping and sampling on this permit would approximate $1,200 in expenditures.

Mark A. Miller

MAM:mek

cc: W.L. Kurtz
W.D. Gay

JDS

ASARCO

Southwestern Exploration Division

March 9, 1990

J.D. Sell

Ground Magnetometry
Yarnell Project
Yavapai County, AZ

The attached report includes a brief summary and interpretation of the magnetometry work performed in Yarnell. Also attached are a plan map, profiles, two regional magnetic gradient maps and all the data collected during this project.

John J. Malusa

JJM:mek
Atts.

cc: W.L. Kurtz

GROUND MAGNETOMETRY

Yarnell Project

Yavapai County, Arizona

INTRODUCTION

Between the dates of January 12, 1990 and January 14, 1990, ground magnetometry data was collected at the Yarnell Project using a total field Geo Metrics G8-16 portable proton magnetometer. Five magnetometry lines (labelled A, B, C, D, & E) were completed in the general area of the structurally controlled Yarnell orebody (Attachment A). Two magnetometry lines (B & C) were oriented perpendicular to the strike of the Yarnell Fault while two others (A & D) were located on semi-sinuous roads crossing the Yarnell Fault. A fifth line (E) was oriented parallel to the Yarnell Fault and served as a tie line for the four other lines. Locations of cultural interference are marked on the plan map (Attachment A). Check points along the tie line indicate an accurate data set due to closely repeated field values. All field data is in Appendix A with field readings corrected according to diurnal drift in Appendix B. Appendix A & B are with file copy only.

The objective of this survey was to see whether the Yarnell orebody has a distinct magnetic signature, and, if so, could this magnetic signature aid in future exploration for other deposits in the district. After plotting the data on a plan map (Attachment A) and in profile (Attachment B & C), it becomes apparent that this epithermal ore deposit has a subtle magnetic signature due to magnetic destruction from oxidation. However, after plotting the location on a residual aeromagnetic map of Arizona (Figure A) and on an aeromagnetic map of the Bradshaw Mountains and vicinity (Figure B), it becomes evident that the project is situated in an area of steep regional magnetic gradient. When qualitatively applying the magnetic gradient, the associated orebody magnetic lows become relatively non-anomalous.

Concerned with the fact that the steep regional gradient was overprinting the possible orebody anomaly beyond recognition, removal of the regional gradient was sought. However, due to the sparsity of data, procedural complexity and the recommendation of Dr. Sumner who is a geophysicist at the UofA, the regional gradient was not removed. Instead, a three-point running average was performed to smooth out the

data on the plan map in order to allow for easier interpretation and construction of a contour map. Further data smoothing was accomplished by discarding field readings affected by cultural interference and replacing them by a single value derived from the average of the four values on either side of the interference. The three-point running average was not performed on the values used for the profiles. Those values were only corrected for the diurnal drift.

Possible Reason and Influence of the Regional Gradient

The regional gradient affecting the surveyed area is most likely a result of deep seated structures. An excellent candidate for this in the Yarnell Area is the P€ Yavapai Series (commonly highly magnetic). Approximately one-half mile SE of the Yarnell Fault trace, metamorphic rocks very similar in lithologic character to the Yavapai Series outcrop. When plotting the location of the metamorphic units on the Residual Aeromag Map of Arizona (Figure A), the location shows excellent correlation with the highest aeromag values in the vicinity. Furthermore, the schistosity of the metamorphic units suggest that they plunge in a northerly direction underneath the granite pluton which contains the Yarnell orebody. An orientation of this sort would be congruent with the regional magnetic gradient decreasing to the north as a function of depth to the metamorphic units increasing to the north.

INTERPRETATION

In order to aid in interpretation, the magnetic susceptibility of various rock types in drill core were measured with a SM-5 digital magnetic susceptibility meter. The results are listed in Table A. It is important to notice that diorite can have either a higher or lower magnetic susceptibility than fresh granite depending upon the amount of weathering and/or alteration of the diorite. Furthermore, magnetic destruction is detected in altered rock core due to the correlation of decreasing magnetic susceptibility with increased alteration.

GROUND MAGNETOMETRY
Yarnell Project

Table A: Magnetic Susceptibility of Drill Core

Rock Type	$*10^{-3}$ cm. gm. sec^{-1}
diorite	>0.6
fresh granite	>0.5
slightly alt. granite	0.4 --> 0.2
weathered and/or alt.diorite	0.2 --> 0.1
footwall containing pyrite	0.1 --> 0.0
moderately alt. granite	0.0
fault gouge	0.0
highly alt. granite	0.0

*values derived from average of 5 separate readings on 5 different pieces of core.

Based upon the contour map and profiles, a noticeable difference is seen in the magnitude of the values and in the amount of change in values relative to lateral distance (i.e., profile wavelength and amplitude) when comparing the footwall versus the hanging wall. In general, the footwall's magnetic signature displays a more complex signature and higher field reading than that of the hanging wall which is typified by low field readings.

Profiles

The profiles show that the overall magnitude of readings are lower in the hanging wall. This can be attributed to the combination of two reasons:

1. The regional magnetic gradient.

2. The process of magnetic destruction due to oxidation in the hanging wall resulting in lower magnetic susceptibilities.

When observing certain profiles, there is a distinct change in wavelength (best seen in Profile B, Attachment B). The wavelength is shorter in the sections of the profiles that encompass the footwall as compared to the hanging wall. The shorter wavelength in the footwall is typical of rapid changes in lithology and/or alteration close to the surface and with little areal extent. Longer wavelengths are typical of a geologic setting with little lithologic change over a broad area and/or deep-seated structures.

GROUND MAGNETOMETRY
Yarnell Project

A possible reason for the differences in wavelength associated with the footwall and hanging wall is the affect that magnetic destruction through oxidation has on the magnetic signature of varying lithologies. In rocks with pervasive fracturing as in the hanging wall at Yarnell, oxidation will "smooth out" the differences in the magnetic susceptibility between different rock types; therefore, giving an oxidized diorite dike the same signature as an oxidized granite (John Sumner, personal communication). Indeed, quite a few dikes and or sills were intercepted while drilling through the hanging wall, but they never showed up magnetically.

Contour Map

In the southern area of the map, the footwall appears to have a pattern of similar values trending in the same direction as the fault strike. There are three possible reasons for this pattern:

1. The orientation of the survey lines when contoured are more likely to give this pattern.

2. Preferential orientation of sills and/or dikes along the main fracture set (i.e., parallel to strike of Yarnell Fault) resulting in similar values trending the same direction as the fault strike.

3. Areas of preferential oxidation associated with fracturing parallel to fault strike.

Dikes and/or Sills

The SW segment of Line E registered the highest field values that were not due to cultural interference. These high readings correlate with the location of a diorite sill that dips to the NE following the major structure. By the strength of the field readings, one can infer that there is a fairly large unoxidized diorite structure close to the surface.

At the intersection of line A, E, and the fault, there is a series of low readings. Presumably these readings correlate to a large felsic structure intersected from 20' to 50' in drill hole YM-67.

GROUND MAGNETOMETRY
Yarnell Project

Topography

Topography appears to have a significant influence on the field readings. On the profile in which topography was represented (Attachment C), the lowest field readings correlate with the lowest elevations and the highest readings with the highest elevation. Topography and the interaction of topography with geology must be considered when interpreting this data. Attachment C plots the gamma readings along the topographic profile and shows the Yarnell Fault and drill hole intercepts.

CONCLUSION & RECOMMENDATION

One must be fully aware of the direction and magnitude of the regional magnetic gradient and look at the Yarnell anomaly as being superimposed upon the regional gradient before any conclusions can be made. Once this is accomplished, the data collected does appear sufficient to detect a subtle magnetic anomaly associated with the Yarnell Orebody. Overall, a more complex magnetic signature is associated with the relatively unoxidized footwall and low values with the highly oxidized and altered hanging wall. This method should be profitable in exploration in this sort of geologic environment based upon its recognition of altered zones. However, if further work is undertaken, it should entail:

1. A tight grid pattern of field readings to allow for more definitive contouring on a plan map.

2. Lines perpendicular to fault should be lengthened to extend well beyond suspected alteration-mineralized area.

3. Lines should be straight to allow for construction of accurate profiles.

FIGURE A

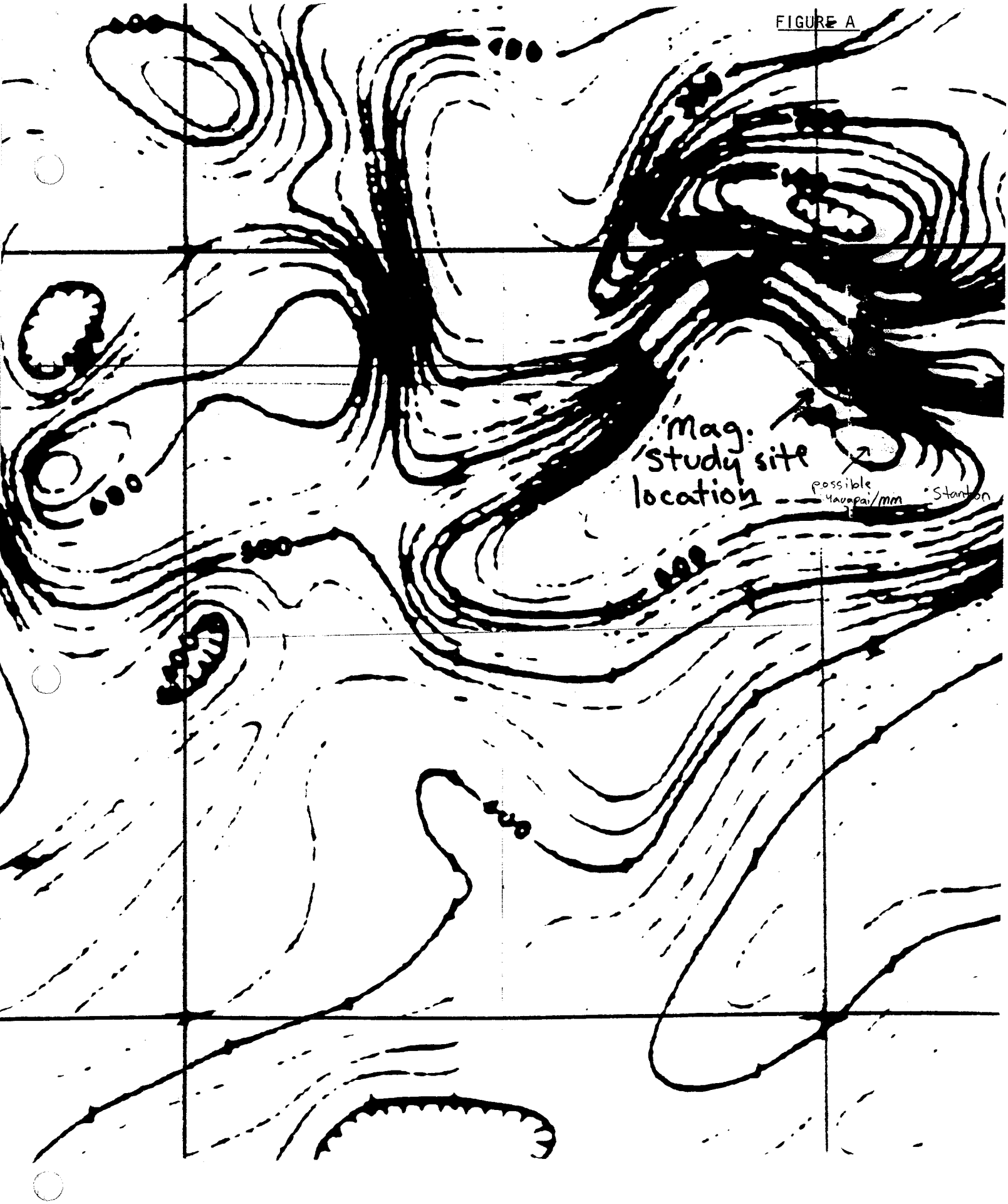


FIGURE A

1 inch ≈ 2.7 miles

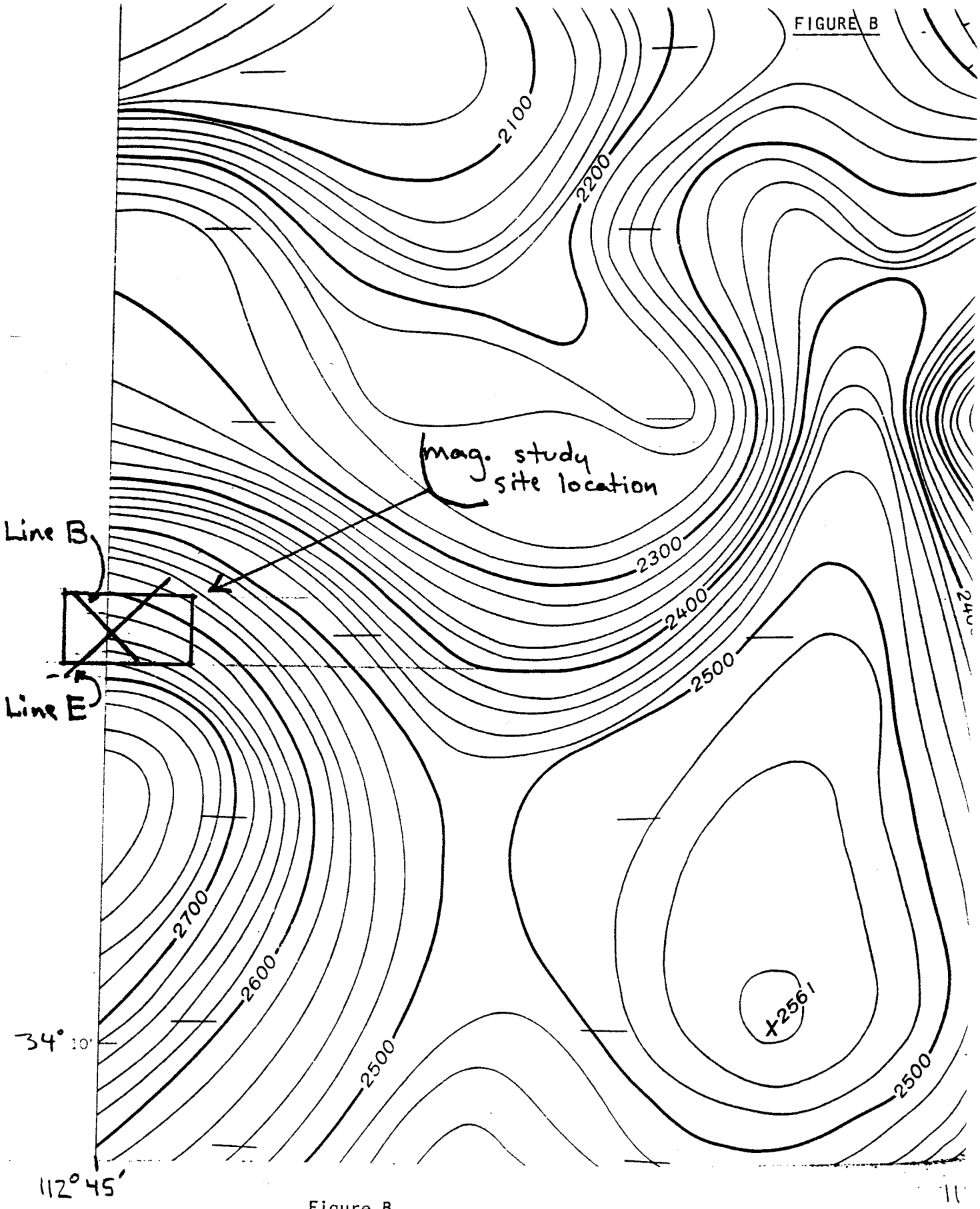
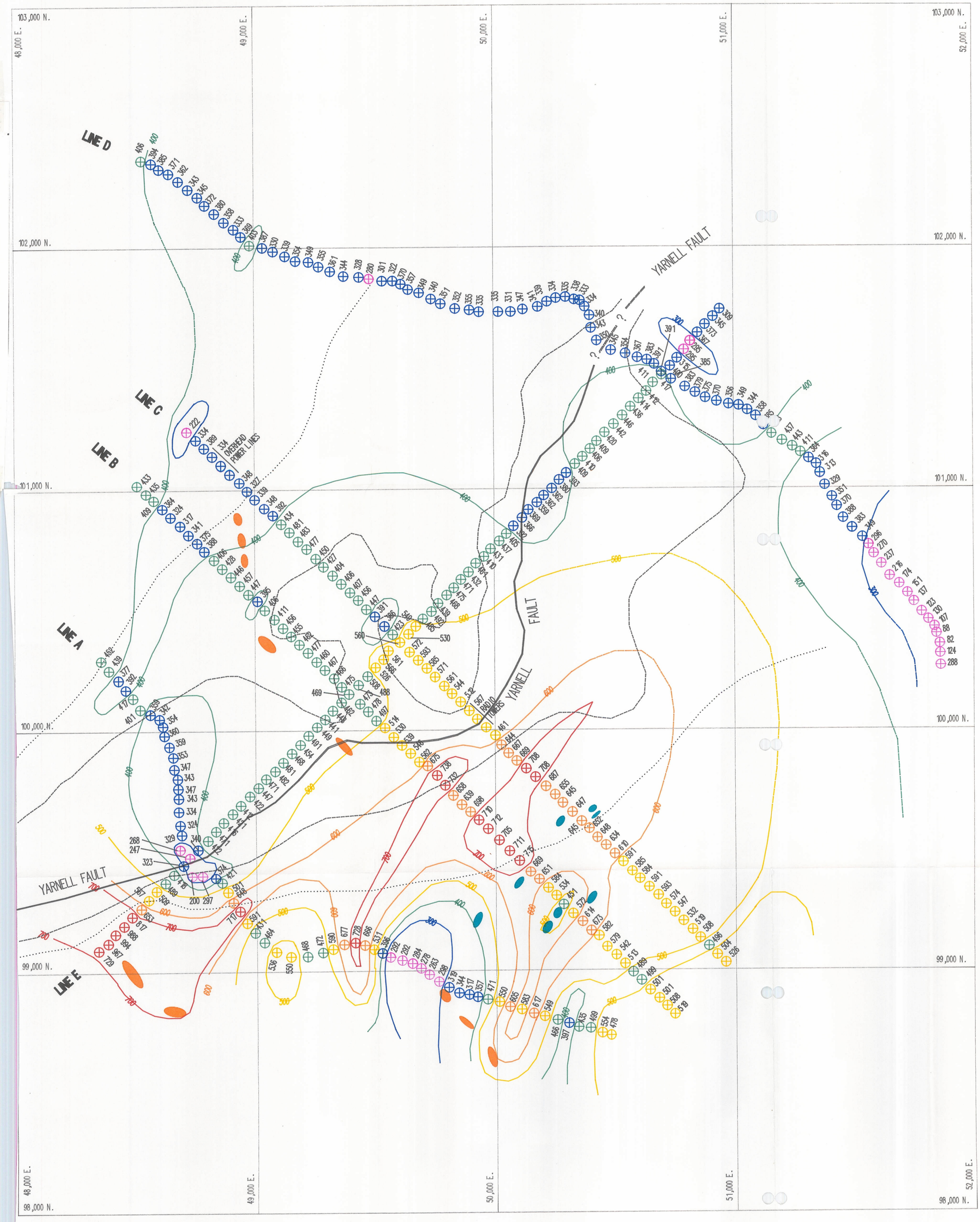


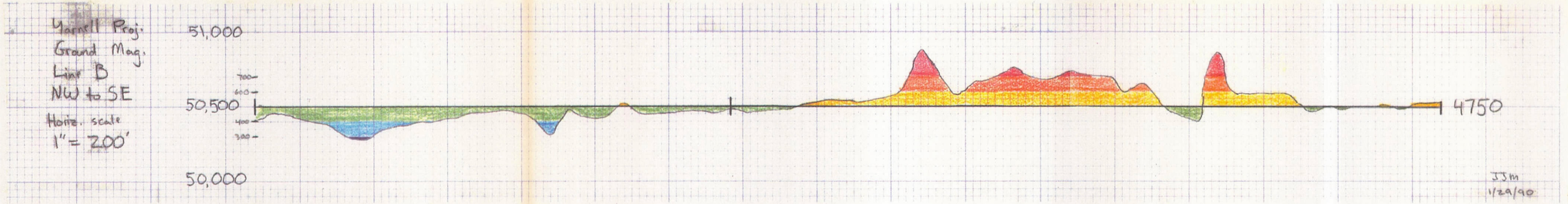
Figure B

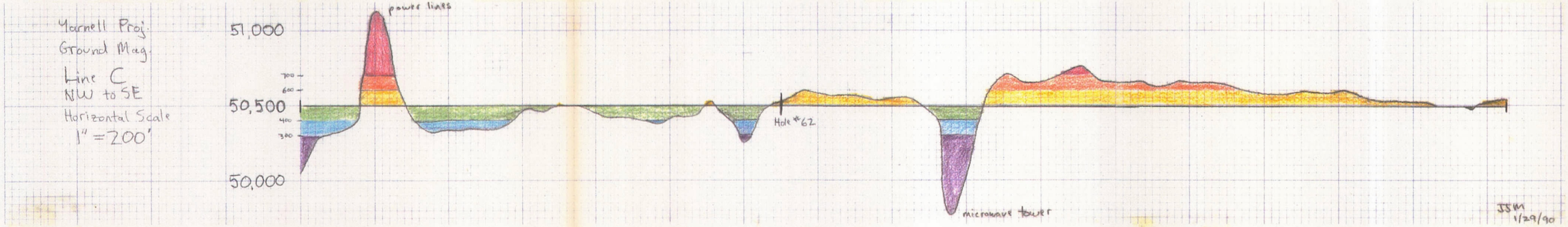
Aeromagnetic Map of the Bradshaw Mountains and Vicinity, Yavapai County, AZ
Line E ≈120 gamma gradient
Line B ≈ 80 gamma gradient

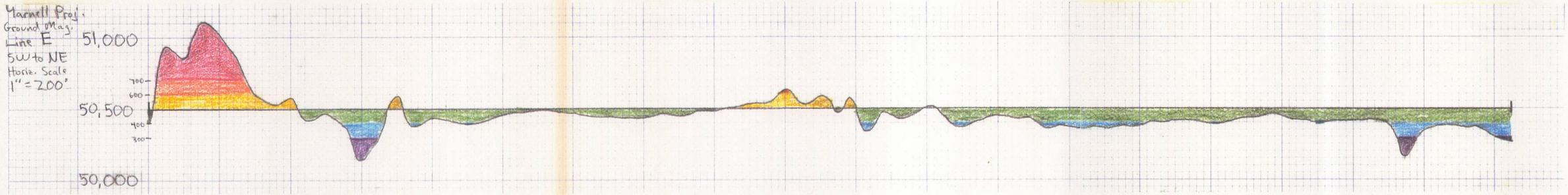
1 inch ≈ 0.71 miles


103,000 N.
102,000 N.
101,000 N.
100,000 N.
99,000 N.
98,000 N.
48,000 E.
49,000 E.
50,000 E.
51,000 E.
52,000 E.
LINE A
LINE B
LINE C
LINE D
LINE E
YARNELL FAULT
YARNELL FAULT
YARNELL FAULT
OVERHEAD POWER LINES
RADIO TOWERS
>700 gammas
601-700 gammas
501-600 gammas
401-500 gammas
301-400 gammas
<300 gammas
MODERATE ALTERATION
WEAK ALTERATION
FELSIC DIKE
DIORITE DIKE OR SILL
NORTH
ASARCO Incorporated
YARNELL PROJECT
GROUND MAGNETICS
YAVAPAI CO., ARIZONA
0 100' 200' 400'
mn 6870 JJM/dam tuc 02-28-90
file YARGMAG1.DWG

ATTACH. B

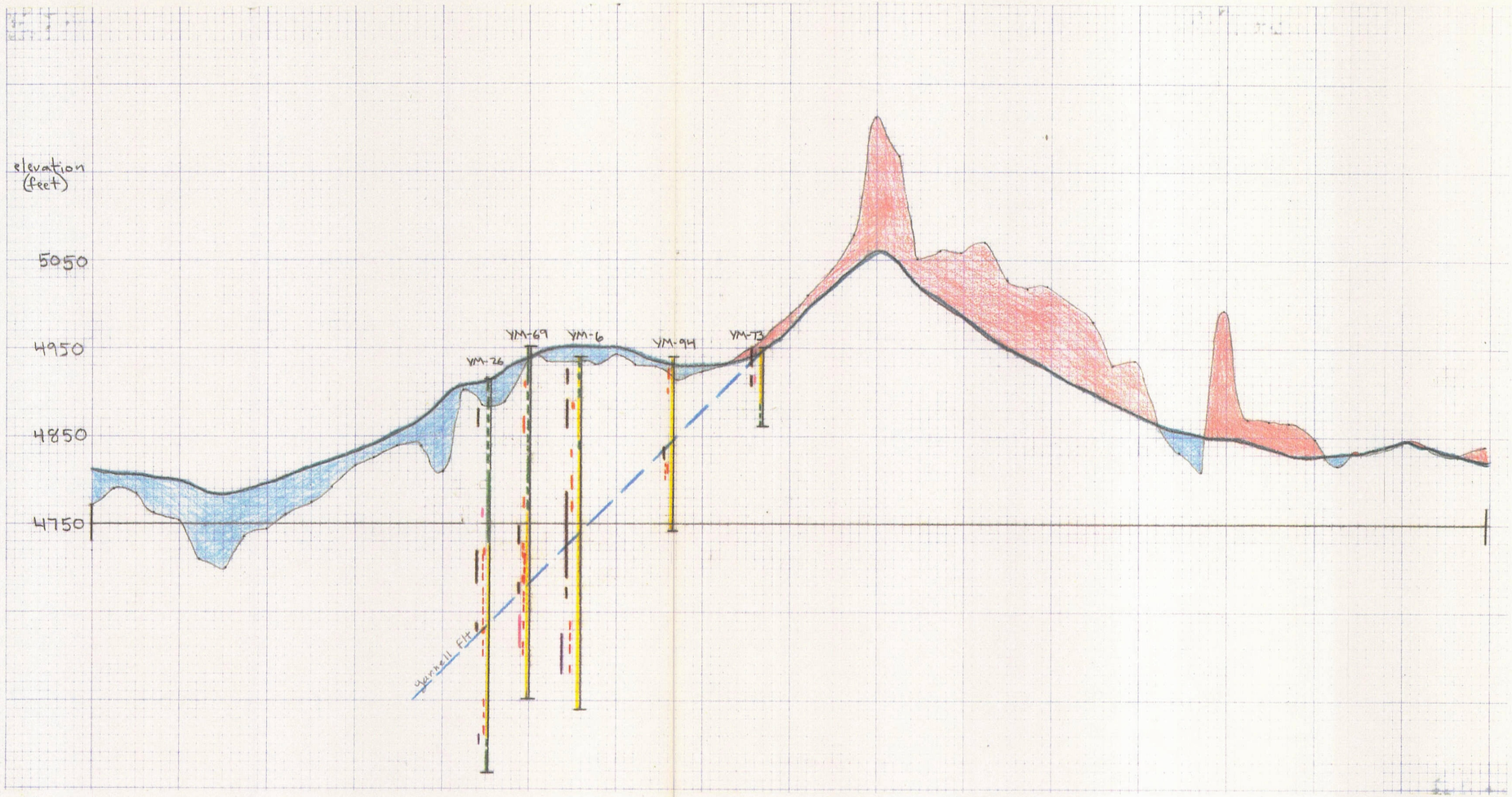






MN-6854 2-15-90

ASARCO Incorporated
YARNELL PROJECT
GROUND MAG LINES B-C-E
JMM 1" = 200' 1-29-90



Yarnell Project

Drill hole lithology x-section, & magnetic profile of Line B

Explanation

- ≥ 1% biotite
- < 1% biotite
- no biotite
- hi qtz. zone
- sulfide zone
- hi clay content
- diorite dike
- hi limonite zone
- Yarnell Fault
- Land Surface — 50500 gammas

Scale

Horizontal 1" = 200'

Vertical 1" = 100' and 1" = 250 gammas

base line = land surface = 50,500 gammas
red > 50,500 gammas
blue < 50,500 gammas

MN-6855 2-15-90

JDS

ASARCO

Southwestern Exploration Division

March 13, 1990

J.D. Sell

Assay Checks
YDDH 2, 3, 4
Yarnell Project
Yavapai County, AZ

The attached list tabulates the assay checks inserted into the diamond drill holes. Each series of checks per hole is from the corresponding rotary hole; example, YDDH-2 = YM-40. The numbering system used brackets the YDDH sample number.

MAM:mek

Mark A. Miller

cc: W.L. Kurtz

Assay Check YDDH 2, 3, 4

Yarnell Project, Yavapai County, AZ

YM-63		Assay Ck. YDDH-3
125-130	=	124-129
130-135	=	129-134
135-140	=	134-139
140-145	=	139-144
145-150	=	144-149
150-155	=	149-154
155-160	=	154-159
160-165	=	159-164
165-170	=	164-169
170-175	=	169-174
175-180	=	174-179
180-185	=	179-184
185-190	=	184-189
190-195	=	189-194
195-200	=	194-199
200-205	=	199-204
205-210	=	204-209
210-215	=	209-214
215-220	=	214-219
220-225	=	219-224
225-230	=	224-229
230-235	=	229-234
235-240	=	234-239

YM-75		Assay Ck. YDDH-4
75-80	=	74-79
80-85	=	79-84
85-90	=	84-89
90-95	=	89-94
95-100	=	94-99
100-105	=	99-104
105-110	=	104-109
110-115	=	109-114
115-120	=	114-119
120-125	=	119-124
125-130	=	124-129
130-135	=	129-134
135-140	=	134-139
140-145	=	139-144
145-150	=	144-149
150-155	=	149-154
155-160	=	154-159
160-165	=	159-164
165-170	=	164-169
170-175	=	169-174
175-180	=	174-179

IG*		Assay Ck. YDDH-2
0-5	=	0-4
5-10	=	4-9
10-15	=	9-14
15-20	=	14-19
20-25	=	19-24
25-30	=	24-29
30-35	=	29-34
35-40	=	34-39
40-45	=	39-44
45-50	=	44-49
50-55	=	49-54
55-60	=	54-59
60-65	=	59-64
65-70	=	64-69
70-75	=	69-74
75-80	=	74-79
80-85	=	79-84
85-90	=	84-89
90-95	=	89-94

YM-40		YDDH-2
255-260	=	254-259
260-265	=	259-264
265-270	=	264-269
270-275	=	269-274

*IG was the designation for the ore zone in YM-40 which was reassayed in the past. The interval represents 275-380 in YM-40. See MAM memo of 9/5/89 for additional details.

JDS

ASARCO

Southwestern Exploration Division

March 19, 1990

J.D. Sell

Whole Rock Analysis
Yarnell Project
Yavapai County, AZ

The attached report consists of geochemical data and a brief interpretation of 6 rocks from the Yarnell Project Area.

John J. Malusa

JJM:mek
Atts.

cc: W.L. Kurtz

WHOLE ROCK ANALYSIS

Yarnell Project

Yavapai County, Arizona

INTRODUCTION

A suite of six rocks was collected from the Yarnell Mine Project Area on February 18, 1990. The samples consisted of unaltered biotite granite from both the footwall and hanging wall, 2 Mid-Tertiary andesites from Antelope Peak, and 2 dikes, one dioritic in appearance and one andesitic in appearance (sample coordinates in Attachment A). The samples were submitted on February 19, 1990 to Skyline Labs (invoice # TAJ-628) for whole rock analysis. Results were received on March 2, 1990 and are listed in Attachment B. A cost estimate of this study is listed in Table 1 with the receipt for whole rock analysis as Attachment D.

To aid in interpretation, a CIPW normative calculation was performed for each of the whole rock samples (Attachment C). Also, the normative weight abundances of quartz, K-spar, and plagioclase were plotted on a ternary diagram (Figure A) for all six samples. Another ternary diagram (Figure B) was constructed using the weights %'s of Fe_2O_3 + FeO, Na_2O + K_2O, and MgO.

Objective of this study:

1. Are the footwall and hanging wall granite the same rock type? This was questionable due to the presence of a change in mineralogy seen in the drill core on either side of the fault zone. Was this change due to a difference rock type or alteration type?

2. Determine if the two different looking dikes are actually the same with respect to elemental abundances, but simply appear different due to different crystallization environments.

3. How are the dikes related to the gold bearing quartz veins?

4. Determine if there is a similar chemical signature between either of the dikes and the Mid-Tertiary volcanics. If one or both of the dikes has a similar chemical signature to the volcanics, one could conclude that the dikes were also Mid-Tertiary in age. This would prove to be an inexpensive alternative method to age dating.

WHOLE ROCK ANALYSIS
Yarnell Project

INTERPRETATION

Objective #1 was determined by observing the close correlation between the hanging wall and the footwall with respect to the normative results, ternary diagrams and the list of chemical constituents. Also, once out of the alteration zone the rocks have a very similar visual appearance. Therefore, both chemical and visual similarities leads one to conclude that the hanging wall and footwall granite are the same. The change in mineralogy seen in the core holes is due to a different type of alteration in the footwall as compared to the hanging wall.

Objective #2 (is dike 1 the same rock type as dike 2) was also answered by the use of the whole rock analysis. The chemical make up of these rocks are so different that there is no way that they were derived from the same magma source.

Objective #3 (relation of dikes and gold bearing quartz veins) - Both of the sampled dikes and a third dike more felsic in appearance are commonly associated with gold bearing quartz veins which are usually located between the dikes and the rock it has intruded. Due to the fact that the two dikes analyzed are not genetically related, and that the gold bearing quartz veins are spatially related to both, one can conclude that all three represent separate events that spatially coincide but are not genetically related. They are spatially related due to structural preparation allowing for repeated intrusions along the same plane of weakness. Therefore, dikes can be used as a guide for exploration in the Yarnell Area because of their apparent association with structural preparation and subsequent mineralization.

Objective #4 (dike related to volcanics, if so,Mid-Tertiary in age?) was answered by observing that the chemical signatures of the dikes and volcanics were far different as shown on the two ternary diagrams and in the weight percent abundances of the chemical constituents. The chemical signatures were so different that there is no way that the dikes and Mid-Tertiary Volcanics are related.

Implying crystal fractionation and/or wall rock assimilation are possible means that may have changed the dikes chemistry to that of the volcanics. However, due to field observations such as the fine grained texture of the dikes and the typically sharp contacts they make with the rock it has intruded, one can infer rapid emplacement with little time for wall rock assimilation and/or crystal fractionation. Therefore, the dikes are not Mid-Tertiary in age, but most likely older.

WHOLE ROCK ANALYSIS
Yarnell Project

CONCLUSION

Due to the similarities in elemental abundances tested for in the whole rock analysis, one can conclude that the hanging wall and footwall granite are of the same rock type.

When comparing the dikes to each other and both dikes to the volcanics, there is almost no similarity in the elemental abundance that were tested; therefore, it is most likely that none of the three are related to the same magma source. Therefore, the dikes are not Mid-Tertiary in age.

The presence of the gold bearing quartz veins with the dikes is due to repeated intrusions along structurally prepared conduits. Much of this structural preparation is probably due to the Yarnell Fault movement. For instance, the andesite dike sampled is one of several dikes in the footwall that parallels the strike of the Yarnell Fault. However, the diorite dike sampled strikes approximately N20°W, crossing the Yarnell Fault nearly perpendicular. The strike of this dike is seen on areal photos as sub parallel to 3 topographic and color lineaments to the SW, further suggesting structural controls although apparently not due to the Yarnell Fault.

JJM:mek

John J. Malusa

WHOLE ROCK ANALYSIS
Yarnell Project

TABLE 1

Cost Estimate of Study

Skyline Labs (Attachment D)	$312.90
Personnel	300.00
Computer Norm Calculation	50.00
	$662.90

WHOLE ROCK ANALYSIS
Yarnell Project

ATTACHMENT A

SAMPLE COORDINATES

upper volcanic (andesite)	103,560N, 52,920E
lower volcanic (andesite)	103,490N, 52,710E
hanging wall granite	101,500N, 48,000E
footwall granite	98,780N, 50,235E
dike 1 (dioritic)	98,485N, 50,120E
dike 2 (andesitic)	94,065N, 50,415E

Attachment B

SKYLINE LABS, INC.
1775 W. Sahuaro Dr. • P.O. Box 50106
Tucson, Arizona 85703
(602) 622-4836

REPORT OF ANALYSIS

JOB NO. TAJ 628
March 2, 1990
PROJECT NO.: 0444

ASARCO INCORPORATED
Attn: Mr. Jim Sell
Southwestern Exploration
P.O. Box 5747
Tucson, AZ 85703

CO Incorporated
MAR 5 - 1990
SW Exploration

Analysis of 6 Rock Samples

ITEM	SAMPLE NUMBER	SiO2 (%)	TiO2 (%)	Al2O3 (%)	Fe2O3 (%)
1	HANGINGWALL	70.0	.70	14.3	3.2
2	FOOTWALL	69.8	.85	14.4	4.3
3	UP VOLC volcanic	60.6	.95	17.0	5.4
4	LOW VOLC volcanic	58.6	1.00	17.8	5.4
5	DIKE 1 - diorite	46.9	1.50	16.0	8.6
6	DIKE 2 - felsic	51.1	.40	12.6	6.0

ITEM	SAMPLE NUMBER	FeO (%)	MnO (%)	MgO (%)	CaO (%)
1	HANG	1.40	.11	1.0	2.6
2	FOOT	.65	.13	1.1	2.3
3	UP VOLC	.75	.11	3.7	6.4
4	LOW VOLC	.90	.12	3.5	6.5
5	DIKE 1	2.70	.16	7.9	9.2
6	DIKE 2	6.70	.19	5.2	7.0

SKYLINE LABS, INC.
1775 W. Sahuaro Dr. • P.O. Box 50106
Tucson, Arizona 85703
(602) 622-4836

JOB NO. TAJ 628
March 2, 1990

ITEM	SAMPLE NUMBER	Na2O (%)	K2O (%)	P2O5 (%)
1	HANG	3.2	4.1	.45
2	FOOT	3.1	3.9	.55
3	UP VOLC	4.1	1.9	.65
4	LOW VOLC	4.3	1.6	.75
5	DIKE 1	3.3	1.5	1.90
6	DIKE 2	1.0	3.3	.40

cc: Mr. John Malusa

REGISTERED ASSAYER
CERTIFICATE NO.
9425
WILLIAM L.
LEHMBECK
ARIZONA
3/2/90

Attachment C

Analysis in wt % HANG hangingwall granite

SiO2	TiO2	Al2O3	Fe2O3	FeO	MnO	MgO	CaO	Na2O	K2O	P2O5	
70.00	0.70	14.30	3.20	1.40	0.11	1.00	2.60	3.20	4.10	0.45	101.06

CIPW Weight Norm

Q 29.90 or 24.23 ab 27.08 an 9.96 C 0.95 hy 2.49 mt 2.84
il 1.33 hem 1.24 ap 1.04

plag is An 27

Analysis in wt % FOOT footwall granite

SiO2	TiO2	Al2O3	Fe2O3	FeO	MnO	MgO	CaO	Na2O	K2O	P2O5	
69.80	0.85	14.40	4.30	0.65	0.13	1.10	2.30	3.10	3.90	0.55	101.08

CIPW Weight Norm

Q 31.82 or 23.05 ab 26.23 an 7.82 C 2.21 hy 2.74 mt 0.06
il 1.61 hem 4.26 ap 1.27

plag is An 23

Analysis in wt % DIKE 1 Diorite

SiO2	TiO2	Al2O3	Fe2O3	FeO	MnO	MgO	CaO	Na2O	K2O	P2O5	
46.90	1.50	16.00	8.60	2.70	0.16	7.90	9.20	3.30	1.50	1.90	99.66

CIPW Weight Norm

or 8.86 ab 27.92 an 24.42 di 6.86 hy 8.94 ol 5.29 mt 4.88
il 2.85 hem 5.24 ap 4.40

plag is An 47

Analysis in wt % DIKE 2 ~~Felsic~~

SiO2	TiO2	Al2O3	Fe2O3	FeO	MnO	MgO	CaO	Na2O	K2O	P2O5	
51.10	0.40	12.60	6.00	6.70	0.19	5.20	7.00	1.00	3.30	0.40	93.89

CIPW Weight Norm

Q 10.41 or 19.50 ab 8.46 an 20.15 di 9.71 hy 15.27 mt 8.70
il 0.76 ap 0.93

plag is An 70

Analysis in wt % UPVOLC Volcanic

SiO2	TiO2	Al2O3	Fe2O3	FeO	MnO	MgO	CaO	Na2O	K2O	P2O5	
60.60	0.95	17.00	5.40	0.75	0.11	3.70	6.40	4.10	1.90	0.65	101.56

CIPW weight Norm

Q 13.19 or 11.23 ab 34.69 an 22.37 di 3.99 hy 7.36 mt 0.02
il 1.80 hem 5.38 ap 1.51

plag is An 39

Analysis in wt % LOVOLC Volcanic

SiO2	TiO2	Al2O3	Fe2O3	FeO	MnO	MgO	CaO	Na2O	K2O	P2O5	
58.60	1.00	17.80	5.40	0.00	0.12	3.50	6.50	4.00	1.60	0.75	100.47

CIPW Weight Norm

Q 11.04 or 9.46 ab 36.39 an 24.54 di 2.18 hy 7.70 mt 0.39
il 1.90 hem 5.13 ap 1.74

plag is An 40

Attachment D

SKYLINE LABS, INC.
1775 W. Sahuaro Dr. • P.O. Box 50106
Tucson, Arizona 85703
(602) 622-4836

INVOICE
NET 30 DAYS

Job No. TAJ 628
March 2, 1990
PROJECT NO.: 0444

ASARCO INCORPORATED
Attn.: Mr. Jim Sell
Southwestern Exploration
P.O. Box 5747
Tucson, AZ 85703

Analysis of 6 Rock Samples

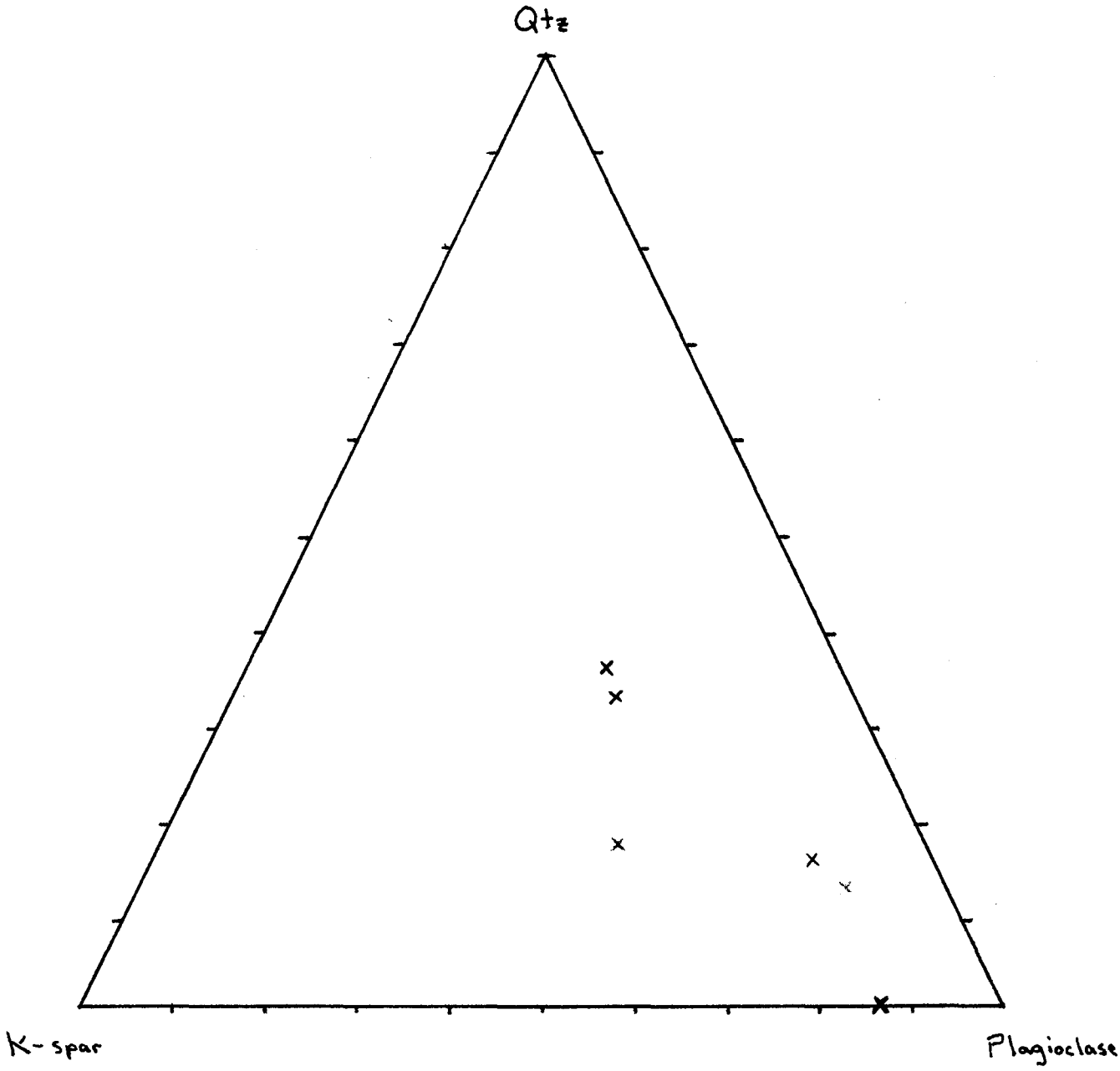
6 SiO2(%) @ $8.50	$51.00
6 TiO2(%) @ $5.75	$34.50
6 Al2O3(%) @ $3.45*	$20.70
6 Fe2O3(%) @ $3.45*	$20.70
6 FeO(%) @ $8.00	$48.00
6 MnO(%) @ $3.45*	$20.70
6 MgO(%) @ $3.45*	$20.70
6 CaO(%) @ $3.45*	$20.70
6 Na2O(%) @ $3.45*	$20.70
6 K2O(%) @ $3.45*	$20.70
6 P2O5(%) @ $5.75	$34.50
Totals	$312.90

* Multi Element Discount

Order No. 425 Quant. O.K.
Ship. Recd. Price OK.
Inv. Recd. 3/5 Exten. O.K.
Frt. Exp. Trk. Mail
Charge 2600
EA444-04
540-754 31290

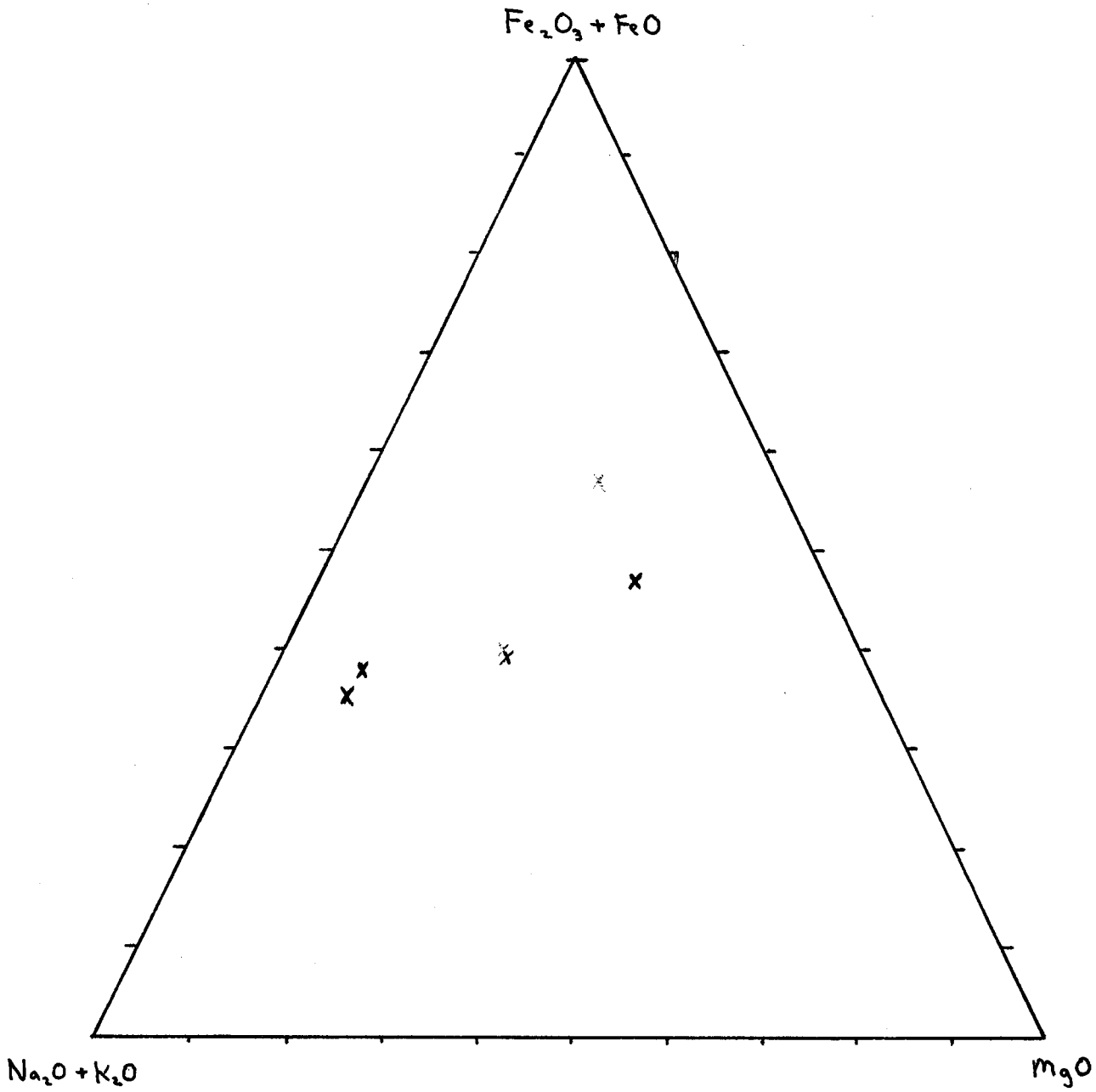
APPROVED FOR PAYMENT
By: James A. Sell
(Signature)
Yarnell Project
EA-0444

Figure A



Hangingwall ×
Footwall ×
upper volcanic ×
lower volcanic ×
felsic dike ×
diorite dike ×

Figure B



Hangingwall	X
Footwall	X
upper volcanic	X
lower volcanic	X
felsic dike	X
diorite dike	X

JDS

SKYLINE LABS, INC.
1775 W. Sahuaro Dr. • P.O. Box 50106
Tucson, Arizona 85703
(602) 622-4836

REPORT OF ANALYSIS

JOB NO. TAJ 628
March 2, 1990
PROJECT NO.: 0444

Yarnell, AZ

ASARCO INCORPORATED
Attn: Mr. Jim Sell
Southwestern Exploration
P.O. Box 5747
Tucson, AZ 85703

Analysis of 6 Rock Samples

ITEM	SAMPLE NUMBER	SiO2 (%)	TiO2 (%)	Al2O3 (%)	Fe2O3 (%)
1	HANG	70.0	.70	14.3	3.2
2	FOOT	69.8	.85	14.4	4.3
3	UP VOLC	60.6	.95	17.0	5.4
4	LOW VOLC	58.6	1.00	17.8	5.4
5	DIKE 1	46.9	1.50	16.0	8.6
6	DIKE 2	51.1	.40	12.6	6.0

ITEM	SAMPLE NUMBER	FeO (%)	MnO (%)	MgO (%)	CaO (%)
1	HANG	1.40	.11	1.0	2.6
2	FOOT	.65	.13	1.1	2.3
3	UP VOLC	.75	.11	3.7	6.4
4	LOW VOLC	.90	.12	3.5	6.5
5	DIKE 1	2.70	.16	7.9	9.2
6	DIKE 2	6.70	.19	5.2	7.0

SKYLINE LABS, INC.
1775 W. Sahuaro Dr. • P.O. Box 50106
Tucson, Arizona 85703
(602) 622-4836

JOB NO. TAJ 628
March 2, 1990

ITEM	SAMPLE NUMBER	Na2O (%)	K2O (%)	P2O5 (%)
1	HANG	3.2	4.1	.45
2	FOOT	3.1	3.9	.55
3	UP VOLC	4.1	1.9	.65
4	LOW VOLC	4.3	1.6	.75
5	DIKE 1	3.3	1.5	1.90
6	DIKE 2	1.0	3.3	.40

cc: Mr. John Malusa

Charles E. Thompson
Arizona Registered Assayer No. 9427

William L. Lehmbeck
Arizona Registered Assayer No. 9425

James A. Martin
Arizona Registered Assayer No. 11122

WLK-JDS

JDS

ASARCO

Mineral Beneficiation Department
Tucson, Arizona

March 19, 1990

Mr. S. L. Lakosky
Mine Superintendent
MISSION UNIT

Yarnell Project
Final McClelland Metallurgical Report

A copy of McClelland's final report for the first phase Yarnell testwork is attached. Since the report is fairly voluminous, I am sending one full copy to Mr. Kupsch for the New York Office and one full copy to the Exploration Department's Tucson Office. Copies of the executive summary, conclusions, and recommendations pages are also attached.

There are no surprises in the report and the summary of results and recommendations for further work are essentially as outlined in my memorandum of February 2, 1990. As soon as the feasibility study is issued I will have the recommended tests started at McClelland. For the record, the proposed tests are:

A. Three 6-inch columns on DD core crushed to 3/8. This will give us a comparison of our bulk sample with other areas of the ore body.

B. Two parallel 15-inch diameter columns at the 1½-inch size, with and without clay. This will give us a feeling for the magnitude of the clay problem.

C. One 15-inch diameter column on low grade at 1½-inch size.

D. E. Crowell

DEC:brw
Attachment
cc: File YAR 3.1
w/report: R. J. Kupsch
W. L. Kurtz/J. D. Sell
w/o report: T. E. Scartaccini
R. L. Brown/F. T. Graybeal
P. J. Maley

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MAR 20 1990
EXPLORATION DEPARTMENT

McCLELLAND LABORATORIES, INC.

1016 Greg Street, Sparks, Nevada 89431 702 / 356-1300
FAX 702 / 356-8917

Report on Preliminary Heap Leach Amenability Evaluation - Yarnell Bulk Ore Composites

MLI Job No. 1378
February 12, 1990

for

Mr. Don Crowell
ASARCO, Incorporated
1150 North 7th Ave.
Tucson, AZ 85703

EXECUTIVE SUMMARY

Bulk mined ore samples designated high-grade (HG), low-grade (LG), underground low-grade (UG/LG), and gouge were submitted for preliminary testwork. A composite of HG and LG was prepared for column leach testwork. Heap leach testwork was conducted also on the UG/LG bulk composite. Cuttings composites from drill hole I-J were subsequently submitted for preliminary cyanidation tests.

Bulk ore samples were amenable to direct agitated cyanidation treatment at an 80 percent minus 3/8 inch feed size. Gold recoveries ranged from 62.8 (HG/LG) to 73.6 (Gouge) percent, and averaged 69.2 percent in 96 hours of leaching. Gold extraction rates were fairly slow, but extraction was generally substantially complete in 48 hours. Cyanide consumptions were low, and ranged from 0.10 to 0.26 (UG/LG) pounds per ton of ore. Lime requirements were moderate at from 4.6 to 10.5 (gouge) pounds per ton of ore. Controlling pH during leaching was not a significant problem.

Cuttings composites were more readily leachable than crushed bulk ore samples. Gold recoveries ranged from 71.3 (40-60') to 82.2 (20-40') percent, and averaged 77.5 percent in 96 hours of agitated cyanidation treatment (minus 1/4 inch feeds). Gold recovery rates were very similar to those achieved from the bulk ore samples. Cyanide consumptions were low, and ranged from 0.31 to 0.58 pounds per ton of ore. Lime requirements were moderate, and ranged from 4.5 to 5.8 pounds per ton of ore.

Column percolation leach tests were conducted on the HG/LG bulk ore composite at 80 percent minus 6, 2, and 3/8 inch feed sizes to determine gold recovery, recovery rate, reagent requirements, and sensitivity to crush size under simulated heap leaching conditions. The composite was amenable to heap leach cyanidation treatment at all three feed sizes. Gold recoveries of 52.2, 70.6, and 76.4 percent were achieved from the respective feed sizes in about 100 days of cyanide solution contact. Gold recovery increased with decreasing feed size. Gold recovery rates were fairly slow, but extraction was substantially complete in 60 days of leaching. Gold recovery rate increased with decreasing feed size. Economic optimum heap leach feed size appears to be minus 2 inch. Optimum heap leach feed size, based on recovery and recovery rate, is 80 percent minus 3/8 inch.

Cyanide consumptions were low and ranged from 0.56 to 0.79 pound per ton of ore. Consumption rates were fairly constant throughout the leaching cycles.

The 10 pounds lime or cement (3/8 inch feed) per ton of ore added to the ore charges before leaching was sufficient to maintain protective alkalinity at above pH 10.5 throughout the leaching cycles.

A vat leach test was conducted on the UG/LG composite at a ROM feed size to determine leachability. A column leach test was conducted on the composite at an 80 percent minus 3/8 inch feed size to determine gold recovery, recovery rate, and reagent requirements. The underground low-grade ore was not amenable to heap leach cyanidation at a ROM feed size, but was amenable at the 3/8 inch feed size. Respective gold recoveries were 40 and 70 percent in about 40 days of cyanide solution contact. Gold recovery rate was slow for the ROM feed, but was fairly rapid for the 3/8 inch feed. Cyanide consumptions were low at 0.31 and 0.71 pounds per ton of ore, respectively. The 5.0 pounds lime and 10 pounds cement added to the respective ore charges before leaching was sufficient for alkalinity control during leaching.

Environmental (cyanide detoxification and CAM-WET metals) experimental and analytical work was conducted on the HG/LG 3/8 inch leached residue. CAM-WET tests for STLC and TTLC values were performed rater than EP-Toxicity tests because limits and metals are more stringent. Water washing decreased free and WAD cyanide concentrations from 900 ppm to below 4 ppm in 15 days. Wash water was applied at the same rate used for leaching. CAM-WET analytical results showed that the leached, washed residue contained no metals that would exceed allowable limits for STLC or TTLC values.

Total and WAD cyanide concentrations in the leached, washed residue were 0.24 and 0.032 mg/kg, respectively. These residual cyanide concentrations are well below EPA allowable limits for processed solids.

As mentioned earlier, CAM-WET tests for STLC and TTLC values were conducted on the HG/LG 3/8 inch leached, washed residue rather than EP-Toxicity tests, because more metals are analyzed for and a total threshold limit concentration (TTLC) digestion method is available.

CAM-WET test results show that the residue contained no metals which would exceed allowable limits for either STLC or TTLC values.

CONCLUSIONS

- Yarnell bulk ore samples are amenable to heap leach cyanidation treatment.
- Optimum heap leach feed size for maximum recovery is 80 percent minus 3/8 inch.
- Optimum heap leach feed size with respect to project economics is probably 80 percent minus 1 1/2 inch (100 percent minus 2 inch).
- The UG/LG (Comp) is not amenable to heap leaching treatment at the ROM feed size, but is amenable at the 3/8 inch feed size.
- Cyanide consumptions were low.
- Lime and cement requirements were moderate, and probably excessive for the feeds for pH control.
- Agglomeration pretreatment is required for fine crushed feeds. Agglomeration may not be required for minus 2 inch feed.
- Bulk ore and cuttings samples, to a depth of 60 feet, were metallurgically similar.
- Visible gold was observed in the HG sample. Visible gold may also be contained in lower grade feeds.

RECOMMENDATIONS

We recommend that additional testwork be conducted on representative core composites to confirm metallurgy determined for bulk samples, to establish the need for and optimize conditions for agglomeration pretreatment, to determine carbon adsorption kinetics for design criteria, and to optimize reagent requirements. Additional bottle roll tests should be conducted on several cuttings composites (based on rock type, grade, area, and depth) to establish a historical data base. Mineralogical or metallurgical evaluation should be made to determine the quantity and occurrence of visible gold.

Gene E. McClelland

Gene E. McClelland
Metallurgist/President

Full Report in File.

WLK - JDS

FILE

ASARCO

Mineral Beneficiation Department
Tucson, Arizona

March 19, 1990

Mr. S. L. Lakosky
Mine Superintendent
MISSION UNIT

Yarnell Project
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D. E. Crowell

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w/o report: T. E. Scartaccini
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P. J. Maley

RECEIVED
MAR 20 1990
EXPLORATION DEPARTMENT

63 pages

McCLELLAND LABORATORIES, INC.
1016 Greg Street, Sparks, Nevada 89431 702 / 356-1300
FAX 702 / 356-8917

Report
on
Preliminary Heap Leach Amenability Evaluation -
Yarnell Bulk Ore Composites
MLI Job No. 1378
February 12, 1990

for

Mr. Don Crowell
ASARCO, Incorporated
1150 North 7th Ave.
Tucson, AZ 85703

EXECUTIVE SUMMARY

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SAMPLE PREPARATION AND HEAD GRADE DETERMINATIONS

A total of about 10 tons of the four bulk ore samples was received for the testing program. Bulk samples were designated high-grade (HG), low-grade (LG), underground low-grade (UG/LG), and gouge. A composite of the HG and LG bulk ore, designated HG/LG, was also prepared for preliminary testwork. A 200 pound split of each sample and the composite was stage crushed to an 80 percent minus 3/8 inch feed size, and was blended and split to obtain samples for preliminary bottle roll tests, and samples for triplicate direct head assay.

Cuttings intervals from drill hole I-J were subsequently submitted for preliminary bottle roll tests. A total of three composites (0-20', 20-40', and 40-60') were prepared on a weighted basis. Each composite was blended and split to obtain samples for bottle roll tests and samples for triplicate direct head assay.

Select core samples, designated YSG-1 through YSG-12, were submitted for bulk density measurement. Core samples were weighed as received, then were oven dried until no additional weight loss occurred. Dried core samples were coated with acrylic enamel. Bulk densities were measured using the volume displacement method, and were checked using the weight differential method. Bulk density measurements are provided in Table 4.

It was discovered during the preliminary testing phase, that a portion of the UG/LG sample had not been shipped initially. That portion of the sample was subsequently received, and was blended with the initial sample. The blended sample was designated UG/LG (Comp). Four 200 pound splits were taken from the composite, and each was blended and split five times to obtain five separate samples for direct head assay (20 total assays). A 5 kilogram charge was split from one of the 200 pound splits for a bottle roll test.

The HG/LG composite and UG/LG (Comp) sample ROM rejects were blended and split to obtain samples for column leach (HG/LG) and vat leach (UG/LG) tests. The vat leach feed was left at the ROM size, while the ROM ~~HG~~ feed was stage crushed to an 80 percent minus 6 inch feed size for column leaching and head screen analysis. A 1000 pound split of ROM UG/LG sample was stage crushed to 80 percent minus 3/8 inch for a column leach test.

HG/LG

Coarse HG/LG rejects were stage crushed to an 80 percent minus 2 inch feed size. Crushed feed was thoroughly blended and split to obtain about 2000 pounds for a column leach test, and 300 pounds for head screen analysis. Nominal 2 inch rejects were stage crushed to an 80 percent minus 3/8 inch feed size, and were blended and split to obtain about 1000 pounds for a column leach test, and 100 pounds for head screen analysis.

Head grades for each sample were determined by multiple direct fire assay, and by metallurgical calculation from the various metallurgical tests. Head screen analyses were performed on the HG/LG composite at each feed size used for column each tests.

Head assay results and head grade comparisons for bottle roll test feeds are shown in Table 1. Head assay results and head grade comparisons for heap leach test feeds are shown in Table 2. Direct head assay results (20 total) for the UG/LG (Comp) sample are provided in Table 3. Multiple tail assay results (20 from each) for the HG/LG column leach residues are included in Table 3 as a matter of convenience. Core bulk density measurements are shown in Table 4. Head screen analysis results for the HG/LG composite are provided along with tail screen and recovery by size fraction results later in this report.

Table 1. - Head Assay Results and Head Grade Comparisons, Yarnell Bottle Leach Feeds

	Sample and Head Grade, oz Au/ton ore								
							Cuttings Composite		
Determination Method	HG	HG/LG	LG	UG/LG (1st)	UG/LG (Comp)	Gouge	1	2	3
Direct Assay, Initial	0.089	0.082	0.030	0.011		0.094	0.054	0.066	0.082
Duplicate	0.103	0.060	0.032	0.009		0.099	0.035	0.053	0.115
Triplicate	0.080	0.070	0.034	0.005	0.010*	0.094	0.050	0.063	0.074
Calculated, Bottle Test	0.085	0.078	0.030	0.011	0.010	0.091	0.038	0.062	0.087
Arithmetic Average	0.089	0.073	0.032	0.009	0.010	0.094	0.044	0.061	0.090
Max. Deviation from Avg.	0.014	0.013	0.002	0.004	0.000	0.005	0.010	0.008	0.025
Precision, percent	86.4	82.2	94.1	55.6	100.0	94.9	81.5	86.9	78.5

*Average of 20 direct head assays. Direct assays ranged from 0.005 to 0.031 ounce gold per ton.

Table 2. - Head Assay Results and Head Grade Comparisons, Yarnell Heap Leach Feeds

Determination Method	Composite and Head Grade, oz Au/ton ore HG/LG	UG/LG
Direct Assay, Initial	0.074	
Duplicate	0.053	
Triplicate	0.062	0.010*
Calculated, Bottle Test, 3/8"	N/A	0.010
Calculated, Head Screen, 6"	0.053	N/A
Calculated, Head Screen, 2"	0.050	N/A
Calculated, Head Screen, 3/8"	0.059	N/A
Calculated, Column Test, 6"	0.046	N/A
Calculated, Column Test, 2"	0.051	N/A
Calculated, Column Test, 3/8"	0.055	0.010
Calculated, Vat Test, ROM	N/A	0.010
Arithmetic Average	0.056**	0.010
Maximum Deviation from Average	0.018	0.000
Precision, percent	75.7	100.0

*Average of 20 direct head assays. Direct assays ranged from 0.005 to 0.031 ounce gold per ton.
**Average without direct assays is 0.052 ounce per ton, and resultant precision is 88.1 percent.

Table 3. - Direct Head Assay Results, Yarnell Underground Low-Grade Composite, and Direct Tail Assay Results, Yarnell HG/LG Composite Column Leach Residues

	Composite and Grade, oz Au/ton			
	UG/LG	HG/LG Residues		
Direct Assays	Head Ore	6"	2"	3/8"
1	0.007	0.022	0.011	0.007
2	0.011	0.009	0.009	0.012
3	0.008	0.028	0.015	0.010
4	0.009	0.017	0.017	0.008
5	0.008	0.013	0.027*	0.009
6	0.011	0.013	0.006	0.013
7	0.010	0.019	0.007	0.011
8	0.005	0.024	0.013	0.020
9	0.007	0.013	0.025	0.007
10	0.008	0.015	0.008	0.015
11	0.006	0.038	0.011	0.015
12	0.006	0.029	0.014	0.010
13	0.007	0.028	0.016	0.012
14	0.024	0.029	0.010	0.013
15	0.010	0.047*	0.011	0.013
16	0.006	0.031	0.015	0.014
17	0.016	0.024	0.019	0.021*
18	0.031*	0.027	0.009	0.013
19	0.007	0.033	0.015	0.012
20	0.011	0.029	0.024	0.011
Arithmetic Average	0.010	0.024	0.014	0.012
Max. Deviation from Avg.	0.021	0.023	0.013	0.009
Precision, percent	32.3	51.1	51.9	57.1

*Sample where maximum deviation from average occurred.

Table 4. - Bulk Density Measurements, Yarnell Core Samples

Sample	Specific Density,	Bulk Density, lb/ft^3	Bulk Volume, ft^3/ton
YSG-1	2.61	162.9	12.3
YSG-2	2.60	162.3	12.3
YSG-3	2.57	160.4	12.5
YSG-4	2.55	159.1	12.6
YSG-5	2.58	161.0	12.4
YSG-6	2.60	162.3	12.3
YSG-7	2.36	147.3	13.6
YSG-8	2.46	153.5	13.0
YSG-9	2.45	152.9	13.1
YSG-10	2.57	162.0	12.5
YSG-11	2.62	163.5	12.2
YSG-12	2.59	161.6	12.4

Head grade agreement was, in general, not within normal desired limits of 90 percent precision. Maximum deviations usually occurred with direct assay samples. Calculated heads agreed fairly well with arithmetic average head grades, especially for head screens and column test head grades. The somewhat "spotty" nature of gold occurrence is probably caused by the presence of visible gold in the feeds. Mineralogical work performed on the HG bulk sample confirmed the presence of visible gold up to 280 microns in size. Calculated heads are considered more reliable because of quantity of sample used for the various metallurgical tests.

DIRECT AGITATED CYANIDATION TEST PROCEDURES AND RESULTS

Direct agitated cyanidation (bottle roll) tests were conducted on all bulk ore samples at an 80 percent minus 3/8 inch feed size, and on the three cuttings composites at the as received feed size to determine gold recovery, recovery rate, and reagent requirements. Bottle roll tests were conducted also to begin a historical metallurgical data base for the Yarnell project.

Ore charges (approximately 5 kilograms) were mixed with water to achieve 40 weight percent solids. Natural pulp pHs were measured. Lime was added to adjust the pH of the pulps to 11.0 before adding the cyanide. Sodium cyanide, equivalent to 2.0 pounds per ton of solution, was added to the alkaline pulps.

Leaching was conducted by rolling the pulps in bottles on the laboratory rolls for 96 hours. Rolling was suspended briefly after 2, 6, 24, 48, and 72 hours to allow the pulps to settle so pregnant solution samples could be taken for gold and silver analysis using A.A. methods. Pregnant solution volumes were measured and sampled. Cyanide concentration and pH were determined for each interim pregnant solution sample. Make-up water, equivalent to that withdrawn, was added to the pulps. Cyanide concentrations were restored to initial values. Lime was added when necessary to maintain the leaching pH at between 10.8 and 11.2.

After 96 hours, pulps were filtered to separate liquids and solids. Final pregnant solution volumes were measured and sampled for analysis. Leached residues were thoroughly washed, dried, weighed, and assayed directly to determine residual gold content. Silver was detected only in trace quantities for all Yarnell samples. Consequently, silver recovery data is not discussed in detail in this report.

Overall metallurgical results from bottle roll tests on bulk ore samples are provided in Table 5. Gold leach rate profiles are shown graphically in Figures 1 and 2. Metallurgical results from bottle roll tests on the cuttings composites are provided in Table 6. Gold leach rate profiles are shown in Figure 3.

Table 5. - Overall Metallurgical Results, Bottle Roll Tests, Yarnell Composites, 80 Percent Minus 3/8 Inch Feeds

Metallurgical Results	Composite					
	HG	HG/LG	LG	UG/LG 1st	UG/LG Comp	Gouge
Extraction: pct. total Au						
in 2 hours	22.7	11.3	11.7	16.4	18.0	34.6
in 6 hours	38.2	31.5	29.7	16.4	35.0	55.9
in 24 hours	56.6	52.2	53.7	32.7	53.0	64.8
in 48 hours	63.4	59.6	61.3	34.5	70.0	70.3
in 72 hours	66.5	62.6	69.0	35.5	70.0	73.6
in 96 hours	69.4	62.8	70.0	36.4	70.0	73.6
Extracted, oz Au/ton ore	0.059	0.049	0.021	0.004	0.007	0.067
Tail Assay, oz Au/ton	0.026	0.029	0.009	0.007	0.003	0.024
Calculated Head, oz Au/ton ore	0.085	0.078	0.030	0.011	0.010	0.091
Head Assay, oz Au/ton ore*	0.091	0.071	0.032	0.008	0.010	0.095
Cyanide Consumed, lb/ton ore	0.10	0.10	0.10	0.19	0.26	0.10
Lime Added, lb/ton ore	6.5	6.2	5.3	5.6	4.6	10.5
Final Solution pH	10.8	10.9	10.9	10.9	10.8	10.9
Natural pH (40% solids)	7.7	8.2	7.4	8.2	7.5	8.0

*Average of 3 direct head assays.

Figure 1. - Gold Leach Rate Profiles,

Bottle Tests, Yarnell Bulk Ore, 3/8"

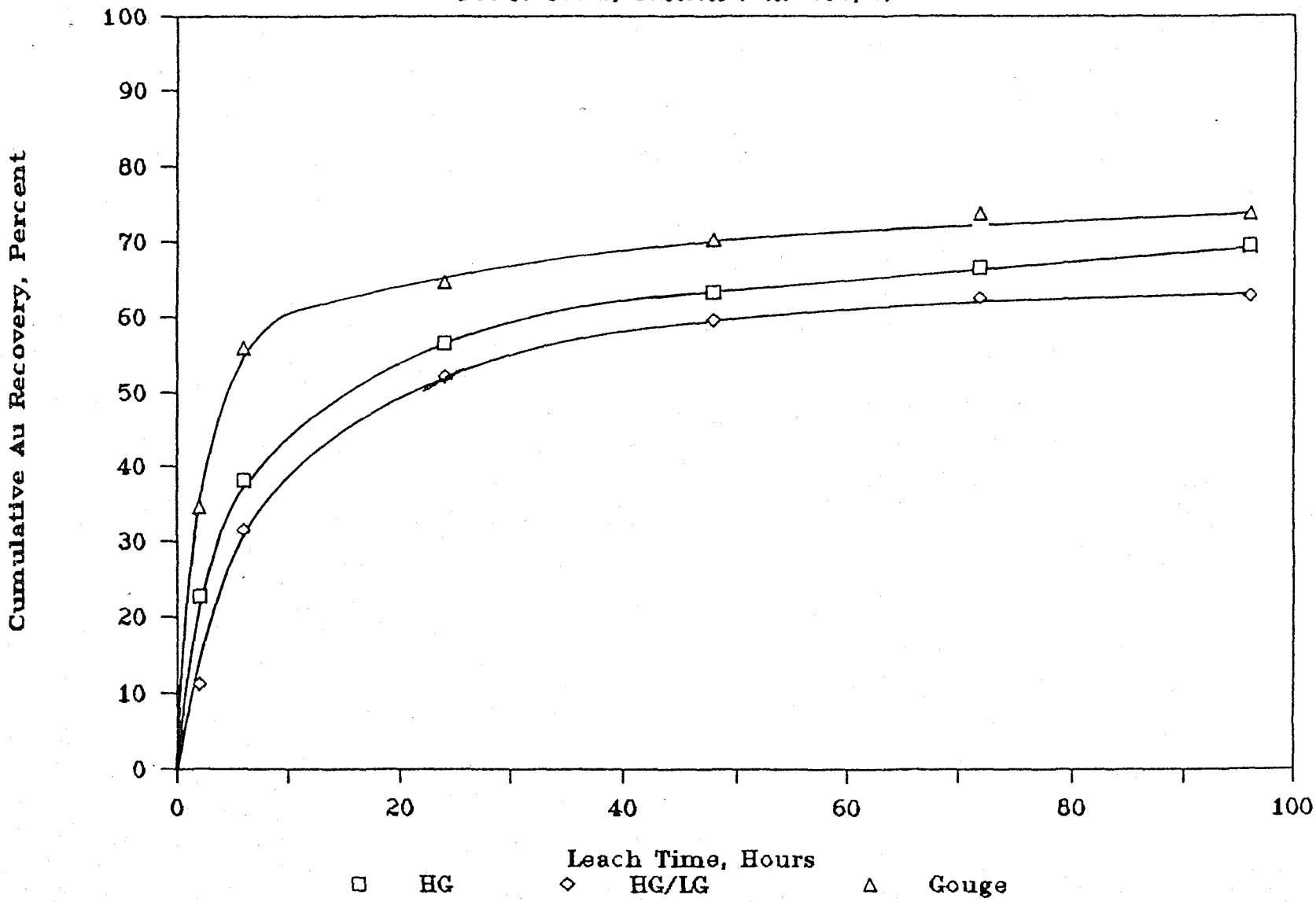
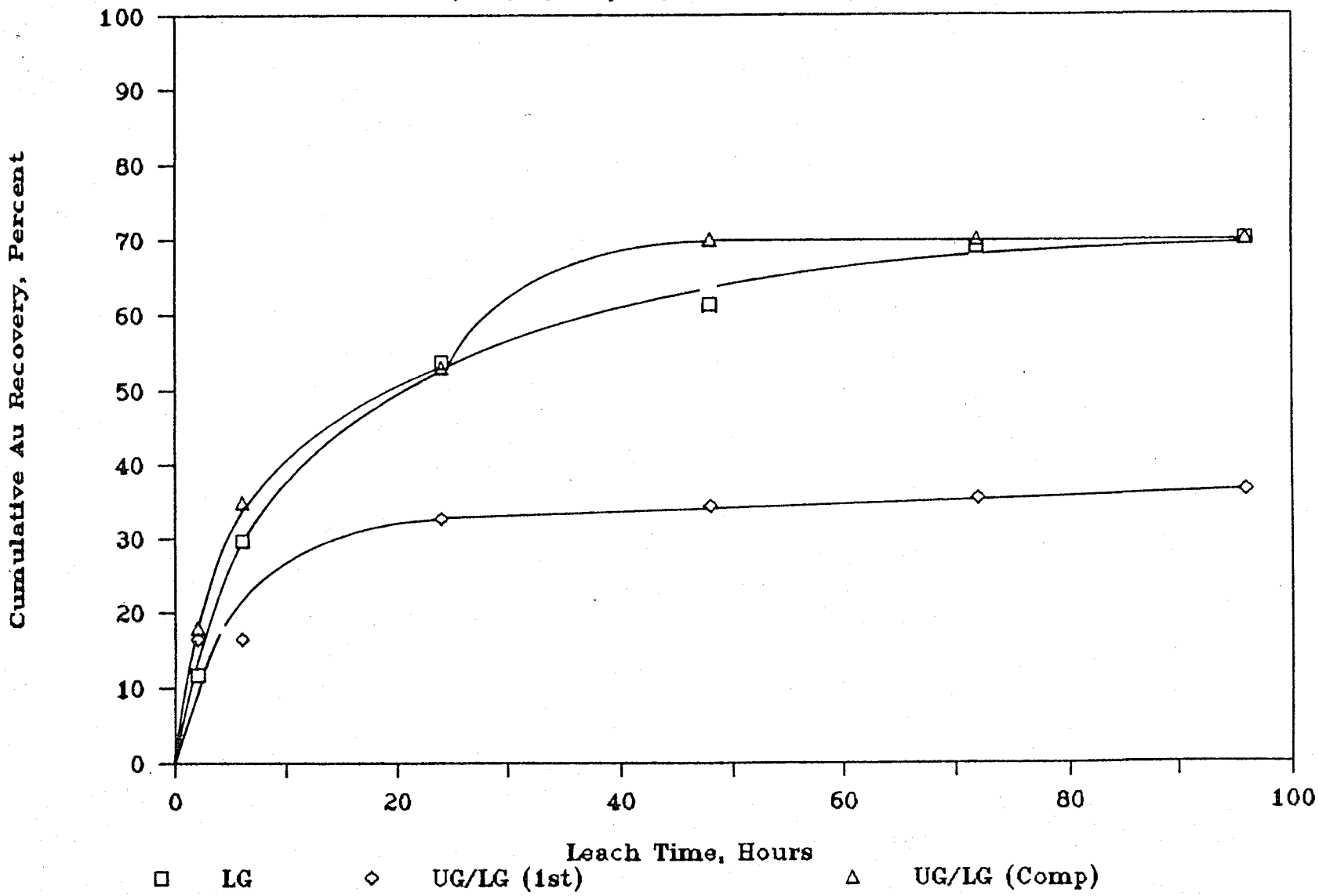


Figure 2. – Gold Leach Rate Profiles,

Bottle Tests, Yarnell Bulk Ore, 3/8"



Metallurgical results show that the Yarnell bulk samples were amenable to direct agitated cyanidation treatment at the 80 percent minus 3/8 inch feed size. Recovery was, however, poor from the initial UG/LG sample. Gold recoveries from the other five bulk samples ranged from 62.8 to 73.6 percent, and averaged 69.2 percent in 96 hours of leaching. Gold extraction rates were fairly slow, but extraction was substantially complete in 48 hours. Additional gold would be extracted with leaching cycles longer than 96 hours, but at a very slow rate. The relatively slow recovery rates and double curve breaks shown for some samples indicates the presence of "free milling" visible gold.

Cyanide consumptions were low, and ranged from 0.10 to 0.26 pound per ton of ore. Consumption rates were fairly constant throughout the leaching cycles. Lime requirements were moderate at from 4.6 to 10.5 pounds per ton of ore. Controlling pH was not difficult even though small quantities of lime had to be added at most sampling intervals to maintain the leaching pH at above 10.8. Lime consumption rate tended to be more rapid the first 24 hours of leaching.

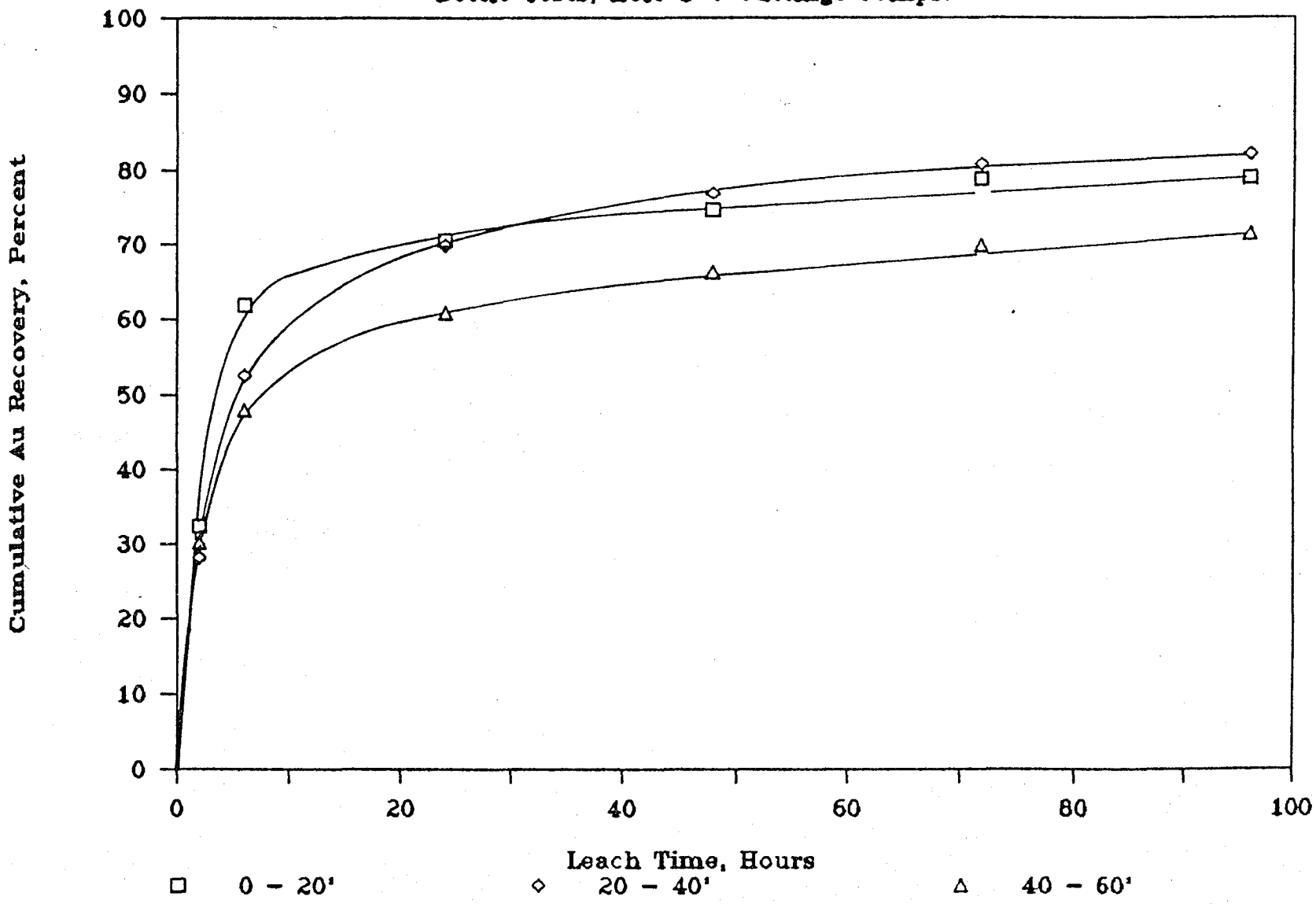
Table 6. - Overall Metallurgical Results, Bottle Roll Tests, Yarnell Drill Cuttings Composites, As Received Feed Size

Metallurgical Results	Composite		
Extraction: pct. total Au	(0-20')	(20-40')	(40-60')
in 2 hours	32.4	28.2	30.2
in 6 hours	61.8	52.6	48.0
in 24 hours	70.5	69.8	60.8
in 48 hours	74.5	76.8	66.2
in 72 hours	78.7	80.8	69.7
in 96 hours	78.9	82.2	71.3
Extracted, oz Au/ton ore	0.030	0.051	0.062
Tail Assay, oz Au/ton	0.008	0.011	0.025
Calculated Head, oz Au/ton ore	0.038	0.062	0.087
Head Assay, oz Au/ton ore*	0.046	0.061	0.090
Cyanide Consumed, lb/ton ore	0.58	0.58	0.31
Lime Added, lb/ton ore	5.5	5.8	4.6
Final Solution pH	10.9	10.9	11.0
Natural pH (40% solids)	7.0	7.2	7.4

*Average of 3 direct head assays.

Figure 3. - Gold Leach Rate Profiles,

Bottle Tests, Hole 1-J Cuttings Comps.



Cuttings composites were slightly more readily leachable at the cuttings feed size than the bulk ore samples at the 3/8 inch feed size. Gold recoveries ranged from 71.3 to 82.2 percent, and averaged 77.5 percent in 96 hours of leaching. A gold recovery versus depth relationship was not definitely established. However, recovery from the 40-60' depth composite was about 10 percent lower than that achieved from the more shallow composites. Gold recovery rates were fairly rapid, and extraction was substantially complete in 24 hours. Additional gold was extracted after 24 hours, but at a slow, constant, rate. Cyanide consumptions were low at from 0.31 to 0.58 pounds per ton of ore. Lime requirements were moderate and ranged from 4.6 to 5.8 pounds per ton of ore. Controlling pH during leaching was not difficult.

Metallurgical behavior of the bulk samples was very similar to that of the cuttings composites, except for gold recovery. Higher recoveries achieved from cuttings would be expected because of the finer nature of the feeds.

COLUMN PERCOLATION LEACH TEST PROCEDURES AND RESULTS

Column percolation leach tests were conducted on the HG/LG bulk ore composite at 80 percent minus 6, 2, and 3/8 inch feed sizes to determine gold recovery, recovery rate, reagent requirements, and sensitivity to crush size. The two coarser feed sizes were mixed with 10 pounds lime per ton of dry ore before being placed into the leaching columns. The 6 inch feed was leached in a 24" I.D. x 19' column, the 2 inch feed in a 15" I.D. x 19' column. The 3/8 inch feed was agglomerated by mixing 10 pounds portland cement per ton of dry ore, wetting with water to a final moisture content of 5.3 weight percent, mechanically tumbling to affect agglomeration, and curing for 72 hours in the 6" I.D. x 19' column before leaching.

Leaching was conducted by applying cyanide solution, equivalent to 2.0 pounds NaCN per ton of solution, over the ore charges at a rate of 0.005 gpm/ft^2 of column cross-sectional area. Pregnant effluent solution volumes were collected each 24 hour period. Effluent volumes were measured by weighing, and were sampled for gold and silver analysis using conventional A.A. methods. A.A. analytical results were checked using the "lead boat" assay method the first 10 days of leaching. Cyanide concentration and pH were determined for each pregnant solution. Pregnant solutions were pumped through three stage carbon circuits for adsorption of dissolved values. Resultant barren solutions were analyzed for Au, Ag, pH, and cyanide content. Barren solution, with appropriate make-up reagent, was recycled to the ore charges daily. Rest

cycles were allowed each ore charge at varied times during the leaching cycles to determine if subsequent pregnant solution grades could be improved. Ore charges were allowed to soak in residual cyanide solution (columns drained) during rest cycles. Each ore charge was washed with water for several days after leaching to recover dissolved values and to remove residual cyanide compounds (County requirement). Specific environmental cyanide detoxification water washing procedures were conducted on the 3/8 inch leached residue to determine cyanide detoxification rates. Each water wash effluent was preserved and was analyzed by High Desert Laboratories (HDL) for WAD and free cyanide concentration. Wash water was applied at the same rate used for leaching for a total of 15 days.

Moistures required to saturate ore charges (in process solution inventory), for agglomeration, and retained moistures were determined. Apparent ore bulk densities were measured before and after leaching and washing.

After leaching and washing, ore charges were removed from columns and moisture samples were taken immediately. An additional moist sample was taken from the 3/8 inch residue for metals content using CAM-WET (EP-Toxicity) methods for STLC and TTLC values. Remaining residues were air dried, blended and split to obtain 20 samples from each for direct tail assay. Dry residues were again blended and split to obtain appropriate quantities of sample for tail screen analyses. Tail screen analyses were performed to determine residue gold content and distribution. Screening procedures and size fractions were the same as for head screens to obtain recovery by size fraction data and to obtain a head versus tail metallurgical balances.

A column percolation leach test was conducted on the UG/LG (Comp) sample at an 80 percent minus 3/8 inch feed size to determine recovery, recovery rate, and reagent requirements. Column test procedures were the same as described above, except that the leached residue was assayed directly in triplicate to determine residual gold content.

A vat leach test was conducted on the UG/LG (Comp) sample at the as received ROM feed size to determine leachability. Vat leach test procedures were essentially the same as column leach tests with respect to handling and analysis of solutions. Solution application procedures were different.

About 700 pounds of run-of-mine (ROM) feed was mixed with 5.0 pounds lime per ton and was placed into a plastic 55 gallon drum for leaching. The ore charge was flooded with cyanide solution

(2.0 pounds NaCN per ton of solution) and was allowed to soak for about 22 hours. About 2 hours was required to drain the charge each day. The 24 hour flood/drain cycle was continued for 8 days, at which time, the flood cycle was extended to seven days. The flood cycle was later extended to about two weeks. The drain cycle remained at about two hours.

After leaching and washing, the ore charge was removed from the vat and was air dried. Dried residue was crushed to minus 3/8 inch in size, and was blended and split to obtain samples for triplicate direct tail assay.

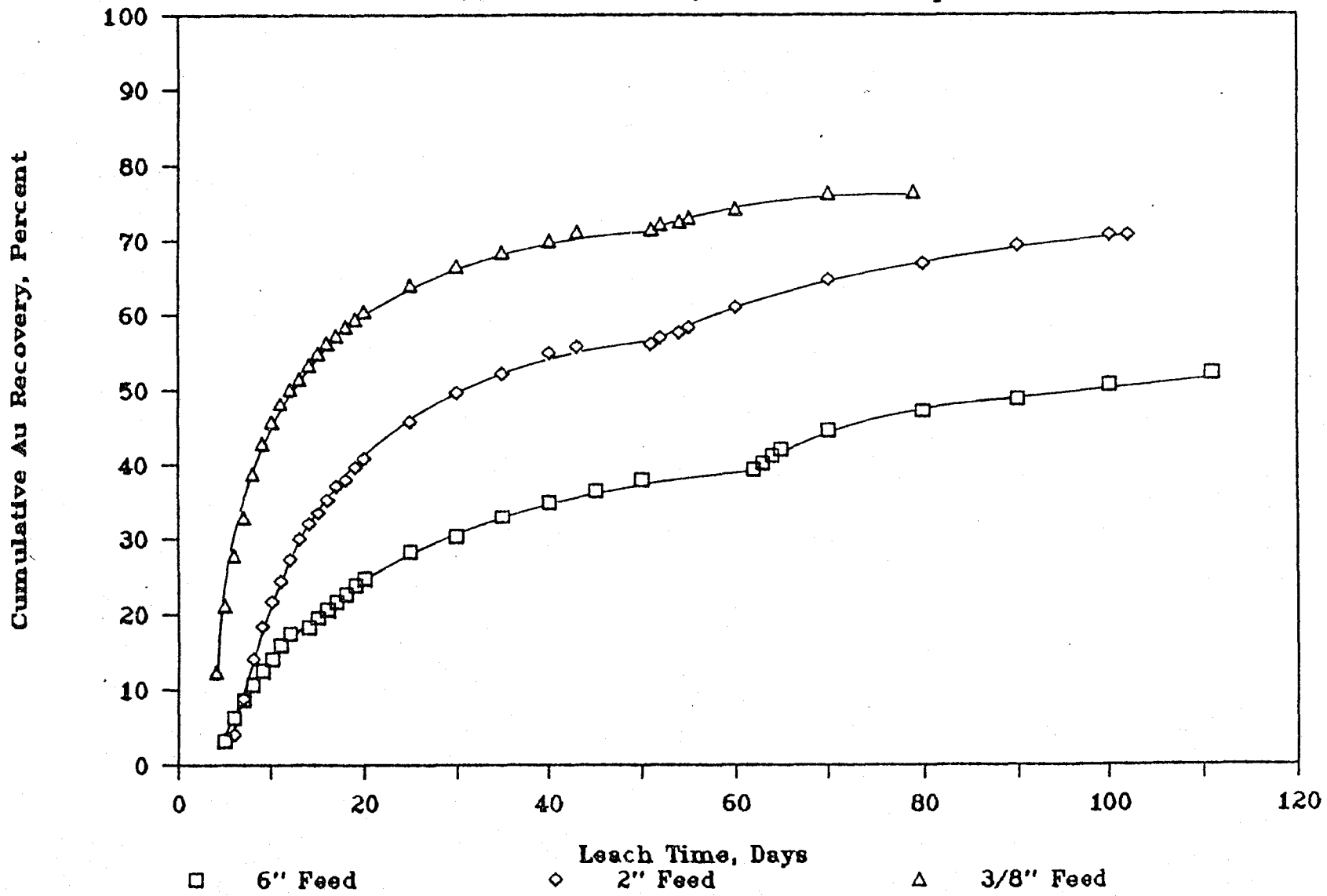
Overall metallurgical results from column leach tests on the HG/LG composite are shown in Table 7. Gold leach rate profiles are shown in Figure 4. Head and tail screen analysis results, and recovery by size fraction data, are provided in Tables 8 through 16. Vat and column leach test results for UG/LG (Comp) are shown in Table 17. Gold leach rate profiles are shown in Figure 5. Physical ore characteristic data for all column leach tests are provided in Table 18. Metallurgical balances for the three HG/LG feed sizes are shown in Tables 19 through 21. WAD and free cyanide detoxification curves are shown in Figures 6 and 7. The Appendix contains pertinent daily leaching data for all heap leach tests, HDL WAD and free cyanide analyses, CAM-WET (STLC and TTLC) results and cyanide analyses on the HG/LG 3/8 inch leached washed residue, and the mineralogical report for the HG sample.

Table 7. - Overall Metallurgical Results, Column Leach Tests, Yarnell HG/LG Composite

Metallurgical Results	Feed Size, Inch		
Extraction: pct. total Au	6	2	3/8
1st Effluent	3.3	4.1	12.5
in 10 days	14.1	21.8	45.8
in 15 days	19.6	33.5	54.9
in 20 days	24.8	40.8	60.4
in 25 days	27.6	45.7	64.0
in 30 days	30.4	49.6	66.5
in 40 days	35.0	54.9	70.0
in 50 days	38.0	56.1	71.1
in 70 days	44.6	64.7	76.2
in 79 days	N/A	N/A	76.4
in 90 days	48.9	69.2	N/A
in 100 days	50.7	70.6	N/A
End of Leach/Wash	52.2	70.6	76.4
Extracted, oz Au/ton ore	0.024	0.036	0.042
Tail Screen, oz Au/ton	0.022	0.015	0.013
Calculated head, oz Au/ton ore	0.046	0.051	0.055
Head Screen, oz Au/ton ore	0.053	0.050	0.059
Cyanide Consumed, lb/ton ore	0.71	0.79	0.56
Lime Added, lb/ton ore	10.0	10.0	10.0 (cement)
Final Solution pH	10.6	11.5	11.3
Leach/Wash Cycle, days	111	102	79

Figure 4. – Gold Leach Rate Profiles,

Column Leach Tests, HG/LG Bulk Comp.



Overall metallurgical results show that the Yarnell HG/LG composite is amenable to heap leach cyanidation treatment at all three feed sizes. Gold recovery increased markedly by decreasing feed size from 6 inch to 2 inch. Recovery increased from 2 inch to 3/8 inch, but not as markedly.

Gold recoveries of 52.2, 70.6, and 76.4 were achieved from the 6, 2, and 3/8 inch feeds, respectively, in about 100 days of leaching and washing. Gold extraction rates were fairly slow for the two coarser feed sizes. However, extraction was substantially complete in 60 days. Additional gold would be extracted with leaching cycles longer than 100 days, but at a slow rate. Gold recovery rate was more rapid for the 3/8 inch feed and extraction was nearly complete in 40 days of leaching. Rest cycles were effective for improving subsequent pregnant solution grades for all feed sizes, but had little effect on improving ultimate recovery, or recovery rate.

Cyanide consumptions were low and ranged from 0.56 to 0.79 pound per ton of ore. Consumption rates were fairly constant throughout the leaching cycles, which explains the higher consumptions experienced with the coarser feeds. Cyanide consumptions are usually higher from column leach tests than those experienced in commercial production. It is expected that commercial consumptions would not exceed 0.50 pound per ton of ore (-2 inch feed).

Lime or cement added before leaching was sufficient to maintain protective alkalinity at above pH 10.5 throughout the leaching cycles for all three feed sizes. Consistently higher effluent pHs for the 2 inch and 3/8 inch feeds may have been caused, in part, by an alkaline gangue mineral liberated by crushing. Controlling pH during leaching was not difficult for any of the feed sizes.

Table 8. - Head Screen Analysis, Yarnell HG/LG Comp, 6 Inch

Size Fraction	Weight, percent	Cum. wt., pct.	Assays, oz Au/ton	Au Distribution, percent	Au Distribution, cum. pct.
+6"	23.4	23.4	0.065	28.7	28.7
-6 +4"	27.7	51.1	0.054	28.3	57.0
-4 +2"	21.7	72.8	0.051	21.0	78.0
-2 +1"	14.4	87.2	0.039	10.6	88.6
-1 +3/4"	2.9	90.1	0.042	2.3	90.9
-3/4 +1/2"	2.4	92.5	0.030	1.3	92.2
-1/2 +1/4"	2.4	94.9	0.058	2.6	94.8
-1/4" +10M	2.3	97.2	0.043	1.9	96.7
-10 +20M	0.8	98.0	0.032	0.6	97.3
-20 +35M	0.5	98.5	0.051	0.6	97.9
-35 +65M	0.4	98.9	0.067	0.6	98.5
-65M	1.1	100.0	0.070	1.5	100.0
Composite	100.0		0.053	100.0	

Table 9. - Tail Screen Analysis, Column Leach Residue, Yarnell HG/LG Comp, 6 Inch Feed

Size Fraction	Weight, percent	Cum. wt., pct.	Assays, oz Au/ton	Au Distribution, percent	Au Distribution, cum. pct.
+6"	22.2	22.2	0.028	28.2	28.2
-6 +4"	43.1	65.3	0.026	50.9	79.1
-4 +2"	18.5	83.8	0.018	15.0	94.1
-2 +1"	8.3	92.1	0.007	2.7	96.8
-1 +3/4"	1.4	93.5	0.009	0.5	97.3
-3/4 +1/2"	1.3	94.8	0.018	0.9	98.2
-1/2 +1/4"	1.3	96.1	0.008	0.5	98.7
-1/4" +10M	1.5	97.6	0.015	0.9	99.6
-10 +20M	0.6	98.2	0.005	0.0	99.6
-20 +35M	0.4	98.6	0.005	0.0	99.6
-35 +65M	0.3	98.9	0.004	0.0	99.6
-65M	1.1	100.0	0.011	0.4	100.0
Composite	100.0		0.022	100.0	

Table 10. - Recovery by Size Fraction Data, Yarnell HG/LG Comp, 6 Inch Feed

Size Fraction	Weight, percent Head	Weight, percent Tail	Assays, oz Au/ton Head	Assays, oz Au/ton Tail	Au Recovery, percent
+6"	23.4	22.2	0.065	0.028	56.9
-6 +4"	27.7	43.1	0.054	0.026	51.9
-4 +2"	21.7	18.5	0.051	0.018	64.7
-2 +1"	14.4	8.3	0.039	0.007	82.1
-1 +3/4"	2.9	1.4	0.042	0.009	78.6
-3/4 +1/2"	2.4	1.3	0.030	0.018	40.0
-1/2 +1/4"	2.4	1.3	0.058	0.008	86.2
-1/4" +10M	2.3	1.5	0.043	0.015	65.1
-10 +20M	0.8	0.6	0.032	0.005	84.4
-20 +35M	0.5	0.4	0.051	0.005	90.2
-35 +65M	0.4	0.3	0.067	0.004	94.0
-65M	1.1	1.1	0.070	0.011	84.3
Composite	100.0	100.0	0.053	0.022	58.5

Table 11. - Head Screen Analysis, Yarnell HG/LG Comp, 2 Inch

Size Fraction	Weight, percent	Cum. wt., pct.	Assays, oz Au/ton	Au Distribution, percent	Au Distribution, cum. pct.
+2"	38.5	38.5	0.047	36.4	36.4
-2 +1"	34.9	73.4	0.045	31.5	67.9
-1 +3/4"	5.2	78.6	0.040	4.2	72.1
-3/4 +1/2"	4.7	83.3	0.051	4.8	76.9
-1/2 +1/4"	4.5	87.8	0.045	4.0	80.9
-1/4" +10M	4.6	92.4	0.046	4.2	85.1
-10 +20M	2.1	94.5	0.037	1.6	86.7
-20 +35M	1.5	96.0	0.042	1.2	87.9
-35 +65M	1.1	97.1	0.065	1.4	89.3
-65M	2.9	100.0	0.184	10.7	100.0
Composite	100.0		0.050	100.0	

Table 12. - Tail Screen Analysis, Column Leach Residue, Yarnell HG/LG Comp, 2 Inch Feed

Size Fraction	Weight, percent	Cum. wt., pct.	Assays, oz Au/ton	Au Distribution, percent	Au Distribution, cum. pct.
+2"	30.0	30.0	0.022	43.4	43.4
-2 +1"	39.7	69.7	0.016	41.4	84.8
-1 +3/4"	5.5	75.2	0.011	4.0	88.8
-3/4 +1/2"	5.1	80.3	0.010	3.3	92.1
-1/2 +1/4"	5.8	86.1	0.008	2.6	94.7
-1/4" +10M	5.8	91.9	0.007	2.6	97.3
-10 +20M	2.1	94.0	0.006	0.7	98.0
-20 +35M	1.7	95.7	0.005	0.7	98.7
-35 +65M	1.1	96.8	0.006	0.0	98.7
-65M	3.2	100.0	0.007	1.3	100.0
Composite	100.0		0.015	100.0	

Table 13. - Recovery by Size Fraction Data, Yarnell HG/LG Comp, 2 Inch Feed

Size Fraction	Weight, percent		Assays, oz Au/ton		Au Recovery, percent
	Head	Tail	Head	Tail	
+2"	38.5	30.0	0.047	0.022	53.2
-2 +1"	34.9	39.7	0.045	0.016	64.4
-1 +3/4"	5.2	5.5	0.040	0.011	72.5
-3/4 +1/2"	4.7	5.1	0.051	0.010	80.4
-1/2 +1/4"	4.5	5.8	0.045	0.008	82.2
-1/4" +10M	4.6	5.8	0.046	0.007	84.8
-10 +20M	2.1	2.1	0.037	0.006	83.8
-20 +35M	1.5	1.7	0.042	0.005	88.1
-35 +65M	1.1	1.1	0.065	0.006	90.8
-65M	2.9	3.2	0.184	0.007	96.2
Composite	100.0	100.0	0.050	0.015	70.0

Table 14. - Head Screen Analysis, Yarnell HG/LG Comp, 3/8 Inch

Size Fraction	Weight, percent	Cum. wt., pct.	Assays, oz Au/ton	Au Distribution, percent	cum. pct.
+3/8"	28.6	28.6	0.076	36.9	36.9
-3/8 +1/4"	17.5	46.1	0.048	14.3	51.2
-1/4" +10M	28.2	74.3	0.057	27.4	78.6
-10 +20M	9.2	83.5	0.036	5.6	84.2
-20 +35M	5.9	89.4	0.048	4.7	88.9
-35 +65M	3.7	93.1	0.074	4.6	93.5
-65M	6.9	100.0	0.055	6.5	100.0
Composite	100.0		0.059	100.0	

Table 15. - Tail Screen Analysis, Column Leach Residue, Yarnell HG/LG Comp, 3/8 Inch Feed

Size Fraction	Weight, percent	Cum. wt., pct.	Assays, oz Au/ton	Au Distribution, percent	cum. pct.
+3/8"	33.3	33.3	0.017	45.2	45.2
-3/8 +1/4"	16.7	50.0	0.014	18.2	63.4
-1/4" +10M	25.3	75.3	0.012	23.8	87.2
-10 +20M	8.7	84.0	0.007	4.8	92.0
-20 +35M	5.7	89.7	0.009	4.0	96.0
-35 +65M	2.6	92.3	0.006	0.8	96.8
-65M	7.7	100.0	0.005	3.2	100.0
Composite	100.0		0.013	100.0	

Table 16. - Recovery by Size Fraction Data, Yarnell HG/LG Comp, 3/8 Inch Feed

Size Fraction	Weight, percent Head	Weight, percent Tail	Assays, oz Au/ton Head	Assays, oz Au/ton Tail	Au Recovery, percent
+3/8"	28.6	33.3	0.076	0.017	77.6
-3/8 +1/4"	17.5	16.7	0.048	0.014	70.8
-1/4" +10M	28.2	25.3	0.057	0.012	78.9
-10 +20M	9.2	8.7	0.036	0.007	80.6
-20 +35M	5.9	5.7	0.048	0.009	81.2
-35 +65M	3.7	2.6	0.074	0.006	91.9
-65M	6.9	7.7	0.055	0.005	90.9
Composite	100.0	100.0	0.059	0.013	78.0

Head screen analysis results show that the 6 inch feed contained 0.053 ounce gold per ton of ore. Gold values were fairly evenly distributed throughout the various size fractions. Silver values were less than 0.10 ounce per ton for each size fraction.

Tail screen results show that the 6 inch leached residue contained 0.022 ounce gold per ton. Residual values were not evenly distributed, but were enriched in the plus 2 inch fractions, especially the plus 4 inch fractions. Plus 2 inch fractions were 83.8 percent of the tail weight, but contained 94.1 percent of the residual gold values. Tail screen data and recovery by size fraction data show that crushing to minus 2 inch in size (80 percent minus 1 1/2 inch) would markedly improve recovery. Improved recovery was confirmed by actual column leach recovery for the 2 inch feed.

Head screen results (Table 11) show that the 2 inch feed contained 0.050 ounce gold per ton. Gold values were fairly evenly distributed, however, some enrichment of gold value was observed in the minus 65 mesh fraction. Reassay of that fraction confirmed initial results. Again, silver was not detected above trace levels in any of the fractions.

Tail screen results show that the 2 inch leached residue contained 0.015 ounce gold per ton. Residual values were not evenly distributed, but were enriched in the plus 2 inch size fraction. This data indicates that crushing to minus 2 inch in size would improve

recovery with subsequent heap leaching treatment. Recovery by size fraction data and column recovery from the 3/8 inch feed show that a minus 1/2 inch feed size would be optimum for maximizing recovery. However, a minus 2 inch feed (80 percent minus 1 1/2 inch) would probably be an economic optimum for the Yarnell ore.

The ore split taken from the bulk HG/LG sample for the 3/8 inch feed was somewhat higher grade than the other splits. Head screen results show that the 3/8 inch feed contained 0.059 ounce gold per ton. The calculated head from the column leach test was 0.055 ounce gold per ton of ore. Gold values were fairly evenly distributed throughout the various head screen fractions, with only slight enrichment of values in the plus 3/8 inch fraction. No economic value of silver was detected.

Tail screen results (Table 15) show that the 3/8 inch leached residue contained 0.013 ounce gold per ton. Residual values were fairly evenly distributed. However, some enrichment was observed in the plus 3/8 inch material. These results show that decreasing feed size from 2 inch to 3/8 inch can only decrease residual value 0.002 ounce gold per ton with subsequent heap leaching treatment. Recovery by size fraction data show that crushing finer than 3/8 inch would not substantially liberate additional gold values for dissolution by cyanide. Fine grinding would be required for maximum liberation of values. Grinding would not be economically feasible at these ore grades.

Table 17. - Overall Metallurgical Results, Heap Leach Tests, Yarnell UG/LG Composite

Metallurgical Results	ROM Feed, Vat Leach	3/8" Feed, Column Leach
Extraction: pct. total Au		
1st Effluent	6.0	3.0
in 5 days	9.0	30.0
in 15 days	18.0	57.0
in 30 days	23.0	67.0
in 45 days	32.0	70.0
in 70 days	40.0	70.0
End of Leach/Wash	40.0	70.0
Extracted, oz Au/ton ore	0.004	0.007
Tail Assay, oz Au/ton	0.006	0.003
Calculated Head, oz Au/ton ore	0.010	0.010
Head Assay, oz Au/ton ore*	0.010	0.010
Cyanide Consumed, lb/ton ore	0.31	0.71
Lime Added, lb/ton ore	5.0	10.0 (cement)
Final Solution pH	10.6	11.5
pH After Wash	9.6	11.4
Leach/Wash Cycle, days	72	90

*Average of 20 direct head assays.

Metallurgical results show that the UG/LG (Comp) was amenable to heap leaching treatment at the 3/8 inch feed size, but not at the ROM feed size. Respective gold recoveries were 70.0 and 40.0 percent in from 72 to 90 days of leaching and washing. Gold recovery rate for the ROM feed was fairly slow, but extraction was substantially complete in 45 days. Recovery rate was more rapid for the 3/8 inch feed, and extraction was nearly complete in 30 days.

Cyanide consumptions were low, at 0.31 to 0.71 (3/8 inch) pounds per ton of ore. Consumption rates were fairly constant throughout the leaching cycles. Lime and cement added to the respective ore charges before leaching was sufficient for alkalinity control throughout the leaching cycles. Ten pounds of cement per ton of ore is excessive for agglomeration of Yarnell fine crushed ore.

Figure 5. - Gold Leach Rate Profiles,

Heap Leach Tests, UG/LG(Comp)

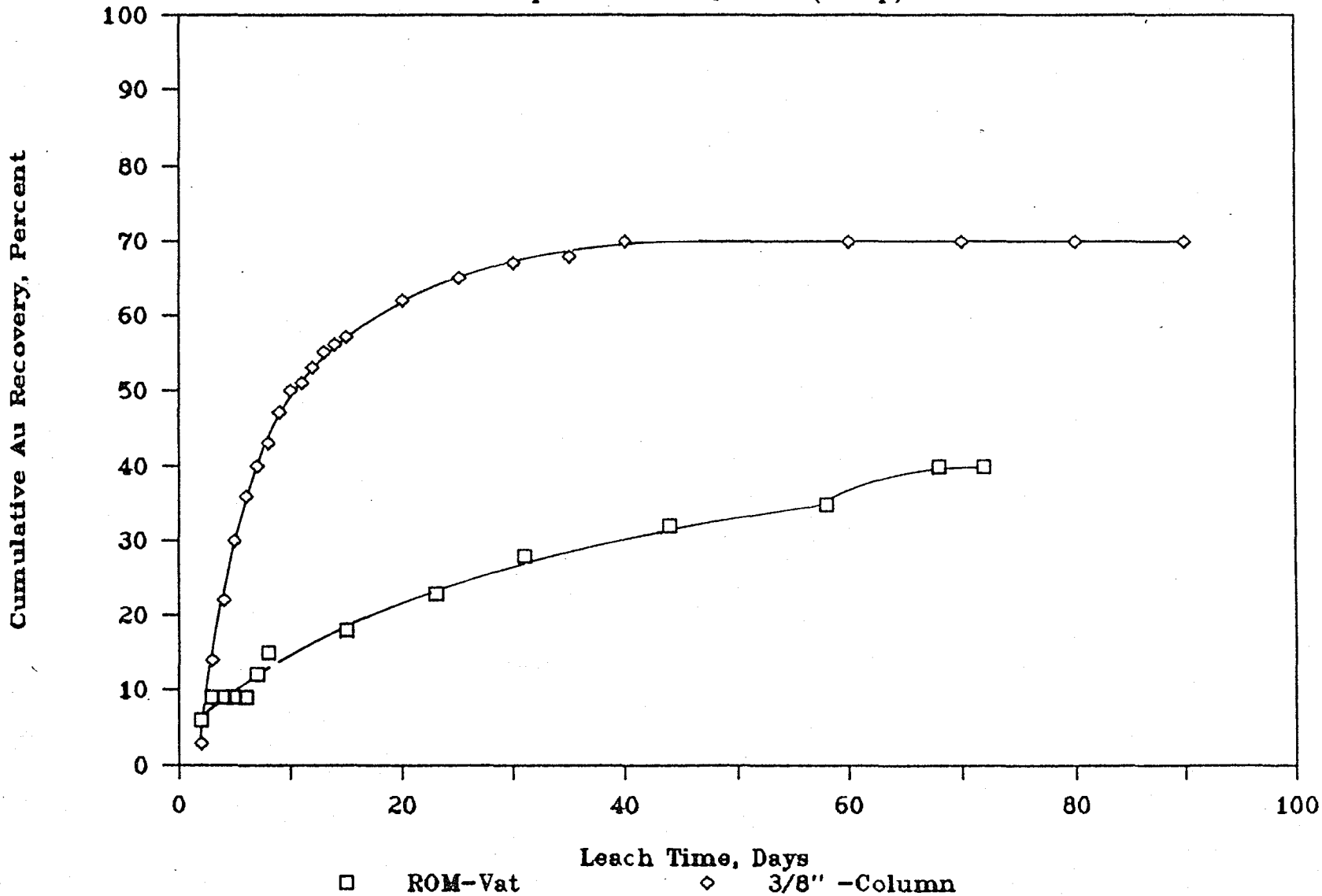


Table 18. - Physical Ore Characteristic Data, Yarnell Composite Column Leach Feeds

Sample	Feed Size, inch	Ore Wt., lbs	Moistures, weight percent: To Saturate Ore Charges*	For Agglomeration	Retained	Bulk Density, lb/ft³: Before	After
HG/LG	6	4800	9.0	N/A	6.3	90.94	91.15
HG/LG	2	2093	12.1	N/A	7.2	86.18	86.27
HG/LG	3/8	967	11.4	5.3	8.1	91.04	91.23
UG/LG	3/8	1000	11.6	6.0	7.8	96.05	97.20

*Includes moisture for agglomeration.

Physical ore characteristic data shows that little "slumping" occurred during leaching. Apparent ore bulk densities were nearly the same before and after leaching. Moisture requirements and retained moistures were fairly low. No percolation, fines migration, or solution channelling problems were observed for any of the column leach tests.

Table 19. - Metallurgical Balances, Yarnell HG/LG, 6 Inch Feed

	Metallurgical Balance		
	Soln vs. Tail	Carbon vs. Tail	Head vs. Tail
Extracted, oz Au/ton	0.024	0.022	0.031
Tail Screen, oz Au/ton	0.022	0.022	0.022
Calc'd Head, oz Au/ton	0.046	0.044	0.053
Au Recovery, percent	52.2	50.0	58.5
Deviation, oz Au/ton*	N/A	0.002	0.007
Precision, percent	100.0	95.7	86.8

*Deviation from solution versus tail calculated head.

Table 20. - Metallurgical Balances, Yarnell HG/LG, 2 Inch Feed

	Metallurgical Balance		
	Soln vs. Tail	Carbon vs. Tail	Head vs. Tail
Extracted, oz Au/ton	0.036	0.034	0.035
Tail Screen, oz Au/ton	0.015	0.015	0.015
Calc'd Head, oz Au/ton	0.051	0.049	0.050
Au Recovery, percent	70.6	69.4	70.0
Deviation, oz Au/ton*	N/A	0.002	0.001
Precision, percent	100.0	96.1	98.0

*Deviation from solution versus tail calculated head.

Table 21. - Metallurgical Balances, Yarnell HG/LG, 3/8 Inch Feed

	Metallurgical Balance		
	Soln vs. Tail	Carbon vs. Tail	Head vs. Tail
Extracted, oz Au/ton	0.042	0.043	0.046
Tail Screen, oz Au/ton	0.013	0.013	0.013
Calc'd Head, oz Au/ton	0.055	0.056	0.059
Au Recovery, percent	76.4	76.8	78.0
Deviation, oz Au/ton*	N/A	0.001	0.004
Precision, percent	100.0	98.2	93.2

*Deviation from solution versus tail calculated head.

Metallurgical balances agreed fairly well for all the HG/LG feeds. The solution versus tail calculated head is considered the most reliable of the three metallurgical balances. All recovery calculations were based on the solution versus tail metallurgical balance.

ENVIRONMENTAL RESULTS

Water washing was effective in decreasing WAD and free cyanide concentrations to below 5 ppm (mg/l) from the 3/8 inch HG/LG leached residue. Both cyanide concentrations were decreased from 900 mg/l to about 4 mg/l in 15 days of water washing. It is expected, that cyanide concentrations would be below 1 mg/l with 5 additional days of water washing. The cyanide detoxification rate was considered slow. Detoxification rate could probably be increased by treating effluent wash solutions with an oxidant (OCI^-, H_2O_2) then recycling the ore charge.

Figure 6. - Detoxification Curve,

Water Wash, HG/LG Comp. 3/8" Feed

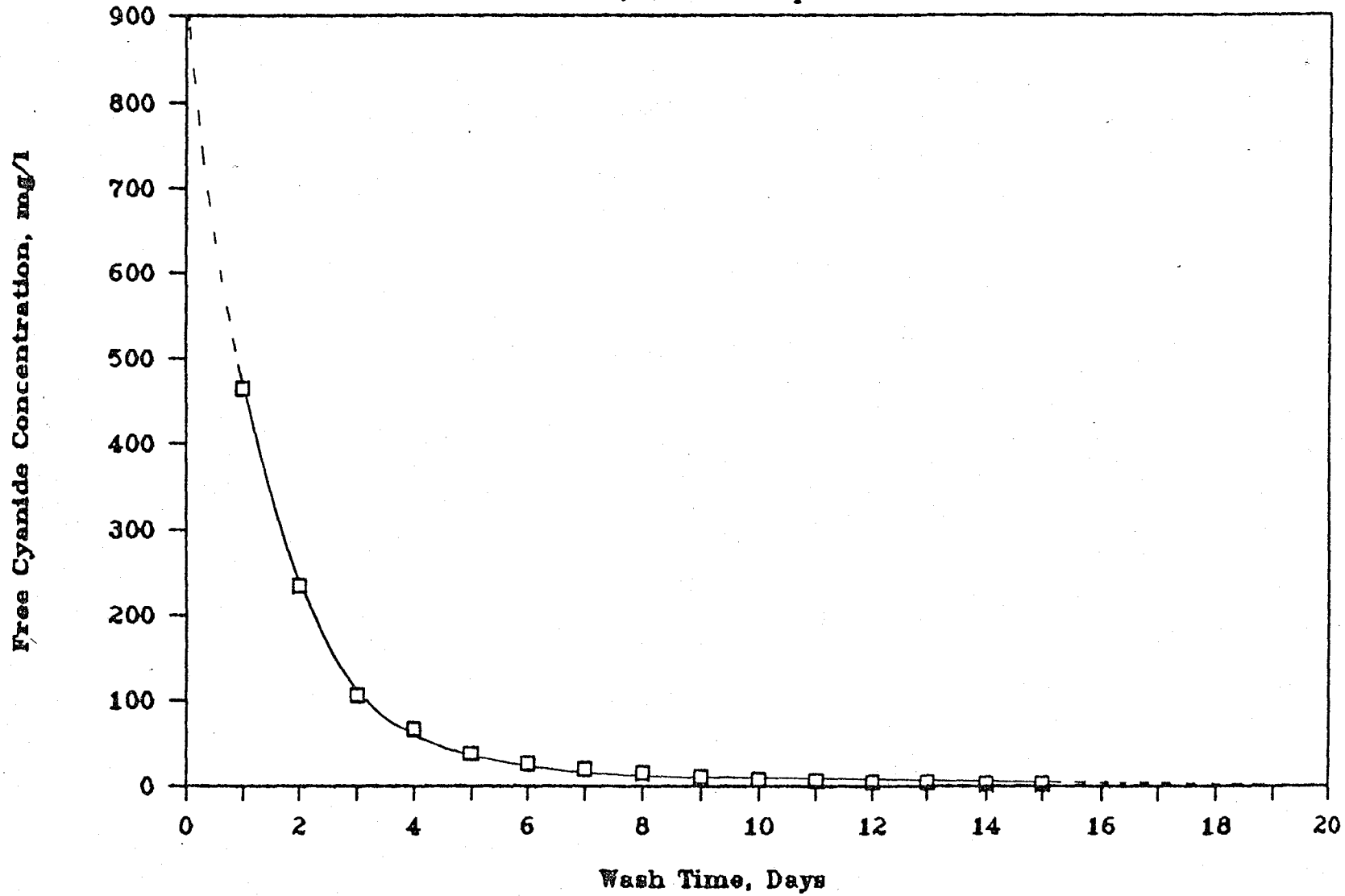
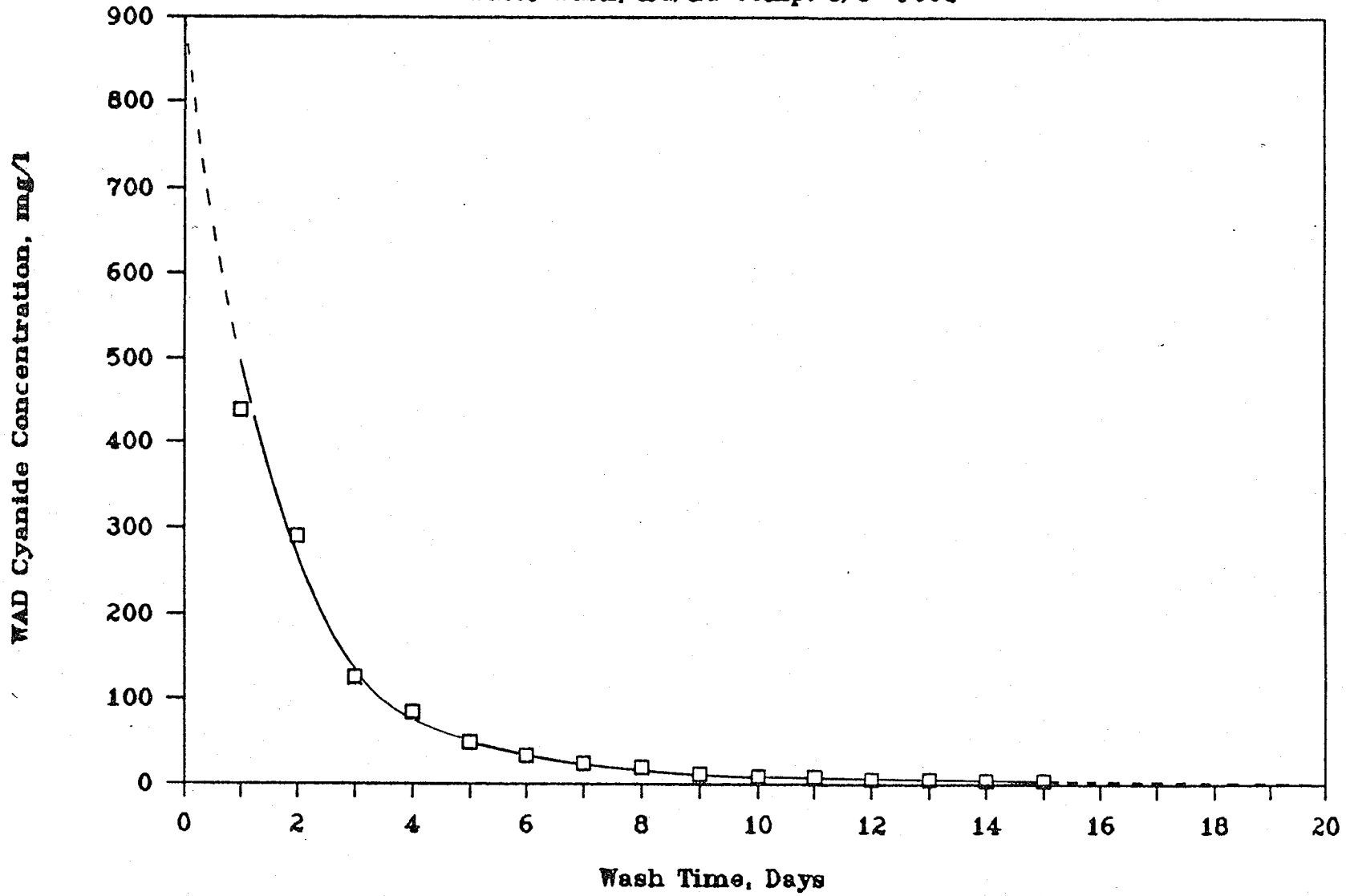


Figure 7. - Detoxification Curve,

Water Wash, HG/LG Comp. 3/8" Feed



Total and WAD cyanide concentrations in the leached, washed residue were 0.24 and 0.032 mg/kg, respectively. These residual cyanide concentrations are well below EPA allowable limits for processed solids.

As mentioned earlier, CAM-WET tests for STLC and TTLC values were conducted on the HG/LG 3/8 inch leached, washed residue rather than EP-Toxicity tests, because more metals are analyzed for and a total threshold limit concentration (TTLC) digestion method is available.

CAM-WET test results show that the residue contained no metals which would exceed allowable limits for either STLC or TTLC values.

CONCLUSIONS

- Yarnell bulk ore samples are amenable to heap leach cyanidation treatment.
- Optimum heap leach feed size for maximum recovery is 80 percent minus 3/8 inch.
- Optimum heap leach feed size with respect to project economics is probably 80 percent minus 1 1/2 inch (100 percent minus 2 inch).
- The UG/LG (Comp) is not amenable to heap leaching treatment at the ROM feed size, but is amenable at the 3/8 inch feed size.
- Cyanide consumptions were low.
- Lime and cement requirements were moderate, and probably excessive for the feeds for pH control.
- Agglomeration pretreatment is required for fine crushed feeds. Agglomeration may not be required for minus 2 inch feed.
- Bulk ore and cuttings samples, to a depth of 60 feet, were metallurgically similar.
- Visible gold was observed in the HG sample. Visible gold may also be contained in lower grade feeds.

RECOMMENDATIONS

We recommend that additional testwork be conducted on representative core composites to confirm metallurgy determined for bulk samples, to establish the need for and optimize conditions for agglomeration pretreatment, to determine carbon adsorption kinetics for design criteria, and to optimize reagent requirements. Additional bottle roll tests should be conducted on several cuttings composites (based on rock type, grade, area, and depth) to establish a historical data base. Mineralogical or metallurgical evaluation should be made to determine the quantity and occurrence of visible gold.

Gene E. McClelland

Gene E. McClelland
Metallurgist/President

APPENDIX

Section 1 - Pertinent Daily Leaching Data

Section 2 - Cyanide Analyses, Water Wash Effluent

Section 3 - CAM-WET, STLC and TTLC Results

Section 4 - Cyanide Results, Final HG/LG 3/8 Inch Residue

Section 5 - Mineralogy Report HG Sample

SECTION 1

DAILY COLUMN LEACH DATA, HIGH GRADE/LOW GRADE COMPOSITE,
6" FEED SIZE

	Preg. Solution			Solution Analysis				Au Ext.	
		NaCN		preg		barren		Au	Au
Days leached	Vol. l.	Conc. lb/ton	pH	Au ppm	Ag ppm	Au ppm	Ag ppm	Cum. oz/t	Cum. %
1	0.00	0.0	0.0	0.00	0.00	0.00	0.00	0.0000	0.0
2	0.00	0.0	0.0	0.00	0.00	0.00	0.00	0.0000	0.0
3	0.00	0.0	0.0	0.00	0.00	0.00	0.00	0.0000	0.0
4	0.00	0.0	0.0	0.00	0.00	0.00	0.00	0.0000	0.0
5	66.82	0.8	11.3	1.64	0.08	0.04	0.04	0.0015	3.3
6	78.64	1.6	11.7	1.44	0.08	0.00	0.00	0.0029	6.3
7	73.48	1.7	12.0	1.08	0.04	0.00	0.00	0.0040	8.7
8	74.62	2.0	12.0	0.84	0.04	0.00	0.00	0.0049	10.7
9	77.74	2.2	12.0	0.88	0.04	0.04	0.00	0.0058	12.6
10	76.50	2.0	12.0	0.80	0.04	0.04	0.00	0.0065	14.1
11	77.44	2.0	12.0	0.72	0.04	0.00	0.00	0.0073	15.9
12	79.32	2.0	12.1	0.68	0.04	0.00	0.00	0.0080	17.4
REST	0.00	0.0	0.0	0.00	0.00	0.00	0.00	0.0080	17.4
14	55.48	2.0	12.2	0.56	0.04	0.00	0.00	0.0084	18.3
15	76.06	2.0	12.1	0.56	0.04	0.00	0.00	0.0090	19.6
16	73.18	1.9	12.0	0.56	0.04	0.04	0.00	0.0095	20.7
17	72.42	2.2	12.0	0.56	0.04	0.04	0.04	0.0100	21.7
18	78.88	2.2	12.0	0.52	0.04	0.04	0.04	0.0105	22.8
19	67.18	1.8	12.2	0.52	0.04	0.08	0.04	0.0110	23.9
20	78.90	1.9	12.1	0.48	0.04	0.08	0.00	0.0114	24.8
21	76.88	2.0	12.1	0.40	0.04	0.08	0.04	0.0117	25.4
22	79.14	2.1	12.1	0.44	0.04	0.08	0.00	0.0121	26.3
23	77.84	2.0	11.7	0.36	0.04	0.08	0.00	0.0124	27.0
24	72.40	2.1	12.0	0.32	0.04	0.08	0.00	0.0126	27.4
25	43.12	2.0	12.1	0.32	0.04	0.08	0.04	0.0127	27.6
26	79.86	1.9	12.1	0.32	0.04	0.08	0.00	0.0130	28.3
27	76.36	1.9	12.0	0.32	0.04	0.08	0.00	0.0133	28.9
28	81.92	1.8	12.0	0.28	0.04	0.08	0.00	0.0135	29.3
29	78.40	2.0	12.0	0.32	0.04	0.08	0.00	0.0137	29.8
30	79.76	2.0	12.0	0.32	0.04	0.08	0.00	0.0140	30.4
31	77.34	2.0	12.0	0.28	0.04	0.04	0.00	0.0142	30.9
32	78.58	2.0	11.9	0.28	0.04	0.00	0.00	0.0145	31.5
33	76.66	2.0	11.8	0.28	0.04	0.04	0.00	0.0147	32.0
34	78.62	2.0	11.9	0.28	0.04	0.08	0.00	0.0150	32.6
35	78.46	1.9	11.9	0.32	0.04	0.08	0.00	0.0152	33.0
36	80.04	1.9	11.2	0.32	0.04	0.12	0.00	0.0155	33.7
37	81.48	2.0	11.7	0.28	0.04	0.12	0.00	0.0157	34.1
38	76.70	2.0	11.6	0.28	0.04	0.16	0.00	0.0158	34.3
39	74.62	2.0	11.8	0.28	0.04	0.16	0.04	0.0160	34.8
40	78.32	1.9	11.8	0.28	0.04	0.16	0.00	0.0161	35.0
41	77.44	2.0	11.8	0.32	0.04	0.16	0.00	0.0162	35.2
42	78.52	2.0	11.8	0.28	0.04	0.16	0.00	0.0164	35.7
43	80.68	2.0	11.7	0.32	0.04	0.16	0.00	0.0166	36.1
44	76.46	2.0	11.7	0.28	0.04	0.16	0.00	0.0167	36.3
45	76.82	2.0	11.6	0.32	0.04	0.16	0.00	0.0168	36.5
46	59.44	1.9	11.3	0.32	0.04	0.16	0.04	0.0169	36.7
47	87.92	0.7	10.3	0.32	0.04	0.16	0.00	0.0172	37.4

DAILY COLUMN LEACH DATA, HIGH GRADE/LOW GRADE COMPOSITE,
6" FEED SIZE

	Preg. Solution			Solution Analysis				Au Ext.	
		NaCN		preg		barren		Au	Au
Days leached	Vol. l.	Conc. lb/ton	pH	Au ppm	Ag ppm	Au ppm	Ag ppm	Cum. oz/t	Cum. %
48	78.80	1.9	11.8	0.28	0.04	0.16	0.00	0.0173	37.6
49	77.10	2.0	11.7	0.24	0.04	0.16	0.00	0.0174	37.8
50	76.52	2.0	11.8	0.28	0.04	0.16	0.00	0.0175	38.0
51	81.38	1.9	11.8	0.28	0.04	0.16	0.00	0.0176	38.3
52	78.56	2.0	11.8	0.32	0.00	0.16	0.00	0.0178	38.7
53	74.04	2.0	11.7	0.28	0.04	0.16	0.04	0.0179	38.9
REST	0.00	0.0	0.0	0.00	0.00	0.00	0.00	0.0177	38.5
61	68.72	1.9	11.6	0.36	0.04	0.28	0.04	0.0181	39.3
62	75.80	1.9	11.7	0.28	0.04	0.16	0.00	0.0181	39.3
63	77.94	1.8	11.6	0.52	0.08	0.00	0.00	0.0185	40.2
64	78.40	1.9	11.6	0.44	0.04	0.00	0.00	0.0189	41.1
65	79.74	1.8	11.6	0.36	0.04	0.00	0.00	0.0193	42.0
66	80.04	1.9	11.6	0.32	0.04	0.00	0.00	0.0197	42.8
67	77.38	1.8	11.5	0.24	0.04	0.00	0.00	0.0199	43.3
68	77.50	1.8	11.5	0.20	0.04	0.00	0.00	0.0201	43.7
69	77.68	1.8	11.5	0.20	0.00	0.00	0.00	0.0203	44.1
70	77.60	1.8	11.5	0.16	0.00	0.00	0.00	0.0205	44.6
71	77.72	1.9	11.3	0.16	0.04	0.00	0.00	0.0207	45.0
72	76.90	1.7	11.4	0.12	0.00	0.00	0.00	0.0208	45.2
73	78.82	1.8	11.4	0.12	0.00	0.00	0.00	0.0209	45.4
74	77.20	1.8	11.2	0.12	0.04	0.00	0.00	0.0210	45.7
75	77.82	1.9	11.1	0.12	0.00	0.00	0.00	0.0212	46.1
76	76.16	1.9	11.1	0.08	0.00	0.00	0.00	0.0212	46.1
77	77.08	1.9	11.0	0.12	0.00	0.00	0.00	0.0214	46.5
78	77.20	1.8	11.0	0.08	0.00	0.00	0.00	0.0215	46.7
79	77.06	1.7	11.3	0.16	0.04	0.00	0.00	0.0216	47.0
80	76.10	1.7	11.1	0.12	0.04	0.00	0.00	0.0217	47.2
81	26.12	1.6	11.0	0.12	0.00	0.00	0.00	0.0218	47.4
82	76.76	1.6	11.0	0.08	0.00	0.00	0.00	0.0219	47.6
83	76.54	1.6	11.0	0.12	0.00	0.00	0.00	0.0220	47.8
84	78.62	1.7	10.9	0.12	0.00	0.00	0.00	0.0221	48.0
85	77.32	1.7	10.8	0.08	0.00	0.00	0.00	0.0222	48.3
86	73.70	1.7	11.2	0.04	0.00	0.00	0.00	0.0222	48.3
87	74.76	1.7	11.1	0.00	0.00	0.00	0.00	0.0222	48.3
88	81.66	1.6	10.8	0.08	0.04	0.00	0.00	0.0223	48.5
89	77.28	1.7	10.9	0.08	0.00	0.00	0.00	0.0224	48.7
90	76.16	1.9	10.9	0.08	0.00	0.00	0.00	0.0225	48.9
91	78.94	1.9	10.8	0.08	0.00	0.00	0.00	0.0226	49.1
92	78.11	1.6	10.8	0.12	0.04	0.00	0.00	0.0227	49.3
93	76.11	1.7	10.9	0.08	0.00	0.00	0.00	0.0228	49.6
94	77.44	1.8	10.9	0.08	0.00	0.00	0.00	0.0229	49.8
95	80.48	1.8	10.9	0.08	0.00	0.00	0.00	0.0229	49.8
96	77.00	1.6	10.8	0.08	0.08	0.00	0.00	0.0230	50.0
97	72.24	1.3	10.6	0.04	0.04	0.00	0.00	0.0231	50.2
98	76.24	1.8	10.8	0.04	0.00	0.00	0.00	0.0231	50.2
99	77.60	1.7	10.5	0.08	0.00	0.00	0.00	0.0232	50.4
100	77.96	1.8	10.8	0.08	0.00	0.00	0.00	0.0233	50.7

DAILY COLUMN LEACH DATA, HIGH GRADE/LOW GRADE COMPOSITE,
6" FEED SIZE

	Preg. Solution			Solution Analysis				Au Ext.	
		NaCN		preg		barren		Au	Au
Days leached	Vol. l.	Conc. lb/ton	pH	Au ppm	Ag ppm	Au ppm	Ag ppm	Cum. oz/t	Cum. %
101	76.92	1.8	10.7	0.08	0.00	0.00	0.00	0.0234	50.9
102	81.02	1.8	10.6	0.08	0.00	0.00	0.00	0.0234	50.9
103	78.78	1.7	10.5	0.12	0.00	0.00	0.00	0.0236	51.3
104	78.78	1.8	10.6	0.08	0.04	0.00	0.00	0.0237	51.5
105	78.90	1.8	10.6	0.12	0.04	0.00	0.00	0.0238	51.7
106	77.54	1.8	10.6	0.12	0.04	0.00	0.00	0.0239	52.0
107	78.56	1.7	10.7	0.08	0.00	0.00	0.00	0.024	52.2
108	78.38	1.8	10.5	0.08	0.00	0.00	0.00	0.024	52.2
109	78.42	1.3	10.5	0.12	0.04	0.00	0.00	0.024	52.2
110	78.14	1.0	10.4	0.08	0.04	0.00	0.00	0.024	52.2
111	77.10	0.5	10.6	0.08	0.04	0.00	0.00	0.024	52.2
END	0.00	0.0	0.0	0.00	0.00	0.00	0.00	0.024	52.2

DAILY COLUMN LEACH DATA, HIGH GRADE/LOW GRADE COMPOSITE,
2" FEED SIZE

	Preg. Solution			Solution Analysis				Au Ext.	
		NaCN		preg		barren		Au	Au
Days leached	Vol. l.	Conc. lb/ton	pH	Au ppm	Ag ppm	Au ppm	Ag ppm	Cum. oz/t	Cum. %
1	0.00	0.0	0.0	0.00	0.00	0.00	0.00	0.0000	0.0
2	0.00	0.0	0.0	0.00	0.00	0.00	0.00	0.0000	0.0
3	0.00	0.0	0.0	0.00	0.00	0.00	0.00	0.0000	0.0
4	0.00	0.0	0.0	0.00	0.00	0.00	0.00	0.0000	0.0
5	0.00	0.0	0.0	0.00	0.00	0.00	0.00	0.0000	0.0
6	20.94	1.6	12.1	3.24	0.08	0.16	0.00	0.0021	4.1
7	28.14	2.1	12.1	2.92	0.08	0.04	0.00	0.0045	8.8
8	33.12	2.3	11.9	2.64	0.08	0.04	0.00	0.0072	14.1
9	33.36	1.8	12.2	2.20	0.04	0.04	0.00	0.0094	18.4
10	30.14	1.8	12.0	1.96	0.08	0.12	0.04	0.0111	21.8
11	27.88	1.7	12.1	1.68	0.04	0.12	0.04	0.0125	24.5
12	31.30	2.1	12.0	1.64	0.04	0.00	0.00	0.0139	27.3
13	33.54	2.0	12.1	1.32	0.04	0.16	0.04	0.0153	30.0
14	32.04	2.1	12.0	1.16	0.04	0.00	0.00	0.0163	32.0
15	25.96	2.0	12.1	1.00	0.04	0.12	0.04	0.0171	33.5
16	37.06	1.9	12.1	0.92	0.04	0.00	0.00	0.0180	35.3
17	32.32	2.0	12.0	0.84	0.04	0.04	0.00	0.0189	37.1
18	27.34	2.0	11.9	0.72	0.04	0.00	0.00	0.0194	38.0
19	35.12	2.0	11.9	0.68	0.04	0.04	0.00	0.0202	39.6
20	32.20	2.0	11.9	0.68	0.04	0.08	0.04	0.0208	40.8
21	29.50	2.0	11.7	0.60	0.04	0.00	0.00	0.0213	41.8
22	32.68	1.9	11.9	0.60	0.04	0.08	0.04	0.0219	42.9
23	32.30	1.9	11.8	0.56	0.04	0.00	0.00	0.0223	43.7
24	31.56	1.9	11.7	0.52	0.04	0.00	0.00	0.0228	44.7
25	32.40	1.8	11.6	0.48	0.04	0.00	0.00	0.0233	45.7
26	29.76	2.0	11.7	0.48	0.04	0.04	0.00	0.0238	46.7
27	30.80	1.9	11.9	0.48	0.04	0.00	0.00	0.0242	47.5
28	29.16	1.9	11.7	0.40	0.04	0.04	0.04	0.0245	48.0
29	34.22	2.0	11.7	0.40	0.04	0.00	0.04	0.0249	48.8
30	31.42	2.0	11.7	0.36	0.04	0.04	0.00	0.0253	49.6
31	28.22	2.0	11.7	0.36	0.04	0.00	0.00	0.0255	50.0
32	30.94	2.0	11.6	0.32	0.04	0.00	0.00	0.0258	50.6
33	30.46	2.0	11.6	0.32	0.04	0.00	0.00	0.0261	51.2
34	34.56	1.8	11.7	0.28	0.04	0.00	0.00	0.0264	51.8
35	19.16	2.0	11.5	0.32	0.04	0.00	0.00	0.0266	52.2
36	32.82	1.9	11.3	0.32	0.04	0.00	0.00	0.0270	52.9
37	28.78	1.9	11.7	0.28	0.04	0.00	0.00	0.0272	53.3
38	34.18	1.9	11.9	0.28	0.04	0.00	0.00	0.0275	53.9
39	31.52	1.9	11.8	0.20	0.00	0.00	0.00	0.0277	54.3
40	31.68	2.0	11.8	0.28	0.04	0.00	0.00	0.0280	54.9
41	31.14	1.8	11.8	0.20	0.04	0.00	0.00	0.0282	55.3
42	29.70	1.9	11.8	0.24	0.00	0.08	0.00	0.0284	55.7
43	30.16	2.0	11.8	0.16	0.04	0.00	0.00	0.0284	55.7
REST	0.00	0.0	0.0	0.00	0.00	0.00	0.00	0.0284	55.7
51	23.86	1.8	11.7	0.28	0.04	0.00	0.00	0.0286	56.1
52	31.44	1.9	11.7	0.36	0.04	0.00	0.00	0.0290	56.9
REST	0.00	0.0	0.0	0.00	0.00	0.00	0.00	0.0290	56.9

DAILY COLUMN LEACH DATA, HIGH GRADE/LOW GRADE COMPOSITE,
2" FEED SIZE

	Preg. Solution			Solution Analysis				Au Ext.	
		NaCN		preg		barren		Au	Au
Days leached	Vol. l.	Conc. lb/ton	pH	Au ppm	Ag ppm	Au ppm	Ag ppm	Cum. oz/t	Cum. %
54	31.12	1.9	11.6	0.40	0.04	0.00	0.00	0.0294	57.6
55	30.42	2.0	11.7	0.32	0.04	0.00	0.00	0.0297	58.2
56	32.06	1.9	11.7	0.36	0.00	0.00	0.00	0.0300	58.8
57	29.52	1.9	11.7	0.32	0.04	0.00	0.00	0.0303	59.4
58	29.34	1.9	11.7	0.28	0.04	0.00	0.00	0.0306	60.0
59	32.54	1.9	11.7	0.32	0.04	0.00	0.00	0.0309	60.6
60	29.46	2.0	11.7	0.24	0.04	0.00	0.00	0.0311	61.0
61	31.20	1.9	11.6	0.28	0.04	0.00	0.00	0.0314	61.6
62	32.16	1.8	11.6	0.20	0.00	0.00	0.00	0.0316	62.0
63	33.30	1.9	11.7	0.20	0.04	0.00	0.00	0.0318	62.4
64	32.06	1.9	11.6	0.20	0.04	0.00	0.04	0.0320	62.7
65	27.60	2.0	11.6	0.16	0.04	0.00	0.00	0.0321	62.9
66	31.56	1.9	11.5	0.20	0.04	0.00	0.00	0.0323	63.3
67	32.34	1.9	11.5	0.16	0.00	0.00	0.00	0.0325	63.7
68	29.12	1.9	11.5	0.16	0.00	0.00	0.00	0.0326	63.9
69	31.30	1.8	11.6	0.16	0.04	0.00	0.00	0.0328	64.3
70	33.68	2.0	11.6	0.20	0.04	0.00	0.00	0.0330	64.7
71	31.42	1.9	11.6	0.16	0.00	0.00	0.00	0.0331	64.9
72	29.00	1.9	11.5	0.12	0.00	0.00	0.00	0.0332	65.1
73	32.46	2.0	11.5	0.12	0.00	0.00	0.00	0.0334	65.5
74	30.70	1.9	11.5	0.16	0.00	0.00	0.00	0.0335	65.7
75	31.54	1.8	11.5	0.08	0.00	0.00	0.00	0.0336	65.9
76	28.54	1.8	11.6	0.08	0.04	0.00	0.00	0.0337	66.1
77	35.30	1.8	11.8	0.08	0.04	0.00	0.00	0.0337	66.1
78	33.92	1.8	11.6	0.12	0.04	0.04	0.04	0.0339	66.5
79	29.74	1.8	11.6	0.16	0.04	0.00	0.00	0.0340	66.7
80	31.50	2.0	11.6	0.12	0.04	0.00	0.00	0.0341	66.9
81	29.90	1.9	11.5	0.16	0.04	0.00	0.00	0.0342	67.1
82	32.64	1.8	11.4	0.12	0.04	0.00	0.00	0.0344	67.5
83	30.04	1.8	11.4	0.16	0.04	0.00	0.00	0.0345	67.6
84	34.02	1.9	11.5	0.08	0.04	0.00	0.00	0.0346	67.8
85	31.58	1.9	11.5	0.12	0.04	0.00	0.00	0.0347	68.0
86	29.18	1.8	11.3	0.12	0.04	0.00	0.00	0.0348	68.2
87	30.16	1.8	11.4	0.12	0.04	0.00	0.00	0.0349	68.4
88	32.46	1.9	11.5	0.12	0.04	0.00	0.00	0.0350	68.6
89	32.84	2.0	11.5	0.12	0.04	0.00	0.00	0.0352	69.0
90	31.00	1.9	11.4	0.12	0.04	0.00	0.00	0.0353	69.2
91	32.44	1.9	11.4	0.12	0.04	0.00	0.00	0.0354	69.4
92	32.06	1.9	11.4	0.08	0.04	0.04	0.04	0.0355	69.6
93	27.26	1.9	11.4	0.12	0.04	0.00	0.00	0.0355	69.6
94	32.48	2.0	11.4	0.12	0.04	0.00	0.00	0.0357	70.0
95	33.42	1.9	11.4	0.12	0.04	0.00	0.00	0.0358	70.2
96	33.26	2.0	11.4	0.12	0.04	0.00	0.00	0.0359	70.4
97	30.24	1.9	11.4	0.12	0.04	0.00	0.00	0.036	70.6
98	30.96	1.9	11.3	0.08	0.04	0.00	0.00	0.036	70.6
99	29.76	1.5	11.3	0.12	0.04	0.04	0.04	0.036	70.6
100	32.56	1.4	11.3	0.08	0.04	0.00	0.00	0.036	70.6

DAILY COLUMN LEACH DATA, HIGH GRADE/LOW GRADE COMPOSITE,
2" FEED SIZE

	Preg. Solution			Solution Analysis				Au Ext.	
		NaCN		preg		barren		Au	Au
Days leached	Vol. l.	Conc. lb/ton	pH	Au ppm	Ag ppm	Au ppm	Ag ppm	Cum. oz/t	Cum. %
101	33.50	1.1	11.6	0.12	0.04	0.00	0.00	0.036	70.6
102	28.46	0.8	11.5	0.08	0.00	0.00	0.00	0.036	70.6
END	0.00	0.0	0.0	0.00	0.00	0.00	0.00	0.036	70.6

DAILY COLUMN LEACH DATA: HIGH GRADE/LOW GRADE COMP.
-3/8" FEED SIZE

	Preg. Solution			Solution Analysis				Au Ext.	
		NaCN		preg		barren		Au	Au
Days leached	Vol. l.	Conc. lb/ton	pH	Au ppm	Ag ppm	Au ppm	Ag ppm	Cum. oz/t	Cum. %
1	0.00	0.0	0.0	0.00	0.00	0.00	0.00	0.0000	0.0
2	0.00	0.0	0.0	0.00	0.00	0.00	0.00	0.0000	0.0
3	0.00	0.0	0.0	0.00	0.00	0.00	0.00	0.0000	0.0
4	21.64	1.3	12.0	4.76	0.24	0.00	0.00	0.0069	12.5
5	20.40	1.5	11.8	3.60	0.16	0.00	0.00	0.0117	21.3
6	19.80	1.6	11.8	2.72	0.12	0.00	0.00	0.0153	27.8
7	15.36	2.0	11.7	2.72	0.12	0.00	0.00	0.0181	32.9
8	22.90	2.0	11.5	2.20	0.12	0.00	0.00	0.0214	38.9
9	21.52	1.7	11.8	1.52	0.08	0.00	0.00	0.0236	42.9
10	20.54	1.5	11.7	1.12	0.08	0.00	0.00	0.0252	45.8
11	19.68	1.8	11.7	1.00	0.04	0.00	0.00	0.0265	48.2
12	20.40	2.1	11.7	0.84	0.04	0.00	0.00	0.0276	50.2
13	20.78	1.7	11.8	0.52	0.04	0.00	0.00	0.0283	51.5
14	21.00	2.0	11.5	0.72	0.04	0.00	0.00	0.0293	53.3
15	19.48	2.0	11.7	0.64	0.04	0.00	0.00	0.0302	54.9
16	20.52	1.9	11.7	0.52	0.04	0.00	0.00	0.0309	56.2
17	20.32	1.8	11.6	0.48	0.04	0.00	0.00	0.0315	57.3
18	20.30	1.8	11.5	0.44	0.04	0.00	0.00	0.0321	58.4
19	19.46	1.9	11.6	0.44	0.04	0.00	0.00	0.0327	59.5
20	20.86	1.9	11.5	0.36	0.04	0.00	0.00	0.0332	60.4
21	20.14	1.9	11.5	0.28	0.04	0.00	0.00	0.0336	61.1
22	20.18	1.9	11.6	0.36	0.04	0.00	0.00	0.0340	61.8
23	19.70	1.9	11.4	0.28	0.04	0.00	0.00	0.0344	62.5
24	20.40	1.7	11.5	0.28	0.00	0.00	0.00	0.0348	63.3
25	20.72	1.7	11.2	0.28	0.00	0.00	0.00	0.0352	64.0
26	19.96	1.9	11.4	0.24	0.04	0.00	0.00	0.0355	64.5
27	20.86	1.9	11.4	0.24	0.04	0.00	0.00	0.0358	65.1
28	20.40	1.9	11.3	0.20	0.04	0.00	0.00	0.0361	65.6
29	19.98	1.9	11.4	0.16	0.00	0.00	0.00	0.0363	66.0
30	20.16	1.8	11.5	0.20	0.00	0.00	0.00	0.0366	66.5
31	20.30	1.8	11.5	0.20	0.04	0.00	0.00	0.0368	66.9
32	20.94	1.9	11.4	0.16	0.00	0.00	0.00	0.0371	67.5
33	20.42	1.9	11.4	0.16	0.00	0.00	0.00	0.0373	67.8
34	20.22	1.8	11.3	0.16	0.04	0.00	0.00	0.0375	68.2
35	20.84	1.9	11.2	0.12	0.00	0.00	0.00	0.0377	68.5
36	20.80	1.8	11.1	0.16	0.00	0.00	0.00	0.0379	68.9
37	20.38	1.8	11.4	0.12	0.00	0.00	0.00	0.0381	69.3
38	20.94	1.9	11.5	0.12	0.00	0.00	0.00	0.0382	69.5
39	20.66	2.0	11.5	0.08	0.00	0.00	0.00	0.0383	69.6
40	20.24	1.8	11.5	0.16	0.00	0.00	0.00	0.0385	70.0
41	20.86	1.9	11.6	0.12	0.00	0.00	0.00	0.0387	70.4
42	20.74	1.9	11.5	0.16	0.00	0.00	0.00	0.0389	70.7
43	18.32	1.8	11.5	0.12	0.00	0.00	0.00	0.0391	71.1
REST	0.00	0.0	0.0	0.00	0.00	0.00	0.00	0.0391	71.1
51	18.26	1.6	11.3	0.20	0.04	0.00	0.00	0.0393	71.5
52	20.80	1.8	11.4	0.24	0.00	0.00	0.00	0.0397	72.2
REST	0.00	0.0	0.0	0.00	0.00	0.00	0.00	0.0397	72.2

DAILY COLUMN LEACH DATA: HIGH GRADE/LOW GRADE COMP.
-3/8" FEED SIZE

	Preg. Solution			Solution Analysis				Au Ext.	
		NaCN		preg		barren		Au	Au
Days leached	Vol. l.	Conc. lb/ton	pH	Au ppm	Ag ppm	Au ppm	Ag ppm	Cum. oz/t	Cum. %
54	20.88	1.9	11.3	0.20	0.04	0.00	0.00	0.0399	72.5
55	19.34	1.7	11.5	0.12	0.00	0.00	0.00	0.0401	72.9
56	20.38	1.8	11.5	0.08	0.00	0.00	0.00	0.0402	73.1
57	18.66	1.8	11.4	0.12	0.00	0.00	0.00	0.0403	73.3
58	16.42	1.9	11.3	0.08	0.04	0.00	0.00	0.0404	73.5
59	23.60	1.9	11.4	0.16	0.00	0.00	0.00	0.0407	74.0
60	18.52	1.8	11.5	0.12	0.00	0.00	0.00	0.0408	74.2
61	20.52	1.9	11.4	0.12	0.04	0.00	0.00	0.0410	74.5
62	21.10	1.8	11.4	0.08	0.00	0.00	0.00	0.0411	74.7
REST	0.00	0.0	0.0	0.00	0.00	0.00	0.00	0.0411	74.7
WASH	18.22	1.8	11.3	0.12	0.04	0.00	0.00	0.0412	74.9
66	19.42	0.9	11.4	0.12	0.04	0.00	0.00	0.0414	75.3
67	20.08	0.6	11.5	0.08	0.00	0.00	0.00	0.0415	75.5
68	18.70	0.4	11.5	0.08	0.00	0.00	0.00	0.0416	75.6
69	20.30	0.3	11.6	0.12	0.00	0.00	0.00	0.0418	76.0
70	21.28	0.1	11.5	0.08	0.00	0.00	0.00	0.0419	76.2
71	18.94	0.2	11.5	0.04	0.00	0.00	0.00	0.0419	76.2
72	17.72	0.2	11.3	0.04	0.00	0.00	0.00	0.0420	76.4
73	20.52	0.1	11.3	0.04	0.00	0.00	0.00	0.0420	76.4
74	20.04	0.1	11.3	0.04	0.00	0.00	0.00	0.0420	76.4
75	19.28	0.1	11.3	0.00	0.00	0.00	0.00	0.042	76.4
76	19.16	0.1	11.2	0.00	0.04	0.00	0.00	0.042	76.4
77	13.66	0.1	10.8	0.00	0.00	0.00	0.00	0.042	76.4
78	23.38	0.0	11.3	0.04	0.00	0.00	0.00	0.042	76.4
79	19.14	0.0	11.3	0.04	0.00	0.00	0.00	0.042	76.4
END	0.00	0.0	0.0	0.00	0.00	0.00	0.00	0.0420	76.4

DAILY VAT LEACH DATA, UNDER GROUND LOW GRADE
BULK ORE SAMPLE, ROM FEED SIZE

	Preg. Solution			Solution Analysis				Au Ext.	
		NaCN		preg		barren		Au	Au
Days leached	Vol. l.	Conc. lb/ton	pH	Au ppm	Ag ppm	Au ppm	Ag ppm	Cum. oz/t	Cum. %
1	0.00	0.0	0.0	0.00	0.00	0.00	0.00	0.0000	0.0
2	79.72	1.9	11.9	0.08	0.04	0.00	0.00	0.0006	6.0
3	80.62	2.3	11.6	0.04	0.00	0.00	0.00	0.0009	9.0
4	79.58	2.0	11.4	0.00	0.00	0.00	0.00	0.0009	9.0
5	79.52	2.0	11.1	0.00	0.00	0.00	0.00	0.0009	9.0
6	79.50	2.0	10.9	0.00	0.00	0.00	0.00	0.0009	9.0
7	79.34	2.0	11.0	0.04	0.00	0.00	0.00	0.0012	12.0
8	79.26	2.0	10.7	0.04	0.04	0.00	0.00	0.0015	15.0
15	78.18	2.0	11.4	0.04	0.00	0.00	0.00	0.0018	18.0
23	78.26	1.8	10.8	0.08	0.00	0.00	0.00	0.0023	23.0
31	78.20	1.8	10.9	0.00	0.00	0.00	0.00	0.0023	23.0
32	79.98	1.9	10.4	0.00	0.00	0.00	0.00	0.0023	23.0
44	78.50	1.8	10.7	0.12	0.00	0.00	0.00	0.0032	32.0
58	79.10	1.7	10.6	0.04	0.00	0.00	0.00	0.0035	35.0
68	78.20	1.8	10.6	0.04	0.00	0.00	0.00	0.0040	40.0
69	79.98	0.1	10.0	0.00	0.00	0.00	0.00	0.0040	40.0
70	79.42	0.1	9.7	0.00	0.04	0.00	0.00	0.0040	40.0
71	79.68	0.1	9.6	0.00	0.00	0.00	0.00	0.0040	40.0
72	79.94	0.1	9.6	0.00	0.00	0.00	0.00	0.0040	40.0
END	0.00	0.0	0.0	0.00	0.00	0.00	0.00	0.0040	40.0

DAILY COLUMN LEACH DATA, UNDERGROUND LOW GRADE
BULK ORE SAMPLE, 80 PERCENT MINUS 3/8 INCH FEED SIZE

	Preg. Solution			Solution Analysis				Au Ext.	
		NaCN		preg		barren		Au	Au
Days leached	Vol. l.	Conc. lb/ton	pH	Au ppm	Ag ppm	Au ppm	Ag ppm	Cum. oz/t	Cum. %
1	0.00	0.0	0.0	0.00	0.00	0.00	0.00	0.0000	0.0
2	4.42	1.0	11.8	0.88	0.24	0.00	0.00	0.0003	3.0
3	19.48	1.3	12.0	0.88	0.20	0.00	0.00	0.0014	14.0
4	18.32	1.3	12.0	0.68	0.12	0.00	0.00	0.0022	22.0
5	22.62	1.1	12.0	0.56	0.12	0.00	0.00	0.0030	30.0
6	19.20	1.4	11.9	0.48	0.08	0.00	0.00	0.0036	36.0
7	19.90	1.9	12.0	0.32	0.08	0.00	0.00	0.0040	40.0
8	20.82	1.8	12.0	0.28	0.04	0.00	0.00	0.0043	43.0
9	19.28	1.9	11.9	0.28	0.04	0.00	0.00	0.0047	47.0
10	20.56	1.8	12.0	0.20	0.16	0.00	0.00	0.0050	50.0
11	20.74	2.0	11.9	0.12	0.04	0.00	0.00	0.0051	51.0
12	20.60	1.9	11.9	0.12	0.04	0.00	0.00	0.0053	53.0
13	18.52	2.0	11.9	0.16	0.04	0.00	0.00	0.0055	55.0
14	20.90	1.9	11.9	0.12	0.04	0.00	0.00	0.0056	56.0
15	20.82	1.8	11.9	0.08	0.16	0.00	0.00	0.0057	57.0
16	20.60	1.8	11.8	0.12	0.04	0.00	0.00	0.0059	59.0
17	20.16	1.9	11.9	0.08	0.04	0.00	0.00	0.0060	60.0
18	21.60	1.9	11.6	0.04	0.04	0.00	0.00	0.0061	61.0
19	18.94	1.6	11.8	0.08	0.04	0.00	0.00	0.0061	61.0
20	20.88	1.5	11.8	0.04	0.00	0.00	0.00	0.0062	62.0
21	21.58	2.0	12.0	0.04	0.00	0.00	0.00	0.0063	63.0
22	19.78	2.0	11.9	0.04	0.00	0.00	0.00	0.0063	63.0
23	19.44	1.9	11.9	0.00	0.04	0.00	0.00	0.0063	63.0
24	20.62	1.7	11.9	0.08	0.04	0.00	0.00	0.0064	64.0
25	21.40	1.8	11.9	0.04	0.04	0.00	0.00	0.0065	65.0
26	19.94	1.9	11.9	0.04	0.04	0.00	0.00	0.0065	65.0
27	19.70	1.9	11.9	0.08	0.00	0.00	0.00	0.0066	66.0
28	19.92	1.9	11.9	0.00	0.00	0.00	0.00	0.0066	66.0
29	20.44	1.8	11.8	0.00	0.00	0.00	0.00	0.0066	66.0
30	19.58	1.8	11.7	0.04	0.00	0.00	0.00	0.0067	67.0
31	21.28	1.8	11.8	0.04	0.00	0.00	0.00	0.0067	67.0
32	20.26	1.8	11.8	0.04	0.00	0.00	0.00	0.0068	68.0
33	19.08	1.8	11.8	0.00	0.00	0.00	0.00	0.0068	68.0
34	21.60	1.8	11.8	0.04	0.04	0.00	0.00	0.0068	68.0
35	20.52	1.7	11.7	0.00	0.04	0.00	0.00	0.0068	68.0
36	19.66	1.7	11.6	0.04	0.04	0.00	0.00	0.0069	69.0
37	20.46	2.0	11.8	0.04	0.04	0.00	0.00	0.0070	70.0
38	20.86	1.8	11.8	0.00	0.00	0.00	0.00	0.0070	70.0
39	21.30	1.7	11.7	0.00	0.00	0.00	0.00	0.0070	70.0
40	19.90	1.8	11.7	0.00	0.04	0.00	0.00	0.0070	70.0
41	20.50	1.9	11.6	0.00	0.00	0.00	0.00	0.0070	70.0
42	18.14	1.8	11.7	0.00	0.04	0.00	0.00	0.0070	70.0
43	21.64	1.7	11.6	0.00	0.00	0.00	0.00	0.0070	70.0
REST	0.00	0.0	0.0	0.00	0.00	0.00	0.00	0.0070	70.0
57	16.04	1.5	11.3	0.00	0.00	0.00	0.00	0.0070	70.0
58	20.66	1.5	11.7	0.00	0.04	0.00	0.00	0.0070	70.0
59	17.06	1.6	11.7	0.00	0.04	0.00	0.00	0.0070	70.0

DAILY COLUMN LEACH DATA, UNDERGROUND LOW GRADE
BULK ORE SAMPLE, 80 PERCENT MINUS 3/8 INCH FEED SIZE

	Preg. Solution			Solution Analysis				Au Ext.	
		NaCN		preg		barren		Au	Au
Days leached	Vol. l.	Conc. lb/ton	pH	Au ppm	Ag ppm	Au ppm	Ag ppm	Cum. oz/t	Cum. %
60	23.86	1.9	11.8	0.00	0.04	0.00	0.00	0.0070	70.0
61	19.10	1.7	11.7	0.00	0.00	0.00	0.00	0.0070	70.0
62	18.16	1.7	11.6	0.00	0.04	0.00	0.00	0.0070	70.0
63	19.80	1.7	11.6	0.00	0.00	0.00	0.00	0.0070	70.0
64	22.98	1.8	11.5	0.00	0.00	0.00	0.00	0.0070	70.0
65	18.58	1.7	11.5	0.00	0.00	0.00	0.00	0.0070	70.0
66	22.90	1.6	11.4	0.00	0.00	0.00	0.00	0.0070	70.0
67	19.66	1.7	11.5	0.00	0.00	0.00	0.00	0.0070	70.0
68	21.46	1.7	11.5	0.00	0.00	0.00	0.00	0.0070	70.0
69	15.46	1.5	11.3	0.00	0.00	0.00	0.00	0.0070	70.0
70	24.88	1.7	11.4	0.00	0.00	0.00	0.00	0.0070	70.0
71	20.68	1.7	11.4	0.00	0.00	0.00	0.00	0.0070	70.0
72	20.36	1.7	11.2	0.00	0.00	0.00	0.00	0.0070	70.0
73	20.74	1.9	11.4	0.00	0.00	0.00	0.00	0.0070	70.0
74	20.62	1.8	11.4	0.00	0.00	0.00	0.00	0.0070	70.0
75	21.90	1.7	11.4	0.00	0.00	0.00	0.00	0.0070	70.0
76	18.64	1.7	11.4	0.00	0.00	0.00	0.00	0.0070	70.0
77	20.56	1.7	11.4	0.00	0.00	0.00	0.00	0.0070	70.0
78	19.86	1.3	11.4	0.00	0.00	0.00	0.00	0.0070	70.0
79	18.78	0.9	11.4	0.00	0.00	0.00	0.00	0.0070	70.0
80	21.06	0.7	11.5	0.00	0.00	0.00	0.00	0.0070	70.0
81	20.24	0.6	11.6	0.00	0.00	0.00	0.00	0.0070	70.0
82	20.56	0.3	11.5	0.00	0.00	0.00	0.00	0.0070	70.0
83	20.46	0.2	11.5	0.00	0.00	0.00	0.00	0.0070	70.0
84	18.78	0.2	11.3	0.00	0.00	0.00	0.00	0.0070	70.0
85	20.42	0.2	11.3	0.00	0.00	0.00	0.00	0.0070	70.0
86	20.30	0.1	11.3	0.00	0.00	0.00	0.00	0.0070	70.0
87	20.42	0.1	11.2	0.00	0.00	0.00	0.00	0.0070	70.0
88	21.46	0.0	11.3	0.00	0.00	0.00	0.00	0.0070	70.0
89	21.84	0.0	11.4	0.00	0.00	0.00	0.00	0.0070	70.0
90	20.28	0.0	11.4	0.00	0.00	0.00	0.00	0.0070	70.0

SECTION 2

INCORPORATED

Client: McClelland Laboratories, Incorporated
Address: 1016 East Greg Street
Sparks, Nevada 89431
Phone: 356-1300
Date Sampled: Various Date Submitted: 11/15/89
Client Reference: Project 378, Wash Solutions as Below.
Laboratory Reference Numbers: 89-1119 to 89-1133.
Analysis Performed: Free and Weak and Dissociable Cyanide.

Sample Identifier	Free CN, mg/L	WAD CN, mg/L
257, 1 of 15	465	440
258, 2 of 15	235	291
259, 3 of 15	105	125
260, 4 of 15	66	85
261, 5 of 15	38	49
262, 6 of 15	27	34
263, 7 of 15	20	25
264, 8 of 15	16	20
265, 9 of 15	11	13 (12)
266, 10 of 15	8.2	9.1
267, 11 of 15	7.1	9.0
268, 12 of 15	5.4	6.7
269, 13 of 15	5.4	6.9
270, 14 of 15	4.2	4.7
271, 15 of 15	3.6	4.3

Note:
Replicate analysis are shown in parenthesis.

Analysis By: Hlubucek/Sharp

Approved By: C. W. Sharp Date: 12/3/89

Laboratory Report Number 347

325 Freeport Blvd., Sparks, Nevada 89431
P.O. Box 6535, Reno, Nevada 89513 (702) 359-0330

SECTION 3

INCORPORATED

Client: McClelland Laboratories, Incorporated
Address: 1016 East Greg Street
Sparks, Nevada 89431
Phone: 356-1300
Date Sampled: 12/12/89 Date Submitted: 12/12/89
Client Reference: 1378, P2, Leached Residue.
Laboratory Reference Numbers: 89-1232.
Analysis Performed: CAM-WET Test as the Soluble Threshold Limit Concentrations (STLC) on Deionized Water Extract and the Total Threshold Limit Concentrations (TTLC).

Analysis	STLC , mg/L	TTLC, mg/Kg
Antimony	<1.0	<6.0
Arsenic	<0.5	<3.0
Barium	6.9	31
Beryllium	<0.1	<0.6
Cadmium	<0.02	<0.13
Chromium	<0.25	2.0
Cobalt	<0.2	<1.3
Copper	<0.1	6.1
Fluoride	0.42	<0.6
Lead	<0.1	4.9
Mercury	<0.002	<0.02
Molybdenum	<1.0	<6.0
Nickel	<0.5	3.4
Selenium	<0.2	<1.3
Silver	<0.02	<0.13
Thallium	<0.5	<3.0
Vanadium	<2.0	<13
Zinc	0.18	28

Note:
STLC extractions and TTLC performed as described in California Title 22, Environmental Health, Article 11.

Analysis By: Hlubucek/Sharp

Approved By: C. W. Sharp Date: 12/24/89

Laboratory Report Number 376

325 Freeport Blvd., Sparks, Nevada 89431
P.O. Box 6535, Reno, Nevada 89513 (702) 359-0330

SECTION 4

INCORPORATED

Client: McClelland Laboratories, Incorporated
Address: 1016 East Greg Street
Sparks, Nevada 89431
Phone: 356-1300
Date Sampled: 2/15/90 Date Submitted: 2/15/90
Client Reference: Project 1378-P2, CY Wash.
Laboratory Reference Numbers: 90-179.
Analysis Performed: Total Cyanide and Weak Acid Dissociable Cyanide.

Sample Identifier	Total CN, mg/Kg	WAD CN, mg/Kg
1378-P2	0.24	0.032 (0.029)

Note:
Replicate analysis is shown in parenthesis.

Analysis By: Hlubucek/Sharp

Approved By: C. W. Sharp Date: 2/19/90

Laboratory Report Number 438

325 Freeport Blvd., Sparks, Nevada 89431
P.O. Box 6535, Reno, Nevada 89513 (702) 359-0330

SECTION 5

Russell M. Honea
Consulting Geologist

AC 303 466-0719

Office
1105 BELLAIRE
BROOMFIELD, COLORADO 80020

Mailing Address
P.O. BOX 323
BROOMFIELD, COLORADO 80020

September 5, 1989

Mr. Jack McPartland
McClelland Laboratories, Inc.
1016 Greg Street
Sparks, Nevada 89431

Re: ASARCO High Grade

Dear Jack:

Enclosed are results of polished section examination of the ASARCO sample you sent a couple of weeks ago. The material was examined in polished sections of the "as received" or head sample ground to minus 70 mesh and in a panned concentrate prepared therefrom. Photomicrographs showing the character of some of the coarser particles are enclosed.

A total of 14 gold particles were observed - 10 of which are liberated and 4 of which are in composites with goethite. Particle size of native gold varies from 12 to 280 microns, and the average particle diameter is 78 microns.

The sample is very strongly oxidized, and contains very minor remnant pyrite along with an oxidation suite of dominant goethite and minor associated psilomelane. Small amounts of silicates from the minor accessory suite of the host are also present.

Please let me know if there are questions or problems regarding the data.

Sincerely,

Russell M. Honea

Encl.

AS&R-1 (High Grade). Liberated and composite native gold particles in strongly oxidized host with minor remnants of pyrite and relatively abundant goethite and psilomelane.

Native gold - -1% - Dark golden yellow color - suggesting low silver content, isotropic but does not show complete extinction because of polishing scratches. Observed as 14 particles - 10 of which are liberated and 4 of which form composites with goethite. Grain size ranges from 12 to 280 microns, and average diameter of particles is 78 microns.

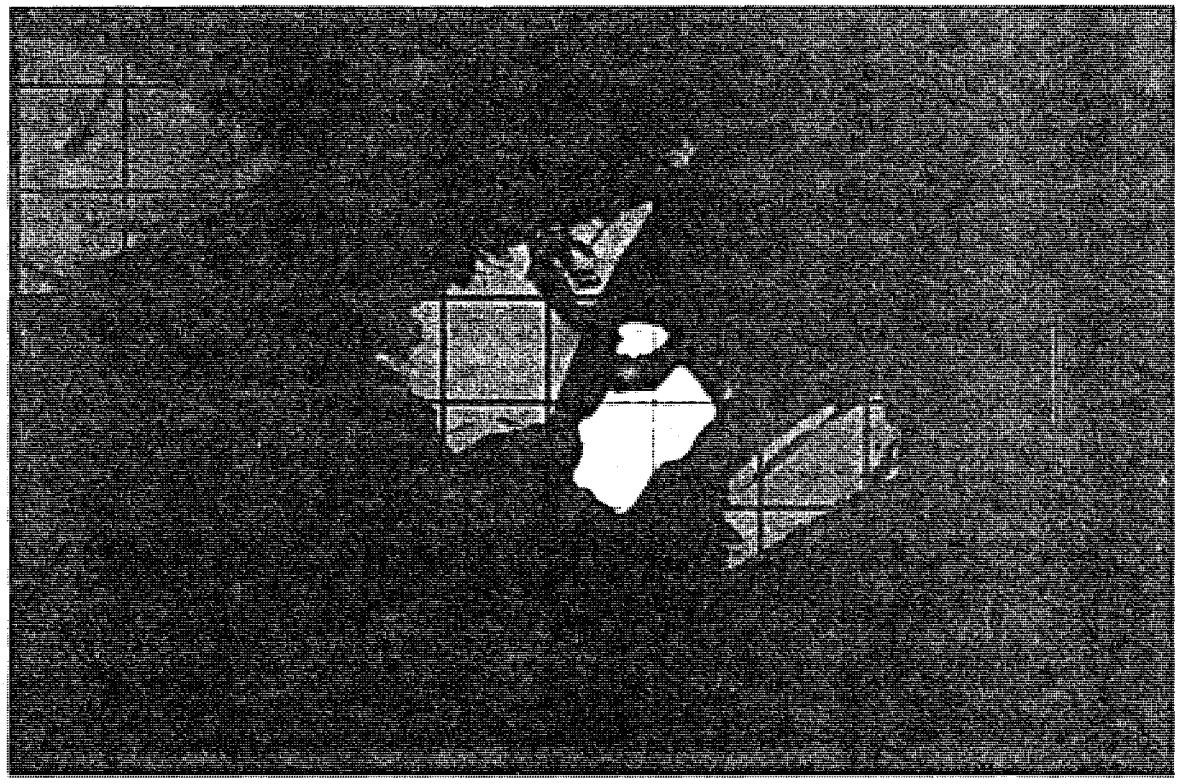
Pyrite - -1% - Pale yellow, either isotropic or with weak anomlaous anisotropism and very faint blue to purplish polarization colors, hard and is well polished. Scarce pyritohedral remnant crystals with margins corroded by oxidation. Most is replaced by goethite oxidation products.

Goethite - 2+% - Medium gray with bluish tint where better polished, anisotropic but with polarization colors masked by strong reddish brown internal reflections, highly variable hardness and perfection of polish. Occurs in separate grains formed as oxidation pseudomorphs after pyrite and intergrown with psilomelane. Often finely banded.

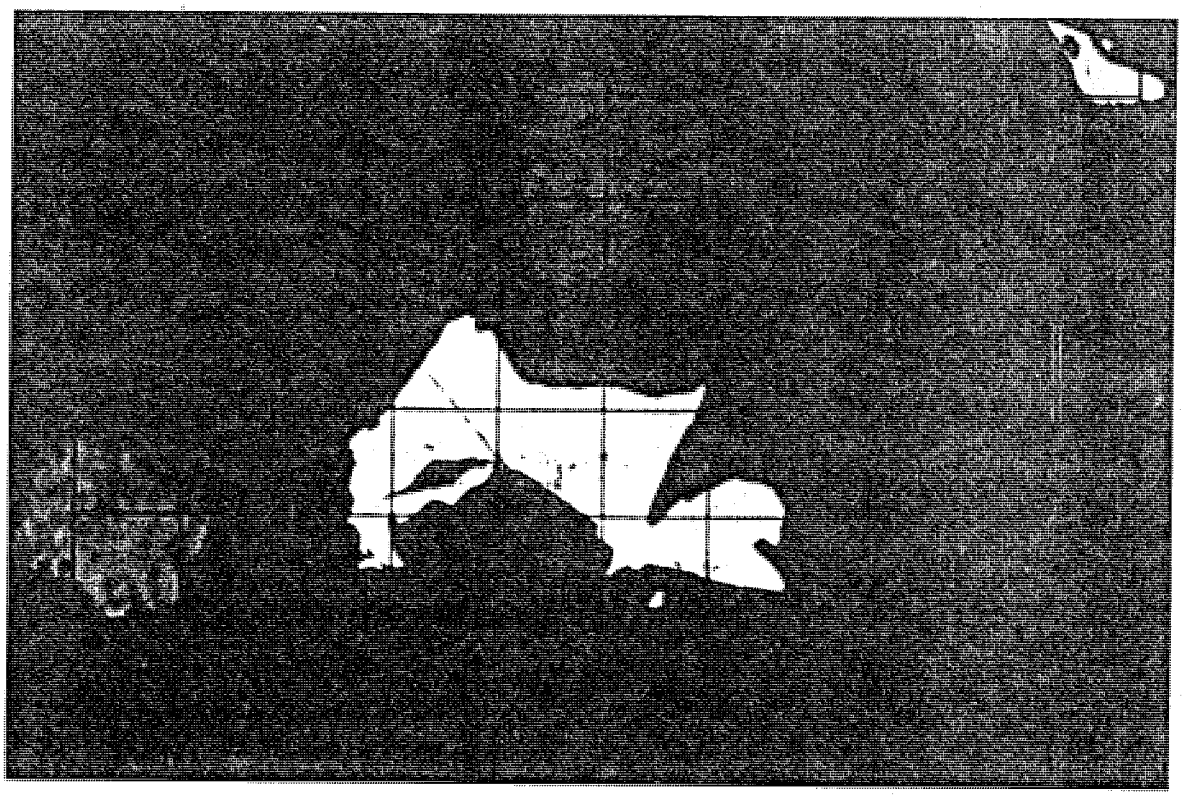
Psilomelane - -1% - Light grayish blue, moderately anisotropic and with polarization colors of blue to gray, moderate hardness and is well polished. Present as thin-banded and in part microbotryoidal aggregates with radial to subradial fibrous internal texture. Present both alone and with goethite.

Rutile + Zircon + Sphene(?) - -1% - Medium gray, anisotropic but with polarization colors masked by strong colorless to pale yellowish brown internal reflections, hard and is well polished. Present as both liberated particles and in composites with silicate gangue. Derived from the minor accessory suite of host or from alteration of host (rutile).

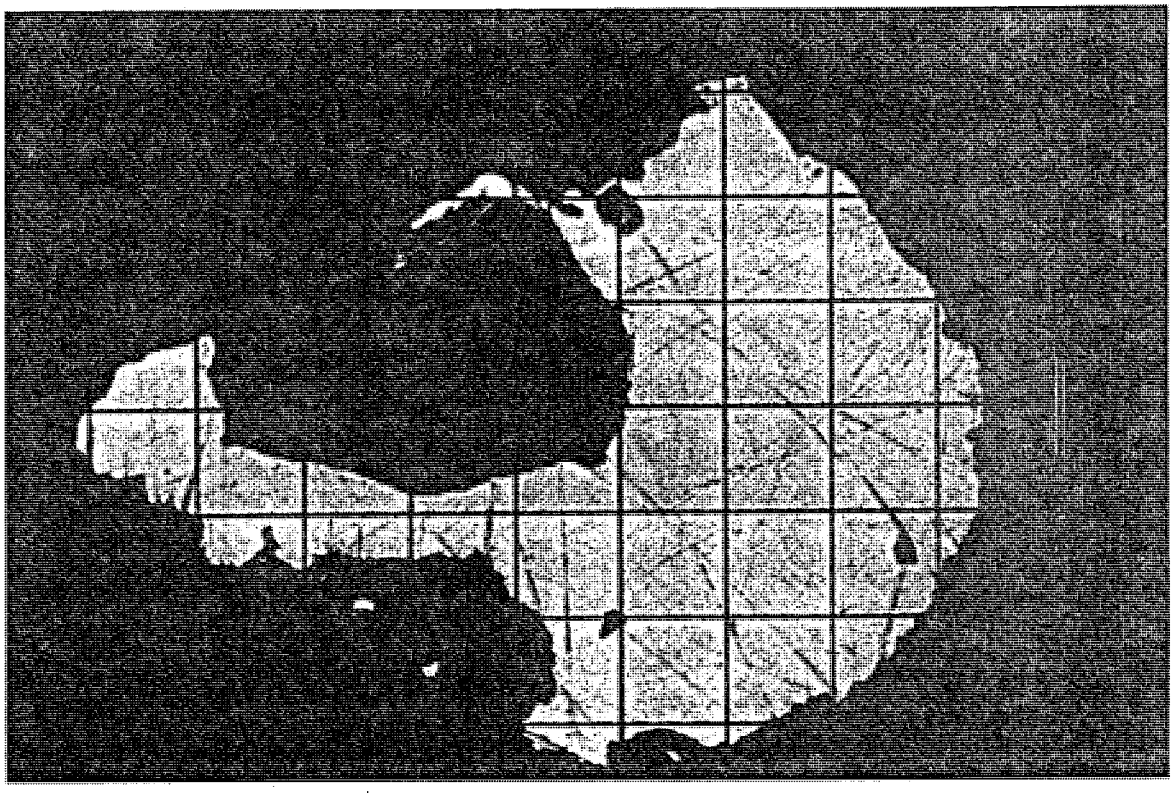
Non-metallic gangue - 97%



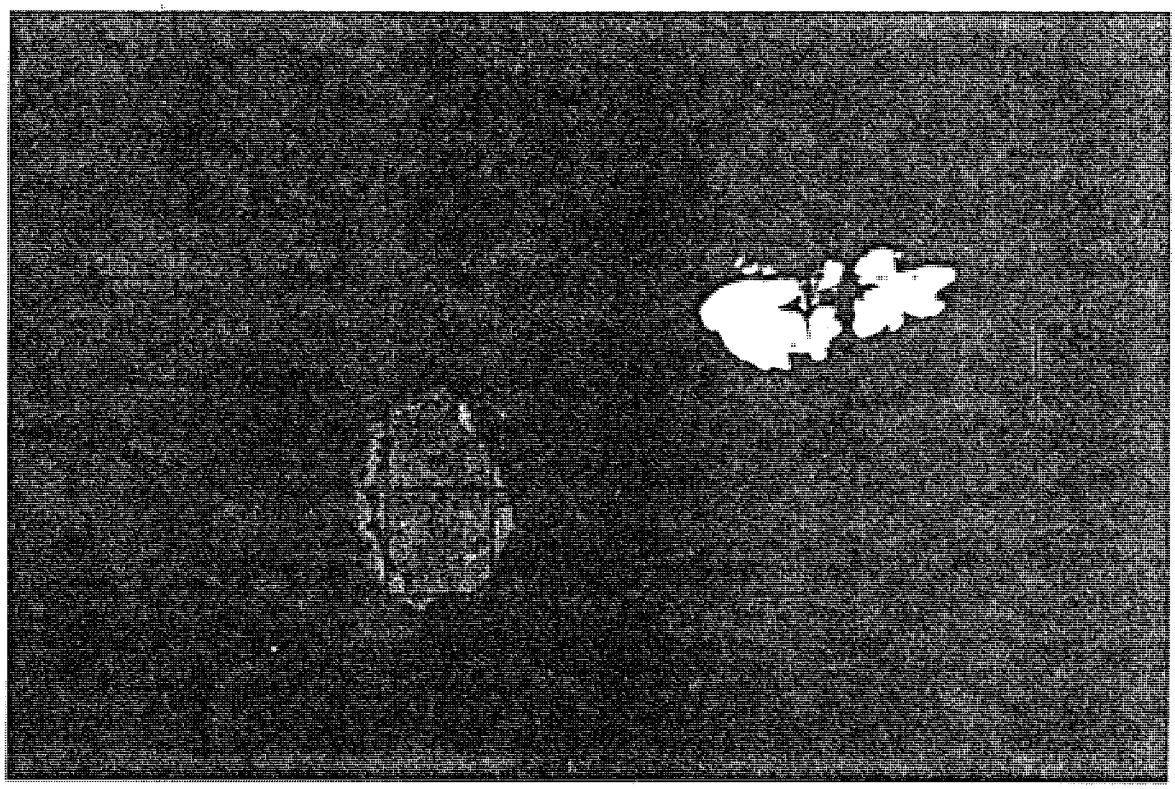
AS&R-1 (H.G.). Polished section photomicrograph of native gold particle with goethite in concentrate panned from head sample. Plain light, X435. Each square of grid is 32 microns on an edge.



AS&R-1 (H.G.) Polished section photomicrograph of relatively coarse native gold forming composite with goethite and silicate gangue. Plain light, X435. Each square of grid is 32 microns on an edge.



AS&R-1 (H.G.) Polished section photomicrograph of large liberated native gold particle bordered ar bottom by minor and poorly polished goethite. Plain light, X435. Each square of grid is 32 microns on an edge.



AS&R-1 (H.G.). Polished section photomicrograph of liberated native gold with associated fragments of goethite. Plain light, X435. Each square of grid is 32 microns on an edge.

METCON Research Inc.

1844 W. Grant Road, Suite 106
Tucson, Arizona 85745

Tel: (602) 623-1327
Telex 284623 KDE UR

22 March 1990
EI-012-90

ASARCO Inc.
Exploration Department
P.O. Box 5747
Tucson, AZ 85703-0747

ASARCO Incorporated
MAR 26 1990
SW Exploration

Attention: Mr. James D. Sell
Manager

Subject: Preliminary Cyanide Leach Testing on YM-Series Interval Samples

Dear Mr. Sell:

Pursuant to instructions outlined in your letter dated January 31, 1990, the following report details results from metallurgical cyanide leach test work conducted on 24 interval samples (designated YM-series) from Yavapai, Co., Arizona.

1.0 INTRODUCTION

During the third week in February 1990, a suite of 24 interval samples labeled YM-6 through YM-93 were picked up by Metcon Research Inc. at the Skyline Labs Inc. facility in Tucson. A single 72 hour cyanide bottle roll leach test was conducted on each interval sample after crushing to minus 10 mesh. The procedures utilized and the results obtained in this investigation are outlined herein.

2.0 SUMMARY

A 72 hour cyanide bottle roll leaching technique provided gold recovery levels ranging from 59.7 to 88.8 percent on interval samples crushed to minus 10 mesh. In general, the higher grade samples showed consistently higher recoveries.

The average overall recoveries observed were 72.82 and 39.44 percent for gold and silver, respectively. The silver recovery may not be an accurate figure since the silver present in the metallurgical products was near the low detectability limit for silver analysis.

Some variability was observed between the head assays and the calculated head assay figures. In most instances, the calculated heads are higher than the head assays. This phenomenon may be attributed to free fine gold particulate material present in the samples. Since a large amount of sample was utilized for leaching, the probability of free gold being present in the test sample is increased accordingly. The aforementioned assumption is corroborated in part by discrepancies observed between duplicate assay figures appended hereto, particularly for the higher grade samples.

The cyanide and lime consumptions were low. The cyanide consumption averaged 0.22 pounds per ton and lime consumption averaged approximately 2.0 pounds per ton. These reagent consumptions are consistent with observations developed in previous test work conducted on samples from the same project.

3.0 PROCEDURES

The procedures utilized for sample preparation and metallurgical testing are described as follows:

3.1 A suite of samples labeled YM-2 through YM-93 received from Skyline Labs Inc. were weighed and logged in. The samples were crushed to minus 10 mesh, blended and representative samples were split out by Skyline Labs personnel for testing and gold and silver assay.

3.2 A 500 gram portion of each sample was combined with 1000 ml of distilled water and 1.0 gram of lime.

3.3 The slurry was agitated on a bottle roll apparatus until the pH stabilized, then 1.0 gram of sodium cyanide was added. Addition of lime continued throughout the leach period at 24 hour intervals to maintain a pH above 11.0.

3.4 Cyanide leaching was conducted for 72 hours. At the end of leaching, solids and liquids were separated by filtration.

3.5 Cyanide and lime consumptions were determined by titration of the combined filtrate and wash liquors.

3.6 Leached residue and pregnant solution samples were assayed for gold and silver and metallurgical calculations were performed.

4.0 RESULTS AND DISCUSSION

The results obtained from cyanide leach testing of the interval samples are outlined in this section of the report. A brief discussion on these results is presented herein.

The metallurgical data produced from each test was grouped in series of 3 tests. The results are presented in Tables 1 through 8 attached hereto.

The interval samples submitted for testing showed gold head assays ranging from 0.02 to 0.145 ounces of gold per ton of ore. The silver content in most of these samples was less than 0.01 ounces per ton. The highest silver content observed was 0.06 ounces per ton for sample YM-43. Inspection of the duplicate head assay data indicates that there is a good correlation between duplicate assay data at gold grades of 0.04 ounces per ton or lower. The variability between duplicate head assays increased at higher gold contents. This circumstance may indicate the presence of free gold in the samples.

Regardless of the initial head gold content, the residue assays were all in the 0.008 to 0.024 ounces per ton range. The residue assays obtained may indicate the presence of finely disseminated gold in the ore samples tested. Grinding of the ore may be necessary to increase the gold recovery, but the ore grade may not justify the additional size reduction. Further testing is recommended to ascertain the amenability of this ore to gold recovery by a heap leaching technique.

We appreciate the opportunity to work with you on this important project. As always, should you have any questions regarding the information contained in this report please do not hesitate to contact us.

Very truly yours,

Eugenio Iasillo

Eugenio Iasillo
Process Engineer

EI:rs

ASARCO SWED.

TABLE. 1 BOTTLE ROLL LEACH TESTS

SUMMARY OF RESULTS

Products 72 hr.leach	WT/Vol	Assays (OPT) Au	Assays (OPT) Ag	Content Au	Content Ag	% Recovery Au	% Recovery Ag	Consumption of Reagents(lb/ton) NaCN	Consumption of Reagents(lb/ton) CaO
YM - 6									
Preg+Wash	1420	0.014	0.002	0.040	0.01	66.53	36.36	0.31	2.25
Residue	497	0.020	0.010	0.020	0.01	33.47	63.64		
Calc Head	500	0.060	0.016						
AssayHead		0.075	<0.05						
YM - 8									
Preg+Wash	1400	0.020	0.003	0.056	0.01	75.68	45.65	0.14	2.71
Residue	500	0.018	0.010	0.018	0.01	24.32	54.35		
Calc Head	500	0.074	0.018						
AssayHead		0.055	<0.05						
YM - 14									
Preg+Wash	1480	0.014	0.001	0.041	0.00	80.56	22.84	0.46	2.55
Residue	482	0.010	0.010	0.010	0.01	19.44	77.16		
Calc Head	500	0.051	0.013						
Assayhead		0.036	<0.05						
AVERAGE						74.26	34.95	0.30	2.50

TABLE. 2 BOTTLE ROLL LEACH TESTS

SUMMARY OF RESULTS

Products 72 hr.leach	WT/Vol	Assays (OPT) Au	Assays (OPT) Ag	Content Au	Content Ag	% Recovery Au	% Recovery Ag	Consumption of Reagents(lb/ton) NaCN	Consumption of Reagents(lb/ton) CaO
YM - 15									
Preg+Wash	1460	0.010	0.001	0.029	0.00	78.49	22.71	0.21	1.50
Residue	497	0.008	0.010	0.008	0.01	21.51	77.29		
Calc Head	500	0.037	0.013						
AssayHead		0.028	<0.05						
YM - 18									
Preg+Wash	1440	0.022	0.002	0.063	0.01	88.79	36.55	0.11	2.09
Residue	488	0.008	0.010	0.008	0.01	11.21	63.45		
Calc Head	500	0.071	0.016						
AssayHead		0.080	<0.05						
YM - 25									
Preg+Wash	1420	0.015	0.002	0.043	0.01	63.96	36.22	0.37	2.34
Residue	490	0.024	0.010	0.024	0.01	36.04	63.78		
Calc Head	500	0.067	0.016						
Assayhead		0.065	<0.05						
AVERAGE						77.08	31.83	0.23	1.98

ASARCO SWED.

TABLE. 3 BOTTLE ROLL LEACH TESTS

SUMMARY OF RESULTS

Products 72 hr.leach	WT/Vol	Assays (OPT) Au	Assays (OPT) Ag	Content Au	Content Ag	% Recovery Au	% Recovery Ag	Consumption of Reagents(lb/ton) NaCN	Consumption of Reagents(lb/ton) CaO
YM - 33									
Preg+Wash	1480	0.011	0.002	0.033	0.01	59.68	37.61	0.15	2.14
Residue	491	0.022	0.010	0.022	0.01	40.32	62.39		
Calc Head	500	0.055	0.016						
AssayHead		0.050	<0.05						
YM - 40									
Preg+Wash	1460	0.017	0.003	0.050	0.01	67.41	46.70	0.15	2.00
Residue	490	0.024	0.010	0.024	0.01	32.59	53.30		
Calc Head	500	0.074	0.019						
AssayHead		0.060	<0.05						
YM - 43									
Preg+Wash	1440	0.020	0.003	0.058	0.01	87.80	14.73	0.26	2.94
Residue	485	0.008	0.050	0.008	0.05	12.20	85.27		
Calc Head	500	0.066	0.059						
Assayhead		0.055	<0.05						
AVERAGE						71.63	33.01	0.19	2.36

TABLE. 4 BOTTLE ROLL LEACH TESTS

SUMMARY OF RESULTS

Products 72 hr.leach	WT/Vol	Assays (OPT) Au	Assays (OPT) Ag	Content Au	Content Ag	% Recovery Au	% Recovery Ag	Consumption of Reagents(lb/ton) NaCN	Consumption of Reagents(lb/ton) CaO
YM - 47									
Preg+Wash	1420	0.009	0.003	0.026	0.01	71.88	46.00	0.17	2.30
Residue	500	0.010	0.010	0.010	0.01	28.12	54.00		
Calc Head	500	0.036	0.019						
AssayHead		0.020	<0.05						
YM - 48									
Preg+Wash	1440	0.012	0.003	0.035	0.01	77.56	46.35	0.14	2.39
Residue	499	0.010	0.010	0.010	0.01	22.44	53.65		
Calc Head	500	0.045	0.019						
AssayHead		0.036	<0.05						
YM - 49									
Preg+Wash	1480	0.009	0.003	0.027	0.01	68.94	47.03	0.15	2.10
Residue	494	0.012	0.010	0.012	0.01	31.06	52.97		
Calc Head	500	0.039	0.019						
Assayhead		0.034	<0.05						
AVERAGE						72.79	46.46	0.15	2.26

ASARCO SWED.

TABLE. 5 BOTTLE ROLL LEACH TESTS

SUMMARY OF RESULTS

Products 72 hr.leach	WT/Vol	Assays (OPT) Au	Assays (OPT) Ag	Content Au	Content Ag	% Recovery Au	% Recovery Ag	Consumption of Reagents(lb/ton) NaCN	Consumption of Reagents(lb/ton) CaO
YM - 53									
Preg+Wash	1400	0.012	0.002	0.034	0.01	77.06	35.90	0.26	2.33
Residue	500	0.010	0.010	0.010	0.01	22.94	64.10		
Calc Head	500	0.044	0.016						
AssayHead		0.034	<0.05						
YM - 54									
Preg+Wash	1440	0.016	0.002	0.046	0.01	67.69	36.55	0.26	2.28
Residue	498	0.022	0.010	0.022	0.01	32.31	63.45		
Calc Head	500	0.068	0.016						
AssayHead		0.055	<0.05						
YM - 63									
Preg+Wash	1440	0.019	0.003	0.055	0.01	71.32	46.35	0.26	2.22
Residue	498	0.022	0.010	0.022	0.01	28.68	53.65		
Calc Head	500	0.077	0.019						
Assayhead		0.046	<0.05						
AVERAGE						72.02	39.60	0.26	2.28

TABLE. 6 BOTTLE ROLL LEACH TESTS

SUMMARY OF RESULTS

Products 72 hr.leach	WT/Vol	Assays (OPT) Au	Assays (OPT) Ag	Content Au	Content Ag	% Recovery Au	% Recovery Ag	Consumption of Reagents(lb/ton) NaCN	Consumption of Reagents(lb/ton) CaO
YM - 71									
Preg+Wash	1500	0.039	0.004	0.117	0.01	82.98	54.69	0.40	1.58
Residue	497	0.024	0.010	0.024	0.01	17.02	45.31		
Calc Head	500	0.141	0.022						
AssayHead		0.120	<0.05						
YM - 75									
Preg+Wash	1390	0.019	0.003	0.053	0.01	81.49	45.47	0.13	2.64
Residue	420	0.012	0.010	0.012	0.01	18.51	54.53		
Calc Head	500	0.065	0.018						
AssayHead		0.055	<0.05						
YM - 79									
Preg+Wash	1430	0.012	0.002	0.034	0.01	60.94	36.39	0.17	2.06
Residue	500	0.022	0.010	0.022	0.01	39.06	63.61		
Calc Head	500	0.056	0.016						
Assayhead		0.032	<0.05						
AVERAGE						75.13	45.52	0.23	2.09

ASARCO SWED.

TABLE. 7 BOTTLE ROLL LEACH TESTS

SUMMARY OF RESULTS

Products 72 hr.leach	WT/Vol	Assays (OPT) Au	Assays (OPT) Ag	Content Au	Content Ag	% Recovery Au	% Recovery Ag	Consumption of Reagents(lb/ton) NaCN	Consumption of Reagents(lb/ton) CaO
YM - 82									
Preg+Wash	1420	0.012	0.001	0.034	0.00	65.44	22.40	0.17	1.87
Residue	492	0.018	0.010	0.018	0.01	34.56	77.60		
Calc Head	500	0.052	0.013						
AssayHead		0.040	<0.05						
YM - 84									
Preg+Wash	1420	0.018	0.003	0.051	0.01	69.91	46.00	0.30	1.91
Residue	512	0.022	0.010	0.022	0.01	30.09	54.00		
Calc Head	500	0.073	0.019						
AssayHead		0.120	<0.05						
YM - 87									
Preg+Wash	1460	0.015	0.006	0.044	0.02	64.60	63.66	0.20	1.08
Residue	500	0.024	0.010	0.024	0.01	35.40	36.34		
Calc Head	500	0.068	0.028						
Assayhead		0.036	<0.05						
AVERAGE						66.65	44.02	0.22	1.62

TABLE. 8 BOTTLE ROLL LEACH TESTS

SUMMARY OF RESULTS

Products 72 hr.leach	WT/Vol	Assays (OPT) Au	Assays (OPT) Ag	Content Au	Content Ag	% Recovery Au	% Recovery Ag	Consumption of Reagents(lb/ton) NaCN	Consumption of Reagents(lb/ton) CaO
YM -88									
Preg+Wash	1520	0.021	0.003	0.064	0.01	74.37	47.70	0.20	1.26
Residue	500	0.022	0.010	0.022	0.01	25.63	52.30		
Calc Head	500	0.086	0.019						
AssayHead		0.085	<0.05						
YM - 90									
Preg+Wash	1460	0.012	0.002	0.035	0.01	66.06	36.87	0.20	1.36
Residue	505	0.018	0.010	0.018	0.01	33.94	63.13		
Calc Head	500	0.053	0.016						
AssayHead		0.055	<0.05						
YM - 93									
Preg+Wash	1400	0.021	0.002	0.059	0.01	78.61	35.90	0.08	2.54
Residue	500	0.016	0.010	0.016	0.01	21.39	64.10		
Calc Head	500	0.075	0.016						
Assayhead		0.065	<0.05						
AVERAGE						73.01	40.15	0.16	1.72

5.0 APPENDIX

SKYLINE LABS, INC.
1775 W. Sahuaro Dr. • P.O. Box 50106
Tucson, Arizona 85703
(602) 622-4836

REPORT OF ANALYSIS

JOB NO. TAJ 627
March 7, 1990
YM-6 TO YM-93

ASARCO INCORPORATED
Attn: Mr. James D. Sell
Southwestern Exploration
P.O. Box 5747
Tucson, AZ 85703

Analysis of 24 Drill Cutting Samples

ITEM	SAMPLE NO.	FIRE ASSAY Au (oz/t)	FIRE ASSAY Ag (oz/t)	FIRE ASSAY Au (oz/t)	FIRE ASSAY Ag (oz/t)
1	YM-6	.075	<.01	.046	<.01
2	YM-8	.055	<.01	.050	<.01
3	YM-14	.036	<.01	.034	<.01
4	YM-15	.028	<.01	.024	<.01
5	YM-18	.080	<.01	.080	<.01
6	YM-25	.065	<.01	.065	<.01
7	YM-33	.050	<.01	.040	<.01
8	YM-40	.060	<.01	.050	<.01
9	YM-43	.055	.06	.048	.06
10	YM-47	.020	<.01	.022	.02
11	YM-48	.036	<.01	.032	<.01
12	YM-49	.034	<.01	.044	<.01
13	YM-53	.034	<.01	.036	<.01
14	YM-54	.055	<.01	.050	<.01
15	YM-63	.046	.01	.050	<.01
16	YM-71	.120	.01	.145	.03
17	YM-75	.055	<.01	.065	.01
18	YM-79	.032	<.01	.038	<.01
19	YM-82	.040	<.01	.040	<.01
20	YM-84	.120	<.01	.075	<.01
21	YM-87	.036	<.01	.040	<.01
22	YM-88	.085	<.01	.075	<.01
23	YM-90	.055	<.01	.042	<.01
24	YM-93	.065	<.01	.065	<.01

cc: Eugene Salazar

3/8/90

Charles E. Thompson
Arizona Registered Assayer No. 9427

William L. Lehmbeck
Arizona Registered Assayer No. 9425

James A. Martin
Arizona Registered Assayer No. 11122

METCON RESEARCH INC.
1844 West Grant Road., Suite 106
Tucson, Arizona 85745
Phone: (602) 623-1327

BOTTLE ROLL NaCN LEACH TEST

CLIENT: ASARCO

DATE: 03/14/90

TEST No.: 1

PROJECT No: M-206

FEED: YM - 6

CONDUCTED BY: E.I./J.L.

OBJECTIVE: SCOPING TEST GOLD RECOVERY

SAMPLE DESCRIP.	METALL. PRODUCT	ASSAYS (Oz/ton)		CONTENT (mg)		CONTENT (mg)		DISTRIBUTION %		DISTRIBUTION %	
SOLUTIONS	gram/ml	Au	Ag	Au	Ag	Au	Ag	Au	Ag	Au	Ag
.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
	1000										
	1000										
	1000										
24 hrs.	1000	0.000	0.00	0.000	0.00	0.000	0.00	0.00	0.00	0.00	0.00
48 hrs.	1000	0.000	0.00	0.000	0.00	0.000	0.00	0.00	0.00	0.00	0.00
72 hrs.	1420	0.014	0.00	0.682	0.10	0.682	0.10	66.67	36.36	66.67	36.36
Leach Res	497	0.020	0.01	0.341	0.170	0.341	0.170	33.33	63.64	33.33	63.64
Calc.Head	500	0.060	0.02								
HeadAssay		0.075	<0.01								

SAMPLE DESCRIP.	METALL. PRODUCT	NaCN lb/ton	NaCN lb/ton	CaO lb/ton	CaO lb/ton	SOLUTION pH
Preg+Wash	mls	sol.conc.	consump.	sol.conc.	consump.	
.....	.....	.....	.....	.....	.....	.....
2 hrs.	1000	2.00		2.00		11.9
4 hrs.	1000					11.9
8 hrs.	1000					11.9
24 hrs.	1000					11.9
48 hrs.	1000					11.6
72 hrs.	1420	1.30	0.31	0.62	2.25	11.6

METCON RESEARCH INC.
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BOTTLE ROLL NaCN LEACH TEST

CLIENT: ASARCO

DATE: 03/14/90

TEST No.: 2

PROJECT No: M-206

FEED: YM - 8

CONDUCTED BY: E.I./J.L.

OBJECTIVE: SCOPING TEST GOLD RECOVERY

SAMPLE DESCRIP.	METALL. PRODUCT	ASSAYS (Oz/ton)		CONTENT (mg)	(mg)	DISTRIBUTION %	%
SOLUTIONS	gram/ml	Au	Ag	Au	Ag	Au	Ag
.....	.....	.....	.....	.....	.....	.....	.....
	1000						
	1000						
	1000						
24 hrs.	1000	0.000	0.00	0.000	0.00	0.00	0.00
48 hrs.	1000	0.000	0.00	0.000	0.00	0.00	0.00
72 hrs.	1400	0.020	0.00	0.960	0.14	75.68	45.65
Leach Res	500	0.018	0.01	0.309	0.171	24.32	54.35
Calc.Head	500	0.074	0.02				
HeadAssay		0.055	<0.01				

SAMPLE DESCRIP.	METALL. PRODUCT	NaCN lb/ton	NaCN lb/ton	CaO lb/ton	CaO lb/ton	SOLUTION pH
Preg+Wash	mls	sol.conc.	consump.	sol.conc.	consump.	
.....	.....	.....	.....	.....	.....	.....
2 hrs.	1000	2.00		2.00		12.0
4 hrs.	1000					12.0
8 hrs.	1000					12.0
24 hrs.	1000					12.0
48 hrs.	1000					11.7
72 hrs.	1400	1.38	0.14	0.46	2.71	11.6

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BOTTLE ROLL NaCN LEACH TEST

CLIENT: ASARCO

DATE: 03/14/90

TEST No.: 3

PROJECT No: M-206

FEED: YM - 14

CONDUCTED BY: E.I./J.L.

OBJECTIVE: SCOPING TEST GOLD RECOVERY

SAMPLE DESCRIP.	METALL. PRODUCT	ASSAYS (Oz/ton)		CONTENT (mg)	(mg)	DISTRIBUTION %	%
SOLUTIONS	gram/ml	Au	Ag	Au	Ag	Au	Ag
.....	.....	.....	.....	.....	.....	.....	.....
	1000						
	1000						
	1000						
24 hrs.	1000	0.000	0.00	0.000	0.00	0.00	0.00
48 hrs.	1000	0.000	0.00	0.000	0.00	0.00	0.00
72 hrs.	1480	0.014	0.00	0.710	0.05	81.13	23.49
Leach Res	482	0.010	0.01	0.165	0.165	18.87	76.51
Calc.Head	500	0.051	0.01				
HeadAssay		0.036	<0.01				

SAMPLE DESCRIP.	METALL. PRODUCT	NaCN lb/ton	NaCN lb/ton	CaO lb/ton	CaO lb/ton	SOLUTION pH
Preg+Wash	mls	sol.conc.	consump.	sol.conc.	consump.	
.....	.....	.....	.....	.....	.....	.....
2 hrs.	1000	2.00		2.00		12.1
4 hrs.	1000					12.1
8 hrs.	1000					12.1
24 hrs.	1000					11.8
48 hrs.	1000					11.8
72 hrs.	1480	1.20	0.46	0.52	2.55	11.7

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BOTTLE ROLL NaCN LEACH TEST

CLIENT: ASARCO

DATE: 03/14/90

TEST No.: 4

PROJECT No: M-206

FEED: YM - 15

CONDUCTED BY: E.I./J.L.

OBJECTIVE: SCOPING TEST GOLD RECOVERY

SAMPLE DESCRIP.	METALL. PRODUCT	ASSAYS (Oz/ton)		CONTENT (mg)		CONTENT (mg)		DISTRIBUTION %		DISTRIBUTION %	
SOLUTIONS	gram/ml	Au	Ag	Au	Ag	Au	Ag	Au	Ag	Au	Ag
.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
	1000										
	1000										
	1000										
24 hrs.	1000	0.000	0.00	0.000	0.00	0.00	0.00	0.00	0.00	0.00	0.00
48 hrs.	1000	0.000	0.00	0.000	0.00	0.00	0.00	0.00	0.00	0.00	0.00
72 hrs.	1460	0.010	0.00	0.501	0.05	0.00	0.00	78.60	22.71	78.60	22.71
Leach Res	497	0.008	0.01	0.136	0.170	0.00	0.00	21.40	77.29	21.40	77.29
Calc.Head	500	0.037	0.01								
HeadAssay		0.028	<0.01								

SAMPLE DESCRIP.	METALL. PRODUCT	NaCN lb/ton	NaCN lb/ton	CaO lb/ton	CaO lb/ton	SOLUTION pH
Preg+Wash	mls	sol.conc.	consump.	sol.conc.	consump.	
.....	.....	.....	.....	.....	.....	.....
2 hrs.	1000	2.00		2.00		12.0
4 hrs.	1000					12.0
8 hrs.	1000					12.0
24 hrs.	1000					12.0
48 hrs.	1000					11.9
72 hrs.	1460	1.30	0.21	0.86	1.50	11.7

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BOTTLE ROLL NaCN LEACH TEST

CLIENT: ASARCO

DATE: 03/14/90

TEST No.: 5

PROJECT No: M-206

FEED: YM - 18

CONDUCTED BY: E.I./J.L.

OBJECTIVE: SCOPING TEST GOLD RECOVERY

SAMPLE DESCRIP.	METALL. PRODUCT	ASSAYS (Oz/ton)		CONTENT (mg)		DISTRIBUTION %	
SOLUTIONS	gram/ml	Au	Ag	Au	Ag	Au	Ag
.....	.....	.....	.....	.....	.....	.....	.....
	1000						
	1000						
	1000						
24 hrs.	1000	0.000	0.00	0.000	0.00	0.00	0.00
48 hrs.	1000	0.000	0.00	0.000	0.00	0.00	0.00
72 hrs.	1440	0.022	0.00	1.086	0.10	89.03	37.11
Leach Res	488	0.008	0.01	0.134	0.167	10.97	62.89
Calc.Head	500	0.071	0.02				
HeadAssay		0.080	<0.01				

SAMPLE DESCRIP.	METALL. PRODUCT	NaCN lb/ton	NaCN lb/ton	CaO lb/ton	CaO lb/ton	SOLUTION pH
Preg+Wash	mls	sol.conc.	consump.	sol.conc.	consump.	
.....	.....	.....	.....	.....	.....	.....
2 hrs.	1000	2.00		2.00		12.0
4 hrs.	1000					12.0
8 hrs.	1000					12.0
24 hrs.	1000					12.0
48 hrs.	1000					11.8
72 hrs.	1440	1.35	0.11	0.68	2.09	11.6

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BOTTLE ROLL NaCN LEACH TEST

CLIENT: ASARCO

DATE: 03/14/90

TEST No.: 6

PROJECT No: M-206

FEED: YM - 25

CONDUCTED BY: E.I./J.L.

OBJECTIVE: SCOPING TEST GOLD RECOVERY

SAMPLE DESCRIP.	METALL. PRODUCT	ASSAYS (Oz/ton)		CONTENT (mg)		DISTRIBUTION %	
SOLUTIONS	gram/ml	Au	Ag	Au	Ag	Au	Ag
	1000						
	1000						
	1000						
24 hrs.	1000	0.000	0.00	0.000	0.00	0.00	0.00
48 hrs.	1000	0.000	0.00	0.000	0.00	0.00	0.00
72 hrs.	1420	0.015	0.00	0.730	0.10	64.43	36.69
Leach Res	490	0.024	0.01	0.403	0.168	35.57	63.31
Calc.Head	500	0.066	0.02				
HeadAssay		0.065	<0.01				

SAMPLE DESCRIP.	METALL. PRODUCT	NaCN lb/ton	NaCN lb/ton	CaO lb/ton	CaO lb/ton	SOLUTION pH
Preg+Wash	mls	sol.conc.	consump.	sol.conc.	consump.	
2 hrs.	1000	2.00		2.00		12.0
4 hrs.	1000					12.0
8 hrs.	1000					12.0
24 hrs.	1000					12.0
48 hrs.	1000					11.8
72 hrs.	1420	1.28	0.37	0.60	2.34	11.7

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BOTTLE ROLL NaCN LEACH TEST

CLIENT: ASARCO

DATE: 03/14/90

TEST No.: 7

PROJECT No: M-206

FEED: YM - 33

CONDUCTED BY: E.I./J.L.

OBJECTIVE: SCOPING TEST GOLD RECOVERY

SAMPLE DESCRIP.	METALL. PRODUCT	ASSAYS (Oz/ton)		CONTENT (mg)		DISTRIBUTION %	
SOLUTIONS	gram/ml	Au	Ag	Au	Ag	Au	Ag
.....	.....	.....	.....	.....	.....	.....	.....
	1000						
	1000						
	1000						
24 hrs.	1000	0.000	0.00	0.000	0.00	0.00	0.00
48 hrs.	1000	0.000	0.00	0.000	0.00	0.00	0.00
72 hrs.	1480	0.011	0.00	0.558	0.10	60.11	37.61
Leach Res	491	0.022	0.01	0.370	0.168	39.89	62.39
Calc.Head	500	0.054	0.02				
HeadAssay		0.050	<0.01				

SAMPLE DESCRIP.	METALL. PRODUCT	NaCN lb/ton	NaCN lb/ton	CaO lb/ton	CaO lb/ton	SOLUTION pH
Preg+Wash	mls	sol.conc.	consump.	sol.conc.	consump.	
.....	.....	.....	.....	.....	.....	.....
2 hrs.	1000	2.00		2.00		12.0
4 hrs.	1000					12.0
8 hrs.	1000					12.0
24 hrs.	1000					12.0
48 hrs.	1000					11.8
72 hrs.	1480	1.30	0.15	0.64	2.14	11.6

METCON RESEARCH INC.
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BOTTLE ROLL NaCN LEACH TEST

CLIENT: ASARCO

DATE: 08/14/90

TEST No.: 8

PROJECT No: M-206

FEED: YM - 40

CONDUCTED BY: E.I./J.L.

OBJECTIVE: SCOPING TEST GOLD RECOVERY

SAMPLE DESCRIP.	METALL. PRODUCT	ASSAYS (Oz/ton)		CONTENT (mg)		CONTENT (mg)		DISTRIBUTION %		DISTRIBUTION %	
SOLUTIONS	gram/ml	Au	Ag	Au		Ag		Au		Ag	
.....	.....	.....	.....	.....		.....		.....		.....	
	1000										
	1000										
	1000										
24 hrs.	1000	0.000	0.00	0.000		0.00		0.00		0.00	
48 hrs.	1000	0.000	0.00	0.000		0.00		0.00		0.00	
72 hrs.	1460	0.017	0.00	0.851		0.15		67.85		47.20	
Leach Res	490	0.024	0.01	0.403		0.168		32.15		52.80	
Calc.Head	500	0.073	0.02								
HeadAssay		0.060	<0.01								

SAMPLE DESCRIP.	METALL. PRODUCT	NaCN lb/ton	NaCN lb/ton	CaO lb/ton	CaO lb/ton	SOLUTION pH
Preg+Wash	mls	sol.conc.	consump.	sol.conc.	consump.	
.....	.....	.....	.....	.....	.....	.....
2 hrs.	1000	2.00		2.00		12.0
4 hrs.	1000					12.0
8 hrs.	1000					12.0
24 hrs.	1000					12.0
48 hrs.	1000					11.8
72 hrs.	1460	1.32	0.15	0.70	2.00	11.7

METCON RESEARCH INC.
1844 West Grant Road., Suite 106
Tucson, Arizona 85745
Phone: (602) 623-1327

BOTTLE ROLL NaCN LEACH TEST

CLIENT: ASARCO

DATE: 03/14/90

TEST No.: 9

PROJECT No: M-206

FEED: YM - 43

CONDUCTED BY: E.I./J.L.

OBJECTIVE: SCOPING TEST GOLD RECOVERY

SAMPLE DESCRIP.	METALL. PRODUCT	ASSAYS (Oz/ton)		CONTENT (mg)		DISTRIBUTION %	
SOLUTIONS	gram/ml	Au	Ag	Au	Ag	Au	Ag
.....	.....	.....	.....	.....	.....	.....	.....
	1000						
	1000						
	1000						
24 hrs.	1000	0.000	0.00	0.000	0.00	0.00	0.00
48 hrs.	1000	0.000	0.00	0.000	0.00	0.00	0.00
72 hrs.	1440	0.020	0.00	0.987	0.15	88.13	15.12
Leach Res	485	0.008	0.05	0.133	0.831	11.87	84.88
Calc.Head	500	0.065	0.06				
HeadAssay		0.055	0.06				

SAMPLE DESCRIP.	METALL. PRODUCT	NaCN lb/ton	NaCN lb/ton	CaO lb/ton	CaO lb/ton	SOLUTION pH
Preg+Wash	mls	sol.conc.	consump.	sol.conc.	consump.	
.....	.....	.....	.....	.....	.....	.....
2 hrs.	1000	2.00		2.00		12.0
4 hrs.	1000					12.0
8 hrs.	1000					12.0
24 hrs.	1000					12.0
48 hrs.	1000					11.9
72 hrs.	1440	1.30	0.26	0.40	2.94	11.5

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BOTTLE ROLL NaCN LEACH TEST

CLIENT: ASARCO
DATE: 03/14/90
TEST No.: 10
PROJECT No: M-206
FEED: YM - 47
CONDUCTED BY: E.I./J.L.
OBJECTIVE: SCOPING TEST GOLD RECOVERY

SAMPLE DESCRIP.	METALL. PRODUCT	ASSAYS (Oz/ton)		CONTENT (mg)		DISTRIBUTION %	
SOLUTIONS	gram/ml	Au	Ag	Au	Ag	Au	Ag
	1000						
	1000						
	1000						
24 hrs.	1000	0.000	0.00	0.000	0.00	0.00	0.00
48 hrs.	1000	0.000	0.00	0.000	0.00	0.00	0.00
72 hrs.	1420	0.009	0.00	0.438	0.15	71.88	46.00
Leach Res	500	0.010	0.01	0.171	0.171	28.12	54.00
Calc.Head	500	0.036	0.02				
HeadAssay		0.020	0.01				

SAMPLE DESCRIP.	METALL. PRODUCT	NaCN lb/ton	NaCN lb/ton	CaO lb/ton	CaO lb/ton	SOLUTION pH
Preg+Wash	mls	sol.conc.	consump.	sol.conc.	consump.	
2 hrs.	1000	2.00		2.00		12.0
4 hrs.	1000					12.0
8 hrs.	1000					12.0
24 hrs.	1000					12.0
48 hrs.	1000					11.9
72 hrs.	1420	1.35	0.17	0.60	2.30	11.6

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BOTTLE ROLL NaCN LEACH TEST

CLIENT: ASARCO
DATE: 03/14/90
TEST No.: 11
PROJECT No: M-206
FEED: YM - 48
CONDUCTED BY: E.I./J.L.
OBJECTIVE: SCOPING TEST GOLD RECOVERY

SAMPLE DESCRIP.	METALL. PRODUCT	ASSAYS (Oz/ton)		CONTENT (mg)		CONTENT (mg)		DISTRIBUTION %		DISTRIBUTION %	
SOLUTIONS	gram/ml	Au	Ag	Au	Ag	Au	Ag	Au	Ag	Au	Ag
.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
	1000										
	1000										
	1000										
24 hrs.	1000	0.000	0.00	0.000	0.00	0.000	0.00	0.00	0.00	0.00	0.00
48 hrs.	1000	0.000	0.00	0.000	0.00	0.000	0.00	0.00	0.00	0.00	0.00
72 hrs.	1440	0.012	0.00	0.592	0.15	0.592	0.15	77.59	46.40	77.59	46.40
Leach Res	499	0.010	0.01	0.171	0.171	0.171	0.171	22.41	53.60	22.41	53.60
Calc.Head	500	0.045	0.02								
HeadAssay		0.036	0.01								

SAMPLE DESCRIP.	METALL. PRODUCT	NaCN lb/ton	NaCN lb/ton	CaO lb/ton	CaO lb/ton	SOLUTION pH
Preg+Wash	mls	sol.conc.	consump.	sol.conc.	consump.	
.....	.....	.....	.....	.....	.....	.....
2 hrs.	1000	2.00		2.00		12.0
4 hrs.	1000					12.0
8 hrs.	1000					12.0
24 hrs.	1000					12.0
48 hrs.	1000					11.9
72 hrs.	1440	1.34	0.14	0.56	2.39	11.6

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BOTTLE ROLL NaCN LEACH TEST

CLIENT: ASARCO

DATE: 02/14/90

TEST No.: 12

PROJECT No: M-206

FEED: YM - 49

CONDUCTED BY: E.I./J.L.

OBJECTIVE: SCOPING TEST GOLD RECOVERY

SAMPLE DESCRIP.	METALL. PRODUCT	ASSAYS (Oz/ton)		CONTENT (mg)		CONTENT (mg)		DISTRIBUTION %		DISTRIBUTION %	
SOLUTIONS	gram/ml	Au	Ag	Au		Ag		Au		Ag	
.....	.....	.....	.....	.....		.....		.....		.....	
	1000										
	1000										
	1000										
24 hrs.	1000	0.000	0.00	0.000		0.00		0.00		0.00	
48 hrs.	1000	0.000	0.00	0.000		0.00		0.00		0.00	
72 hrs.	1480	0.009	0.00	0.457		0.15		69.20		47.33	
Leach Res	494	0.012	0.01	0.203		0.169		30.80		52.67	
Calc.Head	500	0.038	0.02								
HeadAssay		0.034	0.01								

SAMPLE DESCRIP.	METALL. PRODUCT	NaCN lb/ton	NaCN lb/ton	CaO lb/ton	CaO lb/ton	SOLUTION pH
Preg+Wash	mls	sol.conc.	consump.	sol.conc.	consump.	
.....	.....	.....	.....	.....	.....	.....
2 hrs.	1000	2.00		2.00		12.0
4 hrs.	1000					12.0
8 hrs.	1000					12.0
24 hrs.	1000					12.0
48 hrs.	1000					11.9
72 hrs.	1480	1.30	0.15	0.65	2.10	11.6

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BOTTLE ROLL NaCN LEACH TEST

CLIENT: ASARCO

DATE: 03/14/90

TEST No.: 13

PROJECT No: M-206

FEED: YM - 53

CONDUCTED BY: E.I./J.L.

OBJECTIVE: SCOPING TEST GOLD RECOVERY

SAMPLE DESCRIP.	METALL. PRODUCT	ASSAYS (Oz/ton)		CONTENT (mg)		DISTRIBUTION %	
SOLUTIONS	gram/ml	Au	Ag	Au	Ag	Au	Ag
.....	.....	.....	.....	.....	.....	.....	.....
	1000						
	1000						
	1000						
24 hrs.	1000	0.000	0.00	0.000	0.00	0.00	0.00
48 hrs.	1000	0.000	0.00	0.000	0.00	0.00	0.00
72 hrs.	1440	0.012	0.00	0.592	0.10	77.56	36.55
Leach Res	500	0.010	0.01	0.171	0.171	22.44	63.45
Calc.Head	500	0.045	0.02				
HeadAssay		0.034	0.01				

SAMPLE DESCRIP.	METALL. PRODUCT	NaCN lb/ton	NaCN lb/ton	CaO lb/ton	CaO lb/ton	SOLUTION pH
Preg+Wash	mls	sol.conc.	consump.	sol.conc.	consump.	
.....	.....	.....	.....	.....	.....	.....
2 hrs.	1000	2.00		2.00		12.0
4 hrs.	1000					12.0
8 hrs.	1000					12.0
24 hrs.	1000					12.0
48 hrs.	1000					11.9
72 hrs.	1440	1.30	0.26	0.58	2.33	11.6

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BOTTLE ROLL NaCN LEACH TEST

CLIENT: ASARCO

DATE: 03/14/90

TEST No.: 14

PROJECT No: M-206

FEED: YM - 54

CONDUCTED BY: E.I./J.L.

OBJECTIVE: SCOPING TEST GOLD RECOVERY

SAMPLE DESCRIP.	METALL. PRODUCT	ASSAYS (Oz/ton)		CONTENT (mg)		CONTENT (mg)		DISTRIBUTION %		DISTRIBUTION %	
SOLUTIONS	gram/ml	Au	Ag	Au	Ag	Au	Ag	Au	Ag	Au	Ag
.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
	1000										
	1000										
	1000										
24 hrs.	1000	0.000	0.00	0.000	0.00	0.00	0.00	0.00	0.00	0.00	0.00
48 hrs.	1000	0.000	0.00	0.000	0.00	0.00	0.00	0.00	0.00	0.00	0.00
72 hrs.	1440	0.016	0.00	0.790	0.10	0.10	0.10	67.77	36.64	67.77	36.64
Leach Res	498	0.022	0.01	0.376	0.171	0.171	0.171	32.23	63.36	32.23	63.36
Calc.Head	500	0.068	0.02								
HeadAssay		0.055	0.01								

SAMPLE DESCRIP.	METALL. PRODUCT	NaCN lb/ton	NaCN lb/ton	CaO lb/ton	CaO lb/ton	SOLUTION pH
Preg+Wash	mls	sol.conc.	consump.	sol.conc.	consump.	
.....	.....	.....	.....	.....	.....	.....
2 hrs.	1000	2.00		2.00		12.0
4 hrs.	1000					12.0
8 hrs.	1000					12.0
24 hrs.	1000					12.0
48 hrs.	1000					11.9
72 hrs.	1440	1.30	0.26	0.60	2.28	11.6

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BOTTLE ROLL NaCN LEACH TEST

CLIENT: ASARCO

DATE: 03/20/90

TEST No.: 15

PROJECT No: M-206

FEED: YM - 63

CONDUCTED BY: E.I./J.L.

OBJECTIVE: SCOPING TEST GOLD RECOVERY

SAMPLE DESCRIP.	METALL. PRODUCT	ASSAYS (Oz/ton)		CONTENT (mg)	(mg)	DISTRIBUTION %	%
SOLUTIONS	gram/ml	Au	Ag	Au	Ag	Au	Ag
.....	.....	.....	.....	.....	.....	.....	.....
	1000						
	1000						
	1000						
24 hrs.	1000	0.000	0.00	0.000	0.00	0.00	0.00
48 hrs.	1000	0.000	0.00	0.000	0.00	0.00	0.00
72 hrs.	1440	0.019	0.00	0.938	0.15	71.41	46.45
Leach Res	498	0.022	0.01	0.376	0.171	28.59	53.55
Calc.Head	500	0.077	0.02				
HeadAssay		0.046	0.01				

SAMPLE DESCRIP.	METALL. PRODUCT	NaCN lb/ton	NaCN lb/ton	CaO lb/ton	CaO lb/ton	SOLUTION pH
Preg+Wash	mls	sol.conc.	consump.	sol.conc.	consump.	
.....	.....	.....	.....	.....	.....	.....
2 hrs.	1000	2.00		2.00		12.0
4 hrs.	1000					12.0
8 hrs.	1000					12.0
24 hrs.	1000					12.0
48 hrs.	1000					11.9
72 hrs.	1440	1.30	0.26	0.62	2.22	11.6

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BOTTLE ROLL NaCN LEACH TEST

CLIENT: ASARCO

DATE: 03/20/90

TEST No.: 16

PROJECT No: M-206

FEED: YM - 71

CONDUCTED BY: E.I./J.L.

OBJECTIVE: SCOPING TEST GOLD RECOVERY

SAMPLE DESCRIP.	METALL. PRODUCT	ASSAYS (Oz/ton)		CONTENT (mg)		CONTENT (mg)		DISTRIBUTION %		DISTRIBUTION %	
SOLUTIONS	gram/ml	Au	Ag	Au	Ag	Au	Ag	Au	Ag	Au	Ag
.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
	1000										
	1000										
	1000										
24 hrs.	1000	0.000	0.00	0.000	0.00	0.000	0.00	0.00	0.00	0.00	0.00
48 hrs.	1000	0.000	0.00	0.000	0.00	0.000	0.00	0.00	0.00	0.00	0.00
72 hrs.	1500	0.039	0.00	2.006	0.21	2.006	0.21	83.06	54.69	83.06	54.69
Leach Res	497	0.024	0.01	0.409	0.170	0.409	0.170	16.94	45.31	16.94	45.31
Calc.Head	500	0.141	0.02								
HeadAssay		0.120	0.01								

SAMPLE DESCRIP.	METALL. PRODUCT	NaCN lb/ton	NaCN lb/ton	CaO lb/ton	CaO lb/ton	SOLUTION pH
Preg+Wash	mls	sol.conc.	consump.	sol.conc.	consump.	
.....	.....	.....	.....	.....	.....	.....
2 hrs.	1000	2.00		2.00		12.0
4 hrs.	1000					12.0
8 hrs.	1000					12.0
24 hrs.	1000					12.0
48 hrs.	1000					11.9
72 hrs.	1500	1.20	0.40	0.81	1.58	11.6

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BOTTLE ROLL NaCN LEACH TEST

CLIENT: ASARCO

DATE: 03/20/90

TEST No.: 17

PROJECT No: M-206

FEED: YM - 75

CONDUCTED BY: E.I./J.L.

OBJECTIVE: SCOPING TEST GOLD RECOVERY

SAMPLE DESCRIP.	METALL. PRODUCT	ASSAYS (Oz/ton)		CONTENT (mg)		CONTENT (mg)		DISTRIBUTION %		DISTRIBUTION %	
SOLUTIONS	gram/ml	Au	Ag	Au		Ag		Au		Ag	
.....	.....	.....	.....	.....		.....		.....		.....	
	1000										
	1000										
	1000										
24 hrs.	1000	0.000	0.00	0.000		0.00		0.00		0.00	
48 hrs.	1000	0.000	0.00	0.000		0.00		0.00		0.00	
72 hrs.	1390	0.019	0.00	0.905		0.14		83.97		49.82	
Leach Res	420	0.012	0.01	0.173		0.144		16.03		50.18	
Calc.Head	500	0.063	0.02								
HeadAssay		0.055	0.01								

SAMPLE DESCRIP.	METALL. PRODUCT	NaCN lb/ton	NaCN lb/ton	CaO lb/ton	CaO lb/ton	SOLUTION pH
Preg+Wash	mls	sol.conc.	consump.	sol.conc.	consump.	
.....	.....	.....	.....	.....	.....	.....
2 hrs.	1000	2.00		2.00		11.9
4 hrs.	1000					11.9
8 hrs.	1000					11.9
24 hrs.	1000					11.9
48 hrs.	1000					11.6
72 hrs.	1390	1.40	0.13	0.64	2.64	11.6

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BOTTLE ROLL NaCN LEACH TEST

CLIENT: ASARCO

DATE: 03/20/90

TEST No.: 18

PROJECT No: M-206

FEED: YM - 79

CONDUCTED BY: E.I./J.L.

OBJECTIVE: SCOPING TEST GOLD RECOVERY

SAMPLE DESCRIP.	METALL. PRODUCT	ASSAYS (Oz/ton)		CONTENT (mg)		CONTENT (mg)		DISTRIBUTION %		DISTRIBUTION %	
SOLUTIONS	gram/ml	Au	Ag	Au		Ag		Au		Ag	
.....	.....	.....	.....	.....		.....		.....		.....	
	1000										
	1000										
	1000										
24 hrs.	1000	0.000	0.00	0.000		0.00		0.00		0.00	
48 hrs.	1000	0.000	0.00	0.000		0.00		0.00		0.00	
72 hrs.	1430	0.012	0.00	0.588		0.10		60.94		36.39	
Leach Res	500	0.022	0.01	0.377		0.171		39.06		63.61	
Calc.Head	500	0.056	0.02								
HeadAssay		0.032	0.01								

SAMPLE DESCRIP.	METALL. PRODUCT	NaCN lb/ton	NaCN lb/ton	CaO lb/ton	CaO lb/ton	SOLUTION pH
Preg+Wash	mls	sol.conc.	consump.	sol.conc.	consump.	
.....	.....	.....	.....	.....	.....	.....
2 hrs.	1000	2.00		2.00		11.9
4 hrs.	1000					11.9
8 hrs.	1000					11.9
24 hrs.	1000					11.9
48 hrs.	1000					11.6
72 hrs.	1430	1.34	0.17	0.68	2.06	11.6

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BOTTLE ROLL NaCN LEACH TEST

CLIENT: ASARCO
DATE: 03/20/90
TEST No.: 19
PROJECT No: M-206
FEED: YM - 82
CONDUCTED BY: E.I./J.L.
OBJECTIVE: SCOPING TEST GOLD RECOVERY

SAMPLE DESCRIP.	METALL. PRODUCT	ASSAYS (Oz/ton)		CONTENT (mg)		CONTENT (mg)		DISTRIBUTION %		DISTRIBUTION %	
SOLUTIONS	gram/ml	Au	Ag	Au	Ag	Au	Ag	Au	Ag	Au	Ag
	1000										
	1000										
	1000										
24 hrs.	1000	0.000	0.00	0.000	0.00	0.00	0.00	0.00	0.00	0.00	0.00
48 hrs.	1000	0.000	0.00	0.000	0.00	0.00	0.00	0.00	0.00	0.00	0.00
72 hrs.	1420	0.012	0.00	0.584	0.05	0.05	0.05	65.80	22.40	65.80	22.40
Leach Res	492	0.018	0.01	0.304	0.169	0.169	0.169	34.20	77.60	34.20	77.60
Calc.Head	500	0.052	0.01								
HeadAssay		0.040	0.01								

SAMPLE DESCRIP.	METALL. PRODUCT	NaCN lb/ton	NaCN lb/ton	CaO lb/ton	CaO lb/ton	SOLUTION pH
Preg+Wash	mls	sol.conc.	consump.	sol.conc.	consump.	
2 hrs.	1000	2.00		2.00		11.9
4 hrs.	1000					11.9
8 hrs.	1000					11.9
24 hrs.	1000					11.9
48 hrs.	1000					11.6
72 hrs.	1420	1.35	0.17	0.76	1.87	11.6

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BOTTLE ROLL NaCN LEACH TEST

CLIENT: ASARCO
DATE: 03/20/90
TEST No.: 20
PROJECT No: M-206
FEED: YM - 84
CONDUCTED BY: E.I./J.L.
OBJECTIVE: SCOPING TEST GOLD RECOVERY

SAMPLE DESCRIP.	METALL. PRODUCT	ASSAYS (Oz/ton)		CONTENT (mg)	CONTENT (mg)	DISTRIBUTION %	DISTRIBUTION %
SOLUTIONS	gram/ml	Au	Ag	Au	Ag	Au	Ag
.....	.....	.....	.....	.....	.....	.....	.....
	1000						
	1000						
	1000						
24 hrs.	1000	0.000	0.00	0.000	0.00	0.00	0.00
48 hrs.	1000	0.000	0.00	0.000	0.00	0.00	0.00
72 hrs.	1420	0.018	0.00	0.876	0.15	69.41	45.42
Leach Res	512	0.022	0.01	0.386	0.176	30.59	54.58
Calc.Head	500	0.074	0.02				
HeadAssay		0.120	0.01				

SAMPLE DESCRIP.	METALL. PRODUCT	NaCN lb/ton	NaCN lb/ton	CaO lb/ton	CaO lb/ton	SOLUTION pH
Preg+Wash	mls	sol.conc.	consump.	sol.conc.	consump.	
.....	.....	.....	.....	.....	.....	.....
2 hrs.	1000	2.00		2.00		11.9
4 hrs.	1000					11.9
8 hrs.	1000					11.9
24 hrs.	1000					11.9
48 hrs.	1000					11.6
72 hrs.	1420	1.30	0.30	0.72	1.91	11.6

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BOTTLE ROLL NaCN LEACH TEST

CLIENT: ASARCO

DATE: 03/20/90

TEST No.: 21

PROJECT No: M-206

FEED: YM - 87

CONDUCTED BY: E.I./J.L.

OBJECTIVE: SCOPING TEST GOLD RECOVERY

SAMPLE DESCRIP.	METALL. PRODUCT	ASSAYS (Oz/ton)		CONTENT (mg)		CONTENT (mg)		DISTRIBUTION %		DISTRIBUTION %	
SOLUTIONS	gram/ml	Au	Ag	Au		Ag		Au		Ag	
.....	.....	.....	.....	.....		.....		.....		.....	
	1000										
	1000										
	1000										
24 hrs.	1000	0.000	0.00	0.000		0.00		0.00		0.00	
48 hrs.	1000	0.000	0.00	0.000		0.00		0.00		0.00	
72 hrs.	1460	0.015	0.01	0.751		0.30		64.60		63.66	
Leach Res	500	0.024	0.01	0.411		0.171		35.40		36.34	
Calc.Head	500	0.068	0.03								
HeadAssay		0.036	0.01								

SAMPLE DESCRIP.	METALL. PRODUCT	NaCN lb/ton	NaCN lb/ton	CaO lb/ton	CaO lb/ton	SOLUTION pH
Preg+Wash	mls	sol.conc.	consump.	sol.conc.	consump.	
.....	.....	.....	.....	.....	.....	.....
2 hrs.	1000	2.00		2.00		11.9
4 hrs.	1000					11.9
8 hrs.	1000					11.9
24 hrs.	1000					11.9
48 hrs.	1000					11.6
72 hrs.	1460	1.30	0.20	1.00	1.08	11.6

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BOTTLE ROLL NaCN LEACH TEST

CLIENT: ASARCO

DATE: 03/20/90

TEST No.: 22

PROJECT No: M-206

FEED: YM - 88

CONDUCTED BY: E.I./J.L.

OBJECTIVE: SCOPING TEST GOLD RECOVERY

SAMPLE DESCRIP.	METALL. PRODUCT	ASSAYS (Oz/ton)		CONTENT (mg)		CONTENT (mg)		DISTRIBUTION %		DISTRIBUTION %	
SOLUTIONS	gram/ml	Au	Ag	Au	Ag	Au	Ag	Au	Ag	Au	Ag
.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
	1000										
	1000										
	1000										
24 hrs.	1000	0.000	0.00	0.000	0.00	0.000	0.00	0.00	0.00	0.00	0.00
48 hrs.	1000	0.000	0.00	0.000	0.00	0.000	0.00	0.00	0.00	0.00	0.00
72 hrs.	1520	0.021	0.00	1.094	0.16	1.094	0.16	74.37	47.70	74.37	47.70
Leach Res	500	0.022	0.01	0.377	0.171	0.377	0.171	25.63	52.30	25.63	52.30
Calc.Head	500	0.086	0.02								
HeadAssay		0.085	0.01								

SAMPLE DESCRIP.	METALL. PRODUCT	NaCN lb/ton	NaCN lb/ton	CaO lb/ton	CaO lb/ton	SOLUTION pH
Preg+Wash	mls	sol.conc.	consump.	sol.conc.	consump.	
.....	.....	.....	.....	.....	.....	.....
2 hrs.	1000	2.00		2.00		11.9
4 hrs.	1000					11.9
8 hrs.	1000					11.9
24 hrs.	1000					11.9
48 hrs.	1000					11.6
72 hrs.	1520	1.25	0.20	0.90	1.26	11.6

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BOTTLE ROLL NaCN LEACH TEST

CLIENT: ASARCO

DATE: 03/20/90

TEST No.: 23

PROJECT No: M-206

FEED: YM - 90

CONDUCTED BY: E.I./J.L.

OBJECTIVE: SCOPING TEST GOLD RECOVERY

SAMPLE DESCRIP.	METALL. PRODUCT	ASSAYS (Oz/ton)		CONTENT (mg)		CONTENT (mg)		DISTRIBUTION %		DISTRIBUTION %	
SOLUTIONS	gram/ml	Au	Ag	Au		Ag		Au		Ag	
.....	.....	.....	.....	.....		.....		.....		.....	
	1000										
	1000										
	1000										
24 hrs.	1000	0.000	0.00	0.000		0.00		0.00		0.00	
48 hrs.	1000	0.000	0.00	0.000		0.00		0.00		0.00	
72 hrs.	1460	0.012	0.00	0.601		0.10		65.84		36.64	
Leach Res	505	0.018	0.01	0.312		0.173		34.16		63.36	
Calc.Head	500	0.053	0.02								
HeadAssay		0.055	0.01								

SAMPLE DESCRIP.	METALL. PRODUCT	NaCN lb/ton	NaCN lb/ton	CaO lb/ton	CaO lb/ton	SOLUTION pH
Preg+Wash	mls	sol.conc.	consump.	sol.conc.	consump.	
.....	.....	.....	.....	.....	.....	.....
2 hrs.	1000	2.00		2.00		11.9
4 hrs.	1000					11.9
8 hrs.	1000					11.9
24 hrs.	1000					11.9
48 hrs.	1000					11.6
72 hrs.	1460	1.30	0.20	0.90	1.36	11.6

METCON RESEARCH INC.
1844 West Grant Road., Suite 106
Tucson, Arizona 85745
Phone: (602) 623-1327

BOTTLE ROLL NaCN LEACH TEST

CLIENT: ASARCO

DATE: 03/20/90

TEST No.: 24

PROJECT No: M-206

FEED: YM - 93

CONDUCTED BY: E.I./J.L.

OBJECTIVE: SCOPING TEST GOLD RECOVERY

SAMPLE DESCRIP.	METALL. PRODUCT	ASSAYS (Oz/ton)		CONTENT (mg)		DISTRIBUTION %	
SOLUTIONS	gram/ml	Au	Ag	Au	Ag	Au	Ag
	1000						
	1000						
	1000						
24 hrs.	1000	0.000	0.00	0.000	0.00	0.00	0.00
48 hrs.	1000	0.000	0.00	0.000	0.00	0.00	0.00
72 hrs.	1400	0.021	0.00	1.008	0.10	78.61	35.90
Leach Res	500	0.016	0.01	0.274	0.171	21.39	64.10
Calc.Head	500	0.075	0.02				
HeadAssay		0.065	0.01				

SAMPLE DESCRIP.	METALL. PRODUCT	NaCN lb/ton	NaCN lb/ton	CaO lb/ton	CaO lb/ton	SOLUTION pH
Preg+Wash	mls	sol.conc.	consump.	sol.conc.	consump.	
2 hrs.	1000	2.00		2.00		11.9
4 hrs.	1000					11.9
8 hrs.	1000					11.9
24 hrs.	1000					11.9
48 hrs.	1000					11.6
72 hrs.	1400	1.40	0.08	0.52	2.54	11.6

ASARCO

Southwestern Exploration Division

JDS

March 23, 1990

M.A. Miller

Proceed
Yarnell Revision

You should proceed in establishing what is to be deleted and what is to be added to the 20-foot bench plan maps so that what was discussed on March 22 can proceed.

All info should be documented and reviewed by me, then by S.A. Anzalone and S.L. Lakosky before proceeding to the computer for revision.

James D. Sell, mek

JDS:mek

James D. Sell

cc: W.L. Kurtz

ASARCO

Southwestern Exploration Division

March 26, 1990

File Note

R.C. Logs to Norgold
Yarnell Project
Yavapai County, AZ

A set of chip logs for holes YM 1-96 have been sent to Norgold per their request. These have been sent to Mike Philpot.

Mark A. Miller
PROJECT GEOLOGIST

MAM:mek

cc: J.D. Sell
W.L. Kurtz

ASARCO

Southwestern Exploration Division

March 28, 1990

M.A. Miller

Assay Check List of Core
Yarnell Project
Yavapai County, AZ

As discussed, the following intervals of diamond sawed drill core have been taken to Triad Minerals in Wickenburg, Arizona for Au assays. The intervals include:

YDDH-2	YDDH-3	YDDH-4
0-125	8- 75	0-255
280-325	180-220	

Also, a list of assay checks submitted with the samples is included on the following page.

John J. Malusa

JJM:mek

cc: J.D. Sell

Assay Check YDDH-2, -3, -4

Yarnell Project, Yavapai County, Arizona

YM-40		Assay Ck. YDDH-2
30-25	=	19-24
40-45	=	39-44
60-65	=	59-64
80-85	=	79-84
100-105	=	99-104
120-125	=	119-124
140-145	=	130-144
160-165	=	159-164
180-185	=	179-184
200-205	=	199-204
220-225	=	219-224
240-245	=	239-244

YM-63		Assay Ck. YDDH-3
20-25	=	19-24
40-45	=	39-44
60-65	=	59-64
80-85	=	79-84
100-105	=	99-104
120-125	=	119-124
285-290	=	284-289
300-305	=	299-304
315-320	=	314-319

YM-75		Assay Ck. YDDH-4
20-25	=	19-24
40-45	=	39-44
60-65	=	59-64
185-190	=	184-189
200-205	=	199-204
215-220	=	214-219

Coarse A Standards Submitted in YDDH-2	Coarse A Standards Submitted in YDDH-3	Coarse A Standards Submitted in YDDH-4
32-33	32-33	32-33
72-73	72-73	52-53
112-113	112-113	197-198
172-173	292-293	
212-213	312-313	

A Standards = .022 opt

METCON Research Inc.

1844 W. Grant Road, Suite 106
Tucson, Arizona 85745

Tel: (602) 623-1327
Telex 284623 KDE UR

30 March 1990
Invoice #8756

ASARCO Incorporated
P.O. Box 5747
Tucson, AZ 85703-0747

Attention: Mr. James D. Sell
Manager

ASARCO Incorporated
APR 2 1990
SW Exploration

INVOICE

This invoice covers costs associated with preliminary cyanide leach testing conducted on your gold ore interval samples. Charges are as follows:

LABORATORY SERVICES:

(24) Bottle roll leach test @ $250.00	$ 6,000.00
TOTAL THIS INVOICE	$ 6,000.00

This invoice is due and payable upon receipt. Please make check payable to Metcon Research Inc.

Thank you,

Joseph M. Keane

Joseph M. Keane, P.E.
President

JMK:rs

SKYLINE LABS, INC.
1775 W. Sahuaro Dr. • P.O. Box 50106
Tucson, Arizona 85703
(602) 622-4836

LDS

REPORT OF ANALYSIS

JOB NO. TAJ 627A
March 30, 1990
YM-6 TO YM-93

ASARCO INCORPORATED
Attn: Mr. James D. Sell
Southwestern Exploration
P.O. Box 5747
Tucson, AZ 85703

ASARCO Incorporated
APR 2 1990
SW Exploration

Replicate Analysis of 6 Pulp Samples

ITEM	SAMPLE NO.	FIRE ASSAY Au (oz/t)	FIRE ASSAY Ag (oz/t)	FIRE ASSAY Au (oz/t)	FIRE ASSAY Ag (oz/t)
1	YM-6	.028	<.01	.020	<.01
2	YM-8	.050	<.01	.050	<.01
15	YM-63	.065	<.01	.055	<.01
16	YM-71	.125	<.01	.115	<.01
20	YM-84	.050	<.01	.050	<.01
23	YM-90	.050	<.01	.050	.02

ITEM	SAMPLE NO.	FIRE ASSAY Au (oz/t)	FIRE ASSAY Ag (oz/t)	FIRE ASSAY Au (oz/t)	FIRE ASSAY Ag (oz/t)
1	YM-6	.030	<.01	.026	<.01
2	YM-8	.044	<.01	.050	.02
15	YM-63	.070	<.01	.065	<.01
16	YM-71	.120	.04	.130	<.01
20	YM-84	.070	.04	.046	<.01
23	YM-90	.036	<.01	.050	<.01

SKYLINE LABS, INC.
1775 W. Sahuaro Dr. • P.O. Box 50106
Tucson, Arizona 85703
(602) 622-4836

JOB NO. TAJ 627A
March 30, 1990

ASARCO Incorporated
APR 2 1990
SW Exploration

ITEM	SAMPLE NO.	FIRE ASSAY Au (oz/t)	FIRE ASSAY Ag (oz/t)	FIRE ASSAY Au (oz/t)	FIRE ASSAY Ag (oz/t)
1	YM-6	.024	<.01	.085	<.01
2	YM-8	.050	<.01	.050	<.01
15	YM-63	.135	<.01	.075	<.01
16	YM-71	.130	.05	.125	<.01
20	YM-84	.055	<.01	.085	<.01
23	YM-90	.046	<.01	.050	<.01

ITEM	SAMPLE NO.	FIRE ASSAY Au (oz/t)	FIRE ASSAY Ag (oz/t)	FIRE ASSAY Au (oz/t)	FIRE ASSAY Ag (oz/t)
1	YM-6	I/S	I/S	I/S	I/S
2	YM-8	.050	<.01	.055	<.01
15	YM-63	I/S	I/S	I/S	I/S
16	YM-71	.135	<.01	I/S	I/S
20	YM-84	.055	<.01	I/S	I/S
23	YM-90	I/S	I/S	I/S	I/S

*NOTE: I/S Denotes Insufficient Sample

cc: Mr. Eugene Salazar

REGISTERED ASSAYER CERTIFICATE NO. 9425 WILLIAM L. LEHMBECK ARIZONA U.S.A.

William L. Lehmbeck
Manager

SKYLINE LABS, INC.
1775 W. Sahuaro Dr. • P.O. Box 50106
Tucson, Arizona 85703
(602) 622-4836

INVOICE
NET 30 DAYS

Job No. TAJ 627A
March 30, 1990
YM-6 TO YM-93

ASARCO INCORPORATED
Attn: Mr. James D. Sell
Southwestern Exploration
P.O. Box 5747
Tucson, AZ 85703

Replicate Analysis of 6 Pulp Samples

40 Au&Ag(oz/t) @ $9.50..... $380.00

Totals $380.00

ASARCO Incorporated
APR 2 1990
SW Exploration

APPROVED FOR PAYMENT

By:_____
(Signature)

Charles E. Thompson
Arizona Registered Assayer No. 9427

William L. Lehmbeck
Arizona Registered Assayer No. 9425

James A. Martin
Arizona Registered Assayer No. 11122

To Sell

Date 3/30 Time 1038 ☐ AM ☐ PM

WHILE YOU WERE OUT

M Eugene Raillo

of Malcom Research

Phone ( ) 6231327

Area Code Number Extension

TELEPHONED	X	PLEASE CALL	X
CALLED TO SEE YOU		WILL CALL AGAIN	
WANTS TO SEE YOU		URGENT	
RETURNED YOUR CALL			

Message

1:15 PM Called he was not in left message that JDS would be out until 10th & that I could get in touch with Mr Sell if he wished

Operator

AMPAD EFFICIENCY®

REORDER #23-000

Eugene was concerned about the availability of valves in Job TAJ 627A, believes a coarse gold problem might exist.

JDS

Memo to J.D Sell

~~Memo to RL Brown~~
~~Monthly report~~ Yarnell Progress Report
March 1990

Yarnell Project,Yavapai County AZ

Mapping was completed in section 14 and 23 @ 1"=200'. No additional mineralization has been found however there are areas of weak to moderate alteration that have been located. The final compilation of the mapping is in progress but has been delayed by other projects. All drill core has been sawed and submitted to Triad Minerals for assay. Results have been recieved and a report will be forthcoming. Preliminary results from the assay of the ore sections only seems to indicate that the varience in the assay results from reverse circulation and diamond drilling is balanced.(there does not appear to be a skewing of the data in one direction or another.). This suggests that the reverse circulation drilling is reporting accurate results assuming that the diamond drilling is most accurate(this is an assumption.

Yarnell Ore Reserves
Several days were spent and will extend into the next month on the computer generated ore reserves. It appears that we can show more continuity in grade and tonnage than the computer has shown. These changes when approved by the committee will be incorporated in the reserve and a new economic model will be run.

4/90

See p 21

TEMPORAL AND SPATIAL RELATIONSHIPS OF DIAGENETIC PROCESSES IN THE UPPER JURASSIC MORRISON FORMATION, COLORADO AND NEW MEXICO, AND ITS IMPLICATION TO DINOSAUR FOSSILS PRESERVATION

GIDAY WOLDEGABRIEL
ROLAND HAGAN
EES-1/D462, Los Alamos National Laboratory, Los Alamos, NM 87545

Clay size fraction (< 2μm) of diagenetic mineral assemblages obtained from samples of the Morrison Formation in northwestern New Mexico and southern and western Colorado are dominantly smectitic (≤ 5% illite layers) along the basin margin and illitic (30-90% illite layers) in the central part of the basin. Traces of kaolinite, chlorite, calcite, and quartz are also common.

K/Ar data on five illite/rich clays (30–90% illite) separated from regionally collected samples yielded an age range of 29.69 to 55.95 m.y. and are related to Laramide (Cretaceous-early Tertiary) tectonic deformation of the Morrison Formation in the San Juan basin. These data, coupled with the published minimum sedimentation age (131 ± 26 m.y.) obtained on smectite of an early diagenetic phase, suggest that there were at least two major diagenetic processes responsible for the formation of authigenic minerals in the Morrison Formation.

The minimum sedimentation age is also a minimum age for the dinosaur fossils found in the Brushy Basin Member of the Morrison Formation. Published vitrinite reflectance data and the prevalence of smectite in the fossil-bearing marginal sedimentary rock suggest that the fossil bones were subjected to low burial temperature (≤ 60°C) and that Laramide-related tectonic deformation was minimal along the margin of the basin in this area.

INTRODUCTION

It has been suggested that soon after the deposition of the Morrison Formation in the Late Jurassic, pore fluids expelled during sediment compaction moved through porous rocks in the basin, initiating the formation of distinctive diagenetic mineral assemblages that were later affected by tectonically induced (Laramide Orogeny) fluid movement (Bell, 1987; Turner-Peterson and Fishman, 1987; Whitney, 1987). Diagenetic minerals associated with dinosaur fossil bones in the Upper Jurassic Morrison Formation, along the southeastern boundary of the San Juan basin about 50 km northwest of Albuquerque, New Mexico, (fig. 1) (Rigby, 1982; Gillette, 1986) shed important clues on burial history and on the conditions under which these minerals formed. Moreover, this information has direct implications for the nature and preservation of fossil bones in a sedimentary environment. Nine dinosaur bone sites have been identified and documented in the study area (Schwartz and Manley, 1989). Most of the dinosaur fossil bones occur in the Brushy Basin Member of the upper part of the Morrison Formation, although one lies in a zone of interfingering Brushy Basin and Westwater Canyon Members. The underlying Westwater Canyon Member is known to contain abundant fossil plants and dinosaur fossils as well (Lee and Brookins, 1978). The fossils in the study area occur in sandstone and claystone (mudstone) units.

The object of this study is to describe the diagenetic mineral assemblages in samples collected within, above, and below the fossil-bearing horizons and to compare these assemblages to diagenetic phases that occur regionally in samples from the Brushy Basin Member. In particular burial depths and temperatures during diagenesis of the Morrison Formation are sought. The K/Ar geochronologic method was used to constrain the time of diagenetic mineral formation, in particular the growth of potassium-rich clays (illite-rich clays). Unfortunately, the diagenetic mineral assemblages from the Morrison Formation at the dinosaur fossil sites are dominated by highly expandable (smectite) clays with traces of kaolinite, chlorite, illite/smectite (≤ 5% illite layers), and microcrystalline silica. Brushy Basin Member samples containing potassium-rich clays (interstratified illite/smectite) were obtained from a drill hole (S6) in the Grants mineral belt northeast of Gallup (New Mexico) and from tuff bed outcrops in southern (Durango) and western (Grand Junction) Colorado (fig. 1). For the K/Ar geochronologic method, finer clay size fractions (< .25 μm) were mostly used in order to avoid detrital clay contamination.

GEOLOGIC OVERVIEW

Current geologic data for the upper Jurassic Morrison Formation in northwestern New Mexico include detailed studies of depositional basin analysis, burial and diagenetic history, uranium mineralization, and other related topics (Brookins, 1980; Bell, 1987; Turner-Peterson and others, 1987; Whitney and Northrop, 1987). The Morrison Formation, with a Rb/Sr sedimentation age of 131 ± 26 m.y. is subdivided into the Recapture Member, Westwater Canyon Member, and the Brushy Basin Member, in ascending stratigraphic order (Lee and Brookins, 1980; Bell, 1987). The Recapture Member, the basal unit of the Morrison Formation, was deposited in a mixed eolian, fluvial, and lacustrine environment and consists of light-gray pebble conglomerate, quartz and feldspathic arenite, and various amounts of reddish brown sandstone (Bell, 1987; Turner-Peterson and Fishman, 1987). The overlying Westwater Canyon Member, which is fluvial in origin, is dominantly feldspathic arenite and mudchip conglomerate with interbeds of reddish-brown and greenish-gray mudstone that grade into the overlying Brushy Basin Member. The Brushy Basin Member exhibits major lateral facies changes from fluvial sandstone beds to low-energy lacustrine sediments characterized by thick intervals of volcanic tuffs, variegated silty and sandy mudstones, and well-sorted, strongly cemented sandstones deposited in alluvial plain, mudflat, and playa-lake environments (Bell, 1987). The dinosaur fossil sites in the Brushy Basin Member are exposed in broad and shallow canyons cut by ephemeral streams. The bone-bearing unit is about 80 m thick, consisting of ledge-forming sandstones alternating with variegated claystones and rare limestones; the units formed as channel and floodplain deposits (Schwartz and Manley, 1989).

Early diagenetic processes in the Morrison Formation were characterized by precipitation of authigenic minerals and by selective dissolution of both detrital and older authigenic phases (Turner-Peterson and Fishman, 1987).

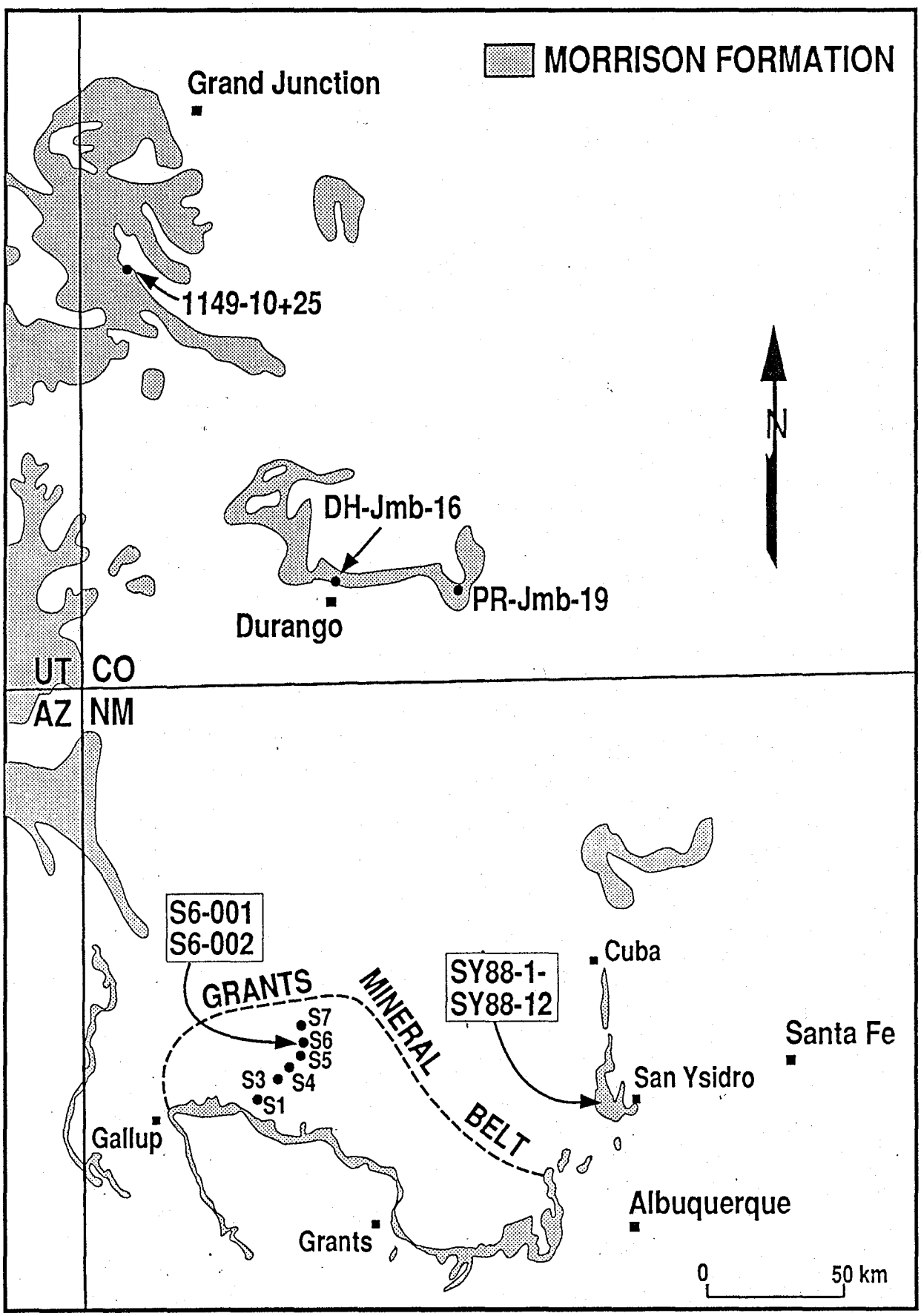

FIGURE 1. Regional distribution of the Morrison Formation in northwestern New Mexico and southwestern Colorado (after Turner-Peterson and Fishman, 1987; Whitney and Northrop, 1987). Sample locations indicated by dots and sample numbers.

According to Bell (1987), burial and diagenetic processes in mudstone and altered tuffs of the Brushy Basin Member and in upper parts of the Westwater Canyon Member were greatly influenced by fresh to hyper-saline and alkaline surface and groundwaters that resulted in distinct, zonally distributed authigenic mineral assemblages that vary from the margin to the center of the basin.

ANALYTICAL METHODS

Thin sections were prepared for some of the sandstone samples from the dinosaur fossil sites, while the rest of the specimens were processed for clay size separation (2 - 0.25 μm, 0.25 - 0.1 μm, and < 0.1 μm) in a DuPont Sorvall superspeed angle-rotor centrifuge alter thorough cleaning. Clay separates for K/Ar age determination were chemically treated to remove calcite, organic matter, and iron oxides using the procedures outlined in Jackson (1978). The chemical treatment was followed by a thorough dialyses of the clay fraction for four to five days in deionized water that was regularly changed. Effects of chemical treatment on clay mineralogy were monitored by XRD analyses before and after processing.

K/Ar age determinations were made on five illite/smectite clay fractions at the Case Western Reserve University K/Ar Laboratory in Cleveland, Ohio. Clay separates of 100-200 mg were used for Ar extraction in a multiload system and were analyzed with an MS-10 Mass spectrometer equipped with an on-line extraction system and a bulb-pipetted ^{38}Ar tracer calibrated by the LP-6 interlaboratory standard at 19.3 $\times$ 10^{-10} mol of radiogenic Ar (^{40}Ar*) per gram (Aronson and Burtner, 1983). Potassium was determined on duplicate samples with a flame photometer using acid solutions of sample beads fused in lithium metaborate.

SAMPLE DESCRIPTIONS AND CLAY MINERALOGY

The main dinosaur bone excavation is of the remains of a *Seismosaurus* (Gillette, 1986); the excavation site is about 15 km west of San Ysidro along the southern edge of a low-lying mesa capped by a strongly cemented and well sorted sandstone (sample SY88-4). The section at this site is about 40 m high and consists of several alternating beds of sandstone and variegated claystones of variable thicknesses. In thin section the basal sandstone (SY88-1) is moderately cemented and sorted with subrounded to rounded quartz grains having secondary silica overgrowth around the rims of individual grains. The matrix consists of calcite and minor clayey material. A few fairly altered plagioclase, biotite, hornblende and granitic rock fragments were also recognized. The next sample (SY88-2) was obtained about 1.5 m above SY88-I. The sample is similar to the previous one; however, it contains more calcite cement. Few altered plagioclase, biotite, and rock fragments are associated with this moderately sorted and cemented sandstone. Smectite and kaolinite clays dominate the matrix of a sandstone sample collected about 1.5 m above SY88-2. This sample contains no calcite and has a few zircon grains. The next unit (SY88-5), unlike the previous ones, has abundant rock fragments in addition to subrounded to rounded quartz grains with minor biotite and feldspar; smectite fills the interstices. The *Seismosaurus* fossil-bearing arkosic sandstone (SY88-6B) is coarse-grained, moderately indurated and buff to grey in color. Vertical joints in the arkosic arenite are filled with calcite and the quartz grains along the joint surfaces are extremely fractured, suggesting movement along joint planes. Petrographic examination indicates that the smectite, kaolinite and secondary silica are confined to grain boundaries and pore spaces.

The clay-size fractions (< 2 μm) separated from four sandstone beds contain abundant smectite, kaolinite, chlorite, calcite, quartz, and traces of interstratified illite/smectite ($\leq$ 5%, R = 0) (table 1). The friable and moderately sorted *Seismosaurus* fossil-bearing arkosic arenite (SY88-6B) is dominated by smectite with minor chlorite and kaolinite. The proportion of illite in illite/smectite and range of order (Reichweite or R) were obtained by calculating a series of patterns (Reynolds, 1980) for which R and percent illite were adjusted by matching calculated patterns with the XRD data.

At the Martini site, about 1.4 km east of the main excavation, fragmentary dinosaur bones occur in the interfingering zone of the Brushy Basin and Westwater Canyon Members (Schwartz and Manley, 1989). The two sandstone units (SY88-7 and SY88-8) collected below and above the fossil horizon are moderately sorted and light

TABLE 1. Mineralogy of diagenetic clay size mineral assemblages (< 2, 0.25-2, and < 0.25 μm) in the Brushy Basin and Westwater Canyon Members of the Morrison Formation.

Sample No.	Location	Host Rock	Lithologic Unit	Clay Mineral Assemblages	% Illite	R
SY88-2	SS1	Sandstone	Brushy Basin	S, K, Q	—	—
SY88-3	SS1	Sandstone	Brushy Basin	S, K, Q	—	—
SY88-5	SS1	Sandstone	Brushy Basin	I/S, Ch, Q	$\leq$ 5	0
SY88-6A	SS1	Sandstone	Brushy Basin	Calcite, Q	—	—
SY88-6B	SS1	Sandstone	Brushy Basin	S, Ch, Q	—	—
SY88-7	MT1	Sandstone	Brushy Basin/Westwater Canyon	I/S, Ch	$\leq$ 5	0
SY88-8	MTI	Sandstone	Brushy Basin/Westwater Canyon	I/S, Ch	$\leq$ 5	0
SY88-10	MCI	Sandstone	Brushy Basin/Westwater Canyon	K, S, Q	—	—
SY88-11	MCI	Volcanic ash	Jack Pile Sandstone	S, K, Q	—	—
SY88-12	MCI	Volcanic ash	Dakota Sandstone	I/S	$\leq$ 5	0
S6-001	GMb	Claystone	Brushy Basin			
S6-002	GMb	Tuff	Brushy Basin	I/S, Ch	$\leq$ 30	0
DH Jmb-16	Durango	Tuff	Brushy Basin	I/S, Ch	$\leq$ 50	0.5
PR Jmb-19	Durango	Tuff	Brushy Basin	I/S	$\geq$ 90	3
1149-10+25	Grand Junction	Tuff	Brushy Basin	I/S, Ch	$\geq$ 90	3

SS1 = Seismosaurus site, MT1 = Martini site, MC1 = McConnell site, GMB = Grants mineral belt, S = Smectite, K = Kaolinite, Q = Quartz, I/S = Illite-smectite, Ch = Chlorite, and R = Reichweite.

TABLE 2. K/Ar age data of clay fractions (> 2μm) from the Brushy Basin Member of the Morrison Formation in southern (Durango) and western (Grand Junction) Colorado and in northwestern (Grants mineral belt) New Mexico.

Sample No.	Location	Weight(g)	Particle Size (μm)	K_2O (%)	$^{40}Ar^*$ (10^{-10}mol/g)	$^{40}Ar^*$ (%)	Age** (m.y.)
1149-10	70 km south of Grand Junction	0.1476	<0.25	5.975	4.685	66	53.68±0.97
DH-jmb-16	vicinity Durango	0.1789	<0.25	7.258	5.936	76	55.95±0.99
PR-jmb-19	vicinity Durango	0.1846	<0.25	6.880	5.579	78	55.48±0.99
S6-001	S6 drill hole, Grants mineral belt	0.1770	<0.25	1.761	0.759	24	29.69±0.56
S6-002	S6 drill hole, Grants mineral belt	0.1907	0.25-2	4.172	2.048	43	33.79±0.60

*Radiogenic
**Determined from decay constants and isotopic abundance of ^{40}K according to Steiger and Jager (1977).

grey to olive grey in color. The fossiliferous horizon is part of a channel-point bar facies (Schwartz and Manley, 1989). The clay size fractions from these samples consist of interstratified illite/smectite (< 5% illite, R = 0) and traces of chlorite (SY88-7).

At the McConnell site, about 2.8 km southeast of the *Seismosaurus* fossil site, several disarticulated skeletal fragments were recognized in silty olive claystone that is part of a thick floodplain-lake margin sequence (Schwartz and Manley, 1989). Three samples were collected from the walls of this narrow valley. The north side of the valley is capped by the Jackpile Sandstone (SY88-10) which is fine-grained, friable, and white in color. The base of the valley consists of the dinosaur fossil-bearing claystone bed (SY88-12). Across the valley from the claystone, a thin layer (~30 cm thick) of altered volcanic ash (SY88-11) occurs at the base of the 94 ± 15 m.y. old Dakota Sandstone (Della Valle, 1980; Schwartz, personal comm.). The volcanic ash is totally altered and contains a few minute grains of sanidine. The three samples from this site consist of smectite, kaolinite, traces of interstratified illite/smectite (55% illite, R = 0), and microcrystalline silica in the fine clay fraction (SY88-12).

Five Brushy Basin Member samples were obtained from areas outside the dinosaur fossil sites in the San Ysidro area of northwestern New Mexico (fig. 1). Two of these samples come from a drill hole (S6) in the Grants mineral belt from a depth of 761 m (S6-001) and 762.2 m (S6-002). Sample S6-001 is a reworked tuffaceous sandstone bed with a fine-grained altered glassy matrix. It is moderately cemented and poorly sorted. Sample S6-002, which is about a meter below S6-001, is a very fine-grained altered and partly limonitized vitric tuff. It is whitish in color and moderately cemented. Three other Brushy Basin Member tuff beds from the central part of the San Juan Basin in southern and western Colorado were also analyzed. The two samples (DH-Jmb-16 and PR-Jmb-19) from the Durango area (southern Colorado) are very similar and about 60 km apart. Both samples are very fine grained, well cemented, and moderately recrystallized. They are medium grey in color. The third sample, which is light green in color comes from western Colorado about 70 km south of Grand Junction. This sample (1149-10 + 25) was obtained about 150 km north-northwest of the Durango area samples. It is very fine-grained, finely recrystallized, and strongly cemented.

The five samples described above consist of dominantly interstratified illite/smectite with varying proportions of illite (30-90%) and range of order (R = 0, R = 0.5, and R = 3). The illite/smectite in two clay size fractions (2-0.25 μm and < 0.25 μm) of sample S6-001 from a depth of 761 m contains about 30% illite (R = 0), whereas sample S6-002 from a depth of 762.2 m contains more illite layers (≥ 50%, R = 0.5) and minor amounts of chlorite. The three samples obtained from tuff beds in southern and western Colorado are illite-rich (≥ 90%, R = 3) with two of the samples (119-10 + 25 and PR Jmb 19) containing minor chlorite. The clay mineralogy data indicate an increase in illite proportions from the Grants mineral belt northeast toward the center of the basin and correlate with the diagenetic mineral distribution of the playa-lake deposit mentioned in the introduction (Bell, 1987).

K/Ar DATA

Illitic clay is a good K/Ar clock; the K/Ar technique can be used to date diagenetic events in a variety of geologic settings (Aronson and Burtner, 1983; Aronson and Lee, 1986; Glasmann, 1987; Glasmann and others, 1987). The K/Ar data from such samples, when viewed in the context of basin development and diagenetic processes, provide information on fluid migration, burial temperature, and the timing of illitization.

Five illite-rich samples (30-90% illite) from the Brushy Basin Member dated by the K/Ar method are Eocene to Oligocene in age (29.69-55.95 m.y., N = 5) (table 2). The two core samples from the Grants mineral belt located within the smectite-dominated diagenetic facies yielded younger ages of 29.69 and 33.79 m.y. Sample S6-001 (< 0.25 μm) from a depth of 761 m and having about 30% illite represents the youngest age (29.69 ± 0.56 m.y.), whereas S6-002 about a meter below it in the same drill hole contains more than 50% illite and gave an age of 33.79 ± 0.60 m.y. The three illite-rich (90% illite layer) tuff beds of the Brushy Basin Member in Colorado are concordant in age. A sample (1149-10 + 25) from the analcime-potassium feldspar facies in the vicinity of Grand Junction in western Colorado is 53.68 ± 0.97 m.y. old. The two other samples (DH-Jmb-16 and Pr-Jmb-19) from the albite facies at the center of the playa-lake deposit in the Durango area of southern Colorado are 55.95 ± 0.99 and 55.48 0.99 m.y. old. The two age groups are consistent with the Cretaceous-early Tertiary Laramide structural deformation that resulted in the burial of the Morrison Formation to depths in excess of 2,000 m in the deepest part of the basin (Bell, 1987), thereby initiating fluid migration and reaction of the early diagenetic phases to form new minerals including illite-rich clays at elevated burial temperatures.

DISCUSSION

As briefly outlined in the introduction, the Brushy Basin Member in the San Juan Basin is characterized by four concentric diagenetic facies formed in variable salinity (fresh to

hyper-saline and alkaline) and temperature (< 60°C to 100°C) gradients (Bell, 1987; Turner-Peterson and Fishman, 1987). At least two major diagenetic facies are recognized in the Morrison Formation. The first is related to fluid movements generated by sediment lithification that initiated the earliest phase of authigenic mineralization. The second phase occurred during Laramide time about 75 m.y. later. The early diagenetic mineral assemblages along the southeastern periphery of the San Juan Basin are dominated by smectite from the alteration of volcanic tuffs. Kaolinite and traces of illite/smectite (≤ 5% illite layer) are also associated with the smectite. According to Bell (1987), the altered volcanic tuff beds (bentonites) in the San Ysidro area are in the outermost smectite facies and have probably never been heated to temperatures in excess of 60°-100°C, based on vitrinite reflectance data (60°C) and the fact that smectite-rich bentonite beds heated to 100°C react to form ordered illite/smectite (≥ 65% illite layers) clays (Hoffman and Hower, 1979).

Diagenetic mineral assemblages in the five tuff bed samples from the Grants mineral belt and Colorado are different from those found at the dinosaur site west of San Ysidro. The percent illite and range of order in the interstratified illite/smectite clays increase from about 30% illite (R = 0) along the basin margin to about 90% illite (R = 3) in the center of the basin, consistent with increase in depth of burial and in temperature, alkalinity, and salinity basinward. In fact, samples S6-001 and S6-002 obtained from the subsurface (761-762.2 m) lie within the smectite facies; however, they contain about 30% and ≥ 50% illite, unlike those diagenetic minerals obtained from the surface in the vicinity of San Ysidro. Illite contents in the tuff bed samples obtained from Colorado are similar although they come from adjacent diagenetic facies. The finer clay size fractions (2-0.25 and < 0.25 μm) in a sample (1149-10+25) from the analcime-potassium feldspar facies is mineralogically and temporally similar to those from the albite facies in the center of the basin.

It has been suggested that the basinward systematic change from authigenic smectite to zeolites and to feldspars along with increased pore water alkalinity and salinity was responsible for the near-surface, low temperature (> 90°C) origin of illite-rich clays in the Brushy Basin Member during early diagenetic alteration (Turner-Peterson and others, 1987b; 1988). However, during the Cretaceous-early Tertiary Laramide Orogeny, deformation and burial of the Morrison Formation (Brushy Basin and Westwater Canyon Members) initiated fluid circulations at elevated temperatures that reacted and converted early diagenetic phases to a new authigenic mineral assemblage of quartz, feldspars, chlorite, and interstratified illite/smectite (Bell, 1987; Whitney, 1987; Whitney and Northrop, 1987). As a result, the Westwater Canyon and the Brushy Basin Members are more illitic near the center of the basin and become less illitic toward the basin margin, an effect attributed to migrating warm (> 100°C) potassium- and aluminum-rich fluids that moved updip from the center to the margin of the basin. This suggestion implies that temperature and fluid chemistry played a major role in the illitization process (Bell, 1987; Whitney, 1987; Whitney and Northrop, 1987).

The K/Ar data (29-55 m.y., table 2) on interstratified illite/smectite clays (30-90% illite layers) separated from regionally collected tuff beds (fig. 1) are consistent with the suggestion that fluid movement responsible for illitization in the Morrison Formation occurred subsequent to the basin formation during Laramide time. Geohistory models constrained by measured vitrinite reflectance and potassium bentonite K/Ar data from the San Juan Basin suggest thermal maturation during the early to mid-Eocene (55-45 m.y.) coinciding with high paleotemperature gradients (Glasmann and others, 1987) probably related to the Cretaceous-early Tertiary Laramide tectonic process. Rb/Sr isochron ages (44 ± 7 and 41 ± 9 m.y.) obtained on illite/smectite from redistributed uranium deposit in the Westwater Canyon Member in the Grants area (Della Valle, 1980; Brookins and Della Valle, 1989) are within the age range of the K/Ar data. The Eocene-Oligocene ages (29.68-55.95 m.y.) obtained on illite/smectite clays from the San Juan Basin are also consistent with the mean age of illitization measured on Cretaceous bentonites regionally selected from drill core samples in the Denver Basin and from outcrops along the Front Range, the western margin of the basin. K/Ar ages of 42-49 m.y. (20-40% illite layers) and 54-59 m.y. (50-60% illite layers) were reported from shallow and deep levels of drill holes, respectively (Elliott and others, 1986). It is further suggested that samples from areas of high geothermal gradient within the Denver Basin (Denver Hot Spot) are highly illitized (55-75% illite layers) with an illitization age of 60-61 m.y. The correlation between percent illite, K/Ar age of illite/smectite, and depth in the Denver Basin were also recognized in the San Juan Basin to the southwest. Differences in K/Ar age and illite content with depth was shown by samples S6-001 (~ 30% illite, 29.68 ± 0.56 m.y.) and S6-002 (≥ 50% illite, 33-79 ± 0.60 m.y.) from drill hole S6 located in the Grants mineral belt. Moreover, the variation in percent illite from the margin (0-5% illite layer) to the center of the basin (≥ 90% illite) in the San Juan Basin provides more evidence regarding the relationships among age, percent illite, and depth of illitization.

The K/Ar and Rb/Sr ages on interstratified illite/smectite presented above are much younger than the Rb/Sr sedimentation age of the Brushy Basin Member (124 ± 28 m.y., Della Valle, 1980) and the Westwater Canyon Member (131 ± 26 m.y., Lee and Brookins, 1980) obtained from diagenetic smectite. The diagenetic smectite is considered to have formed soon after the deposition of the Morrison Formation (Bell, 1987; Turner-Peterson and Fishman, 1987) and represents the age of early diagenesis due to compaction and dewatering of sediments during the deposition of the Morrison Formation. This also provides a minimum age of sedimentation, and of the dinosaur fossils contained in these sediments. On the other hand, the Tertiary diagenetic mineral ages reflect recent tectonic deformation associated with the Laramide Orogeny.

CONCLUSION

Clay mineralogy studies of authigenic minerals from the Brushy Basin and the Westwater Canyon Members of the Morrison Formation indicate a basinward enrichment in illite contents (5-90% illite layers). Low illite content in diagenetic mineral phases along the basin margin suggests shallow burial, minimum structural deformation of the fossil-bearing rocks, and the preservation of original organic materials in the fossils. K/Ar data on illitic clays (30-90%) also increase basinward suggesting that illitization processes started earlier in the central and deepest part of the San Juan basin. A published Rb/Sr isochron age on smectite from the basin margin is much older (131 ± 26 m.y.) and represents a minimum sedimentation age. The geochronologic data demonstrate that at least two major diagenetic processes are recorded in the Morrison Formation.

ACKNOWLEDGMENTS

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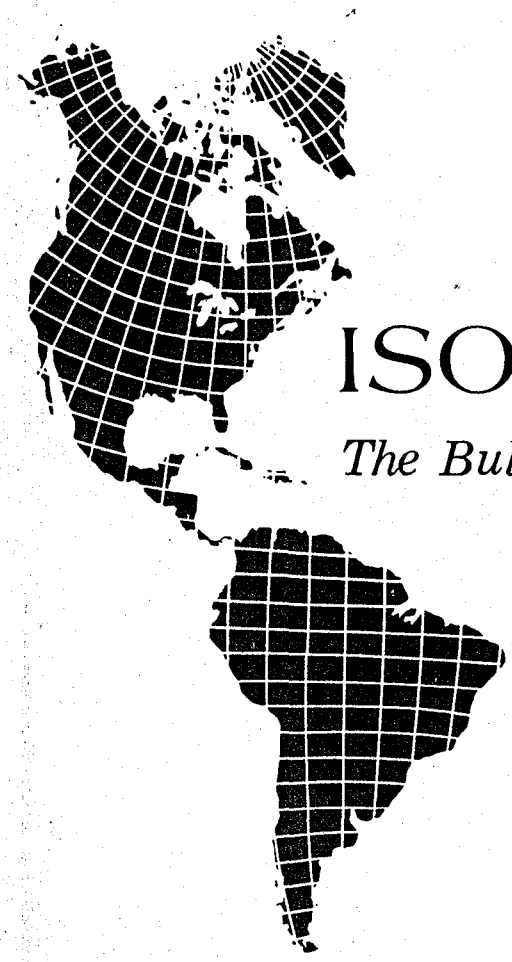
No. 55, April 1990

ASARCO Incorporated
MAY 21 1990
SW Exploration



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The Bulletin of Isotopic Geochronology

NEW MEXICO BUREAU OF MINES & MINERAL RESOURCES
and
NEVADA BUREAU OF MINES AND GEOLOGY

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FROM: W. L. KURTZ — 4/9 WLK - JDS

To: JDS

estern Mining Department

page 2 paragraph 1

Is true?

April 3, 1990

Feasibility report on my drafting table for your use

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APR 6 1990

EXPLORATION DEPARTMENT

Perhaps time for Feasibility Study - but our reserve model will be made compatible with geology - structure - assayment continuity, etc, & this may change tonnes - grade - waste somewhat.

JDS

TO

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Introduction

The Yarnell Project, located approximately 70 miles northwest of Phoenix, Arizona is a proposed open pit-heap leach operation which has the potential to produce 139,500 ounces of gold over a 3.7 year mine life. Norgold Resources (US) Inc. secured options with the principal underlying owner in this area in late 1988. Per the Exploration and Option Agreement between ASARCO Incorporated and Norgold Resources dated January 30, 1989, Asarco can earn a fifty-one percent (51%) interest in Norgold's interest in the property.

Revisions

The following paragraphs briefly summarize the revisions and refinements which have been completed since the Intermediate Feasibility Study was submitted on February 16, 1990.

WLK - JDS

ASARCO

Southwestern Mining Department

April 3, 1990

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APR 6 1990

EXPLORATION DEPARTMENT

MEMORANDUM

TO: T. E. Scartaccini

FROM: S. L. Lakosky

RE: Yarnell Project Feasibility Study

The following is a summary of the attached Feasibility Study for the Yarnell Project:

Introduction

The Yarnell Project, located approximately 70 miles northwest of Phoenix, Arizona is a proposed open pit-heap leach operation which has the potential to produce 139,500 ounces of gold over a 3.7 year mine life. Norgold Resources (US) Inc. secured options with the principal underlying owner in this area in late 1988. Per the Exploration and Option Agreement between ASARCO Incorporated and Norgold Resources dated January 30, 1989, Asarco can earn a fifty-one percent (51%) interest in Norgold's interest in the property.

Revisions

The following paragraphs briefly summarize the revisions and refinements which have been completed since the Intermediate Feasibility Study was submitted on February 16, 1990.

Asarco's Southwestern Exploration Division reviewed and further refined the computer generated ore reserve by reducing the area of influence of one (1) drill hole which contained an anomalously high assay interval. The reserve was also adjusted downward by 250,000 tons at 0.053 OPT Au to account for previous underground open stope mining activity in this area. Having made these revisions, no further refinements to the ore reserve model were required for the Feasibility Study.

Haul road design and mine scheduling were completed in March and better defined both pre-production and production stripping requirements. Scheduling indicates that ore grade maximization during the first several years is somewhat limited due to topographic considerations.

Detailed financial evaluations for $550 and $350 economic pit designs were completed during the month of March. Both designs proved to be less favorable than the $400 economic pit design used in this Feasibility Study.

At this point in time, purchase of water from the Yarnell Water Improvement Association, or use of their distribution system is not a viable option. A private water source located about six (6) miles north of the project is the nearest available source. At an estimated continuous output of 250-300 GPM, this would allow a maximum mining and processing rate of 3,000 tons of ore per day.

In an effort to: reduce initial capital expenditures, take advantage of the economy of scale, and improve the ROI, the scope of the Yarnell Project was changed from a 2,000 TPD operation to a 3,000 TPD operation with a contractor performing all mining, crushing and placement operations. Budgetary estimates for mining, crushing and placement were firmed up from a ± 25% range to a ± 10% range.

Ore Reserves

Computer generated reserves for the $400 Economic Pit Design total 3,928,000 tons of ore at 0.049 OPT Au and 6,749,000 tons of waste after adjustments for mining dilution and haul road construction. The overall stripping ratio, including pre-production stripping, averages 1.72 tons of waste per ton of ore.

Production Rate

At a scheduled mining rate of 3,000 tons of ore per day, the project (on a 100 percent basis) will yield 139,494 recoverable ounces over a 3.7 year mine life, at an average rate of 37,700 ounces per year.

YARNELL PROJECT

$400 ECONOMIC PIT (ON A 100% BASIS)

Ore Tons (after mining dilution)	3,928,000
Diluted Ore Grade (OPT)	0.049
Waste Tons (after ore dilution)	6,749,000
Waste Grade (OPT)	0.008
Overall Strip Ratio	1.72:1
Mine Life @ 3,000 TPD Ore (years)	3.7
Recoverable Ounces	139,494
Recoverable Ounces Per Year	37,700

FINANCIAL SUMMARY OF THE YARNELL PROJECT ON A 100% BASIS
(Based on a $400 Economic Pit Design)

GOLD PRICE ($/OZ)	TOTAL INITIAL CAP. EXP. INCL. SUNK COSTS (000s)	AFTER TAX CASH FLOW (000s)	DCFROI (%)	NPV @ 5% (000s)	NPV @ 10% (000s)	NPV @ 15% (000s)
600	$13,954	$22,833	80.1	$18,007	$14,281	$11,371
550	$13,954	$18,052	64.0	$14,012	$10,907	$ 8,493
500	$13,954	$13,270	47.8	$10,018	$ 7,533	$ 5,616
450	$13,954	$ 8,342	31.0	$ 5,908	$ 4,068	$ 2,665
400	$13,954	$ 3,052	12.0	$ 1,503	$ 361	$ (486)
350	$13,954	$(2,334)	(10.0)	$(2,977)	$(3,406)	$(3,684)

FINANCIAL SUMMARY OF ASARCO'S PORTION OF THE YARNELL PROJECT
(Based on a $400 Economic Pit Design)

1) ASARCO'S 51% INTEREST IF NORGOLD ELECTS AND MAINTAINS A 49% JOINT VENTURE POSITION

GOLD PRICE ($/Oz)	ASARCO'S INITIAL CAP. EXPEND. INCL. SUNK COSTS (000s)	AFTER TAX CASH FLOW (000s)	DCFROI (%)	NPV @ 5% (000s)	NPV @ 10% (000s)	NPV @ 15% (000s)
600	$7,618	$11,636	74.3	$9,136	$7,209	$5,705
550	$7,618	$ 9,197	59.5	$7,099	$5,488	$4,238
500	$7,618	$ 6,759	44.5	$5,062	$3,768	$2,770
450	$7,618	$ 4,245	28.8	$2,966	$2,000	$1,265
400	$7,618	$ 1,548	11.1	$ 720	$ 110	$ (341)
350	$7,618	$(1,200)	(9.4)	$(1,565)	$(1,811)	$(1,973)

FINANCIAL SUMMARY OF ASARCO'S PORTION OF THE YARNELL PROJECT, CONT'D
(Based on a $400 Economic Pit Design)

2) ASARCO'S INTEREST IF NORGOLD ELECTS A 49% JOINT VENTURE POSITION AND DILUTES IT'S PARTICIPATING INTEREST TO A 15% NET PROFITS ROYALTY

GOLD PRICE ($/OZ)	ASARCO'S INITIAL CAP. EXPEND. INCL. SUNK COSTS (000s)	AFTER TAX CASH FLOW (000s)	DCFROI (%)	NPV @ 5% (000s)	NPV @ 10% (000s)	NPV @ 15% (000s)
600	$13,954	$19,243	71.0	$15,085	$11,872	$ 9,362
550	$13,954	$15,104	56.3	$11,622	$ 8,943	$ 6,860
500	$13,954	$10,769	41.0	$ 7,998	$ 5,880	$ 4,246
450	$13,954	$ 6,301	24.9	$ 4,269	$ 2,734	$ 1,565
400	$13,954	$ 1,747	7.4	$ 479	$ (455)	$(1,145)
350	$13,954	$(2,806)	(13.2)	$(3,324)	$(3,668)	$(3,884)

3) ASARCO'S INTEREST IF NORGOLD ELECTS A MINING LEASE AND RESULTING 25% SHARE OF A 75/25 JOINT VENTURE OPTION

GOLD PRICE ($/OZ)	ASARCO'S INITIAL CAP. EXPEND. INCL. SUNK COSTS (000s)	AFTER TAX CASH FLOW (000s)	DCFROI (%)	NPV @ 5% (000s)	NPV @ 10% (000s)	NPV @ 15% (000s)
600	$13,954	$17,466	65.9	$13,625	$10,659	$ 8,345
550	$13,954	$13,590	52.0	$10,383	$ 7,918	$ 6,003
500	$13,954	$ 9,691	37.8	$ 7,121	$ 5,158	$ 3,646
450	$13,954	$ 5,774	23.1	$ 3,840	$ 2,380	$ 1,271
400	$13,954	$ 1,768	7.3	$ 479	$ (469)	$(1,168)
350	$13,954	$(2,976)	(14.0)	$(3,473)	$(3,798)	$(4,001)

NOTE: SUNK COSTS (ESTIMATED AT $1,024,000) ARE ASARCO'S TOTAL EXPLORATION EXPENDITURES ON THE YARNELL PROJECT FROM JANUARY 1 1989 THROUGH DELIVERY OF A FEASIBILITY STUDY TO NORGOLD

SENSITIVITIES

The following sensitivities are based on a 51% share of the 51/49 Joint Venture option with gold at $400 per ounce. (Listed below as Base Case).

INCREASE (+) OR DECREASE (-)
COMPARED TO BASE CASE

	INITIAL CAPITAL EXPENDIT. (000s)	AFTER TAX CASH FLOW (000s)	DCFROI (%)
10% Reduction in Operating Costs	$ -108	$ +1,583	+ 10.6
10% Reduction in Cap. & Dev. Exp.	$ -516	$ + 351	+ 3.6
1% Increase in Recovery	$ 0	$ + 305	+ 2.1
Base Case	$ 0	$ 0	0
1% Decrease in Recovery	$ 0	$ - 306	- 2.1
10% Increase in Cap. & Dev. Exp.	$ +517	$ - 352	- 3.1
10% Increase in Operating Costs	$ +108	$ -1,603	- 11.5

COST PER OUNCE SUMMARY
$400 ECONOMIC PIT

RECOVERABLE OUNCES	139,494
OPERATING COSTS	COST PER OUNCE($)
CONTRACTOR	
Mining Ore	31.69
Mining Waste	49.47
Crushing & Placing Ore	71.81
Sub-Total	152.97
OPERATOR	
Supervision and Administration	19.05
Operations and Repair Labor	8.24
Additional Labor	10.91
Supplies-Maintenance and Reagents	25.34
Utilities	12.11
Sub-Total	75.65
MISCELLANEOUS	
Royalties (Atchinson & Western)	5.66
Severance Tax	5.35
Property Tax	7.16
Insurance	9.68
Sales Tax, Other	1.95
General & Administrative	6.33
Sub-Total	36.12
TOTAL OPERATING COSTS (PRODUCTION)	$264.74
DEPRECIATION AND DEPLETION	
Exploration Dept. (Sunk Costs)	7.34
Additional Land Payments	8.02
Microwave Relocations	3.55
Permitting and Testing	6.31
Site Prep, Utilities, Distribution	13.68
Fresh Water Supply	7.89
Adsorption, Desorption, Refining	11.36
Heap Pad and Solution Ponds	12.77
Ancillary Facilities & Mobile Equipment	6.19
Construction Overhead & General Ind.	7.72
Operating Cost (Pre-Production)	15.21
Delayed Capital Expenditures	11.28
Operating Cost (Post-Production)	6.45
Mine Closure	3.71
TOTAL DEPRECIATION AND DEPLETION	$121.47
GRAND TOTAL COST PER OUNCE	$386.22

NORGOLD'S OPTIONS

Within 180 days of Asarco's delivery to Norgold of: a feasibility study, a written commitment (subject to a force majeure clause) to initiate commercial production on the property within three years, certification that Asarco has complied with all terms of the agreement, and a work plan and budget, Norgold must elect to either (1) execute and enter into a 49% share of a 51/49 Joint Venture Agreement, or (2) execute and enter into a Mining Lease and subsequent 25% share of a 75/25 Joint Venture Agreement. In either case, Norgold may elect to not participate in work plans and budgets and have its participating interest reduced to a 15% net profits interest.

ROYALTIES

The ultimate pit outline for each economic scenario evaluated during the feasibility phase fell within the boundaries of three (3) patented and one (1) unpatented mining claim currently owned by Western Building & Mining Co. Western retains a net smelter return royalty of: 2% for the first and second years of commercial production, 1% for the third and fourth years, and 1/2% thereafter. In addition, Atchinson, Topeka & Santa Fe owns a small parcel of land within Western's Juniper patented claim. Atchinson owns a microwave installation on this site and retains a 5% net smelter return royalty on this land.

PROCESS DESCRIPTION

The proposed Yarnell Project is an open pit-heap leach operation which will mine, crush, place and leach gold ore at the rate of 3,000 tons per day. Overall gold recovery is estimated at 72%.

A contractor will mine ore and waste, crush the ore to 80% minus 1 and 1/2 inches, agglomerate as required, then place the ore on the heap pad. The Contractor will supply all of the equipment, facilities and supplies necessary to complete those operations.

Asarco personnel will leach the crushed ore with a weak cyanide solution, collect the pregnant solution and recover the contained gold through an adsorption, desorption and refining (ADR) process. Gold will be recovered using activated carbon columns. The adsorbed gold will then be stripped, electrowon, filtered and refined in an on-site induction furnace. The resulting gold bullion will then be shipped to a refinery for final upgrading.

MANPOWER

The contractor's combined mining, crushing and placement manpower is estimated at 50 persons.

Asarco's estimated manpower is 19 salaried and 10 hourly personnel.

PLANT DESIGN

The administration/changehouse building and laboratory building are trailer modules, the covered shop area is a pre-engineered "Butler type" building, and most of the ADR process equipment is mounted on easily disassembled structural steel frames.

CAPITAL AND OPERATING COSTS

Capital and operating cost estimates have been refined in-house from information generated from Kilborn Engineering (B.C.) Ltd's pre-feasibility study, from contractor's cost estimates for mining, crushing, and placement, and from costs at other similar open pit mining and heap leaching operations.

PERMITTING

Two (2) of the major permits required for this project are the Aquifer Protection Permit (APP) from the Arizona Department of Environmental Quality (ADEQ), and the Plan of Operation Permit from the Bureau of Land Management (BLM). Both permits require that detailed operating plans be submitted upon completion of: a hydrogeologic characterization of the site, and detailed engineering and design work for the operation.

The estimated time required to obtain the APP is one year. The ADEQ references the relatively new Best Available Demonstrated Control Technology (BADCT) Document for determination of design requirements for the process including the liner configuration for the heap pad. Variance from BADCT is possible if the applicant can demonstrate that site specific characteristics combined with a less than optimal BADCT design is technically sound. Heap pad cost estimates used in the Feasibility Study assume that site specific conditions will allow a single 60 - 80 mil liner to be used, rather than a double or triple liner system recommended by BADCT. Technically the APP cannot be denied if BADCT is utilized; therefore, if the ADEQ is unwilling to accept less than BADCT design, the only consideration is whether the project can withstand an additional estimated $500,000 - $1,000,000 for the optimal BADCT heap pad configuration.

The granting of a federal environmental permit such as the BLM Plan of Operation Permit will require analysis under the National Environmental Policy Act. This analysis can range from an Environmental Assessment (EA) or "Mini-Environmental Impact Statement" to a full-scale Environmental Impact Statement (EIS). The Feasibility Study assumes that only an EA will be required for this project at an estimated cost of $200,000 and an estimated duration of 3 months. Conceivably, local opposition to the project could pressure the BLM to require that an EIS be completed for the project. The added cost and time required for an EIS has not been factored into the Feasibility Study.

Environmental Impact Statements for other mining firms have ranged from $200,000 to $2,000,000+ and have taken from 1 to 3+ years to complete.

PUBLIC RELATIONS

Two (2) communities are located within one (1) mile of the Yarnell deposit. Glen Ilah, which is primarily a retirement community with an estimated population of 200, is located about 2,500 feet away. Mining operations during the first several years of operation would be visible to about 25% of this community. The community of Yarnell, with an estimated population of 600 is located about 4,000 feet away. Mining operations would be shielded from Yarnell by topographic relief. An aggressive public relations strategy prior to and during the permitting process will likely be appropriate.

START-UP

All of the financial evaluations contained in the Feasibility Study are based on a best case production start-up scenario of July 1, 1991.

DEVELOPMENT EXPENDITURES

Continued project development will require an estimated $900,000 (on a 100% basis) over the first 4 to 5 months of development. Most of this expenditure is for the testing and engineering required for permit applications preparation. Another $13,000,000 (on a 100% basis) will be required prior to production start-up for pre-production capital expenditures including procurement, site preparation, construction, and pre-production stripping.

DEVELOPMENT SCHEDULE

If development of the Yarnell Project is deemed appropriate; then, per the Asarco/Norgold Exploration and Option Agreement, Asarco should deliver to Norgold: 1) A Feasibility Study (on a 100% basis only), 2) A written commitment (subject to a force majeure clause) to initiate commercial production within 3 years, 3) Certification that Asarco has complied with all terms of the Agreement, and 4) A work plan and budget for all activity prior to commencement of commercial production.

Once the above items have been accomplished, Asarco will be deeded and assigned a 51% interest in the property. The testing, engineering and permit preparations should begin immediately thereafter. Assuming this work commences in early April 1990, applications for the major permits (the APP and the BLM Plan of Operation) would be complete by July 1990 at the earliest.

Continued development after submission of applications for the major permits would depend on the approach Asarco takes with regard to the uncertainty involved in the BLM's Plan of Operation permitting process.

The illustration on the following page presents three start-up scenarios, labeled as options "A", "B", and "C". In each case, it is assumed that the permitting preparation work (at an estimated cost of $900,000) will commence in April 1990 and that permit applications will be submitted in July 1990.

Option "A" is a fast track approach in which pre-production capital expenditures (estimated at $13,000,000) would be made concurrently with the permitting procedure. This scenario, which was used for the financial evaluation portion of the Feasibility Study, would enable production start-up as early as July 1991. However, a disfavorable ruling by the BLM to require a full blown Environmental Impact Statement (EIS), would place the otherwise operational plant on standby for a minimum of one (1) year during the EIS process.

Option "B" is a more conservative approach. Pre-production capital expenditures would not commence until April 1991, which is the end of a 9 month period during which the BLM must provide a preliminary ruling regarding the necessity of an EIS. Under this schedule, production would commence in the second quarter of 1992. Naturally, a favorable ruling by the BLM prior to the end of the 9 month period would enable pre-production development to commence earlier.

Option "C" is a variation of Option "B" (the conservative approach), and shows the effect on production start-up if an EIS (with an estimated minimum duration of 1 year) is required for the project. Under this scenario, production would not commence until the 2nd. quarter of 1993.

S. L. Lakosky

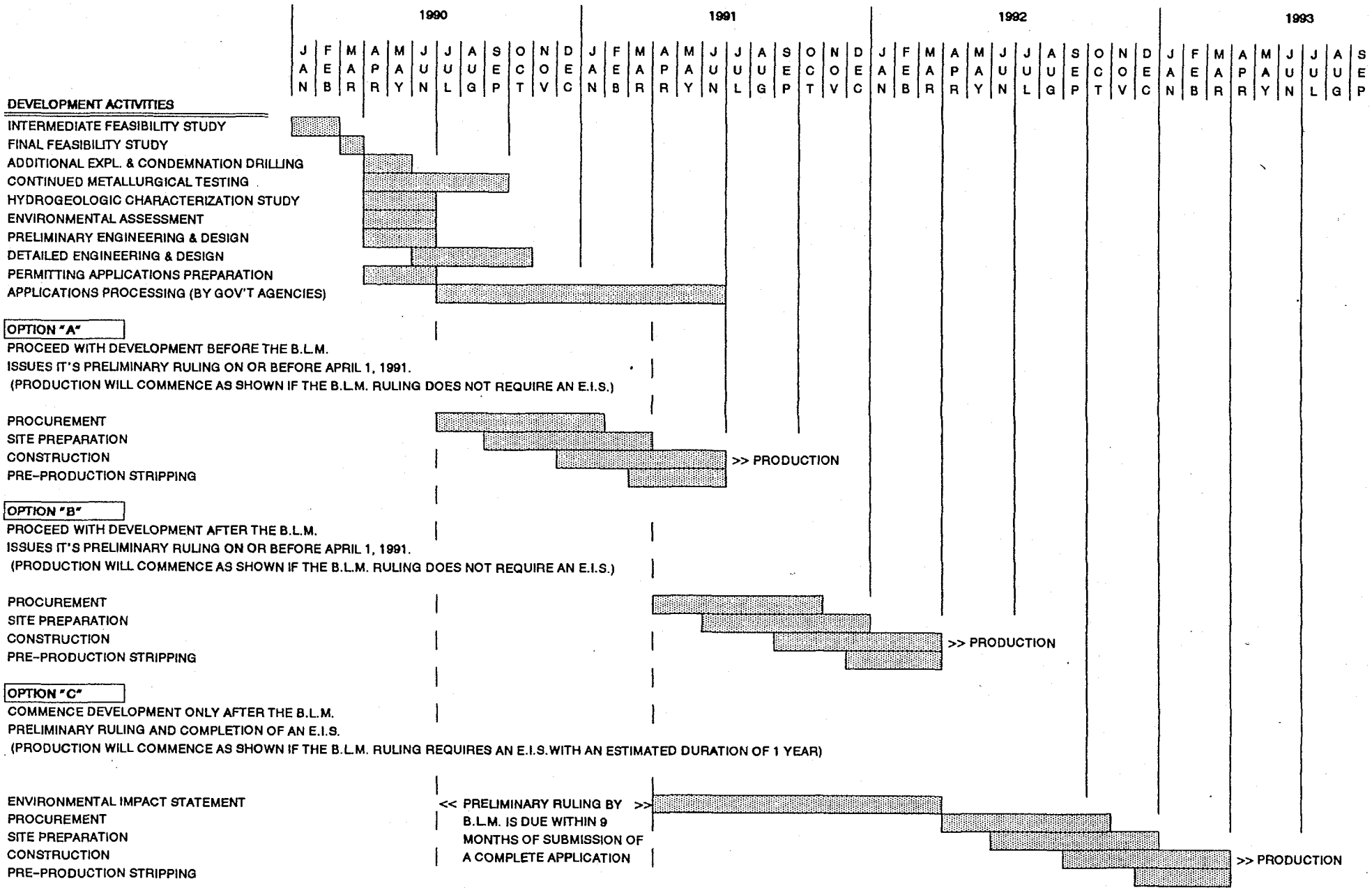
S. L. Lakosky
Yarnell Project Manager

SLL/kh

cc: RJKupsch -w/attach.
RLBrown " "
DECrowell " "
WLKurtz/JDSell[redacted] "
DFSKidmore -w/o attach.
PJMaley -" "
File -w/attach.

YARNELL PROJECT DEVELOPMENT SCHEDULE

4/3/90



ASARCO

Southwestern Mining Department
T. E. Scartaccini
General Manager

April 12, 1990

Mr. Christopher Moat
NORGOLD RESOURCES (US) INC.
2380 Harbour Centre
P. O. Box 12122
555 W. Hastings Street
Vancouver, B.C. V6B-4N6
Canada

ASARCO Inc.
APR 1 2 1990
SW Exploration

RE: Yarnell Project

Dear Mr. Moat:

During the month of March 1990, work continued on the Yarnell Project Feasibility Study.

The computer generated ore reserve was closely scrutinized by Asarco's Exploration and Mining Departments. After reducing the area of influence of one (1) drill hole which contained an anomalously high assay interval, and adjusting the reserve to account for previous underground open stope mining activity, no further refinements to the ore reserve model were deemed necessary for the Feasibility Study. *

Investigation of potential water sources indicates that under the most optimistic scenario, the estimated maximum continuous water supply potentially available would enable a maximum ore processing rate of 3,000 tons per day.

Site visits by several mining and crushing contractors were completed during the month of March.

Sincerely,

S. L. Lakosky
S. L. Lakosky
Yarnell Project Manager

SLL/kh
bcc: TEScartaccini
RLBrown
WLKurtz
JDSell[redacted]

* but, refinement of the ore reserve model is still in progress. Just how much will change is unknown but it will be more geologically-ore control compatible. JDS

ASARCO Incorporated P. O. Box 5747 Tucson, Az 85703-0747
1150 North 7th Avenue (602) 792-3010

ASARCO

Southwestern Mining Department
T. E. Scartaccini
General Manager

April 12, 1990

Mr. Michael D. Philpot
NORGOLD RESOURCES (US) INC.
2380 Harbour Centre
P. O. Box 12122
555 W. Hastings Street
Vancouver, B.C. V6B-4N6
Canada

Dear Michael:

Per your first request during our conversation this morning, ASARCO Incorporated has spent an estimated $971,000.00 on the Yarnell Project from January 1989 through February 1990.

In response to your second request that Asarco provide the basic design and cost criteria used thus far in the feasibility evaluation, our position remains as explained this morning. Preliminary design and cost criteria will not be provided until if and when Asarco delivers a Feasibility Study to Norgold. While work on the project has thus far progressed diligently, Asarco has until July 1, 1991 to provide a Feasibility Study to Norgold. Until that date, Asarco may continue to evaluate the project.

Sincerely,

S. L. Lakosky

S. L. Lakosky
Yarnell Project Manager

SLL/kh

bcc: TEScartaccini
RJKupsch
RLBrown
WLKurtz
JDSell

RECEIVED
APR 12 1990
EXPLORATION DEPARTMENT

ASARCO Incorporated P. O. Box 5747 Tucson, Az 85703-0747
1150 North 7th Avenue (602) 792-3010

Y-3.0

JDSell

you agree nothing due to be cut or changed area of influence.

ASARCO

Southwestern Mining Department
T. E. Scartaccini
General Manager

April 12, 1990

*See below

Mr. Christopher Moat
NORGOLD RESOURCES (US) INC.
2380 Harbour Centre
P. O. Box 12122
555 W. Hastings Street
Vancouver, B.C. V6B-4N6
Canada

RECEIVED
APR 12 1990
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Sincerely,

S. L. Lakosky
S. L. Lakosky
Yarnell Project Manager

SLL/kh
bcc: TEScartaccini
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WLKurtz
JDSell

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1150 North 7th Avenue (602) 792-3010

JDS

ASARCO

Southwestern Exploration Division

April 16, 1990

W.L. Kurtz

Metallics Assay
6 Samples
Yarnell Project
Yavapai County, AZ

Six samples were selected from the drill holes at Yarnell and a metallics/screen fraction/gold-silver assay was requested to the plus and minus 100 mesh material.

The attached Skyline Job No. TAJ 627B reports the values of gold-silver for the six samples.

Samples YM-6, -8, -63, -71, and -84 all contained their gold value in the minus 100 mesh material. Sample YM-90 contained some value (equivalent to 0.008 opt gold) in the plus 100 mesh, with the bulk of the value in the minus 100 mesh (equivalent to 0.050 opt gold).

From these results it would appear that only a small portion of "coarse" gold is found in the main "B" zone material.

The silver values are nil.

James D. Sell

James D. Sell

JDS:mek
Att.

cc: M.A. Miller
D.E. Crowell
S.L. Lakosky

SKYLINE LABS, INC.
1775 W. Sahuaro Dr. • P.O. Box 50106
Tucson, Arizona 85703
(602) 622-4836

REPORT OF ANALYSIS

JOB NO. TAJ 627B
April 12, 1990
YM-6 TO YM-93

ASARCO INCORPORATED
Attn: Mr. James D. Sell
Southwestern Exploration
P.O. Box 5747
Tucson, AZ 85703

Metallics Assay of 6 Resplit Reject Samples. Columns 8 and 9 are the calculated head values for gold and silver.

ITEM	SAMPLE NO.	1 Weight of Pulverized Split (grams)	2 Weight of +100m Fraction (grams)	3 Weight of Au in +100m Fraction (mgs)
1	YM-6	447.	.1164	<.002
2	YM-8	411.	.0375	<.002
15	YM-63	462.	.0784	<.002
16	YM-71	430.	.1670	.002
20	YM-84	481.	.1425	<.002
23	YM-90	461.	.2647	.125

ASARCO Incorporated
APR 16 1990
SW Exploration

Charles E. Thompson
Arizona Registered Assayer No. 9427

William L. Lehmbeck
Arizona Registered Assayer No. 9425

James A. Martin
Arizona Registered Assayer No. 11122

SKYLINE LABS, INC.
1775 W. Sahuaro Dr. • P.O. Box 50106
Tucson, Arizona 85703
(602) 622-4836

JOB NO. TAJ 627B
April 12, 1990

ITEM	SAMPLE NO.	4 Au in +100 m Fraction (oz/t)	5 Au in -100 m Fraction (oz/t)	6 Ag in +100 m Fraction (oz/t)
1	YM-6	<.002	.032	<.01
2	YM-8	<.002	.050	<.01
15	YM-63	<.002	.055	<.01
16	YM-71	<.002	.125	<.01
20	YM-84	<.002	.055	<.01
23	YM-90	.008	.050	<.01

ASARCO Incorporated
APR 16 1990
SW Exploration

Charles E. Thompson
Arizona Registered Assayer No. 9427

William L. Lehmbeck
Arizona Registered Assayer No. 9425

James A. Martin
Arizona Registered Assayer No. 11122

SKYLINE LABS, INC.
1775 W. Sahuaro Dr. • P.O. Box 50106
Tucson, Arizona 85703
(602) 622-4836

JOB NO. TAJ 627B
April 12, 1990

ITEM	SAMPLE NO.	7 Ag in -100 m Fraction (oz/t)	8 Au in Original Sample (oz/t)	8 Ag in Original Sample (oz/t)
1	YM-6	<.01	.034	<.01
2	YM-8	<.01	.050	<.01
15	YM-63	<.01	.055	<.01
16	YM-71	<.01	.125	<.01
20	YM-84	<.01	.060	<.01
23	YM-90	<.01	.058	<.01

cc: Metcon Research
Attn.: Mr. Eugene Salazar
1844 W. Grant Rd., #106
Tucson, AZ 85745

ASARCO Incorporated
APR 16 1990

Charles E. Thompson
Arizona Registered Assayer No. 9427

William L. Lehmbeck
Arizona Registered Assayer No. 9425

James A. Martin
Arizona Registered Assayer No. 11122

40' YM 14- Bottom 10' .035

~~20~~ 40' ~~isolate~~ YM-64 " ~~.018~~ 5' 10' .020 ~~.01½~~

one no seed below

70' isolate YM-78 " ~~15~~ 5' 1 .031 .015½

~~.015~~ .018

isolate YM-87 95' 70' .019 @ .025 TD

sub zone
~~contin at YF~~
but below YF mineral

Down Dip Hole

20' YM-62 Bottom 5' .052

isolated

90' below YM-1 Bottom 5' .040

1-14 may be sub parallel along strike 44 downdip

	DH-1	+35' fault 5'	+50' 2) fault 10'	+50' 3) Slope ≈50'	+20' 4) fault 4'
	(8)		+20' (40)	+10' (6.3)	+25' (75)
Sericite	30' ↑ 10 ↓		15.5 ↑ silch ↓	60 to 110' ↑ ↓ 50	35 ↑ ↓ silch
argillic	silch ↑ overlap silch		silch ↑ overlap 45'	silch ↑ silch	silch ↑ 30'
propylitic	+ 100 ↓ 30+		45 ↑ ↓ 40'+ TD	sericite & sep. ↑ ↓ 55+ TD	+ 40' & sep. ↑ ↓ 40' TD

fresh hard core below

med grained ph - eq.
strong cuttings / granulation

Y-161

alt sequence

Plagam	24
mica	44
Qtz	5?
biot	2
sec. element	3
sec qtz	10
sec. K-spar	15? (adularia)
sec sericite	7

~~a~~ med grained phaneritic, equigranular
altered sequence

Y-157

also PS w/Au

Plag	27
mica	44 minor
Qtz	3
biot	2
sec. seri	2
sec clay	3
py (1) sec FeOx	2

Calcite + albite veining

as above
now strongly sheared & recrystallized

Y-160

PS-160 w/Au

Plag	20?
mica	62
Qtz	12
biot	5
sec qtz	22
sec chlorite, epidote	1
sec seri	10
sec clay	10
py (2) goethite	4

Fltzone

med grain phenocrysts, ~~equigranular~~ selectively
Y-158

	Plag an?	36
PS-158 w/ Ag	mica	40
	qtz	15
	kspar	8 partially
	sec qtz	5
	sec seri	27
py(2)	sec rutile	3

as above

moderate seri - (phyllic alt.)
Y-154

	Plag	35
	mica	45
	qtz	12
	biotite	6
	sec. qtz	2
	sec. seri	20
	sec chlorite	4
	sec calcite	2
py(-1)	sec hem	1

Au?

as above

mod seri
Y-155

	Plag	35
	mica	41
	qtz	12
	biotite	10
	sec seri.	20
py(-1)	sec. limonite	2

Au?

Medgrained phaneritic, equigranular biotite granite

weakly altered
Y-150

Plag. An?	25
Microcline	50
Quartz	14
biotite	7 / 98
sec. ~~[illegible]~~	6
sec. epidote	3
sec. hematite	1
sec. chlorite	1

all have crushed + albite twinning

as above.

possibly alt
Y-152

Plagioclase	30
Microcline	44
Quartz	15
biotite	9 / 98
sec. ~~[illegible]~~	9
sec. mnox	2

An?

YARNEL (YM-)

Table 4 Comparison of Original assay vs Skyline Head & Metcon Calc.-head assays.

April 25, 1990 CN Leach TRAVERVAL report RCD-

Hole #	Feet	TRIAD Original Assay	SKYLINE Skyline Head	Metcon 72hr-CN Calc. Head	METCON CALCULATED
		2.	4.	6. (6)	
1.0	6	042	075	060	
1.3	8	041	055	074	
1.6	14	040	036	051	
1.9	15	034	028	037	
2.2	18	078	080	071	
2.5	25	070	065	067	
2.8	33	051	050	055	
3.1	40	062	060	074	
3.4	43	063	055	064	
3.7	47	031	020	036	
4	48	049	036	045	
4.3	49	049	034	039	
4.6	53	036	034	044	
4.9	54	054	055	068	
5.2	63	081	046	077	
5.5	71	131	120	141	
5.8	75	066	055	065	
6.1	79	046	032	056	
6.4	82	049	040	052	
6.7	84	062	120	073	
7	87	050	036	068	
7.3	88	064	085	086	
7.6	90	062	055	053	
7.9	93	064	065	075	
	1450	82.150	77.705	91.235	
		=0.057	=0.054	= 0.063	

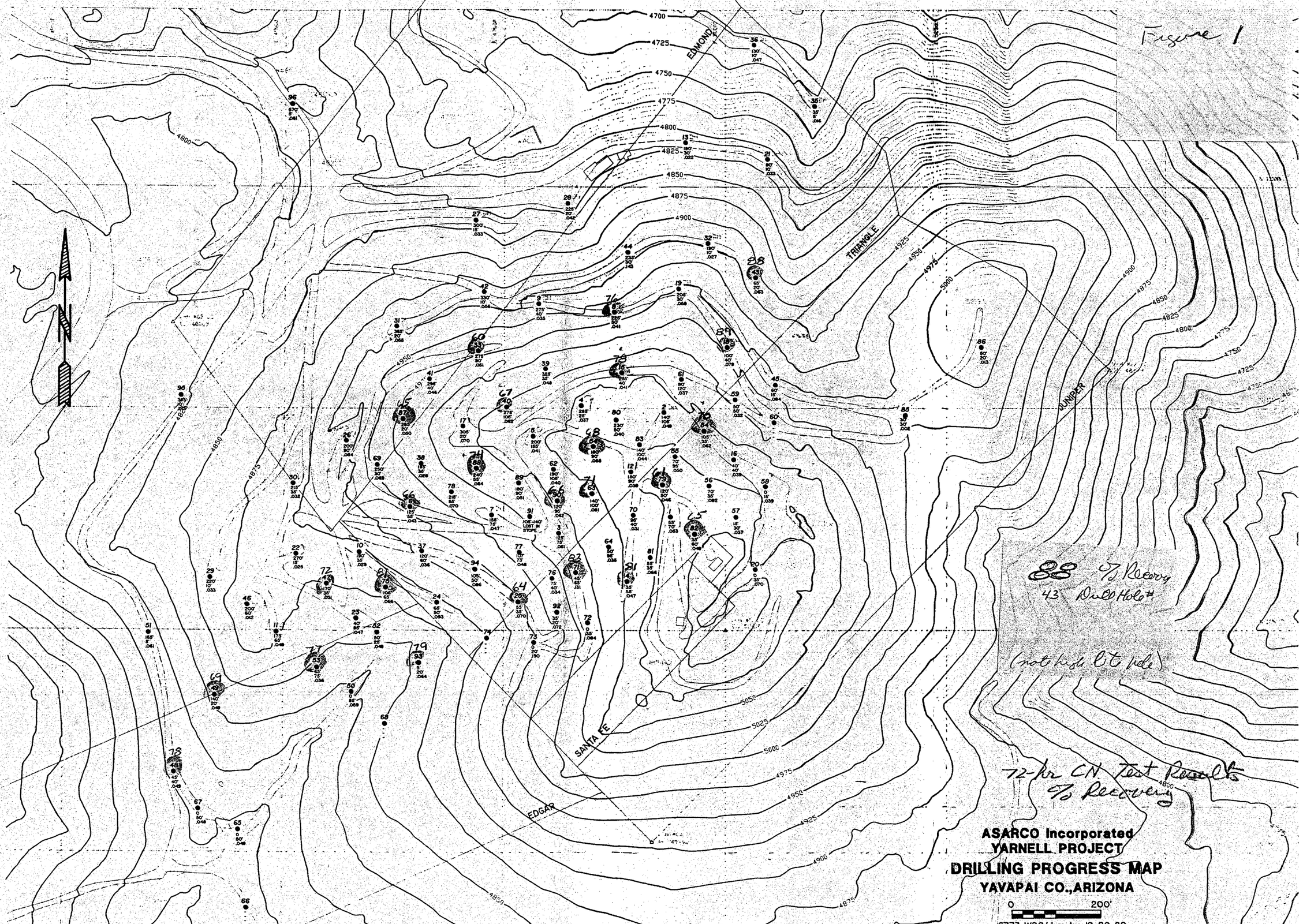


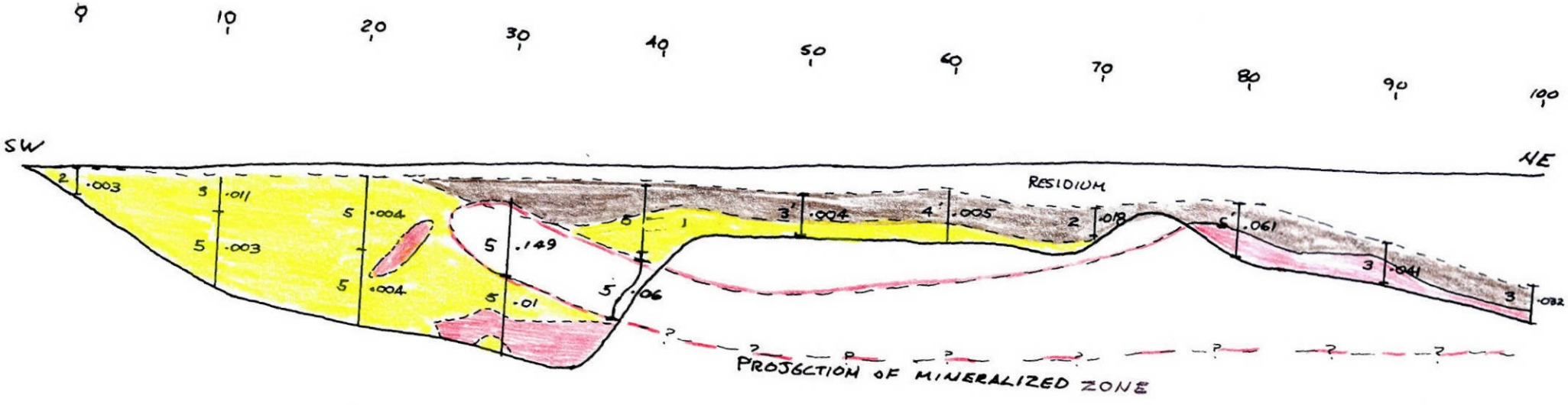
Figure 1
EDMOND
TRIANGLE
JUNIPER
SANTA FE
EDGAR
% Recovery
Drill Hole #
(not high lit pile)
72-hr CN Test Results
% Recovery
ASARCO Incorporated
YARNELL PROJECT
DRILLING PROGRESS MAP
YAVAPAI CO., ARIZONA
0 200'
mri6773 WDG/dam tuc 10-20-89

TRENCH Y-117

Trench Footage		Assay Value (in opt Au)
0	0-2'	.003
10	0-2'	.011
	2-7'	.003
20	0-5'	.009
	5-10'	.004
30	0-5'	.149
	5-10'	.01
40	0-5'	.021
	5-10'	.06
50	0-3'	.004
60	0-3'	.005
70	0-3'	.018
80	0-5'	.061
90	0-3'	.041
100	0-3'	.035

NOTE: "0" starts at top of sampling, not top of trench (see attached section)

TRENCH Y-117 LOOKING NW



CHLORITIC/PROPYLITIC LOOKS LIKE FOOTHILL TYPE ROCKS.

STRONGLY SILICEOUS

RED HM PATCHES W/IN OUTLINED ZONES > 50% RED HM

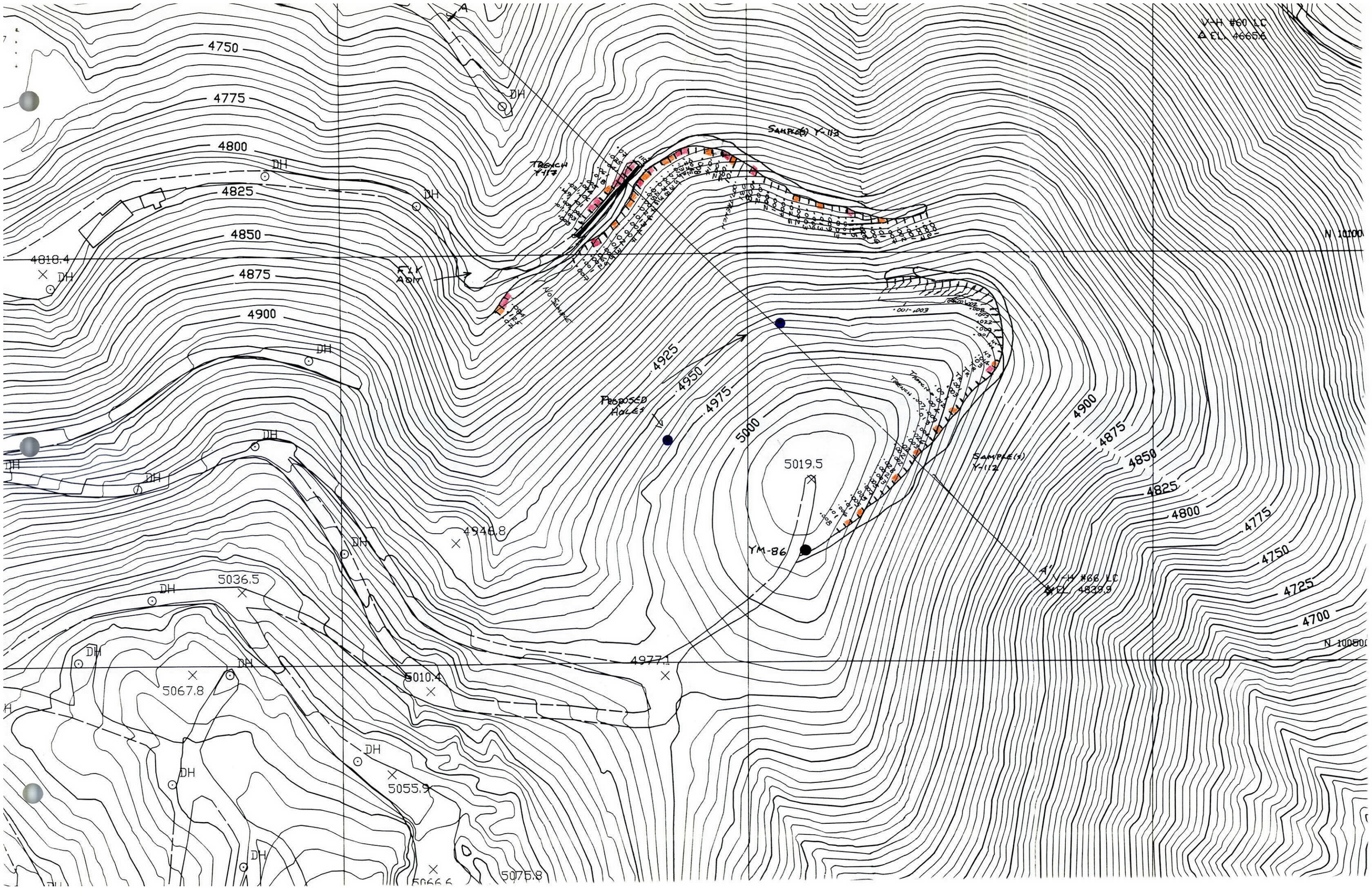
SPECULARITE VNLTS
SERICITE QZ VNLTS
N50°E, ±5°NW
(MAJOR STRUCTURE

STRONGLY SER.
POSS. OVERPRINTED POTASSIC ADDITION
QZ VNLTS
LIM VNLTS.

RED HM PATCHES
STRONGLY SILICEOUS
+
STRONG SERICITE ALTERATION

PATCHES OF RED HM BOTTOM TRENCH 1' %

1" = 10'


V-H #60 LC
EL. 4665.6
4750
4775
4800
4825
4850
4875
4900
4925
4950
4975
5000
5019.5
DH
SAMPLE(S) Y-113
TRENCH Y-113
NO SAMPLE
ELK ADIT
PROPOSED HOLES
SAMPLE(S) Y-112
TRENCH
YM-86
4946.8
5036.5
4977.1
5010.4
5067.8
5055.9
5066.6
5075.8
4818.4
V-H #66 LC
EL. 4839.9
N 10100
N 10050
4725
4700

JDS

ASARCO

Southwestern Exploration Division

April 17, 1990

FILE NOTE

Falcon Exploration
Mine Close-down
Equipment Sale
Gilbert Area
Esmeralda County, NV

In returning from Reno, I noted a large EQUIPMENT FOR SALE sign at a closed-down heap-leach operation.

Fleetwood informs me that the people to call are:

Falcon Exploration
Phone: 702/482-3566
Tonopah, Nevada.

The mine is some 25 miles west of Tonopah alongside US 95.

Fleet believes all the little stuff has long been sold, but I noted the modular office-lab-recovery system type buildings were still on site.

A quick call may determine if any Yarnell type equipment is available at bargin-basement costs, including transportation.

Fleet also informs me that under the new Nevada regulations, Falcon Exploration may have a large decontamination, close-down cost, and perhaps that is why the larger buildings are still on site.

James D. Sell

JDS:mek

James D. Sell

cc: S.L. Lakosky
W.L. Kurtz

JDS

ASARCO

Southwestern Exploration Division

April 17, 1990

J.D. Sell

Yarnell Progress Report
Yarnell Project
Yavapai County, AZ

Mapping was completed in Sections 14 and 23 at 1"=200'. No additional mineralization has been found; however, there are areas of weak to moderate alteration that have been located. The final compilation of the mapping is in progress but has been delayed by other projects. All drill core has been sawed and submitted to Triad Minerals for assay. Results have been received and a report will be forthcoming. Preliminary results from the assay of the ore sections only seems to indicate that the variance in the assay results from reverse circulation and diamond drilling is balanced. (There does not appear to be a skewing of the data in one direction or another.) This suggests that the reverse circulation drilling is reporting accurate results assuming that the diamond drilling is most accurate (this is an assumption).

Ore Reserves

Several days were spent and will extend into the next month on the computer generated ore reserves. It appears that we can show more continuity in grade and tonnage than the computer has shown. These changes when approved by the committee will be incorporated in the reserve and a new economic model will be run.

MAM:mek

Mark A. Miller

cc: W.L. Kurtz

JDS

ASARCO

Southwestern Exploration Division

April 17, 1990

J.D. Sell

Yarnell Property
Interest in Farm-out
from Gold Star Mining
(Energy Fuels)

I received a call from Pat Hillard, Chief Geologist for Gold Star Mining (Energy Fuels) inquiring about future of Yarnell Mine. They would like to be considered for a farm-out on the Yarnell mine if Asarco does not want to pursue it. I informed him that no decision has been made, but I would pass their interest on.

Contact can be made at either:

I.W. Mathisen Jr.
Vice President Exploration
Gold Star Mining
One Tabor Center, Suite 2500
Denver, Colorado

Phone: 303/623-8317

or

Pat Hillard, Chief Geologist
Energy Fuels Nuclear, Inc.
Box 1320
Kanab, Utah

Phone: 602/643-7325

JDR:mek

James D. Rasmussen

cc: M.A. Miller

JDS

Law Offices of
P. MICHAEL MARFISI, LTD.

P.O. Box 871
555 - 6th Street

(702) 738-9211
Elko, Nevada 89801

see cover sheet attached for distribution

FAX MEMORANDUM

TO: NORGOLD RESOURCES
Attn: Michael

FAX NUMBER: (604) 687-8787

FROM: P. MICHAEL MARFISI, ESQ.

DATE: April 18, 1990

Re: **DELBERT C. LAYTON - ESTATE**

Subject: *Letters Testamentary (Priscilla Layton)*

****

Dear Sir:

I have just spoken with Mrs. Priscilla Layton who expressed that I fax you a copy of the Letters Testamentary in the Matter of the Estate of DELBERT C. LAYTON aka D.C. LAYTON, Deceased.

Very truly yours,

P. MICHAEL MARFISI

APR 18 1990
Siv Exploration

****

TO THE RECEIVER OF THIS FACSIMILE: IF FOR ANY REASON YOU DO NOT RECEIVE THE ABOVE SPECIFIED PAGES, PLEASE PHONE LYNN COMMUNICATIONS FOR RETRANSMISSION (702) 738-5191. THANK YOU.

FILED

'89 JUN 19 A10:10

CLERK KAREN VASQUEZ
DEPUTY S. Hammond

CASE NO. 3827

DEPT. 1

IN THE FOURTH JUDICIAL DISTRICT COURT OF THE STATE OF NEVADA

IN AND FOR THE COUNTY OF ELKO

IN THE MATTER OF THE ESTATE OF DELBERT C. LAYTON aka D.C. LAYTON, DECEASED.	**LETTERS TESTAMENTARY**

STATE OF NEVADA)
) SS.
COUNTY OF ~~WHITE PINE~~ ELKO)

THE LAST WILL of DELBERT C. LAYTON, Deceased, having been duly admitted to Probate in our said Court, PRISCILLA A. LAYTON, who is named therein Executrix, is by our said Court on the 19th day of June, 1989, duly appointed Executrix, and who having qualified as such is hereby authorized to act by virtue thereof.

IN TESTIMONY WHEREOF, I have officially signed these Letters and affixed hereto the seal of said Court this 19th day of June, A.D., 1989.

KAREN VASQUEZ, CLERK

BY S. Hammond
DEPUTY

Law Offices of
P. MICHAEL MARFISI, LTD.

OATH OF OFFICE

I, PRISCILLA A. LAYTON, do solemnly swear that I will perform according to law, the duties of Executrix of the Estate of DELBERT C. LAYTON aka D.C. LAYTON, Deceased.

/s/ PRISCILLA A. LAYTON

PRISCILLA A. LAYTON

Subscribed and sworn to before me this 19th day of June, 1989.

KAREN VASQUEZ

NOTARY PUBLIC L. Hammond

CERTIFICATION OF COPY

STATE OF NEVADA
COUNTY OF ELKO SS.

I, KAREN VASQUEZ, COUNTY CLERK AND EX-OFFICIO CLERK OF THE DISTRICT COURT OF THE FOURTH DISTRICT OF THE STATE OF NEVADA, IN AND FOR THE COUNTY OF ELKO, DO HEREBY CERTIFY THAT THE ANNEXED IS A FULL, TRUE AND CORRECT COPY OF THE INSTRUMENT AS THE SAME APPEARS ON FILE AND OF RECORD IN MY OFFICE.

Witness my hand and the seal of said court affixed the 19th day of June A.D. 19 89.

KAREN VASQUEZ, County Clerk

By L. Hammond, Deputy Clerk

JDS

cc: W.D. Gay
W.L. Kurtz
S.L. Lakosky
C.L. Snow

FACSIMILE TRANSMISSION

DATE: April 18/90

TO: ASARCO

ATTENTION: Jim Sell

TOTAL NO. OF PAGES: 4 (including this page)

FROM: Michael Phelgat > NORGOLD RESOURCES INC

Suite 206/210 - 475 Howe Street
Vancouver, B.C.
V6C 2B3 Canada

Telephone: (604) 681-5566

Facsimile No.: (604) 687-8789

ASARCO Incorporated

APR 18 1990

SW Exploration

* * * * * * * * * * * * * * * *

IF THIS TRANSMISSION IS NOT FULLY OR LEGIBLY RECEIVED

PLEASE TELEPHONE (604) 687-4144

OPERATOR: AR

NOTES:

URGENT : Please forward to Mr. Sell A.S.A.P

TXS AR

ASARCO

Exploration Department
Southwestern United States Division

James D. Sell
Manager

CERTIFIED MAIL
RETURN RECEIPT

April 18, 1990

Mrs. Priscilla Layton
Box 13 Route , Box 13
Elko, Nevada 89801

Dear Mrs. Layton:

Enclosed is Asarco's check of $15,000 as payment due April 21, 1990 per item 1 of Option to Purchase Victoria Claims, Arizona, dated April 21, 1989, between NORGOLD RESOURCES (US) INC. and Mr. and Mrs. D. Layton.

Sincerely yours,

James D. Sell

JDS:mek
Enc.

cc: M.D, Philpot - Norgold Resources (US) Inc.
C.L. Snow
S.L. Lakosky

ASARCO Incorporated P. O. Box 5747 Tucson, Az 85703-0747
1150 North 7th Avenue (602) 792-3010

JDS

ASARCO

Exploration Department
Southwestern United States Division

James D. Sell
Manager

CERTIFIED MAIL
RETURN RECEIPT

April 18, 1990

Mrs. Priscilla Layton
Box 13 Box 192
Box 192-13
Elko, Nevada 89801

Dear Mrs. Layton:

Enclosed is Asarco's check of $15,000 as payment due April 21, 1990 per item 1 of Option to Purchase Victoria Claims, Arizona, dated April 21, 1989, between NORGOLD RESOURCES (US) INC. and Mr. and Mrs. D. Layton.

Sincerely yours,

James D. Sell

JDS:mek
Enc.

cc: M.D. Philpot - Norgold Resources (US) Inc.
C.L. Snow
S.L. Lakosky

ASARCO Incorporated P. O. Box 5747 Tucson, Az 85703-0747
1150 North 7th Avenue (602) 792-3010

JDS

ASARCO

Southwestern Exploration Division

April 23, 1990

W.L. Kurtz

J.D. Rasmussen's
Trace Element Geochemistry
Yarnell Mine
Yavapai County, Arizona

I transmit Mr. J.D. Rasmussen's report on his study and interpretation of the soil and rock chip geochemistry in the Yarnell Mine area.

Of interest is the soil gold value of 100 ppb found over the ore zone, and to the south. At the GSN field trip to Carlin, NV, I learned that Newmont does not fuss with any anomaly less than 100 ppb. Also, if you convert the rock chip values near the surface outcrops, the value would be above 100 ppb gold.

Under Discussion, p. 2, Rasmussen states "I favor the extension of gold-bearing fluids into the footwall ..." (See Attachment 2). The silver values (Attachment 3), and the molybdenum values (Attachment 5) also show a similar distribution which may back up such thoughts. Only one mercury value (Attachment 4) shows up in the footwall block and this would be in keeping with its volatile nature, and as shown in the report, the major concentrations of volatile mercury and arsenic are within the weak alteration zone and several hundred feet above the top of the ore zone as now known (Attachment 4).

The results of this orientation study should be of help in evaluating similar zones in Central Arizona, and perhaps elsewhere.

James D. Sell

James D. Sell

JDS:mek
Att.

cc: F.T. Graybeal
J.D. Rasmussen
M.A. Miller

JDS

ASARCO

Southwestern Exploration Division

March 20, 1990

J.D. Sell

Trace Element Geochemistry
Orientation Study
Yarnell Mine
Yavapai County, Arizona

INTRODUCTION

Soil, borehole cuttings and rock chip samples were collected and analyzed as part of a trace element orientation study about the Yarnell Mine site. The purpose of the study was to identify trace concentrations of elements that may be of use in exploration or evaluation of prospects similar to Yarnell. The investigation objectives were to establish verifiable thresholds for anomalous elements using both soil and rock as sample media. The study also was to generally evaluate the geographic distribution of the anomalous populations.

One hundred thirty-nine soil samples were collected at 100 foot spacing along five (5) north-south oriented lines. Four of the lines traverse the outlined orebody from the base of "Yarnell Hill," near the present water well, south 3000 feet, ending 1400 feet south of the open cut on the Yarnell Fault. These four lines are separated by 100 feet. The fifth line (2000 feet long) located 450 feet west of the others was collected to investigate changes associated with the contact between weak alteration and fresh granite. Attachment 1 illustrates the soil sample pattern and presents the sample locations. All soil samples were taken within the outcrop of the hosting granite and included the fresh, weak altered and moderate altered zone defined by Mark Miller were sampled. The location of these zones is noted where applicable on the attachments.

In addition to the soils sixty splits were gathered from borehole samples and rock chip samples previously collected. Splits of rejects from borehole YM-6 and YM-26 were sampled every 25 feet. Also, splits of samples cut along the "Main Drift" were taken every twenty feet. The location of the boreholes and the drift are shown on Figure 1. It

should be noted that no rock samples were taken from outside the weak or moderate alteration zones.

The soils and sample splits were analyzed by Geochemical Services Inc. (GSI) using their SRP30 (soils) and GXPL10, (rock chip) analytical packages. The soils were dried and sieved to -80 mesh before analysis. Both packages included the following elements: Au, Ag, As, Bi, Cd, Hg, Sb, Se, Te, Cu, Mo, Pb, Zn, Ga, Tl. The results are attached as Appendix A.

The results were plotted as histograms, converted to cumulative frequency plats and partitioned into background and anomalous populations as outlined by Sinclair, A.S., 1976, Application of Probability Graphs in Mineral Exploration, Assoc. of Exploration Geochemists, Special Volume No. 4. The work sheets for both the histograms and cumulative frequency plots are included as Appendix B & C. The plotting and partitioning were done by hand since Asarco does not have the software to do this on a computer. A summary of the results are presented in Table 1.

DISCUSSION

Attachment 2 and 3 are contour maps of the gold and silver concentration in the soils. On Attachment 1 gold concentration above 100 ppb are localized over the orebody as expected. However, only the samples taken over the fresh granite on the western line and four samples in the south of the main block are below the calculated threshold of 7 ppb. Two arguments as to why the background samples are so extensive to the south are possible; first, soils may be remnants from a now eroded part of the orebody or, second; gold bearing fluids extended into the foot wall of the Yarnell Fault, well below the limit of weak alteration. I favor the extension of gold bearing fluids into the foot wall because the geography of the area would make it difficult for downslope movement of soils to spread values 500 feet away from the base of the hill where the mine is located.

Silver concentration above 100 ppm are grouped above the Yarnell orebody even though no discernable division between anomalous and background population was identified. The reason for this apparent lack of a background population could be a lag or wide dispersement of values in the soil during erosion or a wider "halo" of silver than the area sampled during this study. Unlike gold the single population of silver extends into both the foot and hanging walls of the Yarnell Fault. In either case, additional work would be needed to identify a true background in silver.

Attachments 4 and 5 present the location of the few samples anomalous in volatile and base metals, respectively. In both groups, anomalous samples are concentrated in the northern end of the sample block. This area is near the bottom of a slope which may account for the location of these anomalous values. But, this area is also where the orebody is deepest which may imply a concentration of these elements vertically higher than precious metal ore grade material. This interpretation is particularly attractive for the volatile elements.

Attachment 6 presents bar graphs of the rock elemental concentrations for each borehole and drift. The thresholds, alteration zones and the Yarnell Fault zone are marked for each element plotted. Gold and silver are understandably concentrated in the moderately altered rock about the Yarnell Fault. Interestingly, copper, and to some extent zinc are depleted within the moderate alteration zone in the two boreholes, although occasional "spikes" are present. Also, molybdenum is elevated in the moderate zone within the boreholes. Base metals do not show variation in the main drift.

CONCLUSION

When soils are the sample media, gold is the best trace element indicator of gold mineralization. However, the diameter of the anomaly is problematic since concentrations of above threshold gold continue to the southern extent of the sampling. Concentrations of 100 ppb or greater gold continue to the weak altered - fresh granite contact in the hanging wall (north). The plus 100 ppb values also occur most widespread, above ore grade material.

Silver in soils is an enigma. Silver values greatly above crustal abundance (100 ppm) outline the orebody in the sample set, but a discernable threshold between an "anomalous" population and background values cannot be verified. The case may be that the anomaly is larger than the area covered by this sampling.

Volatile and base metals in the soils are present in anomalous concentrations in a few samples, but do not occur frequently enough to be of use in exploration. The clustering of anomalies at the north end of the close-spaced lines must be more completely understood before these elements will be applicable in exploration.

When rock is the sampled media, anomalous concentrations of gold and silver occur within the moderate altered zone. Concentrations above calculated threshold of arsenic, the only volatile metal present in sufficient quantity to be measured, occur only within the moderate zone.

Base metals appear depleted in the moderate alteration zone. This study indicates that both soils and rock chip samples can be used in exploration for Yarnell-like deposits. Gold is the best indicator element for either sample media, but silver should also be included in any program because of the very elevated silver concentration about the orebody. Thresholds will, of course, depend on the host rock of the exploration target.

Jim

JDR:mek James D. Rasmussen

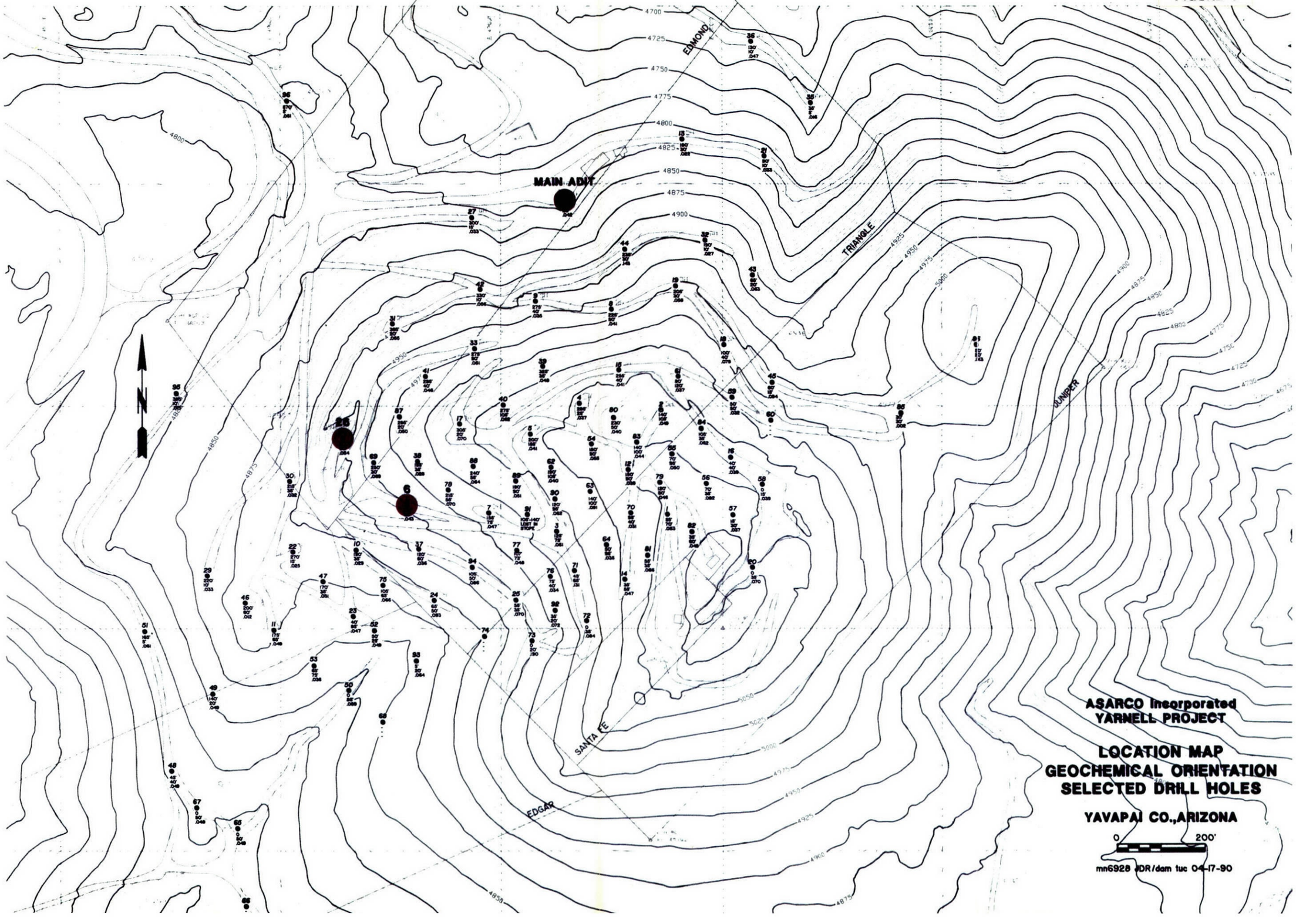
YARNELL MINE

Yavapai County, Arizona

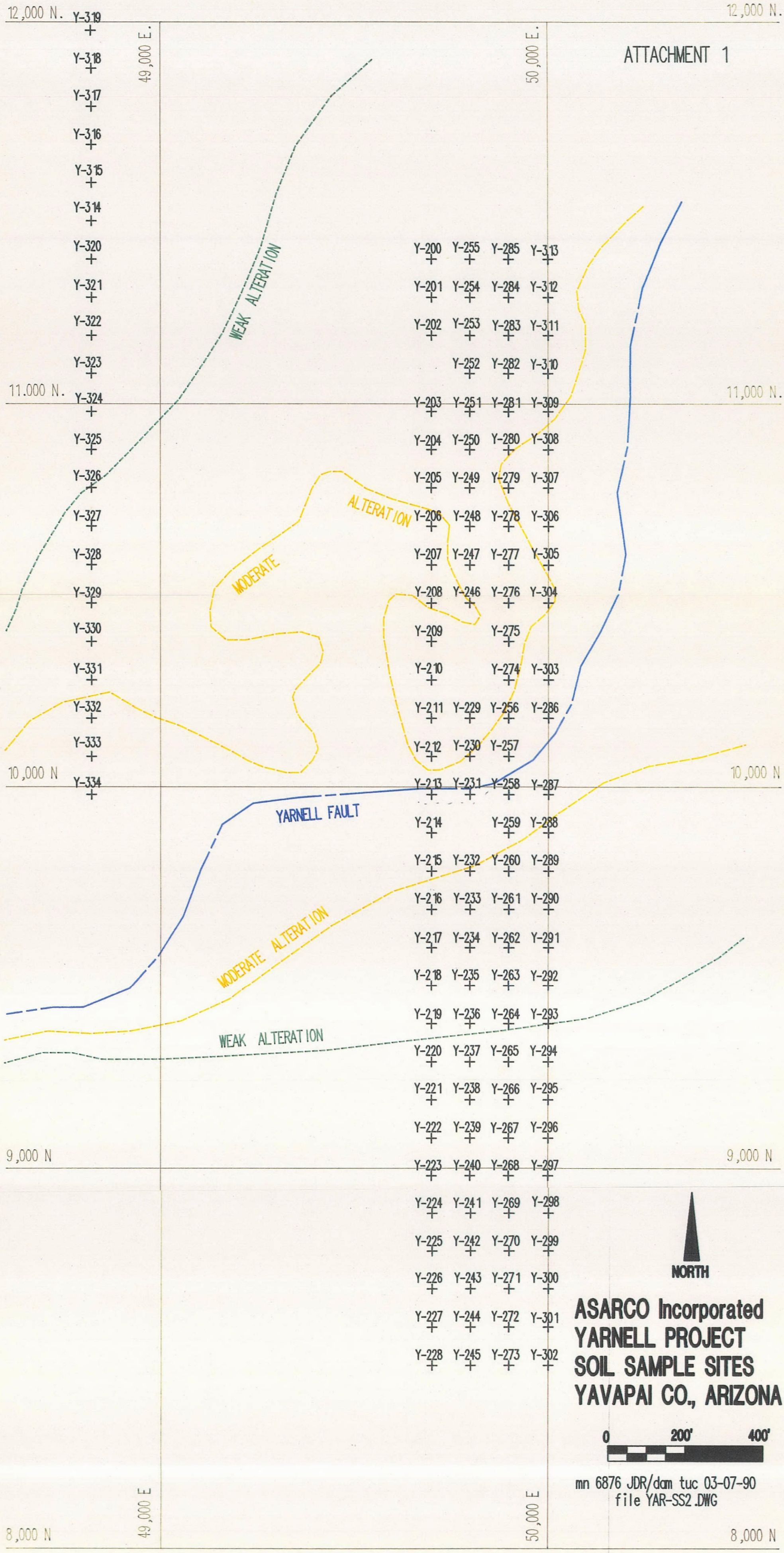
Table I Summary of Threshold for Soil and Rock Samples (dash [-] indicates insufficient values above detection limit to determine threshold).

Element	Soil Threshold	Rock Threshold	Comments
Au	7 ppb	.05 ppm	Small percentage of background in soil sample set.
Ag	Single Population	.20 ppm	No verifiable change in soil population, although values range well above crustal concentrations.
As	25 ppm	100 ppm	Rock chip cumulative frequency plot indicates three populations may be present.
Bi	0.72 ppm	--	
Cd	Single Population	Single Population	
Cu	Single Population	6.2 ppm	Depletion of Cu in rock chips within moderately altered rock.
Mo	2.1 ppm	5.0 ppm	
Pb	36.0 ppm	19.0 ppm	Small percentage of anomalous values in both sets.
Zn	200 ppm	60 ppm	Soils from histogram only, see Appendix B.
Sb	2.0 ppm	--	Soils from histogram only, see Appendix B.
Hg	0.95 ppm	--	
Ga	Single Population	--	

FIGURE 1


MAIN ADIT
EDMOND
TRIANGLE
JUNIPER
SANTA FE
EDGAR
N
ASARCO Incorporated
YARNELL PROJECT
LOCATION MAP
GEOCHEMICAL ORIENTATION
SELECTED DRILL HOLES
YAVAPAI CO.,ARIZONA
0
200'
mn6928 JDR/dam tuc 04-17-90

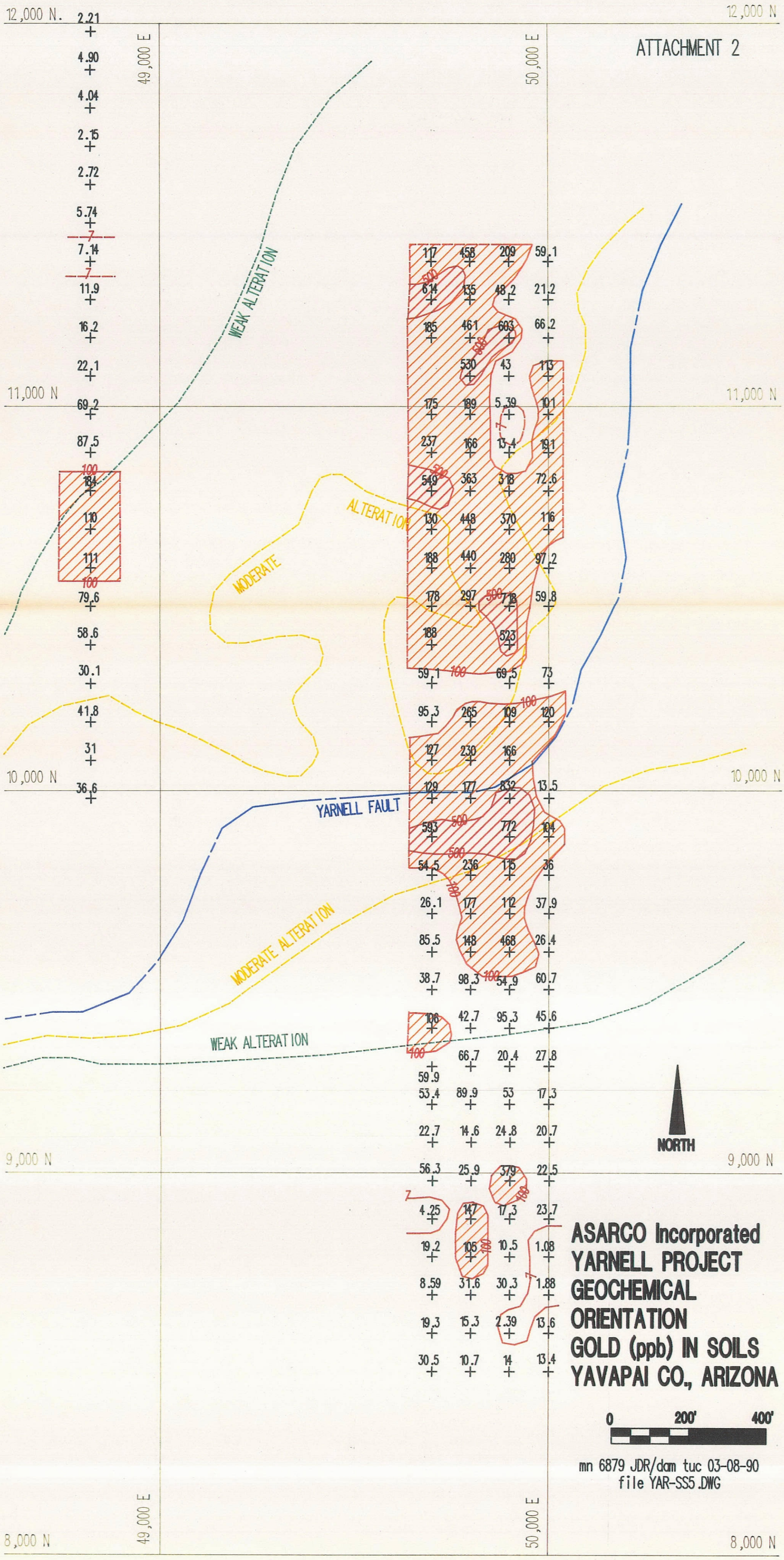
ATTACHMENT 1



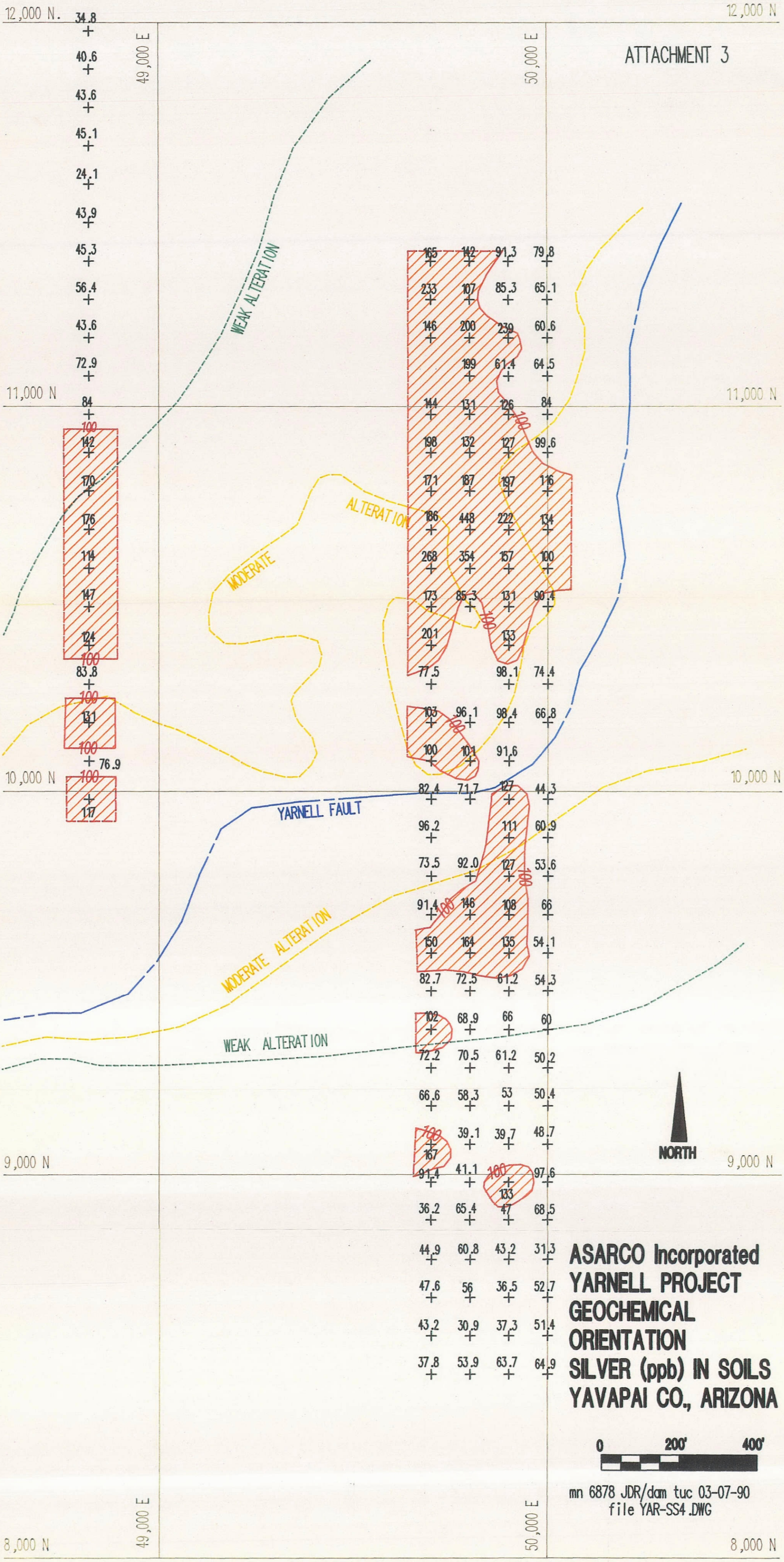
ASARCO Incorporated
YARNELL PROJECT
SOIL SAMPLE SITES
YAVAPAI CO., ARIZONA

mn 6876 JDR/dam tuc 03-07-90
file YAR-SS2.DWG

ATTACHMENT 2



ATTACHMENT 3



ASARCO Incorporated
YARNELL PROJECT
GEOCHEMICAL
ORIENTATION
SILVER (ppb) IN SOILS
YAVAPAI CO., ARIZONA

0 200' 400'

mn 6878 JDR/dam tuc 03-07-90
file YAR-SS4.DWG

ATTACHMENT 4

ASARCO Incorporated
YARNELL PROJECT
GEOCHEMICAL ORIENTATION
VOLATILE ELEMENTS ABOVE THRESHOLD IN SOILS
YAVAPAI CO., ARIZONA

ATTACHMENT 5

12,000 N.

12,000 N

49,000 E

50,000 E

WEAK ALTERATION

ALTERATION

MODERATE

11,000 N

11,000 N

10,000 N

10,000 N

YARNELL FAULT

MODERATE ALTERATION

WEAK ALTERATION

9,000 N

9,000 N

NORTH

Pb (36ppm)

COLOR INDICATES CONCENTRATION
ABOVE THRESHOLD VALUE NOTED

Mo (2.1ppm)

Zn (200ppm)

ASARCO Incorporated
YARNELL PROJECT
GEOCHEMICAL
ORIENTATION
BASE METAL ABOVE
THRESHOLD IN SOILS
YAVAPAI CO., ARIZONA

0 200' 400'

mn 6877 JDR/dam tuc 03-07-90
file YAR-SS3.DWG

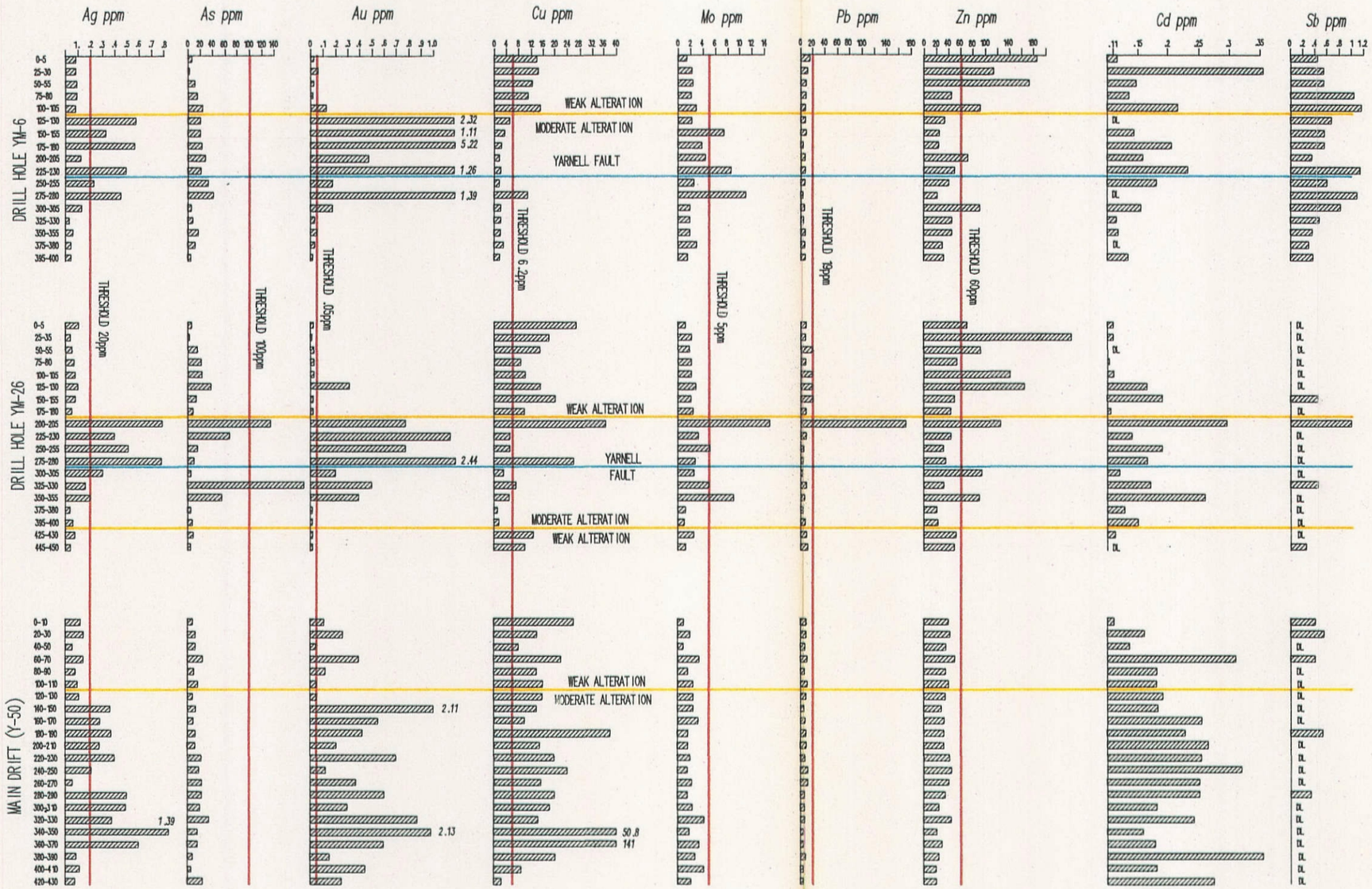
49,000 E

50,000 E

8,000 N

8,000 N

ATTACHMENT 6



ASARCO Incorporated
YARNELL PROJECT

GEOCHEMICAL ORIENTATION
TRACE ELEMENT DISTRIBUTION
DRILL HOLES YM-6, YM-26
AND MAIN DRIFT
YAVAPAI COUNTY, ARIZONA
J.D.R. 3/20/90

MN 6880 JDR/DAM TUC 03-20-90
FILE YAR-SS6.DWG

APPENDIX A

ANALYTICAL RESULTS

GEOCHEMICAL SERVICES INC.

GEOCHEMICAL ANALYSIS REPORT

JOB #: ASB-OR1722

SAMPLE ID	#	Ag ppb	Au ppb	As ppm	Bi ppm	Cd ppm	Hg ppm	Sb ppm	Se ppm	Te ppm	Cu ppm	Mo ppm	Pb ppm	Zn ppm	Ga ppm	Tl ppm
YA 200	1	165.	117.	40.3	1.32	.371	.131	3.36	<.246	1.06	35.9	20.7	58.5	160.	2.82	<.493
YA 201	2	233.	614.	31.6	1.31	.324	.121	3.27	<.249	1.29	38.3	21.6	51.0	149.	2.43	<.497
YA 202	3	146.	185.	49.7	.477	.567	.197	.761	.345	.128	29.9	4.19	34.4	181.	4.34	<.497
YA 203	4	144.	157.	12.6	.409	.384	.152	.516	<.248	.06	27.6	1.58	33.9	117.	4.65	<.495
YA 204	5	198.	237.	12.7	.364	.553	.142	.512	.309	.102	32.0	1.93	39.1	100.	2.97	<.492
YA 205	6	171.	549.	10.0	.552	.364	.086	.638	<.247	.145	40.1	2.88	19.8	94.4	4.29	<.494
YA 206	7	186.	130.	9.12	.413	.422	.04	.426	<.247	.074	41.9	1.48	16.3	93.3	4.93	<.494
YA 207	8	268.	188.	8.34	.333	.564	.062	.385	<.249	.074	55.4	1.39	20.6	109.	4.60	<.497
YA 208	9	173.	178.	6.86	.360	1.02	.05	.544	<.247	.055	49.7	1.71	14.5	89.1	3.21	<.494
YA 209	10	201.	188.	7.19	1.01	.375	.042	.370	<.248	.107	54.1	1.90	17.6	76.4	4.21	<.496
YA 210	11	77.5	59.1	5.02	.208	.231	.028	.331	<.248	<.05	28.0	1.29	12.3	62.5	3.46	<.495
YA 211	12	103.	95.3	6.53	.426	.250	.04	.360	<.246	<.049	27.4	1.25	17.0	59.3	3.75	<.493
YA 212	13	100.	127.	5.67	.350	.423	.049	.405	<.248	<.05	25.3	1.39	20.4	65.1	3.00	<.496
YA 213	14	82.4	129.	6.87	.248	.455	.042	.519	<.247	.053	21.6	1.70	15.4	52.3	3.26	<.494
YA 214	15	96.2	593.	5.19	.180	.244	.041	.376	<.249	.074	16.5	2.25	12.5	38.9	3.32	<.498
YA 215	16	73.5	54.5	6.40	.216	.811	.043	.382	.270	<.049	18.1	1.24	13.1	58.7	3.55	<.494
YA 216	17	91.4	26.1	8.62	.327	.792	.111	.516	<.246	<.049	23.4	1.42	21.9	75.9	3.72	<.493
YA 217	18	150.	85.5	11.5	.525	.403	.074	.904	<.248	.145	24.2	2.93	22.7	57.2	2.90	<.496
YA 218	19	82.7	38.7	8.55	.376	.310	.048	.549	<.249	.056	20.1	1.63	20.3	54.6	3.18	<.499
YA 219	20	102.	106.	9.03	.320	.194	.047	.630	<.25	<.05	22.0	1.80	19.3	56.7	4.09	<.499
YA 220	21	72.2	59.9	6.47	.279	.185	.04	.526	<.247	.073	18.5	1.53	16.2	51.1	3.35	<.493
YA 221	22	66.6	53.4	7.36	.284	.136	.025	.524	<.247	<.049	17.7	1.51	16.6	46.2	3.30	<.493
YA 222	23	167.	22.7	13.9	.281	.154	.059	.473	<.248	<.05	17.5	2.01	24.6	67.4	5.18	<.495
YA 226	24	47.6	8.59	5.04	.479	.125	<.02	.359	<.249	<.05	20.4	1.74	22.5	76.0	5.17	<.498
YA 227	25	43.2	19.3	9.68	.332	.139	.023	.743	<.249	<.05	24.3	1.45	17.9	60.8	4.71	<.497
YA 228	26	37.8	30.5	5.17	.291	.140	<.02	.351	<.249	<.05	16.9	1.75	22.1	58.0	4.31	<.498
YA 229	27	96.1	265.	6.23	.316	.214	<.02	.407	<.248	.052	21.2	1.56	18.3	55.3	3.53	<.496
YA 230	28	101.	230.	6.50	.269	.358	.02	.417	<.249	<.05	24.8	1.56	19.7	65.5	4.16	<.498
YA 231	29	71.7	177.	9.56	.309	.339	.051	.635	<.248	.071	20.4	2.41	14.8	48.7	3.45	<.496
YA 232	30	92.0	236.	6.88	.290	.425	.042	.430	<.249	<.05	24.2	2.12	18.9	67.8	4.41	<.498

3805 Atherton Road • Rocklin, California 95677 • 916/624-6000 1/800/827-4GSI FAX: 916/624-8986
1498 Kleppe Lane • Sparks, Nevada 89431 • 702/359-6600 FAX: 702/359-6605

GEOCHEMICAL SERVICES INC.

GEOCHEMICAL ANALYSIS REPORT

JOB #: ASB-OR1722

SAMPLE ID	#	Ag ppb	Au ppb	As ppm	Bi ppm	Cd ppm	Hg ppm	Sb ppm	Se ppm	Te ppm	Cu ppm	Mo ppm	Pb ppm	Zn ppm	Ga ppm	Tl ppm
YA 233	31	146.	177.	11.6	.404	.261	.048	.408	<.246	<.049	28.2	1.78	27.4	94.2	4.82	<.493
YA 234	32	164.	148.	15.4	.439	.238	.073	.822	<.246	.129	30.0	5.45	26.2	93.2	4.96	<.492
YA 235	33	72.5	98.3	8.72	.334	.211	.031	.507	<.249	<.05	21.2	2.39	20.9	63.5	3.51	<.499
YA 236	34	68.9	42.7	9.73	.304	.168	.041	.483	<.246	<.049	18.7	1.64	19.9	59.0	3.58	<.492
YA 237	35	70.5	66.7	10.1	.337	.197	.037	.528	<.247	<.049	18.3	1.65	21.4	63.7	3.45	<.494
YA 238	36	58.3	89.9	9.30	.320	.165	.03	.539	<.249	<.05	18.7	1.81	20.6	57.7	3.73	<.498
YA 239	37	39.1	14.6	6.77	.285	.186	.022	.323	<.249	<.05	18.1	1.45	22.8	66.4	4.27	<.499
YA 240	38	41.1	25.9	6.39	.212	.121	<.02	.378	<.25	<.05	15.6	1.44	18.2	56.6	3.60	<.5
YA 241	39	65.4	147.	6.57	.245	.110	<.02	.324	<.25	<.05	15.0	1.08	17.5	51.9	3.74	<.5
YA 242	40	60.8	105.	5.31	.926	.135	<.02	.297	<.248	<.05	25.7	1.48	20.8	61.0	4.98	<.496
YA 243	41	56.0	31.6	6.12	.447	.223	.024	.344	<.247	<.049	23.6	1.52	25.0	80.5	5.32	<.494
YA 244	42	30.9	15.3	5.57	.435	.200	<.02	.407	<.25	<.05	18.8	1.91	24.1	69.4	5.00	<.5
YA 245	43	53.9	10.7	5.99	.490	.134	<.02	.340	<.248	<.05	21.3	1.76	23.3	76.6	5.81	<.497
YA 246	44	85.3	297.	9.04	.305	.269	.052	.383	<.247	<.049	28.9	1.43	17.3	97.8	4.38	<.494
YA 247	45	354.	440.	9.04	.301	.389	.024	.340	<.249	.117	55.1	1.42	15.5	93.6	4.34	<.497
YA 248	46	221.	448.	11.3	.306	.415	.049	.337	<.248	.082	44.4	1.75	18.9	114.	5.24	<.495
YA 249	47	187.	363.	13.5	.488	.450	.100	.466	<.249	.113	32.0	2.25	29.0	103.	4.24	<.499
YA 250	48	132.	166.	8.83	.355	.390	.079	.400	<.247	.081	30.6	1.50	22.6	101.	4.76	<.494
YA 251	49	131.	189.	9.19	.365	.398	.059	.416	<.249	<.05	27.4	1.16	24.6	103.	4.65	<.498
YA 252	50	199.	530.	9.66	.362	.386	.134	.464	<.249	<.05	24.7	1.30	27.5	102.	4.58	<.498
YA 253	51	200.	461.	14.3	.397	.816	.176	.608	<.25	<.05	27.3	2.04	43.9	270.	4.02	<.499
YA 254	52	107.	135.	29.2	.541	.386	.104	1.05	<.249	.272	23.6	8.39	31.4	145.	4.03	<.498
YA 255	53	142.	458.	56.2	.507	.322	.110	.907	<.249	.199	31.9	6.05	28.6	111.	4.22	<.499
YA 255 DUP	54	141.	512.	54.7	.472	.329	.120	.907	<.246	.216	~~31.0~~	6.19	~~28.6~~	~~102.~~	3.49	<.493
YA 256	55	98.4	109.	4.73	.353	.315	.043	.407	<.246	<.049	21.6	1.24	20.1	58.7	3.41	<.493
YA 257	56	91.6	166.	9.13	.336	.388	.063	.496	<.249	.057	24.9	1.89	18.8	61.5	4.31	<.499
YA 258	57	127.	832.	10.5	.478	.231	.021	1.16	<.248	.205	16.7	5.96	17.9	41.7	2.16	<.496
YA 259	58	111.	772.	6.74	.368	.451	.038	.453	<.246	.074	23.7	2.98	18.3	62.6	3.35	<.492
YA 260	59	127.	115.	7.07	.350	.394	.052	.355	<.25	<.05	24.3	1.86	24.0	77.1	3.70	<.5
YA 261	60	108.	112.	8.95	.305	.242	.046	.446	<.25	<.05	27.0	1.60	22.8	81.3	4.35	<.5

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GSI GEOCHEMICAL SERVICES INC.

GEOCHEMICAL ANALYSIS REPORT

JOB #: ASB-OR1722

SAMPLE ID	#	Ag ppb	Au ppb	As ppm	Bi ppm	Cd ppm	Hg ppm	Sb ppm	Se ppm	Te ppm	Cu ppm	Mo ppm	Pb ppm	Zn ppm	Ga ppm	Tl ppm
YA 262	61	135.	468.	16.0	.440	.234	.054	.795	<.247	<.049	24.2	1.98	26.5	81.9	4.41	<.495
YA 263	62	61.2	54.9	11.2	.307	.166	.046	.563	<.248	<.05	20.1	1.38	23.1	65.7	3.67	<.496
YA 264	63	66.0	95.3	10.0	.335	.169	.036	.592	<.249	<.05	19.2	1.52	19.7	58.0	3.73	<.498
YA 265	64	61.2	20.4	8.14	.343	.172	.031	.474	<.246	<.049	16.1	1.59	19.1	51.6	3.09	<.493
YA 266	65	53.0	53.0	7.80	.418	.189	<.02	.546	<.247	<.049	16.6	1.77	21.4	51.7	3.32	<.494
YA 267	66	39.7	24.8	7.71	.239	.110	<.02	.436	<.249	<.05	17.4	1.38	20.6	81.1	5.50	<.497
YA 268	67	133.	379.	24.4	.519	.266	.088	.453	<.247	.059	20.8	1.81	27.3	95.6	4.63	<.493
YA 269	68	47.0	17.3	18.8	1.76	.156	.046	.495	<.247	<.049	27.3	1.87	28.0	124.	7.00	<.493
YA 270	69	43.2	10.5	5.06	1.07	.130	.035	.315	<.246	<.049	19.2	1.23	16.8	51.6	3.63	<.493
YA 271	70	36.5	30.3	6.14	.672	.151	<.02	.338	<.248	<.05	14.8	1.15	27.9	48.3	3.17	<.495
YA 272	71	37.3	2.39	6.06	.485	.197	<.02	.438	<.246	<.049	20.9	1.83	27.6	84.5	5.76	<.493
YA 273	72	63.7	14.0	6.33	.443	.155	.022	.373	<.249	<.05	20.8	1.30	18.8	78.4	6.00	<.498
YA 274	73	98.1	69.5	4.71	.380	.286	.066	.404	<.249	.059	24.3	1.36	25.0	66.1	4.08	<.498
YA 275	74	133.	523.	5.81	.497	.387	.043	.385	<.247	.083	23.9	1.34	24.1	60.9	3.67	<.494
YA 276	75	131.	718.	6.56	.409	.333	.036	.497	<.247	.100	22.5	1.84	25.8	68.8	4.16	<.493
YA 277	76	157.	280.	5.98	.443	.526	.045	.340	<.248	.113	30.8	1.43	19.9	86.3	3.63	<.496
YA 278	77	222.	307.	9.45	1.63	.523	.073	.435	<.247	.128	31.4	1.81	26.3	109.	3.81	<.493
YA 279	78	197.	318.	19.0	.750	.425	.075	.579	<.247	.118	29.8	2.53	28.7	105.	3.85	<.494
YA 280	79	127.	13.4	10.0	.393	.382	.083	.337	<.247	.096	22.3	1.85	21.2	79.7	2.42	<.495
YA 281	80	126.	5.39	8.38	.439	.373	.120	.437	<.248	.085	31.5	1.42	25.3	84.5	3.61	<.496
YA 282	81	61.4	43.0	4.69	.171	.203	.035	.239	<.247	<.049	16.3	.865	15.8	43.1	2.03	<.494
YA 283	82	239.	603.	9.99	1.33	.496	.139	.316	<.25	<.05	21.1	1.43	30.0	120.	2.17	<.5
YA 284	83	85.3	48.2	38.2	.315	.312	.071	.451	<.247	<.049	17.1	2.08	24.3	104.	2.84	<.494
YA 285	84	93.1	209.	35.6	.277	.263	.059	.486	<.247	.067	20.1	3.15	20.5	62.4	2.44	<.493
YA 285 DUP	85	85.4	144.	33.1	.282	.262	.05	.485	<.246	.054	~~20.0~~	3.11	~~20.2~~	~~62.1~~	2.31	<.493
YA 286	86	66.8	120.	7.59	.289	.261	.028	.482	<.249	<.05	19.6	1.58	20.6	37.3	2.27	<.497
YA 288	87	60.9	104.	4.38	.181	.328	.062	.300	<.25	<.05	19.9	1.41	22.5	46.6	1.82	<.499
YA 289	88	53.6	36.0	4.39	.163	.197	.028	.255	<.247	<.049	19.3	1.16	18.7	42.4	1.92	<.493
YA 290	89	66.0	37.9	5.64	.219	.219	.028	.280	<.247	<.049	18.4	1.36	19.7	38.7	1.94	<.494
YA 291	90	54.1	26.4	6.80	.202	.184	.033	.308	<.247	<.049	15.8	1.79	18.8	38.1	2.06	<.494

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GEOCHEMICAL SERVICES INC.

GEOCHEMICAL ANALYSIS REPORT

JOB #: ASB-OR1722

SAMPLE ID	#	Ag ppb	Au ppb	As ppm	Bi ppm	Cd ppm	Hg ppm	Sb ppm	Se ppm	Te ppm	Cu ppm	Mo ppm	Pb ppm	Zn ppm	Ga ppm	Tl ppm
YA 292	91	54.3	60.7	9.32	.281	.155	.048	.431	<.247	<.049	17.3	1.87	18.0	33.5	2.13	<.494
YA 293	92	60.0	45.6	8.14	.301	.176	.058	.394	<.248	<.05	17.9	1.72	20.3	36.4	2.31	<.496
YA 294	93	50.2	27.8	8.28	.355	.175	<.02	.481	<.25	.059	15.0	1.50	19.1	31.4	2.18	<.499
YA 295	94	50.4	17.3	6.82	.327	.145	<.02	.333	<.246	<.049	13.8	1.45	17.5	30.3	2.15	<.493
YA 296	95	48.7	20.7	8.87	.304	.125	.023	.381	<.249	<.05	14.0	1.34	19.9	34.1	2.81	<.499
YA 297	96	97.6	22.5	12.0	.286	.116	.038	.442	<.247	<.049	11.5	1.25	20.8	32.9	3.30	<.494
YA 298	97	68.5	23.7	10.9	.381	.116	.028	.325	<.247	<.049	13.5	1.23	19.1	58.1	4.37	<.494
YA 299	98	31.3	9.08	9.37	.347	.088	<.02	.363	<.248	<.05	13.5	1.50	19.0	59.0	4.93	<.496
YA 300	99	52.7	1.88	3.64	.179	.135	<.02	.204	<.248	<.05	14.4	1.01	15.3	33.3	2.56	<.495
YA 301	100	51.4	13.6	10.0	.463	.174	.033	.295	<.247	<.049	16.6	1.29	24.8	49.2	2.50	<.493
YA 302	101	64.9	13.4	7.34	.360	.120	<.02	.277	<.248	<.05	25.9	1.32	18.8	45.8	4.09	<.495
YA 303	102	74.4	73.0	3.96	.258	.257	.023	.315	<.249	<.05	20.6	1.31	19.0	33.7	1.93	<.499
YA 304	103	90.4	59.8	4.62	.382	.364	.044	.361	<.249	.058	24.2	1.54	22.8	39.4	1.87	<.497
YA 306	104	134.	116.	8.77	.526	.320	.05	.389	<.248	.110	32.4	1.60	25.6	53.9	2.23	<.496
YA 307	105	116.	72.6	6.87	.493	.343	.047	.384	<.249	.111	26.6	1.29	25.4	52.6	2.27	<.499
YA 308	106	99.6	191.	10.0	.460	.317	.054	.494	<.249	.089	24.1	1.24	28.3	59.7	2.44	<.498
YA 309	107	84.0	101.	5.96	.300	.230	.022	.346	<.249	.072	21.0	.964	19.8	52.1	2.82	<.497
YA 310	108	64.5	113.	10.0	.329	.186	.034	.385	<.25	<.05	18.8	3.65	15.7	55.4	2.42	<.5
YA 311	109	60.6	66.2	20.2	.341	.240	.04	.336	<.247	<.049	17.8	1.13	25.4	60.0	2.52	<.494
YA 312	110	65.1	21.2	13.0	.295	.412	.042	.361	<.247	<.049	21.6	1.48	23.8	93.5	2.22	<.494
YA 313	111	79.8	59.1	14.2	.447	.417	.059	.415	<.249	.102	19.0	1.97	25.6	90.2	2.03	<.497
YA 314	112	43.9	5.74	3.96	.290	.144	.028	.230	<.249	<.05	8.51	.526	21.2	61.5	3.90	<.498
YA 315	113	24.1	2.72	4.86	.083	.147	.024	.223	<.249	<.05	8.33	.486	17.2	47.2	3.24	<.498
YA 315 DUP	114	20.5	2.05	4.05	.095	.136	<.02	.201	<.249	<.05	~~7.47~~	.429	~~15.4~~	~~40.6~~	2.74	<.497
YA 316	115	45.1	2.15	3.37	.264	.332	.037	.271	<.249	<.05	19.2	.702	20.2	67.1	3.47	<.497
YA 317	116	43.6	4.04	3.47	.191	.265	.022	.198	<.246	<.049	18.0	.760	22.5	64.6	3.28	<.493
YA 318	117	40.6	4.90	3.16	.175	.241	<.02	.195	<.247	<.049	14.9	.638	17.6	52.5	2.68	<.493
YA 319	118	34.8	2.21	3.69	.154	.102	<.02	.178	<.248	<.05	11.9	.616	15.0	43.7	3.43	<.496
YA 320	119	45.3	7.14	5.22	.279	.216	<.02	.303	<.249	<.05	10.9	.700	30.9	86.9	3.61	<.498
YA 321	120	56.4	11.9	6.49	.310	.314	.029	.403	<.25	<.05	22.5	1.24	~~73~~.2	165.	3.84	<.499

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GEOCHEMICAL SERVICES INC.

GEOCHEMICAL ANALYSIS REPORT

JOB #: ASB-OR1722

SAMPLE ID	#	Ag ppb	Au ppb	As ppm	Bi ppm	Cd ppm	Hg ppm	Sb ppm	Se ppm	Te ppm	Cu ppm	Mo ppm	Pb ppm	Zn ppm	Ga ppm	Tl ppm
YA 322	121	43.6	16.2	4.29	.171	.103	.031	.287	<.249	<.05	15.8	1.17	17.9	51.0	4.25	<.498
YA 323	122	72.9	22.1	9.19	.238	.345	.03	.391	<.248	<.05	22.9	1.67	28.3	100.	3.85	<.496
YA 326	123	170.	184.	17.8	.305	1.08	.082	.659	<.247	.084	25.6	2.09	73.0	341.	2.16	<.495
YA 327	124	176.	110.	8.34	.270	.551	.08	.405	<.247	.057	28.3	1.33	35.2	179.	2.55	<.494
YA 328	125	114.	111.	7.84	.283	.468	.05	.518	<.248	.116	35.1	1.04	23.6	141.	2.40	<.497
YA 329	126	147.	79.6	9.22	.284	.457	.057	.429	<.248	.076	48.2	1.26	23.8	103.	2.39	<.497
YA 330	127	124.	58.6	11.0	.289	.307	.043	.502	<.248	<.05	34.9	.999	20.1	68.5	2.59	<.495
YA 331	128	83.8	30.1	9.23	.249	.315	.041	.326	<.247	.059	29.9	1.01	17.9	53.7	1.88	<.495
YA 332	129	131.	41.8	21.8	.545	.218	.047	.527	<.249	<.05	31.8	1.22	22.8	40.7	2.32	<.499
YA 333	130	76.9	31.0	11.2	.254	.429	.053	.305	<.248	<.05	30.5	1.07	17.1	57.0	2.00	<.495
YA 334	131	117.	36.6	21.8	.653	.355	.074	.446	<.249	.055	47.2	1.68	25.1	52.2	2.87	<.498

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GEOCHEMICAL SERVICES INC.

GEOCHEMICAL ANALYSIS REPORT

JOB #: REP-OR1722

SAMPLE ID	#	Ag ppb	Au ppb	As ppm	Bi ppm	Cd ppm	Hg ppm	Sb ppm	Se ppm	Te ppm	Cu ppm	Mo ppm	Pb ppm	Zn ppm	Ga ppm	Tl ppm
YA 223	1	91.4	56.3	10.7	.573	.279	<.02	.690	<.247	<.049	26.0	2.54	34.9	99.8	6.34	<.494
YA 224 FW	2	36.2	4.25	4.13	.744	.181	<.02	.388	<.249	<.05	16.7	1.51	20.9	50.7	3.59	<.499
YA 225	3	40.9	19.2	4.76	1.21	.166	.022	.361	<.249	.05	17.6	1.56	23.5	59.1	3.94	<.498
YA 225 DUP	4	55.2	19.6	4.77	1.37	.169	.033	.345	<.248	.052	~~18.1~~	1.63	~~24.4~~	~~61.4~~	4.16	<.497
YA 287 FW	5	44.3	13.5	3.98	.312	.137	<.02	.302	<.247	<.049	8.45	.506	21.1	61.2	4.13	<.495
YA 305 HW	6	100.	97.2	6.68	.397	.276	.022	.350	<.25	.051	19.9	1.10	22.6	46.2	2.37	<.5
YA 324	7	84.0	69.2	7.25	.239	.397	.097	.327	<.249	<.05	21.9	1.28	40.3	217.	2.70	<.497
YA 325	8	142.	87.5	9.96	.285	.265	.073	.349	<.247	.063	19.2	1.36	22.4	122.	2.93	<.495

central 4 Lines SQ14S

ppm

Cu HW 53 samples, total 1502.7, ave = 28.4, hi = 55.4, low = 16.3

Cu FW 61 samples, " 1181.7, ave = 19.4, hi = 30.0, low = 11.5

Pb HW 53 sample, total 1303.3, ave = 24.6, hi = 58.5, low = 14.5

Pb FW 61 samples, total 1289.2, ave = 21.1, hi = 34.9, low = 12.5

Zn HW 53 samples, total 4602.3, ave = 86.8, hi = 270.0, low = 33.7

Zn FW 61 samples, total 3678.7, ave = 60.3, hi = 124.0, low = 30.3

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Incomplete See Attached

GEOCHEMICAL SERVICES INC.

GEOCHEMICAL ANALYSIS REPORT

TO: Mr. James D. Sell
ASARCO Inc.
P. O. Box 5747
Tucson, AZ 85703 tel:602/792-3010

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Job Number: ASB-OR1722
Analysis Code: SRP30
Digest: 30 gram
Total number of samples: 131

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This report has been reviewed and approved by:

Nancy G. Gonzalez for Date: 1/11/90
Mary Leitch, Quality Assurance Manager

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1498 Kleppe Lane • Sparks, Nevada 89431 • 702/359-6600 FAX: 702/359-6605

GEOCHEMICAL SERVICES INC.

GEOCHEMICAL ANALYSIS REPORT

TO: Mr. James D. Sell
ASARCO Inc.
P. O. Box 5747
Tucson, AZ 85703 tel:602/792-3010

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Job Number: REP-OR1722
Analysis Code: SRP30
Digest: 30 gram
Total number of samples: 8

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This report has been reviewed and approved by:

Nancy G. Gonzalez for Date: 1/18/90
Mary Leitch, Quality Assurance Manager

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GEOCHEMICAL ANALYSIS REPORT

GEOCHEMICAL SERVICES INC.

JOB #: ASB-OS6273

SAMPLE ID	#	Ag ppm	As ppm	Au ppm	Cu ppm	Hg ppm	Mo ppm	Pb ppm	Sb ppm	Tl ppm	Zn ppm	Bi ppm	Cd ppm	Ga ppm	Se ppm	Te ppm
YM6 275 280	31	.445	42.4	1.39	1.52	.166	11.0	4.42	1.11	<.498	21.2	.775	<.1	<.498	<.996	.753
YM6 300 305	32	.126	3.21	.163	.920	<.099	1.91	5.92	.808	<.495	93.3	<.247	.154	<.495	<.989	<.495
YM6 325 330	33	.022	3.58	.037	.694	<.097	1.94	5.54	.475	<.484	44.8	<.242	.116	.681	<.967	<.484
YM6 350 355	34	.056	17.6	.05	1.62	<.097	1.93	7.59	.317	<.483	43.8	<.241	.119	.502	<.965	<.483
YM6 375 380	35	.045	13.2	.024	1.65	<.096	3.00	6.18	.293	<.48	30.2	<.24	<.096	<.48	<.961	<.48
YM6 395 400	36	.049	3.74	.016	4.42	<.1	1.72	8.15	.365	<.5	32.6	<.25	.136	.950	<.999	<.5
Y50 0 10	37	.131	7.54	.118	26.1	<.099	.983	7.45	.407	<.497	39.5	<.249	.108	1.45	<.994	<.497
Y50 20 30	38	.197	10.6	.261	14.5	<.096	2.33	8.43	.555	<.481	40.4	<.241	.159	.734	<.962	<.481
Y50 40 50 B	39	.057	10.9	.044	8.71	<.096	.887	7.07	<.24	<.479	34.8	<.24	.135	1.60	<.959	<.479
Y50 60 70	40	.189	26.6	.381	22.0	<.097	3.58	11.7	.401	<.483	57.0	<.242	.307	.626	<.966	<.483
Y50 80 90	41	.077	9.30	.131	13.6	<.096	1.71	7.74	<.239	<.478	37.4	<.239	.180	1.43	<.956	<.478
Y50 100 110	42	.09	17.8	.061	15.7	<.097	2.25	12.2	<.242	<.484	38.2	<.242	.178	.994	<.967	<.484
Y50 100 110 DUP	43	.086	16.1	.051	14.2	<.098	2.01	10.7	<.244	<.489	35.9	<.244	.157	.837	<.978	<.489
Y50 120 130	44	.102	9.85	.054	15.4	<.1	2.23	10.6	<.25	<.499	39.2	<.25	.189	1.21	<.998	<.499
Y50 140 150	45	.368	13.2	2.11	14.0	.151	2.22	5.86	<.238	<.477	36.9	.309	.181	1.30	<.953	1.06
Y50 160 170	46	.255	8.98	.547	11.2	<.097	3.02	8.81	<.243	<.486	27.5	<.243	.251	1.10	<.973	<.486
Y50 180 190	47	.374	12.3	.426	38.4	.119	1.66	10.1	.538	<.481	33.4	<.241	.227	.666	<.962	<.481
Y50 200 210	48	.270	13.4	.210	15.3	.168	1.71	10.8	<.24	<.481	33.5	<.24	.267	.969	<.962	<.481
Y50 220 230	49	.397	21.5	.668	19.6	<.1	1.98	7.39	<.249	<.499	41.5	<.249	.252	.524	<.997	<.499
Y50 240 250	50	.211	19.6	.139	24.2	<.099	1.72	12.5	<.248	<.496	46.6	<.248	.319	1.01	<.991	<.496
Y50 260 270	51	.113	22.6	.326	15.4	.103	2.11	13.6	<.247	<.494	41.2	.279	.250	.670	<.987	<.494
Y50 280 290	52	.517	21.7	.584	20.2	.110	1.56	7.30	.323	<.493	35.6	<.246	.249	1.27	<.985	.869
Y50 300 310	53	.473	20.3	.358	18.7	<.099	2.17	8.09	<.247	<.495	25.7	<.247	.180	.555	<.989	.800
Y50 320 330	54	.364	36.2	.867	14.3	<.097	4.19	7.95	<.242	<.483	43.0	<.242	.246	.789	<.966	.704
Y50 340 350	55	1.39	17.4	2.13	50.8	<.099	1.96	6.60	<.249	<.497	21.9	<.249	.157	.869	<.994	2.94
Y50 360 370	56	.603	16.6	.599	141.	.134	3.71	6.61	<.241	<.481	29.0	<.241	.177	<.481	<.962	<.481
Y50 380 390	57	.087	8.32	.142	20.3	<.1	2.96	8.11	<.249	<.498	25.7	<.249	.356	<.498	<.996	<.498
Y50 400 410	58	.115	6.54	.450	9.49	<.099	4.25	6.77	<.248	<.495	20.3	<.248	.180	.857	<.99	<.495
Y50 420 430	59	.074	14.0	.239	2.72	<.099	2.20	6.01	<.247	<.495	20.0	<.247	.268	.739	<.989	<.495

Cu 84.9%; ave = 17.0
Pb 42.4%; ave = 8.5
Zn 209.1%; ave 41.8

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GEOCHEMICAL SERVICES INC.

GEOCHEMICAL ANALYSIS REPORT

JOB #: ASB-OS6273

SAMPLE ID	#	Ag ppm	As ppm	Au ppm	Cu ppm	Hg ppm	Mo ppm	Pb ppm	Sb ppm	Tl ppm	Zn ppm	Bi ppm	Cd ppm	Ga ppm	Se ppm	Te ppm
YM26 0 5	1	.109	4.76	.02	27.4	<.099	1.24	10.1	<.246	<.493	70.6	<.246	.109	1.10	<.985	<.493
YM26 25 30	2	.041	2.67	.008	18.6	<.096	2.35	9.01	<.241	<.481	240.	<.241	.108	1.31	<.962	<.481
YM26 50 55	3	.05	17.3	.012	15.5	<.099	1.87	14.2	<.248	<.495	94.7	<.248	<.099	.884	<.99	<.495
YM26 75 80	4	.064	22.9	.014	8.85	<.1	2.08	9.59	<.249	<.498	54.4	<.249	.101	<.498	<.995	<.498
YM26 100 105	5	.065	25.4	.016	10.8	<.099	2.16	21.0	<.248	<.496	141.	<.248	.109	<.496	<.991	<.496
YM26 125 130	6	.099	39.4	.320	15.7	<.099	2.79	20.4	<.248	<.496	163.	<.248	.163	1.36	<.991	<.496
YM26 175 180	7	.051	8.10	.011	10.0	<.099	2.61	9.57	<.248	<.497	45.1	<.248	.106	1.40	<.993	<.497
YM26 200 205	8	.790	139.	.769	36.8	<.097	14.7	255.	1.01	<.485	124.	1.81	.298	<.485	<.971	1.46
YM26 200 205 DUP	9	.722	124.	.698	~~33.4~~	<.099	13.3	~~231.~~	1.00	<.496	~~113.~~	1.68	.278	<.496	<.991	1.30
YM26 225 230 B	10	.395	69.4	1.09	5.13	<.099	3.79	9.17	<.247	<.494	43.5	.287	.139	<.494	<.988	<.494
YM26 250 255	11	.518	15.1	.762	5.55	<.099	5.40	7.69	<.248	<.496	34.3	<.248	.189	<.496	<.991	<.496
YM26 275 280	12	.782	11.8	2.44	26.3	<.097	2.76	4.73	<.242	<.483	36.4	.323	.166	<.483	<.966	.509
YM26 300 305	13	.302	5.11	.206	2.46	<.099	2.70	3.71	<.248	<.495	94.2	<.248	.120	<.495	<.99	<.495
YM26 325 330	14	.164	188.	.520	6.85	<.099	4.97	10.1	.414	<.496	36.7	<.248	.169	<.496	<.992	<.496
YM26 350 355	15	.200	58.4	.399	5.29	.187	9.02	6.97	<.249	<.498	90.4	<.249	.257	<.498	<.996	<.498
YM26 375 380	16	.034	3.31	.014	1.19	<.096	1.19	4.19	<.239	<.479	21.4	<.239	.128	<.479	<.958	<.479
YM26 395 400	17	.058	5.13	.015	1.64	<.098	1.09	8.94	<.245	<.489	23.6	<.245	.149	<.489	<.978	<.489
YM26 425 430	18	.069	6.85	.019	12.4	<.099	2.73	10.1	<.247	<.494	54.4	<.247	.114	2.30	<.987	<.494
YM26 445 450	19	.04	4.65	.009	10.6	<.096	1.03	12.6	.289	<.478	52.8	<.239	<.096	2.41	<.957	<.478
YM6 0 5	20	.067	6.78	.025	14.3	<.098	1.58	16.6	.467	<.491	187.	<.246	.108	1.71	<.982	<.491
YM6 25 30	21	.067	2.00	.056	14.5	<.096	2.20	12.8	.559	<.48	113.	<.24	.357	1.00	<.961	<.48
YM6 50 55	22	.071	11.4	.013	12.6	<.097	2.28	10.7	.558	<.487	172.	<.243	.149	.528	<.974	<.487
YM6 75 80	23	.071	17.5	.021	11.7	<.099	2.23	8.82	1.04	<.494	47.1	<.247	.137	<.494	<.987	<.494
YM6 100 105	24	.064	23.0	.143	14.9	<.099	2.94	8.85	1.17	<.496	92.9	<.248	.213	<.496	<.991	<.496
YM6 125 130	25	.580	18.8	2.32	4.99	<.099	2.12	7.12	.679	<.496	36.4	.967	<.099	<.496	<.991	<.496
YM6 150 155 B	26	.319	19.9	1.11	3.50	<.097	7.53	10.7	.539	<.483	24.1	.742	.141	<.483	<.965	<.483
YM6 175 180	27	.562	22.2	5.22	2.55	<.1	3.89	5.90	.550	<.5	25.8	<.25	.207	<.5	<.999	<.5
YM6 200 205	28	.137	27.9	.472	1.86	<.098	4.28	7.46	.326	<.488	71.0	<.244	.157	<.488	<.976	<.488
YM6 225 230	29	.493	22.2	1.26	2.02	.112	8.43	7.29	1.14	<.48	49.6	<.24	.232	<.48	<.961	.599
YM6 250 255	30	.238	32.6	.164	1.64	<.099	2.32	6.26	.604	<.493	41.7	<.247	.180	<.493	<.986	<.493

Cu total = 73.8, core = 18.4
Pb total = 276.6, core = 69.1
Zn total = 238.2, core = 59.6

Cu total = 11.0, core = 3.7
Pb total = 23.7, core = 7.9
Zn total = 86.3, core = 28.8

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GEOCHEMICAL SERVICES INC.

GEOCHEMICAL ANALYSIS REPORT

JOB #: REP-OS6273

SAMPLE ID	#	Ag ppm	As ppm	Au ppm	Cu ppm	Hg ppm	Mo ppm	Pb ppm	Sb ppm	Tl ppm	Zn ppm	Bi ppm	Cd ppm	Ga ppm	Se ppm	Te ppm
YM26 150 155	1	.075	15.4	.012	21.3	<.096	2.03	20.6	.446	<.478	54.7	.545	.186	.998	<.956	<.478

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GEOCHEMICAL SERVICES INC.

GEOCHEMICAL ANALYSIS REPORT

TO: Mr. James D. Sell
ASARCO Inc.
P. O. Box 5747
Tucson, AZ 85703 tel:602/792-3010

==========

Job Number: REP-0S6273
Analysis Code: GXPL10
Digest: 10 gram
Total number of samples: 1

==========

This report has been reviewed and approved by:

Nancy G. Gonzalez for Date: 1/15/90
Mary Leitch, Quality Assurance Manager

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Incomplete See Attached

GEOCHEMICAL SERVICES INC.

GEOCHEMICAL ANALYSIS REPORT

TO: Mr. James D. Sell
ASARCO Inc.
P. O. Box 5747
Tucson, AZ 85703 tel:602/792-3010

==========

Job Number: ASB-0S6273
Analysis Code: GXPL10
Digest: 10 gram
Total number of samples: 59

==========

This report has been reviewed and approved by:

Nancy G. Gonzalez for Date: 1/11/90
Mary Leitch, Quality Assurance Manager

3805 Atherton Road • Rocklin, California 95677 • 916/624-6000 1/800/827-4GSI FAX: 916/624-8986
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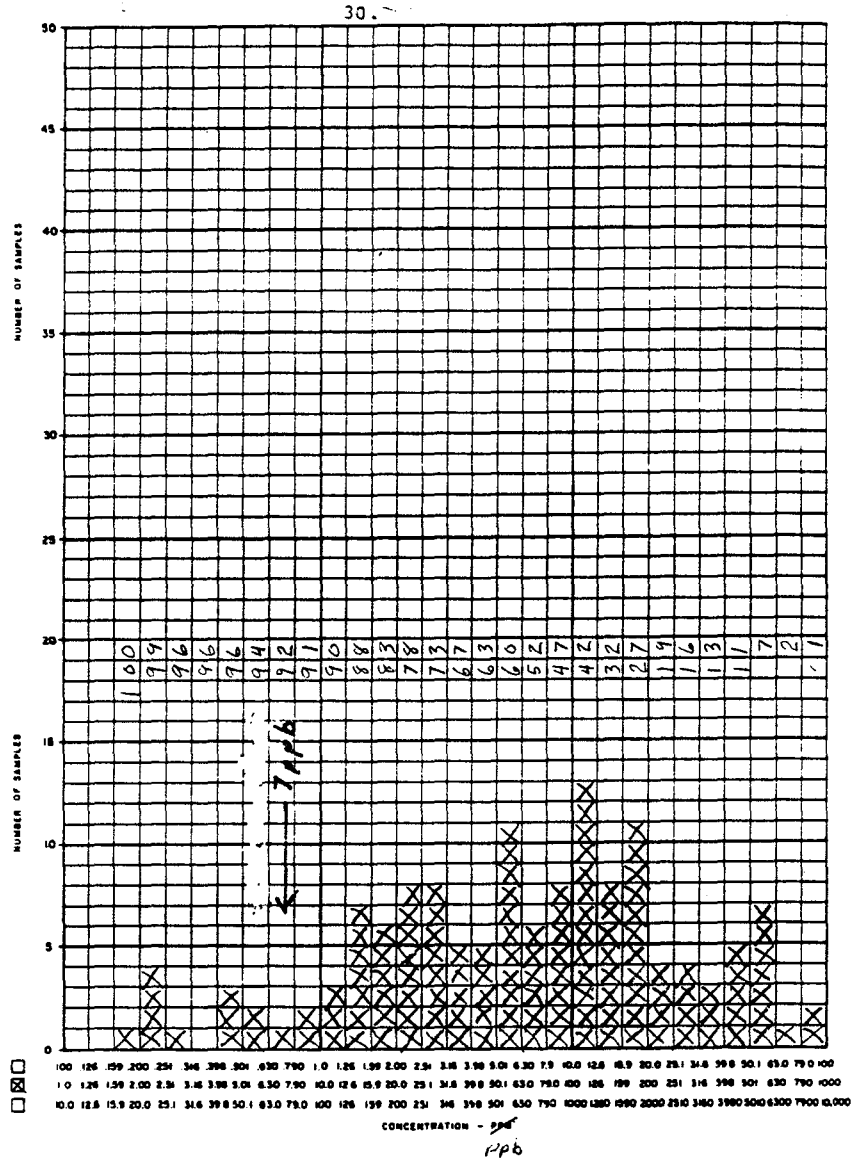
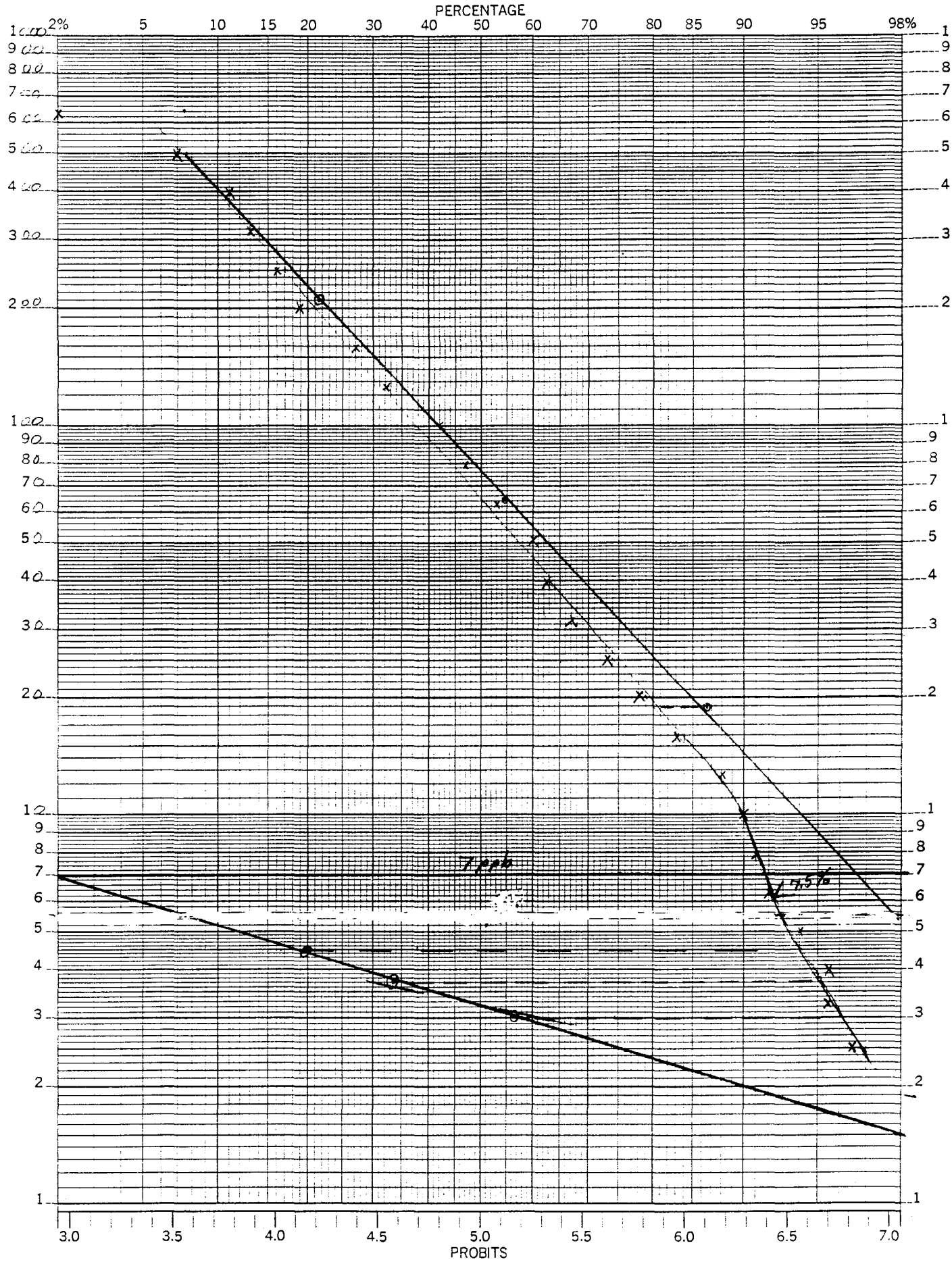
APPENDIX B

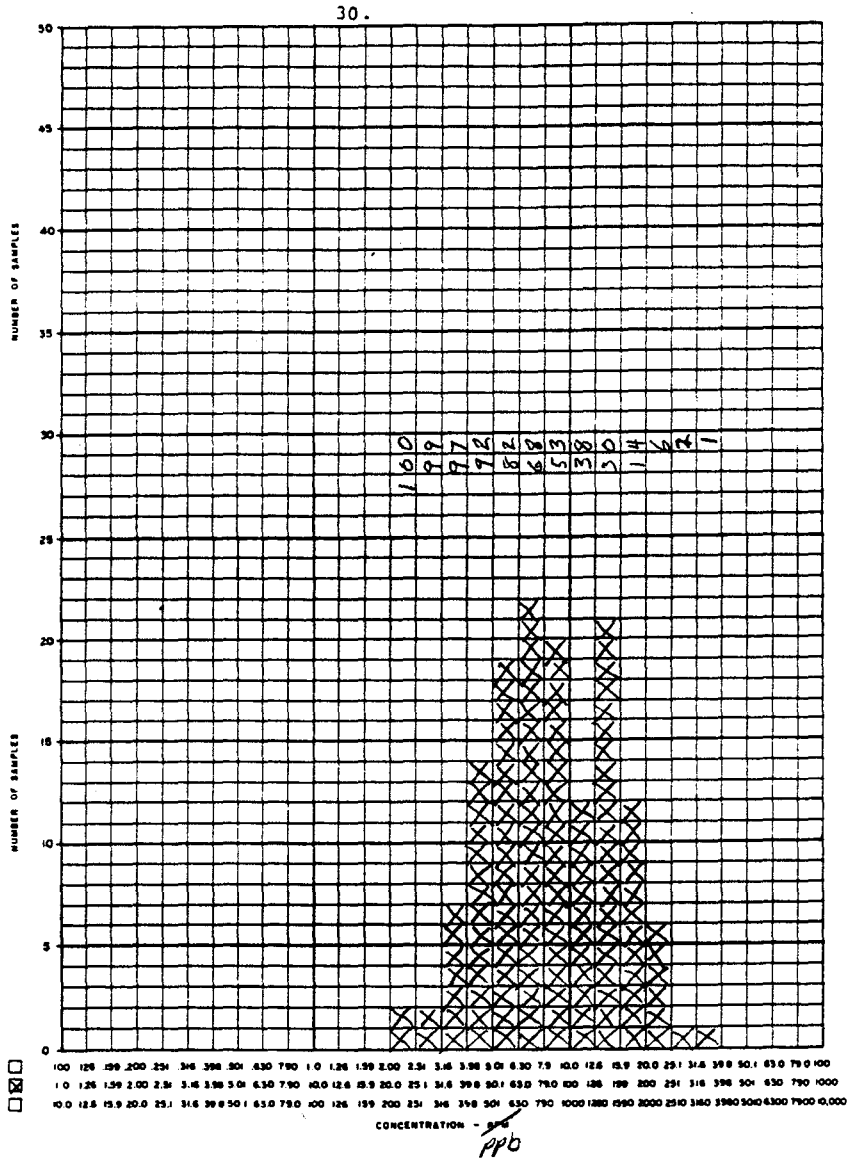
HISTOGRAMS AND CUMULATIVE
FREQUENCY PLOTS, SOILS


NUMBER OF SAMPLES
NUMBER OF SAMPLES
0
5
10
15
20
25
30
35
40
45
50
100 99 96 96 96 94 92 91 90 88 83 78 73 67 63 60 52 47 42 32 27 19 16 13 11 7 2 1
7 ppb
CONCENTRATION - ppb
ppb

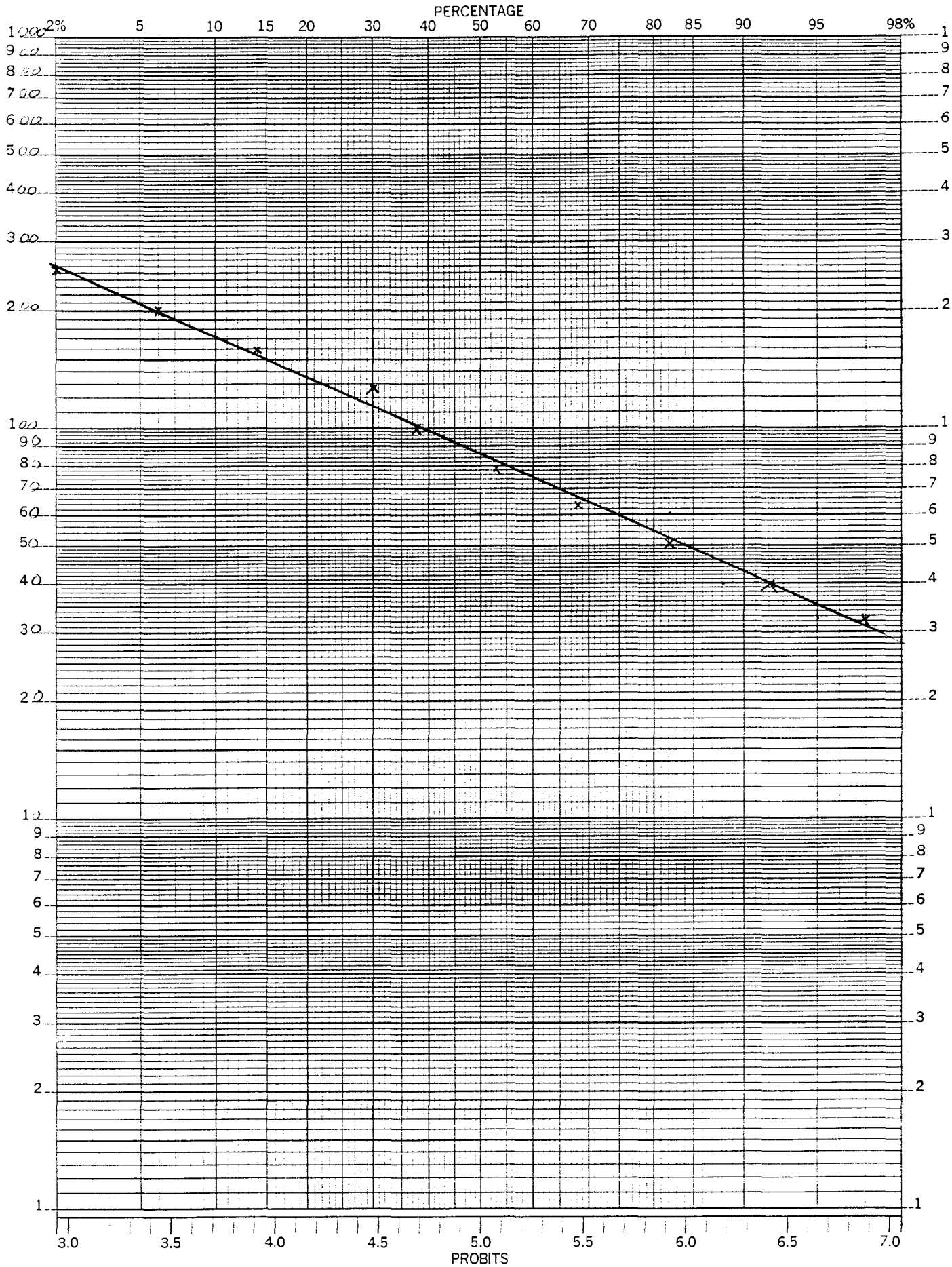
Au

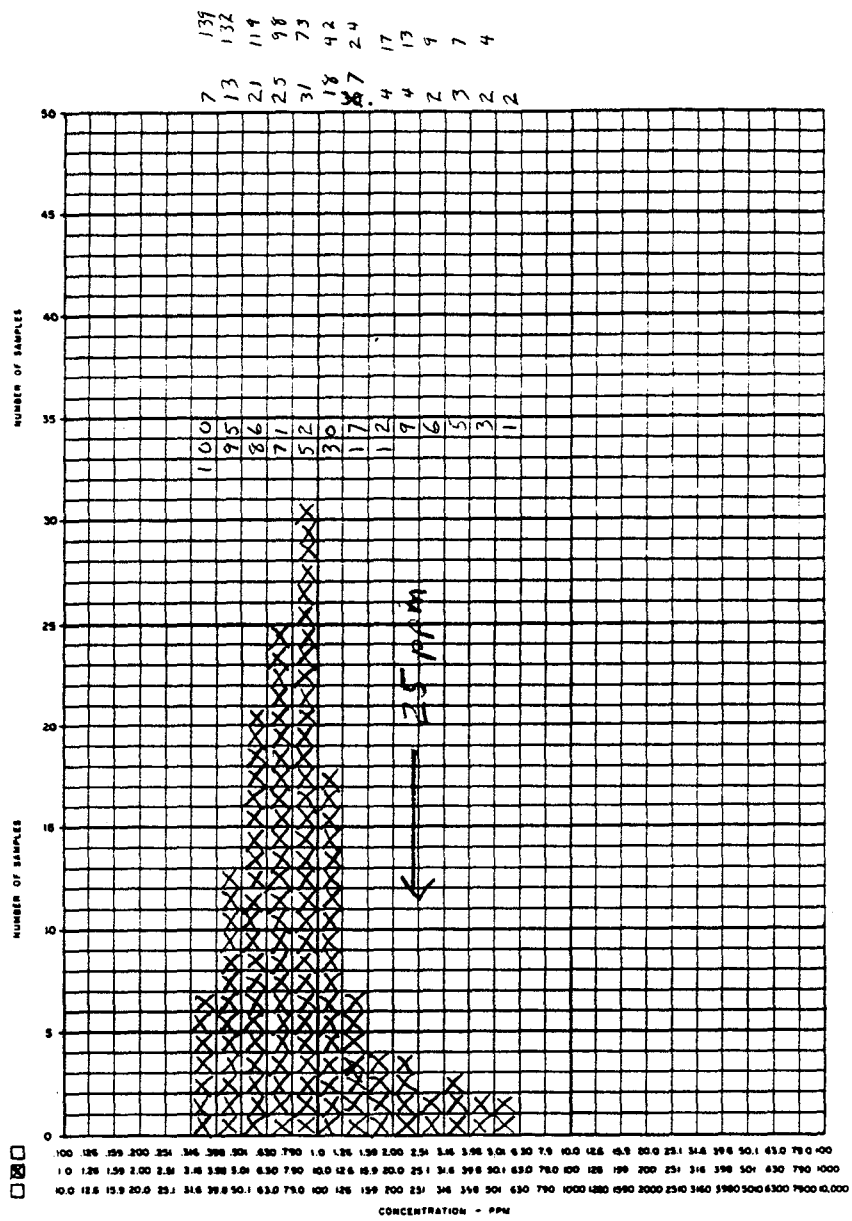


46 8080
K+E PROBABILITY X 3 LOG CYCLES
KEUFFEL & ESSER CO. MADE IN U.S.A.

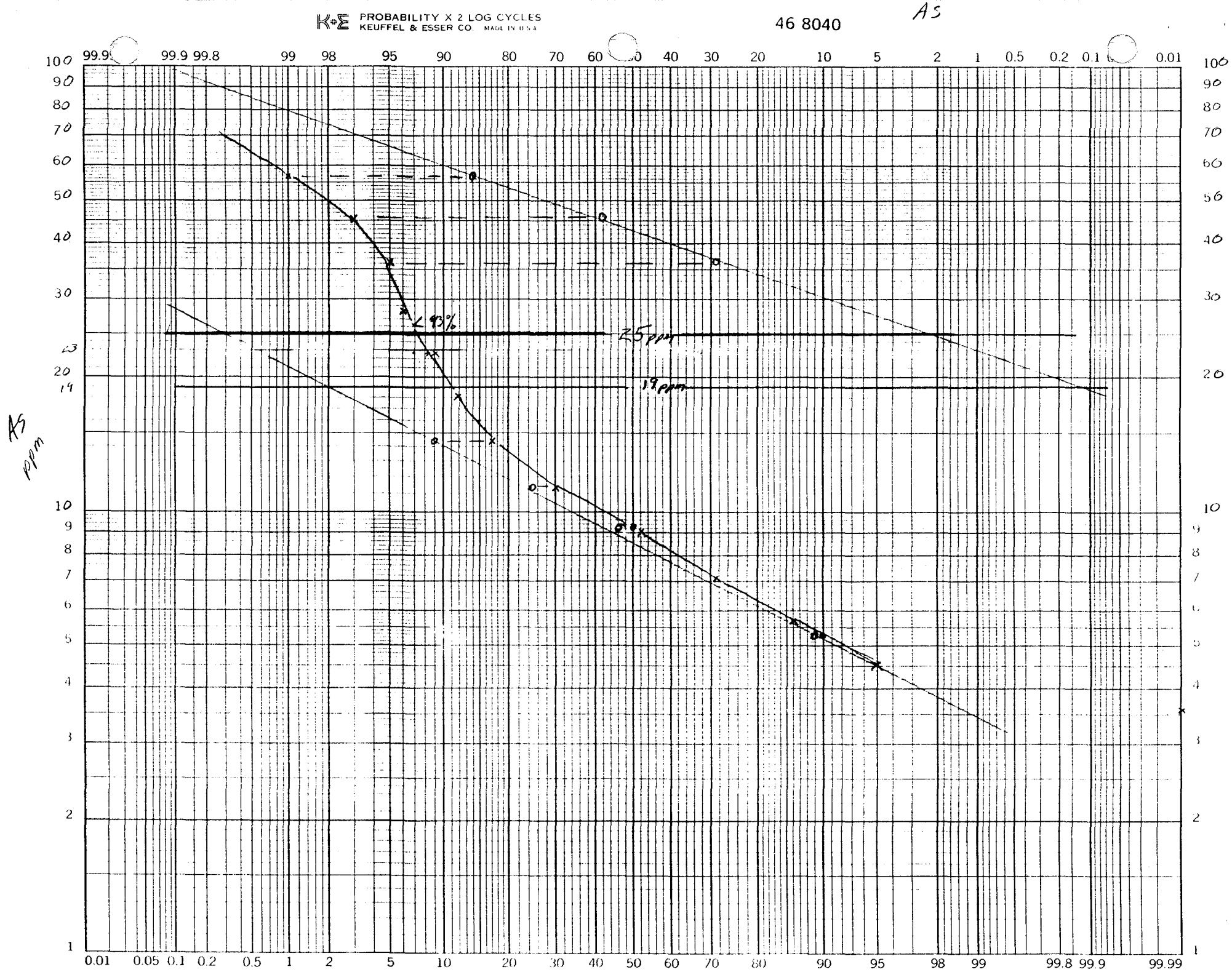


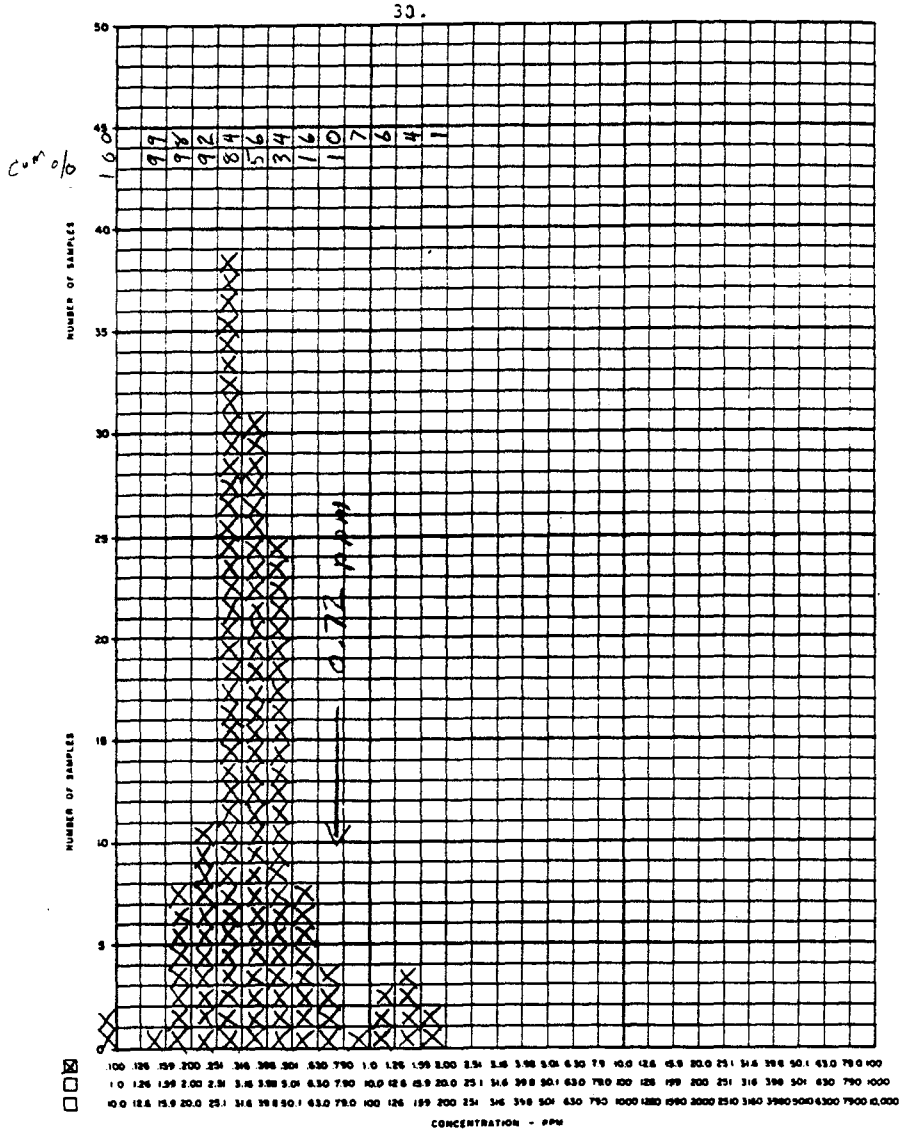
Ag


PERCENTAGE
2%
5
10
15
20
30
40
50
60
70
80
85
90
95
98%
PROBITS
3.0
3.5
4.0
4.5
5.0
5.5
6.0
6.5
7.0
46 8080
PROBABILITY X 3 LOG CYCLES
KEUFFEL & ESSER CO. MADE IN U.S.A.



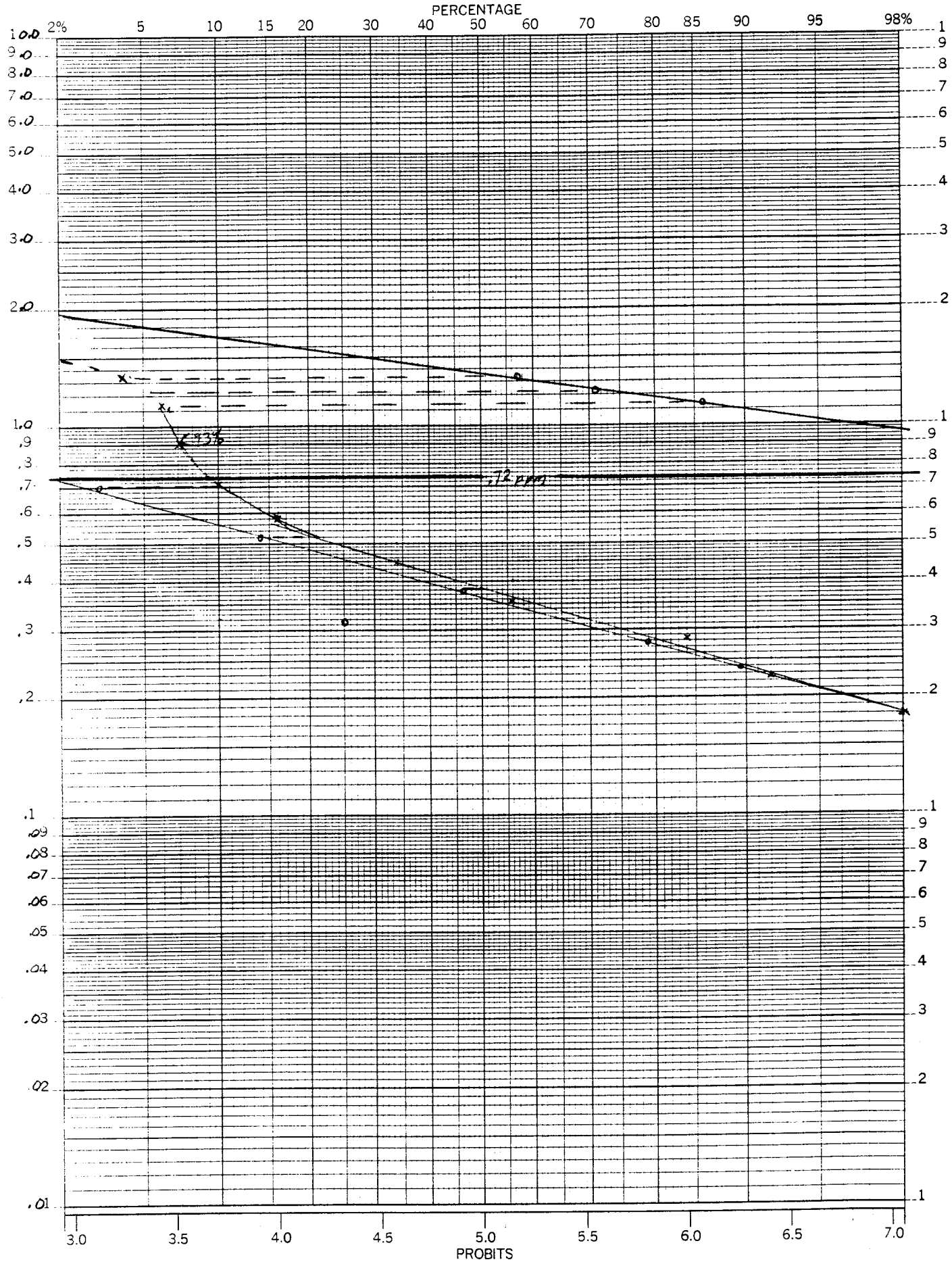
As


K+E PROBABILITY X 2 LOG CYCLES
KEUFFEL & ESSER CO. MADE IN U.S.A.
46 8040
As
As ppm
25 ppm
19 ppm
93%


cum %
99
98
92
84
56
34
16
10
7
6
4
1
0.72 ppm
NUMBER OF SAMPLES
NUMBER OF SAMPLES
CONCENTRATION - PPM

Bi

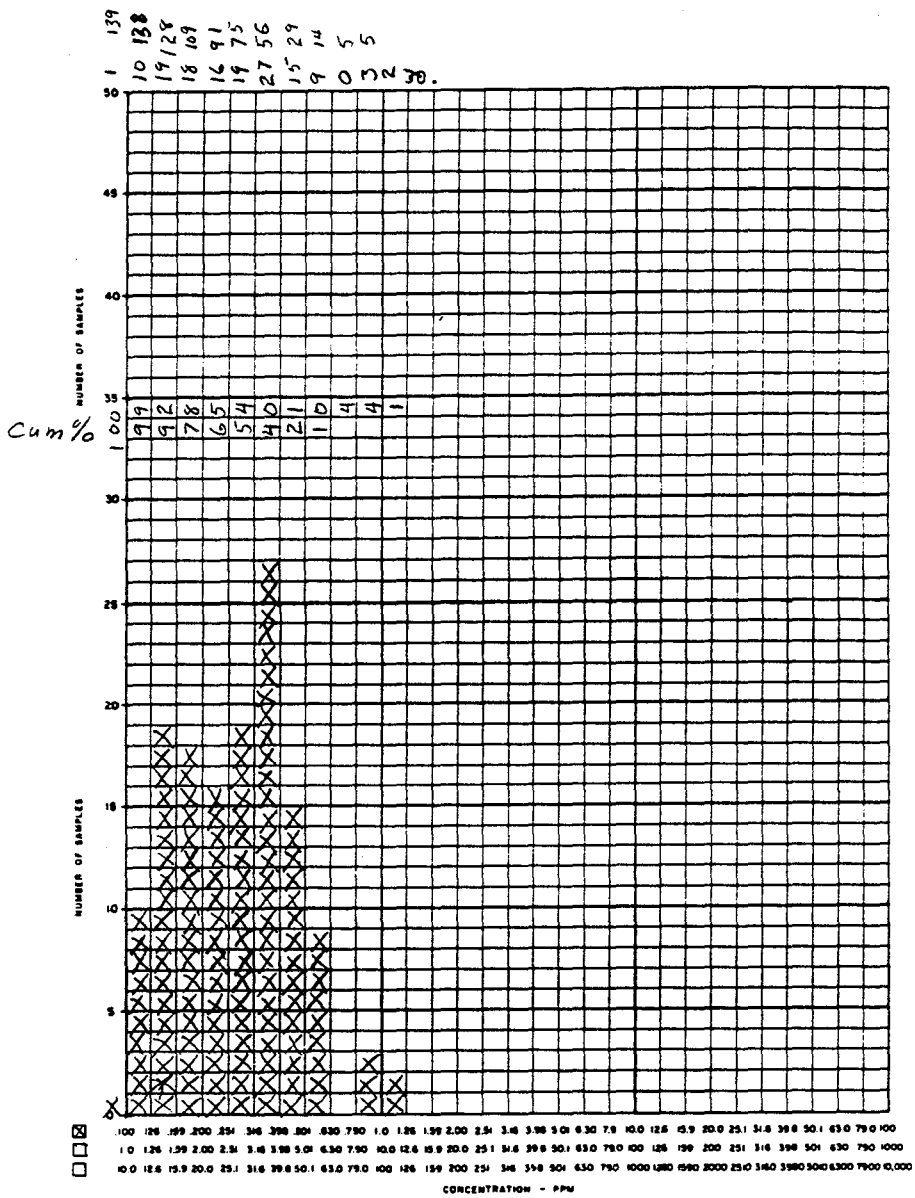
Bi



Bi (ppm)

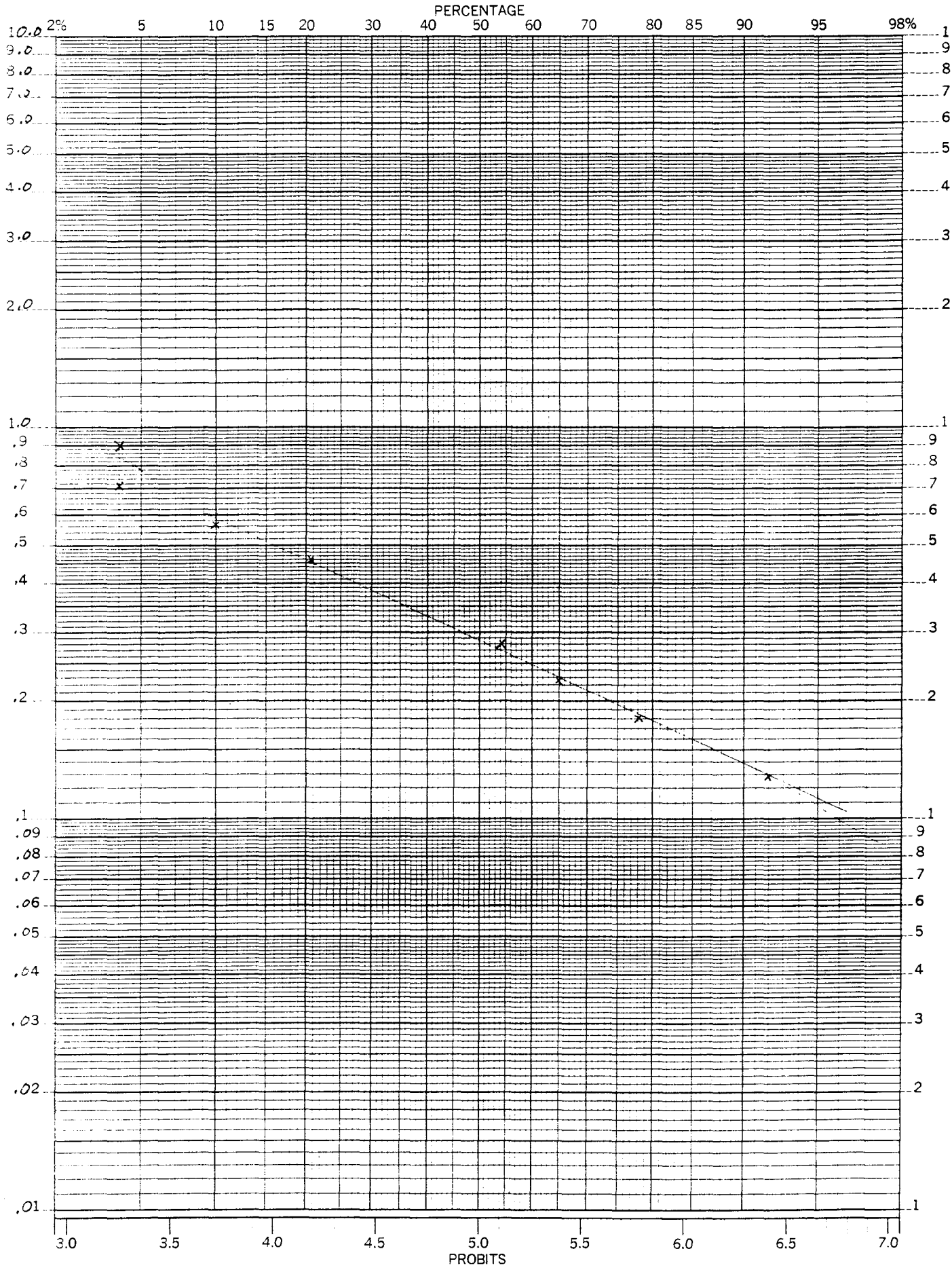
46 8080

PROBABILITY X LOG CYCLES
KEUFFEL & ESSER CO.



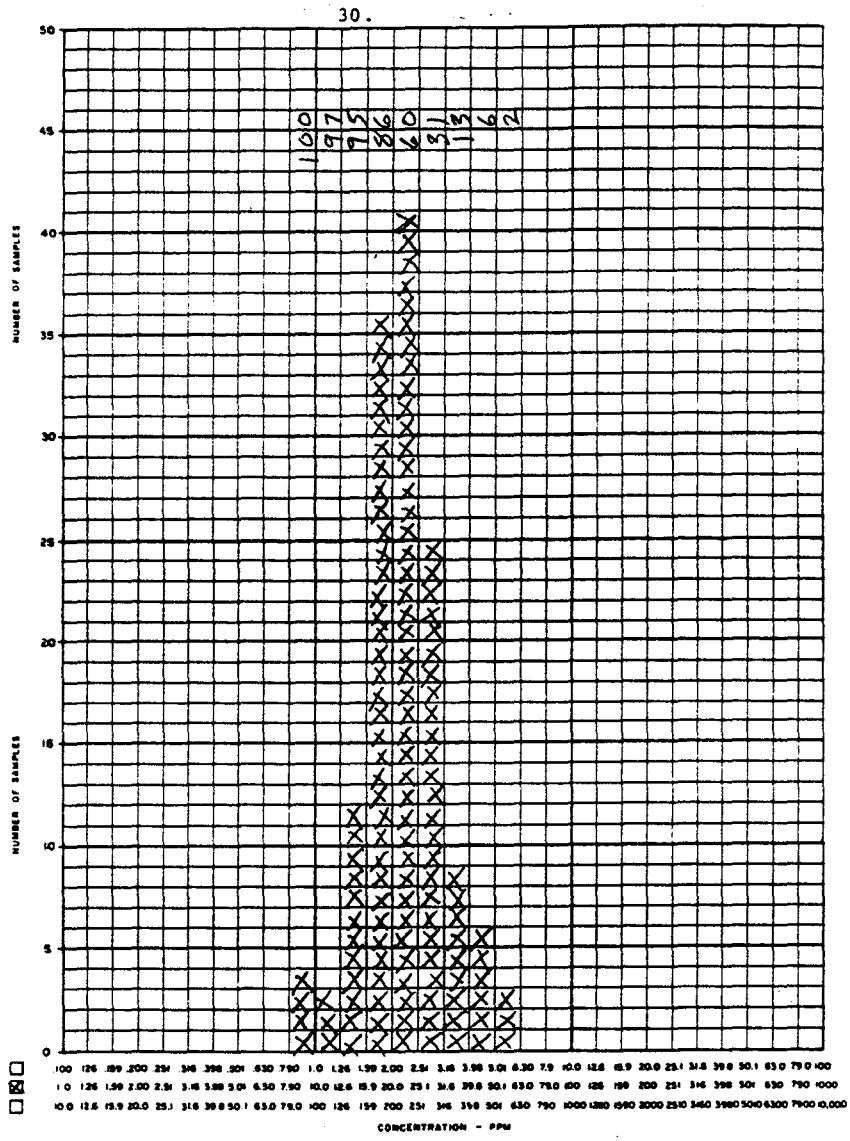
Cd

Cd

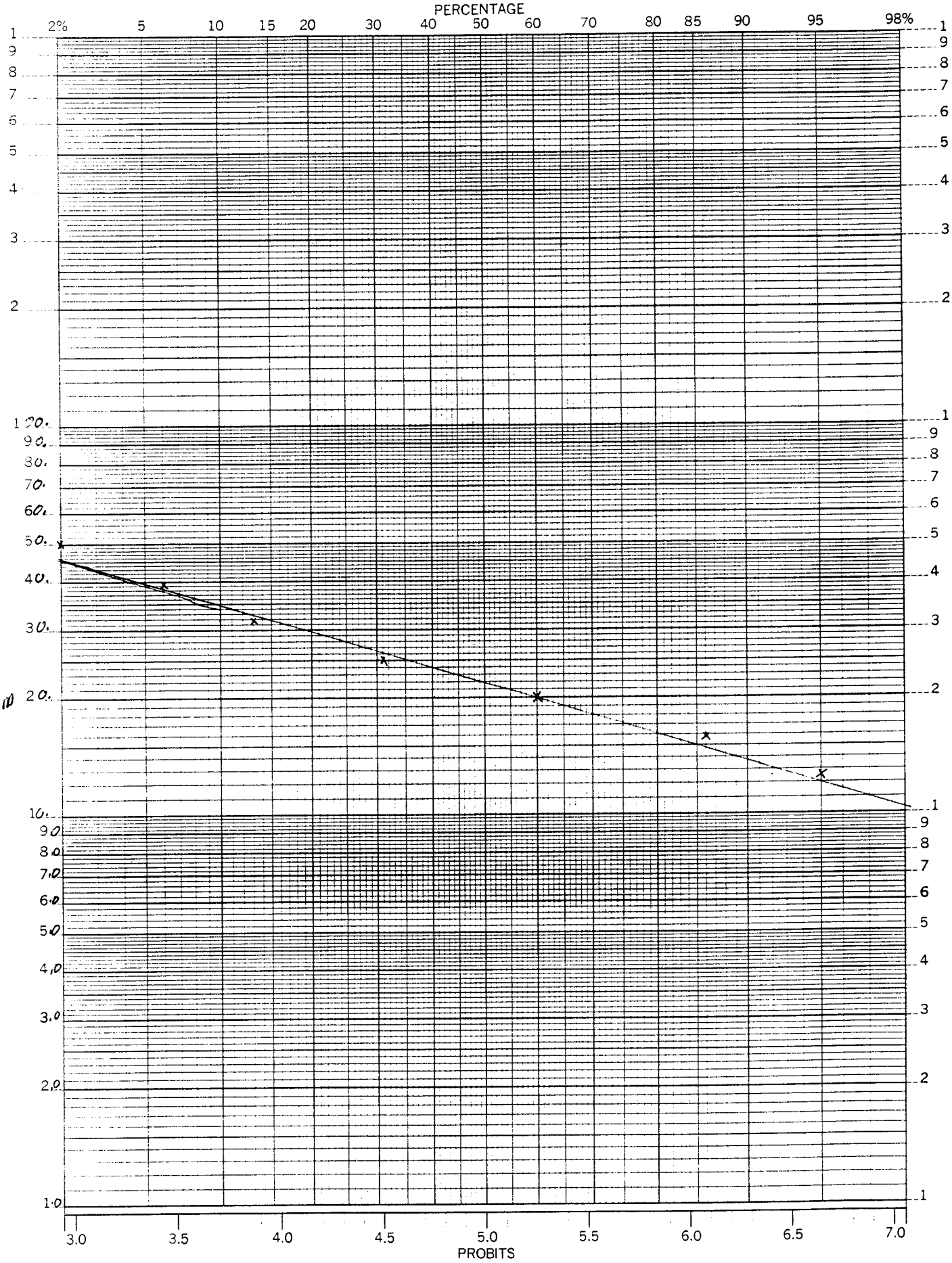


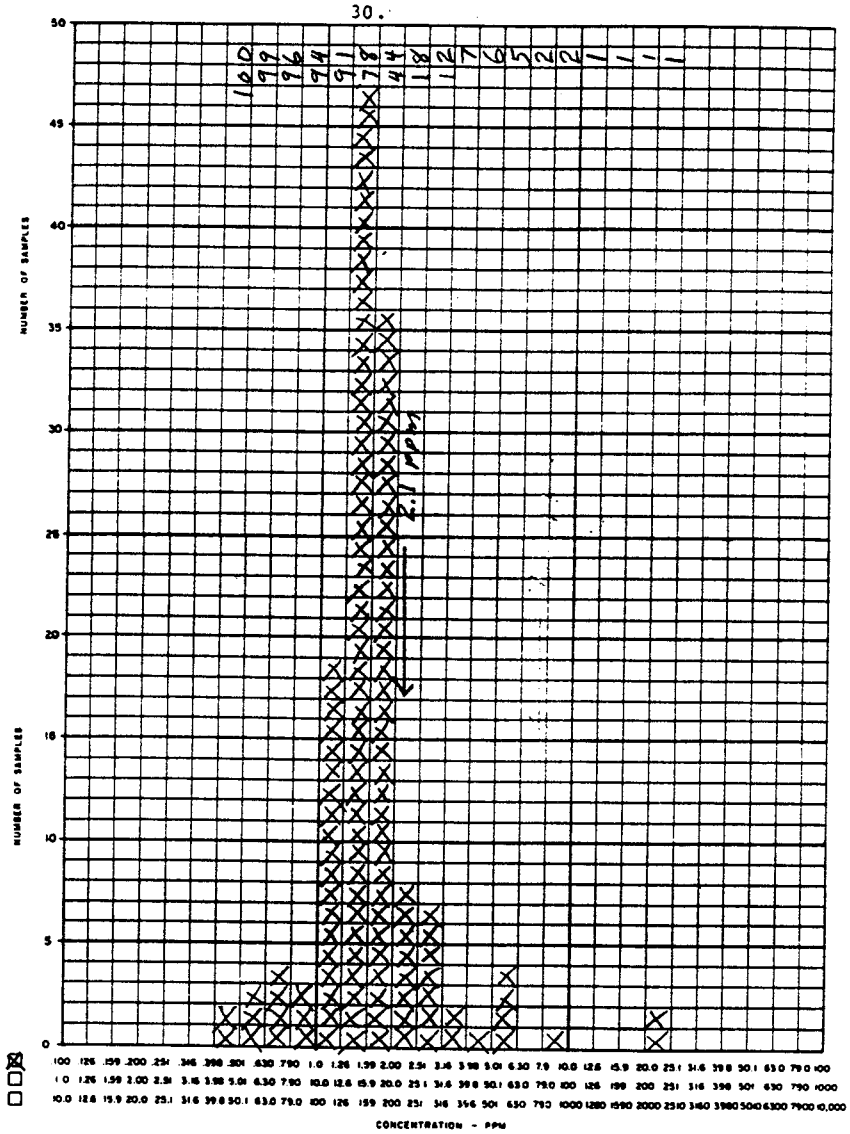
46 8080

PROBABILITY X LOG CYCLES
KEUFFEL & ESSER CO.

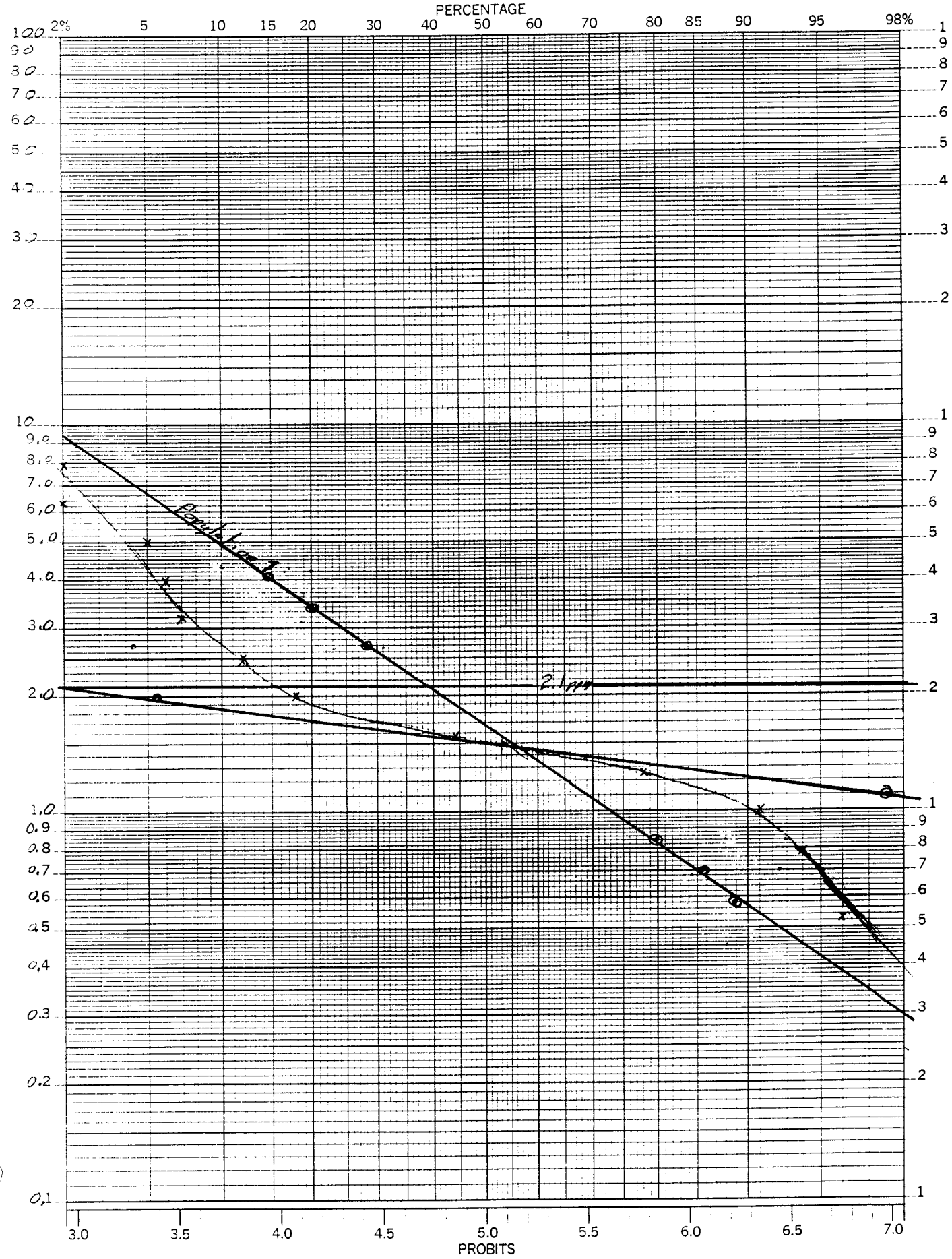


Cu

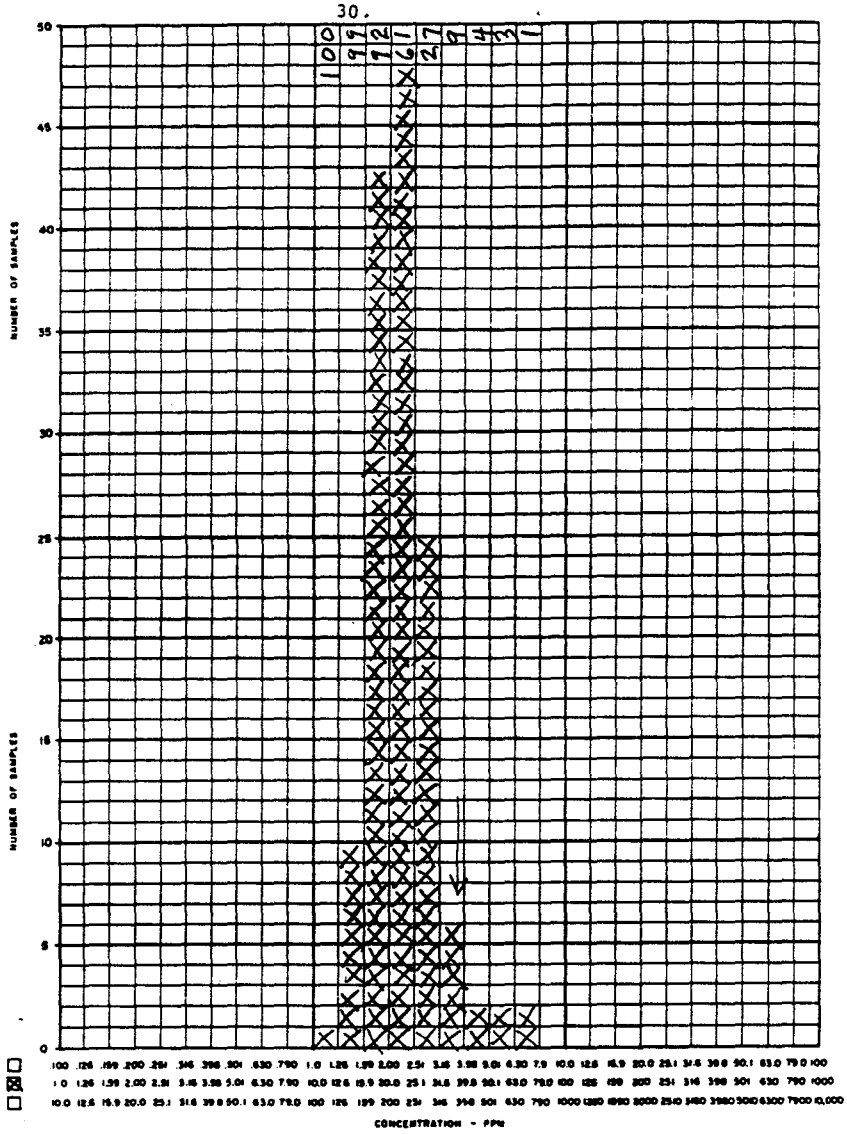

PERCENTAGE
2% 5 10 15 20 30 40 50 60 70 80 85 90 95 98%
PROBITS
3.0 3.5 4.0 4.5 5.0 5.5 6.0 6.5 7.0
PROBABILITY X 3 LOG CYCLES
KEUFFEL & ESSER CO.
46 8080



Mo



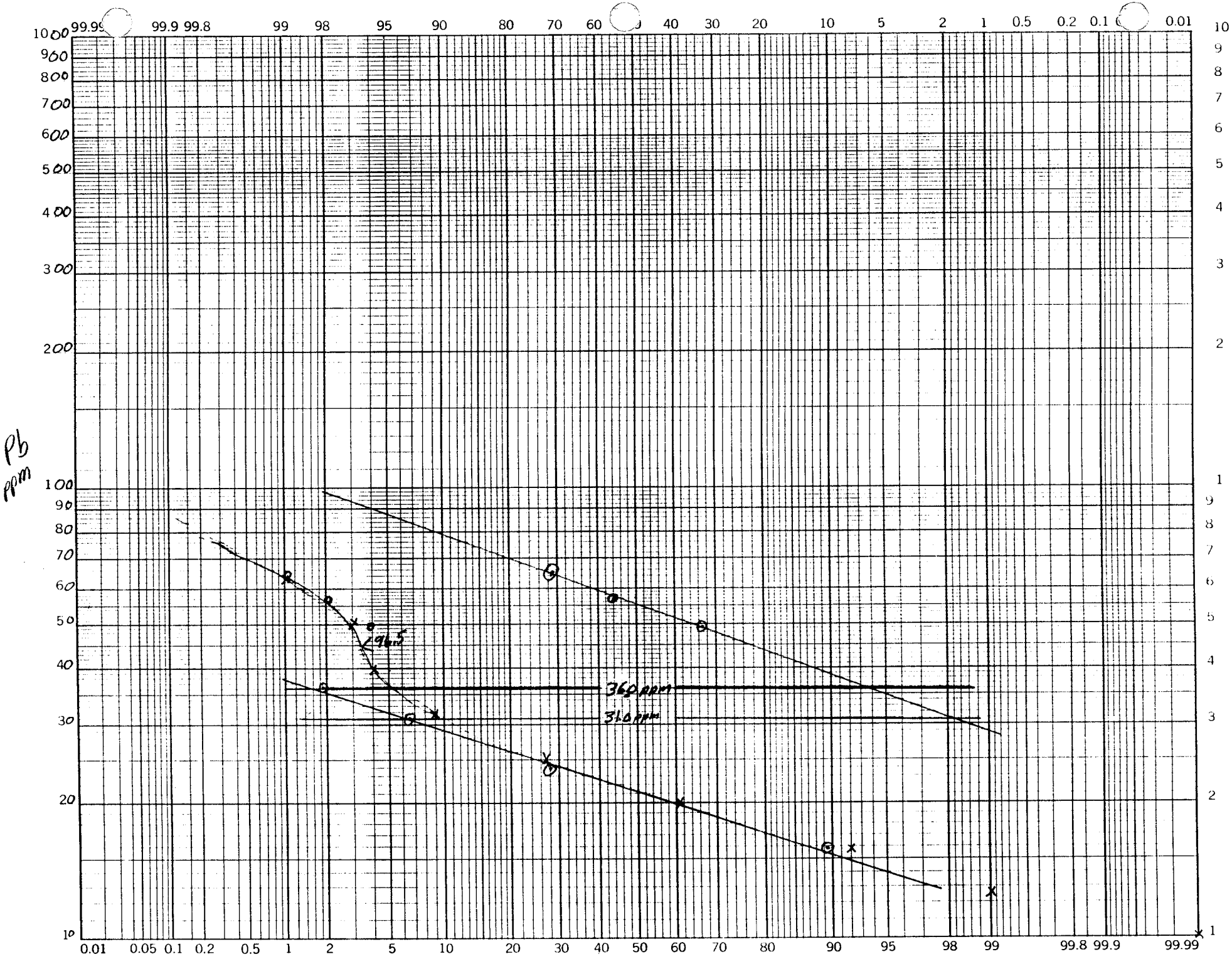
46 8080
PROBABILITY X 3 LOG CYCLES
KEUFFEL & ESSER CO.

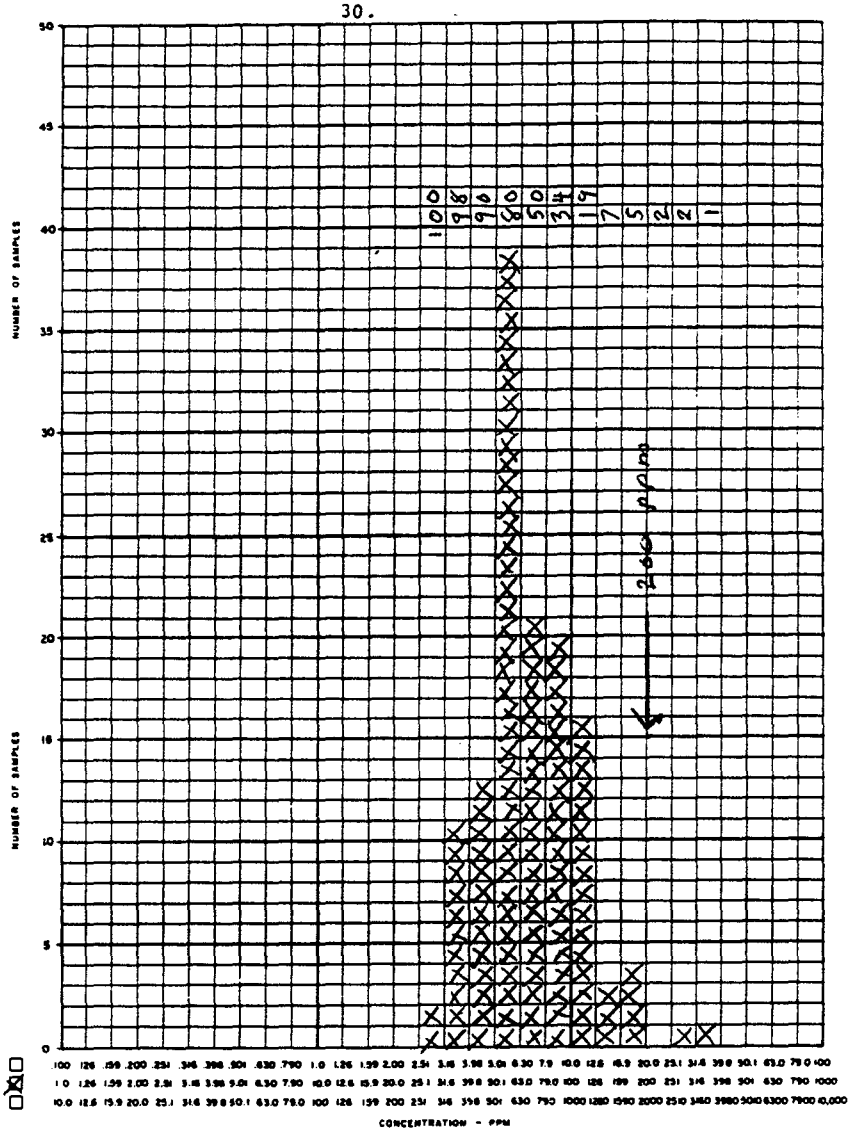


Pb

K+E PROBABILITY X 2 LOG CYCLES
KEUFFEL & ESSER CO. MADE IN U.S.A.

46 8040

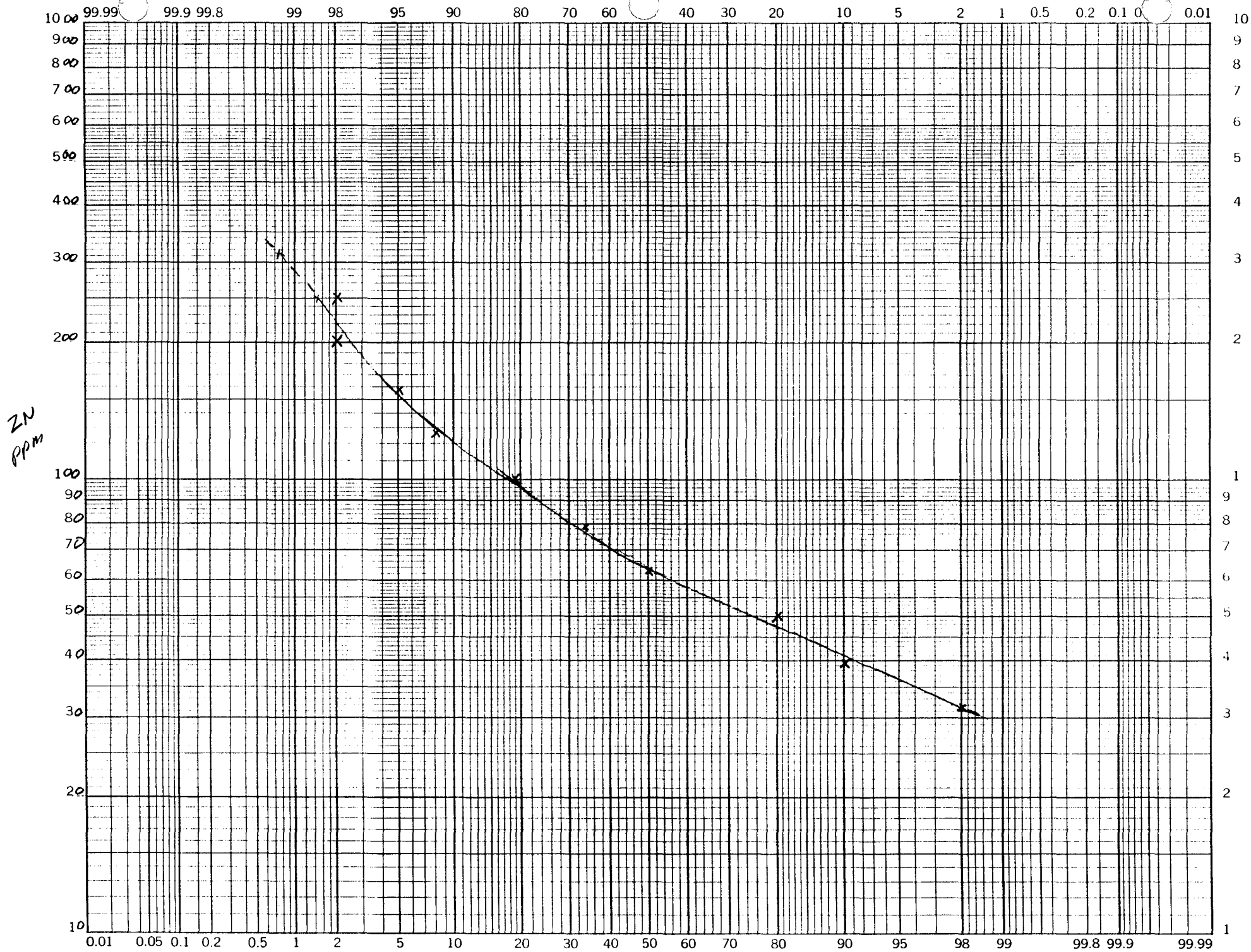


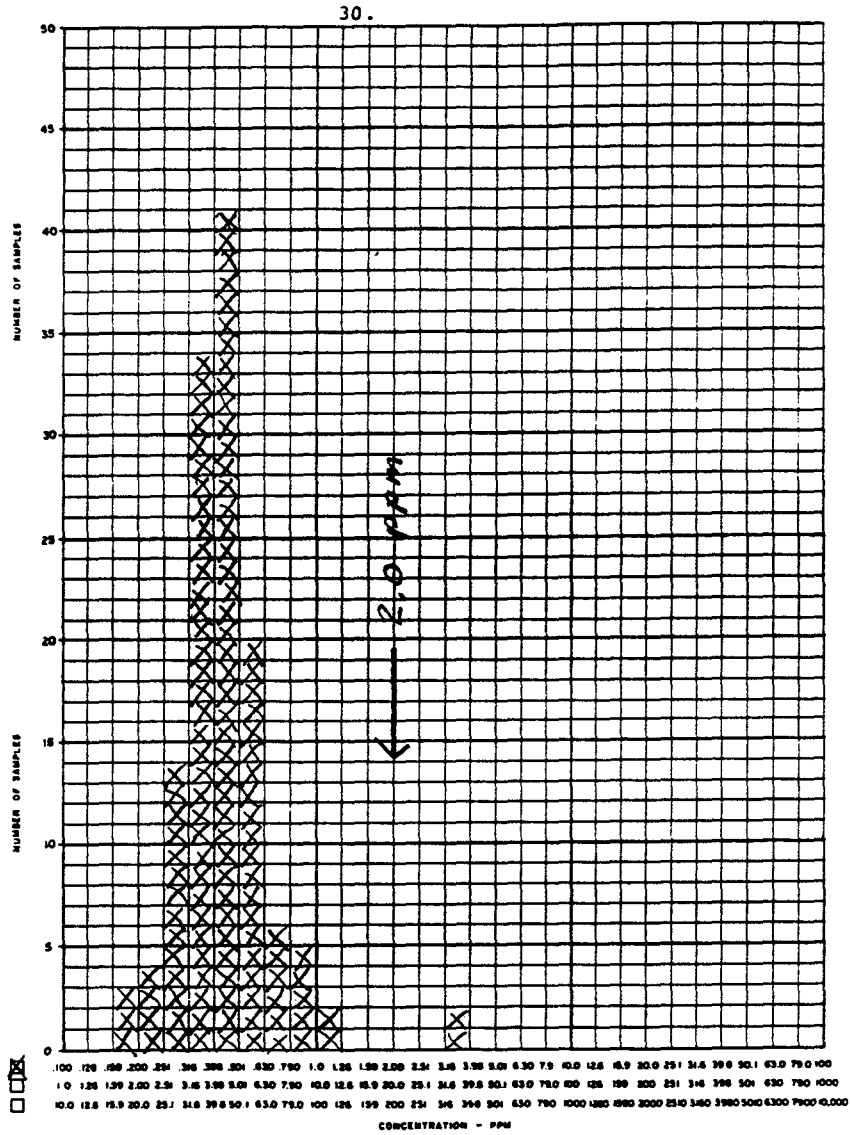

NUMBER OF SAMPLES
NUMBER OF SAMPLES
CONCENTRATION - PPM
100
98
90
80
50
34
19
17
5
2
2
1
260 ppm

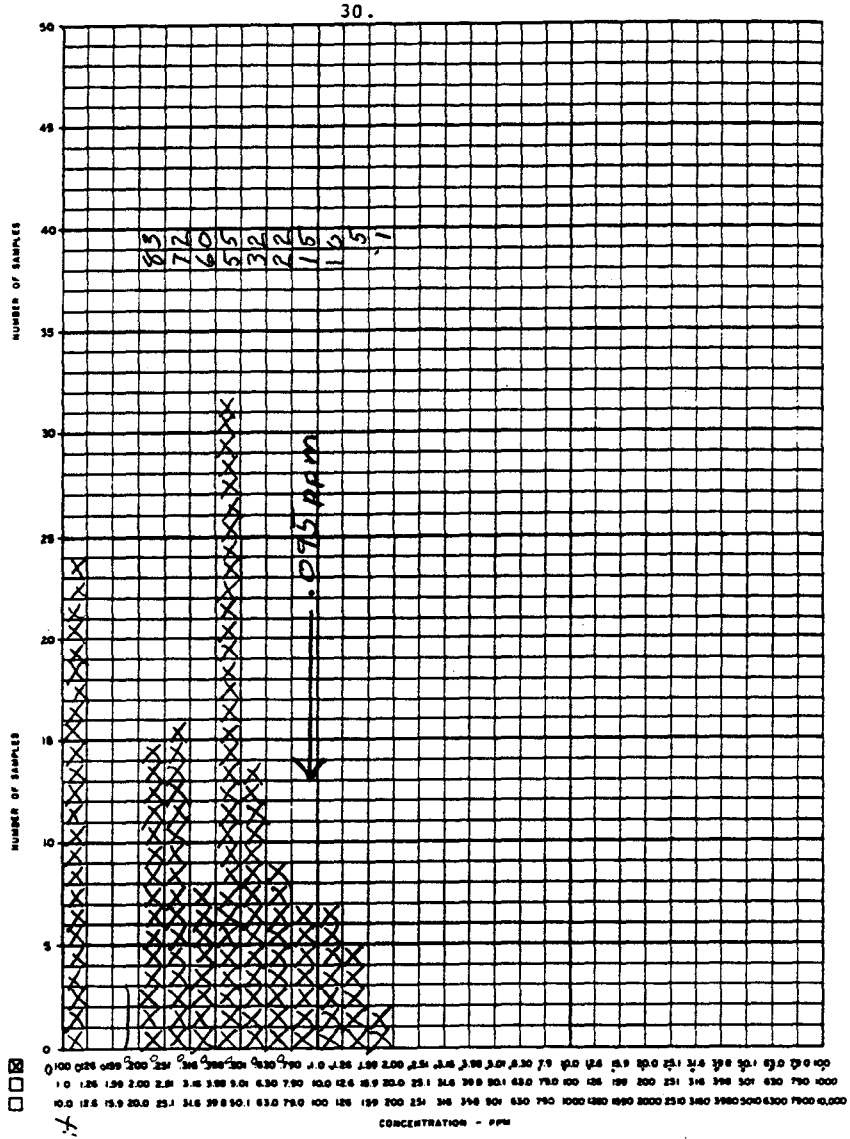
Zn

K+E PROBABILITY X 2 LOG CYCLES
KEUFFEL & ESSER CO. MADE IN U.S.A.

46 8040




NUMBER OF SAMPLES
NUMBER OF SAMPLES
CONCENTRATION - PPM
2.0 ppm

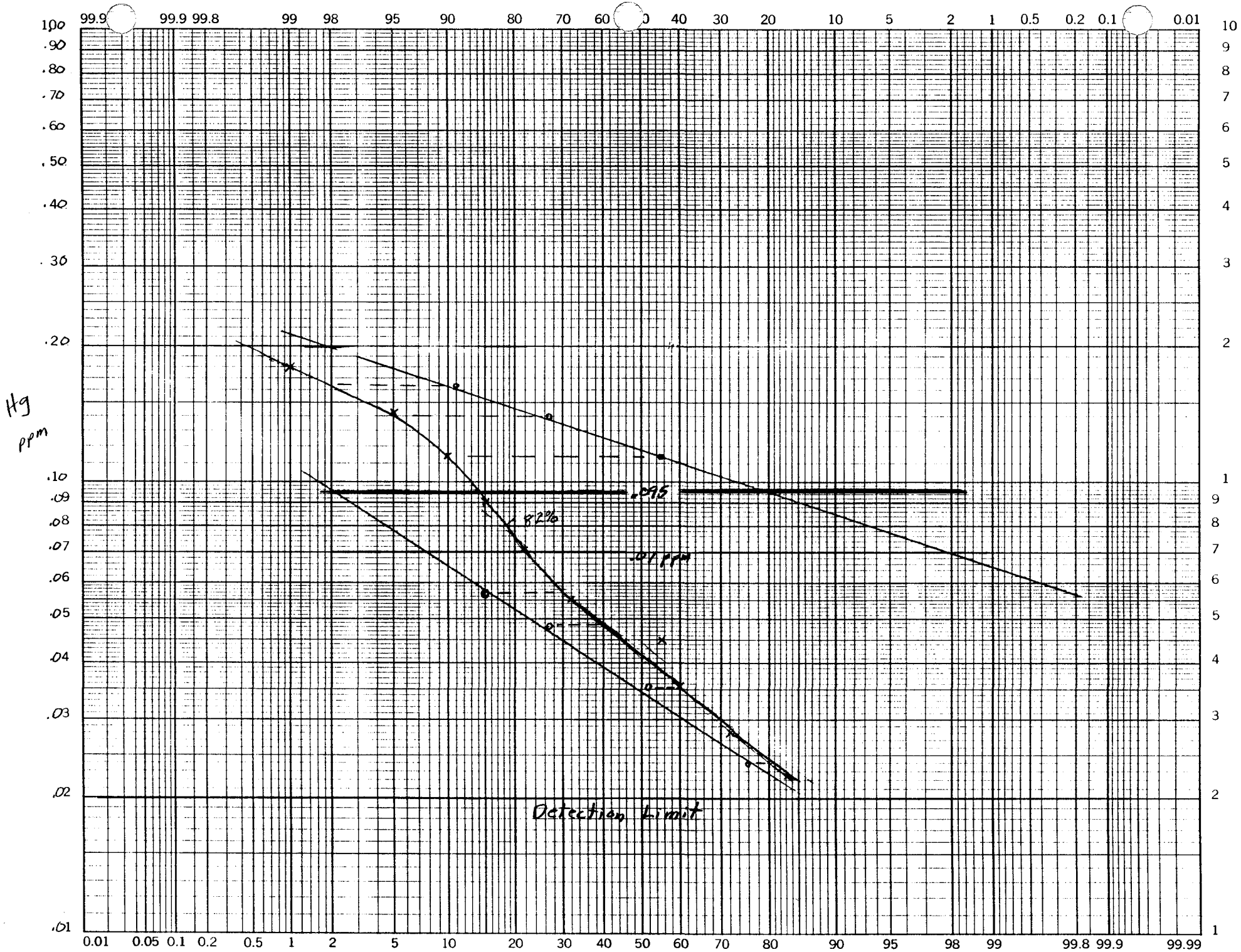


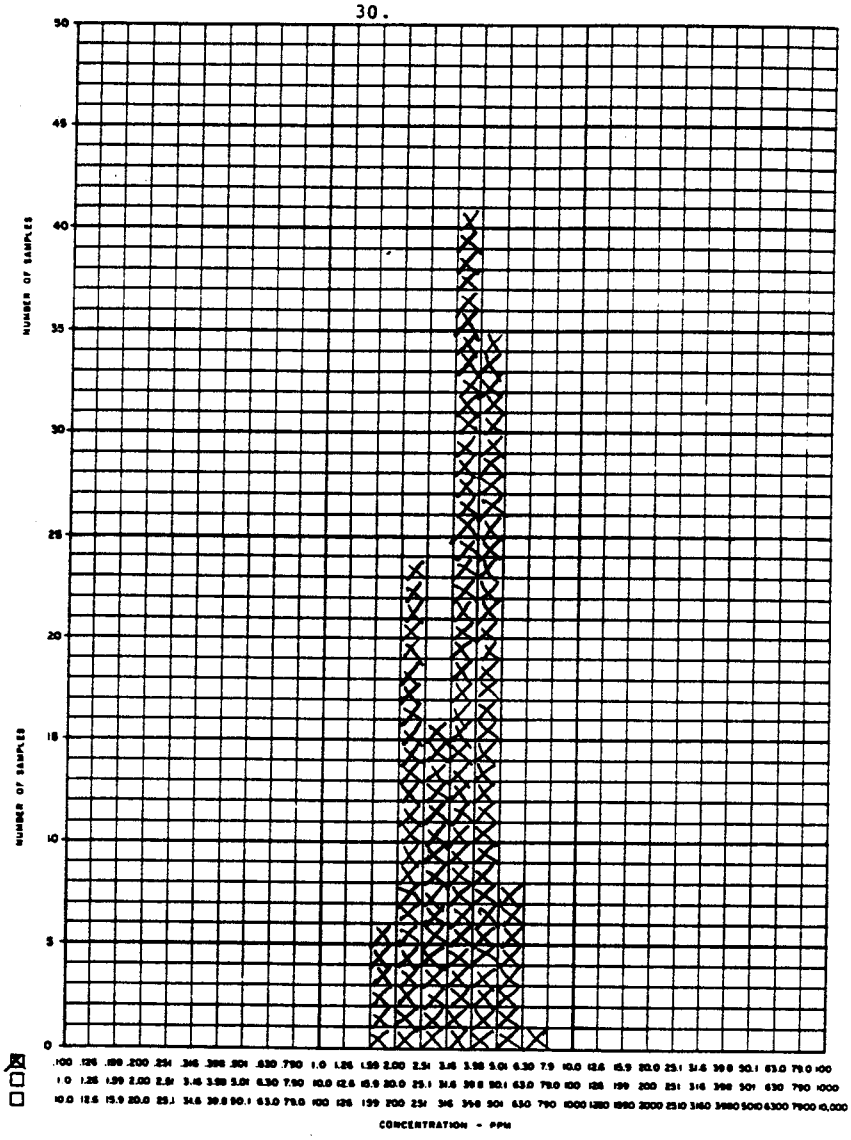
Detection Limit

Hg

K+E PROBABILITY X 2 LOG CYCLES
KEUFFEL & ESSER CO. MADE IN USA

46 8040 Hg

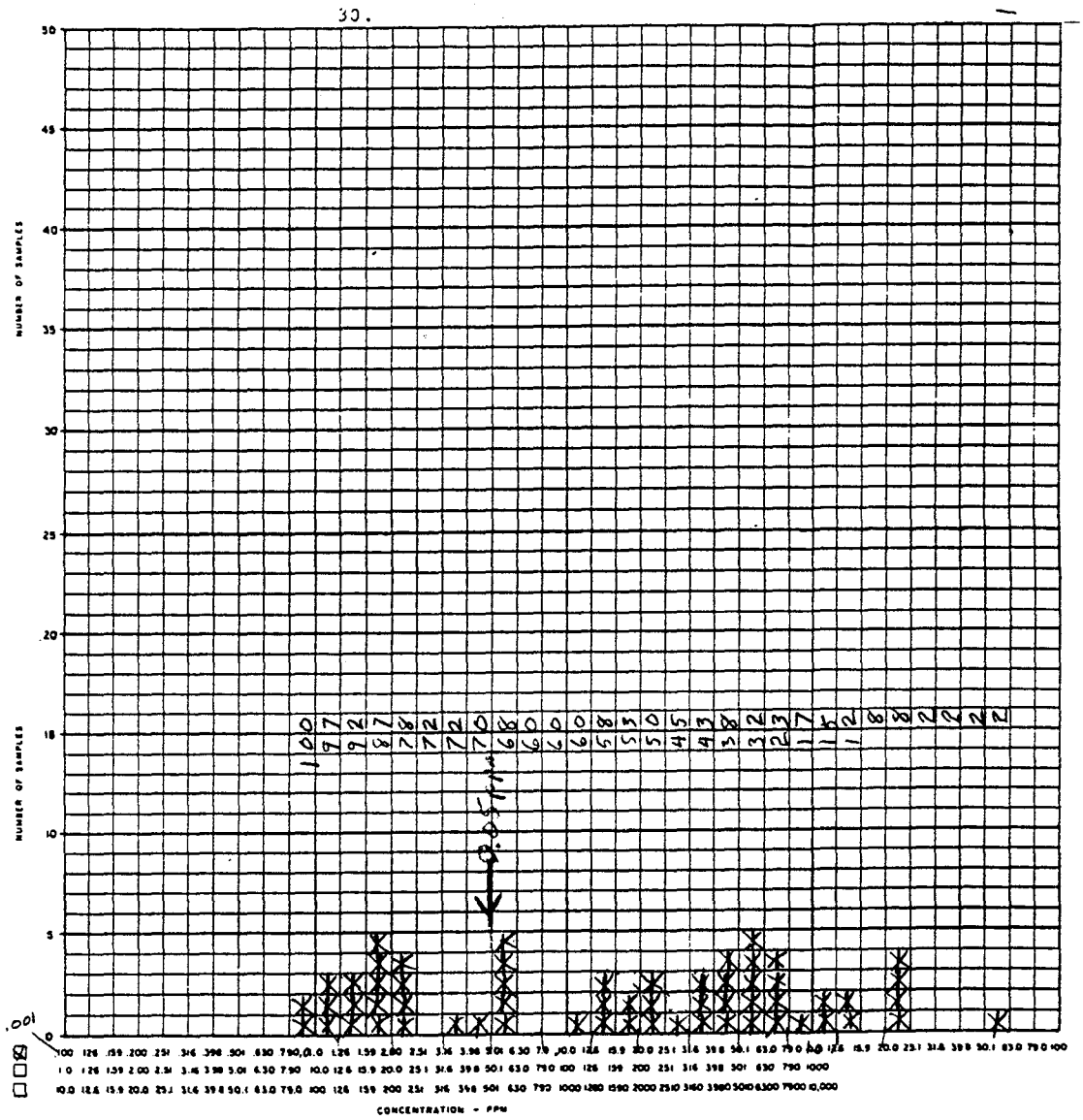




6a

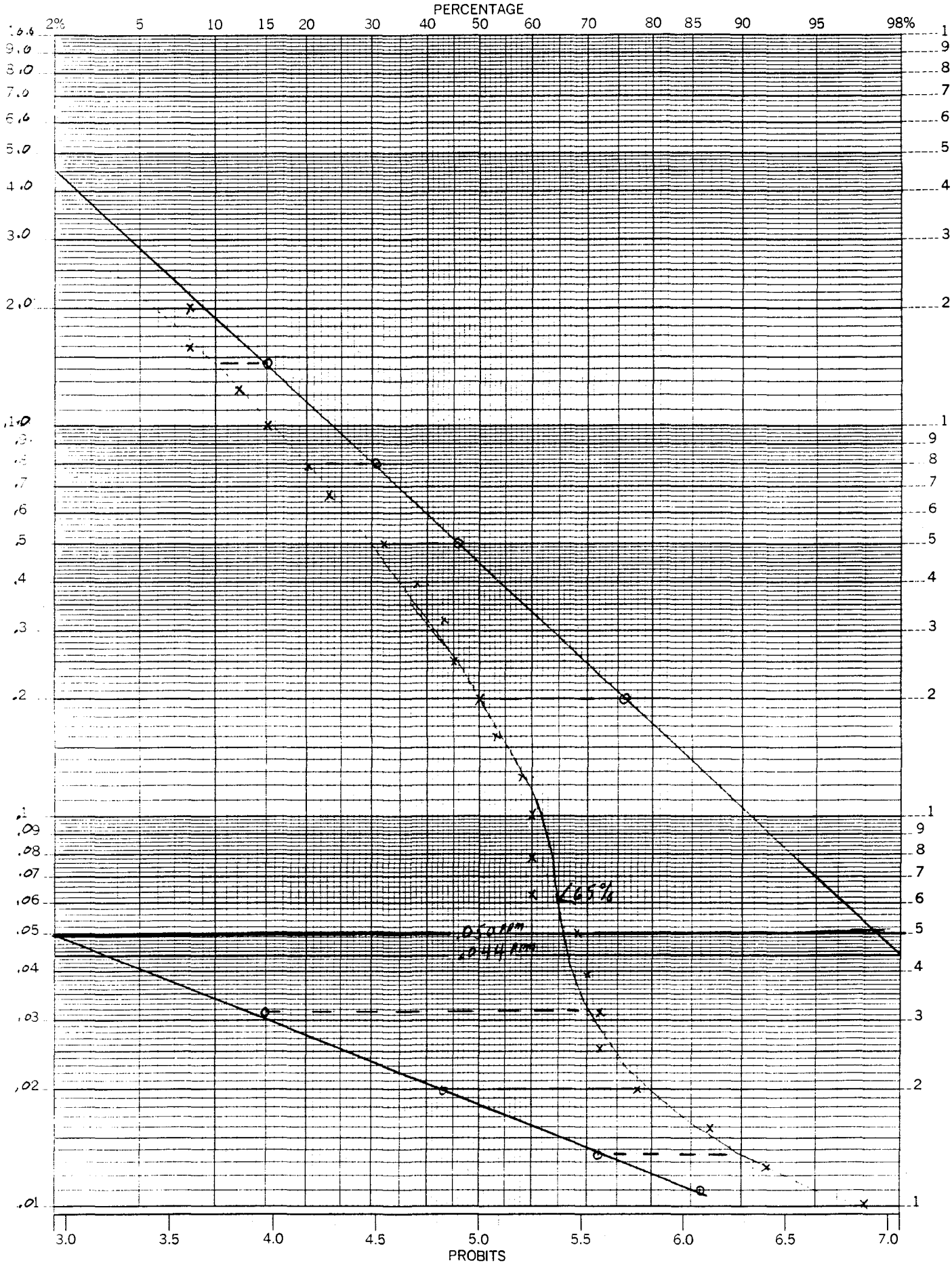
APPENDIX C

HISTOGRAMS AND CUMULATIVE
FREQUENCY PLOTS, ROCK SAMPLES



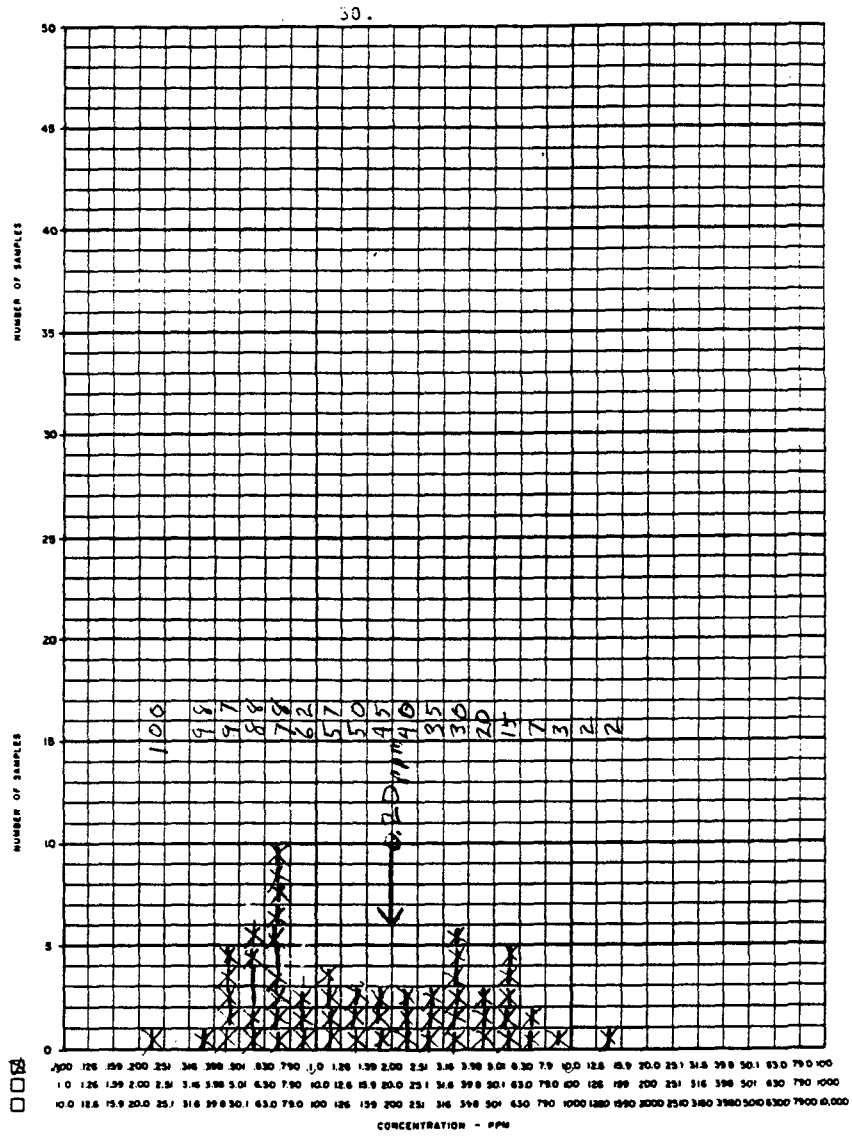
Au

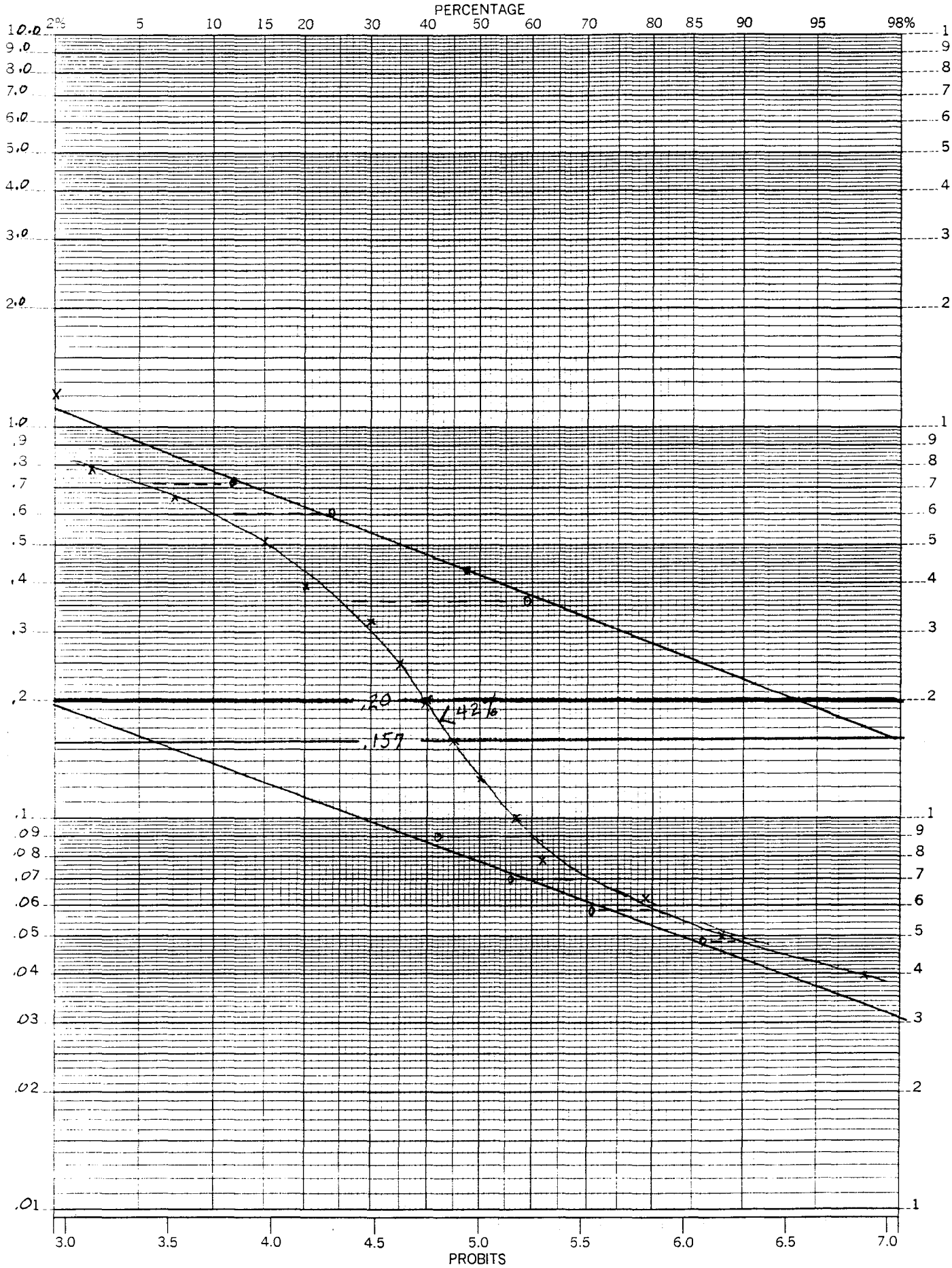
.008 → 5.22



46 8080

PROBABILITY X 3 LOG CYCLES
KEUFFEL & ESSER CO.

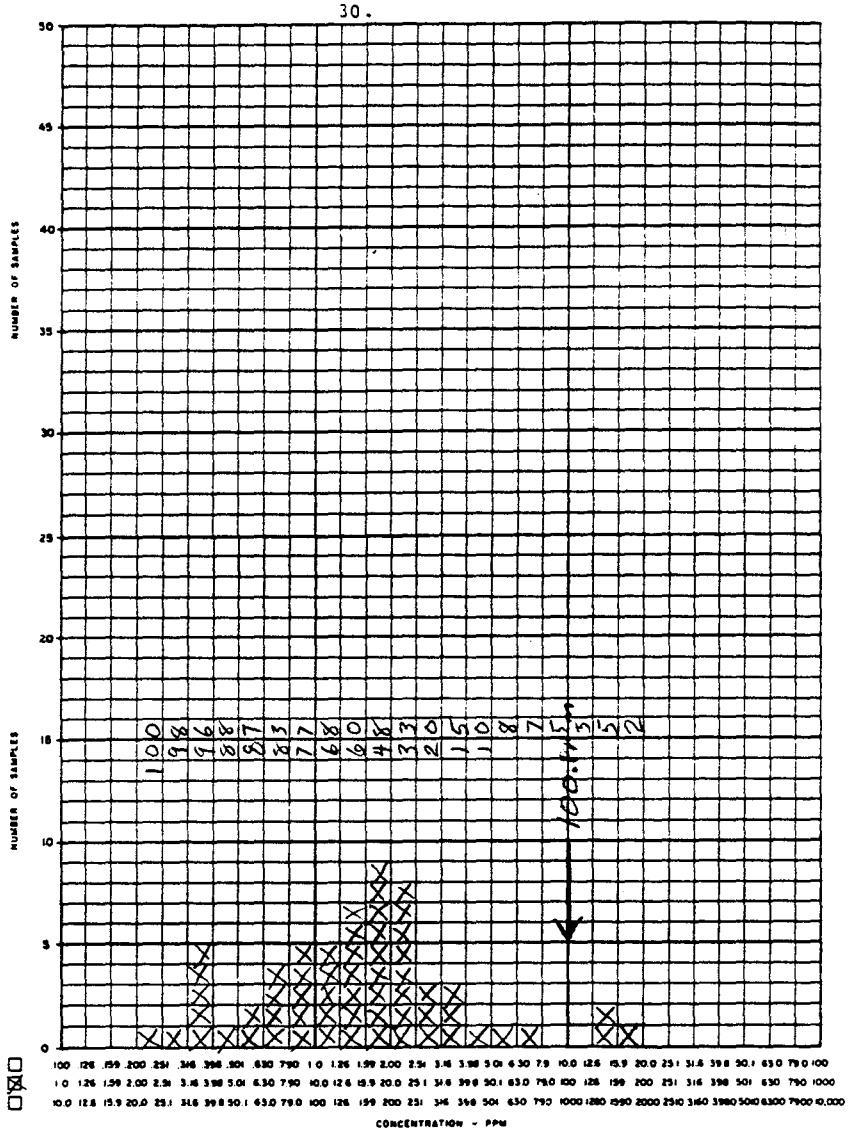

NUMBER OF SAMPLES
CONCENTRATION - PPM



46 8080

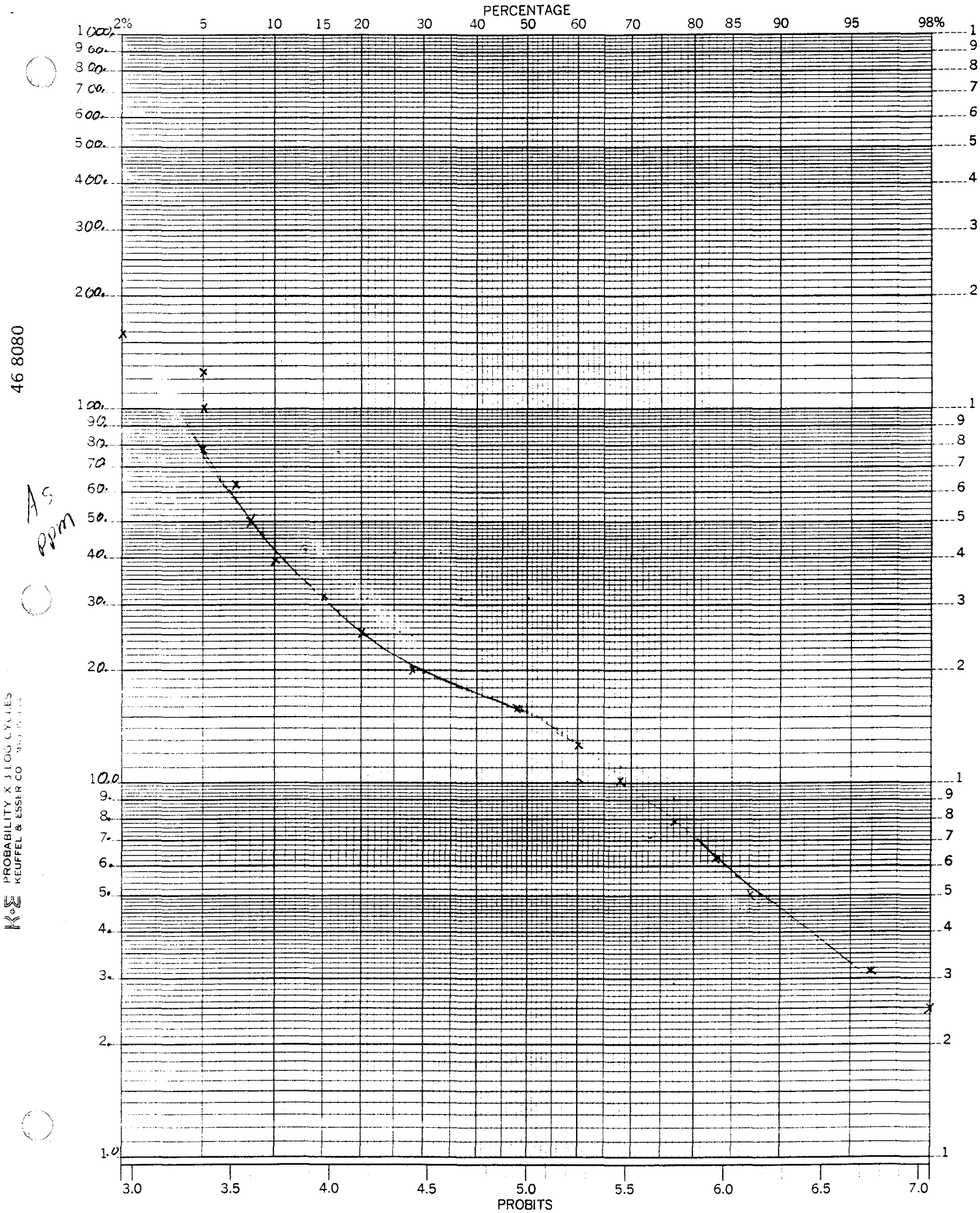
Ag PPM

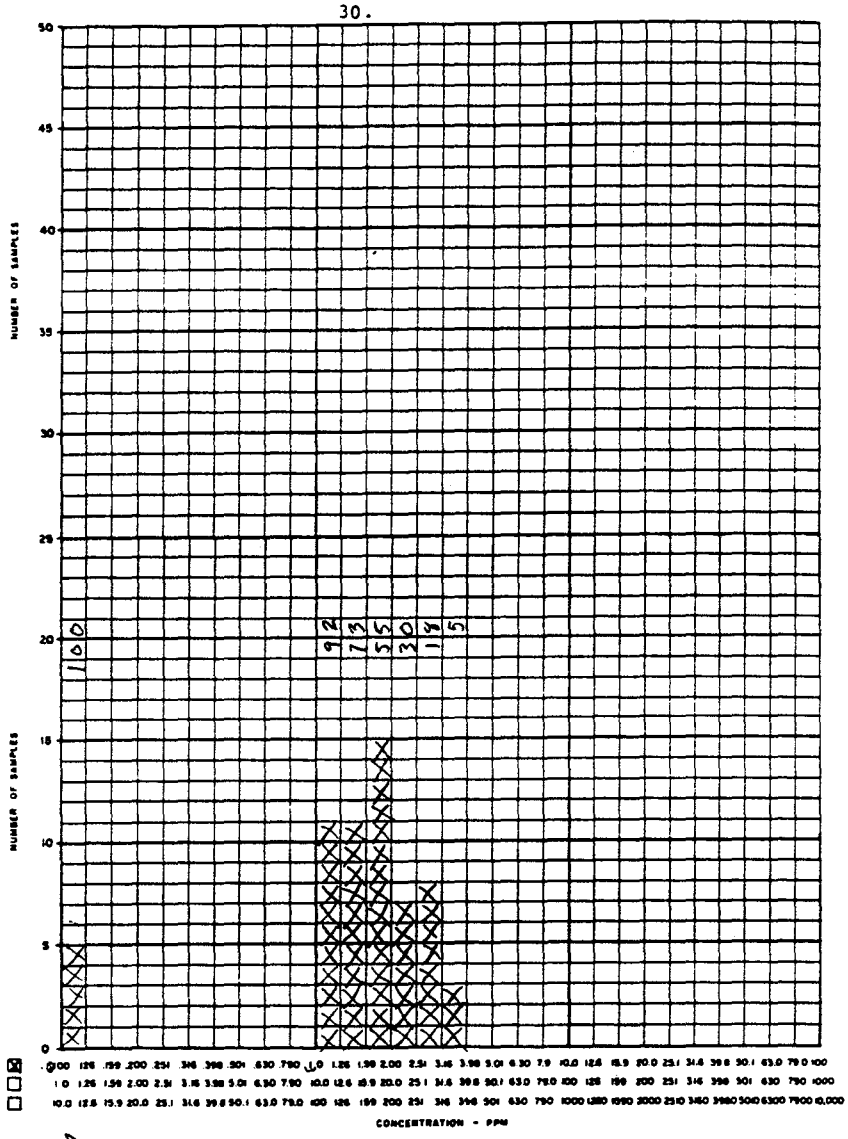
K&E PROBABILITY X 3 LOG CYCLES KEUFFEL & ESSER CO.


NUMBER OF SAMPLES
NUMBER OF SAMPLES
CONCENTRATION ~ PPM
100.4 ppm

As

2.0 → 188

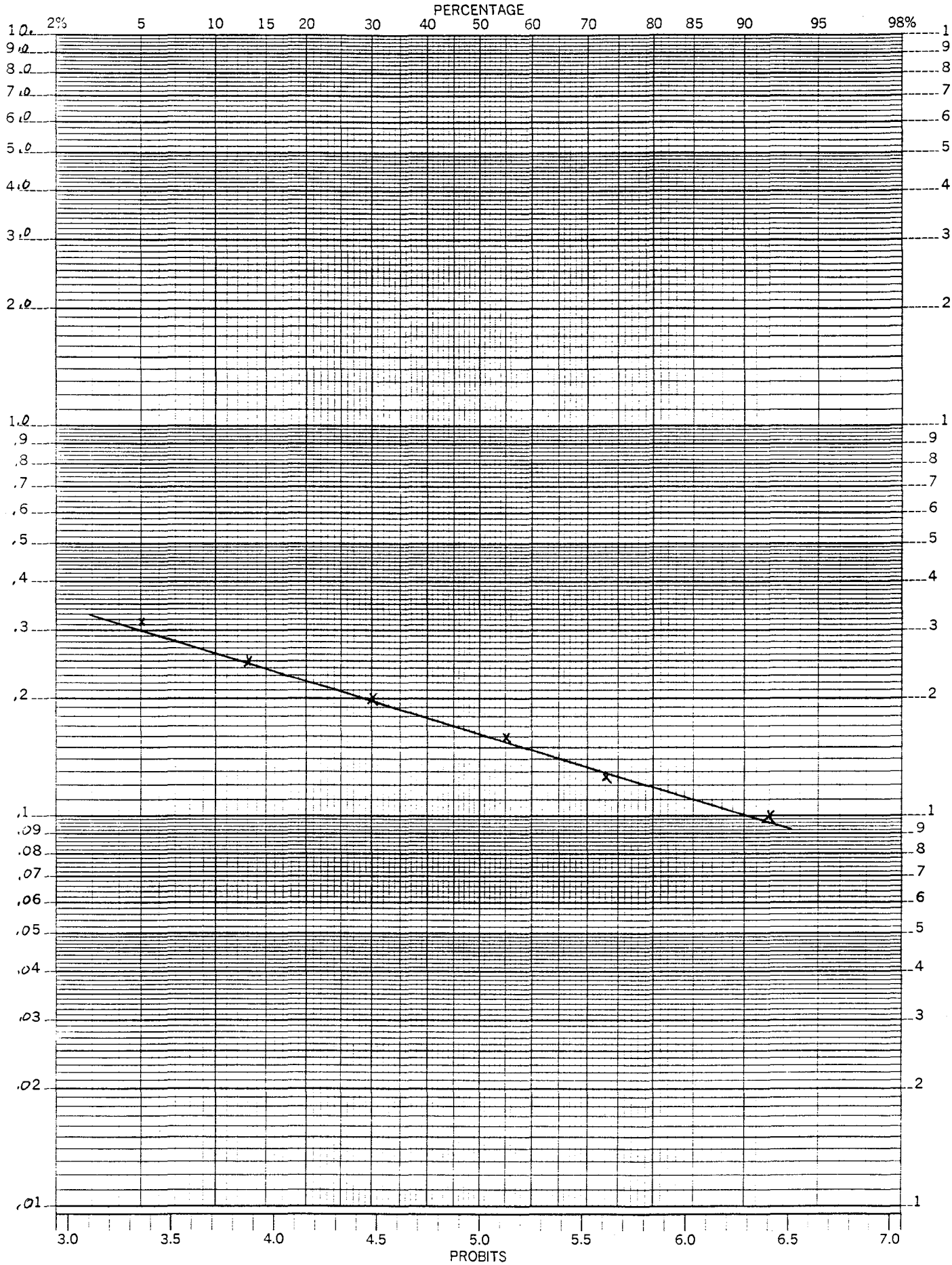

PERCENTAGE
2%
5
10
15
20
30
40
50
60
70
80
85
90
95
98%
1000
900
800
700
600
500
400
300
200
100
90
80
70
60
50
40
30
20
10.0
9.
8.
7.
6.
5.
4.
3.
2.
1.0
3.0
3.5
4.0
4.5
5.0
5.5
6.0
6.5
7.0
PROBITS
As ppm
46 8080
K+E PROBABILITY X 3 LOG CYCLES
KEUFFEL & ESSER CO.



Detection limit

Cd

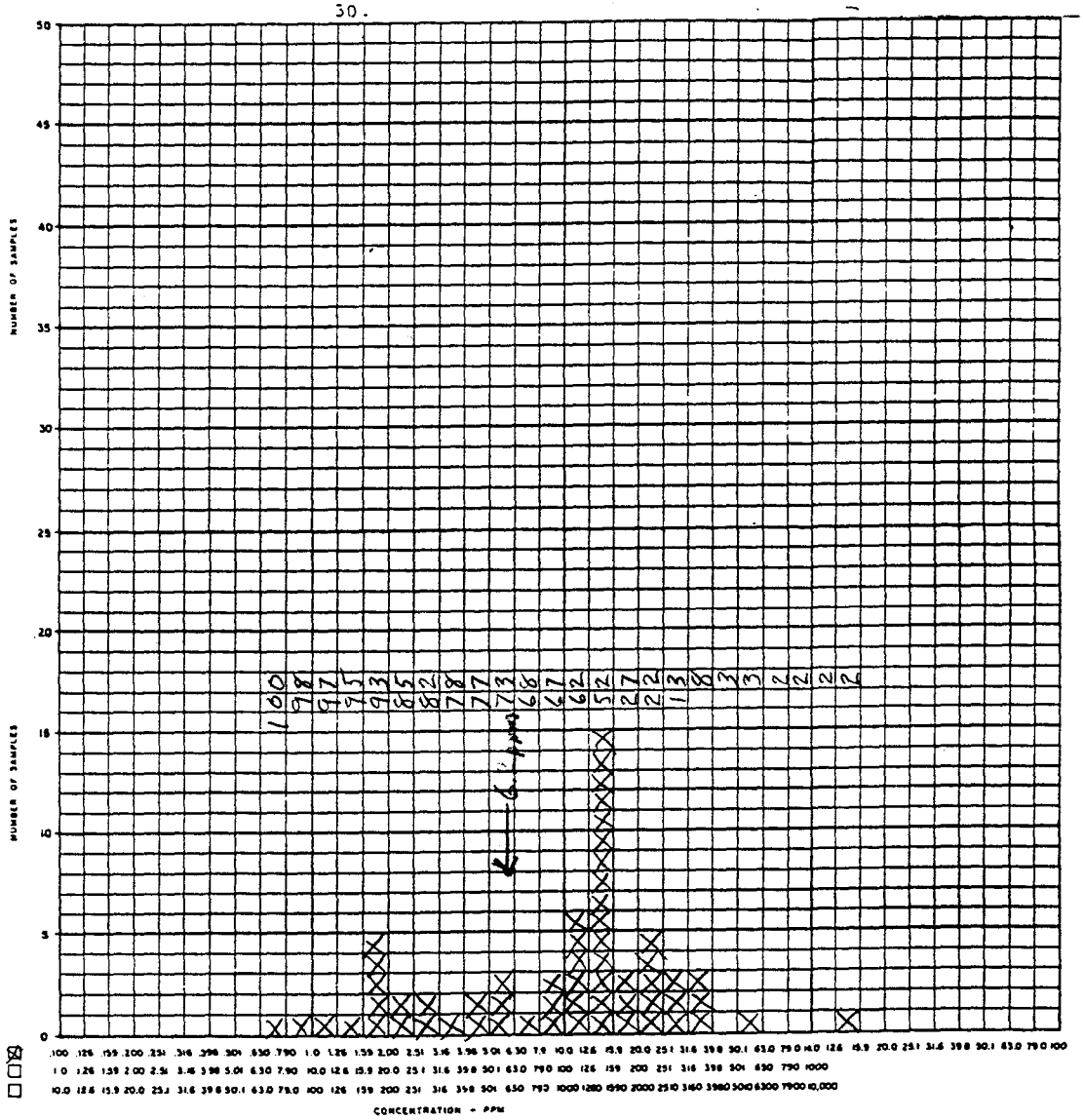
.069 → .357



46 8080

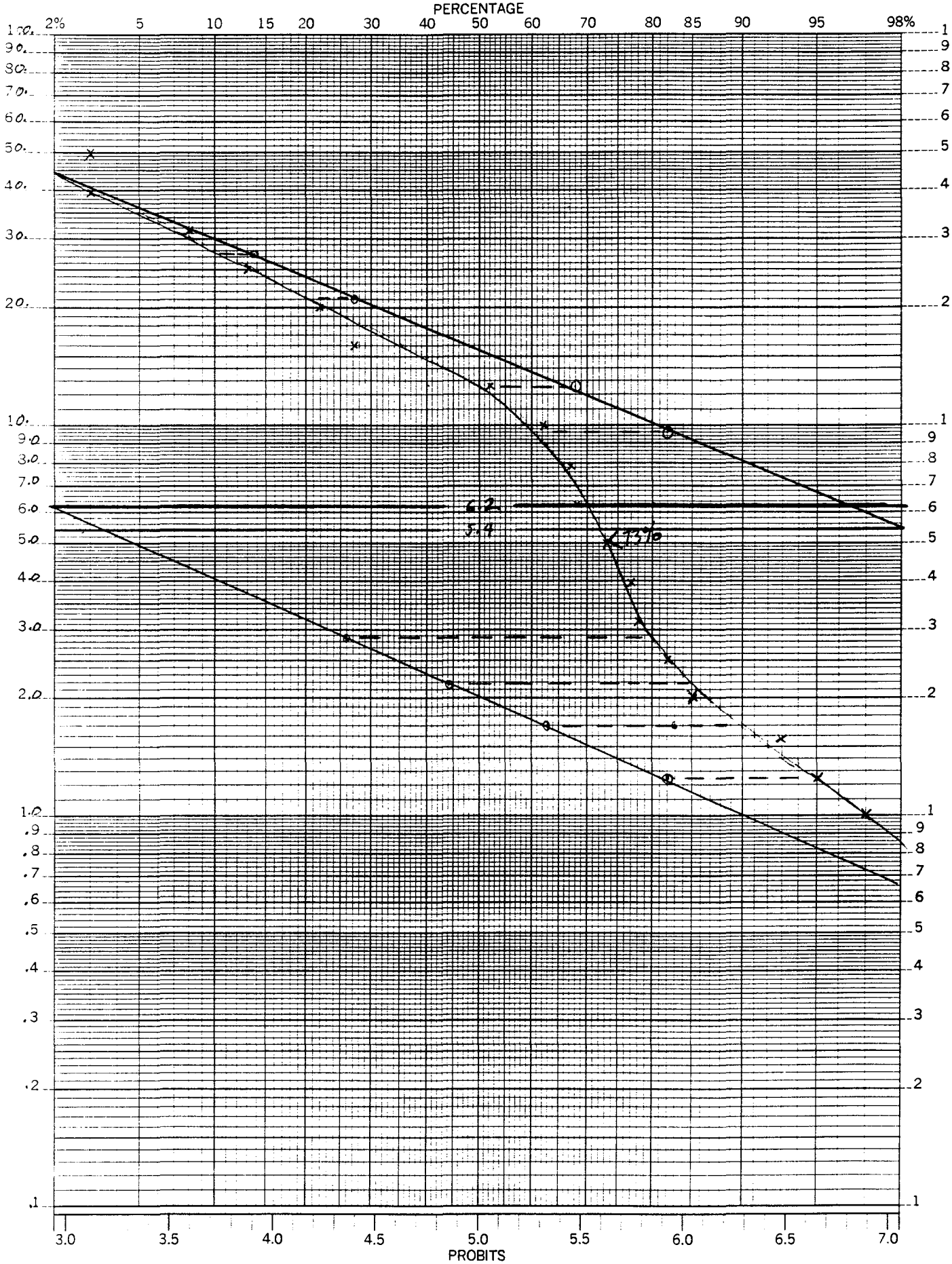
Cd ppm

K+E PROBABILITY X 3 LOG CYCLES
KEUFFEL & ESSER CO. MADE IN U.S.A.



Cu

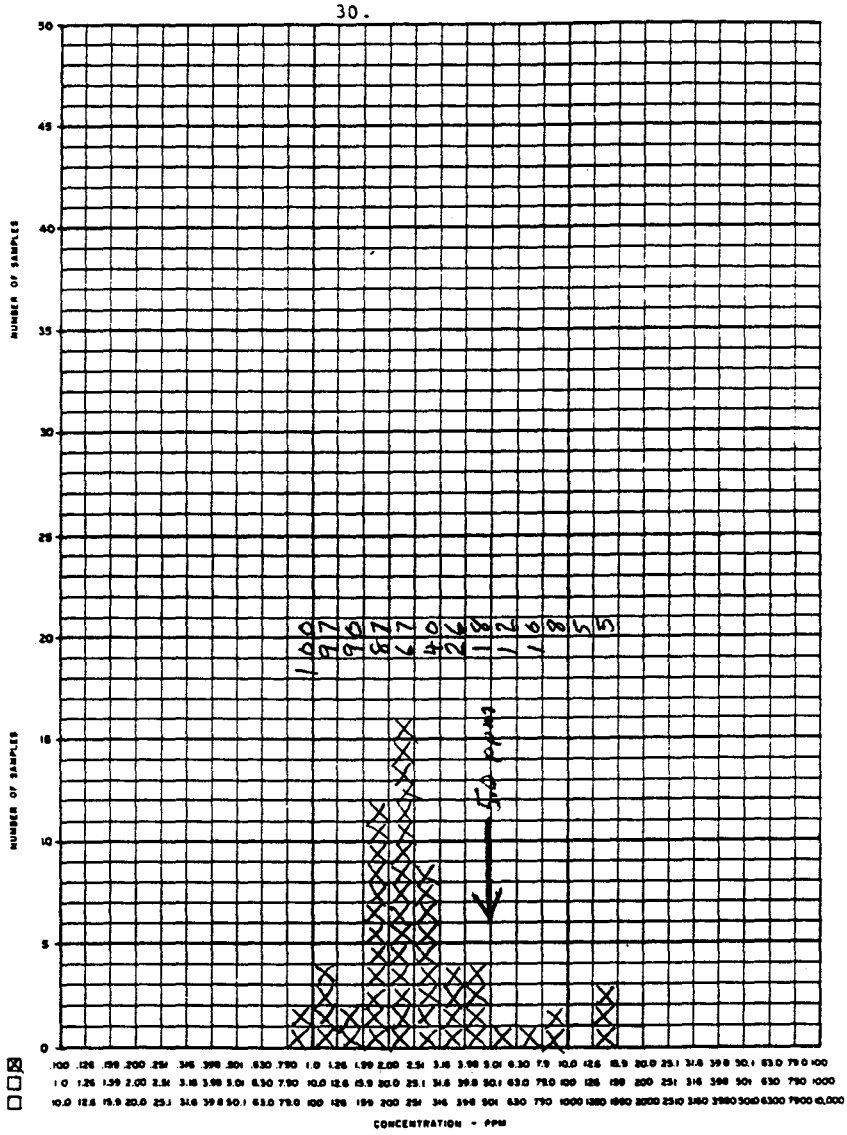
.694 → 141



46 8080

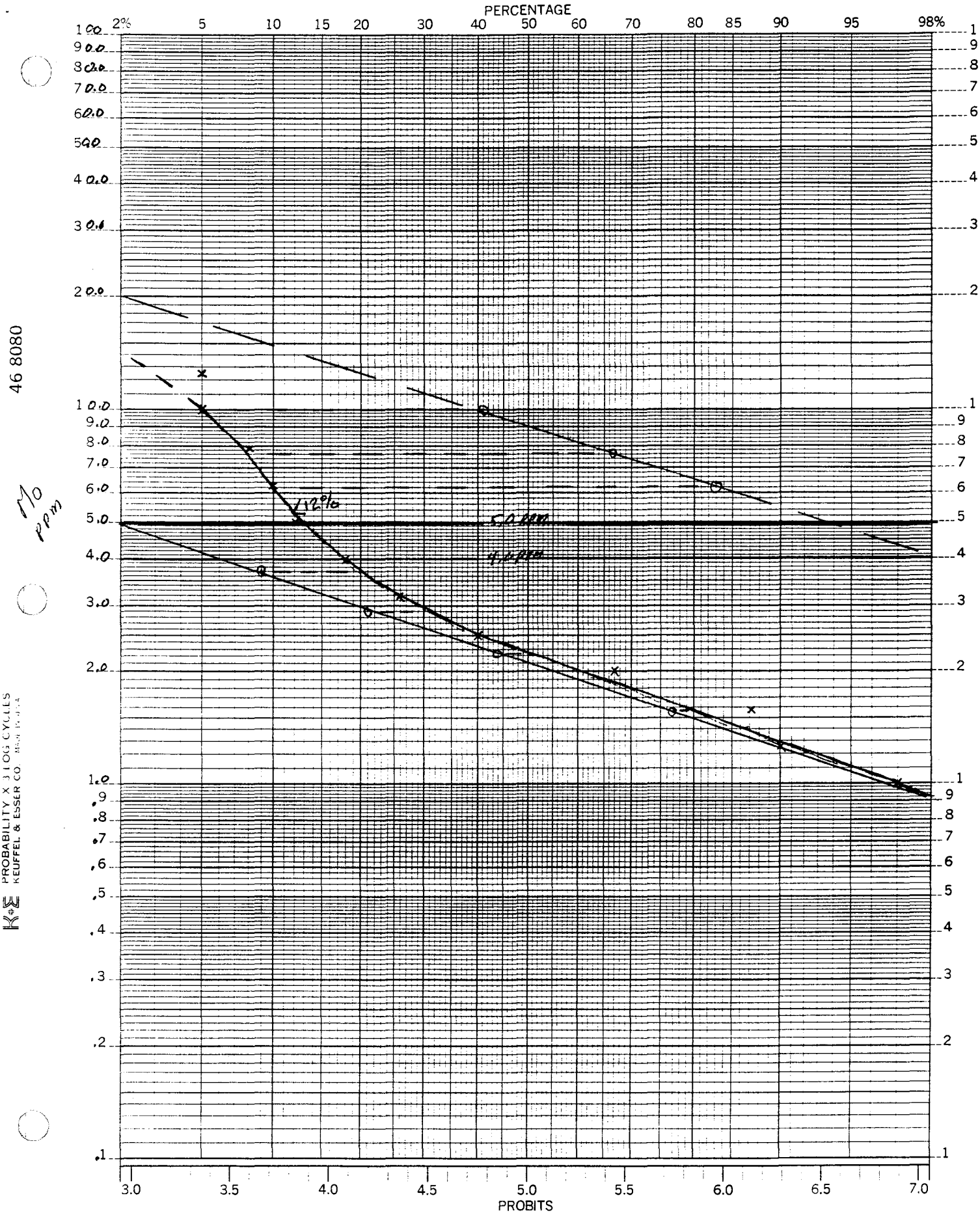
~4 ppm

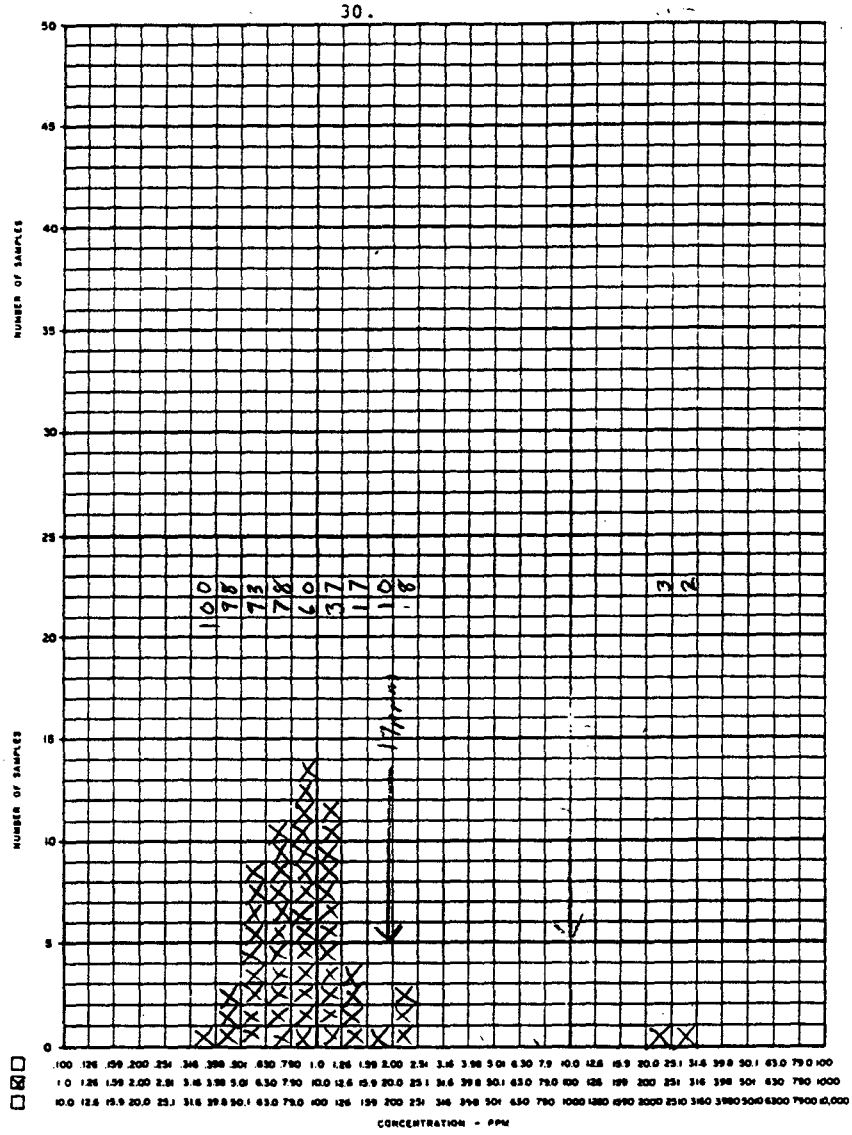
K+E PROBABILITY X 3 LOG CYCLES
KEUFFEL & ESSER CO.


NUMBER OF SAMPLES
NUMBER OF SAMPLES
CONCENTRATION - PPM
100
97
96
87
67
40
26
18
12
16
8
5
5
50 ppm

110

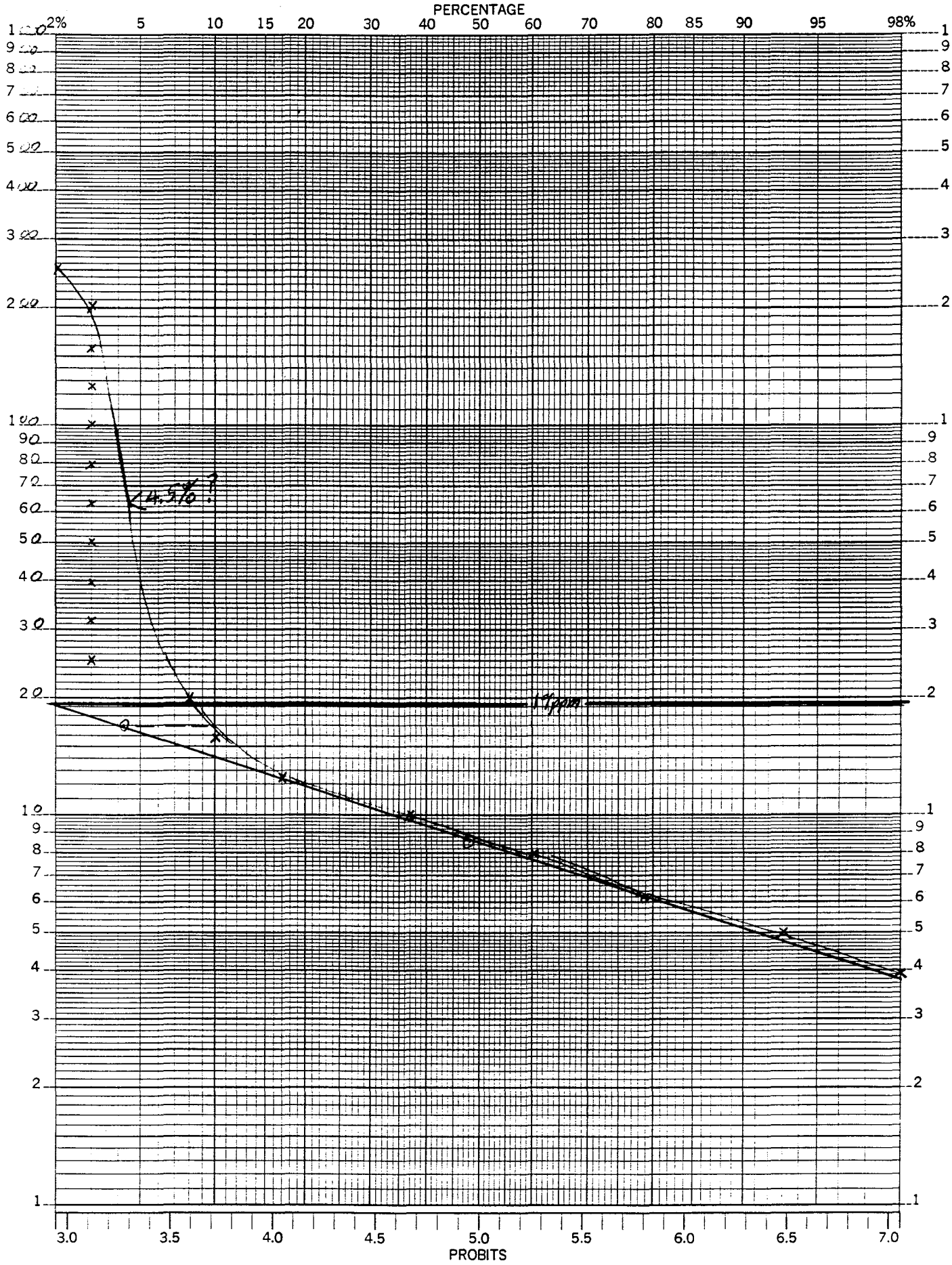
.227 → 147


PERCENTAGE
2%
5
10
15
20
30
40
50
60
70
80
85
90
95
98%
100
90.0
80.0
70.0
60.0
50.0
40.0
30.0
20.0
10.0
9.0
8.0
7.0
6.0
5.0
4.0
3.0
2.0
1.0
.9
.8
.7
.6
.5
.4
.3
.2
.1
Mo ppm
12%
5.0 ppm
4.6 ppm
3.0
3.5
4.0
4.5
5.0
5.5
6.0
6.5
7.0
PROBITS
46 8080
K&E PROBABILITY X 3 LOG CYCLES
KEUFFEL & ESSER CO.

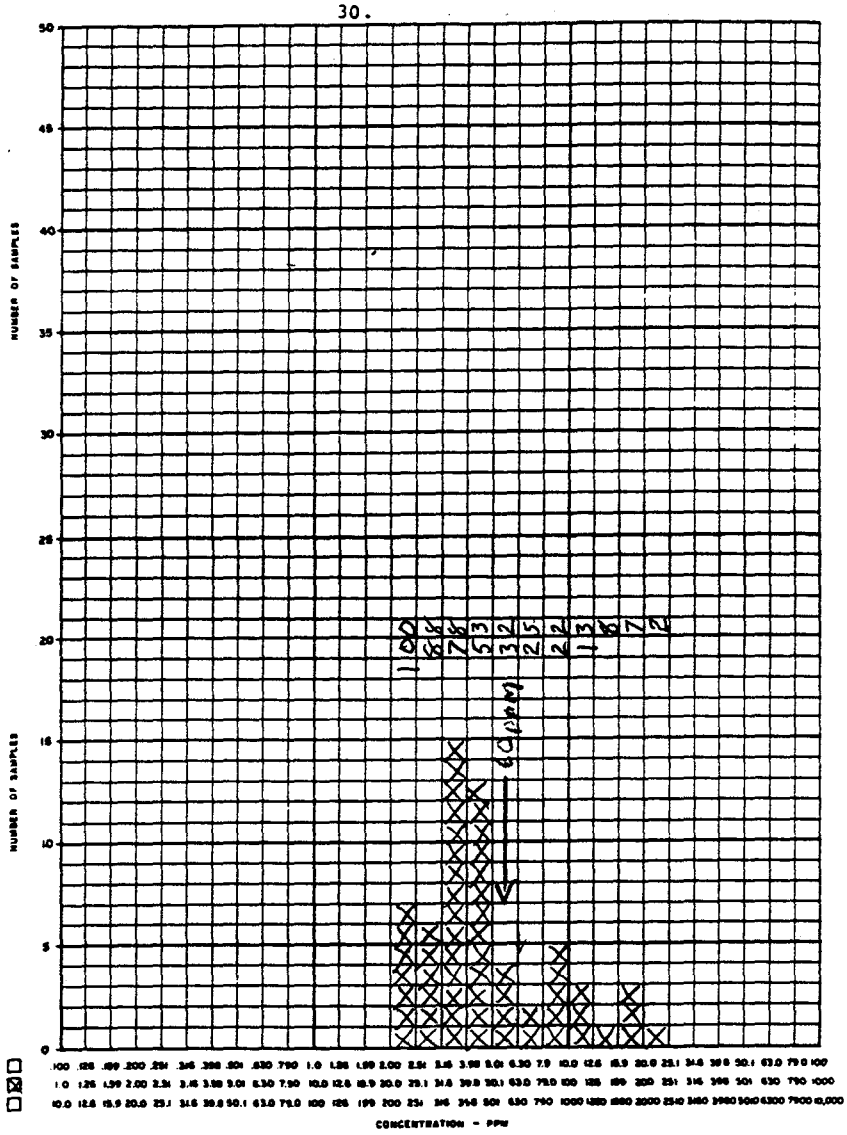


Pb

3.71 → 255



46 8080
K+E PROBABILITY X 3 LOG CYCLES
KEUFFEL & ESSER CO. MADE IN U.S.A.

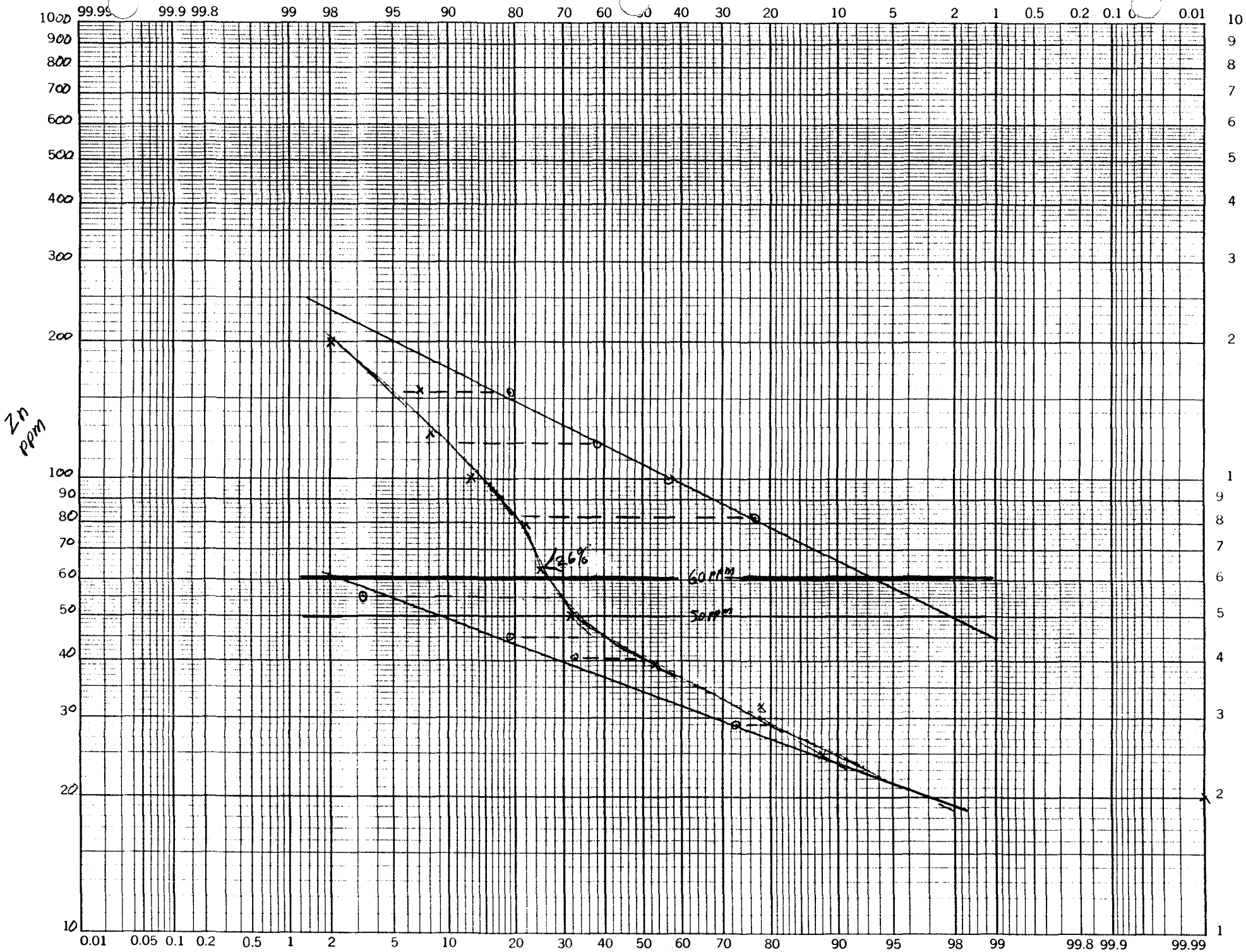

NUMBER OF SAMPLES
NUMBER OF SAMPLES
CONCENTRATION - PPM
60 ppm

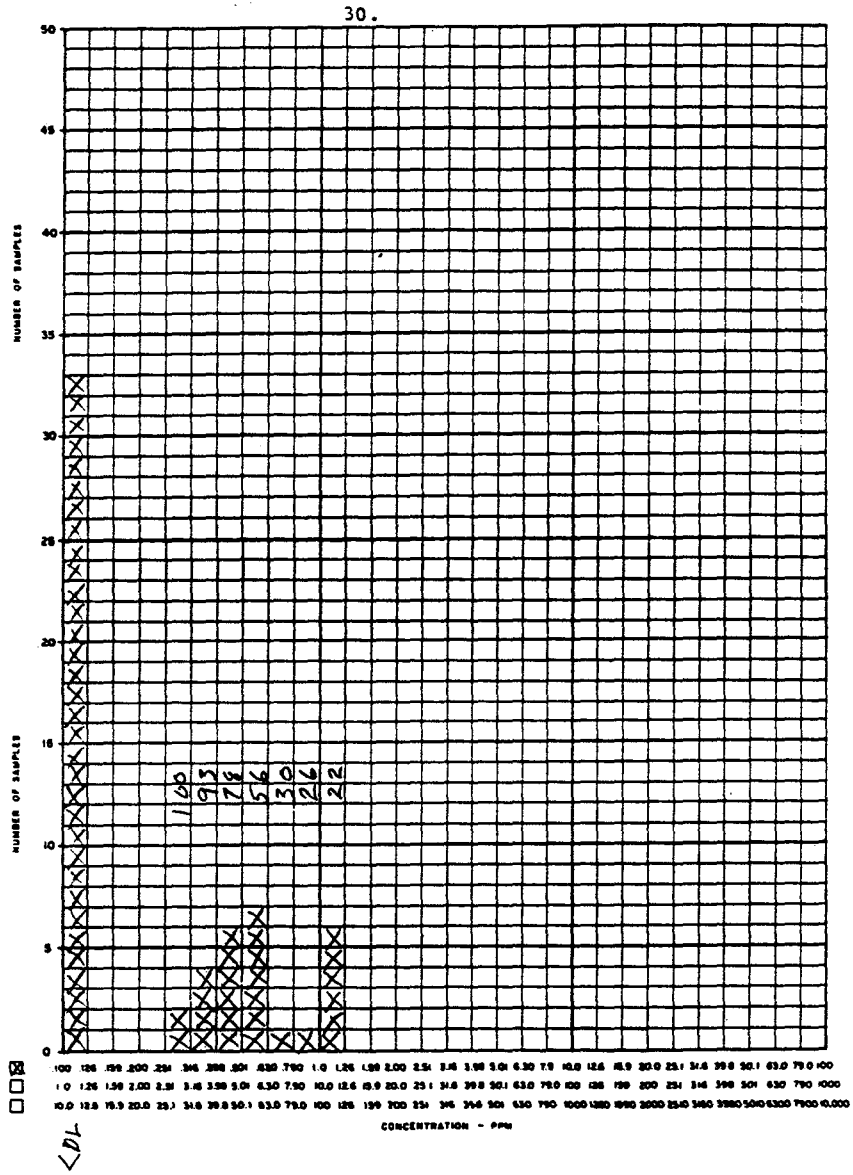
ZN

20.0 → 240.

K+E PROBABILITY X 2 LOG CYCLES
KEUFFEL & ESSER CO. MADE IN U.S.A.

46 8040




NUMBER OF SAMPLES
NUMBER OF SAMPLES
CONCENTRATION - PPM
100
93
78
56
30
26
22
<DL

56

.2 → 1.17

JDS

ASARCO

Southwestern Exploration Division

April 25, 1990

W.L. Kurtz

CN Leach Tests
Yarnell Project
Yavapai Co., AZ

Conclusions

The Metcon report EI-012-90 (Attachment A) and the plan map (Figure 1) showing the distribution of the holes used for the CN leach tests and the results are appended.

No strong variation is noted across nor down the mineralized zone. The percent recovery of gold in the 72-hour cyanide bottle roll leaching technique varied from 59.7 to 88.8 percent with an overall average of 72.8% recovery.

I have looked at the CN Leach Test results compared to assay interval (Table 1), thickness of sample interval (Tables 2 and 2A), and depth of the interval from the present surface (Table 3). No trend is evident. Although, as Table 3 indicates, percent recovery varies from the 60's to the 80's in the sample set, and the sub-set average decreases from surface to depth below the surface. Thus the early heap-leach material, being more highly oxidized at shallow depths, may provide a higher percentage recovery than the last material placed on the heaps. However, this factor is offset by the ounces available at the various levels, and (Figure 3A) the bench level tabulation indicates the lower middle of the proposed pit contains the bulk of the ounces expected. Thus the "average" of 72-73% recovery is probably valid for the mineral zone.

Metcon had brought up the question of the variance between Skyline head assays and Metcon calculated head assay. I have compared the three assays (Triad original - Skyline Head - Metcon Calculated Head) in Table 4, which indicates a variance between the three sets of data, with the Metcon calculated head being the general higher value.

The variance between Metcon and Skyline is covered in Table 5, with the Metcon and Triad in Table 6. Skyline had run duplicate splits on six drill holes and these are tabulated in Table 7. Table 8 comments on the high and low values in the individual drill holes which made up the composite which Skyline and Metcon used.

Figure 2 portrays the three assays and some general thoughts are:

1. Metcon's calculated head is consistently higher than either Skyline head or the Triad composite value.

2. When preparing a composite sample from individual samples which have several intervals of 0.1-0.3 opt gold, it will be difficult to blend such material in the composite so as not to have the chance of a bias split at any time.

3. Part of the problem is undoubtedly enhanced by a "coarse" gold effect. This effect is probably not a real problem within the individual samples although it must be recognized, along with the high-grade values, when trying to composite an interval of many samples, such as used in the CN leach test composite.

4. If the general average of the gold grain size is around 10 micron, then the percentage of grains found to be 3-5 times as large, i.e., 30-50 microns, could be the source of problems in preparing a uniform blended pulp.

Discussion

The Metcon report EI-012-90, dated March 22, 1990 (Attachment A) covers the 72-hour cyanide leach test on 24 holes within the Yarnell deposit. All sample were composite samples from the main "B" zone of mineralization.

Figure 1 is the drilling progress map with the drill holes highlighted that were used in the 72-hour cyanide leach test. The percentage recovery of gold is displayed over the drill hole number. Inspection of Figure 1 indicates that within the central area of the drill indicated mineralization, a predominate number of 60's, 70's and a few 80's are found with an average of 70% recovery.

Otherwise, there seems to be no real trend of values from north to south, nor east to west across the drill holes used. The average of all the drill hole results on Figure 1 is 73% recovery.

For further insight to any possible relationship the percent recovery was looked at in three different ways:

1. in relationship to the mineral grade intercept increments,

2. in relationship to the thickness of the intercept, and

3. in relationship to the present depth to the top of the intercept.

Table 1 tabulates the percentage recovery vs. the assay of the interval. At first glance it is a mixed bag of values within most of the 0.0X opt gold increments. However, there is a hint that the assay values between 0.046-0.061 opt gold may have a lower than average percentage recovery, being 67% average value. This may be of some concern as this interval range of assays contains over half the ounces of gold within the drill indicated inventory.

Table 2 looks at the same recovery data based on the thickness of the intercept. Again, a mixed bag of values seems to be present, with a slight hint for lower values (68% recovery) when the thickness of the intercept becomes 90 feet or more. Of the six holes with 90 feet or more (hole number 15, 33, 40, 54, 63 and 90), only 2 of the 6 holes have an assay of 0.053-0.055, while the remaining 4 holes have assays of 0.037 and 0.068 to 0.77 opt gold, with a total average of 0.059 opt gold (Table 2A).

Table 3 looks at the percentage recovery based on the depth to the top of the mineralized interval, and shows a mixed bag of values within the established depths. However, the sub-average of the sets indicate a better recovery in the early part of the mining, i.e., the shallower depths to expose the mineralization give higher than average percent recovery of the the gold values. This is probably related to the better oxidation of the zone near the present surface. Table 3A reviews the mining plan benches and indicates the bulk of the ounces are in the bottom 2/3rds of the pit.

Table 4 was tabulated to compare the three head assays of the CN-leach test intervals. The table compared the original Triad assay of the original individual 5-foot interval assays recalculated to the interval assay composite, with the Skyline head assay of a new pulp combined from the individual coarse rejects into a new sample from which the Metcon lab cut out its 500 grain sample for the CN-leach test, which in turn Metcon calculated a head assay from their leach values.

At first glance, the values in Table 4 show a high variance between the three labs and their methods on individual drill holes. As the weighted averages indicate, the calculated head assay by Metcon is by far the most optimistic, with Skyline generally the lowest weighted assay value.

Upon further breakdown of the data, as shown in Table 5, Metcon can be as close to Skyline (on the high side) at 0.001 opt gold (hole 88) difference, to as much as 0.031 opt gold (hole 63), with a weighted average of 0.014 opt gold when Metcon is higher then Skyline. Similarly, when Metcon is lower than Skyline, the difference can range from 0.002 to 0.047 opt gold, with a weighted average of 0.013 opt gold difference.

Table 6 compares the data variation between Metcon and the original Triad assays, and shows a weighted average of 0.011 opt gold difference when Metcon is higher than Triad, and a weighted average of 0.005 opt gold when Metcon is lower than Triad.

Metcon, page 2 of their report, commented on the variability between the head assay (Skyline) and their calculated head assays. They thought it might be a factor of the larger volume of material they used (500 gram) vs. the small 29 gram sample used in the Skyline fire-assay charge. Verbally, Metcon suggested that a coarse gold problem might account for the assay differences and refers to duplicate assay listing which Skyline had provide to Metcon (see Metcon report, Skyline Lab sheet TAJ 627, dated March 7).

The problem had also been reviewed by having Skyline take resplits of the samples from 6 holes and do a metallic screen assay. The results reported in my memo of April 16, 1990 (Metallics Assay) suggested only a small portion of "coarse" gold was found in the samples tested.

Skyline was requested to use up all the remainder (reject) from the samples left over after the Metcon sample was cut-out. In addition to the two assays provided by Skyline on March 7, TAJ-627, they then ran and submitted the remainder under TAJ-627A, dated March 30, 1990 (Attachment B). The total assays from TAJ-627 and -627A are tabulated in Table 7.

Drill holes YM-8 and YM-71 exhibited good running correlations of values through the samples. YM-6 and YM-84 had wide variations in value. YM-63 exhibited one high spike, while YM-90 a low trough.

These values and tables again hint at a problem of coarse gold in some of the samples within the deposit, but part of the problem with the head assay is found within the individual assays which made up the head assay.

Table 8 lists the high and low values of the individual samples which made up the composite head sample. As the high values are generally the 10-20 feet which was mined underground, it is not out of order to find a higher grade spike in any of the composite samples.

James D. Sell

James D. Sell

JDS:mek
Atts.
cc: R.L. Brown/F.T. Graybeal
M.A. Miller
D.E. Crowell
S.L. Lakosky

ATTACHMENT CONTENTS

Attachment A. Metcon Research Report EI-012-90.
Attachment B. Skyline assay, job TAJ-627A.

Figure 1. Drilling map with 72-hour CN Test Results.
Figure 2. Comparison of Original (Triad) assay vs. Skyline Head and Metcon Head Assays.

Table 1. Comparison of CN Results based on Assay of Interval by Triad and Metcon Calculated Head.
Table 2. Comparison of CN Results based on Footage of Sample.
Table 2A. Comparison of Holes with thickness of 90 feet or more, vs. the Metcon Head Assay and % Recovery of Gold.
Table 3. Comparison of CN Results based on Depth of Interval from Surface.
Table 3A. Comparison of Bench Elevations and Expected Ounces Gold.
Table 4. Comparison of Original (Triad) Assay vs. Skyline Head and Metcon Calculated Head.
Table 5. Variation in Assay value Difference Between Metcon and Skyline.
Table 6. Variation in Assay Value Difference Between Metcon and Triad.
Table 7. Skyline Variation of Head Assay for CN Leach Tests.
Table 8. Triad High and Low Values Combined for Head Assay.

CN Leach Tests
Yarnell Project

April 25, 1990

Table 1. Comparison of CN Results based on Assay of Interval

Hole Number	Triad Original Assay	Metcon Calculated Head Assay	CN % Recovery, Au	
47	.031	.036	72	
15	.034	.037	78	
53	.036	.044	77	
			Sub-average	76
14	.040	.051	81	
6	.042	.060	66	
8	.042	.074	76	
79	.046	.056	61	
48	.049	.045	78	
49	.049	.039	69	
82	.049	.052	65	
			Sub-average	71
87	.050	.068	65	
33	.051	.055	60	
54	.054	.068	68	
			Sub-average	64
40	.062	.074	67	
84	.062	.073	70	
90	.062	.053	66	
43	.063	.066	88	
88	.064	.086	74	
93	.064	.075	79	
75	.066	.065	81	
			Sub-average	75
25	.070		64	
18	.078		89	
63	.081		71	
71	.131		83	
			Sub-average	77
			Overall average	73

CN Leach Tests
Yarnell Project

April 25, 1990

Table 2. Comparison of CN Results based on Footage of Sample

Hole Numbers	Feet of Sample	% Recovery 72-hr. CN Leach
43	20	88
49	20	69
87	20	65
93	20	79
25	35	64
47	35	72
84	35	70
18	40	89
48	40	78
8	50	76
79	50	61
6	55	66
88	55	74
82	60	65
71	65	83
75	65	81
14	75	81
53	75	77
33	90	60
54	90	68
90	95	66
63	100	71
40	105	67
15	155	78
	Average	73%

Table 2A. Comparison of Holes with Thickness of 90' or more, vs. the Metcon Head Assay and Percent Recovery of Gold.

Drill Hole No.	Thickness Feet	Metcon Head Assay opt Au	% Recovery of Au
33	90	.055	60
54	90	.068	68
90	95	.053	66
63	100	.077	71
40	105	.074	67
15	155	.037	78
	106' avg.	.059 wtd.avg.	68% avg. rec.

Table 3. Comparison of CN (Percent Recovery) based on Depth from Surface

Depth Below Surface to Top of Intercept	Hole Number	CN Results % Recovery, Au	
0-50'	14	81	
	48	78	
	71	83	
	82	65	
	93	79	
		Sub-average	77
51-100'	25	64	
	43	88	
	53	77	
	54	68	
		Sub-average	74
101-150'	6	66	
	18	89	
	49	69	
	63	71	
	75	81	
	79	61	
	84	70	
	90	66	
		Sub-average	72
151-200'	47	72	
		Sub-average	72
201-250'	88	74	
		Sub-average	74
251-300'	8	76	
	15	78	
	33	60	
	40	67	
	87	65	
		Sub-average	69
		Overall Average	73

Table 3A. Comparison of Bench Elevations and Expected Ounces of Gold

Bench Level	Interval	1000 Tons	oz. Au (rounded)
5100-5040	60	256	19,200
5040-4980	60	347	18,000
4980-4920	60	535	29,200
4920-4860	60	701	39,500
4860-4800	60	767	46,700
4800-4720	60	809	41,900
4720-4680	60	526	32,600
4680-4620	60	68	4,200

Data from Intermediate Feasibility Study, 2-16-90, Section D.

Table 4. Comparison of Original Assay vs. Skyline Head and Metcon Calculated Head Assays.

RCD-Hole No.	Feet	Triad Original Assay	Skyline Head	Metcon 72-hr. CN Calc.Head
6	55	.042	.075	.060
8	50	.041	.055	.074
14	75	.040	.036	.051
15	155	.034	.028	.037
18	40	.078	.080	.071
25	35	.070	.065	.067
33	90	.051	.050	.055
40	105	.062	.060	.074
43	20	.063	.055	.066
47	35	.031	.020	.036
48	40	.049	.036	.045
49	20	.049	.034	.039
53	75	.036	.034	.044
54	90	.054	.055	.068
63	100	.081	.046	.077
71	65	.131	.120	.141
75	65	.066	.055	.065
79	50	.046	.032	.056
82	60	.049	.040	.052
84	35	.062	.120	.073
87	20	.050	.036	.068
88	55	.064	.085	.086
90	95	.062	.055	.053
93	20	.064	.065	.075
Weighted Average	60	.057	.054	.063

Table 5. Variation in Assay Value Difference Between Metcon and Skyline.

Metcon higher than Skyline			Metcon lower than Skyline		
Hole No.	Feet	Difference	Hole No.	Feet	Difference
			6	55	.015
8	50	.019			
14	75	.015			
15	155	.009			
			18	40	.009
25	35	.002			
33	90	.005			
40	105	.014			
43	20	.011			
47	35	.016			
48	40	.009			
49	20	.005			
53	75	.010			
54	90	.013			
63	100	.031			
71	65	.021			
75	65	.010			
79	50	.024			
82	60	.012			
			84	35	.047
87	20	.032			
88	55	.001			
			90	95	.002
93	20	.010			
Totals	1185'	16.550 (ft-oz)		225'	3.020 (ft-oz)
Weighted Avg:	59'	0.014 opt Au		56'	0.013 opt Au

Table 6. Variation in Assay Value Difference Between Metcon and Triad.

Metcon higher than Triad			Metcon lower than Triad		
Hole No.	Feet	Difference	Hole No.	Feet	Difference
6	55	.018			
8	50	.034			
14	75	.011			
15	155	.003			
			18	40	.007
			25	35	.003
33	90	.004			
40	105	.012			
43	20	.003			
47	35	.005			
			48	40	.004
			49	20	.010
53	75	.008			
54	90	.014			
			63	100	.004
71	65	.010			
			75	65	.001
79	50	.010			
82	60	.003			
84	35	.009			
87	20	.018			
88	55	.022			
			90	95	.009
93	20	.011			
Totals	1055'	11.130 (ft-oz)		39.5'	2.065 (ft-oz)
Weighted Avg:	62'	0.011 opt Au		56'	0.005 opt Au

Table 7. Skyline Variation of Head Assay for CN-Leach Tests.

Hole No.	Job TAJ-627 opt AU		Job TAJ-627A opt Au								Average
YM-	1	2	3	4	5	6	7	8	9	10	
6	.075	.046	.028	.020	.030	.026	.024	.085	I/S	I/S	.042
8	.055	.050	.050	.050	.044	.050	.050	.050	.050	.055	.050
63	.046	.050	.065	.055	.070	.065	.135	.075	I/S	I/S	.070
71	.120	.145	.125	.115	.120	.130	.130	.125	.135	I/S	.127
84	.120	.075	.050	.050	.070	.046	.055	.085	.055	I/S	.067
90	.055	.042	.050	.050	.036	.050	.046	.050	I/S	I/S	.047

I/S denotes Insufficient Sample

Table 8. High & Low Values (from Triad)

Combined for Head Assay.

Hole	Assay (Triad) High	Low	Comments
YM-6	.155	.007	With such a high value (and low value), it would be difficult to blend the sample without having a few discrete gold values to be picked up (or not being there) during any assay split.
YM-8	.087	.023	Reasonable value throughout.
YM-63	.203	.015	A number of high values in the 100' column, difficult to blend.
YM-71	.943	.013	Two high values in run, yet all sample splits mimic one another in consistent high value.
YM-84	.124	.019	A short, 35' run, but with 2 out of 7 samples having high value, it's not surprising to see the variation.
YM-90	.298	.005	95' Composite with 3 high values gave surprisingly moderate values on all head splits.

ATTACHMENT A

METCON Research Inc.

1844 W. Grant Road, Suite 106
Tucson, Arizona 85745

Tel: (602) 623-1327
Telex 284623 KDE UR

22 March 1990
EI-012-90

ASARCO Inc.
Exploration Department
P.O. Box 5747
Tucson, AZ 85703-0747

ASARCO Incorporated
MAR 26 1990
SW Exploration

Attention: Mr. James D. Sell
Manager

Subject: Preliminary Cyanide Leach Testing on YM-Series Interval Samples

Dear Mr. Sell:

Pursuant to instructions outlined in your letter dated January 31, 1990, the following report details results from metallurgical cyanide leach test work conducted on 24 interval samples (designated YM-series) from Yavapai, Co., Arizona.

1.0 INTRODUCTION

During the third week in February 1990, a suite of 24 interval samples labeled YM-6 through YM-93 were picked up by Metcon Research Inc. at the Skyline Labs Inc. facility in Tucson. A single 72 hour cyanide bottle roll leach test was conducted on each interval sample after crushing to minus 10 mesh. The procedures utilized and the results obtained in this investigation are outlined herein.

2.0 SUMMARY

A 72 hour cyanide bottle roll leaching technique provided gold recovery levels ranging from 59.7 to 88.8 percent on interval samples crushed to minus 10 mesh. In general, the higher grade samples showed consistently higher recoveries.

The average overall recoveries observed were 72.82 and 39.44 percent for gold and silver, respectively. The silver recovery may not be an accurate figure since the silver present in the metallurgical products was near the low detectability limit for silver analysis.

Some variability was observed between the head assays and the calculated head assay figures. In most instances, the calculated heads are higher than the head assays. This phenomenon may be attributed to free fine gold particulate material present in the samples. Since a large amount of sample was utilized for leaching, the probability of free gold being present in the test sample is increased accordingly. The aforementioned assumption is corroborated in part by discrepancies observed between duplicate assay figures appended hereto, particularly for the higher grade samples.

The cyanide and lime consumptions were low. The cyanide consumption averaged 0.22 pounds per ton and lime consumption averaged approximately 2.0 pounds per ton. These reagent consumptions are consistent with observations developed in previous test work conducted on samples from the same project.

3.0 PROCEDURES

The procedures utilized for sample preparation and metallurgical testing are described as follows:

3.1 A suite of samples labeled YM-2 through YM-93 received from Skyline Labs Inc. were weighed and logged in. The samples were crushed to minus 10 mesh, blended and representative samples were split out by Skyline Labs personnel for testing and gold and silver assay.

3.2 A 500 gram portion of each sample was combined with 1000 ml of distilled water and 1.0 gram of lime.

3.3 The slurry was agitated on a bottle roll apparatus until the pH stabilized, then 1.0 gram of sodium cyanide was added. Addition of lime continued throughout the leach period at 24 hour intervals to maintain a pH above 11.0.

3.4 Cyanide leaching was conducted for 72 hours. At the end of leaching, solids and liquids were separated by filtration.

3.5 Cyanide and lime consumptions were determined by titration of the combined filtrate and wash liquors.

3.6 Leached residue and pregnant solution samples were assayed for gold and silver and metallurgical calculations were performed.

4.0 RESULTS AND DISCUSSION

The results obtained from cyanide leach testing of the interval samples are outlined in this section of the report. A brief discussion on these results is presented herein.

The metallurgical data produced from each test was grouped in series of 3 tests. The results are presented in Tables 1 through 8 attached hereto.

The interval samples submitted for testing showed gold head assays ranging from 0.02 to 0.145 ounces of gold per ton of ore. The silver content in most of these samples was less than 0.01 ounces per ton. The highest silver content observed was 0.06 ounces per ton for sample YM-43. Inspection of the duplicate head assay data indicates that there is a good correlation between duplicate assay data at gold grades of 0.04 ounces per ton or lower. The variability between duplicate head assays increased at higher gold contents. This circumstance may indicate the presence of free gold in the samples.

Regardless of the initial head gold content, the residue assays were all in the 0.008 to 0.024 ounces per ton range. The residue assays obtained may indicate the presence of finely disseminated gold in the ore samples tested. Grinding of the ore may be necessary to increase the gold recovery, but the ore grade may not justify the additional size reduction. Further testing is recommended to ascertain the amenability of this ore to gold recovery by a heap leaching technique.

We appreciate the opportunity to work with you on this important project. As always, should you have any questions regarding the information contained in this report please do not hesitate to contact us.

Very truly yours,

Eugenio Iasillo

Eugenio Iasillo
Process Engineer

EI:rs

ASARCO SWED.

TABLE. 1 BOTTLE ROLL LEACH TESTS

SUMMARY OF RESULTS

Products 72 hr.leach	WT/Vol	Assays (OPT) Au	Assays (OPT) Ag	Content Au	Content Ag	% Recovery Au	% Recovery Ag	Consumption of Reagents(lb/ton) NaCN	Consumption of Reagents(lb/ton) CaO
YM - 6									
Preg+Wash	1420	0.014	0.002	0.040	0.01	66.53	36.36	0.31	2.25
Residue	497	0.020	0.010	0.020	0.01	33.47	63.64		
Calc Head	500	0.060	0.016						
AssayHead		0.075	<0.05						
YM - 8									
Preg+Wash	1400	0.020	0.003	0.056	0.01	75.68	45.65	0.14	2.71
Residue	500	0.018	0.010	0.018	0.01	24.32	54.35		
Calc Head	500	0.074	0.018						
AssayHead		0.055	<0.05						
YM - 14									
Preg+Wash	1480	0.014	0.001	0.041	0.00	80.56	22.84	0.46	2.55
Residue	482	0.010	0.010	0.010	0.01	19.44	77.16		
Calc Head	500	0.051	0.013						
Assayhead		0.036	<0.05						
AVERAGE						74.26	34.95	0.30	2.50

TABLE. 2 BOTTLE ROLL LEACH TESTS

SUMMARY OF RESULTS

Products 72 hr.leach	WT/Vol	Assays (OPT) Au	Assays (OPT) Ag	Content Au	Content Ag	% Recovery Au	% Recovery Ag	Consumption of Reagents(lb/ton) NaCN	Consumption of Reagents(lb/ton) CaO
YM - 15									
Preg+Wash	1460	0.010	0.001	0.029	0.00	78.49	22.71	0.21	1.50
Residue	497	0.008	0.010	0.008	0.01	21.51	77.29		
Calc Head	500	0.037	0.013						
AssayHead		0.028	<0.05						
YM - 18									
Preg+Wash	1440	0.022	0.002	0.063	0.01	88.79	36.55	0.11	2.09
Residue	488	0.008	0.010	0.008	0.01	11.21	63.45		
Calc Head	500	0.071	0.016						
AssayHead		0.080	<0.05						
YM - 25									
Preg+Wash	1420	0.015	0.002	0.043	0.01	63.96	36.22	0.37	2.34
Residue	490	0.024	0.010	0.024	0.01	36.04	63.78		
Calc Head	500	0.067	0.016						
Assayhead		0.065	<0.05						
AVERAGE						77.08	31.83	0.23	1.98

ASARCO SWED.

TABLE. 3 BOTTLE ROLL LEACH TESTS

SUMMARY OF RESULTS

Products 72 hr.leach	WT/Vol	Assays (OPT) Au	Assays (OPT) Ag	Content Au	Content Ag	% Recovery Au	% Recovery Ag	Consumption of Reagents(lb/ton) NaCN	Consumption of Reagents(lb/ton) CaO
YM - 33									
Preg+Wash	1480	0.011	0.002	0.033	0.01	59.68	37.61	0.15	2.14
Residue	491	0.022	0.010	0.022	0.01	40.32	62.39		
Calc Head	500	0.055	0.016						
AssayHead		0.050	<0.05						
YM - 40									
Preg+Wash	1460	0.017	0.003	0.050	0.01	67.41	46.70	0.15	2.00
Residue	490	0.024	0.010	0.024	0.01	32.59	53.30		
Calc Head	500	0.074	0.019						
AssayHead		0.060	<0.05						
YM - 43									
Preg+Wash	1440	0.020	0.003	0.058	0.01	87.80	14.73	0.26	2.94
Residue	485	0.008	0.050	0.008	0.05	12.20	85.27		
Calc Head	500	0.066	0.059						
Assayhead		0.055	<0.05						
AVERAGE						71.63	33.01	0.19	2.36

TABLE. 4 BOTTLE ROLL LEACH TESTS

SUMMARY OF RESULTS

Products 72 hr.leach	WT/Vol	Assays (OPT) Au	Assays (OPT) Ag	Content Au	Content Ag	% Recovery Au	% Recovery Ag	Consumption of Reagents(lb/ton) NaCN	Consumption of Reagents(lb/ton) CaO
YM - 47									
Preg+Wash	1420	0.009	0.003	0.026	0.01	71.88	46.00	0.17	2.30
Residue	500	0.010	0.010	0.010	0.01	28.12	54.00		
Calc Head	500	0.036	0.019						
AssayHead		0.020	<0.05						
YM - 48									
Preg+Wash	1440	0.012	0.003	0.035	0.01	77.56	46.35	0.14	2.39
Residue	499	0.010	0.010	0.010	0.01	22.44	53.65		
Calc Head	500	0.045	0.019						
AssayHead		0.036	<0.05						
YM - 49									
Preg+Wash	1480	0.009	0.003	0.027	0.01	68.94	47.03	0.15	2.10
Residue	494	0.012	0.010	0.012	0.01	31.06	52.97		
Calc Head	500	0.039	0.019						
Assayhead		0.034	<0.05						
AVERAGE						72.79	46.46	0.15	2.26

ASARCO SWED.

TABLE. 5 BOTTLE ROLL LEACH TESTS

SUMMARY OF RESULTS

Products 72 hr.leach	WT/Vol	Assays (OPT) Au	Assays (OPT) Ag	Content Au	Content Ag	% Recovery Au	% Recovery Ag	Consumption of Reagents(lb/ton) NaCN	Consumption of Reagents(lb/ton) CaO
YM - 53									
Preg+Wash	1400	0.012	0.002	0.034	0.01	77.06	35.90	0.26	2.33
Residue	500	0.010	0.010	0.010	0.01	22.94	64.10		
Calc Head	500	0.044	0.016						
AssayHead		0.034	<0.05						
YM - 54									
Preg+Wash	1440	0.016	0.002	0.046	0.01	67.69	36.55	0.26	2.28
Residue	498	0.022	0.010	0.022	0.01	32.31	63.45		
Calc Head	500	0.068	0.016						
AssayHead		0.055	<0.05						
YM - 63									
Preg+Wash	1440	0.019	0.003	0.055	0.01	71.32	46.35	0.26	2.22
Residue	498	0.022	0.010	0.022	0.01	28.68	53.65		
Calc Head	500	0.077	0.019						
Assayhead		0.046	<0.05						
AVERAGE						72.02	39.60	0.26	2.28

TABLE. 6 BOTTLE ROLL LEACH TESTS

SUMMARY OF RESULTS

Products 72 hr.leach	WT/Vol	Assays (OPT) Au	Assays (OPT) Ag	Content Au	Content Ag	% Recovery Au	% Recovery Ag	Consumption of Reagents(lb/ton) NaCN	Consumption of Reagents(lb/ton) CaO
YM - 71									
Preg+Wash	1500	0.039	0.004	0.117	0.01	82.98	54.69	0.40	1.58
Residue	497	0.024	0.010	0.024	0.01	17.02	45.31		
Calc Head	500	0.141	0.022						
AssayHead		0.120	<0.05						
YM - 75									
Preg+Wash	1390	0.019	0.003	0.053	0.01	81.49	45.47	0.13	2.64
Residue	420	0.012	0.010	0.012	0.01	18.51	54.53		
Calc Head	500	0.065	0.018						
AssayHead		0.055	<0.05						
YM - 79									
Preg+Wash	1430	0.012	0.002	0.034	0.01	60.94	36.39	0.17	2.06
Residue	500	0.022	0.010	0.022	0.01	39.06	63.61		
Calc Head	500	0.056	0.016						
Assayhead		0.032	<0.05						
AVERAGE						75.13	45.52	0.23	2.09

ASARCO SWED.

TABLE. 7 BOTTLE ROLL LEACH TESTS

SUMMARY OF RESULTS

Products 72 hr.leach	WT/Vol	Assays (OPT) Au	Assays (OPT) Ag	Content Au	Content Ag	% Recovery Au	% Recovery Ag	Consumption of Reagents(lb/ton) NaCN	Consumption of Reagents(lb/ton) CaO
YM - 82									
Preg+Wash	1420	0.012	0.001	0.034	0.00	65.44	22.40	0.17	1.87
Residue	492	0.018	0.010	0.018	0.01	34.56	77.60		
Calc Head	500	0.052	0.013						
AssayHead		0.040	<0.05						
YM - 84									
Preg+Wash	1420	0.018	0.003	0.051	0.01	69.91	46.00	0.30	1.91
Residue	512	0.022	0.010	0.022	0.01	30.09	54.00		
Calc Head	500	0.073	0.019						
AssayHead		0.120	<0.05						
YM - 87									
Preg+Wash	1460	0.015	0.006	0.044	0.02	64.60	63.66	0.20	1.08
Residue	500	0.024	0.010	0.024	0.01	35.40	36.34		
Calc Head	500	0.068	0.028						
Assayhead		0.036	<0.05						
AVERAGE						66.65	44.02	0.22	1.62

TABLE. 8 BOTTLE ROLL LEACH TESTS

SUMMARY OF RESULTS

Products 72 hr.leach	WT/Vol	Assays (OPT) Au	Assays (OPT) Ag	Content Au	Content Ag	% Recovery Au	% Recovery Ag	Consumption of Reagents(lb/ton) NaCN	Consumption of Reagents(lb/ton) CaO
YM -88									
Preg+Wash	1520	0.021	0.003	0.064	0.01	74.37	47.70	0.20	1.26
Residue	500	0.022	0.010	0.022	0.01	25.63	52.30		
Calc Head	500	0.086	0.019						
AssayHead		0.085	<0.05						
YM - 90									
Preg+Wash	1460	0.012	0.002	0.035	0.01	66.06	36.87	0.20	1.36
Residue	505	0.018	0.010	0.018	0.01	33.94	63.13		
Calc Head	500	0.053	0.016						
AssayHead		0.055	<0.05						
YM - 93									
Preg+Wash	1400	0.021	0.002	0.059	0.01	78.61	35.90	0.08	2.54
Residue	500	0.016	0.010	0.016	0.01	21.39	64.10		
Calc Head	500	0.075	0.016						
Assayhead		0.065	<0.05						
AVERAGE						73.01	40.15	0.16	1.72

5.0 APPENDIX

SKYLINE LABS, INC.
1775 W. Sahuaro Dr. • P.O. Box 50106
Tucson, Arizona 85703
(602) 622-4836

REPORT OF ANALYSIS

JOB NO. TAJ 627
March 7, 1990
YM-6 TO YM-93
PAGE 1 OF 1

ASARCO INCORPORATED
Attn: Mr. James D. Sell
Southwestern Exploration
P.O. Box 5747
Tucson, AZ 85703

Analysis of 24 Drill Cutting Samples

ITEM	SAMPLE NO.	FIRE ASSAY Au (oz/t)	FIRE ASSAY Ag (oz/t)	FIRE ASSAY Au (oz/t)	FIRE ASSAY Ag (oz/t)
1	YM-6	.075	<.01	.046	<.01
2	YM-8	.055	<.01	.050	<.01
3	YM-14	.036	<.01	.034	<.01
4	YM-15	.028	<.01	.024	<.01
5	YM-18	.080	<.01	.080	<.01
6	YM-25	.065	<.01	.065	<.01
7	YM-33	.050	<.01	.040	<.01
8	YM-40	.060	<.01	.050	<.01
9	YM-43	.055	.06	.048	.06
10	YM-47	.020	<.01	.022	.02
11	YM-48	.036	<.01	.032	<.01
12	YM-49	.034	<.01	.044	<.01
13	YM-53	.034	<.01	.036	<.01
14	YM-54	.055	<.01	.050	<.01
15	YM-63	.046	.01	.050	<.01
16	YM-71	.120	.01	.145	.03
17	YM-75	.055	<.01	.065	.01
18	YM-79	.032	<.01	.038	<.01
19	YM-82	.040	<.01	.040	<.01
20	YM-84	.120	<.01	.075	<.01
21	YM-87	.036	<.01	.040	<.01
22	YM-88	.085	<.01	.075	<.01
23	YM-90	.055	<.01	.042	<.01
24	YM-93	.065	<.01	.065	<.01

cc: Eugene Salazar

Charles E. Thompson
Arizona Registered Assayer No. 9427

William L. Lehmbeck
Arizona Registered Assayer No. 9425

James A. Martin
Arizona Registered Assayer No. 11122

METCON RESEARCH INC.
1844 West Grant Road., Suite 106
Tucson, Arizona 85745
Phone: (602) 622-1327

BOTTLE ROLL NaCN LEACH TEST

CLIENT: ASARCO

DATE: 03/14/90

TEST No.: 1

PROJECT No: M-206

FEED: YM - 6

CONDUCTED BY: E.I./J.L.

OBJECTIVE: SCOPING TEST GOLD RECOVERY

SAMPLE DESCRIP.	METALL. PRODUCT	ASSAYS (Oz/ton)		CONTENT (mg)		DISTRIBUTION %	
SOLUTIONS	gram/ml	Au	Ag	Au	Ag	Au	Ag
.....	.....	.....	.....	.....	.....	.....	.....
	1000						
	1000						
	1000						
24 hrs.	1000	0.000	0.00	0.000	0.00	0.00	0.00
48 hrs.	1000	0.000	0.00	0.000	0.00	0.00	0.00
72 hrs.	1420	0.014	0.00	0.682	0.10	66.67	36.36
Leach Res	497	0.020	0.01	0.341	0.170	33.33	63.64
Calc.Head	500	0.060	0.02				
HeadAssay		0.075	<0.01				

SAMPLE DESCRIP.	METALL. PRODUCT	NaCN lb/ton	NaCN lb/ton	CaO lb/ton	CaO lb/ton	SOLUTION pH
Preg+Wash	mls	sol.conc.	consump.	sol.conc.	consump.	
.....	.....	.....	.....	.....	.....	.....
2 hrs.	1000	2.00		2.00		11.9
4 hrs.	1000					11.9
8 hrs.	1000					11.9
24 hrs.	1000					11.9
48 hrs.	1000					11.6
72 hrs.	1420	1.30	0.31	0.62	2.25	11.6

METCON RESEARCH INC.
1944 West Grant Road., Suite 108
Tucson, Arizona 85745
Phone: (602) 623-1327

BOTTLE ROLL NaCN LEACH TEST

CLIENT: ASARCO
DATE: 03/14/90
TEST No.: 2
PROJECT No: M-206
FEED: YM - 8
CONDUCTED BY: E.I./J.L.
OBJECTIVE: SCOPING TEST GOLD RECOVERY

SAMPLE DESCRIP.	METALL. PRODUCT	ASSAYS (Oz/ton)		CONTENT (mg)		CONTENT (mg)		DISTRIBUTION %		DISTRIBUTION %	
SOLUTIONS	gram/ml	Au	Ag	Au	Ag	Au	Ag	Au	Ag	Au	Ag
.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
	1000										
	1000										
	1000										
24 hrs.	1000	0.000	0.00	0.000	0.00	0.00	0.00	0.00	0.00	0.00	0.00
48 hrs.	1000	0.000	0.00	0.000	0.00	0.00	0.00	0.00	0.00	0.00	0.00
72 hrs.	1400	0.020	0.00	0.960	0.14	0.14	0.14	75.68	45.65	75.68	45.65
Leach Res	500	0.018	0.01	0.309	0.171	0.171	0.171	24.32	54.35	24.32	54.35
Calc.Head	500	0.074	0.02								
HeadAssay		0.055	<0.01								

SAMPLE DESCRIP.	METALL. PRODUCT	NaCN lb/ton	NaCN lb/ton	CaO lb/ton	CaO lb/ton	SOLUTION pH
Preg+Wash	mls	sol.conc.	consump.	sol.conc.	consump.	
.....	.....	.....	.....	.....	.....	.....
2 hrs.	1000	2.00		2.00		12.0
4 hrs.	1000					12.0
8 hrs.	1000					12.0
24 hrs.	1000					12.0
48 hrs.	1000					11.7
72 hrs.	1400	1.38	0.14	0.46	2.71	11.6

METCON RESEARCH INC.
1944 West Grant Road, Suite 106
Tucson, Arizona 85745
Phone: (602) 623-1327

BOTTLE ROLL NaCN LEACH TEST

CLIENT: ASARCO
DATE: 03/14/90
TEST No.: 3
PROJECT No: M-206
FEED: YM - 14
CONDUCTED BY: E.I./J.L.
OBJECTIVE: SCOPING TEST GOLD RECOVERY

SAMPLE DESCRIP.	METALL. PRODUCT	ASSAYS (Oz/ton)		CONTENT (mg)	(mg)	DISTRIBUTION %	%
SOLUTIONS	gram/ml	Au	Ag	Au	Ag	Au	Ag
	1000						
	1000						
	1000						
24 hrs.	1000	0.000	0.00	0.000	0.00	0.00	0.00
48 hrs.	1000	0.000	0.00	0.000	0.00	0.00	0.00
72 hrs.	1480	0.014	0.00	0.710	0.05	81.13	23.49
Leach Res	482	0.010	0.01	0.165	0.165	18.87	76.51
Calc.Head	500	0.051	0.01				
HeadAssay		0.036	<0.01				

SAMPLE DESCRIP.	METALL. PRODUCT	NaCN lb/ton	NaCN lb/ton	CaO lb/ton	CaO lb/ton	SOLUTION pH
Preg+Wash	mls	sol.conc.	consump.	sol.conc.	consump.	
2 hrs.	1000	2.00		2.00		12.1
4 hrs.	1000					12.1
8 hrs.	1000					12.1
24 hrs.	1000					11.8
48 hrs.	1000					11.8
72 hrs.	1480	1.20	0.46	0.52	2.55	11.7

METCON RESEARCH INC.
1944 West Grant Road., Suite 106
Tucson, Arizona 85745
Phone: (602) 623-1327

BOTTLE ROLL NaCN LEACH TEST

CLIENT: ASARCO

DATE: 03/14/90

TEST No.: 4

PROJECT No: M-206

FEED: YM - 15

CONDUCTED BY: E.I./J.L.

OBJECTIVE: SCOPING TEST GOLD RECOVERY

SAMPLE DESCRIP.	METALL. PRODUCT	ASSAYS (Oz/ton)		CONTENT (mg)		DISTRIBUTION %	
SOLUTIONS	gram/ml	Au	Ag	Au	Ag	Au	Ag
	1000						
	1000						
	1000						
24 hrs.	1000	0.000	0.00	0.000	0.00	0.00	0.00
48 hrs.	1000	0.000	0.00	0.000	0.00	0.00	0.00
72 hrs.	1460	0.010	0.00	0.501	0.05	78.60	22.71
Leach Res	497	0.008	0.01	0.136	0.170	21.40	77.29
Calc.Head	500	0.037	0.01				
HeadAssay		0.028	<0.01				

SAMPLE DESCRIP.	METALL. PRODUCT	NaCN lb/ton	NaCN lb/ton	CaO lb/ton	CaO lb/ton	SOLUTION pH
Preg+Wash	mls	sol.conc.	consump.	sol.conc.	consump.	
2 hrs.	1000	2.00		2.00		12.0
4 hrs.	1000					12.0
8 hrs.	1000					12.0
24 hrs.	1000					12.0
48 hrs.	1000					11.9
72 hrs.	1460	1.30	0.21	0.86	1.50	11.7

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BOTTLE ROLL NaCN LEACH TEST

CLIENT: ASARCO

DATE: 03/14/90

TEST No.: 5

PROJECT No: M-206

FEED: YM - 18

CONDUCTED BY: E.I./J.L.

OBJECTIVE: SCOPING TEST GOLD RECOVERY

SAMPLE DESCRIP.	METALL. PRODUCT	ASSAYS (Oz/ton)		CONTENT (mg)		CONTENT (mg)		DISTRIBUTION %		DISTRIBUTION %	
SOLUTIONS	gram/ml	Au	Ag	Au	Ag	Au	Ag	Au	Ag	Au	Ag
.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
	1000										
	1000										
	1000										
24 hrs.	1000	0.000	0.00	0.000	0.00	0.000	0.00	0.00	0.00	0.00	0.00
48 hrs.	1000	0.000	0.00	0.000	0.00	0.000	0.00	0.00	0.00	0.00	0.00
72 hrs.	1440	0.022	0.00	1.086	0.10	1.086	0.10	89.03	37.11	89.03	37.11
Leach Res	488	0.008	0.01	0.134	0.167	0.134	0.167	10.97	62.89	10.97	62.89
Calc.Head	500	0.071	0.02								
HeadAssay		0.080	<0.01								

SAMPLE DESCRIP.	METALL. PRODUCT	NaCN lb/ton	NaCN lb/ton	CaO lb/ton	CaO lb/ton	SOLUTION pH
Preg+Wash	mls	sol.conc.	consump.	sol.conc.	consump.	
.....	.....	.....	.....	.....	.....	.....
2 hrs.	1000	2.00		2.00		12.0
4 hrs.	1000					12.0
8 hrs.	1000					12.0
24 hrs.	1000					12.0
48 hrs.	1000					11.8
72 hrs.	1440	1.35	0.11	0.68	2.09	11.6

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BOTTLE ROLL NaCN LEACH TEST

CLIENT: ASARCO
DATE: 03/14/90
TEST No.: 6
PROJECT No: M-206
FEED: YM - 25
CONDUCTED BY: E.I./J.L.
OBJECTIVE: SCOPING TEST GOLD RECOVERY

SAMPLE DESCRIP.	METALL. PRODUCT	ASSAYS (Oz/ton)		CONTENT (mg)		DISTRIBUTION %	
SOLUTIONS	gram/ml	Au	Ag	Au	Ag	Au	Ag
.....	.....	.....	.....	.....	.....	.....	.....
	1000						
	1000						
	1000						
24 hrs.	1000	0.000	0.00	0.000	0.00	0.00	0.00
48 hrs.	1000	0.000	0.00	0.000	0.00	0.00	0.00
72 hrs.	1420	0.015	0.00	0.730	0.10	64.43	36.69
Leach Res	490	0.024	0.01	0.403	0.168	35.57	63.31
Calc.Head	500	0.066	0.02				
HeadAssay		0.065	<0.01				

SAMPLE DESCRIP.	METALL. PRODUCT	NaCN lb/ton	NaCN lb/ton	CaO lb/ton	CaO lb/ton	SOLUTION pH
Preg+Wash	mls	sol.conc.	consump.	sol.conc.	consump.	
.....	.....	.....	.....	.....	.....	.....
2 hrs.	1000	2.00		2.00		12.0
4 hrs.	1000					12.0
8 hrs.	1000					12.0
24 hrs.	1000					12.0
48 hrs.	1000					11.8
72 hrs.	1420	1.28	0.37	0.60	2.34	11.7

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BOTTLE ROLL NaCN LEACH TEST

CLIENT: ASARCO
DATE: 03/14/90
TEST No.: 7
PROJECT No: M-206
FEED: YM - 33
CONDUCTED BY: E.I./J.L.
OBJECTIVE: SCOPING TEST GOLD RECOVERY

SAMPLE DESCRIP.	METALL. PRODUCT	ASSAYS (Oz/ton)		CONTENT (mg)	(mg)	DISTRIBUTION %	%
SOLUTIONS	gram/ml	Au	Ag	Au	Ag	Au	Ag
.....	.....	.....	.....	.....	.....	.....	.....
	1000						
	1000						
	1000						
24 hrs.	1000	0.000	0.00	0.000	0.00	0.00	0.00
48 hrs.	1000	0.000	0.00	0.000	0.00	0.00	0.00
72 hrs.	1480	0.011	0.00	0.558	0.10	60.11	37.61
Leach Res	491	0.022	0.01	0.370	0.168	39.89	62.39
Calc.Head	500	0.054	0.02				
HeadAssay		0.050	<0.01				

SAMPLE DESCRIP.	METALL. PRODUCT	NaCN lb/ton	NaCN lb/ton	CaO lb/ton	CaO lb/ton	SOLUTION pH
Preg+Wash	mls	sol.conc.	consump.	sol.conc.	consump.	
.....	.....	.....	.....	.....	.....	.....
2 hrs.	1000	2.00		2.00		12.0
4 hrs.	1000					12.0
8 hrs.	1000					12.0
24 hrs.	1000					12.0
48 hrs.	1000					11.8
72 hrs.	1480	1.30	0.15	0.64	2.14	11.6

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BOTTLE ROLL NaCN LEACH TEST

CLIENT: ASARCO
DATE: 02/14/90
TEST No.: 8
PROJECT No: M-206
FEED: YM - 40
CONDUCTED BY: E.I./J.L.
OBJECTIVE: SCOPING TEST GOLD RECOVERY

SAMPLE DESCRIP.	METALL. PRODUCT	ASSAYS (Oz/ton)		CONTENT (mg)		DISTRIBUTION %	
SOLUTIONS	gram/ml	Au	Ag	Au	Ag	Au	Ag
	1000						
	1000						
	1000						
24 hrs.	1000	0.000	0.00	0.000	0.00	0.00	0.00
48 hrs.	1000	0.000	0.00	0.000	0.00	0.00	0.00
72 hrs.	1460	0.017	0.00	0.851	0.15	67.85	47.20
Leach Res	490	0.024	0.01	0.403	0.168	32.15	52.80
Calc.Head	500	0.073	0.02				
HeadAssay		0.060	<0.01				

SAMPLE DESCRIP.	METALL. PRODUCT	NaCN lb/ton	NaCN lb/ton	CaO lb/ton	CaO lb/ton	SOLUTION pH
Preg+Wash	mls	sol.conc.	consump.	sol.conc.	consump.	
2 hrs.	1000	2.00		2.00		12.0
4 hrs.	1000					12.0
8 hrs.	1000					12.0
24 hrs.	1000					12.0
48 hrs.	1000					11.8
72 hrs.	1460	1.32	0.15	0.70	2.00	11.7

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BOTTLE ROLL NaCN LEACH TEST

CLIENT: ASARCO
DATE: 03/14/90
TEST No.: 9
PROJECT No: M-206
FEED: YM - 43
CONDUCTED BY: E.I./J.L.
OBJECTIVE: SCOPING TEST GOLD RECOVERY

SAMPLE DESCRIP.	METALL. PRODUCT	ASSAYS (Oz/ton)		CONTENT (mg)		DISTRIBUTION %	
SOLUTIONS	gram/ml	Au	Ag	Au	Ag	Au	Ag
.....	.....	.....	.....	.....	.....	.....	.....
	1000						
	1000						
	1000						
24 hrs.	1000	0.000	0.00	0.000	0.00	0.00	0.00
48 hrs.	1000	0.000	0.00	0.000	0.00	0.00	0.00
72 hrs.	1440	0.020	0.00	0.987	0.15	88.13	15.12
Leach Res	485	0.008	0.05	0.133	0.831	11.87	84.88
Calc.Head	500	0.065	0.06				
HeadAssay		0.055	0.06				

SAMPLE DESCRIP.	METALL. PRODUCT	NaCN lb/ton	NaCN lb/ton	CaO lb/ton	CaO lb/ton	SOLUTION pH
Preg+Wash	mls	sol.conc.	consump.	sol.conc.	consump.	
.....	.....	.....	.....	.....	.....	.....
2 hrs.	1000	2.00		2.00		12.0
4 hrs.	1000					12.0
8 hrs.	1000					12.0
24 hrs.	1000					12.0
48 hrs.	1000					11.9
72 hrs.	1440	1.30	0.26	0.40	2.94	11.5

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BOTTLE ROLL NaCN LEACH TEST

CLIENT: ASARCO

DATE: 03/14/90

TEST No.: 10

PROJECT No: M-206

FEED: YM - 47

CONDUCTED BY: E.I./J.L.

OBJECTIVE: SCOPING TEST GOLD RECOVERY

SAMPLE DESCRIP.	METALL. PRODUCT	ASSAYS (Oz/ton)		CONTENT (mg)	(mg)	DISTRIBUTION %	%
SOLUTIONS	gram/ml	Au	Ag	Au	Ag	Au	Ag
.....	.....	.....	.....	.....	.....	.....	.....
	1000						
	1000						
	1000						
24 hrs.	1000	0.000	0.00	0.000	0.00	0.00	0.00
48 hrs.	1000	0.000	0.00	0.000	0.00	0.00	0.00
72 hrs.	1420	0.009	0.00	0.438	0.15	71.88	46.00
Leach Res	500	0.010	0.01	0.171	0.171	28.12	54.00
Calc.Head	500	0.036	0.02				
HeadAssay		0.020	0.01				

SAMPLE DESCRIP.	METALL. PRODUCT	NaCN lb/ton	NaCN lb/ton	CaO lb/ton	CaO lb/ton	SOLUTION pH
Preg+Wash	mls	sol.conc.	consump.	sol.conc.	consump.	
.....	.....	.....	.....	.....	.....	.....
2 hrs.	1000	2.00		2.00		12.0
4 hrs.	1000					12.0
8 hrs.	1000					12.0
24 hrs.	1000					12.0
48 hrs.	1000					11.9
72 hrs.	1420	1.35	0.17	0.60	2.30	11.6

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BOTTLE ROLL NaCN LEACH TEST

CLIENT: ASARCO
DATE: 03/14/90
TEST No.: 11
PROJECT No: M-206
FEED: YM - 48
CONDUCTED BY: E.I./J.L.
OBJECTIVE: SCOPING TEST GOLD RECOVERY

SAMPLE DESCRIP.	METALL. PRODUCT	ASSAYS (Oz/ton)		CONTENT (mg)		CONTENT (mg)		DISTRIBUTION %		DISTRIBUTION %	
SOLUTIONS	gram/ml	Au	Ag	Au	Ag	Au	Ag	Au	Ag	Au	Ag
	1000										
	1000										
	1000										
24 hrs.	1000	0.000	0.00	0.000	0.00	0.00	0.00	0.00	0.00	0.00	0.00
48 hrs.	1000	0.000	0.00	0.000	0.00	0.00	0.00	0.00	0.00	0.00	0.00
72 hrs.	1440	0.012	0.00	0.592	0.15	0.171	0.171	77.59	46.40	77.59	46.40
Leach Res	499	0.010	0.01	0.171	0.171			22.41	53.60	22.41	53.60
Calc.Head	500	0.045	0.02								
HeadAssay		0.036	0.01								

SAMPLE DESCRIP.	METALL. PRODUCT	NaCN lb/ton	NaCN lb/ton	CaO lb/ton	CaO lb/ton	SOLUTION pH
Preg+Wash	mls	sol.conc.	consump.	sol.conc.	consump.	
2 hrs.	1000	2.00		2.00		12.0
4 hrs.	1000					12.0
8 hrs.	1000					12.0
24 hrs.	1000					12.0
48 hrs.	1000					11.9
72 hrs.	1440	1.34	0.14	0.56	2.39	11.6

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BOTTLE ROLL NaCN LEACH TEST

CLIENT: ASARCO

DATE: 02/14/90

TEST No.: 12

PROJECT No: M-206

FEED: YM - 49

CONDUCTED BY: E.I./J.L.

OBJECTIVE: SCOPING TEST GOLD RECOVERY

SAMPLE DESCRIP.	METALL. PRODUCT	ASSAYS (Oz/ton)		CONTENT (mg)		CONTENT (mg)		DISTRIBUTION %		DISTRIBUTION %	
SOLUTIONS	gram/ml	Au	Ag	Au	Ag	Au	Ag	Au	Ag	Au	Ag
.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
	1000										
	1000										
	1000										
24 hrs.	1000	0.000	0.00	0.000	0.00	0.00	0.00	0.00	0.00	0.00	0.00
48 hrs.	1000	0.000	0.00	0.000	0.00	0.00	0.00	0.00	0.00	0.00	0.00
72 hrs.	1480	0.009	0.00	0.457	0.15	0.15	0.15	69.20	47.33	69.20	47.33
Leach Res	494	0.012	0.01	0.203	0.169	0.169	0.169	30.80	52.67	30.80	52.67
Calc.Head	500	0.038	0.02								
HeadAssay		0.034	0.01								

SAMPLE DESCRIP.	METALL. PRODUCT	NaCN lb/ton	NaCN lb/ton	CaO lb/ton	CaO lb/ton	SOLUTION pH
Preg+Wash	mls	sol.conc.	consump.	sol.conc.	consump.	
.....	.....	.....	.....	.....	.....	.....
2 hrs.	1000	2.00		2.00		12.0
4 hrs.	1000					12.0
8 hrs.	1000					12.0
24 hrs.	1000					12.0
48 hrs.	1000					11.9
72 hrs.	1480	1.30	0.15	0.65	2.10	11.6

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BOTTLE ROLL NaCN LEACH TEST

CLIENT: ASARCO
DATE: 03/14/90
TEST No.: 13
PROJECT No: M-206
FEED: YM - 53
CONDUCTED BY: E.I./J.L.
OBJECTIVE: SCOPING TEST GOLD RECOVERY

SAMPLE DESCRIP.	METALL. PRODUCT	ASSAYS (Oz/ton)		CONTENT (mg)		CONTENT (mg)		DISTRIBUTION %		DISTRIBUTION %	
SOLUTIONS	gram/ml	Au	Ag	Au		Ag		Au		Ag	
.....	.....	.....	.....	.....		.....		.....		.....	
	1000										
	1000										
	1000										
24 hrs.	1000	0.000	0.00	0.000		0.00		0.00		0.00	
48 hrs.	1000	0.000	0.00	0.000		0.00		0.00		0.00	
72 hrs.	1440	0.012	0.00	0.592		0.10		77.56		36.55	
Leach Res	500	0.010	0.01	0.171		0.171		22.44		63.45	
Calc.Head	500	0.045	0.02								
HeadAssay		0.034	0.01								

SAMPLE DESCRIP.	METALL. PRODUCT	NaCN lb/ton	NaCN lb/ton	CaO lb/ton	CaO lb/ton	SOLUTION pH
Preg+Wash	mls	sol.conc.	consump.	sol.conc.	consump.	
.....	.....	.....	.....	.....	.....	.....
2 hrs.	1000	2.00		2.00		12.0
4 hrs.	1000					12.0
8 hrs.	1000					12.0
24 hrs.	1000					12.0
48 hrs.	1000					11.9
72 hrs.	1440	1.30	0.26	0.58	2.33	11.6

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BOTTLE ROLL NaCN LEACH TEST

CLIENT: ASARCO

DATE: 03/14/90

TEST No.: 14

PROJECT No: M-206

FEED: YM - 54

CONDUCTED BY: E.I./J.L.

OBJECTIVE: SCOPING TEST GOLD RECOVERY

SAMPLE DESCRIP.	METALL. PRODUCT	ASSAYS (Oz/ton)		CONTENT (mg)		DISTRIBUTION %	
SOLUTIONS	gram/ml	Au	Ag	Au	Ag	Au	Ag
	1000						
	1000						
	1000						
24 hrs.	1000	0.000	0.00	0.000	0.00	0.00	0.00
48 hrs.	1000	0.000	0.00	0.000	0.00	0.00	0.00
72 hrs.	1440	0.016	0.00	0.790	0.10	67.77	36.64
Leach Res	498	0.022	0.01	0.376	0.171	32.23	63.36
Calc.Head	500	0.068	0.02				
HeadAssay		0.055	0.01				

SAMPLE DESCRIP.	METALL. PRODUCT	NaCN lb/ton	NaCN lb/ton	CaO lb/ton	CaO lb/ton	SOLUTION pH
Preg+Wash	mls	sol.conc.	consump.	sol.conc.	consump.	
2 hrs.	1000	2.00		2.00		12.0
4 hrs.	1000					12.0
8 hrs.	1000					12.0
24 hrs.	1000					12.0
48 hrs.	1000					11.9
72 hrs.	1440	1.30	0.26	0.60	2.28	11.6

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BOTTLE ROLL NaCN LEACH TEST

CLIENT: ASARCO

DATE: 03/20/90

TEST No.: 15

PROJECT No: M-206

FEED: YM - 63

CONDUCTED BY: E.I./J.L.

OBJECTIVE: SCOPING TEST GOLD RECOVERY

SAMPLE DESCRIP.	METALL. PRODUCT	ASSAYS (Oz/ton)		CONTENT (mg)		DISTRIBUTION %	
SOLUTIONS	gram/ml	Au	Ag	Au	Ag	Au	Ag
	1000						
	1000						
	1000						
24 hrs.	1000	0.000	0.00	0.000	0.00	0.00	0.00
48 hrs.	1000	0.000	0.00	0.000	0.00	0.00	0.00
72 hrs.	1440	0.019	0.00	0.938	0.15	71.41	46.45
Leach Res	498	0.022	0.01	0.376	0.171	28.59	53.55
Calc.Head	500	0.077	0.02				
HeadAssay		0.046	0.01				

SAMPLE DESCRIP.	METALL. PRODUCT	NaCN lb/ton	NaCN lb/ton	CaO lb/ton	CaO lb/ton	SOLUTION pH
Preg+Wash	mls	sol.conc.	consump.	sol.conc.	consump.	
2 hrs.	1000	2.00		2.00		12.0
4 hrs.	1000					12.0
8 hrs.	1000					12.0
24 hrs.	1000					12.0
48 hrs.	1000					11.9
72 hrs.	1440	1.30	0.26	0.62	2.22	11.6

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BOTTLE ROLL NaCN LEACH TEST

CLIENT: ASARCO

DATE: 03/20/90

TEST No.: 16

PROJECT No: M-206

FEED: YM - 71

CONDUCTED BY: E.I./J.L.

OBJECTIVE: SCOPING TEST GOLD RECOVERY

SAMPLE DESCRIP.	METALL. PRODUCT	ASSAYS (Oz/ton)		CONTENT (mg)	(mg)	DISTRIBUTION %	%
SOLUTIONS	gram/ml	Au	Ag	Au	Ag	Au	Ag
.....	.....	.....	.....	.....	.....	.....	.....
	1000						
	1000						
	1000						
24 hrs.	1000	0.000	0.00	0.000	0.00	0.00	0.00
48 hrs.	1000	0.000	0.00	0.000	0.00	0.00	0.00
72 hrs.	1500	0.039	0.00	2.006	0.21	83.06	54.69
Leach Res	497	0.024	0.01	0.409	0.170	16.94	45.31
Calc.Head	500	0.141	0.02				
HeadAssay		0.120	0.01				

SAMPLE DESCRIP.	METALL. PRODUCT	NaCN lb/ton	NaCN lb/ton	CaO lb/ton	CaO lb/ton	SOLUTION pH
Preg+Wash	mls	sol.conc.	consump.	sol.conc.	consump.	
.....	.....	.....	.....	.....	.....	.....
2 hrs.	1000	2.00		2.00		12.0
4 hrs.	1000					12.0
8 hrs.	1000					12.0
24 hrs.	1000					12.0
48 hrs.	1000					11.9
72 hrs.	1500	1.20	0.40	0.81	1.58	11.6

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BOTTLE ROLL NaCN LEACH TEST

CLIENT: ASARCO

DATE: 03/20/90

TEST No.: 17

PROJECT No: M-206

FEED: YM - 75

CONDUCTED BY: E.I./J.L.

OBJECTIVE: SCOPING TEST GOLD RECOVERY

SAMPLE DESCRIP.	METALL. PRODUCT	ASSAYS (Oz/ton)		CONTENT (mg)		DISTRIBUTION %	
SOLUTIONS	gram/ml	Au	Ag	Au	Ag	Au	Ag
	1000						
	1000						
	1000						
24 hrs.	1000	0.000	0.00	0.000	0.00	0.00	0.00
48 hrs.	1000	0.000	0.00	0.000	0.00	0.00	0.00
72 hrs.	1390	0.019	0.00	0.905	0.14	83.97	49.82
Leach Res	420	0.012	0.01	0.173	0.144	16.03	50.18
Calc.Head	500	0.063	0.02				
HeadAssay		0.055	0.01				

SAMPLE DESCRIP.	METALL. PRODUCT	NaCN lb/ton	NaCN lb/ton	CaO lb/ton	CaO lb/ton	SOLUTION pH
Preg+Wash	mls	sol.conc.	consump.	sol.conc.	consump.	
2 hrs.	1000	2.00		2.00		11.9
4 hrs.	1000					11.9
8 hrs.	1000					11.9
24 hrs.	1000					11.9
48 hrs.	1000					11.6
72 hrs.	1390	1.40	0.13	0.64	2.64	11.6

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BOTTLE ROLL NaCN LEACH TEST

CLIENT: ASARCO

DATE: 03/20/90

TEST No.: 18

PROJECT No: M-206

FEED: YM - 79

CONDUCTED BY: E.I./J.L.

OBJECTIVE: SCOPING TEST GOLD RECOVERY

SAMPLE DESCRIP.	METALL. PRODUCT	ASSAYS (Oz/ton)		CONTENT (mg)		CONTENT (mg)		DISTRIBUTION %		DISTRIBUTION %	
SOLUTIONS	gram/ml	Au	Ag	Au		Ag		Au		Ag	
.....	.....	.....	.....	.....		.....		.....		.....	
	1000										
	1000										
	1000										
24 hrs.	1000	0.000	0.00	0.000		0.00		0.00		0.00	
48 hrs.	1000	0.000	0.00	0.000		0.00		0.00		0.00	
72 hrs.	1430	0.012	0.00	0.588		0.10		60.94		36.39	
Leach Res	500	0.022	0.01	0.377		0.171		39.06		63.61	
Calc.Head	500	0.056	0.02								
HeadAssay		0.032	0.01								

SAMPLE DESCRIP.	METALL. PRODUCT	NaCN lb/ton	NaCN lb/ton	CaO lb/ton	CaO lb/ton	SOLUTION pH
Preg+Wash	mls	sol.conc.	consump.	sol.conc.	consump.	
.....	.....	.....	.....	.....	.....	.....
2 hrs.	1000	2.00		2.00		11.9
4 hrs.	1000					11.9
8 hrs.	1000					11.9
24 hrs.	1000					11.9
48 hrs.	1000					11.6
72 hrs.	1430	1.34	0.17	0.68	2.06	11.6

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1944 West Grant Road., Suite 106
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Phone: (602) 623-1327

BOTTLE ROLL NaCN LEACH TEST

CLIENT: ASARCO
DATE: 03/20/90
TEST No.: 19
PROJECT No: M-206
FEED: YM - 82
CONDUCTED BY: E.I./J.L.
OBJECTIVE: SCOPING TEST GOLD RECOVERY

SAMPLE DESCRIP.	METALL. PRODUCT	ASSAYS (Oz/ton)		CONTENT (mg)		CONTENT (mg)		DISTRIBUTION %		DISTRIBUTION %	
SOLUTIONS	gram/ml	Au	Ag	Au	Ag	Au	Ag	Au	Ag	Au	Ag
.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
	1000										
	1000										
	1000										
24 hrs.	1000	0.000	0.00	0.000	0.00	0.000	0.00	0.00	0.00	0.00	0.00
48 hrs.	1000	0.000	0.00	0.000	0.00	0.000	0.00	0.00	0.00	0.00	0.00
72 hrs.	1420	0.012	0.00	0.584	0.05	0.584	0.05	65.80	22.40	65.80	22.40
Leach Res	492	0.018	0.01	0.304	0.169	0.304	0.169	34.20	77.60	34.20	77.60
Calc.Head	500	0.052	0.01								
HeadAssay		0.040	0.01								

SAMPLE DESCRIP.	METALL. PRODUCT	NaCN lb/ton	NaCN lb/ton	CaO lb/ton	CaO lb/ton	SOLUTION pH
Preg+Wash	mls	sol.conc.	consump.	sol.conc.	consump.	
.....	.....	.....	.....	.....	.....	.....
2 hrs.	1000	2.00		2.00		11.9
4 hrs.	1000					11.9
8 hrs.	1000					11.9
24 hrs.	1000					11.9
48 hrs.	1000					11.6
72 hrs.	1420	1.35	0.17	0.76	1.87	11.6

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BOTTLE ROLL NaCN LEACH TEST

CLIENT: ASARCO
DATE: 03/20/90
TEST No.: 20
PROJECT No: M-206
FEED: YM - 84
CONDUCTED BY: E.I./J.L.
OBJECTIVE: SCOPING TEST GOLD RECOVERY

SAMPLE DESCRIP.	METALL. PRODUCT	ASSAYS (Oz/ton)		CONTENT (mg)		CONTENT (mg)		DISTRIBUTION %		DISTRIBUTION %	
SOLUTIONS	gram/ml	Au	Ag	Au		Ag		Au		Ag	
.....	.....	.....	.....	.....		.....		.....		.....	
	1000										
	1000										
	1000										
24 hrs.	1000	0.000	0.00	0.000		0.00		0.00		0.00	
48 hrs.	1000	0.000	0.00	0.000		0.00		0.00		0.00	
72 hrs.	1420	0.018	0.00	0.876		0.15		69.41		45.42	
Leach Res	512	0.022	0.01	0.386		0.176		30.59		54.58	
Calc.Head	500	0.074	0.02								
HeadAssay		0.120	0.01								

SAMPLE DESCRIP.	METALL. PRODUCT	NaCN lb/ton	NaCN lb/ton	CaO lb/ton	CaO lb/ton	SOLUTION pH
Preg+Wash	mls	sol.conc.	consump.	sol.conc.	consump.	
.....	.....	.....	.....	.....	.....	.....
2 hrs.	1000	2.00		2.00		11.9
4 hrs.	1000					11.9
8 hrs.	1000					11.9
24 hrs.	1000					11.9
48 hrs.	1000					11.6
72 hrs.	1420	1.30	0.30	0.72	1.91	11.6

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BOTTLE ROLL NaCN LEACH TEST

CLIENT: ASARCO
DATE: 03/20/90
TEST No.: 21
PROJECT No: M-206
FEED: YM - 87
CONDUCTED BY: E.I./J.L.
OBJECTIVE: SCOPING TEST GOLD RECOVERY

SAMPLE DESCRIP.	METALL. PRODUCT	ASSAYS (Oz/ton)		CONTENT (mg)		CONTENT (mg)		DISTRIBUTION %		DISTRIBUTION %	
SOLUTIONS	gram/ml	Au	Ag	Au	Ag	Au	Ag	Au	Ag	Au	Ag
.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
	1000										
	1000										
	1000										
24 hrs.	1000	0.000	0.00	0.000	0.00	0.000	0.00	0.00	0.00	0.00	0.00
48 hrs.	1000	0.000	0.00	0.000	0.00	0.000	0.00	0.00	0.00	0.00	0.00
72 hrs.	1460	0.015	0.01	0.751	0.30	0.751	0.30	64.60	63.66	64.60	63.66
Leach Res	500	0.024	0.01	0.411	0.171	0.411	0.171	35.40	36.34	35.40	36.34
Calc.Head	500	0.068	0.03								
HeadAssay		0.036	0.01								

SAMPLE DESCRIP.	METALL. PRODUCT	NaCN lb/ton	NaCN lb/ton	CaO lb/ton	CaO lb/ton	SOLUTION pH
Preg+Wash	mls	sol.conc.	consump.	sol.conc.	consump.	
.....	.....	.....	.....	.....	.....	.....
2 hrs.	1000	2.00		2.00		11.9
4 hrs.	1000					11.9
8 hrs.	1000					11.9
24 hrs.	1000					11.9
48 hrs.	1000					11.6
72 hrs.	1460	1.30	0.20	1.00	1.08	11.6

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BOTTLE ROLL NaCN LEACH TEST

CLIENT: ASARCO

DATE: 03/20/90

TEST No.: 22

PROJECT No: M-206

FEED: YM - 88

CONDUCTED BY: E.I./J.L.

OBJECTIVE: SCOPING TEST GOLD RECOVERY

SAMPLE DESCRIP.	METALL. PRODUCT	ASSAYS (Oz/ton)		CONTENT (mg)	CONTENT (mg)	DISTRIBUTION %	DISTRIBUTION %
SOLUTIONS	gram/ml	Au	Ag	Au	Ag	Au	Ag
.....	.....	.....	.....	.....	.....	.....	.....
	1000						
	1000						
	1000						
24 hrs.	1000	0.000	0.00	0.000	0.00	0.00	0.00
48 hrs.	1000	0.000	0.00	0.000	0.00	0.00	0.00
72 hrs.	1520	0.021	0.00	1.094	0.16	74.37	47.70
Leach Res	500	0.022	0.01	0.377	0.171	25.63	52.30
Calc.Head	500	0.086	0.02				
HeadAssay		0.085	0.01				

SAMPLE DESCRIP.	METALL. PRODUCT	NaCN lb/ton	NaCN lb/ton	CaO lb/ton	CaO lb/ton	SOLUTION pH
Preg+Wash	mls	sol.conc.	consump.	sol.conc.	consump.	
.....	.....	.....	.....	.....	.....	.....
2 hrs.	1000	2.00		2.00		11.9
4 hrs.	1000					11.9
8 hrs.	1000					11.9
24 hrs.	1000					11.9
48 hrs.	1000					11.6
72 hrs.	1520	1.25	0.20	0.90	1.26	11.6

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BOTTLE ROLL NaCN LEACH TEST

CLIENT: ASARCO

DATE: 03/20/90

TEST No.: 23

PROJECT No: M-206

FEED: YM - 90

CONDUCTED BY: E.I./J.L.

OBJECTIVE: SCOPING TEST GOLD RECOVERY

SAMPLE DESCRIP.	METALL. PRODUCT	ASSAYS (Oz/ton)		CONTENT (mg)		CONTENT (mg)		DISTRIBUTION %		DISTRIBUTION %	
SOLUTIONS	gram/ml	Au	Ag	Au	Ag	Au	Ag	Au	Ag	Au	Ag
.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
	1000										
	1000										
	1000										
24 hrs.	1000	0.000	0.00	0.000	0.00	0.00	0.00	0.00	0.00	0.00	0.00
48 hrs.	1000	0.000	0.00	0.000	0.00	0.00	0.00	0.00	0.00	0.00	0.00
72 hrs.	1460	0.012	0.00	0.601	0.10	0.00	0.00	65.84	36.64	65.84	36.64
Leach Res	505	0.018	0.01	0.312	0.173	0.00	0.00	34.16	63.36	34.16	63.36
Calc.Head	500	0.053	0.02								
HeadAssay		0.055	0.01								

SAMPLE DESCRIP.	METALL. PRODUCT	NaCN lb/ton	NaCN lb/ton	CaO lb/ton	CaO lb/ton	SOLUTION pH
Preg+Wash	mls	sol.conc.	consump.	sol.conc.	consump.	
.....	.....	.....	.....	.....	.....	.....
2 hrs.	1000	2.00		2.00		11.9
4 hrs.	1000					11.9
8 hrs.	1000					11.9
24 hrs.	1000					11.9
48 hrs.	1000					11.6
72 hrs.	1460	1.30	0.20	0.90	1.36	11.6

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BOTTLE ROLL NaCN LEACH TEST

CLIENT: ASARCO
DATE: 03/20/90
TEST No.: 24
PROJECT No: M-206
FEED: YM - 93
CONDUCTED BY: E.I./J.L.
OBJECTIVE: SCOPING TEST GOLD RECOVERY

SAMPLE DESCRIP.	METALL. PRODUCT	ASSAYS (Oz/ton)		CONTENT (mg)	(mg)	DISTRIBUTION %	%
SOLUTIONS	gram/ml	Au	Ag	Au	Ag	Au	Ag
.....	.....	.....	.....	.....	.....	.....	.....
	1000						
	1000						
	1000						
24 hrs.	1000	0.000	0.00	0.000	0.00	0.00	0.00
48 hrs.	1000	0.000	0.00	0.000	0.00	0.00	0.00
72 hrs.	1400	0.021	0.00	1.008	0.10	78.61	35.90
Leach Res	500	0.016	0.01	0.274	0.171	21.39	64.10
Calc.Head	500	0.075	0.02				
HeadAssay		0.065	0.01				

SAMPLE DESCRIP.	METALL. PRODUCT	NaCN lb/ton	NaCN lb/ton	CaO lb/ton	CaO lb/ton	SOLUTION pH
Preg+Wash	mls	sol.conc.	consump.	sol.conc.	consump.	
.....	.....	.....	.....	.....	.....	.....
2 hrs.	1000	2.00		2.00		11.9
4 hrs.	1000					11.9
8 hrs.	1000					11.9
24 hrs.	1000					11.9
48 hrs.	1000					11.6
72 hrs.	1400	1.40	0.08	0.52	2.54	11.6

SKYLINE LABS, INC.
1775 W. Sahuaro Dr. • P.O. Box 50106
Tucson, Arizona 85703
(602) 622-4836

ATTACHMENT B

REPORT OF ANALYSIS

JOB NO. TAJ 627A
March 30, 1990
YM-6 TO YM-93

ASARCO INCORPORATED
Attn: Mr. James D. Sell
Southwestern Exploration
P.O. Box 5747
Tucson, AZ 85703

ASARCO Incorporated
APR 2 1990
SW Exploration

Replicate Analysis of 6 Pulp Samples

ITEM	SAMPLE NO.	FIRE ASSAY Au (oz/t)	FIRE ASSAY Ag (oz/t)	FIRE ASSAY Au (oz/t)	FIRE ASSAY Ag (oz/t)
1	YM-6	.028	<.01	.020	<.01
2	YM-8	.050	<.01	.050	<.01
15	YM-63	.065	<.01	.055	<.01
16	YM-71	.125	<.01	.115	<.01
20	YM-84	.050	<.01	.050	<.01
23	YM-90	.050	<.01	.050	.02

ITEM	SAMPLE NO.	FIRE ASSAY Au (oz/t)	FIRE ASSAY Ag (oz/t)	FIRE ASSAY Au (oz/t)	FIRE ASSAY Ag (oz/t)
1	YM-6	.030	<.01	.026	<.01
2	YM-8	.044	<.01	.050	.02
15	YM-63	.070	<.01	.065	<.01
16	YM-71	.120	.04	.130	<.01
20	YM-84	.070	.04	.046	<.01
23	YM-90	.036	<.01	.050	<.01

Charles E. Thompson
Arizona Registered Assayer No. 9427

William L. Lehmbeck
Arizona Registered Assayer No. 9425

James A. Martin
Arizona Registered Assayer No. 11122

SKYLINE LABS, INC.
1775 W. Sahuaro Dr. • P.O. Box 50106
Tucson, Arizona 85703
(602) 622-4836

ATTACHMENT B

JOB NO. TAJ 627A
March 30, 1990

ASARCO Incorporated
APR 2 1990
SW Exploration

ITEM	SAMPLE NO.	FIRE ASSAY Au (oz/t)	FIRE ASSAY Ag (oz/t)	FIRE ASSAY Au (oz/t)	FIRE ASSAY Ag (oz/t)
1	YM-6	.024	<.01	.085	<.01
2	YM-8	.050	<.01	.050	<.01
15	YM-63	.135	<.01	.075	<.01
16	YM-71	.130	.05	.125	<.01
20	YM-84	.055	<.01	.085	<.01
23	YM-90	.046	<.01	.050	<.01

ITEM	SAMPLE NO.	FIRE ASSAY Au (oz/t)	FIRE ASSAY Ag (oz/t)	FIRE ASSAY Au (oz/t)	FIRE ASSAY Ag (oz/t)
1	YM-6	I/S	I/S	I/S	I/S
2	YM-8	.050	<.01	.055	<.01
15	YM-63	I/S	I/S	I/S	I/S
16	YM-71	.135	<.01	I/S	I/S
20	YM-84	.055	<.01	I/S	I/S
23	YM-90	I/S	I/S	I/S	I/S

*NOTE: I/S Denotes Insufficient Sample

cc: Mr. Eugene Salazar

REGISTERED ASSAYER CERTIFICATE NO. 9425 WILLIAM L. LEHMBECK STATE OF ARIZONA

William L. Lehmbeck
Manager

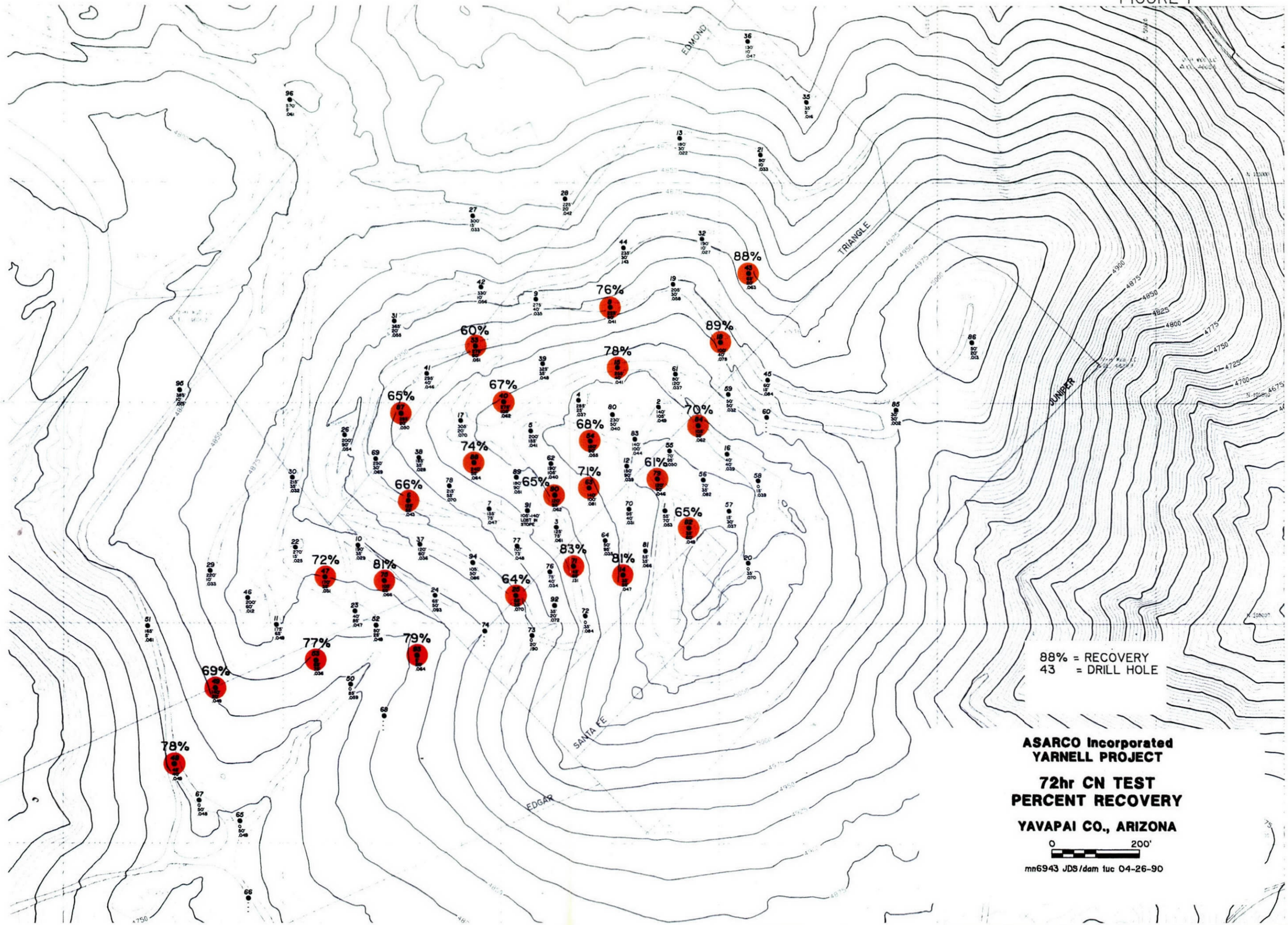
3/31/90

Charles E. Thompson
Arizona Registered Assayer No. 9427

William L. Lehmbeck
Arizona Registered Assayer No. 9425

James A. Martin
Arizona Registered Assayer No. 11122

FIGURE I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TRIANGLE
JUNIPER
SANTA FE
EDGAR
88%
76%
89%
60%
78%
67%
65%
70%
68%
74%
61%
71%
66%
65%
65%
83%
81%
72%
81%
64%
77%
79%
69%
78%
88% = RECOVERY
43 = DRILL HOLE
ASARCO Incorporated
YARNELL PROJECT
72hr CN TEST
PERCENT RECOVERY
YAVAPAI CO., ARIZONA
0
200'
mn6943 JDS/dam tuc 04-26-90

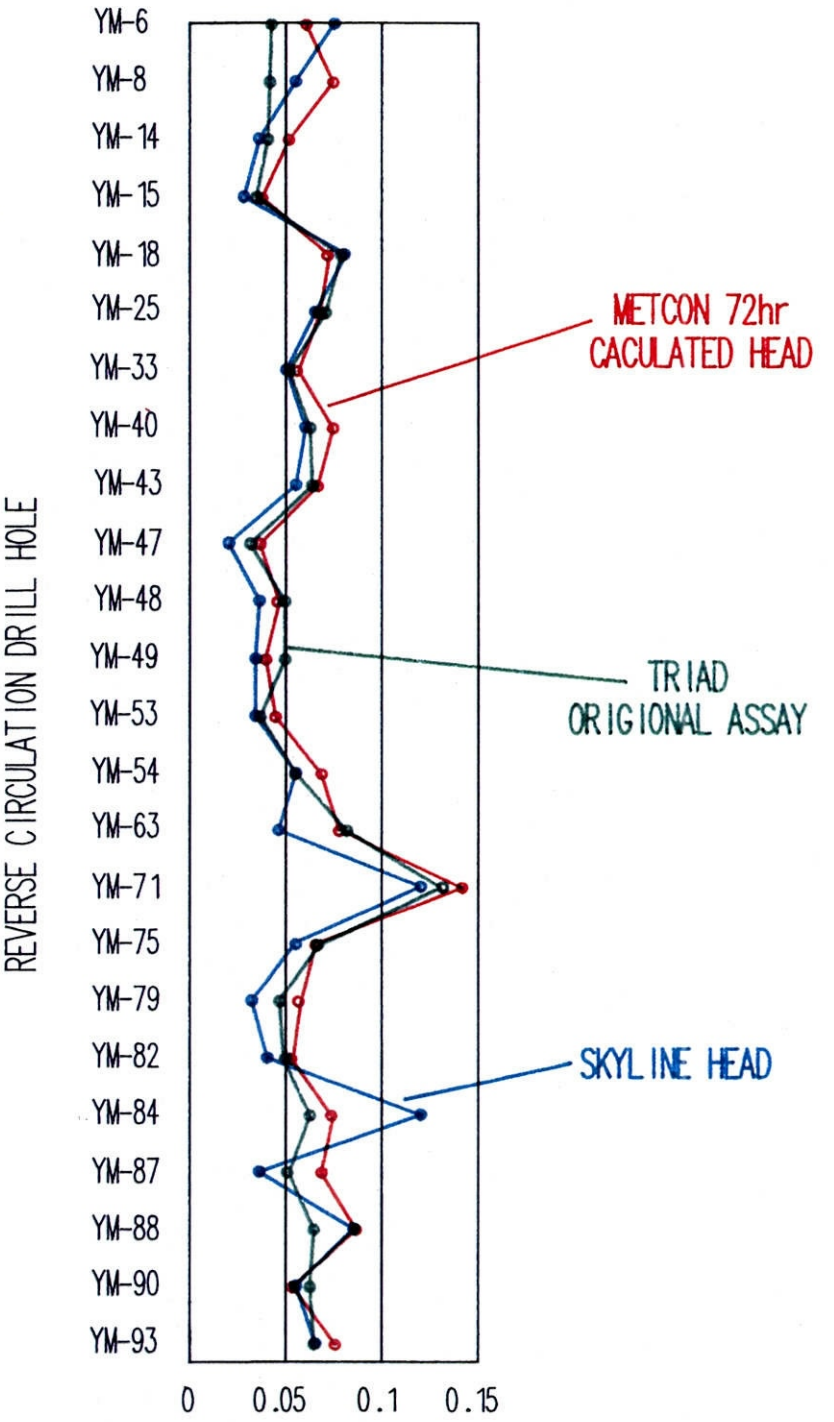

FIGURE 2 Comparison of origional assay vs. Skyline head and Metcon calculated head assays.

mn 6934 JDS/dam tuc 04-18-90
file YAR-6934.DWG

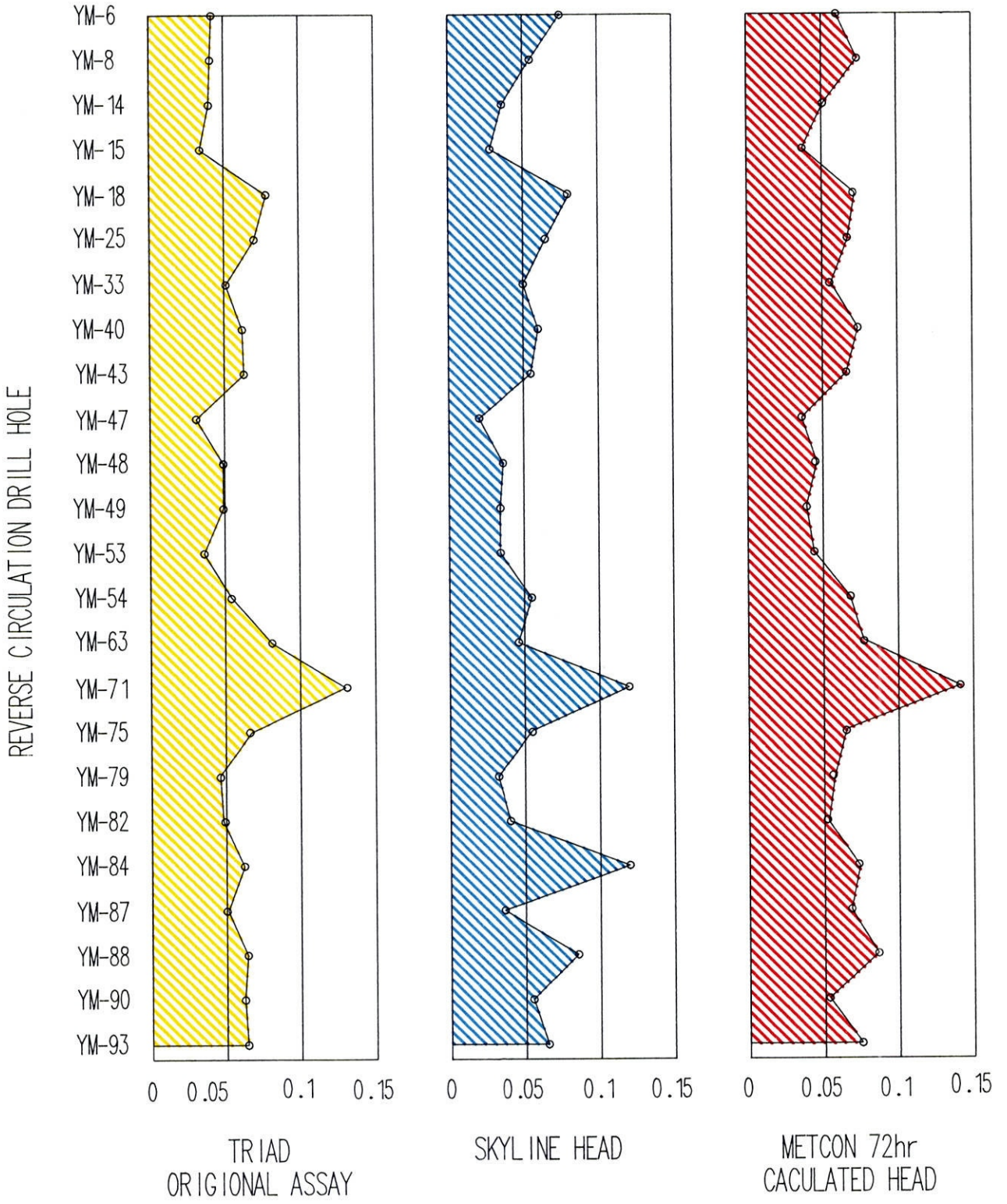

TABLE 1- Comparison of origional assay vs. Skyline head and Metcon calculated head assays.

mn 6934 JDS/dam tuc 04-18-90
file YAR-ASSY.DWG

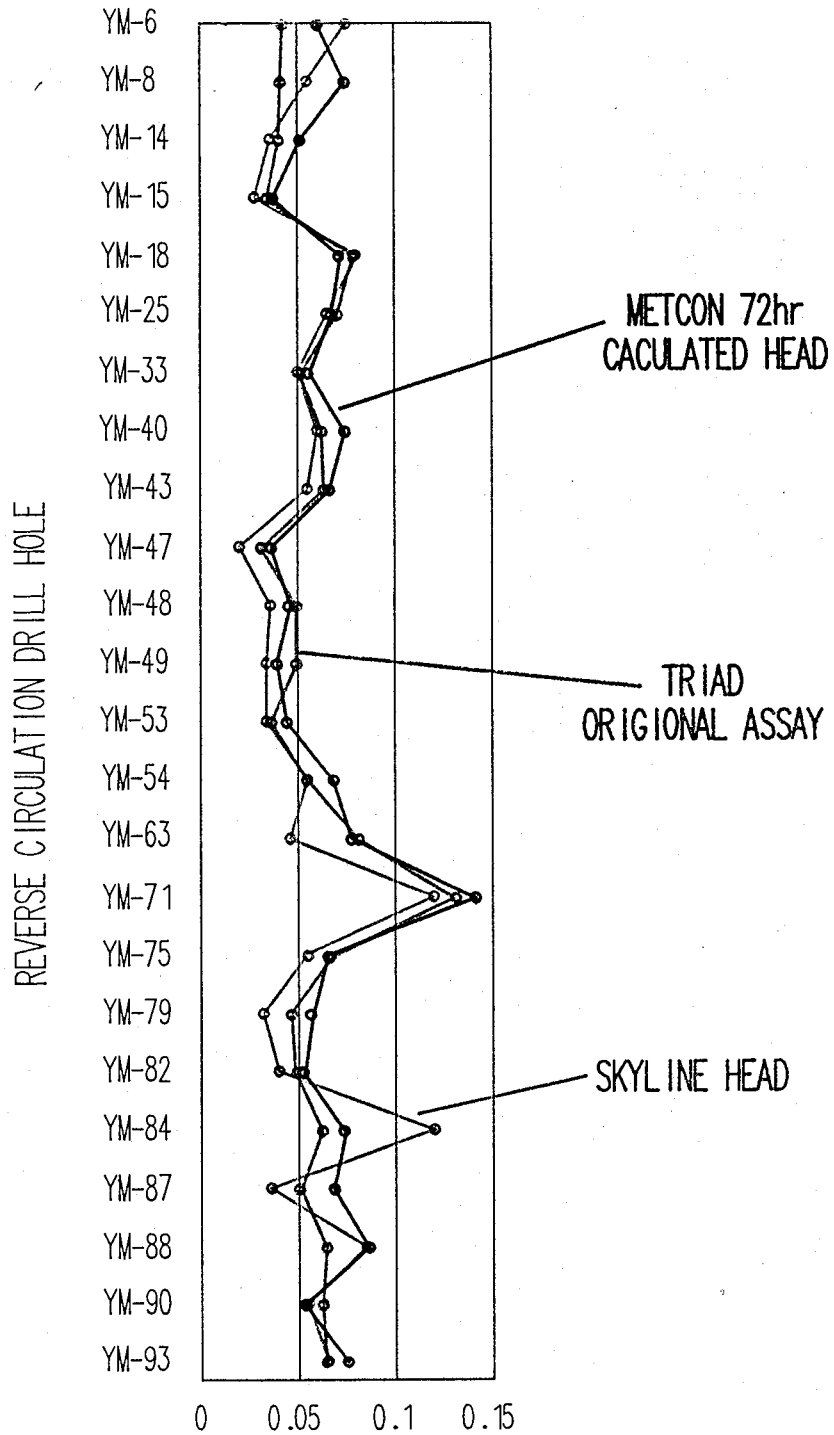

Figure 2

- Comparison of origional assay vs. Skyline head and Metcon calculated head assays.

mn 6934 JDS/dam tuc 04-18-90
file YARASSY1.DWG