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File No. Aa-19.8.8.

Subject: HARDSHELL

GEOCHEM.

J. H. C.

OCT 21 1969

AMERICAN SMELTING AND REFINING COMPANY
Tucson Arizona

MR. WES ROK

READ AND RETURN

PREPARE ANSWERS HANDLE

FILE ✓ INITIALS

October 9, 1969

MEMORANDUM TO: J. H. Courtright, Chief Geologist

FROM: A. Dalla Vista

W.E.S.

OCT 21 1969

REGARDING: HARDSHELL PROJECT
GEOCHEMICAL SAMPLING
SEPTEMBER 1969

I am attaching a contoured map of the geochemical silver values obtained from outcrop sampling of the Hardshell property. Each sample location and value in ppm are shown. Rock type and degree of Mn-OX mineralization are listed separately.

The majority of samples were distributed within the Mn-OX mineralized area, as shown on the surface.

An E-W grid system of sampling was followed, except at and/or near the central part of the orebody where samples were collected along roads and drill sites.

Grid lines were spaced from 200' to 400' apart with intervals varying from 100' to 300'.

Each sample covered a length of approximately 10 ft. A total of 360 samples, weighing from 4 to 7 lbs. each, was taken in about 10 days' work.

All of the significant values appear to be confined to the chief conglomerate and the outcropping silicified sediments. The diabase and granodiorite show weak to moderate values at and/or near the contact with the conglomerate. The andesitic extrusives, which cropout at the southern part of the property (near HDS-27), show very weak or no values at all. No consistent values were obtained in the limestone except in a few silicified or brecciated contact zones.

Several high values (+1.0 oz/ton) which were obtained in areas of very high Mn-OX fairly well reflected known mineralization of depths.

Samples were assayed by the atomic absorption method.

A. Dalla Vista

ADV:mt

cc: W.E.Saegart
N.P.Whaley
C.Moss w/att

Att.

A. Dalla Vista

HARDSHELL PROJECT

Geochem Samples

Sample No.	Rock Type	Ag,ppm (Atomic Absorption)
H-1	Tdb (Trs. MnOX)	2.1
H-2	Tdb (" ")	1.9
H-3	Tdb (No MnOX)	1.5
H-4	Tdb (" ")	1.9
H-5	Tdb (" ")	1.2
H-6	Tdb (" ")	0.8
H-7	Tcc (Wk. MnOX)	0.4
H-8	Tcc (" ")	1.5
H-9	Tcc (" ")	1.5
H-10	Tcc (" ")	1.1
H-11	Tcc (" ")	1.2
H-12	Tcc (Mod. MnOX)	22.5
H-13	Tcc (Wk. MnOX)	3.3
H-14	Tcc (" ")	4.0
H-15	Tcc (" ")	2.3
H-16	Tcc (" ")	1.9
H-17	Tcc (" ")	3.8
H-18	Tdb (Trs. MnOX)	1.5
H-19	Tcc (Trs. MnOX)	0.8
H-20	Tcc (Trs. MnOX)	0.8
H-21	Tcc (" ")	1.7
H-22	Tcc (Wk. MnOX)	7.4
H-23	Tcc (" ")	2.5
H-24	Tcc (" ")	2.9
H-25	Tcc (Mod. MnOX)	30.5
H-26	Tcc (Wk. MnOX)	7.8
H-27	Db (Tr. MnOX)	1.5
H-28	Db (" ")	1.7
H-29	Tcc (Mod. MnOX)	31.9
H-30	Tcc (" ")	10.6
H-31	Tcc (Wk. MnOX)	1.2
H-32	Tcc (" ")	1.1
H-33	Tdb (Wk. MnOX)	1.7
H-34	Tcc (Wk. MnOX)	1.1
H-35	Tcc (" ")	1.9
H-36	Tcc (" ")	1.5
H-37	Tcc (" ")	9.5
H-38	Tcc (Mod. MnOX)	28.1
H-39	Tcc (Wk. MnOX)	1.0
H-40	Tcc (Wk. MnOX)	1.3
H-41	Tcc (" ")	1.0
H-42	Tcc (" ")	1.0
H-43	Tcc (" ")	1.0
H-44	Tcc (" ")	2.5
H-45 (Dump)	Tcc (Mod. MnOX)	67.9
H-46	Tcc (Strong MnOX)	151.3
H-47	Tdb (Wk. MnOX)	6.8
H-48	Tgd (" ")	3.3
H-49	Tcc (" ")	2.3
H-50	Tcc (" ")	3.8
H-51	Tcc (" ")	3.3

Sample No.	Rock Type	Ag (ppm)
H-52	Tcc (Wk. MnOX)	4.8
H-53	Tcc (" ")	2.5
H-54	Tcc (Mod. MnOX)	66.6
H-55	Tcc (" ")	24.1
H-56	Tcc (Wk. MnOX)	6.0
H-57	Tcc (" ")	2.5
H-58	Tcc (" ")	36.2
H-59	TGD (" ")	10.3
H-60	TGD (" ")	15.1
H-61	Tcc (Wk MnOX)	17.1
H-62	Tcc (" ")	10.3
H-63	Tcc (" ")	16.6
H-64	Tcc (" ")	3.3
H-65	Tcc (" ")	2.3
H-66	Tcc (" ")	13.8
H-67	Tcc (" ")	1.3
H-68	Tcc (" ")	2.5
H-69	Tcc (" ")	2.5
H-70	Tcc (" ")	2.5
H-71	Tcc (" ")	14.8
H-72	Tcc (Mod. MnOX)	113.2
H-73	Tcc (" ")	28.9
H-74	Tcc (Trs. MnOX)	8.5
H-75	Tcc (" ")	2.3
H-76	Tcc (" ")	3.3
H-77	Tcc (" ")	1.3
H-78	Tcc (" ")	14.3
H-79	Tcc (Wk. MnOX)	1.0
H-80	Tcc (" ")	20.4
H-81	Tcc (" ")	3.5
H-82	Tcc (" ")	2.3
H-83	Tcc (" ")	3.3
H-84	Tcc (" ")	11.6
H-85	Tcc (" ")	2.0
H-86	Tcc (" ")	3.5
H-87	Tcc (" ")	5.5
H-88	Tcc (" ")	3.5
H-89	Tcc (" ")	3.0
H-90	Tcc (" ")	9.3
H-91	Tcc (" ")	4.8
H-92	Tcc (" ")	4.0
H-93	TGD (" ")	1.3
H-94	Tcc (Wk MnOX)	11.8
H-95	Tcc (Strong MnOX)	86.2
H-96	Tcc (" ")	2.0
H-97	Tcc (" ")	8.8
H-98	Tcc (Strong MnOX)	2.8
H-99	Tcc (Trs. MnOX)	1.8
H-100	Tcc (" ")	3.0
H-101	Tcc (" ")	-.8
H-102	Tcc (" ")	1.0
H-103	Tcc (" ")	1.8
H-104	Tcc (" ")	1.0
H-105	Tcc (" ")	2.0

Sample No.	Rock Type	Ag (ppm)
H-106	Tap (Trs. MnOX)	1.0
H-107	Tcc (" ")	2.0
H-108	Tcc (" ")	1.5
H-109	Tcc (" ")	1.8
H-110	Tcc (" ")	1.3
H-111	Tcc (" ")	1.3
H-112	Tcc (" ")	-.8
H-113	Tap (" ")	-.8
H-114	Tcc (" ")	1.3
H-115	Tcc (Pit) No MnOX	2.0
H-116	Tcc (Trs. MnOX)	1.3
H-117	Tcc (" ")	1.3
H-118	Tcc (" ")	1.3
H-119	Tcc (" ")	1.3
H-120	Tcc (" ")	1.0
H-121	Tcc (" ")	1.0
H-122	Tcc (" ")	3.8
H-123	Tcc (" ")	2.0
H-124	Tcc (" ")	1.0
H-125	Tcc No MnOX	-.8
H-126	Tcc (Trs. MnOX)	1.8
H-127	Tcc (" ")	1.8
H-128	Tcc (" ")	2.0
H-129	Tcc (" ")	2.0
H-130	Silicified TFG No MnOX	1.3
H-131	Tcc (Wk MnOX	1.5
H-132	Tcc (" ")	1.3
H-133	Tcc (Wk MnOX)	37.9
H-134	Tcc (" ")	1.5
H-135	Tcc (" ")	48.8
H-136	Tcc (" ")	1.0
H-137	Tcc (" ")	-.8
H-138	Tcc (" ")	-.8
H-139	Tcc (" ")	3.6
H-140	Tcc (" ")	4.3
H-141	Tcc (" ")	-.8
H-142	Tcc (" ")	1.0
H-143	Tcc (" ")	1.0
H-144	Tcc (" ")	-.8
H-145	Tcc (Mod. MnOX) Dump	112.6
H-146	Tcc (Wk MnOX)	5.7
H-147	Tcc (" ")	8.6
H-148	Tcc (" ")	5.5
H-149	Tcc (Mod MnOX)	52.5
H-150	Tcc (Wk MnOX)	8.4
H-151	Tcc (" ")	7.2
H-152	Tcc (" ")	16.3
H-153	TGD (" ")	11.2
H-154	TGD (" ")	2.4
H-155	TGD (" ")	3.1
H-156	Tcc (" ")	2.9
H-157	Tcc (" ")	5.0
H-158	Tcc (" ")	4.1
H-159	Tcc (" ")	1.7

Sample No.	Rock Type	Ag (ppm)
H-160	TGD (Trs. MnOX)	3.1
H-161	TGD (" ")	3.4
H-162	TGD (" ")	8.4
H-163	Tcc (Wk MnOX)	2.4
H-164	Tcc (Wk MnOX)	2.4
H-165	Tcc (" ")	2.2
H-166	TGD (Trs MnOX)	5.7
H-167	TGD (" ")	4.6
H-168	TGD (" ")	2.4
H-169	Tcc (Wk MnOX)	4.1
H-170	Tcc (" ")	3.8
H-171	Tcc & Tdb (Wk MnOX)	3.6
H-172	Tcc (Wk MnOX)	12.2
H-173	Tcc (" ")	20.3
H-174	Tdb (Trs MnOX)	2.6
H-175	Tcc (" ")	2.2
H-176	Tdb (" ")	2.2
H-177	Tcc (Wk MnOX)	3.4
H-178	Tcc (" ")	16.3
H-179	Tcc (" ")	11.5
H-180	Tcc (" ")	1.7
H-181	Tcc (" ")	18.7
H-182	Tcc (" ")	23.2
H-183	Tcc (" ")	9.3
H-184	Tcc (" ")	1.9
H-185	Tcc (" ")	8.4
H-186	SiO_2 (No MnOX)	13.9
H-187	Tcc (Wk to Mod MnOX)	21.1
H-188	Tcc (" " ")	8.6
H-189	Tcc (" " ")	14.4
H-190	Tcc (" " ")	46.3
H-191	Tcc (" " ")	11.0
H-192	Tcc (" " ")	89.4
H-193	Tcc (" " ")	45.8
H-194	Tcc (" " ")	8.1
H-195	Tcc (" " ")	3.4
H-196	Tcc (Trs. MnOX)	1.0
H-197	Tcc (" ")	4.1
H-198	Tcc (" ")	2.2
H-199	TFG (" ")	1.4
H-200	TFG (" ")	1.0
H-201	TAP (" ")	1.0
H-202	Tcc (" ")	1.0
H-203	Tcc (" ")	-.8
H-204	Tcc (" ")	-.8
H-205	Tcc (" ")	-.8
H-206	Tcc (" ")	-.8
H-207	Tcc (" ")	-.8
H-208	Tcc (" ")	-.8
H-209	Tcc (" ")	1.2
H-210	TAP (No MnOX)	1.2
H-211	TAP (" ")	1.2
H-212	Tcc (" ")	1.4
H-213	TAP (" ") (Strong FeOX)	-.8

Sample No.	Rock Type	Ag (ppm)
H-214	TAP (Strong FeOX)	-.8
H-215	TAP (Trs. MnOX)	-.8
H-216	TAP (No MnOX)	-.8
H-217	TAP & Tcc (No MnOX)	-.8
H-218	TAP & Tcc (" ")	-.8
H-219	TAP (Trs. MnOX)	-.8
H-220	TAP (" ")	-.8
H-221	Tcc (" ")	1.4
H-222	TAP (" ")	-.8
H-223	TAP (" ")	-.8
H-224	Tcc (" ")	1.4
H-225	Tcc (" ")	-.8
H-226	TAP (No MnOX)	1.9
H-227	TAP (" ")	-.8
H-228	TAP (" ")	-.8
H-229	Tcc (" ")	-.8
H-230	TAP & Tcc (No MnOX)	1.9
H-231	TAP (No MnOX)	1.2
H-232	Tcc (Trs. MnOX)	1.2
H-233	Tcc (" ")	1.2
H-234	Tcc (" ")	1.2
H-235	Tcc (" ")	1.2
H-236	Tcc (" ")	1.2
H-237	Tcc (Wk. MnOX)	25.8
H-238	Tcc (Sil.) (Wk. MnOX)	22.5
H-239	Tcc (Wk. MnOX)	1.1
H-240	Tcc (" ")	1.1
H-241	Tcc (Mod. MnOX)	1.1
H-242	Tcc (" ")	5.6
H-243	Tcc (" ")	1.9
H-244	Tcc (" ")	12.7
H-245	TFG (" ")	1.9
H-246	TFG (Wk MnOX)	6.6
H-247	TFG (FeOX & MnOX)	5.3
H-248	TFG (" ")	1.1
H-249	TFG (" ")	1.6
H-250	SiO_2 (Strong MnOX)	31.5
H-251	SiO_2 (" ")	245.0
H-252	SiO_2 (" ")	170.0
H-253	SiO_2 (Mod. MnOX)	19.6
H-254	TFG^2 (Mod. MnOX)	63.9
H-255	TFG (Trs. MnOX)	2.9
H-256	TFG (" ")	1.6
H-257	TFG (" ")	-.8
H-258	TFG (" ")	-.8
H-259	TFG (" ")	1.9
H-260	TFG (" ")	-.8
H-261	TFG (" ")	1.6
H-262	TFG (" ")	1.6
H-263	PLs (" ")	7.7
H-264	Tcc (Mod. MnOX)	37.0
H-265	Tcc (" ")	3.7
H-266	Tcc (Strong MnOX)	3.4
H-267	Tcc (Wk MnOX)	3.4
H-268	Tcc & Tdb (Wk MnOX)	1.6

Sample No.	Rock Type	Ag (ppm)
H-269	Tcc (Trs. MnOX)	2.9
H-270	Tdb (" ")	2.4
H-271	Tcc (Strong MnOX)	96.7
H-272	Tdb (Trs. MnOX)	3.2
H-273	Tcc (Wk. MnOX)	2.7
H-274	Tcc (" ")	2.7
H-275	Tcc (" ")	2.9
H-276	Tcc (" ")	2.1
H-277	Tcc & Tdb) (Wk MnOX)	1.6
H-278	Tdb (Trs MnOX)	2.1
H-279	Tcc (Wk MnOX)	1.3
H-280	Tcc (adict) (Mod. MnOX)	1.1
H-281	Tdb (Trs MnOX)	1.1
H-282	Sil. Pls (No MnOX)	2.4
H-283	Tcc (Strong MnOX)	23.0
H-284	Tcc (Wk MnOX)	2.4
H-285	Tcc (" ")	1.6
H-286	Tcc (" ")	1.6
H-287	Tdb (Trs. MnOX)	2.7
H-288	Tcc (Wk MnOX)	2.4
H-289	TFG (" ")	1.6
H-290	TFG (" ")	-.8
H-291	TFG (" ")	-.8
H-292	PLs (Trs. MnOX)	-.8
H-293	Sil. PLs(Trs. MnOX)	5.0
H-294	Sil. PLs(Trs. MnOX)	2.7
H-295	PLs (No MnOX)	2.1
H-296	Tcc (Trs. MnOX)	1.3
H-297	TFG (" ")	1.9
H-298	TAP (" ")	2.7
H-299	TFG (" ")	2.1
H-300	Tcc (" ")	2.1
H-301	Tcc (" ")	1.6
H-302	Tcc (Trs. MnOX)	1.3
H-303	Tcc (" ")	1.3
H-304	Tcc (" ")	1.3
H-305	Tcc (" ")	1.9
H-306	Tcc (" ")	-.8
H-307	Tcc (" ")	-.8
H-308	PLs (" ")	4.8
H-309	Tcc (" ")	1.6
H-310	Tcc (" ")	1.6
H-311	Tcc (No MnOX)	1.6
H-312	Tcc (" ")	2.1
H-313	Tcc (" ")	1.9
H-314	Tcc (" ")	1.9
H-315	Tcc (" ")	-.8
H-316	Tcc (" ")	-.8
H-317	Tcc (" ")	-.8
H-318	Tcc (" ")	-.8
H-319	Tcc (" ")	-.8
H-320	Tcc (" ")	1.6
H-321	Tcc (" ")	1.6

Sample No.	Rock Type	Ag (ppm)
H-322	Tcc (Trs MnOX)	1.6
H-323	Tcc (" ")	1.6
H-324	Tcc (" ")	1.6
H-325	Tcc (" ")	1.6
H-326	TFG (Mod. MnOX)	40.2
H-327	TFG (Trs. MnOX)	2.4
H-328	SiO_2 (" ")	4.8
H-329	TFG (Mod. to Strong MnOX)	1.9
H-330	PLs (Trs. MnOX)	9.0
H-331	Tdb (" ")	2.8
H-332	Tdb (" ")	2.2
H-333	Tdb (" ")	2.8
H-334	Contact (MnOX)	35.2
H-335	" "	6.1
H-336	Tcc (Wk MnOX)	1.5
H-337	Tdb	1.8
H-338	Tdb	1.7
H-339	Tcc (MnOX)	16.9
H-340	Tcc (")	2.2
H-341	Tcc (")	3.1
H-342	Tcc (")	.8
H-343	Tcc (")	9.8
H-344	Tdb (")	2.5
H-345	Tcc (")	1.5
H-346	Tdb (")	2.1
H-347	Tcc (")	4.3
H-348	Tcc (")	4.1
H-349	Tcc (Wk MnOX)	2.3
H-350	Tcc (" ")	.8
H-351	Tcc (" ")	3.1
H-352	Tcc (" ")	5.5
H-353	Tcc (No MnOX)	2.1
H-354	Tcc (Wk MnOX)	2.8
H-355	Tcc (" ")	4.3
H-356	Tcc (FeOX No MnOX)	2.8
H-357	Tcc (" ")	2.1
H-358	Tcc (Wk MnOX)	6.4
H-359	Tcc (" ")	1.0
H-360	Special (Outside Property)	1.9

Explanation of Geologic Symbols used

Tcc- Tertiary chief conglomerate
Tdb- " diabase
TGD- " Grano-diorite
TFG- " Fine grained sediments
TAP- " Andesitic extrusives
PLs- " Paleozoic Limestone

EXPLANATION

- > 30 ppm
- 10 — 30 ppm
- 3 — 10 ppm
- < 3 ppm

86 —— sample number
1.9 —— ppm (Ag)

Distribution of Silver Values from Geochemical Sampling

HARDSHELL PROSPECT

SCALE: 1"=200'

Sept. 1969 ADV