Mining District File Summary Sheet

DISTRICT	Manhattan
DIST_NO	2690 60000507
COUNTY If different from written on document	Nye
TITLE If not obvious	Hughes Tool Co.; Metallurgy; Group26 Screen Test, Boundy – Big Pine Pit
AUTHOR	W.T. Boundy, W.J. Robinson; W. Simmons; D.K. Hamilton; F. Saunders
DATE OF DOC(S)	1976
MULTI_DIST Y (N?) Additional Dist_Nos:	
QUAD_NAME	Manhattan 7½'
P_M_C_NAME (mine, claim & company names)	Hughes Tool Co.; Big Pine Pit
COMMODITY If not obvious	gold
NOTES	Screen analysis test report and data; correspondence

Keep docs at about 250 pages if no oversized maps attached
(for every 1 oversized page (>11x17) with text reduce
the amount of pages by ~25)

Revised: 1/22/08

SS: DD 2/22/08 (Initials / Date)
DB: (Initials / Date)
SCANNED: T.M. 3/20/09 (Initials / Date)

Met.
Group 26 - Screen Tests
by: Boundy 131

HUGHES TOOL CO. 131
METALLURGY
GROUP 26, SCREEN TEST, BOUNDY

60000507

2690

SUMMARY AND CONCLUSIONS OF

SCREEN ANALYSIS TESTS

BIG PINE PIT - GROUP 26

by Wallace T. Boundy

Distribution: W. J. Robinson
W. Simmons
D. K. Hamilton
F. Saunders

SUMMARY AND CONCLUSIONS OF
SCREEN ANALYSIS TESTS
BIG PINE PIT - GROUP 26

Early time miners and operators of Manhattan gold properties utilized a screening process of coarse crushed ores very effectively to upgrade the gold ore prior to delivery to a Mill. In a report by Henry G. Ferguson (U. S. Geological Survey Bulletin #723), the indication was that the up-grading in the Big Pine Mining Area of Manhattan was 10 to 1. Ferguson also states that after coarse crushing (most of the old screen piles observed in the area are in the -3" range), 45% of the material was -5/8". This then allowed them to take approximately only 45% of the material mined to the Mill with over 80% of the gold involved.

In March, 1976, four screen analysis tests were conducted of the ore from the Big Pine Pit. The No. 2 test was accidently salted at the lab and was not utilized. The ore from these tests were derived from a point in the Big Pine Pit where at least 45 to 50 feet of overburden had already been mined. The results from these tests (copies attached) do not show more than a 2 to 1 upgrading in any one size category. This is possibly somewhat explained in Ferguson's Report, pages 139 and 140, a copy of which is attached, wherein the ore's tendency to upgrade at depth was considerably less.

Although the overall picture of the screen test showed no tendency, in any one size range, of the ore to upgrade sufficiently as to allow the rejection of some of the material prior to delivery to a leaching process,

There are two important factors that would possibly make a screening process feasible.

1. The reduction of the ore in size, by blasting or crushing, will in all probability allow enough freeing of the gold from the fractures and thereby make for a greater recovery at the heap leach.

2. In the pad preparation for the heap leach there is approximately 20,000 tons of fine material that is utilized as a protective cover for the plastic base. The material utilized in the present heap leach pads was tailing and screen piles from early gold mining operations in the Big Pine Area. These materials are now depleted and to acquire and transport similar materials from a source anywhere except in the immediate area would be a prohibitive cost and would contain little or no gold value. Our own screening process could provide this needed material and would contain 40% of the gold in the entire heap.

One interesting aspect of screen analysis No. 4 appears wherein the size range above 3" contains enough fractures to make the grade run high. This size of material is very unacceptable to cyanide leaching and should be broken down to at least the 3" or 4" range.

At this time, to follow up on the screen tests, there is great need to conduct heap leaching tests of the different size ranges at the laboratory. Approximately 4 tons of material has been screened and sized at the screening plant and is available for this purpose. The grade of this material is essentially the same as that reported in screen analysis No. 4.

Wallace T. Boundy

Attachments: Screen Analysis 1, 3 and 4
Composite 1, 3 and 4
Copies of pages 139-141 Ferguson Report (USGS Bulletin #723) N240-9B

Internal Communication

summa

Date: February 27, 1976

To: Walt Simmons

From: Wallace T. Boundy

Subject: Big Pine Pit Screen Test

On 2/26/76 a screen test of the ore in the Big Pine Pit was made, utilizing the trommel screening plant at the placer site. Prior to this test and between snow storms, approximately 3 days of preperation was required to prepare the plant for this test and included the following:

1. 1 day setting power plant in place and running trommel and conveyor's to clean out hopper of placer material.

2. 2 days welding and repairing trommel so that the different sizes could be properly collected. Also a dry run of plant was made to clear the trommel and belts of all placer material so that a salt or desalt did not occur.

On 2/26/76 Wally Boundy and Fred Saunders, with the help of Mark Eskeldson and Mr. Berger, ran the plant and collected approximately 5½ ton of material from the Big Pine Pit and the break down is as follows:

1. Bob Bottom's dump truck was taken to Round Mountain and weighed empty. This weight: 14,650 lbs.

2. Four sizes of material were collected and included: -¼", -½", -1" and +1" to 10". The -¼" through -1" was collected separately in cyanide barrels while the over-size went directly to the dump truck.

To WS from WTB
2/27/76

3. All material including 14 cyanide barrels holding the -¼" through the -1" was loaded into the dump truck and again taken to Round Mountain and weighed. This weight, including the truck, was 25,800 lbs.

4. Truck was returned to Tonopah and on 2/27/76 the barrels of material were weighed so that a breakdown of each material size could be determined. These breakdowns are as follows:

Loaded Truck:	25,800	lbs.	
Empty Truck:	14,650	lbs.	
Material & Barrels:	11,150	lbs.	
Barrels w/lids:	241	lbs.	
TOTAL WT. all material:	10,909	lbs.	
Total weight of -1" material	1,459	lbs.	13.37 % of total
" " " -½" "	1,355	lbs.	12.42 % " "
" " " -¼" "	2,252	lbs.	20.64 % " "
" " " +1-10" "	5,843	lbs.	53.56 % " "
TOTAL WEIGHT	10,909	lbs.	100.00 % " "

The head sample taken by Fred Saunders was taken from the belt prior to entering the trommel. Thirteen samples were taken and are presently being assayed.

Fred Saunders is presently doing the cone and quartering of the four sizes of material. Reports to follow as assays and screen analysis progress.

Wallace T. Boundy

Dist: WJR
FS
WTB
WTB rf ✓
Group 26

Internal Communication

summa

Date: March 11, 1976

To: Walt Simmons

From: Wallace T. Boundy WTB

Subject: Big Pine Pit Screen Test: Part 2

The following is a follow-up on the Big Pine Pit Screen Test #1 (See Part 1 dated 2/27/76).

Due to the dampness of the material it was necessary to run separate screen analysis on each of the size ranges (-1", -½", -¼"). Also the oversize material was quartered by hand sizing. The finer materials (-1", -½" and -¼") were also coned and quartered and split down for Assay purposes and the breakdown is as follows on the attached sheet.

Test results by Fred Saunders and myself.

Att.

Dist: FS
WJR ✓
Gr. 26
DKH

BIG PINE PIT SCREEN TEST

Size Range		Lbs. Material	Assay	Oz Au.	% Total Mat. This Size	Accum. Total ↓	% Material ↑	% Total Au Accumulative ↑	↓	% Au This Size
	+10"	502	.0166	.0042	4.6017	4.6017	100.	100.	2.3438	2.3438
+1"	-10"	5,341	.0180	.0483	48.9596	53.5613	95.3984	97.6362	29.2969	26.9531
-1"	+½"	983.1294	.0468	.0230	9.0121	62.5733	46.4388	70.7031	42.1317	12.8348
-½"	+¼"	973.8025	.0140	.0068	8.9268	71.5001	37.4267	57.8683	45.9263	3.7946
-¼"	+6 M	649.5016	.0480	.0156	5.9538	77.4540	28.4999	54.0737	54.6317	8.7054
-6M	+12M	474.0527	.0519	.0123	4.3455	81.7995	22.5461	45.3683	61.4955	6.8638
-12M	+20M	357.8863	.0799	.0143	3.2807	85.0801	18.2006	38.5045	69.4754	7.9799
-20M	+80M	692.466	.0887	.0307	6.3477	91.4278	14.9199	30.5246	86.6071	17.1317
	-80M	935.1434	.0513	.0240	8.5722	100.0000	8.5722	13.3929	100.	13.3929
TOTAL		10,909.	.0329	.1792						

* Original head assay from conveyor belt at plant: .0346

Calc. head: .0329

WTB & FS 3/10/76

Internal Communication

summa

Date: March 12, 1976

To: Walt Simmons

From: W. T. Boundy

Subject: Screen Analysis #3 Group 26
Big Pine Pit

Screen Analysis No. 2 (salted)

Screen Analysis No. 3

2.9 tons of material were taken in the bottom of the Big Pine Pit at a point 30 feet west of the Big Pine Shaft on 3/11/76.

All material was coned and quartered at the screen plant and hauled to town.

Size Range	Lbs. Material	Tons Material	% Total Volume	
10 +1"	3,622	1.8110	62.44	
-1" +½"	778	.3890	13.41	
-½" +¼"	486	.2430	8.38	-37.56
-¼"	915	.4575	15.77	
TOTAL	5,801	2.9005	100.00	

Assays of head sample expected to be ready on Friday, March 12. Further splitting and crushing at size range to begin 3/12/76 and will probably be assayed on Monday 3/15/76.

Dist: WJR
DKH
Gr. 26
WTB rf

Internal Communication

summa

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Dist: WJR
DKH
Gr. 26
WTB rf

BIG PINE PIT SCREEN ANALYSIS TEST #3

Size Range		Lbs. Material	Assay	Oz. Au	% Total Mat. This Size	% Au This Size	% Au Accumulative	% Total Mat. Accumulative
10"	+1"	3,622	.0267	.0484	62.44	41.54	100.00	100.00
-1"	+½"	778	.0240	.0093	13.41	7.98	58.46	37.56
-½"	+¼"	486	.0402	.0098	8.38	8.41	50.48	24.15
-¼	+6M	101	.0260	.0013	1.74	1.12	42.07	15.77
-6	+12M	175	.1533	.0134	3.02	11.50	40.95	14.03
-12	+20M	159	.0787	.0063	2.74	5.41	29.45	11.01
-20	+40M	137	.1200	.0082	2.36	7.04	24.04	8.27
-40	+80M	148	.1763	.0130	2.55	11.16	17.00	5.91
	-80M	195	.0693	.0068	3.36	5.84	5.84	3.36
		5,801	.0402	.1165	100.00	100.00		

Compiled by W. T. Boundy
F. Saunders
3/16/76

Distribution: WS
WJR
DKH
Gr. 26
WTB rf

summa

Internal Communication

Date: March 30, 1976

To: Walt Simmons

From: Wallace T. Boundy WTB

Subject: Big Pine Pit Screen Analysis #4 - Group 26

SCREEN SIZE	LBS. MAT.	TONS MAT.	ASSAY	OZ. OF Au	% MATERIAL	% Au
10" + 3"	1,072	0.5360	.1846	.0999	37.32	42.89
-3" +1"	678	0.3390	.0684	.0232	23.61	9.96
-1" + ½"	361	0.1805	.1369	.0247	12.57	10.61
-½" + ¼"	245	0.1225	.1077	.0132	8.53	5.67
-¼"	516	0.2580	.2785	.0719	17.97	30.87
	2,872	1.7140	.1359 (calc.)	.2329	100.%	100.%

SCREEN SIZE	% Au ACCUM.	% MAT. ACCUM.
-¼"	30.87	17.97
-½"	36.54	26.50
-1"	47.15	39.07
-3"	57.11	62.68
-10"	100.00	100.00

Dist: WJR
DKH
WTB rf
Gr. 26
FS

summa

Internal Communication

Date: April 1, 1976

To: Walt Simmons

From: Wallace T. Boundy WTB.

Subject: Report on Screen Analysis Tests
Big Pine Ore - Group 26

COMPOSITE SCREEN ANALYSIS TESTS 1, 3 and 4

SCREEN SIZE	LBS. MAT.	OZ. Au	OZ./TON	% Au	% MATERIAL
-¼"	4,540	.2241	.0987	41.90	23.18
+¼" - ½"	1,705	.0298	.0350	5.57	8.71
+½" - 1"	2,122	.0570	.0537	10.66	10.84
+1"	11,215	.2240	.0399	41.88	57.27
TOTALS	19,582	.5349	.0546 (calc.)	100.00	100.00

SCREEN SIZE	% Au ACCUM	% MAT. ACCUM.
-¼"	41.90	23.18
+¼ -½"	47.47	31.89
+½" -1"	58.13	42.73
+1"	100.00	100.00

Dist: WJR
DKH
FS
GR. 26
WTB rf

summa

Internal Communication

Date: February 27, 1976

To: Walt Simmons

From: Wallace T. Boundy

Subject: Big Pine Pit Screen Test

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To WS from WTB
2/27/76

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Wallace T. Boundy

Dist: WJR
FS
WTB
WTB rf ✓
Group 26

Internal Communication

summa

Date: March 11, 1976

To: Walt Simmons

From: Wallace T. Boundy WTB

Subject: Big Pine Pit Screen Test: Part 2

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Test results by Fred Saunders and myself.

Att.

Dist: FS
WJR
Gr. 16

BIG PINE PIT SCREEN TEST

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-80M	935.1434	.0513	.0240	8.5722	100.0000	8.5722	13.3929	100.	13.3929
TOTAL	10,909.	.0329	.1792						

* Original head assay from conveyor belt at plant: .0346

Calc. head: .0329

WTB & FS 3/10/76

Internal Communication

summa

Date: March 12, 1976

To: Walt Simmons

From: W. T. Boundy

Subject: Screen Analysis #3 Group 26
Big Pine Pit

Screen Analysis No. 2 (salted)

Screen Analysis No. 3

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Dist: WJR
DKH
Gr. 26
WTB rf

BIG PINE PIT SCREEN ANALYSIS TEST #3

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	-80M	195	.0693	.0068	3.36	5.84	5.84	3.36
		5,801	.0402	.1165	100.00	100.00		

Compiled by W. T. Boundy
F. Saunders
3/16/76

Distribution: WS
WJR
DKH
Gr. 26
WTB rf

material mined was coarsely crushed, and the oversize, above five-eighths of an inch, was rejected. The tenor of the ore as mined was about $5 a ton. The rejected oversize material was reported to carry less than $1, and the portion milled about $10. The average width of the ore body is between 40 and 50 feet, and the maximum about 75 feet. On the north the same zone continues in the Big Four workings and in the south on the Big Pine. There are no sharp walls, but beyond the limit of ore the tenor grades down within a short distance to $1 or less a ton.

The ore consists of little veinlets, commonly under one-eighth of an inch in width and nowhere exceeding half an inch. These consist of comby quartz, more or less iron stained and carrying small specks of oxidized pyrite and a little finely divided free gold. A few of the larger veinlets also contain quartz pseudomorphic after tabular calcite, together with a little adularia. The pyrite of the veins is oxidized even in the ore from the deepest workings, 200 feet below the collar of the shaft. In places the schist at moderate depth contains a considerable amount of pyrite in small fresh crystals, either irregularly disseminated or embedded in the schist along joint planes. This material is said to be barren. Most of the little veinlets follow either the bedding of the schist and sandstone or a prominent vertical joint system that strikes between N. 20° E. and N. 40° E.

The tendency of the veinlets to break off along the walls, which allowed concentration by screening, was most pronounced near the surface. In 1919 the deeper ore, besides showing a somewhat lower tenor, no longer exhibited this tendency so strongly; hence it was necessary to mill all the material mined.

BIG FOUR MINE (8).

The Big Four mine began production in 1909 and from 1910 to 1913 was worked on a large scale. In the later part of 1913 the declining tenor of the ore in depth caused the closing of the mill. Since that time the output has been intermittent and has come entirely from small operations by lessees. The total production is probably about the same as that of the Big Pine.

The mine has been developed by a shaft 500 feet in depth. At the time of visit water stood at the 400-foot level. The Joker tunnel, from the north side of the hill, near the gulch, joins the Big Four workings on the 200-foot level. The ore is similar to that of the Big Pine mine and consists of minute quartz veins that in a general way follow the joints, which form a well-defined system with average strike N. 35° E. and dip 80° SE. and a less distinct system with strike N. 5° E. and dip 68° W., and the bedding planes of the schist

and sandstone, which here strike N. 20°–40° W. and dip 38°–78° SW. The ore body in places seems to follow the direction of a small fault vein, which strikes about N. 30° E. and dips steeply to the northwest and which is possibly the same vein as that developed in the Jumping Jack mine. The largest stope is over 100 feet in drift length and 50 feet in maximum width.

The ore, at least as far as the 300-foot level, is completely oxidized; only rarely are small grains of pyrite observable. It is commonly iron stained. Patches of manganese oxide are present here and there, but manganese oxide is much less prominent than in the ores of the mines on the western slope of the hill, which follow definite fault fissures. The small veinlets consist largely of quartz and adularia, for the most part pseudomorphic after tabular calcite. The interstices between the intersecting plates carry adularia crystals and in places drusy quartz. Here and there are specks of limonite pseudomorphic after pyrite, most commonly resting on the quartz crystals or in microscopic specks in the pseudomorphic adularia that follows the outline of the original calcite crystals. Gold can be occasionally seen in minute specks embedded in the adularia or resting on the quartz crystals. No association of the gold with the oxidized pyrite or with the rather rare patches of manganese oxide was observed. The average tenor of the whole of the ore mined in the first part of 1913 was $8.32 to the ton, but very rich streaks of high-grade ore were encountered here and there. This rich ore does not differ in general appearance from the other small veinlets in the schist. The deepest ore stoped was on the 465-foot level.

Here and there small veins of bluish glassy quartz as much as 1½ inches in width cut the schist irregularly. These veins are barren and appear to have no effect on the distribution of the ore in the later veinlets.

Besides the principal ore body small stringers of high-grade ore of similar type have been mined by lessees at several points on the property, on both the Big Four and the Joker claims, particularly northeast of the shaft. These stringers, however, have not been developed in depth. The body of mineralized schist mined on the Big Pine apparently extends north into the Big Four ground.

The loose material on the hillside north of the shaft carried sufficient gold to mine as placer ground. The underlying older gravel was not productive.

MAYFLOWER MINE (9).

The Mayflower claim adjoins the Big Pine on the south and includes a part of the same ore body. Ore has also been mined from a shaft in the eastern part of the claim. According to Mineral Re-

rocks is evidence of the existence of small dikes. A large dike of biotite-bearing rhyolite cuts the older rocks about a mile to the east. This breccia contains material derived from the older rocks, including the dark slate of the Ordovician and the quartzite and mica schist of the Cambrian (?) Gold Hill formation. Rare pebbles that are almost completely kaolinized may represent altered granitic material. The underlying sediments are much metamorphosed, owing to the proximity of the granite.

The principal zone of mineralization appears to follow a shear zone in the breccia, which strikes about N. 60° W. and dips steeply to the southwest. In places it appears as if the contact of the breccia with the older rocks is along a parallel fault, but this impression could not be certainly verified.

The mineralized zone that follows the shear zone is irregular but averages about 25 feet in width for a length of 200 or 300 feet and has been prospected to a depth of 40 feet, though the best ore was mined close to the surface.

The pebbles of the breccia in the mineralized zone are cemented by minutely crystalline quartz much stained with iron oxide and more rarely with manganese oxide. Here and there are patches of a white powdery material, apparently halloysite. Concentrates from this material show light-colored gold in small flakes and hackly particles, together with much cerargyrite in small light-green grains—the only known occurrence of this mineral in the Manhattan district. A small amount of fluorite is also present in the concentrates. The silver is greatly in excess of the gold, the proportion in the surface ore being 10 to 1. The surface ores were spotty but extremely rich in places. Assays as high as $2,000 a ton in silver and gold were obtained.

The deeper workings, at about 40 feet below the surface, gave assays of $5 to $8 a ton, with a higher proportion of gold. Neither visible gold nor cerargyrite is present. Across the gulch a shaft has been sunk in the crumpled black calcareous slate, and a tunnel, now caved, was driven into the hillside near by. It is not known whether any ore was obtained in these workings.

MARIS MINE (6).

The Maris "pebble mine" furnishes tube-mill pebbles for the mills of Manhattan, Tonopah, and Goldfield. The mine is outside the area included in the geologic map, about 8 miles northeast of Manhattan, on the road to Belmont, on the east front of the Toquima Range. The Bald Mountain lake beds here reach the level of the valley and in the neighborhood of the mine are cut by irregular dikes and masses of the Maris rhyolite. Apparently the action of

siliceous waters, either connected with the rhyolite intrusion or possibly due to a hot spring at the time the lake beds were forming, has silicified a portion of the fine-grained shaly tuff. The bed mined is about 30 feet thick, and its outcrop can be traced for about 300 feet. The strike is here N. 10° E. and the dip 30° E. Below is clayey rhyolite tuff with small rhyolite fragments, and directly above on the crest of the hill is a few feet of banded onyx, in places showing attractive coloring. In the vicinity at a lower horizon is fine-grained tuffaceous shale carrying imperfect plant remains. The productive bed consists of slightly brecciated tuff with a cement of chalcedony. Under the microscope small angular fragments of tuff can be seen crowded without orientation in the chalcedonic matrix. It is this brecciated structure that gives the material its requisite toughness, as there are no easily developed planes of weakness such as would occur in silicified material that preserves its bedding. Near the top there is in places a little calcite, and such material is rejected. The uppermost material is also less brecciated and consequently less desirable. The banded onyx at the top is too brittle to be of value. Here and there in the vicinity there are small veinlets with comby quartz and quartz after tabular calcite. It could not be determined whether or not these veinlets were contemporaneous with the silicified tuff. According to Mr. Maris, the tuff as mined carries a small quantity of gold, not over $2 to the ton.

The material after quarrying is sorted and broken roughly to size by hand and then milled in 1½-ton lots for half to three-quarters of an hour in a tube mill. The rounded pebbles, which are of about the average size and shape of the Danish tube-mill pebbles, are then sacked for shipment. Owing to the isolated situation of the deposit and the high railroad freights it has not been possible to meet the competition of Danish pebbles over a wide area, but the tube-mill pebbles as furnished by this mine largely supply the demand in the neighboring mining camps.

SHALLOW VEIN DEPOSITS IN THE OLDER ROCKS.

BIG PINE MINE (7).

The Big Pine mine is one of the largest mines in the Gold Hill section of the district. Its production began in 1914 and was continued on a large scale to 1917 and intermittently since then. The total production is probably about $300,000, including the output from ore from leases on neighboring claims. The ore is mined principally from two large glory holes and has been developed to a depth of 200 feet. In 1915, when the mine was being operated on a large scale, the daily production was about 450 tons, of which 200 tons was milled. The cost per ton mined was about 46 cents. The