A GEOLOGICAL REPORT ON THE UNITED MINING AND MILLING CORPORATION OPERATIONS, SOCORRO, NEW MEXICO

INTRODUCTION

The United Mining and Milling Corporation of New Mexico has been operating and developing several manganese properties southwest of Socorro, New Mexico for several years. One of these, the Black-Hill-Red Hill area, has been producing manganese since the beginning of the operation. The other area, the Big Basin group of claims, is in the late stages of development.

The ore mineral, psilomelane, occurs as a cavity filling, both as fissure and breccia fillings, in rhyolite flows and rhyolitic conglomerates which are assigned to the Datil formation of Tertiary age. Numerous more or less north-south trending high angle gravity faults transect the properties, offsetting and shattering the country rock. The brecciated fault zones resulting from this faulting have been the principal channelways through which the mineralizing solutions migrated. The best mineralization has taken place at or near the junctures of several faults. In the breccia zones the ore mineral has been emplaced in the interstices between the broken and angular pieces of the country rock. Rather large pieces of pure psilomelane are found in this type ofoccurrence. Adjacent to the majority of the faults are areas where numerous fissures have been developed in the country rock due to the shattering effect of the faulting. The hanging wall sides of the faults are usually more highly fissured and mineralized than the footwall sides.

Unsigned ca July 1947

The gangue minerals, associated to varying degrees with the psilomelane, are manganiferous (black) calcite, white calcite, and quartz, variety chalcedony.

The psilomelane is considered to have been deposited from downward-percolating ground waters which migrated through the fault and fissure zones at or near the present topographic surfaces. It is thought that this geochem cal process is actually going on at the present time. No replacementof the country rock has taken place and, thus, all of the ore bodies are restricted to the fault and fissure zones. Due to the fact that the ore mineral has been precipitated from ground waters, the mineralization will probably die out at depth. However, this opinion should not lower the value of, or the interest in, these deposits, for large tonnages of ore will be present from 100 to 150 feet below the surface of the ground, the probable depth of strong mineralization.

RED HILL-BLACK HILL AREA

This area consists of the Red Hill and Red Hill Extension patented lode claims. The latter group of claims is commonly referred to as the Black Hill area. Approximately 75,000 tons of ore, from which about 5,000 tons of washed ore has been recovered, has been mined in this area since the beginning of the operation. A topographic map of this area, which also shows the pits opened to date, is included with this report (fig. 1).

In the writer's opinion there are three very favorable ore bodies located in this area. They are: the Black Hill zone; the Northeast Black Hill zone; and the Northeast Red Hill zone. Another, the East Red Hill Pit, is still a possibility but no inferences concerning this pit will be made in this report.

The Black Hill zone has been mined on five 12-foot levels and approximately 35,000 tons of high-grade ore have been removed from this zone. The ore is still continuing in the bottom of the pit. Due to the high topographic level at which this ore body is exposed it is inferred that the mineralization will continue downward for at least 75 feet.

The best and largest ore body in this area is included in the Northeast Black Hill zone. It is delimited on the Northeast by the Miera fault, which is expressed physiographically by Iwo Jima Arroyo. Intersecting the Miera fault ore are several smaller, more or less northeast-southwest-trending fault zones, one of which passes through the Black Hill Pit. The reason for the strong mineralization in this large ore body is the high porosity and permeability caused by the junction of the

several faults. During the month of May, 1947 the ratio of ore milled to washed ore extracted from this zone was about 10 to 1.

The Northeast Red Hill zone is also favored as a potential producing area. This zone has been trenched with very good results. The largest pieces of psilomelane observed in this mining area were removed from these trenches.

The extent of the various mineralized zones of the Red Hill-Black Hill area is shown on the accompanying topographic map (fig. 1). Cross sections of two of the major zones have been prepared and have been used in calculating the volume of the ore bodies (fig. 2). Fifteen cubic feet of the rhyolitic country rock were considered to weigh one (1) long ton. The following table summarizes the indicated and inferred tonnages:

	Long tons ore
Black Hill zone	22,500
Northeast Black Hill zone	700,000
Northeast Red Hill zone	136,000
Total - - -	858,500

The above tonnages and the high quality of the ore from this area, especially from the Northeast Black Hill zone, is sufficient to operate successfully for a considerable period of time.

BIG BASIN CLAIMS

The Big Basin property consists of ten (10) unpatented lode claims. This area is in late stages of development. A road has been completed into the claims, considerable drilling has been done, and two faces have been opened. Some ore from this area has actually been milled and has produced concentrates. The float evidence, which has been abundant and has been useful in delimiting the ore zones, has been checked in numerous places by drilling. The two faces that have been opened up have also confirmed the exploratory work.

The ore occurs in several more or less north-south-trending fault and fissure zones. The most extensive of these are; The Switchback Zone; the Pinnacle Zone; the Quarter Corner Zone; and the No. 1 West Zone. There are several other promising zones included within the area of the claims but they have not been investigated or drilled as thoroughly as the above zones. The operators are conscious of the presence of these unexplored zones, however.

Three of the principal ore zones, the Pinnacle, the Quarter Corner, and the No. 1 West, are all traversed by Arroyo Alto which has eroded away some of the ore bodies (see fig. 3). It has been proven by drilling, that the ore mineralization extends below the level of this arroyo on the Pinnacle, Quarter Corner, and No. 1 West Zones. Therefore, in estimating ore reserves, a depth of mineralization of 50 feet below the level of Arroyo Alto has been used. Actually, these zones are probably mineralized at depths below 50 feet as is suggested by the strong mineralization in the Switchback Zone, which lies more than 50 feet below the elevation of the point where Arroyo Alto crosses the Pinnacle Zone.

The extent of the four major mineralized zones is shown on the map of a portion of the Big Basin claims (fig. 3). Cross sections of the four major zones have been prepared and have been used in calculating the volume of the ore bodies (fig. 4). Fifteen cubic feet of the rhyolitic country rock were considered to weigh one (1) long ton. In calculating the tonnages of the individual ore zones, each zone was subdivided into several trapezoidal-shaped blocks (see fig. 4). The following table summarizes the indicated and inferred tonnages of ore in these four zones;

	Long tons ore
Switchback Zone	260,000
Pinnacle Zone	439,000
Quarter Corner Zone	891,000
No. 1 West Zone	524,000
Total - - -	2,114,000

There are at least 6,000 linear feet of surface exposures of mineralized fault zones, most of which appear to be mineable. It is not difficult, therefore, to arrive at a substantial estimate of tonnage withoutprojecting the ore bodies more than a few feet beneahh the present surface. Another feature, favorable to this area, is that many of the fault zones have suffered a post-ore recurrence of movement which has "softened" the ore zones. This softening is conducive to greater ease of mining and easier separation of the ore mineral from the gangue.

MINING AND MILLING METHODS AND APPARENT COSTS

Black Hill is within 1.8 miles and the Big Basin Claims are approximately 3 miles of the concentrator. All of the ore is mined by open pit methods employing power shovels and trucks. All openings are above the water table and due to climatic conditions are workable during all seasons of the year. The grade has been held to 6% on all roads.

The concentrating process is based upon the high hardness (6) and specific gravity (5) of the psilomelane as compared to the relatively low specific gravity of the country rock. About 50% of the material originally mined is discarded as barren waste by screening the mine ore over a grizzly. The mill circuit is the usual system where the Hancock type of jig is employed. The first three of the five cells produces concentrate, the fourth and fifth products are recirculated. The tailings from the Hancock jig are dewatered and screened in order to produce the product, classified as chips, salable for highway paving. The minus 10-mesh tailing runs to waste. The concentrate is dewatered and discharged into a 100 ton concentrate bin. An ample supply of water for the operation is supplied by a 520 foot well cased with standard 12-inch pipe.

The concentrator has a capacity of about 50 tons an hour of minus ½ inch material. The average ratio of concentration of the material which is crushed and washed is about 7 to 1. The output of the mill is about 7 tons an hour of washed metallurgical grade manganese ore. Since the beginning of the operation about 5,000 tons of washed ore have been recovered from about 75,000 tons of ore. An average analysis of the metallurgical grade manganese ore produced to date is as follows:

Manganese, 44%; Silica plus alumina, 10%; Phosphorus, 0.03%; Sulphur, nil; Iron, 2%; Zinc plus lead plus copper, less than 0.5%.

The following tables summarize the estimated mining and milling costs:

Estimated Mining Cost Detail

Drilling, including labor, power and supplies	8¢ per long ton mined
Blasting, including labor and explosives	15¢ per long ton mined
Loading, including labor and supplies	10¢ per long ton mined
Hauling ore about 2,000 feet and incidental waste to dump	15¢ per long ton mined
Roads and other development	8¢ per long ton mined
Supervision of mining, geology, and engineering	4¢ per long ton mined
Total direct mining costs---	60¢ per long ton mined

Estimated Milling Costs

Screening, sorting, and stacking of rejected waste	20¢ per long ton mined
Hauling about 50% of original material mined an average distance of 3 miles to mill	15¢ per long ton mined
Crushing	15¢ per long ton mined
Washing	15¢ per long ton mined
Supervision, etc.	5¢ per long ton mined
Total direct milling cost---	70¢ per long ton mined

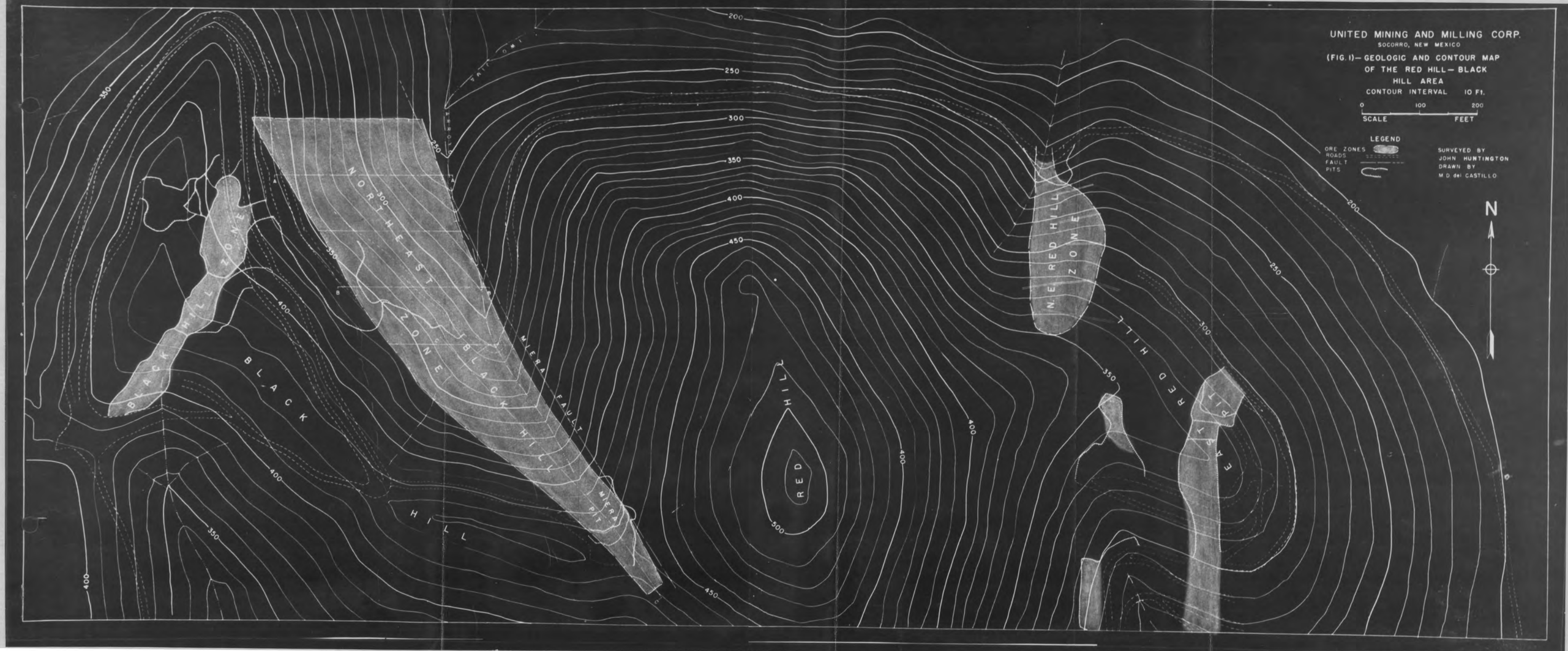
C O N C L U S I O N S

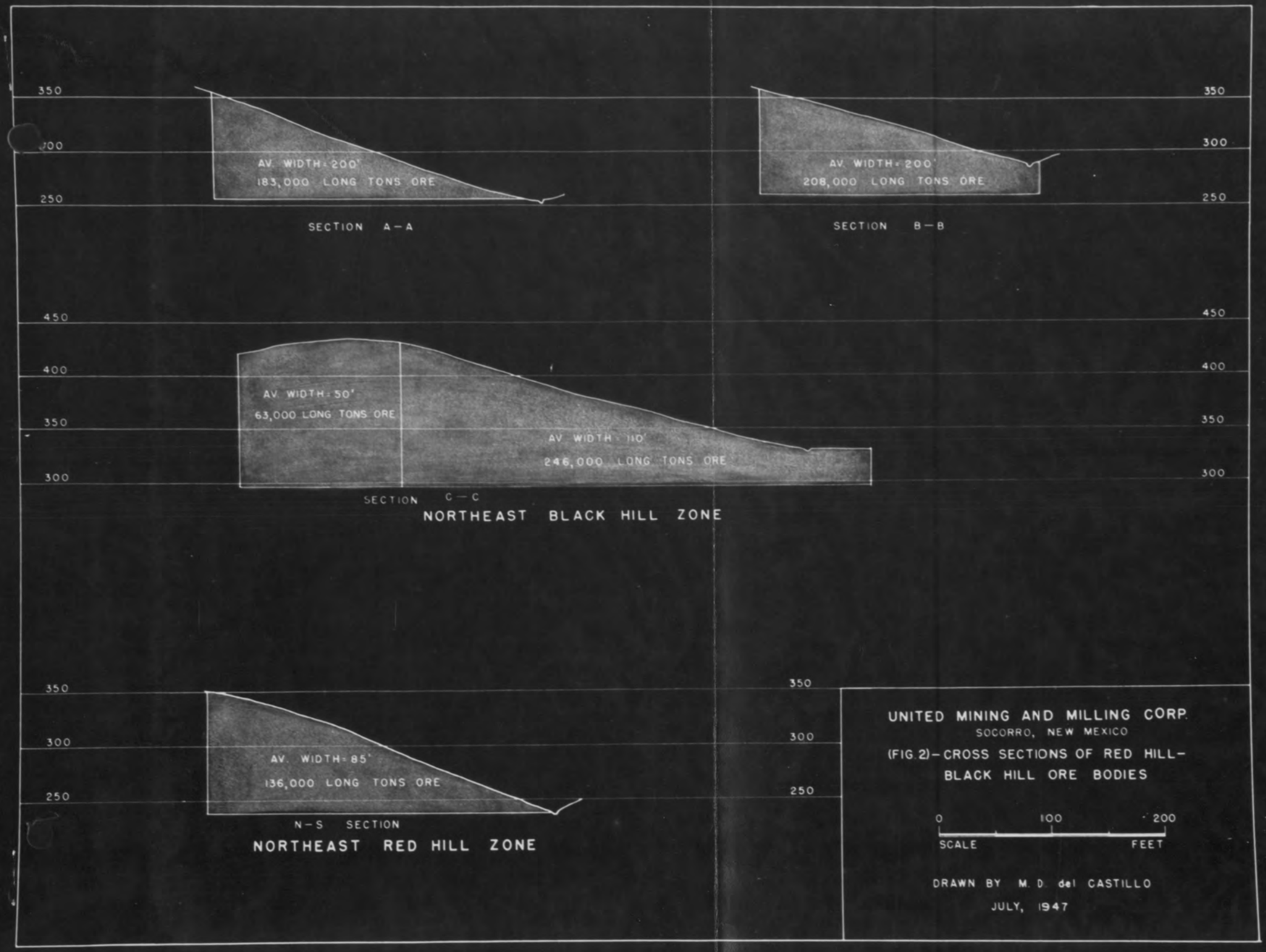
From geological evidence and drilling it is believed that almost 3,000,000 tons of indicated and inferred ore is present in the mapped ore zones of the Red Hill-Black Hill and Big Basin areas. This tonnage is sufficient to warrant a successful and economical long-time operation.

The past history of the concentrator should be considered to be that of a pilot plant. The early months of operation resulted in an effective concentrating ratio of 30 tons mined for each ton of finished product. This same ore is now treated in the same plant with certain modifications and the concentrating ratio is better than 10 to 1. The economics of the operation are summarized as follows:

Total direct costs	0.60¢	mining per long ton mined
	0.70¢	milling per long ton milled
	$1.30	
Against which can be credited	0.35	sale of waste product chips to New Mexico State Highway Department and private contractors
Actual costs - - - - - -	0.95	per long ton mined

Using the ratio of 15 tons of ore mined to 1 ton of metallurgical grade manganese ore produced and considering that it costs about $14.25 to produce one ton of metallurgical grade manganese ore (0.95¢ x 15) it is possible to see that this enterprise could be operated successfully if a sufficient volume of mining was done. The market price for the finished product, according to the terms of the government contract, is approximately $40.00 per long ton of washed ore.


UNITED MINING AND MILLING CORP.
SOCORRO, NEW MEXICO
(FIG. 1)– GEOLOGIC AND CONTOUR MAP OF THE RED HILL– BLACK HILL AREA
CONTOUR INTERVAL 10 Ft.
0 100 200
SCALE FEET
LEGEND
ORE ZONES
ROADS
FAULT
PITS
SURVEYED BY JOHN HUNTINGTON
DRAWN BY M.D. del CASTILLO
N
BLACK HILL ZONE
NORTHEAST BLACK HILL ZONE
MIERA FAULT
MIERA PIT
BLACK HILL
RED HILL
N.E. RED HILL ZONE
EAST RED HILL PIT
200
250
300
350
400
450


350
300
250
AV. WIDTH = 200'
183,000 LONG TONS ORE
SECTION A—A
AV. WIDTH = 200'
208,000 LONG TONS ORE
SECTION B—B
450
400
350
300
AV. WIDTH = 50'
63,000 LONG TONS ORE
AV. WIDTH = 110'
246,000 LONG TONS ORE
SECTION C—C
NORTHEAST BLACK HILL ZONE
AV. WIDTH = 85'
136,000 LONG TONS ORE
N—S SECTION
NORTHEAST RED HILL ZONE
UNITED MINING AND MILLING CORP.
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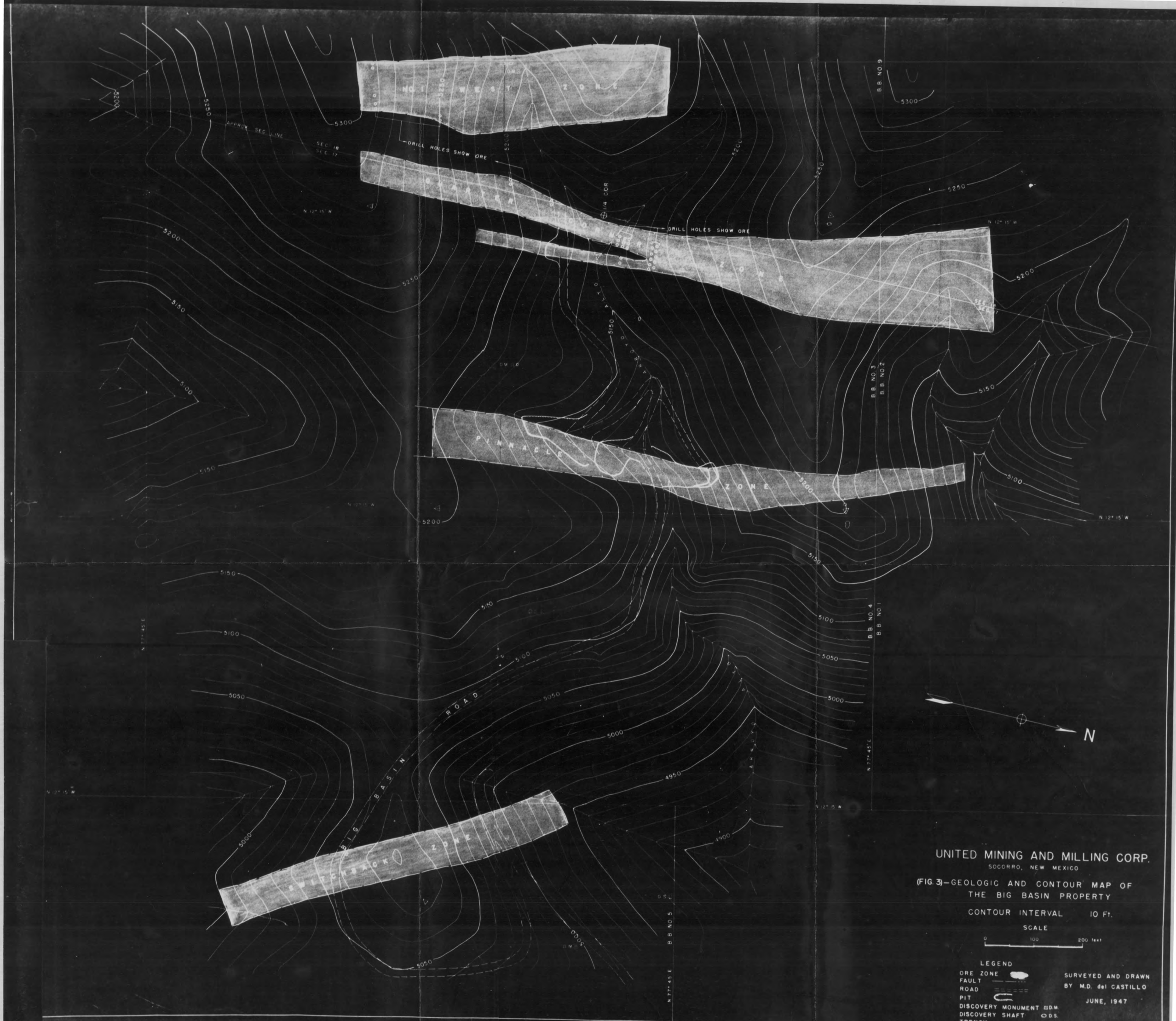
(FIG. 2) — CROSS SECTIONS OF RED HILL — BLACK HILL ORE BODIES
0
100
200
SCALE
FEET
DRAWN BY M. D. del CASTILLO
JULY, 1947



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(FIG. 3)—GEOLOGIC AND CONTOUR MAP OF THE BIG BASIN PROPERTY

CONTOUR INTERVAL 10 Ft.

SCALE

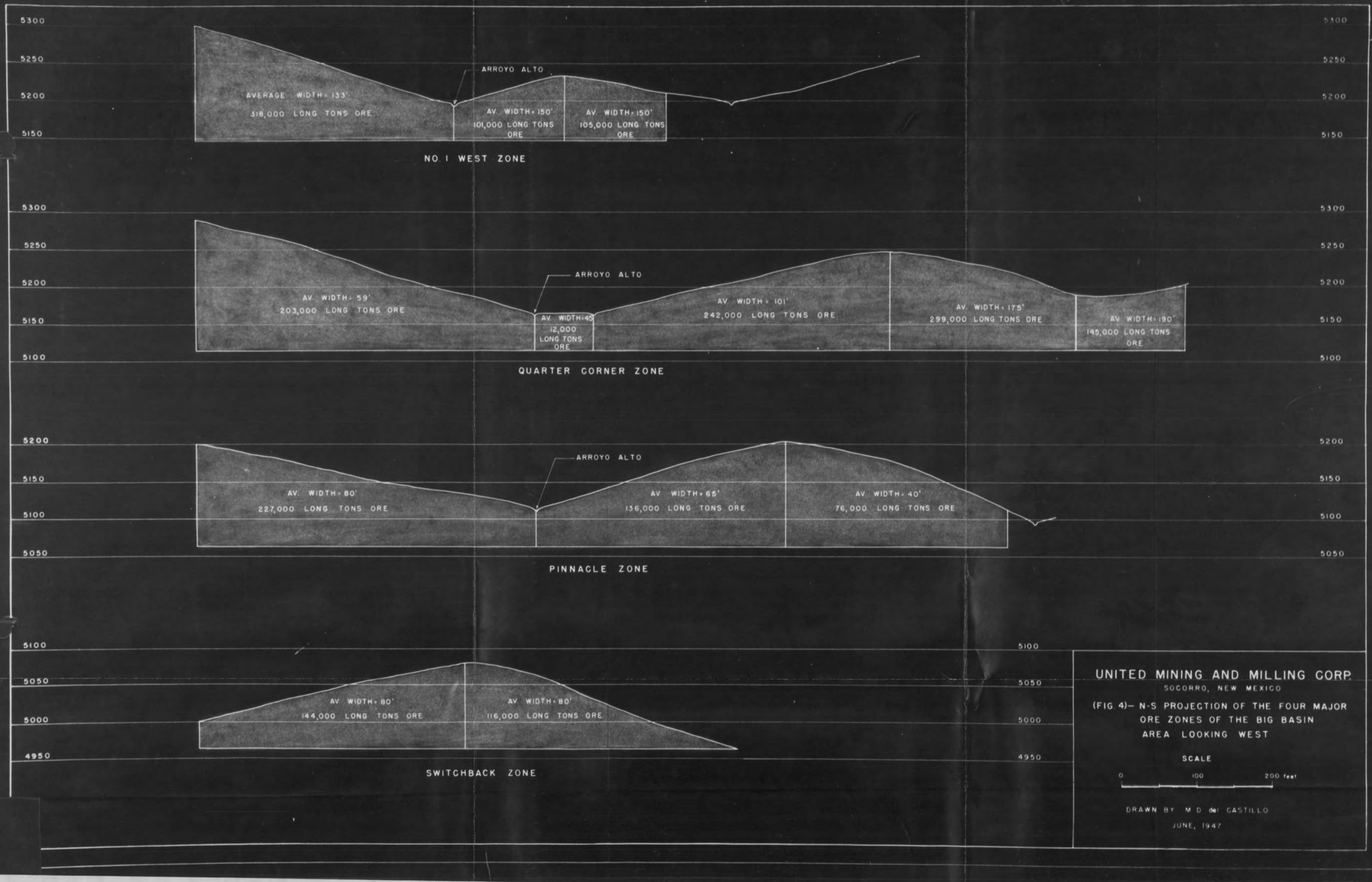
0 100 200 feet

LEGEND

ORE ZONE
FAULT
ROAD
PIT
DISCOVERY MONUMENT ⊞ D.M.
DISCOVERY SHAFT ⊙ D.S.
TRENCH

SURVEYED AND DRAWN BY M.D. del CASTILLO

JUNE, 1947



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SOCORRO, NEW MEXICO

(FIG. 4)– N-S PROJECTION OF THE FOUR MAJOR ORE ZONES OF THE BIG BASIN AREA LOOKING WEST

SCALE
0 100 200 feet

DRAWN BY M D del CASTILLO
JUNE, 1947