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PRINTED: 03/05/2003

ARIZONA DEPARTMENT OF MINES AND MINERAL RESOURCES AZMILS DATA

PRIMARY NAME: HOUCK SILICA SAND

ALTERNATE NAMES:
ARIZONA SILICA SAND

APACHE COUNTY MILS NUMBER: 304

LOCATION: TOWNSHIP 22 N RANGE 29 E SECTION 29 QUARTER C
LATITUDE: N 35DEG 16MIN 30SEC LONGITUDE: W 109DEG 17MIN 10SEC
TOPO MAP NAME: BURNTWATER WASH - 7.5 MIN

CURRENT STATUS: PRODUCER

COMMODITY:
SILICON SAND HYDROFR
SAND & GRAVEL SAND HYDROFR

BIBLIOGRAPHY:
ADMMR HOUCK SILICA SAND FILE

PRINTED: 09/21/2001

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BIBLIOGRAPHY:
ADMMR HOUCK SILICA SAND FILE

08/14/86

ARIZONA DEPARTMENT OF MINES AND MINERAL RESOURCES FILE DATA

PRIMARY NAME: HOUCK SILICA SAND PLANT

ALTERNATE NAMES:

APACHE COUNTY MILS NUMBER: 303

LOCATION: TOWNSHIP 22 N RANGE 29 E SECTION 25 QUARTER C
LATITUDE: N 35DEG 16MIN 30SEC LONGITUDE: W 109DEG 17MIN 10SEC
TOPO MAP NAME: HOUCK - 7.5 MIN

CURRENT STATUS: PRODUCER

COMMODITY:
SILICON SAND HYDROFR

BIBLIOGRAPHY:
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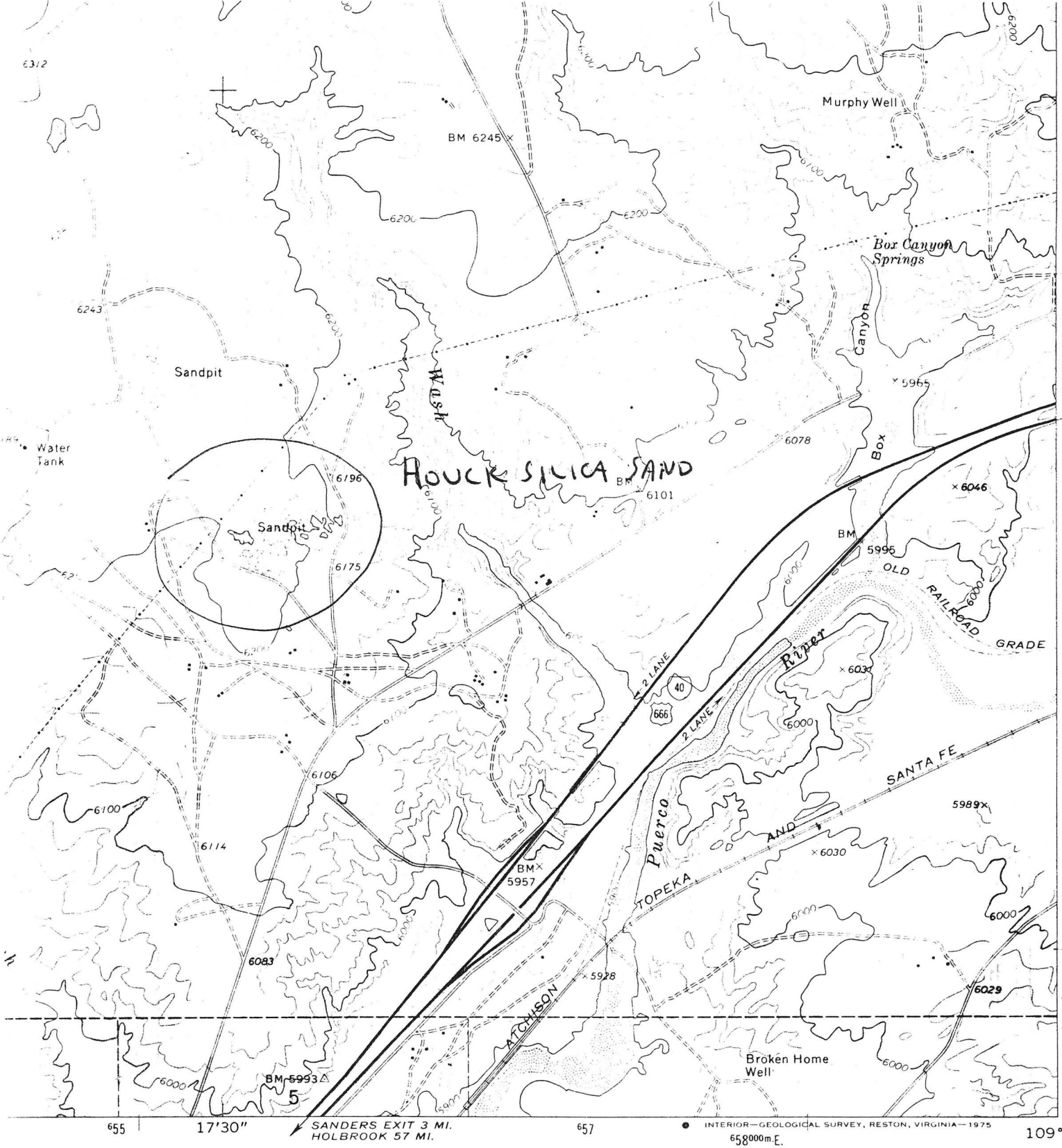


T22N R29E Sec 29

1 MILE
7000 FEET
KILOMETRE

ARIZONA
QUADRANGLE LOCATION

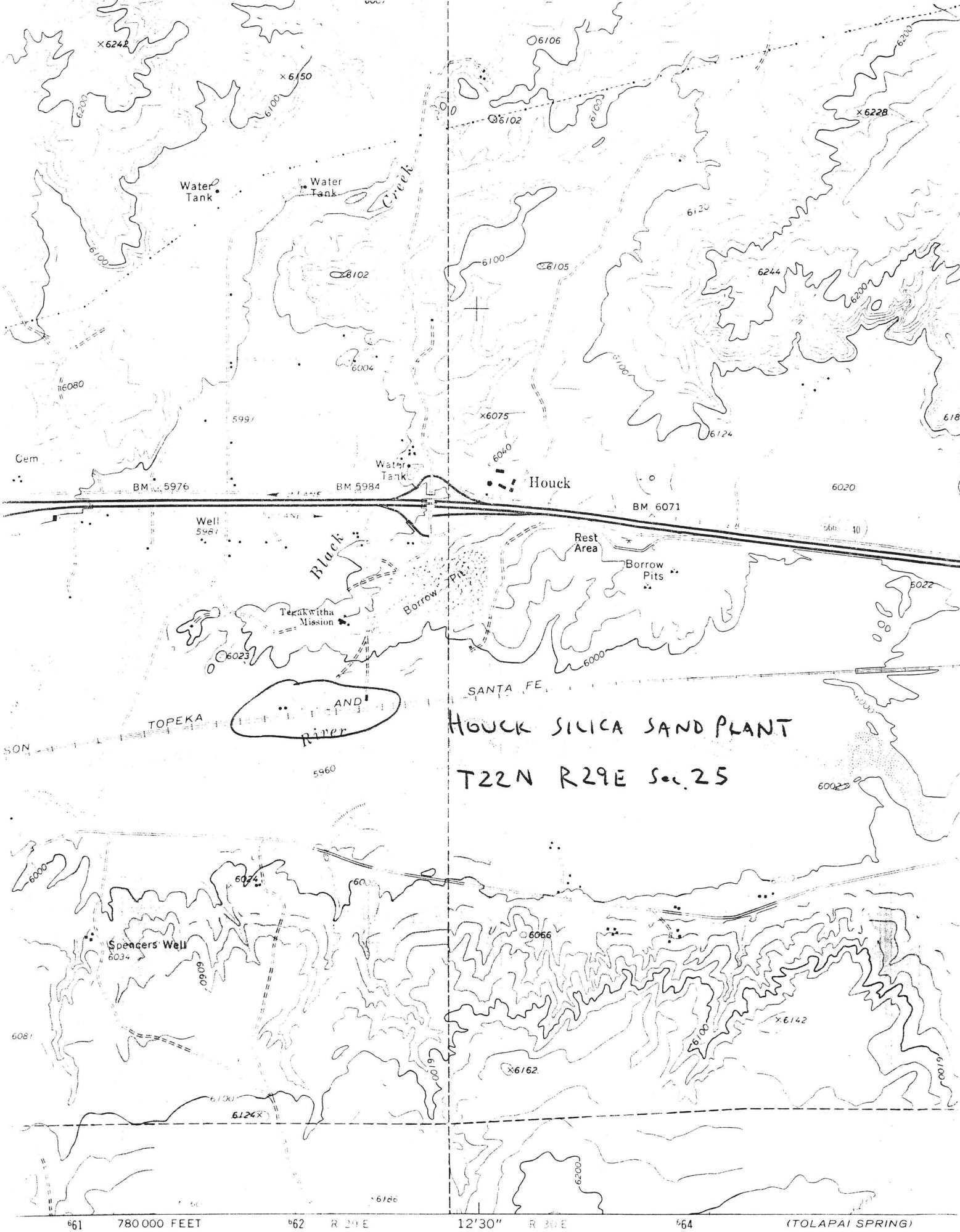
ROAD CLASSIFICATION

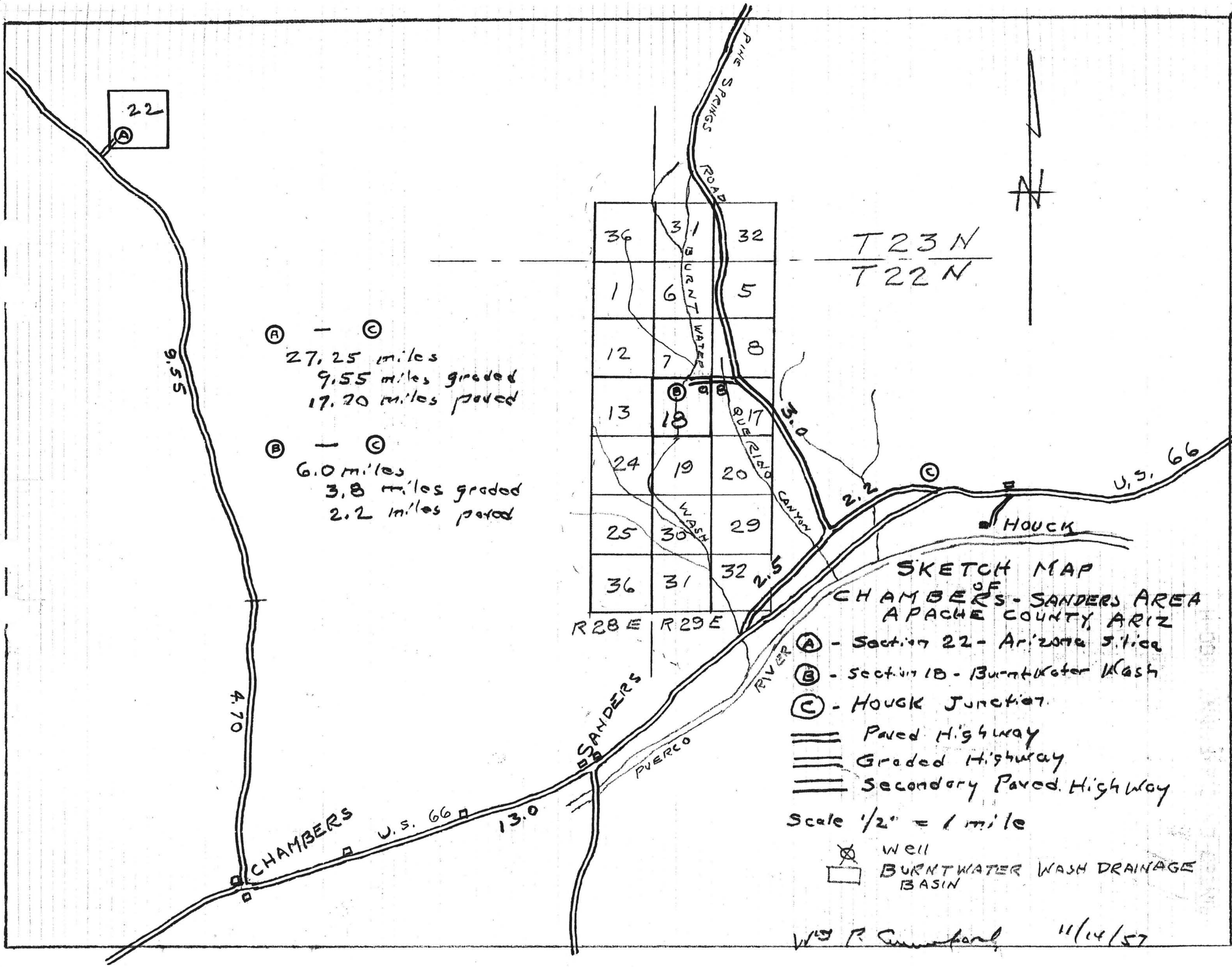
Primary highway, hard surface
Secondary highway, hard surface
Light-duty road, hard or improved surface
Unimproved road
Interstate Route
U. S. Route
State Route

BURNTWATER WASH, ARIZ.
N3515—W10915/7.5

1971

ARDS
STON, VIRGINIA 22092
ON REQUEST


Water Tank
Water Tank
Creek
Houck
BM 5976
BM 5984
BM 6071
Well
Rest Area
Borrow Pits
Black
Borrow Pit
Tegakwitha Mission
Cem
SANTA FE
TOPEKA
AND
River
Spencers Well
HOUCK SILICA SAND PLANT
T22N R29E Sec. 25
780 000 FEET
12'30"
R 29 E
R 30 E
(TOLAPAI SPRING)
4154 II NW
SCALE 1:24 000
HOUCK 7.5


22
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CHAMBERS
U.S. 66
13.0
SANDERS
PUERCO
RIVER
PINE SPRINGS
ROAD
BURNT WATER
WASH
QUE RIDO
CANYON
3.0
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U.S. 66
HOUCK
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T22N
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R28E
R29E
Ⓐ — Ⓒ
27.25 miles
9.55 miles graded
17.20 miles paved
Ⓑ — Ⓒ
6.0 miles
3.8 miles graded
2.2 miles paved
SKETCH MAP
CHAMBERS - SANDERS AREA
APACHE COUNTY, ARIZ
Ⓐ - Section 22 - Arizona 3.1 ca
Ⓑ - Section 18 - Burntwater Wash
Ⓒ - HOUCK Junction
Paved Highway
Graded Highway
Secondary Paved Highway
Scale 1/2" = 1 mile
Well
BURNTWATER WASH DRAINAGE BASIN
W.J. R. Summerford
11/14/57

SKETCH MAP OF BALCOMB SAND DEPOSIT AND ADJACENT SECTIONS.

▭ - AREA DRILLED and SAMPLED

▭ - SECTION 18 - BALCOMB DEPOSIT

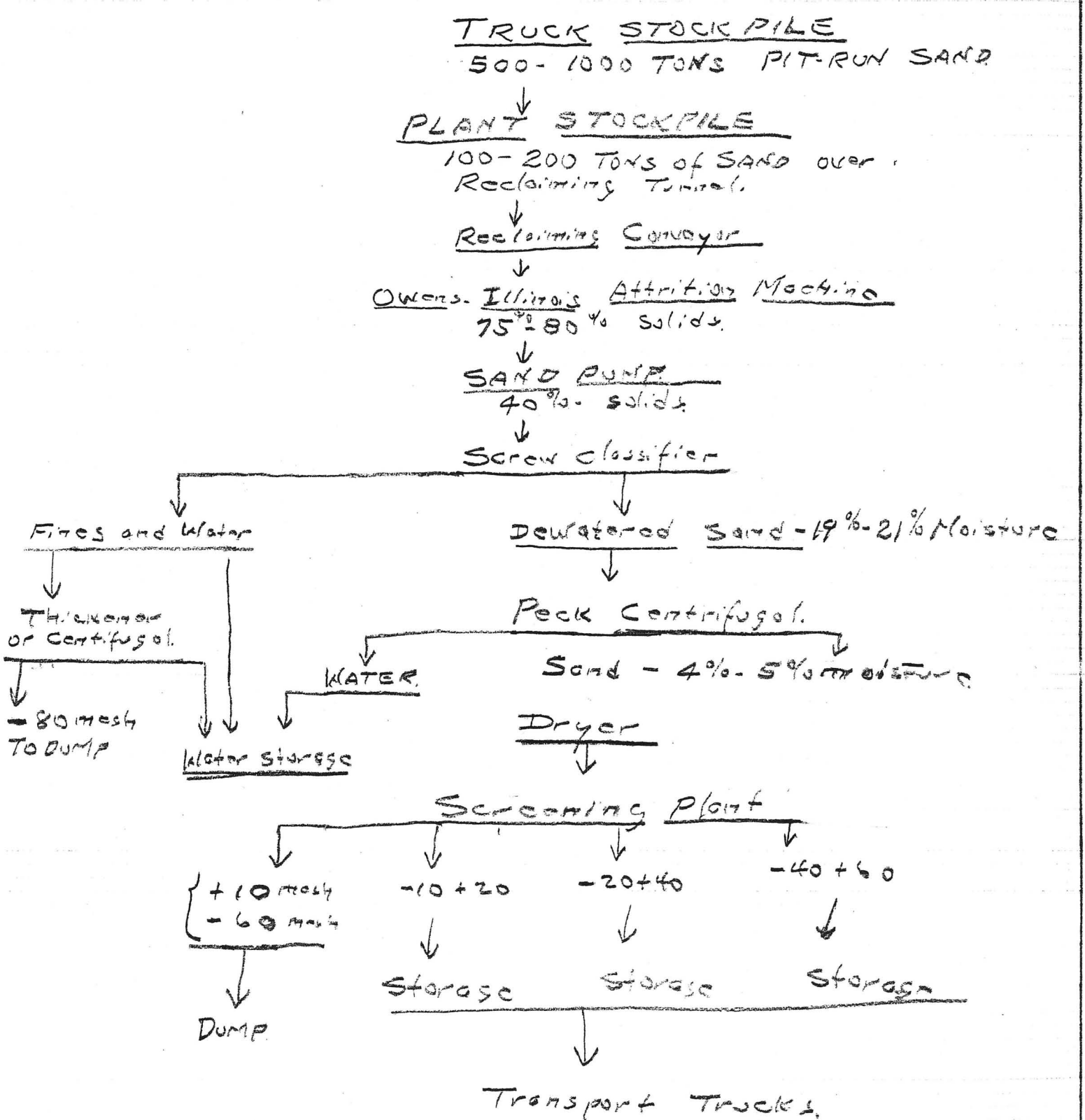
▭ - SECTION 7 - PERMITTED TO LOTHMANN

⊓ - DRILLING PERMIT REQUEST

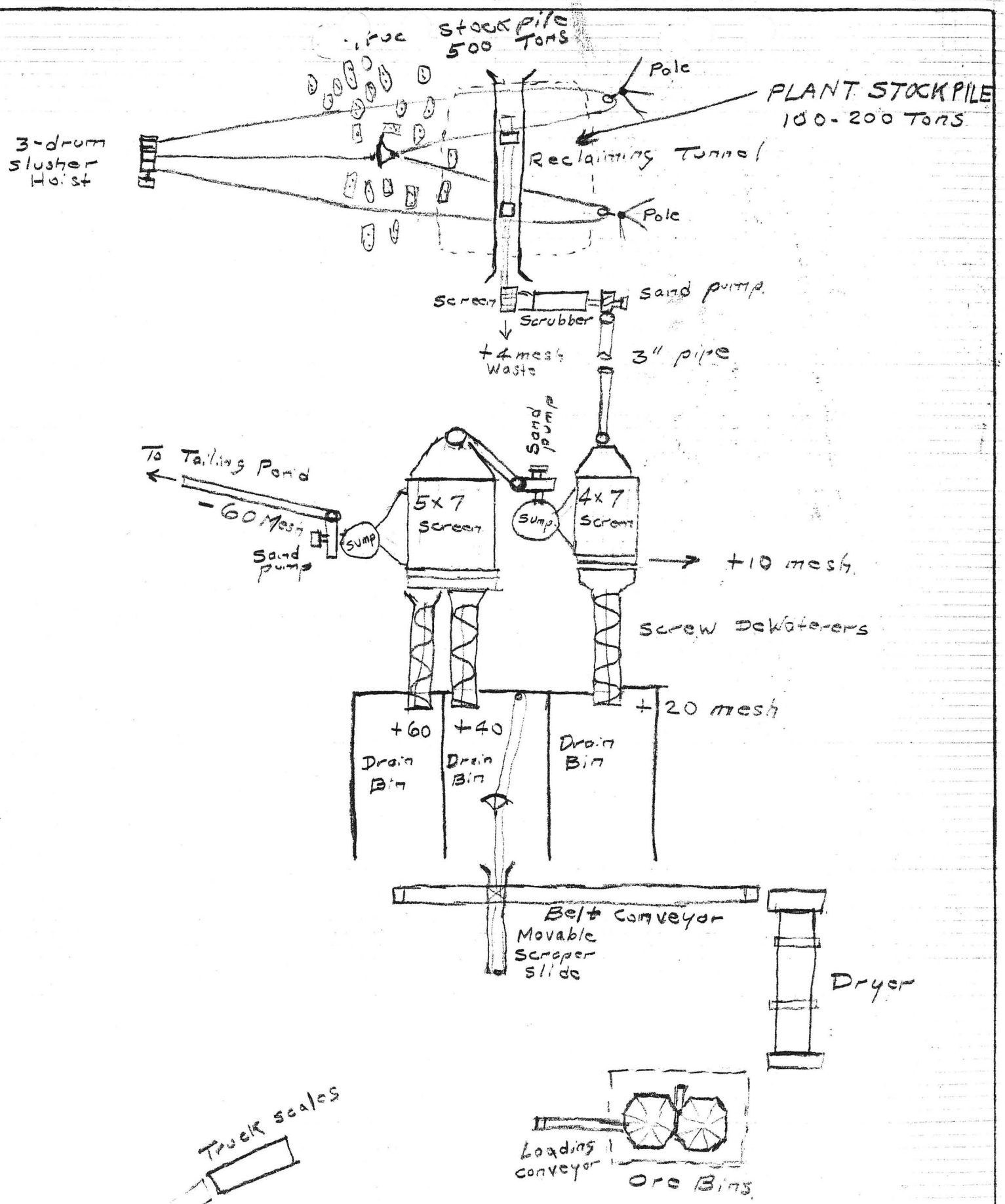
W.P.C. 9/10/57

BURNT[illegible] T R SAND [illegible] PLANT

PROPOSED FLOW SHEET FOR WASHING AND DRY SCREENING WITH MAXIMUM WATER RECOVERY.



W[illegible] P Crawford 3/1/58 AM



GENERALIZED FLOW SHEET

TO ACCOMPANY MEMO OF FEBRUARY 6, 1958

WASHING and WET SCREENING.

Wm R Crawford 2/3/58 A

BURNTWATER SAND DEPOSIT.

FLOW SHEET CONTAINING PROCESS MODIFICATIONS, WASHING AND WET SCREENING

Truck Stockpile
500 - 1000 Tons pit-run Sand

↓

Plant Stockpile
100 - 200 Tons of Sand piled by slusher over reclaiming tunnel.

↓

Reclaiming Conveyor

↓

Shaker screen

↓ -4 mesh | ↓ +4 mesh to waste

Scrubber
High pressure Water and Sand

↓

Sand pump
Sand at 30 - 40 % solids

↓

4 × 7 Double deck screen.

-20 mesh | +20 mesh - (to Screw dewaterers) | +10 Mesh - stockpile

-20 mesh ↓

Sand pump

↓

5 × 7 Double Deck screen

-60 | +60 | +40

-60 ↓ Tailing Cone and pond

+60, +40 and +20 mesh ↓

Screw dewaterers and drain bins
Peck centrifugal.

→ Drain Water to Sump.

↓

Reclaimer
Slusher slide and Conveyor belt

↓

Dryer

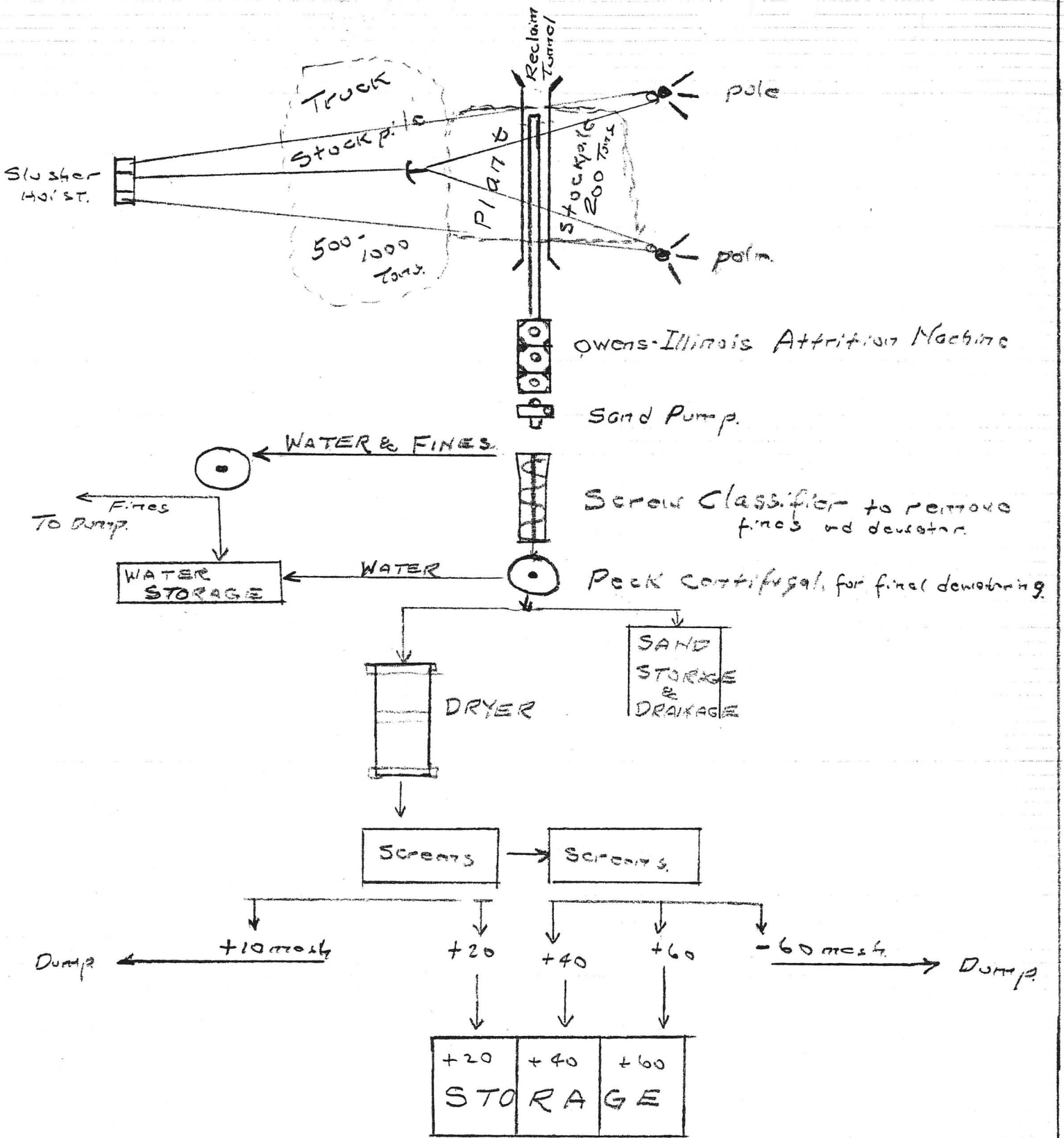
↓

Ore Bins

↓

Transport Trucks

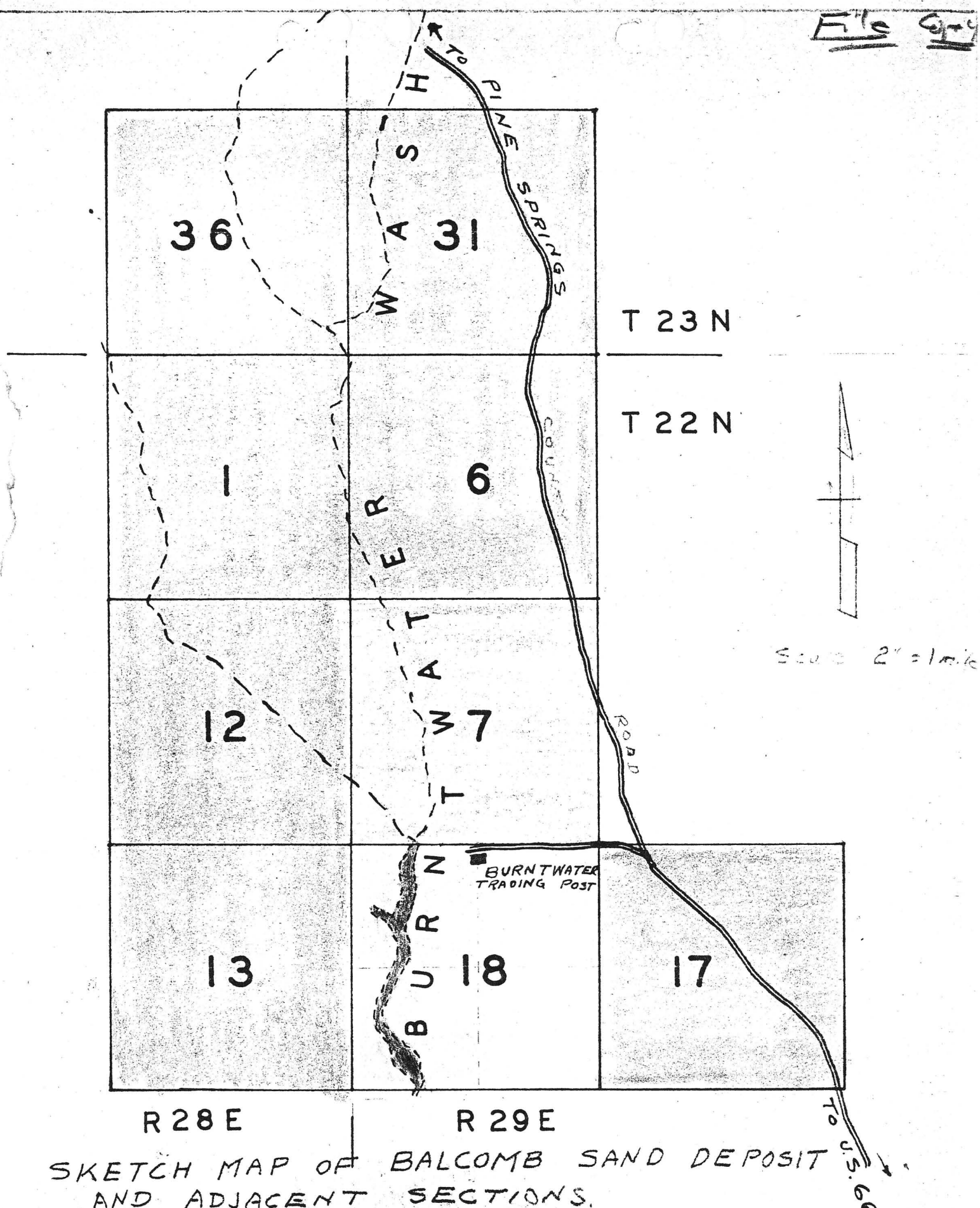
W.P. 2/3/58 A5



BURNTWATER SAND DEPOSIT
PROPOSED FLOW SHEET FOR WASHING AND DRY SCREENING WITH MAXIMUM WATER RECOVERY.

W. P. Crawford 3/1/58 A4

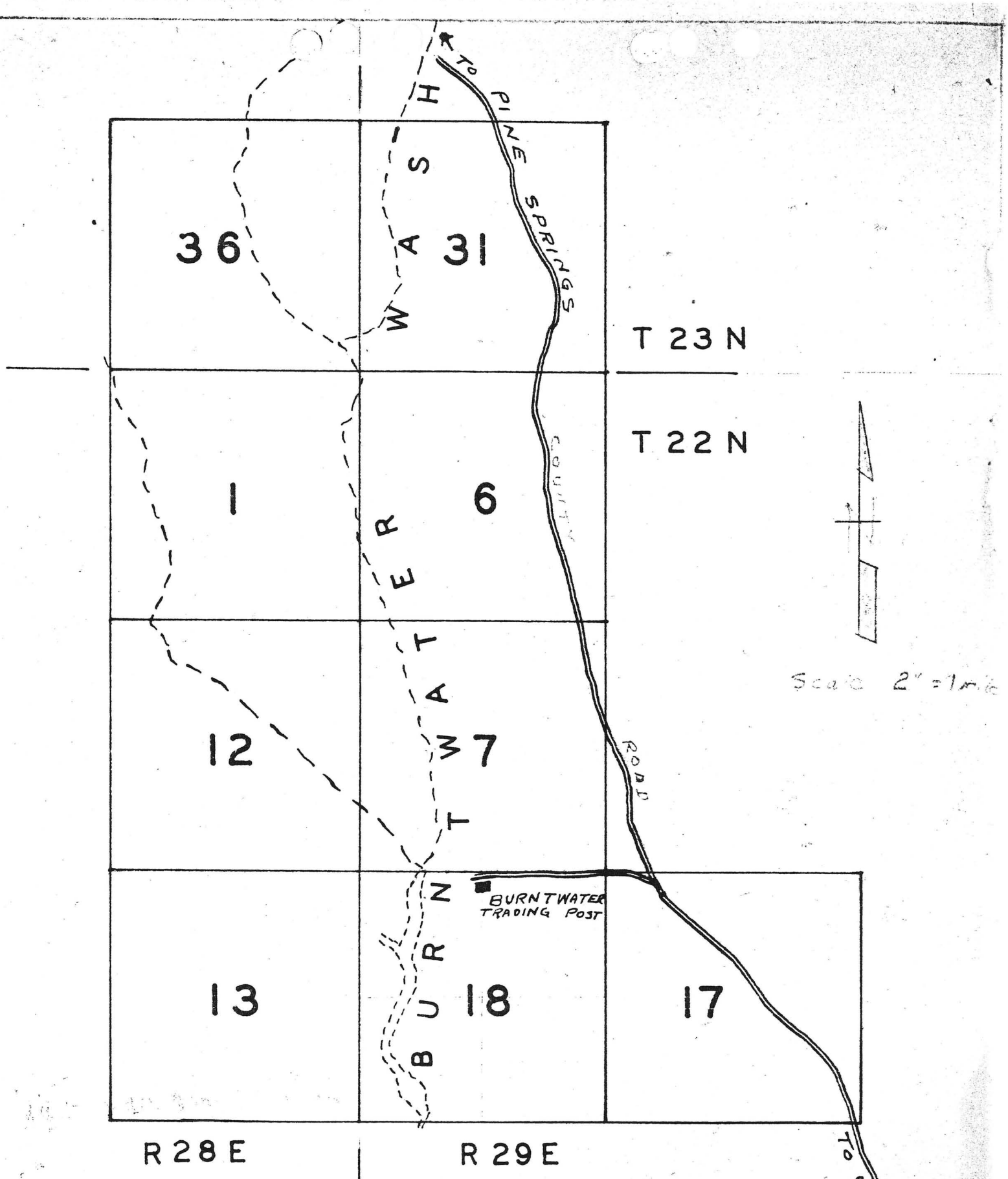
Fig 9-9



SKETCH MAP OF BALCOMB SAND DEPOSIT AND ADJACENT SECTIONS.

- AREA DRILLED and SAMPLED
- SECTION 18 - BALCOMB DEPOSIT
- SECTION 7 - PERMITTED TO LOTHMANN
- DRILLING PERMIT REQUEST

B19



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▭ - SECTION 18 - BALCOMB DEPOSIT

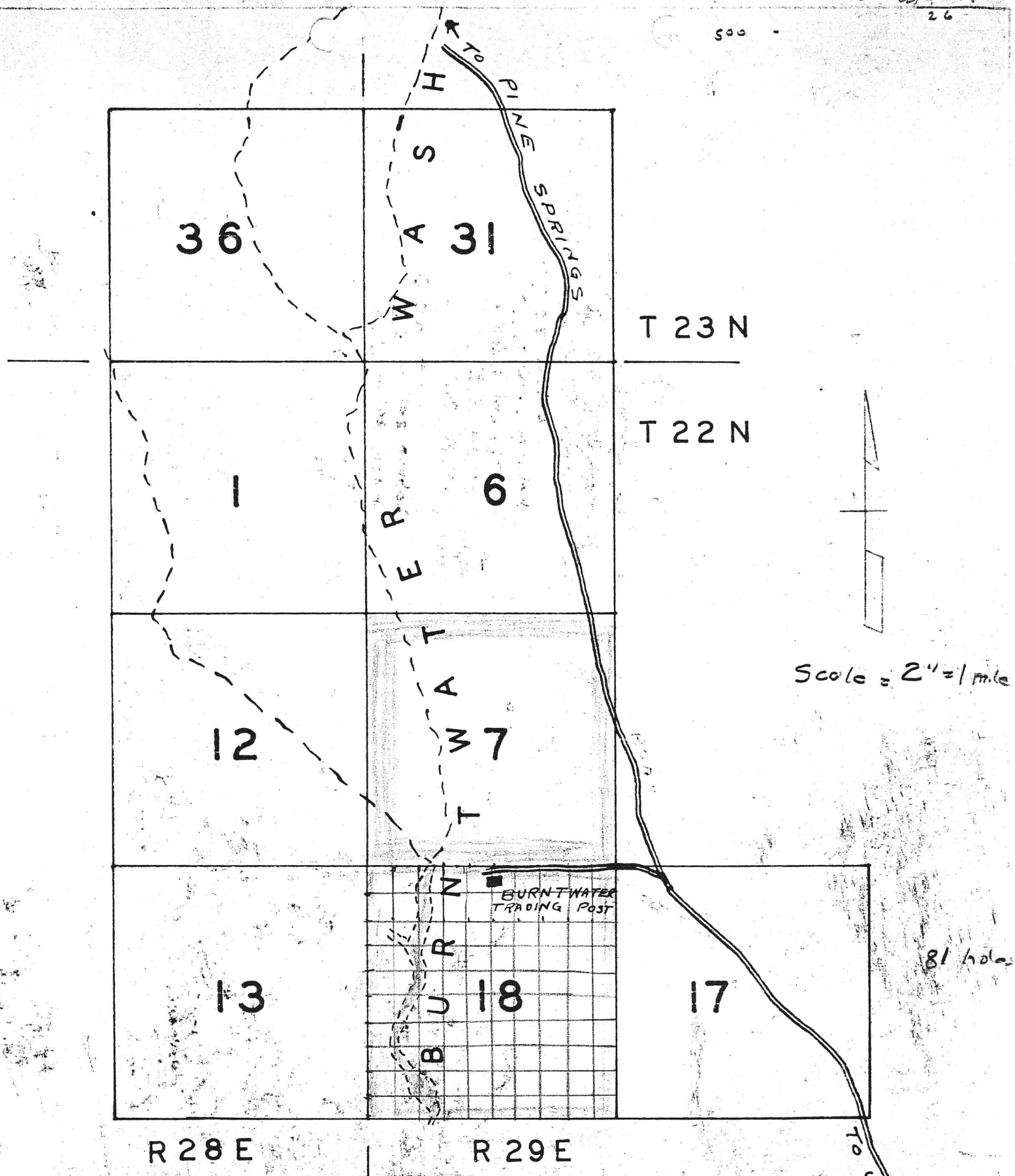
▭ - SECTION 7 - PERMITTED TO LOTHMANN

⊢ - DRILLING PERMIT REQUEST

B4

20 20/5 240.
26

500 -



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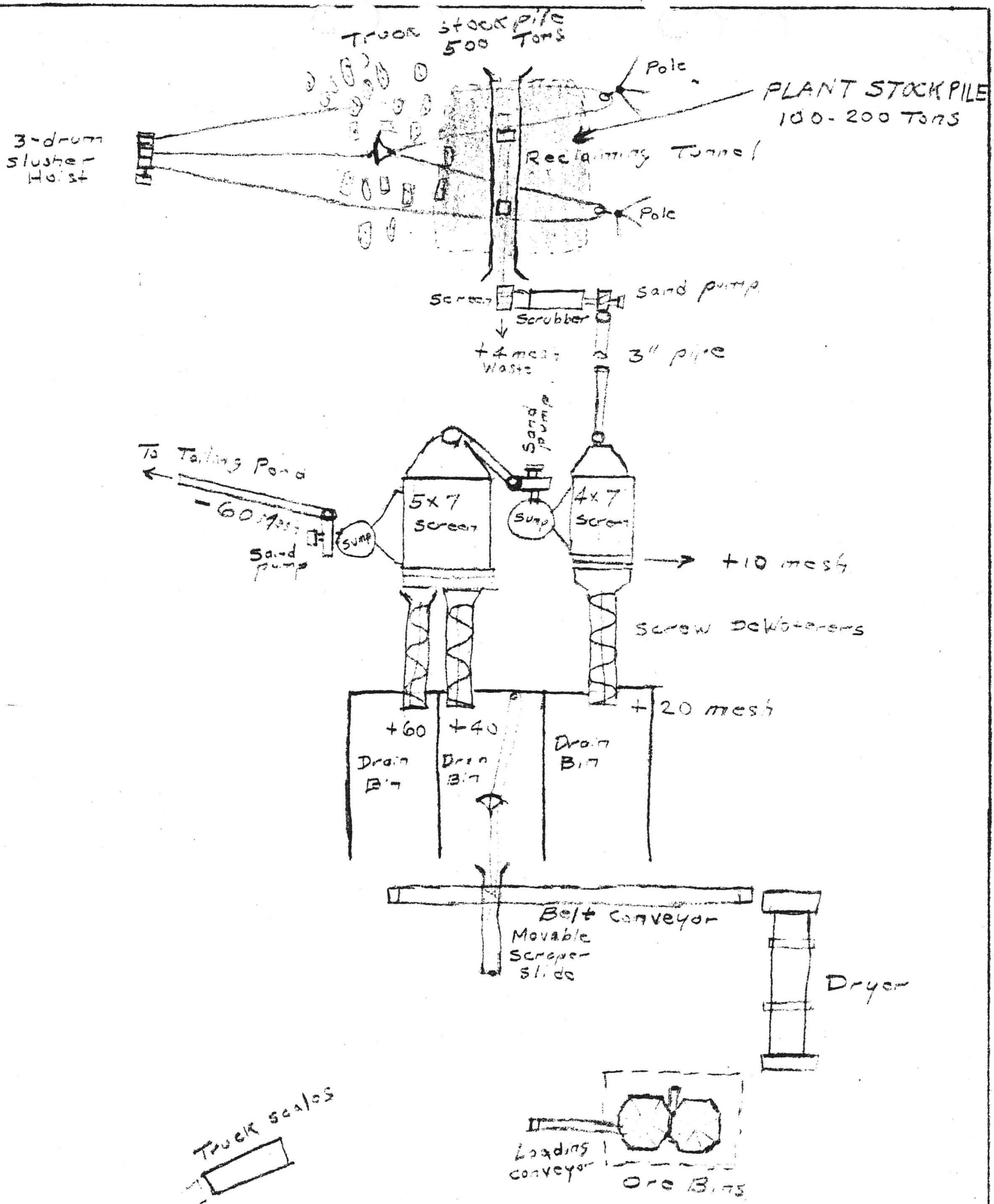
A1



GENERALIZED FLOW SHEET

TO ACCOMPANY MEMO OF FEBRUARY 6, 1958

WASHING and WET SCREENING

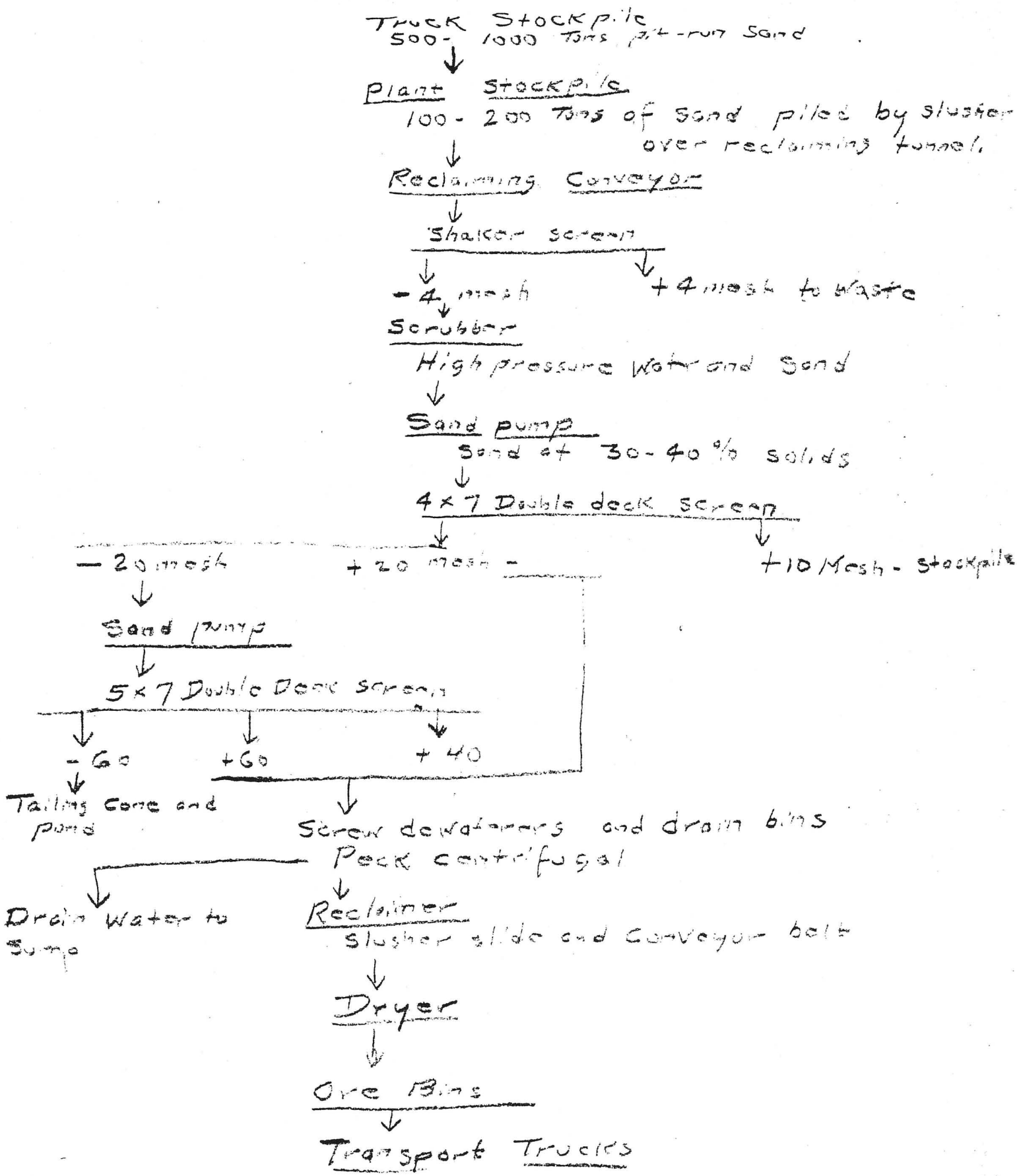
W. E. P. Crawford

2/3/58

B46

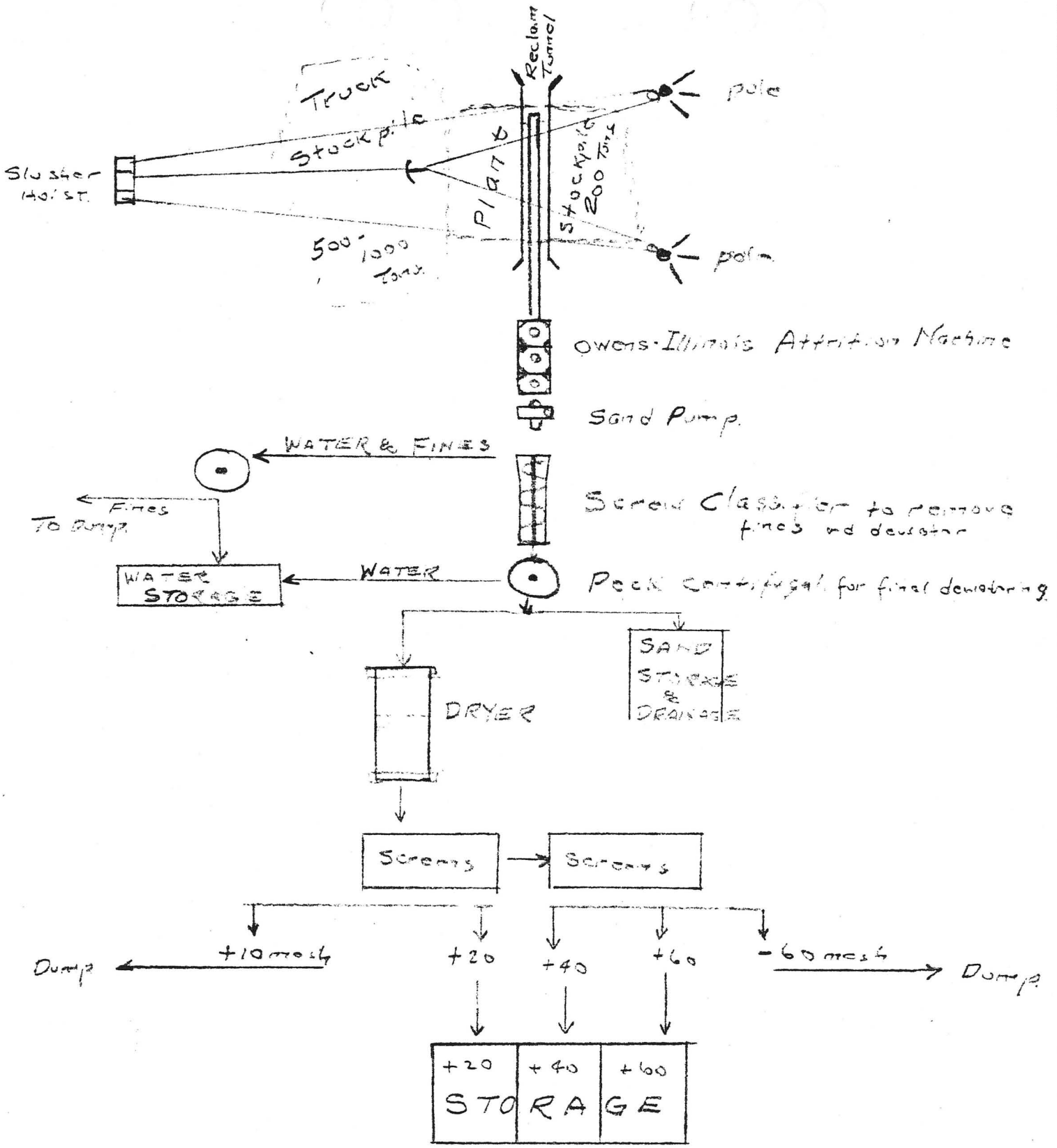
BURIED WATER SAND DEPOSIT.

FLOW SHEET CONTAINING PROCESS MODIFICATIONS, WASHING AND WET SCREENING



B4

W.P.C 2/3/50



BURNTWATER SAND DEPOSIT

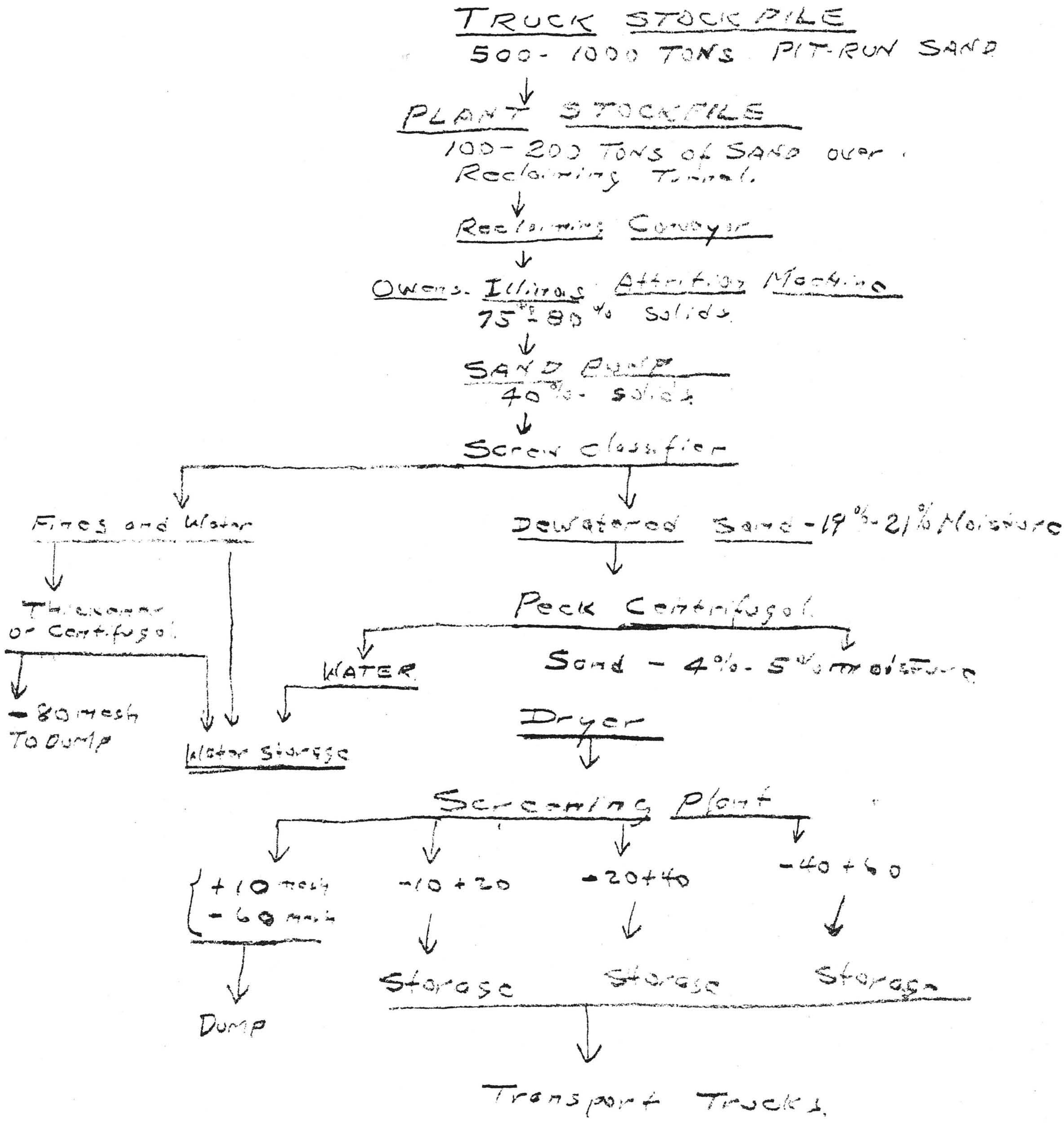
PROPOSED FLOW SHEET FOR WASHING AND DRY SCREENING WITH MAXIMUM WATER RECOVERY.

W. R. Crawford

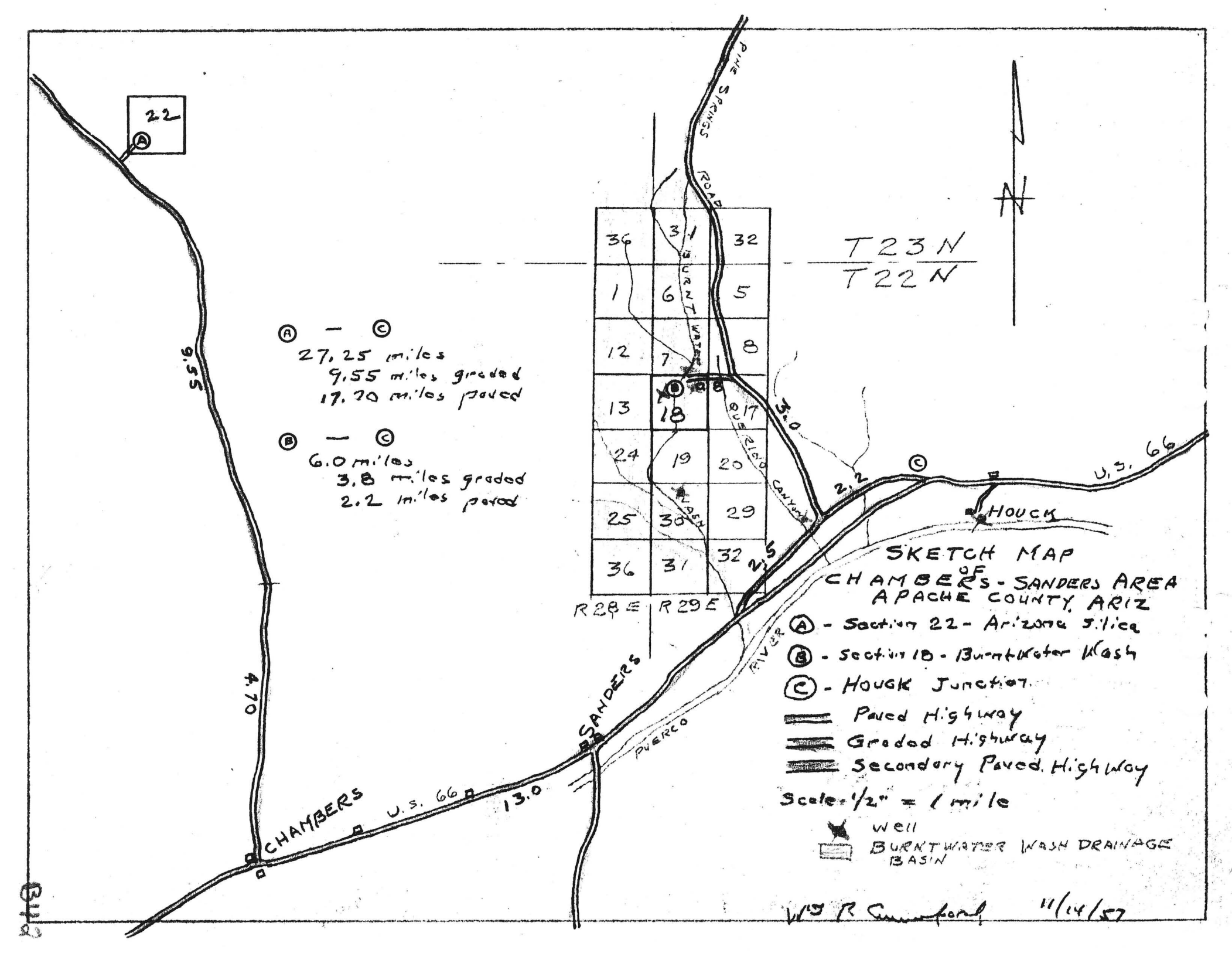
3/1/58

BURNTWATER SAND DEPOSIT

PROPOSED FLOW SHEET FOR WASHING AND DRY SCREENING WITH MAXIMUM WATER RECOVERY



W. P. Crawford 3/1/58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PINE SPRINGS
ROAD
BURNT WATER
WASH
RED RIDGE
CANYON
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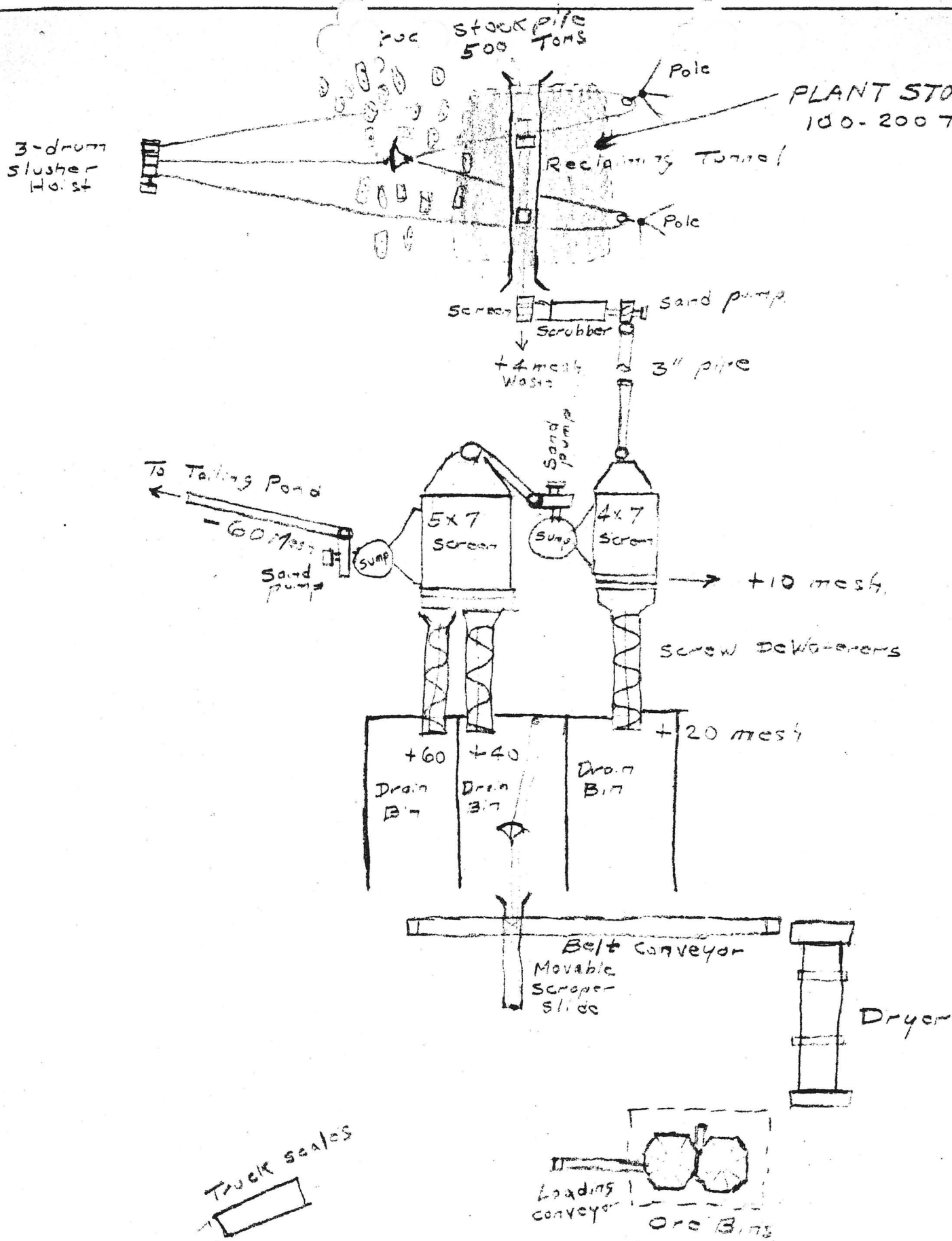
Ⓐ — Ⓒ
27.25 miles
9.55 miles graded
17.70 miles paved
Ⓑ — Ⓒ
6.0 miles
3.8 miles graded
2.2 miles paved
SKETCH MAP
OF
CHAMBERS - SANDERS AREA
APACHE COUNTY, ARIZ
Ⓐ - Section 22 - Arizona Silica
Ⓑ - Section 18 - Burntwater Wash
Ⓒ - Houck Junction
Paved Highway
Graded Highway
Secondary Paved Highway
Scale: 1/2" = 1 mile
Well
BURNTWATER WASH DRAINAGE BASIN
W. R. Crawford 11/14/57



GENERALIZED FLOW SHEET

TO ACCOMPANY MEMO OF FEBRUARY 6, 1958

B34

W. R. Crawford 2/3/59

Arizona at a glance.....

Fiscal Year 2001

Federal Onshore Collections

	Sales Volume	Revenues
Production Royalties		
Sodium	271 tons	$ 447
Rents		$137,683
Bonuses		$ 25,735
Other Revenues		$ 1
Total		**$163,866**

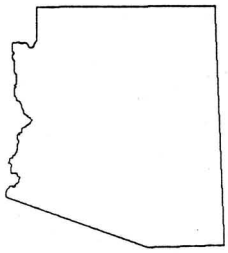
Disbursements to Arizona from Federal Onshore Lands $122,920

Disbursements to Arizona from Outer Continental Shelf Funds (Total since 1968)

Land and Water Conservation Fund Grants	$ 48,623,357
Land and Water Federal Acquisitions	104,209,948
Historic Preservation Fund	10,653,851
Total	**$163,487,156**

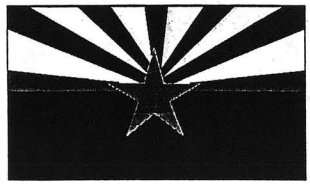
American Indian Collections

	Sales Volume	Revenues
Production Royalties		
Coal	13,738,125 tons	$ 36,820,468
Copper	109,224 tons	2,008,003
Gas	293,580 Mcf	255,051
Gas Plant Products	346,090 gals	32,993
Oil	55,709 bbl	248,601
Sand and Gravel	1,300,150 tons	1,267,733
Silica Sand	33,976 tons	15,584
Subtotal		$ 40,648,433
Rents		$ (41,885)
Other Revenues		$ 615,741
Total		**$ 41,222,289**



Arizona at a glance.....

Fiscal Year 2000



Federal Onshore Collections

	Sales Volume	Revenues
Production Royalties		
Sodium	633 tons	$ 1,044
Rents		$ 128,471
Bonuses		$ 1,712
Total		**$ 131,227**

Disbursements to Arizona from Federal Onshore Lands ..... $ 90,936

Disbursements to Arizona from Outer Continental Shelf Funds (Total since 1968)

Land and Water Conservation Fund Grants	$ 46,985,907
Land and Water Federal Acquisitions	83,958,948
Historic Preservation Fund	9,834,290
Total	**$140,779,145**

American Indian Collections

	Sales Volume	Revenues
Production Royalties		
Coal	15,626,394 tons	$ 42,999,587
Copper	103,639 tons	2,131,412
Gas	348,907 Mcf	130,620
Gas Plant Products	530,023 gals	42,564
Oil	62,933 bbl	262,628
Sand and Gravel	3,150,598 tons	2,460,501
Silica Sand	36,387 tons	16,010
Subtotal		$ 48,043,322
Rents		$ 63,158
Other Revenues		$ 603,573
Total		**$ 48,710,053**

Arizona at a glance.....

Fiscal Year 1999

Federal Onshore Collections

	Sales Volume	Revenues
Production Royalties		
Sodium	241 tons	$ 398
Rents		$146,202
Total		**$146,600**

Disbursements to Arizona from Federal Onshore Lands ..... $ 86,000

Disbursements to Arizona from Outer Continental Shelf Funds (Total since 1968)

Land and Water Conservation Fund Grants	$ 46,289,424
Land and Water Federal Acquisitions	66,327,272
Historic Preservation Fund	9,284,815
Total	**$121,901,511**

American Indian Collections

	Sales Volume		Revenues
Production Royalties			
Coal	9,678,124	tons	$ 25,997,860
Copper	86,896	tons	1,049,722
Gas	342,547	Mcf	89,879
Gas Plant Products	189,552	gallons	10,994
Molybdenum	2	tons	455
Oil	99,669	bbl	264,751
Sand and Gravel	3,290,521	tons	2,638,221
Silica Sand	48,033	tons	21,134
Subtotal			$ 30,073,016
Rents			$ (66,988)
Other Revenues			$ 832,079
Total			**$ 30,838,107**

Arizona at a glance.....

Fiscal Year 1998

Federal Onshore Collections

	Sales Volume		Revenues
Production Royalties			
Sodium	468	tons	$ 772
Rents			$151,519
Bonuses			$149,827
Total			**$302,118**

Disbursements to Arizona from Federal Onshore Lands $184,000

Disbursements to Arizona from Outer Continental Shelf Funds (Total since 1968)

Land and Water Conservation Fund Grants	$ 46,289,424
Land and Water Federal Acquisitions	61,323,272
Historic Preservation Fund	8,739,012
Total	**$116,351,708**

Indian Collections

	Sales Volume		Revenues
Production Royalties			
Clay	148,052	tons	$ 9,623
Coal	14,098,127	tons	37,464,108
Copper	43,117	tons	605,253
Gas	514,856	Mcf	172,522
Gas Lost	426	Mcf	120
Oil	91,343	bbl	204,427
Sand and Gravel	3,224,363	tons	2,414,499
Silica Sand	42,076	tons	18,513
Subtotal			$ 40,889,065
Rents			$ 89,704
Other Revenues			$ 1,256,076
Total			**$ 42,234,845**

Arizona at a glance.....

Fiscal Year 1997

Federal Onshore Collections

	Sales Volume	Revenues
Production Royalties		
Sodium	95 tons	$ 157
Rents		$ 54,553
Bonuses		$ 640
Total		**$ 55,350**

Disbursements to Arizona from Federal Onshore Lands ..... $ 69,000

Disbursements to Arizona from Outer Continental Shelf Funds (Total since 1968)

Land and Water Conservation Fund Grants	$ 46,290,920
Land and Water Federal Acquisitions	50,323,272
Historic Preservation Fund	8,228,313
Total	**$104,842,505**

Indian Collections

	Sales Volume	Revenues
Production Royalties		
Coal	12,207,867 tons	33,237,969
Copper	37,558 tons	1,447,258
Gas	327,463 Mcf	143,518
Gas Plant Products	197,733 gallons	9,507
Molybdenum	(4) tons	(1,010)
Oil	87,282 bbl	301,163
Sand and Gravel	2,069,928 tons	1,649,435
Silica Sand	31,273 tons	13,760
Subtotal		$ 36,801,600
Rents		$ 62,328
Other Revenues		$ 1,076,688
Total		**$ 37,940,616**

Arizona at a glance.....

Fiscal Year 1996

Federal Onshore Collections

Rents	$118,398

Disbursements to Arizona from Federal Onshore Lands ..... $ 41,000

Disbursements to Arizona from Outer Continental Shelf Funds (Total since 1968)

Land and Water Conservation Fund Grants	$ 46,290,920
Land and Water Federal Acquisitions	46,714,272
Historic Preservation Fund	7,717,614
Total	**$100,722,806**

Indian Collections

	Sales Volume		Revenues
Production Royalties			
Coal	11,481,462	tons	$ 31,723,899
Copper	58,012	tons	2,106,953
Gas	1,598,627	Mcf	236,341
Gas Plant Products	102,111	tons	4,046
Molybdenum	172	tons	39,614
Oil	82,962	bbl	238,307
Sand and Gravel	3,199,429	tons	2,232,686
Silica Sand	29,022	tons	12,770
Subtotal			$ 36,590,570
Rents			$ 25,462
Other Revenues			$ 740,664
Total			**$ 37,356,696**

Arizona at a glance.....

Fiscal Year 1995

Federal Onshore Collections

Rents	$ 61,219
Bonuses	$ 77,139
Total	**$138,358**

Disbursements to Arizona from Federal Onshore Lands **$112,000**

Disbursements to Arizona from Outer Continental Shelf Funds (Total since 1968)

Land and Water Conservation Fund Grants	$ 45,439,329
Land and Water Federal Acquisitions	42,857,532
Historic Preservation Fund	7,206,915
Total	**$ 95,503,776**

Indian Collections

	Sales Volume		Revenues
Production Royalties			
Coal	12,489,863	tons	$ 32,444,589
Copper	85,261	tons	7,227,650
Gas	46,809	Mcf	6,014
Gas Plant Products	180	tons	9
Molybdenum	20	tons	6,891
Oil	65,364	bbl	165,590
Sand and Gravel	1,042,622	tons	727,582
Silica Sand	29,959	tons	13,182
Subtotal			$ 40,591,507
Rents			$ 840,128
Other Revenues			$ 158,781
Total			**$ 41,590,416**

Arizona at a glance.....

Fiscal Year 1994

Federal Onshore Collections

Rents	$145,447
Bonuses	$ 2,759
Total	**$148,206**

Disbursements to Arizona from Federal Onshore Lands ..... $ 94,000

Disbursements to Arizona from Outer Continental Shelf Funds (Total since 1968)

Land and Water Conservation Fund Grants	$ 45,439,329
Land and Water Federal Acquisitions	45,838,682
Historic Preservation Fund	6,668,310
Total	**$ 97,946,321**

Indian Collections

	Sales Volume		Revenues
Production Royalties			
Coal	12,253,000	tons	$ 33,192,103
Copper	74,214	tons	3,522,890
Gas	230,394	Mcf	34,797
Oil	91,198	bbl	214,288
Sand and Gravel	2,141,898	tons	1,412,998
Silica Sand	39,314	tons	17,352
Subtotal			$ 38,394,428
Rents			$ 768,970
Total			**$ 39,163,398**

HOUCK SILICA SAND APACHE COUNTY

KAP WR 10/23/87: In the process of gathering data for the new Directory of Active Mines in Arizona talked with Mr. Gilstrap, General Manager, Arizona Silica Sand. He reported activities about normal at the Houck Silica Sand (file) operation, Apache County. Business is somewhat down along with the rest of the oil industry. A small portion of their production is sold as sized silica sand for sandblasting. Most goes to the current oil production industry which has not suffered as much as new drilling.

ARIZONA SILICA SAND

APACHE COUNTY

Hydrafrac sand was produced at Houck by Arizona Silica Sand Co. but at a lower rate than last year. FTJ Annual Report 8-19-71

Dir. of Mining - August 1971 - 7 men.

To Houck. Interview with Mr. Gilstrip. They were loading trucks for shipment to Farmington where most of their cracking sand is sold. FTJ WR 8/17/72

Active Mine List- Oct. 1972 - Empl. 7

Went to Houck and met Mr. Gilstrap, supt. of the Arizona Silica Sand Co. who said that over the past year their business had increased appreciably. He is now ~~[illegible]~~ shipping about 12,000 tons per year mainly to the oil fields where the sand is used for fracturing of the oil formations. He said the selling prices is 10.85/ton f.o.b. Houck. Due to an approching storm, left. GW WR ~~11-2-73~~ 10/29/73

Arizona Silica Sand File Apache County

Stopped at Arizona Silica Sand Co. at Houck. Three sized products being produced and shipped out of State. Mr. Jett's Travel 5/25/77

RRB WR 10/30/81: Visited the plant of Arizona Silica Sand Co. about 1 mile south of Houck and their sand pit about 1½ miles NW of Exit 343 from Interstate 40. Never did find Mr. Fisher but got information for Active Mines from his secretary.

MG WR 3/12/82: Learned indirectly that the Arizona Silica Sand Co. in Apache County produces about 30,000 TPY hydrofac sand. It apparently has the capacity to produce up to 50,000 TPY.

See Filtrol Corporation (active file) Cheeto No. 2 , 6/16/82: The dark sandstone is presently being mined in nearby areas by Arizona Silica Sand Company and hauled to their sizing plant at Houck, Arizona. It was reported, recovery was down by 20% from their previously worked pit, so they moved to this location.

ARIZONA SILICA SAND APACHE COUNTY

Active Mine List April 1968 - 9 men

Interviewed Mr. Gilstrop, who said business in 1967 was the poorest yet--5,000 tons against 17--20,000 tons in 1966. FTJ WR 5-17-68

Active Mine List October 1968 - 9 men
Active Mine List April 1969 - 9 men - Elmer Gilstrop, Mgr.

No one around when I got to the Arizona Silica Sand plant at Houck, inquiries in the area found both operations to be going along "about as usual" and both appeared to be active. FPK WR 6-4-69

Arizona Silica Sand Co. produced hydrafrac sand near Houck at about the same rate as last quarter. FTJ QR 4-3-70

Active Mine List Oct. 1969

Interviewed Elmer Gilstrop. He said sales fell off considerably. FTJ WR 5-15-70

Active Mine List May 1970 - 7 men - Elmer Gilstrop

Visited plant at Houck, which was down at the time. Mr. Gilstrop and two men were making repairs. Mr. Gilstrop said their business, which depends mostly on oil strata fracturing in the Farmington, New Mexico area, has been off about 1/3 for the past year or more - from 1500 to about 1000 tons per year. Note from FPK 7-8-70

Arizona Silica Sand Co. mined and beneficiated sand at Houck throughout the year but at a reduced rate due to a slack market in the 4 corners area. FTJ Annual Report 6-30-70

Active Mine List Oct. 1970 - 7 men - Elmer Gilstrop

Arizona Silica Sand Co. continued to produce hydrafrac sand at Houck but at a greatly reduced rate. FTJ QR 1-13-71

Arizona Silica Sand Company at Houck and two bentonite quarries near Saunders were the only active mining operations in this County. Oil and gas production was somewhat less than last Quarter and exploration activity eased also. FTJ QR 4-5-71

To Houck. Interviewed Mr. Gilstrop at Arizona Silica Sand plant. He said they are able to lease at a year at a time or as long as it pays to produce sand. They produce from 700 to 1000 T/m. Mr. Gilstrop with a partner are drilling a 1000 ft. well in salt deposit for purpose of storage area for propane gas. First hole is to be for test purposes. FTJ WR 5-17-71

ARIZONA SILICA SAND CORP.
HOUCK, ARIZONA

APACHE COUNTY

Visited with Mr. Gilstrop at the Houck plant of Arizona Silica Sand. Co. Demand for sand has fallen off, but some shipments have been made to California.

FTJ WR 9/16/66

Active Mine List Oct. 1967 - 9 men

ARIZONA SILICA SAND CORP.
Houck, Ariz.

APACHE COUNTY

Visited the Cracking Sand plant of Arizona Silica Sand Corp. at Houck. Del Fischer is the sole owner of the project, Tom Fallon is Supt., and Elmer Gilstrop is plant Foreman. The latter was present and furnished information re the plant set-up and current operations as follows: The plant works 2 shifts per day and ships an average 2000 TPM. Present source of sand is Sec. 29, T.22E, R29E., about 5½ miles NW of the plant. The plant washes, screens and dries 3 sizes for the market, viz. 10-40 M, 20-40M, and 40-60M. The greatest demand is for the 20-40 size for oil well use and most of this goes to Farmington, N.M. The oil fields in southern California take a smaller amount but mostly in the 10-20 M size. The plant has operated steadily for the past year and a half and employs 14 Navajos in addition to supervising personnel (Fallon and Gilstrop).

TRAVIS P. LANE - Weekly Report - 8-5-61

Active 10-1961

BURNT WATER DEPOSIT & HOUCK PLANT active 2-1962 - 16 men working
" 10-1962 - 16 men working

August 30, 1962
Visit by F.P.Knight

Mr. Elmer Gilstrop, Mgr.

Have new mine about 5 miles west and a little north of Houck and on the west side of the Pine Springs road. The sand is whiter and near the quality of the Wide Ruins deposit.

Mine and mill were idle at the time of visit. No one was at the mine. 4 men were at the mill. Mr. Gilstrop said they were running about as usual, all shipments still are going to the oil fields for fracturing purposes.

Visited Arizona Silica Sand Co., Houck. Active 12-14 men working.

FTJ WR 9/17/65

Visited Arizona Silica Sand plant at Houck. Mr. Gilstrop said they had from 12-14 on the payroll. 90% of their sand serves the oil companies around Farmington. Cost to mine and ship is between $6-$7 plus 30 cents royalty. In 1965 they mined, processed and sold 19,799 tons of sand.

FTJ WR 5/14/66

Date Printed: 12/09/93

ARIZONA DEPARTMENT OF MINES AND MINERAL RESOURCES

VERBAL INFORMATION SUMMARY

Information from: **James Burkewitz**

Company: P.O. Box 108

Address: Arizona Silica Sand
City, State ZIP: Houck, Arizona 86506
Phone: 602-688-2602

MINE: **Houck Silica sand**

ADMMR Mine File: Houck Silica Sand mine file
County: **Apache**
AzMILS Number: **304**

SUMMARY

Specification data on a number of Arizona mined products was obtained for Gerd A. Zimmermann of Scottsdale, the U.S. contact for Hebel GmbH of Germany. They (Hebel GmbH) are interested in building a wall panel plant in the southwestern United States.
James Berkewitz, General Manager, Arizona Silica Sand Company provided analysis on their hydrofrac sand products. In addition to their washed, clean, screened, sand they have a large stockpile of fine-size off grade material that runs about 90% quartz. Copies of the data provided by Mr. Burkewitz has been made for the Houck Silica Sand mine file.

Ken A. Phillips, Chief Engineer Date: December 9, 1993

Date Printed: 12/01/92

ARIZONA DEPARTMENT OF MINES AND MINERAL RESOURCES

VERBAL INFORMATION SUMMARY

Information from: **Jim Burkerwitz, General Manager**

Company: Arizona Silica Sand Company

Address: P.O. Box 108
City, State ZIP: Houck, Arizona 86506
Phone: 602-688-2602

MINE: **Houck Silica Sand**

ADMMR Mine File: Houck Silica Sand
County: **Apache**
AzMILS Number: **304**

SUMMARY

While verifying information for our 1993 Directory of Active Mines Jim Burkerwitz, General Manager reported on the current status of their operations.

They mine silica sand from their pits between the thaw in the springtime until about the end of December during which time they produce enough raw plant feed for daily operations and to build a stockpile to feed the plant during the very cold months. At various times in the past they attempted to operate the pits year round, but the frozen sand was diffucult to load and haul to the plant.

The oil well drilling business is their major customer. The winter always seem to be their best business season due to end-of-the-year drilling budgets.

Ken A. Phillips, Chief Engineer Date: December 1, 1992

Apache County

ABSTRACTED FROM ADMMR ACTIVE MINES DIRECTORY, 1992

ARIZONA SILICA SAND COMPANY

Houck Silica Sand T22N R29E Sec. 29
P.O. Box 108, Houck, AZ 86506 - Phone 688-2602 - Employees: 18 - Open pit mine - Plant south of Houck - Hydrafrac sand for oil well treatment - Markets include New Mexico and California - Abrasives and mold sand - Markets in Arizona and New Mexico - Bagged and bulk products available.
President Robert D. Fisher
General Manager James Burkerwitz
Foreman Ralph Nelson

ABSTRACTED FROM ADMMR ACTIVE MINES DIRECTORY, 1991

ARIZONA SILICA SAND COMPANY

Houck Silica Sand T22N R29E Sec. 29
P.O. Box 108, Houck, AZ 86506 - Phone 688-2602 - Employees: 25 - Open pit mine - Plant south of Houck - Hydrafrac sand for oil well treatment - Markets include New Mexico and California - Abrasives and mold sand - Markets in Arizona and New Mexico.
President ..... Robert D. Fisher
General Manager ..... James Burkerwitz
Foreman ..... Ralph Nelson

ABSTRACTED FROM ADMMR ACTIVE MINES DIRECTORY, 1990

ARIZONA SILICA SAND COMPANY

Houck Silica Sand T22N R29E Sec. 29
P.O. Box 108, Houck, AZ 86506 - Phone 688-2602 - Employees: 25 - Open pit mine - Plant south of Houck - Hydrafrac sand for oil well treatment - Markets include New Mexico and California - Abrasives and mold sand - Markets in Arizona and New Mexico.
President ..... Robert D. Fisher
General Manager ..... James Burkerwitz
Foreman ..... Ralph Nelson

ABSTRACTED FROM ADMMR ACTIVE MINES DIRECTORY, 1989

ARIZONA SILICA SAND COMPANY

Houck Silica Sand T22N R29E Sec. 29

P.O. Box 108, Houck 86506 - Phone 688-2602 - Employees 25 - Open pit mine Plant south of Houck - Hydrafrac sand for oil well treatment - Markets include New Mexico and California. Abrassives and mold sand - Markets in Arizona and New Mexico.

President ..... Robert D. Fisher
General Manager ..... Elmer J. Gilstrap
Foreman ..... Ralph Nelson
Superintendent .....(position currently vacant)

ABSTRACTED FROM ADMMR ACTIVE MINES DIRECTORY, 1988

ARIZONA SILICA SAND COMPANY

Houck Silica Sand T22N R29E Sec. 29

P.O. Box 108, Houck 86506 - Phone 688-2602 - Employees 15 - Open pit mine - Plant south of Houck - Hydrafrac sand for oil well treatment - Markets include New Mexico and California.

President ..... Robert D. Fisher
General Manager ..... Elmer J. Gilstrap
Foreman ..... Ralph Nelson
Superintendent ..... Jim Burkewitz

ABSTRACTED FROM ADMMR 1986
DIRECTORY OF ACTIVE MINES
April 24, 1987

ARIZONA SILICA SAND COMPANY

Houck Silica Sand
P.O. Box 108, Houck 86506 - Phone 688-2602 - Employees 10-12 - Open pit mine - Plant south of Houck - Hydrafrac sand for oil well treatment - Markets include New Mexico and California.

President ..... Robert D. Fisher
General Manager ..... Elmer J. Gilstrap
Foreman ..... Ralph Nelson

Apache

ARIZONA SILICA SAND COMPANY

TELEPHONE
AREA CODE 602-888-2802

P. O. BOX 108
HOUCK, ARIZONA 86506

SIEVE ANALYSIS

SIEVE SIZE	PERCENT RETAINED	SIEVE SIZE	PERCENT RETAINED
12		16	
16		20	
18		30	
20		35	
30		40	
PAN		50	
TOTAL		PAN	
		TOTAL	

Plaster Sand

SIEVE SIZE	PERCENT RETAINED			
		30	1.2	
30	0	40	6.0	
40	19.8	50	24.2	
50	46.7	60	12.3	
60	13.6	70	14.1	
70	9.5	100	25.7	
100	9.4	pan	16.5	100.0
PAN	1.0	DATE:	12/15/93	
TOTAL	100.0	TESTED BY:		

ULTIMA

SANDMASTER OIL WELL FRACTURING SANDS

Arizona Testing Laboratories
810 East Hammond Lane ☐ Phoenix, Arizona 85034 ☐ 602/254-6181

For: Arizona Silica Sand Co.
P.O. Box 108
Houck, Arizona 86506

Date: January 27, 1992

Lab. No.: 753902

Sample: Sand

Marked: See Below

Received: 01/15/92

Submitted by: J. Buckewitz

REPORT OF LABORATORY TESTS

	40/70	
Silica, SiO2	93.	%
Aluminum, Al2O3	1.4	
Iron Oxide, Fe2O3	1.9	
Calcium Oxide, CaO	0.09	
Sodium Oxide, Na2O	0.24	
Potassium Oxide, K2O	0.7	
Magnesium Oxide, MgO	0.08	
Titanium Oxide, TiO2	0.02	
Ignition Loss @ 1000°C	0.2	

Respectfully submitted,
ARIZONA TESTING LABORATORIES

Claude E. McLean, Jr.

ARIZONA SILICA SAND COMPANY

TELEPHONE
AREA CODE 602-688-2602

P. O. BOX 108
HOUCK, ARIZONA 86506

Table One
API RP 56 Tests Performed on 20/40 Sand

Sieve Analysis of Submitted Sample per Section 4, API RP 56

Sieve Size	Percent Retained	Cumulative Percent
16	0.06	0.06
20	1.80	1.86
25	16.80	18.66
30	27.34	46.00
35	25.68	71.68
40	20.88	92.56
50	7.30	99.86
pan	0.14	100.00

Section 5, RP 56, Shape Factor

Sphericity	.7
Roundness	.6
Minimum Acceptable	.6

Section 5, RP 56, Sand Grain Clusters

Percent	0.25
Maximum Acceptable	1.00

Section 7, RP 56, Turbidity

FTU	187.00
Maximum Acceptable	250.00

Section 8, RP 56, Crush Resistance

4000psi	8.42
Maximum Acceptable at 4000 psi	14.00

HOUCK SILICA (file) mine

Arizona Testing Laboratories

810 East Hammond Lane □ Phoenix, Arizona 85034 □ 602/254-6181

For: Arizona Silica Sand Co.
P.O. Box 108
Houck, Arizona 86506

Date: January 27, 1992

Lab. No.: 753902

Sample: Sand

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Iron Oxide, Fe2O3	1.9	
Calcium Oxide, CaO	0.09	
Sodium Oxide, Na2O	0.24	
Potassium Oxide, K2O	0.7	
Magnesium Oxide, MgO	0.08	
Titanium Oxide, TiO2	0.02	
Ignition Loss @ 1000°C	0.2	

Respectfully submitted,

ARIZONA TESTING LABORATORIES

Claude E. McLean, Jr.

ARIZONA SILICA SAND APACHE COUNTY
AT HOUCK

Visited the sand washing and screening plant of Arizona Silica Sand Co. at Houck. The newly completed plant was idle pending structural repairs to stiffen the tall bin sections of the plant. W. C. Crawford is part owner and manager of the project. He lives at Houck.

T. P. LANE
4-20-59 WR

A[illegible]ONA DEPARTMENT OF MINE[illegible] RESOURCES
Mineral Building, Fairgrounds
Phoenix, Arizona

1. Information from: Mrs. Elmer Gilstrap
   Address: Houck, Ariz.
2. Mine: Burnt Water (?)
3. No. of Claims - Patented ______ Unpatented ______
4. Location: ______
5. Sec ______ Tp ______ Range ______
6. Mining District Apache Co
7. Owner: ______
8. Address: ______
9. Operating Co.: Arizona Silica Sand Corp.
10. Address: Houck, Ariz.
11. President: ______
12. Gen. Mgr.: Elmer Gilstrap
13. Principal Metals: sized sand
14. No. Employed: About 9
15. Mill, Type & Capacity: Washing and sizing
16. Present Operations: (a) Down ☐ (b) Assessment work ☐ (c) Exploration ☐ (d) Production ☑ (e) Rate ______ tpd.
17. New Work Planned: ______
18. Miscl. Notes: Running at about 50% of rate for past fiscal year. Shipping fine sand to Farmington for use in connection with AEC's Project Gas Buggy – a joint project with El Paso Natural Gas Co. to fracture oil field to increase production. Future use of sand at Farmington field uncertain and wont be known before results of the project. Have customers in Utah who might make Mr. demand interesting. Besides the fines, they are sizing -10+20 -20+40 and -40+60 mesh.
    Mr. Gilstrap was down with the flu.

Date: 10/5/67 F.P.K. (Signature) (Field Engineer)

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MEMO

Arizona Silica Sand Co. Feb. 27, 1961

Travis P. Lane

Francis E. Cooper of Bancorporation advises that the corporation disposed of its interest to Del W. Fisher in Dec. 1960. Fisher now owns the enterprise outright and is continuing the operation without name change. Thomas Fallon is the manager. Some plant alterations are being made at the present time. Production rate during 1960 ranged from 1,000 to 5,500 TPM. 10 to 17 men are employed. Sales are handled by Jack Brown of the Research Department of Fisher Contracting Co., 2201 S 19th Ave., Phoenix. Phone ~~AL 8-7741.~~ 252-5092

B24

Mr. Frances Cooper was out of town for a few days.

Arizona Bancorporation - Room 622 Professional Building (or P.O. Box 1533) says that Mr. Cooper has no title with reference to Arizona Silica Sand. Seems Arizona Bancorporation is the largest single stockholder in Arizona Silica Sand and they have the managing authority - handle the books, etc. (and she was reluctant to discuss Mr. Cooper's position in either company) She did say that correspondence could be addressed to Mr. Cooper's attention if they needed a name to refer to.

B92

Mr. Leslie A. Wood, Vice President
Arizona Bancorporation
Drawer 71
Phoenix, Arizona

Dear Mr. Wood:

During January and February, 1957 26.5 acres of the Balcomb lease in Burntwater Wash, Section 18, T 22 N, R 29 E were sampled by hand-auger holes. Due to the severe weather conditions sampling was limited to the channel and banks of the wash where the overburden and the snow were the thinnest. Within the sampled area, drilling developed a positive yardage of 334,778 cubic yards of sand and gravel, of which, 255,692 cubic yards are in the -10 + 60 mesh sizes, divided as follows:

52,504 cubic yards of -10 +20 mesh sand
131,549 cubic yards of -20 +40 mesh sand
71,639 cubic yards of -40 +60 mesh sand

In addition to the holes in the channel and banks, several scattered drill holes were put down along the slopes above the wash. These were not used in calculating the yardage although they showed some sand. A test pit at the Burntwater Trading Post store, nearly a quarter of a mile from the center of the wash and approximately 100 feet vertically above the channel found round silica sand of marketable grade under five feet of overburden. The existence of marketable grade sand in the test pit ad in the hill-side holes indicates that saleable material is not limited to drainage channel.

Although drilling developed sufficient sand to justify a small plant the remainder of Section 18 should be systematically sampled and mapped. A preliminary investigation including rough mapping and sampling should be made of the adjacent sections. This work, discussed in detail later, will show the limits of the sand deposit, the amount of overburden, the thickness and grading of

the sand and the cubic yardage. All of these data will be required before a layout can be completed for a processing plant. If the sampling recommended produces a substantial increase in the yardage already developed, a more economical plant can be designed and a better sales program outlined.

Jeep-mounted drill

Two Polaroid prints of the jeep-mounted drill assembled for drilling the Burntwater deposit are included. The drill is a Boyles BBU-1 model, chain driven through a power take-off, with a screw-feed swivel head. and is mounted so the jeep can be used both for drilling and as a standard four-wheel drive vehicle. The rated capacity is 800 feet of 1-½ inch hole; 100 feet of 3-½ inch hole.

An adequate supply of drill rods, bits, tools and repair parts will be taken to Burntwater together with equipmentfor surveying and for making sieve analyses. The machine is equipped with 4-inch Iwan auger, 3-½ inch pocket shoe and core barrel, 2-inch open spiral auger and 2-inch carbide bits and corebarrel.

We will use a pick-up truck and tow the drill to Sanders. Will use the pick-up for transportation and leave the jeep-mounted drill on the property until sampling is completed.

Recommendations:

The small scale sketch map shows the outline of the sampled area and its relationship to the remainder of Section 18; the map also shows the relationship of Section 18 to the drainage pattern and to the adjacent sections.

Section 18 will be surveyed on a 500-foot grid and holes drilled at 500-foot centers, excluding the area which has already been drilled and sampled. Drill cuttings will be examined as the holes are drilled and spparated according to the class of

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material. Samples will be split and saved for sieve analysis and examination. Wet screen tests will be made.

Additional holes will be drilled if need to outline and block out the sand beds. The depth of holes will depend upon ground conditions and vary from less than ten feet to fifty feet.

A detailed examination of Section 18 will require ten or twelve days. Following this several days will be used in making a preliminary examination of the sections on which the Tribal Council has granted a drilling permit. Drilling will be kept to a minimum footage as a thorough examination of the Tribal lands can be made later. The extension of fracture sand into the ground contiguous to Section 18 will be checked but sampling will be a minimum amount.

Equipment Cost:

Jeep-mounted drill with drill rods, bits and tools
$40.00 per diem plus gasoline and oil.

Jeep - without use of drill, etc
$25.00 per diem plus gasoline and oil.

Drill operator - wage and subsistence
$30.00 per diem

Pick-up truck - mileage basis

No rental charge for days jeep or drill is not used.

I shall be out of town Monday. Will telephone you Tuesday and if agreeable will leave Thursday or Friday.

Very truly yours,

Wm. P. Crawford

Sept. 14, 1957
2130 West Van Buren
Phoenix, Arizona

B-9

M E M O R A N D U M

on

BURNTWATER WASH SAND DEPOSIT, APACHE COUNTY, ARIZONA

Water Investigation, Surveying and Sampling. Field Work
February 16 - February 21, 1958

Proposed Sites for Sand Processing Plant and Flow Sheet
For Washing and Dry Screening, With Maximum Water Recovery

Subjects covered by this memorandum are:

1. Investigation of water supply and well yields in Burntwater Wash.
2. Surveys for road to processing plant and possible plant sites
3. Sampling for washing and screen tests.

Maps and sketches accompanying this memorandum are:

1. 200-scale map of west-half of Section 18, T 22 N, R 29 E showing Burntwater Wash, Possible plant sites and proposed road, wells and buildings with elevations.

2. 50-scale print of proposed sites for processing plant. Two prints, Site "A" and Site "B". Contours and elevations.

3. Modified flowsheet for washing sand and wet screening. Normal water recovery.

4. Flowsheet for washing and dry screening sand to yield maximum water recovery.

5 Sketch of Chambers-Sanders Area showing Burntwater Wash drainage basin, highways and wells.

WATER INVESTIGATION

Water records inthe Tribal Water Supply Office at Window Rock, Arizona and the Ground Water Branch of the U.S.Geological Survey, Holbrook, Arizona show that water occurrence in Burntwater Wash is erratic and that well production is about 3 gpm. This is borne out by pumping tests on Stanley Smith's drilled well on Section 18, which yielded 2.25 gallons per minute. Details of the pumping test are on the accompanying data sheet.

Following is a copy of a letter from Mr. J.P.Akers, Geologist in Charge, Ground Water Branch, USGS, Holbrook:

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY

W. P. Crawford
P.O.Box 6412
Phoenix, Arizona

Holbrook, Arizona.
Feb. 28, 1958

Dear Mr. Crawford:

Our records show that several deep wells in the

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area of your interest were dry. Others in the same area produce about 3gpm from the De Chelly sandstone. Production of large quantities of ground water is not possible in this area.

" The best possibility for developing small quantities of ground water is from the alluvial fill in Burntwater Wash. This fill should be test-drilled to determine water levels, coarseness of gravels, and depth of fill. A production well should be located in the location where gravels are coarsest and the fill is deepest.

" I hope this information will be of help to you. Please forgive this handwritten letter. We have no secretary at the present time.

(signed) J.P. Akers
Geologist "

Mr. Akers has been in charge of the ground water study on the Navajo Reservation for a number of years and is familiar with the Burntwater Wash area. Test drilling for blocking out sand reserves has roughly outlined the gravel deposits and can be used in accordance with his suggestion.

WATER REQUIREMENTS FOR SAND PLANT

The water requirements for a sand processing plant with wet screening were originally calculated at 20 gpm. Under the original flowsheet water recovery was a function of drying and it was assumed that washed, screened sands would be stored in drainage bins; that reduced moisture would favorably affect the drying cost and water recovery was incidental.

It is now apparent that water recovery is an important factor and that water consumption must be held to a minimum with recovery at a maximum. Figures based upon two stages of washing are in the accompanying data sheet. Washing tests are in progress by Deister Concentrator and by Western Machinery Company.

Water consumption can be reduced by washing the pit-run sand, floating off the fines and then de-watering the sand in a Peck centrifugal. This will yield maximum water recovery for water re-use and 5 gpm will maintain water storage. On a daily production of 120 tons of pit-run sand 3,000 to 5,000 gallons will restore water losses from drainage and evaporation.

Water Sources:

There are four available sources of water for Burntwater Wash sand processing.

1. Drill a well near Highway 66 and pump water to processing plant. From well logs at Houck, Sanders and Chambers such a well should find adequate water at 200 feet or less. Well will be in quicksand and will require gravel packing. The pipe line will be 4-½ to 5 miles in length; it will require a right-of-way across Tribal lands. Well, pipe line, pump equipment and installation will cost at least $20,000. This is not recommended.

B52

Water Sources - continued

2. Drill well on Tribal lands south of Section 18 and pump water to sand plant. A well located within a mile or two of Setion 18 would have a shorter pipe line distance and lower pumping head than one near Highway 66. It will be necessary to secure drilling permit and pipe line right-of-way from the Tribe and the chance of finding a big well is remote. This is not recommnded.

3. Haul water from existing wells which have loading and pumping facilities. The nearest source of water is Houck, eight miles by highway from Burntwater Wash Store. The wells at Houck belong to the Santa Fe Railroad whose average charge for water is 50¢ per thousand gallons. After an initial storage of 50,000 gallons, daily requirments should not exceed 5,000 gallons. Tankers for contract water hauling may be available in the Houck-Chambers area but this has not been investigated. If adequate water cannot be developed in Burntwater Wash on Section 18, this method is recommended.

4. Develop water near sand plant by shallow dug wells and collection galleries. Sink shallow shafts through the alluvial fill to bedrock and cut collecting basins. Such shallow wells or test pits may be sunk to depths of 25 - 35 feet with simple equipment, using Indian labor, at a low cost. Collection galleries holding 2000 -3,000 gallons of water will provide storage, even though the flow is loss than 3 gpm. The dug well at the old store may be used if cleaned out and the lining repaired.

Tentative locations for wells are shown on the ~~200~~ -scale map, with estimated depths to bedrock. One or two wells yielding 3 gpm will supply sufficient water for a plant, providing diligence is exercised in reclaiming water.

It is recommended that test wells be sunk as soon as possible.

WATER STORAGE

Water storage of at least 50,000 gallons should be provided. The cheapest method will be a dug tank with an impervious lining. Tank may be excavated by bull-dozer or scraper but should be narrow and deep to reduce evaporation loss. Koroseal sheets, manufactured by B.F.Goodrich, will make an excellent lining and is the cheapest of the water proof fabrics.

Excavation and lining of storage tank should be in advance of well development.

ROAD and PLANT SITE SURVEYS

The west half of Section 18 with two proposed plant sites and location for a truck road is shown on the accompanying 200-scale print. The plant sites are mappedin greater detail on the 50-scale prints.

ROAD and PLANT SITE SURVEYS - continued

Site " A " is accessible to the county road; is equidistant from the north and south section lines, equalizing the haul from sand pits at either end of the section; the area is open and the flats at the bottom of the slopes are above high water level.

Site " B " has steeper slopes but its location near the south section line will require nearly one-half mile more transport truck road than Site " A ". The terrain is rougher, site preparation and truck road construction will be more expensive than on the other site. Also the flat on which the plant would be located is three feet below high water mark.

Stanley H. Smith, Jr., owner of Section 18, inspected both sites after they were staked. He will be reluctant to grant a ground lease on Site "B " due to the greater distance from the County road and to its being under water during floods. Site " A" is satisfactory to him. Mr. Smith, who was a location engineer for the New Mexico Highway Department for several years, gave valuable assistance in locating the proposed truck road and plant sites. Inasmuch as he has seen Burntwater Wash in flood on numerous occasions it would be wise to consider his recommendations.

Mr. Smith has requested a short curve at the intersection of the truck road and the county road. It is his opinion that a short curve will cause the truck driver to reduce speed and will lessen traffic hazard. He is agreeable to a cattle guard but wants a "Texas" gate which will be closed when the sand plant is idle.

SAMPLING and TEST WORK

Samples of sand from different places above Burntwater Wash were collected and 100 pounds sent to Mr. S.A.Stone, Chief Engineer, Deister Concentrator Company, Fort Wayne, Indiana for screen tests to make sure that specifications can be made. Laboratory tests will also be made on washing equipment.

The Owens-Illinois Glass Company has developed a scrubbing machine for removing clay and soft material from silica sands. The scrubber or attrition machine is manufactured, under license, by the Western Machinery Company. A 100-pound sample has been sent their San Francisco testing laboratory for testing with the attrition machine and a screw classifier.

Both Deister and Western Machinery have been asked to make tests as quickly as possible and their reports will outline what washing and screening equipment will be required.

The Colorado Iron Works Company, Denver, Colorado has made several moisture determinations on the discharge product from an Akins spiral classifier. Their tests show 19% - 21% moisture on Burntwater Wash sand. Heap drainage reduces this figure to about 9% moisture in 24 hours to 48 hours, after which it drys slowly.

SAMPLING and TEST WORK - Continued

A Peck centrifugal machine will reduce the moisture in the spiral classifier product from 21% down to 4% - 5% with consequent reduction in drying costs and improved water recovery.

Preliminary estimates on drying equipment have been received from Link-Belt, Colorado Iron Works Company, Madsen and Standard Steel Company.

GENERAL:

The clay mine operated at Sanders by Alba Corporation curtailed production in February and reduced the working force. It may be possible to obtain equipment from them for road building and plant site preparation.

Phoenix, Arizona
March 6, 1958

W.P.Crawford

DATA SHEET - WELL PUMPING TEST

Well — Drilled Well on Section 18, T 22 N, R 29 E. West side of Burntwater Wash

Collar Elevation	6,332.9 feet
Depth	128.0 feet (measured Feb.16,1958.)
Casing	8-inch standard pipe.
Area	50.027 square inches.
Water level	46' 6" below collar without tubing.
	40' 0" below collar with 2-½" tubing.

Pump — 2-½ inch Pacific deep well. Check valve 123' below collar.

Set pump in well February 16, 1958. Pumped February 17, 1958 Water level at 40'. Ran pump 3 minutes and pulled well to 100'. Let well fill up and pumped down again. Continued intermittent pumping.

Water was measured by contents of casing less pump tubing and difference in water elevation. Calculated volume of casing less tubing is 2.26136 gallons per foot of hole.

Build up is 1 foot per minute; average flow is 2-¼ gallons of water per minute. When well was pumped down to 100 - 110 feet below collar the rate of inflow was slightly greater than 1 foot per minute until water reached height of 75 feet below collar at which point it remained at 1 foot per minute. The casing is either perforated or has a hole as water can be heard running until the water level reaches 80' below collar.

Pump discharge was calculated at 45.23 gpm. A triangular notch weir, 60 degree notch, was placed in the ditch 10 feet from the end of the discharge hose. Weir measurement was 15.9 gallons per minute; the seepage loss in 10 feet was 29.33 gpm.

Water level measured with electrical device, accurate to ½-inch.

Calculated contents of casing outside tubing was 199.017 gallons with water level at 40 feet.

Deep well pump was pulled February 19th and windmill cylinder and tubing replaced.

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DATA on WATER REQUIRED FOR SAND WASHING

Estimated production — 120 tons pit-run sand per 8-hours.

Washing equipment — Attrition machine; sand pump; screw classifier. Peck centrifugal machine.

Sand will be put through attrition machine at 75% - 80% solids; pulp will be diluted to 40% solids for sand pump and will enter screw classifier at this density.

Drained product off screw will contain 19% moisture.

Product from Peck centrifugal at 5% moisture.

Specific gravity of sand - 2.6 -

75%	solids	12 gallons of pulp per minute
80%	"	11 gallons of pulp per minute
40%	"	32 gallons of pulp per minute

Water requirements for 120 tons of sand per 8-hours:

75% solids	120 tons/8 hrs.	9,488	gallons water/ 8 hrs.
80% solids	ditto	7,188	ditto
40% solids	ditto	43,128	ditto

Water requirements for 8-hour period will be about 45,000 gallons. Actual for 120 tons is 43,128 gallons but someone will spill a teaspoon or more.

Drained material off screw at 19% moisture. This is equivalent to 6,747 gallons. If material containing 19% moisture is put through a Peck centrifugal it will be brought down to at least 5% moisture. which is equivalent to 1,513 gallons. Centrifuging will recover 5,234 gallons of water for reuse and also removes this burden from the dryer.

The fines from the screw classifier will contain water probably exceeding 25% moisture. They can be thickened by passing through a Callow tank to about 60% solids. The same result will come from a pump and cyclone but this material must be bought and the Callow tank can be built out of plank.

Actual water losses should not exceed 5,000 gallons per 120 tons of sand. Two wells yielding 3 gpm will furnish sufficient water.

Those figures may be modified by tests now being made by Dolster and Western.

Phoenix, Arizona
March 5, 1958

F.6 Co.

P.O.Box 6412
Phoenix, Arizona
February 6, 1958

Mr. Leslie A. Wood, Vice President
Arizona Bancorporation
Drawer 71
Phoenix, Arizona

Dear Mr. Wood:

I am enclosing herewith:

1. The summary of a conversation with Bob Jones, of the Harry E. Blood Company, Los Angeles, California on January 24th. Mr. Jones went into considerable detail on the fracture sand situation pertaining to Halliburton, Dowell and the Arizona deposits. He is very familiar with the situation, talked quite frankly butasked that he was not quoted directly. I am not mentioning his name in the memo and am not sending a copy to Del Fisher or Jack Brown.

2. Copy of a letter frm Peter Balcomb, Chambers, Arizona dated February 1, 1958, giving some information on Lothmann's current operations. Halliburton has apparently stopped buying sand from Lothmann, which checks the information Brown and I received in December, 1957 at Lubbock.

3. Advertisement of bulk sand fracturing plant for sale in Texas. Ty Williams sent me the ad as an index of used equipment prices in Texas.

4. Modified flow sheet of proposed processing plant.

5. Memo on capital cost of proposed plant and recommendations.

I am forwarding copies of items 2, 4 and 5 to Del Fisher and Jack Brown and I gave Jack a verbal account of Bob Jones' conversation. After reading the documents you may want to have a meeting.

Sincerely yours,

Wm. P. Crawford

B4

Memorandum on Fracture Sand, January 24 Conversation

Following is the summary of a conversation held on January 24, 1958 at Corona, California on the subject of fracture sand, firm markets, potential markets, price per ton and the advisability of building a processing plant.

The speaker does not want any direct quotes and is not mentioned by name. He is very familiar with the fracture sand in the Apache County area and is keepingin close tough with the present situation. I can add that heknows almost as much about the negotiations between Fisher, Lothmann, Halliburton and Dowell as they do. It will giveyou some insight but please regardit as confidential to protect him.

"--- was connected with the Chambers sand deal and helped with the pilot plant. Was really sorry when the deal blew up as that area is a good source of fracture sand. The Arizona sand, if it is beneficiated and graded, can get the Farmington, New Mexico and Vernal, Utah markets.

" If you had good sand you could get 1,500 to 2,000 tons per month at Farmington right now and if you hold the price down you can pick up part of the SouthEast New Mexico and West Texas market. --What do I mean by price? From $5.50 to $6.50 per ton at the plant - that's Lothmann's trouble, he boosted the price out of reason. Oh sure, he came down but he had and it didn't set well.

" -- Both companies (Halliburton and Dowell) are interested in the Arizna sand. They want a surce where they aren't dependent on the railroad; they want good sand and a dependable source. You people have several conversations with both companies; you've made several trips to talk to them. I know they are interested; that they want the sand but they want to see some action and not talk. You get a plant going and you will have the market. How do I know? How do I know you were in Lubbock; tht Del Fisher was in Farmington the first part of the month? But you can't quote me; I'd just deny it because I can't have my pipeline blocked.

" -- I think that California market will be good before long. They have not done much sand fracing here but there are 2,600 wells that are potential customers. So far the sand has been shipped in bags but they (Halliburton) has built two bulk plants in the past few months. The California sand will have to be coarse, we havn't any in this State and the Arizona sand will be good. Has Lothman tried to sell the coarse sand? Yes, but he wanted $10.00 per ton - didn't get to first base.

" -- you peopleknow what you are doing but from my viewpoint I would urge you to put up a plant and get it up soon. Do a good job ofbeneficiating and screening and you can sell the sand. But don't wait too long. Show the boys a little action and you'll get results.

" I heard Lothmann had offered to sell and that Fisher was waiting to see how his water exploration comes out. In my opeinion you would be foolish to buy an old plant at a high figure. If you work it, you are no better off than Lothmann; if you move it to Burntwater you have an old plant; he has money and can put up a good plant on your money. If the ground

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is transferred to your company an you move the plant away, the Tribe will probably issue permits to someone else. It's hard to buy off competition but if you build a good plant, run it efficiently and hold the cost down you can keep the market.

" -- I still think that the Arizma sand is as good for fracturing as any on the market. The Monterey sand is coarse but isn't a high silica nor the right shape. Tha silica sand used in glass making is like this (Corona sand is flat and sharp - WPC) "

Chambers, Arizona
2-1-58

Wm. P. Crawford

Phoenix, Arizona

Dear Bill:

Received your letter when I arrived home last evening from jury duty at St. Johns, and it surely did pep me up. In November I took the Chambers Trading Post back over and let me tell you I have had my nose to the old grind stone. I thought any day you would be headed some place or the other and stop in and see us. Then I thought again, hell, too cold for you up here, just **wait till summer and then they will start showing themselves.**

Bill, Lothmann, I believe is hurting bad. They have been spending a lot of money and getting nowhere. Since December thet have drilled 700 feet of water well with no water. They have been using a rotary rig and using a lot of mud, and they don't know whether they ever hit water of not. They are having Cowleys from St. Johns come in and try again for water enough for a washing plant. I was talking to Mr. Sibley this morning and someone has told him he can get hot water around 2200 ft. There ha sn't been much change in their plant since you were here. They are just running it through more times trying to clean it up, with plant continuously breaking down.

There has been only two Whitfield trucks in since November; I presume that is all Halliburton has gotten from here since then. They haven't cleaned the sand up much but Dowell is still coming regularily for it.

It has come to me through the grapevine that Lothmann has **sold some of his uranium stock to keep the plant here in operation.** How true that is I don't know. When you say that speed is essential I sure go along with you on that. Course I would, but honestly I can't see another years operation for them a t the speed that they are progressing now.

One other thing before I close, I would like to make you or your associates a deal. I will discount my contract $2,000.00 for some quick money. Of course as usual I'm backed against the fence for money, especially since I took the big store back over. If anything at all could be worked out send me a wire and I'll fly down to see you.

Regards to you and your family.

Yours truly,

Peter Balcomb

Peter Balcomb

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BURNTWATER WASH SAND DEPOSIT
Apache County, Arizona

AMENDED FLOW SHEET of PROPOSED SAND PROCESSING PLANT

The amended flow sheet for the proposed sand processing plant on Burntwater Wash is shown on the two prints. Revisions from the flow sheets in the report of November 1, 1957 are:

1. Pit-run sand will be dumped ahead of reclaiming tunnel, forming a stock pile of 500 - 1,000 tons.

2. Sand will be piled ove reclaiming tunnel by slusher hoist and slusher rake. Substitution of slushingsystem will eliminate inclined belt conveyor and will provide larger plant stock pile.

3. Sand from reclaimingtunnel will pass over shaker screen to remove coarse material above 4 mesh. Screen undersize will be washed in scrubber tank with high pressure water jets; pulp will flow to 3-inch sand pump. Sand pump will deliver pulp at 30% - 40% solids to primary screen, for wet screening.

4. Plus 20 mesh sand to screw dewaterer; minus 20 mesh to a second 3-inch sand pump which will deliver the pulp to the second screen. Plus 40 and 60 mesh sands to screw dewaterers; minus 60 mesh to third 3-inch sand pump to delivery to sand cone and tailing pond.

5. Discharge from screws to bins. Sands will be reclaimed by slusher hoist and rake to belt conveyor to dryer. Surplus will be loaded by the sluher into truck for delivery to screened sand stockpile.

6. Sand from dryer into bins. Bins to be made of steel shell supported by wooden frame. Loading from bin to trucks by conveyor.

High pressure water jets combined with the scrubbing action in the sand pumps willproduce a cleaner sand than wet screening alone. The substitution ofpumps for belt conveyors or bucket elevators and the addition of a pumping stage between the screening will reduce the required height of the screen building.

Pumps will be standard pumps used in ore concentration practice.

It is recommended that timber be used for all construction where possible. Timber can be framed and erected by semi-skilled labor. Delivery costs will be less.

The flow sheet, as shown, is designed for a plant built on flat terrain. If the plant can be built on a slope, then gravity can be utilized to move the material.

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Memo to Mr. Leslie A. Wood on Burntwater Washsand plant.

Dear Mr. Wood:

On several occasions you have mntioned you would like to see a sand plant designed for a production of 50 to 120 tons per day which could be built as a "Poor Boy" enterprise and enlarged out of profits. I believe the one shown on the accompanying flow sheet will meet your requirements. As designed, it will produce clean, washed sand, scrubbed to eliminate soft particles and with ample stockpiling for the various products. Particular attention has been paid to water recovery.

The plant design requires a minimum amount of steel fabrication. The reclaiming tunnel, the screen building and the ore bins will be wood framed, using native timber from the Navajo Tribal Sawmill. Framing will use timber connectors, both split rings and shear plates. Both framing and erection can be done by semi-skilled labor.

The sand will be scrubbed by high pressure water jets and moved through the plant by sand pumps. The sand pumps will yield additional scrubbing action and the maintenance on the rubber lined pumps is low. Power requirements are also low.

Stockpilingboth pit-run and screened material will use slusher hoists and rakes. The hoist on the screened stock pile will deliver the sand either to a conveyor belt feeding the dryer or can load out trucks with undried sand.

You will recall that a figure of $160,552.00 was set up for capital expense in the report dated November 1, 1957. As exact knowledge of the plant site was not known the capital costs were figured for a plant located on flat terrain with material costs based upon thelist price of new equipment.

The figureof $160,552.00 can be reduced $20,000 by the revised flow sheet and costs are again based upon new equipment. Distributor or "bird dog" discounts on new equipment can reduce the capital expense still furthur and certain items can be second hand.

I have made working sketches of the installations in the revised flow sheet, have securd prices on part of the material but a detailed cost estimate cannot be compiled until the actual plant site is located and surveyed. The plant should be located on sloping ground, on the east side of Burntwater Wash and accessible to the highway.

The surveying should be done as quickly as possible. The field work will ~~require~~ a two-man party and surveying and cross-sectioning the plant site, runing a profile of the transport truck road should not exceed two and one-half days.

If your group will bear the mileage, the living expenses at Sanders, and a per diem of $25 to Dale Milner for field work, I will contribute my field work on the plant site location and my office work to get out a detailed estimate on the cost of building a plant. Oncewe have a detailed estimate you can decide whether you want to build the plant.

W. T. Crumpton

Phoenix, Arizona
Feb. 7, 1958

MEMO

Arizona Silica Sand Co.

Feb. 27, 1961

Travis P. Lane

Francis E. Cooper of Bancorporation advises that the corporation disposed of its interest to Del W. Fisher in Dec. 1960. Fisher now owns the enterprise outright and is continuing the operation without name change. Thomas Fallon is the manager. Some plant alterations are being made at the present time. Production rate during 1960 ranged from 1,000 to 5,500 TPM. 10 to 17 men are employed. Sales are handled by Jack Brown of the Research Department of Fisher Contracting Co., 2201 S 19th Ave., Phoenix. Phone AL 8-7741.

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DEPARTMENT OF MINERAL RESOURCES

STATE OF ARIZONA

FIELD ENGINEERS REPORT

Mine: ARIZONA SILICA SAND — Date: September 2, 1959

District: Apache County (At Houck) — Engineer: Frank P. Knight

Subject: Visit

Mr. William Crawford took the writer through the plant, which after rather a long spell of troublesome details, is running smoothly.

The silica sand from either the Wide Ruins or Burnt Water deposit (the latter in Secs. 7, 9, 18, T. 22 N., R. 29 E., and Sec. 22, T. 23 N., R. 27 E.) is dumped from trucks thru a close grizzly onto a long conveyor to a primary storage bin (steel tank 16' diameter, about 63' high, the top part of which is a water tank). A feeder delivers the sand to a bucket elevator discharging into a watering trough from which it passes to a vibrating 10 mesh screen. The plus 10 mesh falls to a dump and the undersize to a washer with about a 24 inch screw. The washer overflow runs into a field from which it drains into the river bed and into the well. The washed sand runs about 22% H_2O and passes to a rotary drier from which it is discharged at not over 180°. After passing through a cooling tower it is elevated to four circular vibrating screens about 4' in diameter with from two to four decks.

Minus 10 plus 20, minus 20 plus 40 and minus 40 plus 60 sizes are produced at present and are stored in three 20' diameter by 60' high steel bins. The minus 60 mesh material is at present waste.

All of the steel bins are former Santa Fe Railroad water tanks. The Houck Station, about 100 yards distant, and the plant are on railroad land. The water supply from the well is large. The railroad land is surrounded by Navajo lands.

Crawford, a young white man and two Navajos were working at the time of the visit.

The sand is trucked by large cement-type trailer combination trucks to Farmington where it is used by and Howell, oil drillers. It is used in sand fracturing of oil strata. A hole is made at a proper place in the well casing and either water and sand or oil and sand is pumped thru the hole into the strata at high pressure. The strata is fractured and the sand remains to hold it open for drainage. 50 or 60 tons may be used in one hole and the Farmington drilling company takes the entire capacity of the plant. Close sizing and rounded sand grains are essential.

A railroad siding can easily be extended to the plant when needed but so far all material has been transported by trucks. The plant capacity is about 12 tons per hour, at present. A drainage floor to reduce the moisture in the drier feed to about 10% is contemplated. With the added drier capacity so effected and with the addition of two Tyler screens it is expected that the plant capacity will be increased to 25 tons per hour. The sand use at Farmington may run as high as 6,000 tons per month.

Some of the equipment of the plant is from the former Lothman plant at Wide Ruins about 15 miles north of Chambers.

There is a 50-ton platform scale near the plant to handle incoming and outgoing loads.

The plant has had numerous bugs and finally to please the Navajo boys working there, their medicine man was called in to chase away the evil spirits. After visiting the plant the troubles persisted and the boys suggested that it might be the trucks. After further treatment of the trucks all seemed to be well. They are hoping that they will stay well.

DEPARTMENT OF MINERAL RESOURCES

STATE OF ARIZONA

FIELD ENGINEERS REPORT

Mine ARIZONA SILICA SAND Date NOVEMBER 14, 1958

District Engineer FRANK P. KNIGHT

Subject: Arizona Silica Sand Company
Phoenix, Arizona

This company is building a sand treatment plant next to the railroad near the Houck, Arizona station. A bin foundation and conveyor pit are ready. The Santa Fe water tanks have been repaired and reset for storage bins. A dryer and screening section were partially installed.

No representative of the company was present and the writer talked with Bob Wilkinson, local manager of Fisher Contracting Company who are building the plant. He said that they expected to be finished in February and that William Crawford, formerly Phelps Dodge Superintendent at Bisbee, would manage the operation. The sand company owns claims 8 miles to the north which were not visited.

These claims are said to lie next to those of Lothman who is not connected with the company but who may possibly supply some sand.

Water will come from a Santa Fe railroad well adjacent to the plant.

The sand is to be used chiefly for oil well operation where it will be dumped into the reservoir to provide better seepage and easier pumping. For this purpose it is desirable to have the rounded sand grains which their claims contain. A small pile of sand showed such grains and appeared to be exceptionally clean. However a large log-washer was there ready to be installed.

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DEPARTMENT OF MINERAL RESOURCES

STATE OF ARIZONA

FIELD ENGINEERS REPORT

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District Engineer **FRANK P. KNIGHT**

Subject: **Arizona Silica Sand Company**
Phoenix, Arizona

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B23

HOUCK SILICA SAND (file)

This is a follow up to a previous analysis of three samples from Arizona Silica in Houck, AZ. (See my memo to JDA of 10/24/87) The chemical analysis, you requested, is listed below.

CHEMICAL ANALYSIS

SAMPLE I.D.	12/20	20/40	#50
SiO2	98.60 %	98.50 %	96.00 %
Fe2O3	.108	.12	.32
Al2O3	.50	.56	2.74
TiO2	.030	.030	.026
CaO	.12	.14	.22
MgO	<.01	<.01	<.01
L.O.I.	.61	.62	.64

Analysis provided by third party from which AOMMP obtained this copy. Sources believed reliable
KAP 7/12/1989

Results are reported below of the three samples you submitted from Arizona Silica in Houck, AZ. The 12/20 sample actually qualifies as an API 16/30 Frac Sand and not a 12/20. The 20/40 sample qualifies as an API 20/40 Frac Sand. The #50 sample is actually an AFS #40 sand instead of an AFS #50.

% Individual Sieve Retention

Mesh	12/20	20/40	#50
12	0.0	---	---
16	2.0	0.0	---
18	17.9 \	---	---
20	59.7 97.9	3.4	0.0
30	20.3 /	70.3\	1.4
40	---	23.9/ 94.2	26.7
50	---	2.3	46.1
70	---	---	20.4
100	---	---	5.0
140	---	---	0.3
200	---	---	tr
270	---	---	tr
PAN	0.1	0.1	tr

API Frac Sand Specs

+12 Mesh	<0.1	+16 Mesh	<0.1	AFS # 40.9
16/30	>90.0	20/40	>90.0	
-40 Mesh	<1.0	-50 Mesh	<1.0	

G. AUSTIN SCHROTER
CONSULTING ENGINEER - GEOLOGIST
3515 SUNSET BOULEVARD
LOS ANGELES 26, CALIF.

JANUARY 13, 1956

MR. F. N. RUMBLEY
668 LORING AVENUE
LOS ANGELES 24, CALIF.

DEAR MR. RUMBLEY:

CONFIRMING THE ORAL INSTRUCTIONS OF YOURSELF AND MR. WALTER DAVIS AS OF 29 DECEMBER, AS WELL AS YOUR WRITTEN INSTRUCTIONS OF 11 JANUARY, 1956, YOU WILL FIND HEREWITH ADDITIONAL TECHNICAL DATA BEARING UPON THE NAVAJO SAND DEPOSITS NORTH OF CHAMBERS, ARIZONA.

TONNAGE FIGURES AND COMPOSITE SCREEN ANALYSIS FOR THE VARIOUS SAND LENSES SO FAR DRILLED HAVE PREVIOUSLY BEEN FURNISHED TO YOU IN OUR REPORT 15 DECEMBER, 1955. THIS REPORT IS CONCERNED WITH ESTIMATED CAPITAL EXPENDITURES AND OPERATING COSTS IN A PROJECTED PLANT TO BE BUILT IN THE GENERAL NAVAJO-CHAMBERS-SANDERS AREA OF APACHE COUNTY, ARIZONA.

WE HAVE HAD OCCASION TO INVESTIGATE THE VARIOUS TYPES OF FLOW SHEETS INVOLVED TO PRODUCE A PRODUCT FALLING WITHIN THE SPECIFICATIONS WHICH YOU HAVE FURNISHED TO US FOR USE OF THIS MATERIAL AS A FRACTING SAND. BECAUSE OF THE RELATIVELY COARSE MESH SIZES, IT DOES NOT APPEAR FEASIBLE TO PROCESS THIS MATERIAL BY HYDRAULIC CONES OR CYCLONES. ACCORDINGLY, THE BUDGET AND COST DATA BELOW ARE BASED UPON A CONVENTIONAL DRY SCREENING PLANT LOCATED ON FLAT TERRAIN. THE FOLLOWING PHYSICAL CHARACTERISTICS OF THE MATERIAL WILL BE OF AID TO ANY ENGINEER CALLED UPON TO DESIGN SUCH A PLANT IN DETAIL:

1. <u>CHEMICAL COMPOSITION</u>: IN CONSIDERING POSSIBLE MARKETS OTHER THAN FOR SAND FRACTING, IT IS NECESSARY TO GIVE DUE CONSIDERATION TO THE CHEMICAL COMPOSITION OF THE MATERIAL. IN ORDER TO HOLD EXPENSES TO A MINIMUM WE HAVE CAUSED ONLY ONE CHEMICAL ANALYSIS TO BE MADE ON COARSE BANK-RUN MATERIAL FROM THE EXISTING PIT. THE FOLLOWING ANALYSIS WAS MADE BY EMERSON P. POSTE, CHEMICAL ENGINEER, CHATTANOOGA 3, TENNESSEE:

ACID INSOLUBLE			99.06%
SILICA	(SiO_2)	97.91%	
ALUMINA	(Al_2O_3)	0.94	
IRON OXIDE	(Fe_2O_3)	0.14	
LIME	(CaO)	0.12	
MAGNESIA	(MgO)	0.08	
SODA	(Na_2O)	0.23	
POTASH	(K_2O)	0.09	
			99.51%

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IT IS OUR OPINION BASED ON VISUAL OBSERVATIONS AND SIMPLE FIELD CHEMICAL TESTS THAT THE LIME CONTENT IS SOMEWHAT HIGHER IN OTHER LENSES, THAN IS SHOWN IN THE ANALYSIS, BUT THIS IS A MATTER WHICH CAN BE INVESTIGATED MORE IN DETAIL AS AND WHEN YOU DECIDE ON YOUR FUTURE PLANS.

2. SCREEN ANALYSES: THE COMPOSITE SCREEN ANALYSIS AS GIVEN IN OUR REPORT OF 15 DECEMBER, 1955, INDICATES THE TONNAGE AND AVERAGE SCREEN ANALYSIS WHICH WOULD BE EXPECTED IN MINING MATERIAL FROM THE FIVE AREAS SO FAR DEVELOPED. IT IS ONLY NECESSARY TO CONSIDER THE OVERALL COMPOSITE SCREEN ANALYSIS IN DESIGNING ANY PROJECTED PLANT. THE AVERAGE SCREEN ANALYSIS FROM ANY GIVEN MINE AREA MUST, OF COURSE, BE CONSIDERED BY YOUR MINE SUPERINTENDENT DURING THE COURSE OF OPERATIONS, SINCE IT MAY BE NECESSARY TO BLEND MATERIALS TO GIVE A UNIFORM PLANT FEED. HEREWITH IS THE AVERAGE SCREEN ANALYSIS FOR EACH OF THE AREAS DEVELOPED TO DATE, BASED ON THE WEIGHTED AVERAGE OF 50 SCREEN ANALYSES OF DRILL SAMPLES FROM THE VARIOUS AREAS:

AREA	+10 M.	-10+20 M.	-20+40 M.	-40+60 M.	-60 M.
1	0.11%	35.31%	32.00%	16.5%	16.08%
2.	0.11	37.20	39.34	12.20	11.15
3	0.04	29.53	34.34	21.68	14.41
4	1.05	38.17	21.28	13.90	25.60
5	1.27	27.09	28.39	19.58	23.67

3. PRELIMINARY ESTIMATE FOR COMMERCIAL PLANT INSTALLATION: IT IS NOT POSSIBLE TO GIVE DETAILED FIGURES FOR PLANT CONSTRUCTION WITHOUT HAVING EXACT KNOWLEDGE OF THE PLANT SITE. THIS WILL BE READILY UNDERSTOOD WHEN ONE CONSIDERS THAT IT IS CONSIDERABLY MORE EXPENSIVE TO BUILD A PLANT ON FLAT TERRAIN THAN WHEN THE PLANT IS BUILT UPON A HILLSIDE UTILIZING THE FORCE OF GRAVITY TO MAXIMUM ADVANTAGE. WE WOULD ALSO REQUIRE EXACT DETAILS PERTAINING TO THE BEARING POWER AND EXCAVATING CHARACTERISTICS OF THE SOIL, THE DISTANCES TO AGGREGATE SOURCES, MORE DETAILED INFORMATION PERTAINING TO ELECTRICAL ENERGY SOURCES, AND MANY OTHER FACTORS WHICH CAN BE ASCERTAINED ONLY WHEN A POSSIBLE PLANT SITE HAS BEEN CHOSEN. THE OVERALL COST OF THE PLANT IS A FUNCTION OF ITS CAPACITY, AND AS WE INFORMED YOU IN NOVEMBER, A GOOD ESTIMATING FIGURE FOR A DRY SCREENING PLANT OF THIS STYLE IS $500/TON OF FEED. THUS THE 100 TON PLANT CONTEMPLATED BY MR. RUMBLEY AT THAT TIME WOULD COST APPROXIMATELY $50,000; A 125 TON PLANT WOULD COST APPROXIMATELY $62,500, ETC.

YOU HAVE ASKED US TO ESTIMATE THE COST OF A PLANT CAPABLE OF PRODUCING EIGHT TONS PER HOUR OF FINISHED MATERIAL, WHICH IS EQUIVALENT, ON THE BASIS OF THE COMPOSITE SCREEN ANALYSIS, TO A PLANT FEED OF TEN TONS PER HOUR OR 240 TONS PER DAY OF THREE SHIFTS. IT IS INTERESTING TO NOTE THAT BASED ON FIRM BIDS AND USUAL ESTIMATING FACTORS FOR FREIGHT AND ERECTION COSTS THE PRECISE FIGURE IS $509/TON OF FEED. IT IS THEREFORE SAFE FOR YOU TO USE THIS FIGURE IN ESTIMATING YOUR BUDGET. THE TOTAL PLANT COST MAY BE OBTAINED BY MULTIPLYING THE 24-HOUR FEED RATE IN TONS BY $500 PER EACH TON OF FEED.

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G. AUSTIN SCHROTER
CONSULTING ENGINEER - GEOLOGIST

THE PLANT CONSTRUCTION FIGURES HEREWITH CONTEMPLATE THE WORST POSSIBLE CONDITIONS, NAMELY, A PLANT SITE BUILT ON FLAT TERRAIN WITH HYDRAULIC DISPOSITION OF TAILINGS AND MAINTENANCE OF TAILINGS DAM. IT ALSO CONTEMPLATES USING NEW EQUIPMENT, UNLESS OTHERWISE INDICATED, AND THE OVERALL BUDGET CAN BE REDUCED PROPORTIONATELY BY THE AMOUNT OF SECOND-HAND EQUIPMENT USED. IT IS PERFECTLY PERMISSIBLE TO USE SECOND-HAND STEEL BINS, FOR EXAMPLE, BUT IT IS NOT RECOMMENDED THAT PRIMARY CONVEYING AND SCREENING EQUIPMENT BE OTHER THAN NEW EQUIPMENT.

SCHEDULE ONE

APPROXIMATE CAPITAL COST
SAND SCREENING PLANT- 10 TONS/HR. FEED
CHAMBERS-SANDERS AREA, APACHE COUNTY, ARIZONA
(SEE FLOW SHEET 11 JANUARY, 1955)

ITEM	F.O.B. COST	FREIGHT	APPROX. ERECTION	TOTAL	SUGGESTED SOURCE
CONCRETE DISCH.RAMP	-	-	$ 1000.00	$ 1000.00	FORCE ACCOUNT
30-TON STEEL HOPPER WITH GATE	$1000.00	$ 100.00	250.00	1350.00	STEPHENS-ADAMS, L.A.
1/2" GRIZZLY, 15' x 15'	1000.00	100.00	250.00	1350.00	STEPHENS-ADAMS, L.A.
20 FT^3 MINE CAR & TRACK	300.00	30.00	75.00	405.00	USED EQUIPMENT
VIBRATOR, BIN	100.00	10.00	25.00	135.00	SYNTRON CO.-SOUTHGATE
FEEDER, 18" x 12'	1500.00	150.00	375.00	2025.00	STEPHENS-ADAMS, L.A.
ELEVATOR, 50', 10" x 6"	6000.00	600.00	1500.00	8100.00	STEPHENS-ADAMS, L.A.
STOCK BIN, 300 T., STEEL	8500.00	850.00	2125.00	11475.00	STEPHENS-ADAMS, L.A.
VIBRATOR, BIN	100.00	10.00	25.00	135.00	SYNTRON CO., SOUTHGATE
FEEDER, 18" x 12'	1500.00	150.00	375.00	2025.00	STEPHENS-ADAMS, L.A.
BELT CONVEYOR, 18" x 50'	2400.00	240.00	600.00	3240.00	STEPHENS-ADAMS, L.A.
ROTARY DRYER, 36" x 16', W/MOTOR, DRIVE, FAN, BURNERS & CONTROL	10000.00	700.00	2500.00	13200.00	STANDARD STEEL, L.A.
ELEVATOR 50', 8" x 5"	5000.00	500.00	1250.00	6750.00	STEPHENS-ADAMS, L.A.
SCREEN, D.D., 4' x 8', W/MOTOR & DRIVE	2100.00	210.00	525.00	2835.00	OVERSTROM & SON, ALHAMBRA
CONDUIT, STEEL, 65' x 4"	65.00	6.50	16.25	87.75	USED EQUIPMENT
CONDUIT, STEEL, 10' x 6"	15.00	1.50	3.75	20.25	USED EQUIPMENT
SCREEN, SD, 4'x 8', COMPLETE	1400.00	140.00	350.00	1890.00	OVERSTROM & SON, ALHAMBRA
CONDUIT, STEEL, 10' x 6"	15.00	1.50	3.75	20.25	USED EQUIPMENT
SCREEN, SD, 4'x8', COMPLETE	1400.00	140.00	350.00	1890.00	OVERSTROM & SON, ALHAMBRA
STEEL CONDUIT, 60' x 4"	60.00	6.00	15.00	81.00	USED EQUIPMENT
3 COMPART. STEEL BIN, 500 TON W/GATES	15000.00	1000.00	3750.00	19750.00	STEPHENS-ADAMS, L.A.
PLATFORM SCALES, 60' WITH REG.BEAM, 50 T.	4190.00	419.00	1047.50	5656.50	HARDY SCALE, MAYWOOD
BUILDING, C.I., STEEL AND WOOD FRAMED	14000.00	1400.00	4600.00	20000.00	LOCAL CONTRACT OR FORCE

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G. AUSTIN SCHROTER
CONSULTING ENGINEER GEOLOGIST

SCHEDULE ONE (CONT'D.

ITEM	F.O.B. COST	FREIGHT	APPROX. ERECTION	TOTAL	SUGGESTED SOURCE
• SEP. MOTOR SCHEDULE:					
2-1½ H.P., 220/440, AC	$228.80	DEL.	$ 57.20	$ 286.00	STERLING MOTORS, L.A.
2 - 2 H.P., SAME	275.60	DEL.	68.90	344.50	STERLING MOTORS, L.A.
1 - 5 H.P., SAME	192.40	DEL.	48.10	240.50	STERLING MOTORS, L.A.
MISC. ELECTRICAL GEAR	1500.00	$ 150.00	375.00	2025.00	LOCAL CONTRACT
FIRE & SAFETY EQT.	500.00	50.00	50.00	600.00	H&P FIRE EQT. & B.F. MCDONALD, LOS ANGELES
COMBUSTION CHAMBER	500.00	25.00	125.00	650.00	LOCAL CONTRACT, GALLUP
TAILINGS FLUSHING AND LAUNDER	1500.00	100.00	375.00	1875.00	FORCE ACCOUNT
TOTAL				$122139.75	
APPROX. COST/TON				$ 509.00	

NOTE ON MOTORS: FIGURED FOR FULLY ENCLOSED, FAN-COOLED, CAPACITOR-TYPE. DISCOUNTS FROM LIST VARY FROM 35% - 50% (FOR REGALE). 35% DISCOUNT FIGURE USED. EQUIPMENT COMPLETE WITH MOTORS WHERE SPECIFIED.

GENERAL NOTES ON ABOVE COSTS:

A. ELECTRICAL ENERGY: ABOVE ESTIMATE CONTEMPLATES PURCHASE OF ELECTRICAL ENERGY FROM R.E.A. FOR NOT OVER $.015/KWH. IF A CONTRACT CANNOT BE EFFECTED WITH THE R.E.A., IT WOULD BE NECESSARY TO INSTALL ELECTRICAL GENERATING EQUIPMENT AT THE PLANT SITE FOR WHICH THE CAPITAL COST IS APPROXIMATELY $9500 ERECTED, FOR A 50 K.V.A. DIESEL GENERATOR.

B. WATER SUPPLY AND SEWERAGE DISPOSAL: FOR INSURANCE PURPOSES YOU SHOULD CONSIDER AN ADEQUATE SUPPLY OF WATER FOR BOTH PROTECTION AND SANITARY USE. COST CANNOT BE ESTIMATED UNTIL PLANT SITE IS CHOSEN. IF NECESSARY TO DEVELOP WATER, A.T. & S.F. RY. REPORTS DEPTH TO WATER TABLE AT CHAMBERS TO BE 85 FEET. CONVERSELY, YOU MAY ELECT TO DO WITHOUT WATER SUPPLY, BUT SINCE YOU ARE PROCESSING AN INDUSTRIAL POISON (SILICA), THE ARIZONA INDUSTRIAL COMMISSION WILL PROBABLY ULTIMATELY REQUIRE SANITARY CONDITIONS WITH RUNNING WATER. FOR FIRE PURPOSES, IT MAY BE POSSIBLE TO GET BY WITH A WINDMILL AND ELEVATED TANK IF NO OTHER WATER SOURCE AVAILABLE. IF YOU ELECT TO PROVIDE FOR SANITARY SEWERAGE DISPOSAL A SIMPLE IMHOFF TANK WITH CHLORINATION OF EFFLUENT SHOULD BE WEIGHED AGAINST COST OF CESSPOOL.

C. DRIVES AND MISCELLANEOUS EQUIPMENT: COVERED IN ABOVE COSTS.

D. BUILDING: THE MILL CONSTRUCTION BUDGET CAN BE REDUCED BY APPROXIMATELY $20,000 BY ELIMINATION OF PAVED FLOOR BUILDING. HOWEVER, DUE CONSIDERATION SHOULD BE GIVEN TO CLIMATIC CONDITIONS AT THE PLANT SITE. STRONG SOUTHWESTERLY WINDS BLOW A GOOD PART OF THE YEAR AND WILL TEND TO INCREASE YOUR COMPENSATION RATE BECAUSE OF SILICOSIS HAZARD AND ALSO TEND TO

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DISSIPATE SALEABLE PRODUCTS FROM THE SCREENS IF COVER IS NOT PROVIDED. IN WINTER MONTHS, WORKERS MUST BE PROTECTED FROM THE COLD. ADEQUATE HEAT RADIATION FROM THE DRYER WILL SERVE THIS FUNCTION IF THE PLANT IS ENCLOSED.

E. LIGHT AND SANITATION: INCLUDED IN ESTIMATED PLANT COST.

F. WEIGHT DETERMINATION: CAPITAL BUDGET FOR PLANT CAN BE REDUCED APPROXIMATELY $5600 BY DEPENDING UPON PUBLIC WEIGHMASTER SCALES, SINCE TRUCKS MUST BE WEIGHED AT THE NEW MEXICO LINE. SINCE YOU ARE SELLING MATERIAL BY THE TON IT MAY BE ECONOMICALLY MORE FEASIBLE TO INSTALL PLATFORM SCALES UNDER THE FEED SPOUTS OF THE PRODUCT BINS. COST OF SCALES INCLUDED IN ABOVE FIGURES.

4. CHOICE OF DESIGN AND ERECTION: IT WILL BE NOTED THAT THE EQUIPMENT FOR THE PLANT WILL BE SUPPLIED BY VARIOUS VENDORS. NO SINGLE VENDOR OF OUR ACQUAINTANCE IS CAPABLE OF SUPPLYING ALL OF THE EQUIPMENT. SPEAKING BROADLY, IT IS NOT GENERALLY WISE TO ISSUE A TURNKEY CONTRACT FOR A COMPLETE PLANT TO ANY MACHINERY MANUFACTURER. IF YOU ELECT TO ADOPT THIS METHOD OF CONSTRUCTION, INCREASE THE ABOVE COSTS BY 25% TO ALLOW FOR SUB CONTRACT PROFITS AND BOOKKEEPING BY THE MACHINERY COMPANY. ENGINEERING COSTS FOR DETAILED DESIGN ARE NOT INCLUDED IN PLANT FIGURES AND USUALLY RUN 5% TO 7% OF THE TOTAL PLANT COST REGARDLESS OF WHETHER YOU ELECT TO HAVE INDEPENDENT ENGINEERS DESIGN THE PLANT OR CONTRACT DESIGN AND CONSTRUCTION TO A MACHINERY MANUFACTURER.

5. COST ACCOUNTING AND FUTURE EXPLORATION: IT IS ESSENTIAL IN A MINING OPERATION TO SEGREGATE YOUR COSTS SO AS TO REFLECT THE COST OF INDIVIDUAL OPERATIONS. THIS IS ESSENTIAL BOTH FROM THE STANDPOINT OF COST ACCOUNTING AND TAXATION. FOR EXAMPLE, MOST OF THE CHARGES ACCRUED BY THIS FACILITY AGAINST YOUR OPERATION ARE NOT ENGINEERING COSTS BUT ARE DEVELOPMENT AND SAMPLING COSTS. IN OTHER WORDS, REGARDLESS OF WHO DOES THE WORK OR HOW IT IS DONE OR WHAT IT IS CALLED, YOU WILL ACCRUE A DEVELOPMENT COST PER TON. SO FAR YOU HAVE DEVELOPED 56,000 TONS OF SALEABLE MATERIAL MORE OR LESS.

THE COST OF DOING THIS IS DIVIDED BETWEEN ENGINEERING, SUPERVISION, GEOLOGY, LABOR AND SURCHARGE COSTS, TOOLS, SAMPLING, AND LABORATORY. WE WOULD ESTIMATE THAT ROUGHLY 20% OF THE TOTAL BILLINGS WHICH YOU HAVE RECEIVED FROM US REPRESENT STRAIGHT ENGINEERING, INCLUDING THE COST OF PREPARING THIS ESTIMATE. THE BALANCE OF THE CHARGES ARE FOR PREPAID DEVELOPMENT AND MUST BE SET UP AS AN ASSET ON YOUR BOOKS AS AND WHEN YOU BEGIN OPERATION.

6. OTHER MINERALS: AS AND WHEN YOU PERFECT YOUR DEAL AND THE INDIAN LEASES AND PROCEED WITH FURTHER DEVELOPMENT WORK, YOU SHOULD INSTRUCT YOUR ENGINEERS TO EXPLORE FOR AND MAP THE CATALYTIC CLAY WHICH WE HAVE BRIEFLY OBSERVED ON THE PROPERTY. THIS MAY PROVE TO BE AN

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EXTREMELY VALUABLE RESOURCE, FAR MORE VALUABLE THAN THE FRACTING SAND, DEPENDING UPON DEVELOPMENT AND EXPLORATION WORK. ALL WE CAN SAY IS THAT WE HAVE OBSERVED THIS MATERIAL IN WIDELY SCATTERED OUTCROPS AND WE ADVISE YOU TO FOLLOW IT THROUGH.

7. OPERATING COSTS IN THE PROJECTED PLANT:

SCHEDULE TWO
ESTIMATED OPERATING COSTS, PROJECTED PLANT

FACTORS

POWER	35 KVA @ .015/KWH
HAULAGE	15 TONS @ .50/MI. = $1.00/TON, BANK-RUN CHAMBERS
STRIPPING RATIO	0.54 YDS^3/TON
EXCAVATING (CONTRACT)	$0.60/YD.^{3} = $0.420/TON, BANK-RUN
COMMON LABOR	$16.00/SHIFT + 11% SURCHARGES = $17.76/SHIFT
FUEL COST	$0.13/GAL., TRUCK & TRAILER
HEAT FACTOR	148,000 B.T.U./GAL.
SUPERVISION	$600.00/MO. + 11% SURCHARGES = $666.00/MO.
ENGR. & DEVELOPMENT	2-MAN DRILL CREW + ENGINEER + JEEP + TRAVEL = $3000.00/MO.
MISC. TRAVEL & LIVING	$600.00/MO.
SPEC. VOLUME, BANK RUN	106 LBS/FT.^{3} = 18.87 FT.^{3}/TON
INDIAN ROYALTY, RENEGOTIATED	$0.20/YD.^{3}, PRODUCT SHIPPED = $0.172/TON, BANK RUN
MILL LABOR, PROJECTED PLANT	2-MAN/SHIFT
CAPACITY, PROJECTED PLANT	10 TONS/HR. FEED
DEVELOPMENT THRU DEC. 1955	$6000.00 FOR 56,000 TONS (FINISHED)

PRODUCTION COST PER TON

MINING & HAULAGE:			
DEVELOPMENT	$.086		
STRIPPING	.324		
MINING (1.43 TONS/YD.)	.420		
ROADS & UPKEEP	.099		
HAULAGE	1.133	2.062	
MILLING & PROCESSING:			
LABOR (3 SHIFTS)		.444	
POWER		.037	
FUEL		.195	
DEPRECIATION/70000 TONS, BANK RUN		1.886	
REPAIR & UPKEEP		.033	
SUPPLIES		.100	
TAILINGS & WASTE		.010	4.767
ADJUST FOR 20% TAIL LOSS			5.959
INDIAN ROYALTY			.140
SUPERVISION			.128
ENGINEERING & TRAVEL			.135
TOTAL @ 70000 TON RESERVE			$6.362/TON PRODUCT
IF RESERVE IS DOUBLED, COST PER TON			5.183
IF RESERVE IS TRIPLED, " " "			4.790

TO WHICH MUST BE ADDED BURDEN AND SALES AND ACQUISITION COSTS.

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8. BREAK-EVEN COST AND BURDEN: THIS FACILITY, OF COURSE, HAS NO WAY OF ESTIMATING YOUR BURDEN, SALES, AND ACQUISITION COSTS SINCE WE ARE NOT FAMILIAR WITH THE OPERATIONS OF YOUR BUSINESS. THE ESTIMATED OPERATING COSTS SHOWN IN SCHEDULE TWO SHOULD BE INCREASED BY A TONNAGE FIGURE EQUIVALENT TO YOUR ESTIMATED SALES, BURDEN, AND ACQUISITION COSTS. WE HAVE ALLOWED FOR A PORTION OF TOTAL TRAVELING COSTS IN SCHEDULE TWO BUT THIS DOES NOT INCLUDE TRAVELING COSTS INCURRED FOR SALES PROMOTION.

AS WE HAVE INDICATED VERBALLY ON SEVERAL OCCASIONS, A PROVEN RESERVE OF 70,000 TONS BANK-RUN EQUIVALENT TO 56,000 TONS OF FINISHED MATERIAL IS NOT AN ADEQUATE RESERVE UPON WHICH TO BUILD A PROCESSING PLANT. YOU WILL NOTE IN SCHEDULE TWO THAT BY DISTRIBUTING THE OVERALL PLANT COST AGAINST A 70,000 TON RESERVE, THAT THE OPERATING COST PER TON WILL BE CLOSE TO $6.35. IF THE RESERVE IS DOUBLED, THE ESTIMATED COST DROPS TO $5.18, AND IF THE RESERVE IS TRIPLED, THE ESTIMATED COST DROPS TO $4.79.

IN ESTIMATING YOUR BUDGET VS. PLANT CAPACITY, YOU MUST AGAIN CONSIDER THE BREAK-EVEN POINT. FOR EXAMPLE, A 50 TON OR A 100 TON PLANT MAY BE NON COMMERCIAL IF DUE CONSIDERATION IS MADE FOR DEPRECIATION, SALES, OVERHEAD AND ACQUISITION COSTS, SINCE THE PLANT OPERATING LABOR AND ACQUISITION COSTS WILL REMAIN FIXED.

WITH THE ABOVE FACTORS BEFORE YOU, YOU ARE IN A POSITION TO MAKE ANY NECESSARY DECISIONS, AND WE RECOMMEND THAT FURTHER DEVELOPMENT WORK BE CONDUCTED BEFORE ANY SIZABLE SUMS ARE EXPENDED IN PLANT ERECTION, UNLESS YOUR INVESTMENT IS OTHERWISE PROTECTED.

VERY TRULY YOURS,

SCHROTER-LOCKWOOD & ASSOC., INC.

G. Austin Schroter

BY G. AUSTIN SCHROTER,
REGISTERED PROFESSIONAL ENGR.
#10155, CALIF. REGISTRY

GAS/ib
ENCL.

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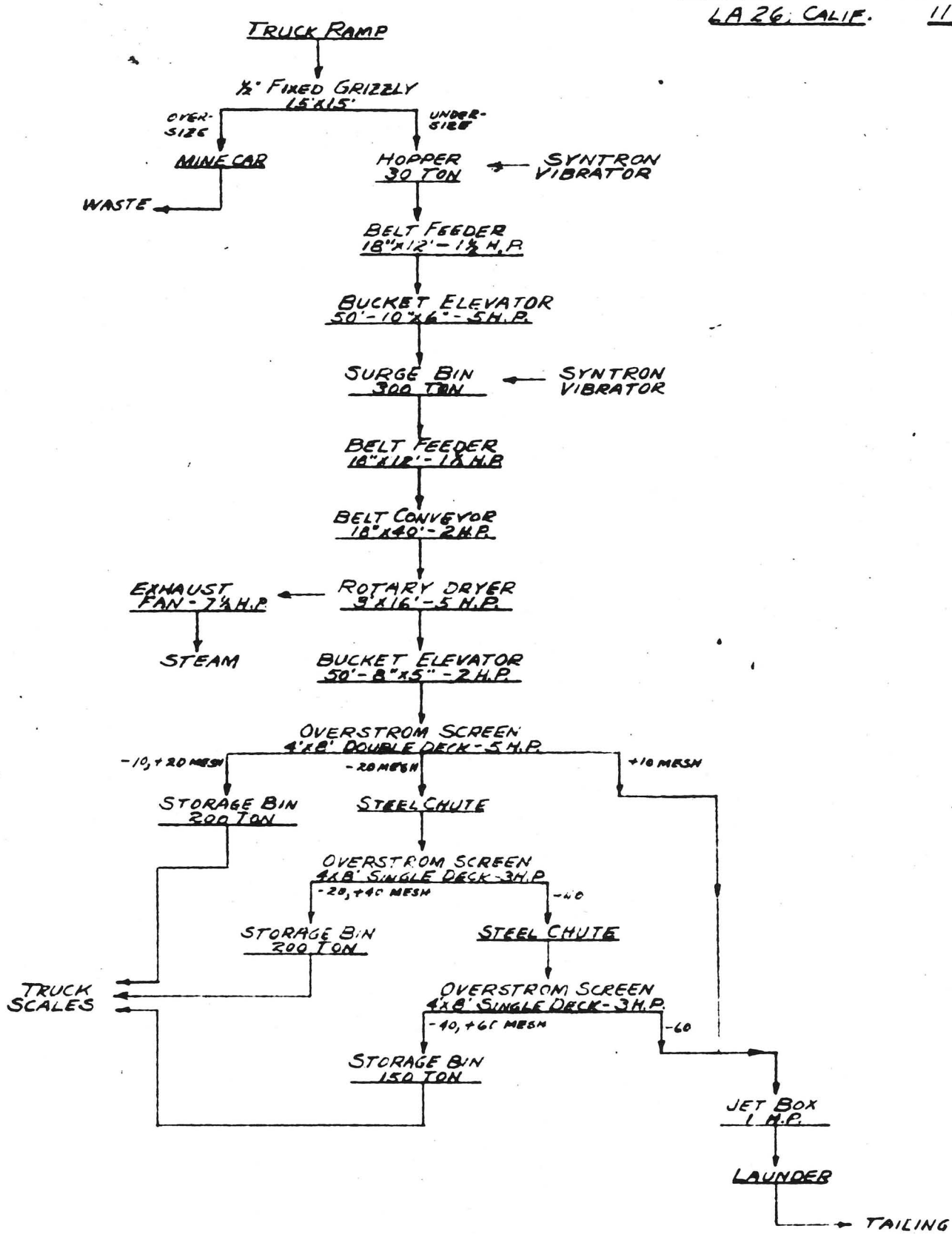
RUMBLEY JOB
NAVAJO SAND PLANT
PRELIMINARY FLOW SHEET

SCHROTER-LOCKWOOD & ASSOC.
LA 26, CALIF. 11 JANUARY 1956



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ARIZONA SILICA SAND CO.

IBLA 95-468 Decided April 22, 1999

Appeal from a decision of the Arizona Deputy State Director, Bureau of Land Management, affirming stipulations to a mining plan. AZ 14-20-0603-8992.

Set Aside and Remanded.

1. Regulations: Applicability

   A sand and gravel mining permit which provides for the applicability of regulations "now or hereafter in force" incorporates future regulations as current permit terms as they become effective, even though such regulations may place additional obligations or burdens on the permittee.

2. Indians: Mineral Resources: Mining: Generally--Mining and Reclamation Plan: Generally

   BLM may condition the approval of a mining plan on the acceptance of stipulations designed to ensure proper reclamation where such stipulations are reasonable and reflect consideration of Indian interests. However, the decision to require particular stipulations must be supported by the record even when they are based on the recommendations of the surface management agency and the tribe involved.

3. Indians: Mineral Resources: Mining: Generally--Mining and Reclamation Plan: Generally

   Under its general authority to approve mining and reclamation plans on Indian lands, 43 C.F.R. § 3592.1, BLM may require the permittee to agree to comply with various stipulations if they are shown to be necessary to meet the reclamation goal of the plan.

APPEARANCES: Jennifer Brooks Gavilondo, Esq., Heidi L. McNeil, Esq., Phoenix, Arizona, for Appellant.

OPINION BY ADMINISTRATIVE JUDGE PRICE

Arizona Silica Sand Company (ASSC) has appealed an April 12, 1995, Decision of the Deputy State Director, Resource Planning, Arizona, Bureau of Land Management (BLM), affirming certain stipulations required as a condition precedent to the approval of a mining and reclamation plan (plan or mining plan). In his letter of July 25, 1994, the BLM Assistant District Manager, Division of Mineral Resources, Phoenix District, conditioned approval of ASSC's mining plan upon its acceptance of five stipulations. ASSC appealed the imposition of three of those stipulations to the State Director. In affirming, the Deputy State Director concluded that the Authorized Officer properly could condition approval of ASSC's mining plan on the company's agreement to fully comply with the stipulations stated in the July 25, 1994, letter.

ASSC has operated a silica sand mine on the Navajo Reservation since 1966 under Bureau of Indian Affairs (BIA) Sand and Gravel Mining Permit Contract No. 14-20-0603-8992 (permit). The permit was issued on April 7, 1966, and approved by BIA on August 10, 1966, for 640 acres, in sec. 29, T. 22 N., R. 29 E., Gila and Salt River Meridian. In November 1982, ASSC agreed to release 130 acres of the permit acreage located in the S½S½ of sec. 29 to the Navajo Nation for the construction of housing. Approximately 40 of the 510 acres now covered by the permit will be disturbed by current and future mining. (Environmental Assessment (EA) No. AZ-020-IND-93-01 at 5.) The remaining 470 acres have been reclaimed or were not disturbed by past mining. The premining use of the land was as grazing for sheep and goats. (EA at 4, 5.) The terms of the permit authorize ASSC to mine silica sand for a term of 5 years from the date of approval and for as long thereafter as silica sand is produced in paying quantities. The sand is valuable as a specialty sand and is sold chiefly as a hydrofac proppant to the petroleum industry in the San Juan Basin. (EA at 4.)

Issuance of leases and permits for extraction of minerals on Tribal and allotted lands is authorized under the Act of May 11, 1938, 25 U.S.C. § 396a-g (1994), the Act of March 3, 1909, as amended, 25 U.S.C. § 396 (1994), and the implementing regulations found at 25 C.F.R. Part 211 (tribal lands) and Part 212 (allotted lands). 1/ Surface mining and reclamation of Indian lands are subject to regulations found at 25 C.F.R. Part 216, which are administered by BIA. However, BLM is authorized to manage minerals on Indian lands, including the approval of mining plans, under Secretarial Order No. 3087, Amendment No. 1, February 7, 1983. 2/ Thus, mining operations on tribal and allotted lands are subject to regulation as outlined in 43 C.F.R. § 3590.0-7.

1/ The permit was issued under the authority of 25 C.F.R. Part 171, currently designated as 25 C.F.R. Part 211.

2/ The regulations were revised in 1996 to include 25 C.F.R. § 211.4, which specifies BLM's authority and responsibility in regard to tribal lands, including approval of mining and reclamation plans for tribal lands. The regulations further provide that BLM's regulations supplement those of the BIA. ASSC does not question BLM's authority to approve mining plans.

The relationship among BLM, BIA, and the Minerals Management Service (MMS) with respect to the administration and management of mineral lease activities relating to Indian mineral resources is governed by a Memorandum of Understanding (MOU) executed by the parties in August and September 1991, as revised in October 1994. Attachment A to this MOU further defines the relative responsibilities of the parties. The responsibility of approving reclamation plans rests with BLM, but BLM is required to obtain BIA's concurrence prior to approval of the operator's plan. (Attachment A at A-12.) While the record does not contain BIA's written approval of the plan with the stipulations, the stipulations were recommended by BIA, and the record shows that BLM did obtain the concurrence of the Navajo Nation. (Conversation Record of July 25, 1994.)

[1] An approved mine and reclamation plan for mining operations on Indian lands is required by 25 C.F.R. § 216.7 and 43 C.F.R. § 3592.1. ASSC had been operating without an approved plan because it began mining at the site before such a plan was required by the regulations. Even so, section 8 of ASSC's permit states that "[t]he Permittee agrees to abide by and conform to any and all regulations of the Secretary of the Interior now or hereafter in force relative to such permits * * *." This Department has long held that the intent of the language "now or hereafter in force" is to incorporate future regulations into existing permit terms when they become effective, even though such future regulations may place additional obligations or burdens on a permittee. Asarco, Inc., 141 IBLA 269, 273 (1997), AMCA Coal Leasing, Inc. (On Reconsideration), 114 IBLA 246 (1990); Gilbert V. Levin, 64 I.D. 1 (1957). Thus, the requirement of an approved mining and reclamation plan in 25 C.F.R. § 216.7 and 43 C.F.R. § 3592.1 applies to ASSC's permit.

ASSC submitted its first mining plan on January 4, 1974, thus initiating the long saga of inspections, inter- and intra-agency review and comment on ASSC's plan submissions, jurisdictional transfers, 3/ and compliance issues that document the effort to obtain an approvable mining and reclamation plan. By letter dated September 10, 1979, USGS notified ASSC that it was operating without a mining plan, in violation of applicable regulations at 30 C.F.R. § 231 and 25 C.F.R. § 177, and requested submission of a plan within 90 days of receipt thereof. MMS informed ASSC on January 27, 1982, that there were deficiencies in the mining plan and that additional information was needed for those portions of the plan dealing with reclamation and revegetation. Specifically, the letter stated: "5. The reclamation and revegetation portion of the plan needs

3/ At that time, responsibility for approval of the plan rested with the Conservation Division of the United States Geological Survey (USGS). That authority was transferred to the MMS, when it was established by Secretarial Order No. 3071, dated Jan. 19, 1982. On Dec. 3, 1982, responsibility for onshore minerals functions was transferred to BLM by Secretarial Order No. 3087, which was amended on Feb. 7, 1983, to specifically provide that BLM was to approve mining plans on Indian lands.

to be expanded. The plan does not state how new growth will be promoted in the abandoned pit areas and does not state to what minimum thickness topsoil would be spread over the disturbed area." (January 27, 1982, Letter from BLM to ASSC, at 2.) ASSC provided the requested information to MMS on February 8, 1982. By memorandum dated April 15, 1982, the Navajo Nation provided its comments on the proposed mining plan, as supplemented by ASSC in February 1982. Seeding and mulching are identified as sequential steps under the heading Integrated Reclamation in section 6A, but neither the seed mix nor the mulching material are specified, and there is no mention of fencing.

On April 21, 1989, BLM informed ASSC that the additional information it had provided to MMS on February 8, 1982, did not meet regulatory requirements. BLM thus requested a further submission, including information regarding the seed mix to be used in reclamation. In response, ASSC provided a mining plan on July 25, 1989, which superceded the 1974 plan, as it had been revised in 1982. There is no mining plan bearing a July 1989 date in the record, but it apparently contained the first mention of a specific seed mixture, evidently a dryland pasture mix. (July 27, 1989, Inspection Report.)

By letter dated August 8, 1989, BLM provided comments on the mining plan. Among other things, BLM mentioned seeding in the form of a suggestion that ASSC contact BIA "regarding effective techniques for using topsoil and application of seed." (Letter from BLM Assistant District Manager to ASSC dated August 8, 1989, at 1.) The Navajo Nation provided its comments on August 10, 1989. Neither seeding nor a seed mixture was mentioned by the tribe. On September 5, 1989, BLM requested yet more information, with the comment that "topsoil stockpiles should be seeded and stabilized to prevent loss due to wind and water erosion." (September 5, 1989, letter from BLM Assistant District Manager to ASSC dated September 5, 1989, at 2.)

Additional information dated September 26, 1989, was provided to BLM, and again, the case file does not contain a copy of what was provided, but it apparently referred to a dryland pasture mix. (Letter from BLM Assistant District Manager to Linkon, Navajo Nation, dated November 13, 1989, at 1.) On July 18, 1990, representatives from BLM, the Navajo Nation, and BIA met to discuss the proposed mining plan. This meeting was memorialized in a memorandum dated September 4, 1990, in which, evidently for the first time, the question of fencing arose. Specifically, in paragraph 2 at 2, under the heading Reclamation, the memorandum noted that the group had commented that, among other things, "topsoil should be stored to minimize loss by fencing and mulching the stockpiles." In addition, in the same para-graph the memorandum stated the following: "The fencing of areas reseeded during reclamation for one to two years was suggested, provided this did not interfere with grazing permittees." As indicated by a memorandum from the BLM Assistant District Manager to the Navajo Nation dated September 6, 1990, at this point, there were approximately 100 disturbed acres on the permit. In June 1993, BLM again requested additional information, and ASSC again complied with the request.

BLM prepared the EA for the mining plan, which was approved by the Phoenix District Office on May 13, 1994. Copies of the EA and Decision Record (DR), which included a mining plan dated June 27, 1994, and the stipulations, were then sent to the Navajo Nation Minerals Department for review and comment. The Navajo Nation provided a number of comments in a letter dated June 13, 1994, including the comment that reclamation would never be successful "if grazing and access to the reclaimed areas are not controlled." Finally, on July 25, 1994, BLM approved the mining plan subject to ASSC's agreement to comply with the five stipulations, and as noted, ASSC challenged the validity of three of the stipulations in an appeal to the State Director.

In that appeal, ASSC objected to Stipulation No. 3, which required that the disturbed land be reseeded with a specific native grass mix recommended by the BIA. ASSC argued that the seed species should be left to its discretion. (September 20, 1994, appeal to State Director at 4, 5.) ASSC also challenged the need for Stipulation No. 4, which requires that a mulching material shall be applied to all areas after they have been seeded. That stipulation requires a mulch of native grass hay, relatively free of viable weeds and grain or grass seeds, to be "uniformly placed over the seeded surface at an application rate of two tons per acre and anchored by crimping." (DR at 1.) As stated, ASSC believes the requirement to mulch is unnecessary, because ASSC contends that it has successfully reclaimed disturbed areas without using it. Stipulation No. 5 requires the seeded areas to be "fenced to protect them from grazing by livestock for a period of two to four years after establishment of vegetation." ASSC expressed some willingness to fence a certain 20-acre area, which reportedly contains a prehistoric archaeological site, for 1 to 2 years, but objected to fencing the entire area for up to 4 years. (Appeal to State Director at 6.) On April 12, 1995, BLM rendered its Decision affirming the imposition of the stipulations. ASSC appealed from that Decision to this Board.

In its Statement of Reasons (SOR), ASSC states it obtained all the information utilized by BLM in reaching its decision to include these three stipulations in the mining plan pursuant to the Freedom of Information Act (SOR at 3), 5 U.S.C. § 552 (1994), and that the documents received from BLM do not reveal any reason or predicate showing why these stipulations are necessary to successfully reclaim disturbed acreage. (SOR at 4.) Additionally, although the BLM Decision recites that the correct procedures were followed, ASSC contends that it does not indicate that the Deputy State Director examined the merits of the stipulations. Thus, ASSC maintains that the stipulations first should be thoroughly examined to ascertain whether they are reasonable before it is required to agree to them.

With respect to Stipulation No. 3, ASSC asserts that BLM is requiring use of a seed mix based on a BIA recommendation that is not supported by evidence that the recommended seed mix is superior or will better adapt to the area than the seed mix used by ASSC. ASSC further asserts that some

of the required seed species are prohibitively expensive and not readily available, and that it has successfully reclaimed areas with a native grass mix in the past. Therefore, it contends, requiring the seed mix specified in Stipulation No. 3 is unreasonable.

Regarding Stipulation No. 4, ASSC argues that mulching is also an unreasonable and unnecessary requirement, because it has successfully reclaimed in the past without using mulch.

ASSC further contends that there is no support in the regulations for the fencing requirement in Stipulation No. 5. It argues that the regulations cited by BLM as support for the stipulation, 43 C.F.R. § 3592.1(c)(10) and 25 C.F.R. § 211.24, 4/ do not provide any such support. (SOR at 5.) ASSC therefore concludes that BLM has failed to provide any reason or basis for these three stipulations. (SOR at 4.)

[2] BLM's authority to impose protective stipulations has been upheld where the record shows that they are the result of a reasoned analysis of all pertinent factors, with due regard for the public interest, and that they reflect a reasonable means to accomplish a proper Departmental purpose. Draco Mines, Inc., 75 IBLA 278, 282 (1983).

The stipulations apparently arose from comments by BIA in a letter noting deficiencies it found in the 1989 mining plan. (Letter of May 14, 1993, from Acting Area Director, BIA Navajo Office to BLM.) However, while BLM is required to consult with any other agency involved (43 C.F.R. § 3592.1(a)) and to obtain the concurrence of BIA (MOU, Attachment A at A-12), ultimately it is BLM's responsibility to approve the reclamation plan, which means that BLM is required to examine and consider the merits of the proposed plan and whether and to what extent stipulations are reasonably necessary to achieve reclamation goals. Furthermore, it is BLM's responsibility to ensure that the written decision discloses the basis for its conclusions, and that the decision is supported by the administrative record thereof. George W. Philip, 141 IBLA 195, 197 (1997); U.S. Oil and Refining Co., 137 IBLA 223, 232 (1996); Kanawha & Hocking Coal, 112 IBLA 365, 368 (1990). Thus, we have held that the recipient of a decision is entitled to a reasoned and factual explanation which provides a basis for understanding and accepting the decision, or alternatively, for appealing and disputing it before the Board. Pittsburg & Midway Coal Mining Co. v. OSMRE, 140 IBLA 105, 109 (1997), and cases cited therein. A decision is properly set aside and remanded if it is not supported by a case record that provides the information necessary for an objective, independent review thereof. Id. This principle remains valid even where the decision on appeal is predicated upon a determination made by another Interior Department agency vested with the authority to do so. Thus, to the extent that BLM relied on recommendations received from BIA or the Navajo Nation

4/ The regulations in 25 C.F.R. Part 211 were revised in 1996. 61 Fed. Reg. 35653 (July 8, 1996). Unless otherwise noted, this opinion refers to the 1995 regulations in effect when BLM issued its Decision.

to carry out its mandate, BLM was obligated to ensure that the recommendations it decided to accept were adequately supported, and to articulate and document its decision-making in the record.

Regulation 25 C.F.R. § 216.1 states that it is the policy of the Department to encourage the development of mineral resources underlying Indian lands, and acknowledges that the "interest of the Indian owners and the public at large requires that, with respect to the exploration for, and the surface mining of, such minerals, adequate measures be taken to avoid, minimize, or correct damage to the environment * * *." 5/ A mining plan is required by 25 C.F.R. § 216.7(a), and when revegetation is required as part of the reclamation goal, the plan must show the types and mixtures of grasses and the types and methods of planting to be employed. 25 C.F.R. § 216.7(c); 43 C.F.R. § 3592.2(c)(9). These provisions establish more than sufficient authority to require the use of a particular seed mix, the application of mulch, and the construction of fences if they are reasonably necessary to achieve reclamation.

ASSC counters that the seed mix in Stipulation No. 3 was merely recommended by BIA and thus it was error to treat it as a requirement. The seed mix was first suggested in the May 14, 1993, memorandum to BLM from the BIA Acting Area Director, in which deficiencies in the mining plan were noted. The BIA specified the desired seed mix as "native species of this geographic location." How and why BIA decided to recommend the disputed seed mix rather than another does not appear from the record, and there certainly is nothing in the record that discusses or explains the benefits of one mix or another, or why the dryland pasture mix used by ASSC was unacceptable or inferior to the BIA recommended mix.

In addition, however, ASSC claims that some of the seed species are too expensive and some are difficult to acquire, without identifying which seed species it is referring to, and further asserts that ASSC has successfully reclaimed using another seed mix. This very assertion was made to the Deputy State Director, who noted the argument in his Decision, and responded to it simply by reciting that BIA and the Navajo Nation had furnished recommendations which were incorporated into the mining plan.

ASSC admits that it has not been totally successful in its reclamation efforts, but asserts that this is attributed to the lack of rain and not to the quality or appropriateness of the seed mix. ASSC's mining plan does not identify the seed mix ASSC would use, beyond generally identifying it as a native grass seed mix. 6/ The record shows, however, that the

5/ Regulation 25 C.F.R. § 216.2(c) states the regulations in this part apply only to permits issued subsequent to the date on which the regulations became effective, but as discussed earlier, the regulations are made applicable to ASSC's permit by reason of section 8 thereof.

6/ ASSC states that it will specify the seed mix to be used, but as noted, 25 C.F.R. § 216.7(c) requires the mining plan to identify the types and mixtures of grasses to be planted, as well as the types and methods of planting and the amount of grasses per acre.

seed mix used by ASSC in the past was a dryland pasture mix consisting of Lincoln Smooth Brome, Crested Wheatgrass, Tetraploid Perennial Ryegrass, Intermediate Wheatgrass, Ephraim Crested Wheatgrass, Annual Ryegrass, and Western Wheatgrass. (July 27, 1989, Inspection Report.) The record also contains an undated letter to BLM from James Burkewitz, General Manager of ASSC, which was sent sometime in June 1993, in which Burkewitz states that he spoke to an unidentified extension representative and was informed that "what [ASSC] had growing out there was all that would grow."

Section 3042 of the BLM Manual, as supplemented by Handbook H-3042-1 (Handbook), provides information and guidance on land reclamation and general performance standards. The provisions of the BLM Manual do not have the force and effect of law; nevertheless, as this Board has held on numerous occasions, they are binding on BLM. Howard B. Keck, Jr., 124 IBLA 44, 55 (1992), and cases cited therein.

The Handbook also establishes general guidelines for seeding, including criteria to be used in selecting a seed mix. These general considerations in determining seed mixes include obtaining recommendations for species selection from BLM and the Soil Conservation Service of the Forest Service. (H-3041-2, Ch. 12, F. 1.) BIA is not identified, but it would be appropriate to obtain recommendations from the Navajo Nation and BIA, given the spirit of the MOU and the benefit of their familiarity with the locale and site. If a particular seed mix is to be required for reclamation based upon the advice or recommendations provided by the Navajo Nation and BIA, it must be explained and supported in the record. Here, the record is devoid of a supporting rationale for requiring the mix specified in the stipulation, and while we assume that the disputed mixture fully satisfies the Handbook criteria, the issue is whether ASSC's mixture also meets those criteria in whole or in part, and if so, what provided the basis for selecting one rather than another.

We note, moreover, that the Handbook lists the availability of seed from commercial seed suppliers as one of the criteria for determining the appropriateness of selecting a plant species, whereas ASSC asserts that some of the seed is not readily available, 7/ an allegation that is not treated in the Decision, apart from noting the argument, or in the record. Thus, there is no discussion or comment as to why the mix used by ASSC in the past cannot be used, or any response to ASSC's assertion that it has successfully reclaimed using the seed mix it prefers. Consequently, the statement that the Authorized Officer must consult with the agency having jurisdiction over the surface of the land, even coupled with the conclusion that BLM may require reseeding with a particular mix, clearly does not provide the requisite rationale for the Decision.

7/ ASSC also asserts that some of the species are expensive. The BLM Handbook does not include cost as a criterion. Even so, we observe that cost often is a function of availability, and we can easily conceive of scenarios in which cost could well become an issue.

The record contains quarterly Inspection Reports of the site beginning in 1988. These reports include observations regarding, among other things, the status of reclamation efforts, and provide some support for ASSC's assertion that it has achieved a degree of success in reclamation, bearing in mind that the issue is whether the reclamation goal expressed in the plan has been achieved. As stated in ASSC's mining and reclamation plan, the goal is "to establish a permanent vegetative cover that is diverse, self-generating and promotes soil stabilization." (Mining Plan at ¶ J.) The quarterly Inspection Reports reveal the following.

The Inspection Report of October 3, 1989, characterizes the reseeding as "somewhat successful." The Report of October 19, 1989, notes that revegetation was established in the "knoll area" (apparently the South Knoll) and appeared to be in acceptable condition, with no rilling. 8/ However, elsewhere the reclamation was deemed inadequate with unacceptable slopes, depressions, and rilling. The presence of dirt bikers and grazing horses was noted as well. A year later, approximately 100 acres had been disturbed, and in the December 6, 1990, Inspection Report, the South Knoll was again described as becoming reestablished. That Report also noted that the rilling west of the knoll had not increased, and may have been stabilized by the vegetation. The February 21, 1991, and May 23, 1991, Inspection Reports noted that sparse vegetation had been reestablished on the South Knoll. On March 15, 1990, the South Knoll remained in satisfactory condition according to the Inspection Report for that date, although a gully had developed, a new pit had been opened, and there was no evidence of reclamation activity that day. ASSC thus seems to have achieved at least part of its reclamation goal at the South Knoll.

Other areas appear not to have fared as well, however, as reflected by the October 26, 1993, report, which stated that vegetation had not grown back very well and that gullies were beginning to form. Photographs of the area were attached to the report which confirm this observation. In contrast, the April 22, 1993, report stated that previous reseeding efforts involving the broadcasting of a dryland grass mix had had limited results and recommended the use of a seed drill, but made no mention of utilizing a different seed mix.

Ascertaining ASSC's success in reclaiming disturbed areas is made more difficult by what appears to be some ambivalence on the part of representatives of the Navajo Nation toward ASSC. Thus, an October 4, 1989, Conversation Record contains a note to the effect that the tribe was "dissatisfied" with the manner in which Appellant conducted mining, yet the Navajo Minerals Department was "reluctant" to encourage any action that could jeopardize the operation, because it employed 23 area residents on a long-term basis. The May 30, October 23, and November 9, 1989, and June 6, 1990, Conversation Records similarly suggest a degree of frustration, if not reluctance, on the part of the Navajo Environmental Protection Agency (EPA) in taking the steps necessary to obtain consistent, satisfactory

8/ A "rill" is defined in the BLM Handbook as "a small erosive feature caused by the channeling of water on slopes." (H-3042-1, Glossary at 8.)

progress on reclamation, a sense also conveyed by correspondence from BLM to the Navajo EPA dated November 15, 1989, and to ASSC dated March 19 and July 6, 1990, for example.

Moreover, grazing of the reseeded areas has been a persistent barrier to successful revegetation. For example, the May 16, 1989, inspection reported horses grazing north of a newly seeded area, while the October 19, 1989, report also noted horses grazing in reseeded areas and dirt bike tracks over the area. The September 26, 1990, Inspection Report at 2 acknowledges that "[t]he area is being grazed, which makes revegetation difficult. Fencing is not desired by residents, according to those present [representatives of ASSC, the Navajo Minerals Department, BIA, and BLM], and if put up would most likely be removed." During the inspection of December 6, 1990, revegetation of the South Knoll was proceeding, but it was noted that grazing permittees continued to graze the area. The general tone of the report suggests that reclamation was proceeding in a satisfactory manner, and that the disturbed acreage was successfully being reduced from 100 acres to 10 acres. The February 21 and May 23, 1991, Inspection Reports include the observations that sparse revegetation was reestablished on the South Knoll in spite of grazing. At the December 17, 1991, inspection, all but the northwest pit area had been reclaimed and revegetation with sparse grass was noted. The report also contained the notation that the tracks of domestic livestock were observable "all around the area." As previously noted, in paragraph 4 of its June 13, 1994, comments on the proposed mining plan, the Navajo Nation stated "reclamation will never be successful if grazing and access to the reclaimed areas are not controlled."

The 1992 Inspection Reports contain no commentary pertaining to the progress of reseeding or revegetation. However, when the claim was inspected on October 26, 1993, it was noted that revegetation was not progressing well and that gullies were forming. Inspections in 1994 were principally concerned with ASSC's encroachment on an archaeological site, with concerns expressed regarding the stockpiling of top soil. The record includes numerous photographs of the site, but these are not especially helpful in judging ASSC's claim that it has successfully reclaimed areas within the permit site using a different seed mixture. Regardless of whether we are able to ascertain the degree of success achieved using the dryland pasture seed mix, in our view the record does not reveal why BLM accepted the seed mix suggested by BIA rather than ASSC's mix or another mix, and the Deputy State Director's Decision did not respond to ASSC's factual contentions. Thus, we conclude that BLM's Decision as to Stipulation No. 3 should be set aside and the case remanded to BLM.

In challenging Stipulation No. 4, which requires mulching of the reseeded area, ASSC asserts that it has successfully reclaimed without the use of mulch. The Handbook notes that the application of mulch or erosion netting may be necessary to reduce surface soil movement and promote revegetation. (Ch. I, D. 6(b).) Whether to use mulch is to be decided on a site-by-site basis, because mulching that is crimped into the soil on dry sites can draw moisture out of the soil in some conditions. See Ch. XII, I of the Handbook.

Mulching was recommended by the BIA in its May 14, 1993, comments on the plan. The record also includes an April 15, 1982, Navajo Nation memorandum discussing mulching material. Both documents appear to proceed from a foregone conclusion that mulching should be required, but neither explains or analyzes the requirement. As stated, rilling was noted as a problem in some of the quarterly Inspection Reports (see reports of Oct. 19, 1989, March 15, 1990), which certainly suggests a basis for the requirement. However, as noted above, the record also provides support for ASSC's claim that it has achieved some degree of success in reclamation without mulching. We assume that ASSC in fact reduced the disturbed area from 100 acres to 40 or less acres without mulching, which clearly suggests that ASSC's claim is not without merit. Again, the Deputy State Director's Decision does not address ASSC's contention or state the basis for concluding that it should be required. Accordingly, we conclude that BLM's Decision as to Stipulation No. 4 should also be set aside and the case remanded to BLM.

[3] In regard to the fifth stipulation requiring fencing, ASSC argues that the regulations cited by BLM in support of its authority to require ASSC to erect fences to protect seeded areas, 25 C.F.R. § 211.24 (1995) and 43 C.F.R. § 3592.1(c)(10), do not in fact confer such authority, and that no such regulatory requirement exists. (SOR at 5.) ASSC notes that 43 C.F.R. § 3592.1(c)(10) requires the submission of the method "proposed to protect unmined recoverable reserves and other resources, including the method proposed to fill in, fence or close all surface openings which are a hazard to people or animals." (SOR at 5 (ASSC's emphasis).) ASSC further notes that 25 C.F.R. § 211.24 provides only that the lessee shall return the leased premises in good order and condition. Finally, ASSC states that it "has informed BLM numerous times that fencing the entire area is not feasible, in part, because fencing, once in place, is removed by persons not affiliated with ASSC" and also that it has fenced areas in the past only to have the fence removed shortly thereafter. (SOR at 6.)

We agree with ASSC that 43 C.F.R. § 3592.1(c)(10) does not authorize BLM to order the erection of fences to protect reseeded areas. Instead, the regulation pertains to plan requirements when operations are abandoned, which is not an issue in this appeal. The other regulation cited by BLM, 25 C.F.R. § 211.24, requires the surrender of leased premises in good order and condition upon expiration of the term thereof or upon surrender of the lease, which is also not relevant here. If BLM determines that fencing should be erected in order to ensure that reclamation is successful, thereby ensuring that the land will be surrendered in good order and condition, it may require a stipulation to that effect in the plan as a result of its general authority to approve mining and reclamation plans, 43 C.F.R. § 3592.1(a), which requires that plans shall provide for the reclamation of the surface of the lands affected by the operation. Additional authority may be found at 43 C.F.R. § 3591.1(b), which requires that the surface shall be reclaimed and that damage to vegetation shall be repaired. Regulations at 25 C.F.R. §§ 216.1 and 216.7, governing surface mining on Indian lands, require that measures shall be taken to avoid,

minimize, and correct damage to the environment, and also require an approved mining plan which, among other things, provides for reclamation of the lands disturbed by mining operations. ASSC's arguments to the contrary are rejected.

The BLM Manual Handbook also recognizes that a reclaimed landscape may require protection to ensure successful reclamation. (Handbook H-3042-1, Ch. I, D. 9.) The Handbook does not specify how that protection is to be achieved, though fencing is an obvious choice. However, ASSC asserts that fencing is not necessary to ensure successful reclamation and argues that the proof of its claim is that it has successfully reclaimed already. While the evidence supporting ASSC's claim that it has successfully reclaimed certain areas within the permit site is not free of question, ASSC over the years apparently has reduced the disturbed acreage from 100 acres to 40 or fewer acres. At the very least, BLM should fully explain its reasoning.

Even if we were able to conclude that the record clearly shows that fencing is a reasonably necessary stipulation, nothing in the record explains why a 2- to 4-year period to maintain the fences was selected. In a September 4, 1990, memorandum to the File, a BLM geologist from the Division of Mineral Resources noted that in a meeting on the mining plan with BIA and the Navajo Nation there was a suggestion that newly reseeded areas be fenced for 1 year or 2, providing it did not interfere with grazing permittees. By May 14, 1993, BIA was recommending protection of seeded areas from grazing livestock for 2 to 4 years. This presumably was the result of a reasoned determination, but there is nothing in the record to show that it was, or to contradict ASSC's argument that, based on its experience, 1 to 2 years is adequate.

The more fundamental issue is whether fencing could, in the actual circumstances at hand, serve as a means of ensuring successful reclamation of the area. ASSC alleges that in the past fencing has been removed by unknown persons, and that the only way to ensure that fencing remains in place is to guard it. ASSC's contentions are well-founded, because the record contains a number of memoranda and Inspection Reports in which it is noted that grazing permittees do not want fences or interference with their grazing activities. (E.g., September 4, 1990, BLM Memorandum to the File; April 22, 1993, Inspection Report.) Indeed, one report acknowledged that if fencing were put up, it likely would be removed because the residents did not desire it. (Sept. 26, 1990, Inspection Report.) Similarly, the Navajo Fish and Wildlife Department stated in its April 1992 Threatened and Endangered Species Survey and Evaluation that attempts should be made to ensure reseeding is successful and that this could include fencing the area and informing the locals of the importance of limiting grazing in these areas for a period of time.

In the same vein, the April 22, 1993, Inspection Report noted that in discussions during the inspection it was recommended that reclaimed areas (i.e., newly reseeded areas) be fenced off, but also noted that this had not been done in the past because the locals objected to it. A May 14, 1993, memorandum from BIA to BLM on deficiencies in the mining plan sought

protection of seeded areas for 2 to 4 years after establishment of vegetation. This memorandum did not specify fencing, stating only that protection by any means necessary was desired. The record also shows that ASSC complained that its fences and markers had been taken down by unknown persons. (July 20, 1993, Inspection Report; Letter from BLM to ASSC dated March 18, 1994.) In any event, the record lacks a clear explanation of how BLM reached its decision to require fencing for 2 to 4 years. In such circumstances, it is appropriate to set aside the Decision and remand the matter to BLM.

We wish to emphasize that we do not hold or suggest that BLM cannot require ASSC to agree to the stipulations here at issue. To the contrary, we decide only that the present record does not explain or adequately document the facts BLM relied on or the reasons why ASSC's alternatives are not acceptable.

Accordingly, pursuant to the authority delegated to the Board of Land Appeals by the Secretary of the Interior, 43 C.F.R. § 4.1, the Decision appealed from is set aside and the case is remanded to BLM for issuance of a decision that comports with this opinion.

T. Britt Price
Administrative Judge

I concur:

John H. Kelly
Administrative Judge

A[illegible]EN-BRADLEY CO.

QUALITY MOTOR CONTROL
QUALITY ELECTRONIC COMPONENTS
MILWAUKEE 4, WISCONSIN

[illegible]EN CORRESPONDING REFER TO OUR INVOICE

No.

SOLD TO: U.S. Electrical Motors

DATE OF INVOICE: 8-12
8012

DATE SHIPPED

PART SHIPMENT ☐ COMPLETE ☐

VIA

YOUR ORDER: 28009

SHIPPED TO: Arizona Silica Sand Co
Houck Arizona

MARK

ROUTE

DATE SHIPPED

PPD. ( ) COLL. ( )

FROM

ITEM	QUANTITY ORDERED	CATALOG OR BULLETIN	H.P.	VOLTS	SIZE	STYLE	FORM	PHASE	CYCLE	NEMA TYPE	QUAN. THIS SHIPM'T
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PACKING SLIP

Note — This shipment contains the apparatus listed herein, which was carefully packed and delivered to the transportation company in good condition. Check contents with this list and make claim for shortage at once. We are not responsible for loss or damage in transit. If goods arrive in bad order, have agent note condition on Freight Bill, and present your claim to Transportation Co.

SHIPMENT PROMISED

SHOP ORDER

B1

FORM 15C

SHIPPING MEMORANDUM SHEET 1 OF 1

THE ALLEN-SHERMAN-HOFF PUMP CO.

259 EAST LANCASTER AVENUE - WYNNEWOOD, PA.

FROM FACTORY AT Hamburg, Pa. Oct. 29 19 58

SHIPPED TO Arizona Silica Sand Co.
% Fisher Contracting C o.
Houck, Arizona

REQ. No. CP-98842
ORDER No. 58-1758
CAR INITIAL
CAR No.
MARK Ord. 5548

VIA Freight ROUTED Santa Fe R.R.

Complete Shipment

Skid #1 contains:

1 - Frame A-6-5 Rubber-Lined Pump with Overhedd Motor Base Assem. - Serial No. 6657-WH
1 - Pump Assembly DWg. 1-3761 (on pump)
1 - Operating Instructions CO-106B "
1 - Maintenance Instructions CM-112 "
1 - Overhead MOtor Base Assdm.Dwg. 3-2298 (on pump)
4 - Gland Pkg. Rings 459 "
1 - Shaft Wrench 353 "
1 - Caution Tag B-1521 "

Salt Lake City
Phoenix

B2

Bill Cranford

PACKING LIST

WESTERN MACHINERY COMPANY

WEMCO

CUSTOMER ORDER NO. 2870-A

OUR ORDER NO. 33025

CONSIGNED TO Western Machinery Company

SHIPPED FROM Sacramento, 10-7-58 195

PACKAGES MARKED

ROUTED

PAGE NO. 1

NUMBER OF PACKAGE	KIND OF PACKAGE	DESCRIPTION OF CONTENTS	WEIGHT IN POUNDS UNLESS MARKED KG. FOR KILOGRAM GROSS	NET OR LEGAL	DIMENSIONS IN INCHES
		FOLLOWING 2 CELL NO. 10 WEMCO ATTRITION MACHINE: SERIAL NO. 5833025			
1	Bare	1 - 2 Cell No. 10 Attrition Machie complete with the following 2 - Bearing Housing and shaft with 27" dia. impellers and P-Mix paddles 1 - base plate 1 - base plate with feed entry 2 - bearing stand and motor supports NOTE: All above assembled	2990	2990	
2	wood box	2 - sheaves 4" PD 9B Grv 1-7/8" Bore 2 - sheaves 25" PD 9B Grv 2-7/16" Bore 18 - V-belts B-85S	565	475	
			3555	3465	

Order No. 6535 shown on all Pkgs.

COMPLETE

B3

Box 666
Chambers, Arizona
11/25/58

Mr. L.A. Wood, Secretary
Arizona Silica Sand Company
Phoenix, Arizona.

Dear Les:

I discussed the matter of the Burntwater sand with Norris(Hoskey) Kronnoneyer, Tribal Councilman for the Burntwater area in District 18. He thought it should be discussed with the Tribal Legal Department and we visited Window Rock yesterday. Hoskeyintroduced me to Mr. Joseph F. McPherson, Asst. General Counsel for the Navajo Tribe.

I gave Mr. McPherson a brief resume of the sand and gravel deal starting with the Bancor's trading with Patrick and Black in 1956, drilling and failure to make a deal with Patrick; the sampling and acquisition of the Balcomb lease on Burntwater Wash; determination to build a processing plant to make high grade silica sand; preliminary work on the processing plant followed by acquisition of the Lothmann assets and permit; plant now under construction at Houck.

Sand and gravel on Section 18 held by placer mining claims located by Smith; expenditure of several thousand dollars for drilling and sampling; that the amount of money spent on the claims was sufficient to permit patenting a number of the claims on the western portion of the Section; that the Mining Attorney discovered the transfer of mineral rights to the Tribe in 1934 (?) when the land exchange was made and new boundaries of Reservation established; that our lawyers had consulted other eminent members of the legal profession in Phoenix with the result of one opinion for us, one opinion against us and the Bureau of Land Management saying they didn't knew.

That we want to mine sand and gravel on Section 18 along with the sand and gravel on Section 7; that we want a clar title to the material removed with no possibility of future action for damages and what is the solution?

Mr. McPherson said he could not and would not give a decision on oral recitation; that he was not familiar with the sand and gravel permits and would require soemthing in writing; BUT

It is his opinion that the mineral rights within the Reservation belong to the Tribe; that the Land Exchange in 1934 gave the Tribe all of the mineral rights previously reserved to the Government; that where a Homestead Entry had been made and processed to patent that the Homestead holder retained all of his rights, even though he was surrounded by the Tribal lands.

If mining claims had been located on lands belonging to individuals or to the Tribe, by dint of land transfer, and if the claims had been patented then the mining rights were retained BUT if the claims had not been subjected to patent a recent Law transferred all unpatented claims within the Reservation (except for a small area in Utah) to the Tribe:

~~So that Smith's claims are valid~~ SO that even if Smith's claims had been valid locations at first, due to their not being patented the mining rights would revert to the Tribe.

B5

Mr. McPherson said we could request an Adverse Hearing before the Dept. of Interior but in view of the various laws and decisions in favor of the Tribe he doubted whether we would secure a ruling in our favor. In answer to a question he said if we could get Smith to agree that he had no right to the minerals in Section 18 then we could no doubt make an agreement with the Tribe to mine sand and gravel on Section 18, providing we could come to terms with Smith on the surface.

Mr. McPherson said if our attorneys would set out a brief summary of the facts in this case, addressing the document to Paul Jones, Chairman, Tribal Council and marked for the attention of Joseph F. McPherson, Asst General Counsel that he would work it up for the Advisory Committee. ALSO; he believed that if we did not claim mineral rights to Section 18 that the Advisory Committee would be agreeable to a permit on the sand and gravel in this Section (18)
The Advisory Committee meets on December 8th.

I thanked him and visited the Mining Department. Leo Denetsoni is Garad's assitant. He said he did not think that Tribe would object to a permit on Section 18 providing that we relinquished an equivalent amount of ground to hold the entire permit to 2560 acres. According to him the Government is insistent on permits being held to a maximum of 2560 acres and he though it would have a b better chance of being passed by the Real Estate office if we relinguished acreage at the same time we requested the other ground. He said Ken Garard would know what to do.

After reading this letter seewhat you think of the following suggestion:
Have the attorneys draw up a brief statemnt of facts for the Tribal Chairman and Asst General Counsel; prepare a release for Smith's signature (I shall see him today and will phone you his decision) ; request a permit on sand gravel in Section 18, relinquishing a like number of acres in the existing permit. I will call you regarding this but it is now my opinion that we should let some of Section 7 go back.; get in touch with Garard so that the papers will be properly steered and possibly with Morris McCabe. If Tribal Councilman signatures are needed for the Advisory Committee I can get them. Section's 18 and 7 are within District 18.
Garard's address is K.N.Garard, 9023 North 52 Street, Phoenix Phone WH 5-9739.Mailing address Rt.2,Box 428-4, Scottsdale,Arizona.
I havn't discussed this with Deland I think you should get the lawyers busy and have your friends work on Garad and McCabe. Jack Brown called on another matter and I told him about my trip and suggested that he have the attorneys look up the recent law transferring unpatant claims to the Tribe. We should limit this action to the present Permit and to Section 18. I am saying this because Del might want to add some ground around Quirino Canyon and it will cloud the whole deal and slow matters.
Until this matter is settled I am not doing anything on Section 18. We are doing some prospecting on Section 7.

I shall now read this composition and if there is enough chaos to create a universe I'll have it mailed. I am headed for Smith's and Wide Ruins and I will call you tomorrow after you receive this letter.