SCANNED IMAGE

NAME

KILBORNE ENGINEERING LTD.

For Canadian Javelin Ltd. - Capital and Operation Cost Estimates for Javelin Iron Ore Pellet Project

23 G (120)

CONFIDENTIAL

No.

23 G (120)

Gray & Goodland Limited

Printers, Stationers and Rubber Stamp Makers

25 Water St.,
St. John's, Newfoundland

Re-Order No. G-612

KILBORN ENGINEERING LTD.
CONSULTING ENGINEERS

K. M. DEWAR, B.Sc., P.ENG.
PRESIDENT

B. S. CROCKER, M.A.Sc., P.ENG.
VICE-PRESIDENT

J. T. DEW, B.A.Sc., P.ENG.
GENERAL MANAGER

N. FARRAR, B.Sc., P.ENG.
CHIEF MECHANICAL ENG.

36 PARK LAWN ROAD
TORONTO 18, ONTARIO, CANADA
TELEPHONE: AREA CODE 416, 252-1101
TELEX: 02-2765

September 14, 1967

FILE NO.

23G(120)

Mr. W. H. Roxburgh,
Secretary,
Canadian Javelin Limited,
100 Bronson Avenue,
Ottawa 4, Ontario.

Re: Capital and Operating Cost Estimates for Julian Iron Ore Pellet Project

Dear Sir:

We enclose herewith twenty copies of our Preliminary Estimates of Capital and Operating Costs dated September 1967, for Mining, Concentrating and Pelletizing plant, located at Julienne Lake, Labrador, of 4,000,000 long tons per year of iron ore pellets and the expansion of this plant to 6,000,000 long tons per year.

This estimate is based on current costs, and if the expansion of the plant to 6,000,000 long tons per year is deferred for several years it will be necessary to add escalation to our estimate.

You had requested that separate estimates be made for the Dravo-Lurgi and the Allis-Chalmers method of making iron pellets. However, we have found that the cost of the two methods is almost identical, and you will see by comparing the two flow sheets that the auxiliary equipment is also identical and only the grate-furnace of the Dravo-Lurgi process differs from the grate-kiln-cooler system used by Allis-Chalmers.

At this early stage we could not clearly bring out the cost differences between the above two methods, and only more complete investigations could give you a recommendation which of these two methods is best for your application.

We have taken the liberty of including only one cost estimate for the pelletizing plant, however we have included drawings showing the flow sheet and general arrangement of both the Dravo plant and the Allis-Chalmers plant.

KILBORN ENGINEERING LTD.

We have refrained from making an Architectural Presentation of the plant, since you suggested that you would have someone make a perspective drawing of the plant. Perhaps this drawing could also be added to the front of our capital cost estimate? Should you not have the time to make such a perspective drawing we could make one for you.

May we express our sincere appreciation of your request to prepare this estimate, which we trust provides you with all the information you require at this time. Should you wish us to discuss this project with European steel companies we would be pleased to accompany your staff, at your convenience, and participate in any conferences that may be deemed desirable.

Yours very truly,

KILBORN ENGINEERING LTD.

K. M. Dewar, P. Eng.,
President.

KMD:jp

SCANNED IMAGE

[redacted]

CANADIAN JAVELIN LTD.

236 (120)

PRELIMINARY ESTIMATE

OF

OPERATING COSTS

F..

A MINING, CONCENTRATING & PELLETIZING PLANT

TO MINE & BENEFICIATE

10,000,000 LONG TONS OF IRON ORE TO PRODUCE

4,000,000 LONG TONS OF IRON PELLETS PER YEAR

AT

JULIENNE LAKE, LABRADOR

September, 1967

Prepared and Submitted By:

KILBORN ENGINEERING LTD.
Consulting Engineers
36 Park Lawn Road
Toronto 18, Ontario

SCANNED IMAGE

CANADIAN JAVELIN LTD.

PRELIMINARY ESTIMATED OPERATING COSTS

FOR A

MINING, CRUSHING, GRINDING, CONCENTRATING & PELLETIZING PLANT

TO MINE & BENEFICIATE

10,000,000 LONG TONS OF IRON ORE TO PRODUCE

4,000,000 LONG TONS OF IRON PELLETS PER YEAR

INDEX

	Page
General Data Furnished by Owner	1
Assumed Operating Data on Which Estimated Capital Costs are Based	2
Preliminary Estimate of Operating Costs for a Mining, Crushing, Grinding, Concentrating & Pelletizing Plant Summary	4
Preliminary Estimate of Operating Costs for a Mining, Crushing, Grinding, Concentrating & Pelletizing Plant Details	6

SCANNED IMAGE

CANADIAN JAVELIN LTD.

GENERAL DATA FURNISHED BY OWNER

1. 4,000,000 long tons of pellets are to be produced per year.

2. 10,000,000 long tons of ore are required to produce 4,000,000 long tons of pellets (2.5:1).

3. Preliminary pit preparation consists of a relatively small amount of clean-up stripping.

4. Mining rate to be based on three shifts per day, 250 days per year operation.

$$\frac{10,000,000}{250} = 40,000 \text{ long tons of ore per day.}$$

5. The Concentrator is to be operated on three shifts per day, 350 days per year.

$$\frac{10,000,000}{350} = 28,571, \text{ say } 28,600 \text{ long tons of ore per day.}$$

6. Concentrating is to be by autogenous grinding and spiral classification method.

7. The concentrating plant is to be based on a 4-line layout.

8. Pellet production is to be by balling drums and the grate furnace method, or grate-kiln furnace method.

9. A grind of 80% minus 325 mesh will be required to produce a satisfactory pellet.

10. Concentrates are to be handled to the pelletizing plant by pipe lines.

11. The pelletizing plant is based on a 2-line layout, each line being capable of producing approximately 2,000,000 long tons of pellets per year.

12. Power costs of 3.5 mills per horsepower hour have been established by Canadian Javelin Ltd.

13. Fuel oil costs of $0.12 per Imperial gallon have been established by Canadian Javelin Ltd.

SCANNED IMAGE

CANADIAN JAVELIN LTD.

ASSUMED OPERATING DATA ON WHICH ESTIMATED CAPITAL COSTS ARE BASED

1. The pit will be operated on a 3 shifts per day, 5 days per week, 250 days per year basis. The production rate will be 40,000 long tons of ore per day.

2. The assumed average effective working time per shift is $6\frac{1}{2}$ hours. During this period the equipment will operate at 85% capacity.

3. The average production rate for a 9 cu. yd. electric shovel is 1,100 long tons per hour.

   $$\text{Shovel shifts required} = \frac{40,000}{1,100 \times 0.85 \times 6.5} = 6.6 \text{ shifts}$$

   The net number of shovels required will be - 3.
   The gross number of shovels required will be - 4.

   1 - $2\frac{1}{2}$ yard diesel shovel will be provided for clean-up work, to be supplemented later as required.

4. Ore haulage to the crusher will be by 100 ton rear dump trucks which have an assumed capacity of 250 long tons per hour.

   $$\text{Truck shifts required} = \frac{40,000}{250 \times 0.85 \times 6.5} = 29 \text{ shifts.}$$

   The net number of trucks required = 10.

   Based on an assumed availability of 70%,
   the gross number of trucks required = 14.

5. The average drilling rate for a Quarry Master Q.M.5-DHD 500 drill, using a 9" bit, is estimated to be 175 ft. per shift, with allowances for sub-drilling, lost time, etc. Assuming an average drilling depth of 55 ft. and a 27 ft. x 31 ft. pattern, each drill hole will provide approximately 70 long tons of ore per ft. of hole.

   Tons produced per shift = 175 x 70 = 12,250 long tons.

   $$\text{Drill shifts required} = \frac{40,000}{12,250} = 3.26$$

   Based on an assumed availability of 70%,
   the gross number of shifts is = 4.66
   Drills required = 2. (one diesel and one electric).

   Also included are costs for two additional machines; one a mobile drilling unit with a 3300 LT/shift capacity, and the other a smaller unit.

SCANNED IMAGE

CANADIAN JAVELIN LTD.

6. Number of Bulldozers required initially:

   Allowing 1 bulldozer per large shovel = 3.
   Ultimate bulldozer requirement will be 4.

7. A 60" x 109" gyratory crusher is included in the estimate. This unit is capable of handling ore from 9 cu. yd. shovels and will provide considerable surplus capacity for the operation. A detailed study must be undertaken prior to design to consider whether a smaller gyratory crusher or perhaps two jaw crushers would prove to be sufficient. In any event, the estimated cost of the crusher building and equipment will be reduced if either of the two latter alternatives is adopted.

8. The cost of a 72" belt conveyor is included in the estimate. A 72" belt conveyor is recommended between the crusher building and the ore storage building. This width will permit the satisfactory handling of the size of ore and tonnages expected. It will also permit future expansion of the plant to 6,000,000 long tons per year of pellet production without necessitating extensive alterations to the crusher and ore storage areas.

9. Ore storage capacity is approximately $2\frac{1}{2}$ days mill feed requirements both in the covered and exterior storage areas.

10. All production is pelletized.

11. Two days of pellet storage is provided in the loadout area silos, as well as an emergency exterior stockpile of approximately 7 days.

SCANNED IMAGE

CANADIAN JAVELIN LTD.

PRELIMINARY ESTIMATE OF OPERATING COSTS FOR A MINING, CONCENTRATING & PELLETIZING PLANT TO MINE & BENEFICIATE 10,000,000 LONG TONS OF IRON ORE TO PRODUCE 4,000,000 LONG TONS OF IRON PELLETS PER YEAR AT JULIENNE LAKE, LABRADOR

SUMMARY

	Cost per Long Ton of Ore	Total
1. Mining		
1. Administration	0.080	
2. Supervision & Operating Labour	0.345	
3. Power	0.004	
4. Auxiliary Services	0.010	
Total for Mining		$0.439
2. Crushing, Grinding & Concentrating		
1. Administration	0.059	
2. Supervision	0.020	
3. Operating Labour	0.097	
4. Power	0.026	
5. Supplies	0.170	
6. Water	0.002	
7. Fuel	0.036	
8. Maintenance	0.051	
9. Auxiliary Services	0.014	
Total for Crushing, Grinding & Concentrating		$0.475
3. Pelletizing & Loadout		
1. Administration	0.059	
2. Supervision	0.021	
3. Operating Labour	0.124	
4. Power	0.086	

SCANNED IMAGE

CANADIAN JAVELIN LTD.

	Cost per Long Ton of Ore	Total
3. Pelletizing & Loadout (Cont'd)		
5. Water	0.002	
6. Supplies	0.194	
7. Fuel	0.377	
8. Maintenance	0.114	
9. Auxiliary Services	0.019	
Total for Pelletizing & Loadout		$0.996
Total Cost per Long Ton of Ore Mined & Processed		$1.910

Cost per Long Ton of Pellets in Cars

1.910 x 2.5 = 4.78

SCANNED IMAGE

CANADIAN JAVELIN LTD.

PRELIMINARY ESTIMATED OPERATING COSTS FOR MINING, CRUSHING, GRINDING, CONCENTRATING & PELLETIZING PLANT TO MINE AND BENEFICIATE 10,000,000 LONG TONS OF IRON ORE TO PRODUCE 4,000,000 LONG TONS OF IRON PELLETS PER YEAR

DETAILS

	Per Year Labour	Per Year Supplies
1. Administration		
(1) Supervisory Staff (Salaried)		
1 - Manager @ $27,500.	$ 27,500	
1 - General Supt. @ $22,500	22,500	
1 - Mechanical Supt. @ $13,200	13,200	
1 - Electrical Supt. @ $13,200	13,200	
1 - Chief Engineer @ $13,200	13,200	
2 - Engineers @ $9,600	19,200	
1 - Chief Accountant @ $12,000	12,000	
1 - Purchasing Agent @ $9,600	9,600	
1 - Shop Foreman @ $9,600	9,600	
1 - Garage Foreman @ $9,600	9,600	
1 - Chief Store Keeper @ $8,400	8,400	
1 - Surface Boss @ $8,400	8,400	
5 - Warehouse Men @ $500/month	30,000	
9 - Office Clerks @ $500/month	54,000	
9 - Office Clerks @ $400/month	43,200	
5 - Draftsmen @ $700/month	42,000	
4 - Surveyor Geologists @ $700/month	33,600	
1 - Engineering Office Clerk @ $500/month	6,000	
1 - Blueprint Operator & General Clerk @ $400/month	4,800	
Office Supplies		52,000
	380,000	

SCANNED IMAGE

CANADIAN JAVELIN LTD.

	Per Year Labour	Per Year Supplies
1. Administration (Cont'd)		
(2) Shops (Hourly)		
6 - Machinists @ 3.50/hr.	$ 42,000	
6 - Mechanic Riggers @ $3.40/hr.	40,800	
8 - Mechanics No. 2 @ $3.25	52,000	
3 - Welder Leaders @ $3.35	20,100	
12 - Welders @ $3.15	75,600	
7 - Electricians @ $3.50	49,000	
7 - Electricians Helpers @ $3.15	44,100	
4 - Carpenters @ $3.25	26,000	
2 - Painters @ $3.10	12,400	
2 - Blacksmiths @ $3.40	13,600	
6 - Drill Repair Men & Bit Sharpener Men @ $3.25	39,000	
14 - Labourers @ $2.55	71,400	
2 - Shop Clerks @ $2.30	9,200	
Expendable Shop Supplies, Tools, Etc.		127,000
	495,200	
(3) Garage (Hourly)		
4 - Automotive Mechanic Leaders @ $3.50	28,000	
8 - Automotive Mechanics "A" @ $3.45	55,200	
9 - Automotive Mechanics "B" @ $3.30	59,400	
12 - Automotive Mechanics "C" @ $3.15	75,600	
6 - Labourers @ $2.55	30,600	
1 - Shop Clerk @ $2.30	4,600	
Garage Supplies		92,000
	253,400	
(4) Miscellaneous		
1 - Stationary Engineer @ $600/month	7,200	
4 - Boiler Attendants & Compressor Operator @ $3.25	26,000	
4 - Dry & First Aid Men @ $2.55	20,400	
8 - Watchmen & Gate Men @ $2.55	40,800	
10 - Misc. Labourers @ $2.55	51,000	
	145,400	
Total Yearly Labour	1,274,000	
Fringe Benefits 20%	254,800	
	1,528,800	
Total Yearly Labour & Supplies		1,799,800
Contingencies		179,980
		1,979,780
Cost per Long Ton of Ore Mined		$ 0.198

SCANNED IMAGE

CANADIAN JAVELIN LTD.

1. Administration (Cont'd)

	Cost per Long Ton of Ore
Mining Charges will be approx. 40% of the above, or	$0.080
Crushing, Grinding & Concentrating charges will be approx. 30% of the above, or	$0.059
Pelletizing & Loadout charges will be approx. 30% of the above, or	$0.059

SCANNED IMAGE

2. MINING (40,000 Long Tons/Day, 250 Days/Year)

	Per Day Labour	Per Day Supplies	Cost Per Long Ton of Ore
1. Administration Cost per Long Ton of Ore Mined			$0.080
2. Operating Labour			
1 - Pit Supt. @ $17,500/year	70.00		
3 - Pit Foremen @ $12,000/year	144.00		
3 - Shift Bosses @ $10,000/year	120.00		
1 - Blasting Foreman @ $10,000/year	40.00		
4 - Powder men @ $3.15/hour	100.80		
Explosives and blasting supplies		1,450.00	
7 - 9 cu.yd. shovel shifts @ $20.00/hr.		1,120.00	
2 - 2½ cu.yd. shovel shifts @ $6.90/hr.		110.40	
8 - Shovel Operators @ $3.75/hr.	240.00		
8 - Shovel Oilers @ $2.82/hr.	180.48		
4 - Quarry Master Drill Shifts incl. bits and rods @ $46.00/hr.		1,472.00	
2 - Air-trac drill shifts @ $17.25/hr.		276.00	
6 - Drill Operator Shifts @ $3.30/hr.	158.40		
6 - Drill Operator Helper Shifts @ $2.82/hr.	135.36		
29 - 100 Ton Truck Shifts @ $15.00/hr.		3,480.00	
29 - Truck Driver Shifts @ $3.30/hr.	765.60		
2 - Fuel Truck Shifts		12.00	
2 - Fuel Truck Operator Shifts @ $3.00	48.00		
2 - Service Truck Shifts		12.00	
2 - Service Truck Operator Shifts @ $3.00/hr.	48.00		
9 - 1 ton pick up truck shifts		54.00	
2 - Man Transportation Truck Shifts		12.00	
9 - Bulldozer Shifts @ $4.60/hr.		331.20	
9 - Bulldozer Operator Shifts @ $3.15	226.80		
5 - Grader Shifts @ $4.60/hr.		184.00	
5 - Grader Operator Shifts @ $3.15/hr.	126.00		
2 - Rubber Mounted Crane Shifts @ $4.60		73.60	
2 - Rubber mounted Crane Operator Shifts @ $3.35/hr.	53.60		
4 - Portable Compressor Shifts @ $2.30		73.60	
18 - Mine Shifts on Misc. Pit Jobs Scaling, Block-holing, Etc. $2.90/	417.60		
3 - Mine Clerk Shifts @ $2.30/hr	55.20		
Heating Mine Dry and Office, also Diesel Oil Requirements for Pit		370.00	

SCANNED IMAGE

CANADIAN JAVELIN LTD.

2. MINING (Continued)

2. Operating Labour (Cont'd)

	Per Day Labour	Per Day Supplies	Cost per Long Ton of Ore
Total Wates	2,929.84		
Fringe Benefits 20%	585.97		
	3,515.81		
Supplies	9,030.80		
	12,546.61		
Contingencies	1,254.66		
	$ 13,801.27		
Cost per Long Ton of Ore Mined			$0.345

3. Power

	H.P.	H.P.H.
3 - Electric Shovels @ 18 hrs. per day, max. usage 600 H.P.	1,800	32,400
Quarry Master Drill, 400 H.P.	400	7,200
Proportion of Auxiliary Services	[illegible]	5,400
Mine Lighting and Misc.	[illegible]	2,880
	2,060	47,880

Power Demand = 80% = 38,304,
say - 38,000 H.P.H.

Power Cost = 3.5 mills per H.P.H.	=	$133.00
Contingencies	=	13.30
		146.30

Cost per long ton of ore mined $0.004

4. Auxiliary Services

Proportion of Auxiliary Services
Maintenance Cost per Long Ton of Ore Mined $0.010

TOTAL COST OF MINING, PER LONG TON OF ORE MINED $0.439

SCANNED IMAGE

3. CRUSHING, GRINDING & CONCENTRATION
(2d,600 long tons per day, 350 days per year)

1. Administration Cost per Long Ton of Ore Mined $0.059

2. Supervision (Salaried)

	Per Yr. Labour	Per Yr. Supplies
1 - Mill Supt. @ $14,000/yr.	14,000	
1 - Asst. Mill Supt. @ $12,000/yr.	12,000	
1 - Metallurgist @ $12,000/yr.	12,000	
4 - Mill Foremen @ $8,400	33,600	
1 - Chemist @ $10,000/yr.	10,000	
4 - Technicians @ $7,200	28,800	
4 - Technicians Helpers @ $6,000	24,000	
2 - Clerks @ $2.30/hr.	9,200	
Other Supplies		11,000
Total Yearly Supervision Labour	143,600	
Fringe Benefits 20%	28,720	172,320
Total Yearly Supervision, Labour & Supplies		183,320
Contingencies		18,332
		201,652

Cost Per Long Ton of Ore Processed $0.020

3. Operating Labour (Hourly)

	No./Men Per Shift	Per Day	Total
Primary Crusher Operator	2	6	
Primary Crusher Operator Helper & Belt Attendants	2	6	
Surge Bin, Bulldozer Operator	4	12	
Autogenous Mill Operator (Leader)	1	3	
Autogenous Mill Operator	4	12	
Spiral Separator Operator (Leader)	1	3	
Spiral Separator Operator	4	12	
Sample & Sample Handling	2	6	
Pump Operator (Leader)	1	3	
Pump Operator Helper	2	6	
Labourers	4	12	81

24 Additional Operators will be required for a 40 hour week. Total No. of Men Required 105

The hourly rate of pay for these men will range from $2.50 to $3.90/hr. An average of $3.20/hr.

81 x 3.20 x 8 = $2,073.60

Cost per long ton of ore processed	$0.073
Fringe Benefits 20%	0.015
Contingencies	0.009

Cost Per Long Ton of Ore Processed $0.097

SCANNED IMAGE

3. Crushing, Grinding & Concentration (Cont'd)

3. Operating Labour (Cont'd)

Fringe Benefits are Made Up as Follows:

Workmen's Compensation	6.00%
Silicosis	1.50%
Vacation Pay	5.00%
Legal Holidays	2.50%
Unemployment Insurance	0.75%
Medical Plan	1.25%
Insurance Plan	0.75%
Miscellaneous	2.25%
Total	20%

4. Power

	Installed H.P.	H.P.H./Day
Primary Crushing Layout @ 20 hrs/day	1,440	28,800
No. 2 Conveyor	1,000	20,000
Ore Storage Layout	450	9,000
Concentrator Layout	7,480	149,600
Proportion of Shop, Garage & Misc. Services	1,600	32,000
	11,970	239,400

Demand Load 80% - 191,520, say 190,000 H.P.H.

Power Cost at this Location will be approx. 3.5 mills/H.P.H.

Total Cost per day	$ 665.00
Contingencies	66.50
	$ 731.50

Cost Per Long Ton of Ore Processed $0.026

5. Supplies

A. Steel Consumption

1#/ton @ $0.11/lb. - $0.11 per ton.

B. Miscellaneous

Screen Cloth & Misc. Repair Material - $0.06 per ton

Total Cost per Long Ton of Ore Processed $0.170

6. Water Cost Per Long Ton of Ore Processed $0.002

SCANNED IMAGE

3. Crushing, Grinding & Concentration (Cont'd)

7. Fuel

Heating Water for Autogenous Mills & Buildings Only

Average 7,900 gallons/day		
Cost per Gallon	$ 0.12	
Cost per day	$ 948.00	
Contingencies	94.80	
	$ 1,042.80	
Cost per Long Ton of Ore Processed		$0.036

8. Maintenance

4% of estimated building cost	193,200	
2% of estimated equipment cost	264,100	
	457,300	
Cost per long ton of ore processed =	.046	
Contingencies =	.005	
Maintenance Cost per Long Ton of Ore Processed		$0.051

9. Auxiliary Services

Proportion of Auxiliary Services Maintenance Cost Per Long Ton of Ore Processed	$0.014
TOTAL COST OF CRUSHING, GRINDING & CONCENTRATION PER LONG TON OF ORE PROCESSED	$0.475

SCANNED IMAGE

4. PELLETIZING & LOADOUT (28,600 long tons/day, 350 days/year)

	Cost per Long Ton of Ore
1. Administration	
Proportion of Cost per Long Ton of Ore Processed	$0.059

2. Supervision (Salaried)	Per Yr. Labour	Per Yr. Supplies
1 - Mill Supt. @ $14,000/yr.	14,000	
1 - Asst. Mill Supt. @ $12,000/yr.	12,000	
1 - Metallurgist @ $12,000/yr.	12,000	
4 - Mill Foremen @ $9,600/yr.	38,400	
1 - Chemist @ $10,000/yr.	10,000	
4 - Technicians @ $7,200/yr.	28,800	
4 - Technicians @ $6,000/yr.	24,000	
2 - Clerks @ $2.30/hr.	9,200	
Office Supplies		11,000
Total Yearly Supervisory Labour	148,400	
Fringe Benefits 20%	29,680	
	178,080	
Supplies	11,000	
Total Yearly Supervision Labour & Supplies	189,080	
Contingencies	18,908	
	$ 207,988	

Cost per Long Ton of Ore Processed	$0.021

3. Operating Labour (Hourly)	No./Men Per Shift	No./Men Per Day	Total
Ball Mill Operator (Leader)	1	3	
Ball Mill Operator Helpers	3	9	
Filter Operator (Leader)	1	3	
Filter Operator Helpers	2	6	
Raw Material Operator (Leader)	1	3	
Raw Material Operator Helpers	3	9	
Pelletizing Operator (Leader)	1	3	
Pelletizing Operator Helpers	3	9	
Grate Operator (Leader)	1	3	
Grate Operator Helpers	3	9	
Sample & Sample Handling	2	6	
Belt Attendant	1	3	
Loadout Man (Leader)	1	3	
Loadout Men	4	12	
Labourers	7	21	102

30 Additional Operators will be required for a 40 Hour Week - Total Number of Men Required 132

CANADIAN JAVELIN LTD.

4. PELLETIZING & LOADOUT (Cont'd)

Cost per Long Ton of Ore

3. Operating Labour (Cont'd)

The hourly rate of pay for these men will range from $2.60 to $4.00/hr. for an average of $3.30/hr.

102 x$3.30 x 8 = $2692.80

Cost per long ton of ore processed	=	$0.094
Fringe Benefits 20%	=	0.019
Contingencies	=	0.011

Cost per Long Ton of Ore Processed $0.124

4. Power

	Installed H.P.	H.P.H./Day
Grinding @ 20 hrs. per day	16,600	332,000
Balling & Pelletizing	1,740	34,800
Drying, Hardening & Cooling	18,000	360,000
Raw Material Handling	720	14,400
Miscellaneous	1,380	27,600
Loadout	300	6,000
Proportion of Shops, Garage, & Misc. Services	1,510	30,200
	40,250	805,000

Demand Load = 80% = 644,000, say 640,000 H.P.H.

Power cost at this location will be approx.

3.5 Mills per H.P.H.	=	$ 2,240.00
Contingencies		224.00
		2,464.00

Cost per long ton of Ore Processed $0.086

5. Water Cost per Long Ton of Ore Processed $0.002

6. Supplies

A. Steel Consumption
Mill Liners, Balls, etc.
1.5#/ton @ $0.11/lb. = $0.165 per ton

B. Miscellaneous
Filter Cloth, screen cloth, fire brick & Misc. = $0.029

Cost per Long Ton of Ore Processed $0.194

SCANNED IMAGE

Cost per Long Ton of Ore

4. PELLETIZING & LOADOUT (Cont'd)

7. Fuel

Drying, Hardening, etc. per day	--	80,000 gallons
Heating, etc. per day	--	1,750 gallons
		81,750 gallons

81,750 gallons @ $0.12/gallong	=	$ 9,810.00
Contingencies	=	981.00
		$10,791.00

Cost per Long Ton of Ore Processed — $0.377

8. Maintenance

4% of estimated building cost =	$404,400
2% of estimated equipment cost	639,500
	1,043,900

Cost per long ton of Ore Processed =	$0.104
Contingencies	0.010
Cost per Long Ton of Ore Processed	$0.114

9. Auxiliary Services

Proportion of Auxiliary Services Maintenance Cost per Long Ton of Ore Processed — $0.019

TOTAL COST OF PELLETIZING & LOADOUT PER LONG TON OF ORE PROCESSED — $0.996

SCANNED IMAGE

AUXILIARY SERVICES			Cost per Long Ton of Ore
Maintenance on auxiliary mill structures covering Boiler House, Shops & Stores, Administration Office, Assay Office, Garage, etc.			
4% on Buildings	=	$120,800	
2% on Equipment	=	30,440	
		$151,240	$0.015
4% on Townsite Buildings			$0.019
2% on Roads & Yards			$0.005
Total			$0.039
Contingencies			$0.004
Cost per Long Ton of Ore Processed			$0.043

Subdivided as follows:

Mining	$0.010
Crushing, Grinding & Concentrating	$0.014
Pelletizing & Loadout	$0.019

SCANNED IMAGE

OPERATING COST
6,000,000 MTPY PLANT

SCANNED IMAGE

CANADIAN JAVELIN LTD.

PRELIMINARY ESTIMATE

OF

OPERATING COSTS

FOR

A MINING, CONCENTRATING & PELLETIZING PLANT

TO MINE & BENEFICIATE

15,000,000 LONG TONS OF IRON ORE TO PRODUCE

6,000,000 LONG TONS OF IRON PELLETS PER YEAR

AT

JULIENNE LAKE, LABRADOR

Prepared and submitted by:

KILBORN ENGINEERING LTD.
Consulting Engineers
36 Park Lawn Road
Toronto 18, Ontario

September, 1967

SCANNED IMAGE

CANADIAN JAVELIN LTD.

PRELIMINARY ESTIMATED OPERATING COSTS

FOR A

MINING, CRUSHING, GRINDING, CONCENTRATING & PELLETIZING PLANT

TO MINE & BENEFICIATE

15,000,000 LONG TONS OF IRON ORE TO PRODUCE

6,000,000 LONG TONS OF IRON PELLETS PER YEAR

INDEX

	Page
General Data Furnished by Owner	1
Assumed Operating Data on Which Estimated Operating Costs are Based	2
Preliminary Estimate of Operating Costs for a Mining, Concentrating and Pelletizing Plant Summary	4
Preliminary Estimate of Operating Costs for a Mining, Concentrating and Pelletizing Plant Details	6

SCANNED IMAGE

CANADIAN JAVELIN LTD.

GENERAL DATA FURNISHED BY OWNER

1. 6,000,000 long tons of pellets are to be produced per year.

2. 2.5 long tons of ore are required to produce 1 long ton of concentrates.

3. Preliminary pit preparation consists of a relatively small amount of clean-up stripping.

4. 15,000,000 long tons of ore are required per year to produce 6,000,000 long tons of pellets.

5. The mining rate is based on three shifts per day, 250 days per year operation.

$$\frac{15,000,000}{250} = 60,000 \text{ long tons of ore per day}$$

6. The concentrator is to be operated three shifts per day, 350 days per year.

$$\frac{15,000,000}{350} = 42,857, \text{ say } 42,900 \text{ long tons of ore per day.}$$

7. Concentration is to be by autogenous grinding and spiral classification method.

8. Concentrating plant to be based on a 6-line layout.

9. Pellet production is to be by balling drums and the grate furnace method or grate - kiln furnace method.

10. It is assumed that a grind of 80% minus 325 mesh will be required to produce a satisfactory pellet.

11. Concentrates to be handled to pelletizing plant by pipe lines.

12. The pelletizing plant is based on a three line layout, each line being capable of producing approx. 2,000,000 long tons of pellets per year.

13. Power costs of 3.5 mills per horse power hour have been established by Canadian Javelin Ltd.

14. Fuel oil cost of $0.12 per Imperial gallon have been established by Canadian Javelin Ltd.

SCANNED IMAGE

CANADIAN JAVELIN LTD.

ASSUMED OPERATING DATA ON WHICH THE ESTIMATED OPERATING COSTS ARE BASED

1. The pit will be operated 3 shifts per day, 5 days per week, 250 days per year. The production will be 60,000 long tons of ore per day.

2. The assumed average effective working time per shift is $6\frac{1}{2}$ hours. During this period the equipment will operate at 85% capacity.

3. The average production rate for a 9 cu. yd. electric shovel is 1100 long tons per hour.

   Shovel shifts required $\dfrac{60,000}{1100 \times 0.85 \times 6.5} = 9.9$ shifts.

   The net number of shovels required will be 4.
   With an availability of 75%
   the number required will ultimately be 5.

   $2 - 2\frac{1}{2}$ yard diesel shovels will be provided for clean-up work, to be supplemented later as required.

4. Ore haulage to the crusher will be by 100 ton rear dump trucks which have an assumed capacity of 250 long tons per hour.

   Truck shifts required $\dfrac{60,000}{250 \times 6.5 \times .85} = 43.4$ shifts

   The net number of trucks required will be 15.
   With availability of 70% the gross number
   of trucks required is 21.

5. The average drilling rate for a Quarry Master QM5-DHD500 drill, using a 9" bit, is estimated to be 175 ft. per shift, with allowances for sub-drilling, lost time, etc. Assuming an average drilling depth of 55 ft. and a 27 ft. x 31 ft. pattern, each drill hole will provide approximately 70 long tons of ore per ft. of hole.

   Tons produced per shift = 175 x 70 = 12,250 long tons

   Drill shifts required $= \dfrac{60,000}{12,250} = 4.9$ shifts

   Based on an assumed availability of 70%, the gross number of shifts is 7.

   Drills required - 3.
   (Provide 2 electric drills and 1 diesel drill)

   Also included are costs for three additional machines; two mobile drilling units with a 6600 long ton per shift capacity and the other a smaller unit.

SCANNED IMAGE

CANADIAN JAVELIN LTD.

ASSUMED OPERATING DATA ON WHICH ESTIMATED OPERATING COSTS ARE BASED (Cont'd)

6. Number of Bulldozers Required:

Number of bulldozers required initially, allowing one bulldozer per large shovel = 4.
Ultimate bulldozer requirements will be 6.

7. A 60" x 109" gyratory crusher is included in the estimate. This unit is capable of handling ore from 9 cu.yd. shovels and will provide considerable surplus capacity for the operation. A detailed study must be undertaken prior to design to consider whether a smaller gyratory crusher, or perhaps two jaw crushers, would prove to be sufficient. In any event, the estimated cost of the crusher building and equipment will be reduced if either of the two latter alternatives is adopted.

8. Cost of a 72" belt conveyor is included in the estimate. A 72" belt conveyor is recommended between the crusher building and the ore storage building. This width will permit the satisfactory handling of the size of ore and tonnages expected.

9. Ore storage capacity is approximately 2½ days mill feed requirements both in the covered and exterior storage areas.

10. All production is pelletized.

11. Two days of pellet storage is provided in the Loadout Area silos, as well as an emergency exterior stockpile of approximately 1.7 days.

SCANNED IMAGE

CANADIAN JAVELIN LTD.

PRELIMINARY ESTIMATE OF OPERATING COSTS FOR
A MINING, CONCENTRATING & PELLETIZING PLANT
TO MINE & BENEFICIATE
15,000,000 LONG TONS OF IRON ORE TO PRODUCE
6,000,000 LONG TONS OF IRON PELLETS PER YEAR
AT
JULIENNE LAKE, LABRADOR

SUMMARY

	Cost per Long Ton of Ore	Total
1. MINING		
1. Administration	0.070	
2. Supervision & Operating Labour	0.338	
3. Power	0.004	
4. Auxiliary Services	0.010	
Total for Mining		$0.422
2. CRUSHING, GRINDING & CONCENTRATING		
1. Administration	0.053	
2. Supervision	0.018	
3. Operating Labour	0.080	
4. Power	0.024	
5. Supplies	0.170	
6. Water	0.002	
7. Fuel	0.037	
8. Maintenance	0.044	
9. Auxiliary Services	0.014	
Total for Crushing, Grinding & Concentrating		$0.442
3. PELLETIZING & LOADOUT		
1. Administration	0.053	
2. Supervision	0.018	
3. Operating Labour	0.105	
4. Power	0.086	
5. Water	0.002	
6. Supplies	0.194	
7. Fuel	0.378	
8. Maintenance	0.110	
9. Auxiliary Services	0.015	
Total for Pelletizing & Loadout		$0.961

SCANNED IMAGE

CANADIAN JAVELIN LTD:

TOTAL COST PER LONG TON OF ORE MINED AND PROCESSED $1.825

Cost per long ton of pellets in cars

$1.825 x 2.5 = $4.56

SCANNED IMAGE

CANADIAN JAVELIN LTD.

PRELIMINARY ESTIMATE OF OPERATING COSTS FOR
A MINING, CONCENTRATING & PELLETIZING PLANT
TO MINE & BENEFICIATE
15,000,000 LONG TONS OF IRON ORE TO PRODUCE
6,000,000 LONG TONS OF IRON PELLETS PER YEAR
AT
JULIENNE LAKE, LABRADOR

DETAILS

	Per Year	
1. ADMINISTRATION	Labour	Supplies
(1) Supervisory Staff (Salaried)		
1 Manager @ $30,000 per year	$30,000	
1 Assistant Manager @ $25,000 per year	25,000	
1 General Supt. @ $22,500 per year	22,500	
1 Mechanical Supt. @ $15,000 per year	15.000	
1 Electrical Supt. @ $15,000 per year	15,000	
1 Chief Engineer @ $15,000 per year	15,000	
1 Asst. Chief Engineer @ $12,000 per year	12,000	
3 Engineers @ $9,600 per year	28,800	
1 Chief Accountant @ $13,000 per year	13,000	
1 Purchasing Agent @ $12,000 per year	12,000	
1 Clerk Store Keeper @ $10,000 per year	10,000	
1 Garage Foreman @ $10,000 per year	10,000	
1 Shop Foreman @ $10,000 per year	10,000	
1 Surface Boss @ $8,400 per year	8,400	
6 Warehouse Men @ $500 per month	36,000	
1 Office Clerk @ $8,400 per year	8,400	
12 Office Clerks @ $500 per month	72,000	
12 Office Clerks @ $400 per month	57,600	
6 Draftsmen @ $700/month	50,400	
1 Clerk Geologist @ $12,000 per year	12,000	
6 Surveyor Geologists @ $700 per month	50,400	
1 Engineering Office Clerk @ $500/month	6,000	
2 Blueprint Operators & General Clerks @ $400 per month	9,600	
Office Supplies		$80,000
	529,100	

SCANNED IMAGE

CANADIAN JAVELIN LTD.

1. ADMINISTRATION (Cont'd)

(2) Shops (Hourly)	Per Year Labour	Per Year Supplies
6 Machinists @ $3.50 per hour	$42,000	
6 Mechanic Riggers @ $3.40 per hour	40,800	
12 Mechanics No. 2 @ $3.25 per hour	78,000	
3 Welder Leaders @ $3.35 per hour	20,100	
16 Welders @ $3.15 per hour	100,800	
9 Electricians @ $3.50 per hour	63,000	
9 Electricians Helpers @ $3.15 per hour	56,700	
2 Carpenters @ $3.40 per hour	13,600	
4 Carpenters @ $3.00 per hour	24,000	
4 Painters @ $3.10 per hour	24,800	
3 Blacksmiths @ $3.40 per hour	20,400	
9 Drill Repair and Bit Sharpener Men @ $3.25 per hour	58,500	
20 Labourers @ $2.55 per hour	102,000	
3 Shop Clerks @ $2.30 per hour	13,800	
Expendable Shop Supplies, tools, etc.		190,000
	$658,500	

(3) Garage (Hourly)		
4 Automotive Mechanic Leaders @ $3.50/hr.	28,000	
9 Automotive Mechanics "A" @ $3.45/hr.	62,100	
12 Automotive Mechanics "B" @ $3.30/hr.	79,200	
15 Automotive Mechanics "C" @ $3.15/hr.	94,500	
10 Labourers @ $2.55 per hour	51,000	
1 Shop Clerk @ $2.30 per hour	4,600	
Garage supplies		140,000
	$319,400	

(4) Miscellaneous		
1 Stationary Engineer @ $600 per month	7,200	
4 Boiler Attendants & Compressor Operator @ $3.25 per hour	26,000	
4 Dry & First Aid Men @ $2.55 per hour	20,400	
8 Watchmen & Gate Men @ $2.55 per hour	40,800	
12 Miscellaneous Labour @ $2.55 per hour	61,200	
	$155,600	

Total Yearly Labour	$1,662,600	
Fringe Benefits 20%	332,520	
	$1,995,120	
Total Yearly Labour & Supplies		2,405,120
Contingencies		240,512
		$2,645,632

SCANNED IMAGE

CANADIAN JAVELIN LTD.

	Cost Per Long Ton of Ore
1. ADMINISTRATION (Cont'd)	
Cost per long ton of ore mined	$0.176
Mining charges will be approx. 40% of the above, or	$0.070
Crushing, Grinding & Concentrating charges will be approx. 30% of the above, or	$0.053
Pelletizing and Loadout charges will be approx. 30% of the above, or	$0.053

SCANNED IMAGE

CANADIAN JAVELIN LTD.

Cost Per Long Ton of Ore

2. MINING (60,000 long tons/day, 250 days/year)

(1) Administration Costs per long ton of ore mined — $0.070

(2) Operating Labour

	per day Labour	per day Supplies
1 Pit Superintendent @ $20,000/year	$80.00	
3 Pit Foremen @ $14,000/year	168.00	
3 Shift Bosses @ $12,000/year	144.00	
1 Blasting Foreman @ $11,000/year	44.00	
6 Powder Men @ $3.15/hour	151.20	
Explosives & Blasting supplies		$2,240.00
10 - 9 c.y. Shovel shifts @ $20.00/hr.		1,600.00
4 - 2½ c.y. Shovel shifts @ $6.90/hr.		220.80
12 - Shovel Operator shifts @ $3.75/hr.	360.00	
12 - Shovel Oilers @ $2.82/hr.	270.72	
3 - Air-tac Drill shifts @ $17.25/hr.		414.00
5 - Quarry Master drill shifts including bits & rods @ $46/hr.		1,840.00
8 - Drill operators @ $3.30/hr.	211.20	
8 - Drill operator-helpers @ $2.82/hr.	180.48	
44 - 100 ton Truck shifts @ $15.00/hr.		5,280.00
44 - 100 ton Truck drivers @ $3.30/hr.	1,161.60	
3 - Fuel truck shifts		18.00
3 - Fuel truck operators @ $3.00/hr.	72.00	
3 - Service truck shifts		18.00
3 - Service truck operator shifts @ $3.00/hr.	72.00	
12 - 1 ton Pick-up truck shifts		72.00
3 - Men transportation truck shifts		18.00
16 - Bulldozer shifts @ $4.60/hr.		588.80
16 - Bulldozer operator shifts @ $3.15/hr.	403.20	
8 - Grader shifts @ $4.60/hr.		294.40
8 - Grader operator shifts @ $3.15/hr.	201.60	
3 - Rubber mounted crane shifts @ $4.60/hr.		110.40
3 - Rubber mounted crane operators @ $3.35/hr.	80.40	
9 - Portable compressor shifts @ $2.30/hr.		165.60
27 - Man shifts on miscellaneous pit jobs, scaling, blockholing, etc. @ $2.90/hr.	626.40	
3 - Mine Clerk shifts @ $2.30/hr.	55.20	
Heating, Mine Dry & Office, also diesel oil requirements for pit		430.00
Total Wages	4,282.00	
Fringe Benefits 20%	856.40	
	5,138.40	
Supplies	13,310.00	
Daily Mining Costs	18,448.40	
Contingencies	1,844.84	
	20,293.24	

Cost per long ton of ore mined — $0.338

SCANNED IMAGE

CANADIAN JAVELIN LTD.

Cost per Long Ton of Ore

2. MINING (Cont'd)

(3) Power

	H.P.	H.P.H.
4 - Electric shovels @ 18 hrs./day. Maximum usage 600 H.P.	2,400	43,200
2 - Quarry Master drills	800	14,400
Proportion of Auxiliary Services	455	8,190
Mine Lighting & Misc. Equipment	200	3,600
	3,855	69,390

Demand Load 80% = 55,512, say 56,000 H.P.H.

Power cost - 3.5 mills per H.P.H.	=	$196.00
Contingencies	=	19.60
		$215.60

Cost per long ton of ore mined $0.004

(4) Auxiliary Services

Proportion of auxiliary services maintenance cost $0.010

TOTAL COST OF MINING, PER LONG TON OF ORE MINED $0.422

SCANNED IMAGE

CANADIAN JAVELIN LTD.

Cost Per Long Ton of Ore

3. CRUSHING, GRINDING & CONCENTRATING
(42,900 long tons per day, 350 days per year)

(1) Administration Cost per long ton of ore processed — $0.053

(2) Supervision (Salaried)

	Per Year Labour	Per Year Supplies
1 Mill Superintendent @ $16,000 per year	$16,000	
1 Asst. Mill Supt. @ $14,000 per year	14,000	
1 Metallurgist @ $14,000 per year	14,000	
4 Mill Foremen @ $10,000 per year	40,000	
3 Chemists @ $12,000 per year	36,000	
3 Technicians @ $8,000 per year	24,000	
6 Technicians Helpers @ $6,000 per year	36,000	
3 Clerks @ $2.30 per hour	13,800	
Office Supplies		$15,000
Total yearly Supervision Labour	193,800	
Fringe benefits 20%	38,760	232,560
Total yearly Supervision Labour & Supplies		247,560
Contingencies		24,756
		272,316

Cost per long ton of ore processed — $0.018

(3) Operating Labour (Hourly)

	No. of Men per shift	No. of Men per day
Primary Crusher Operators	2	6
Primary Crusher Operators & Belt Attendants	2	6
Surge Bin Bulldozer Operators	4	12
Autogenous Mill Operator (Leader)	1	3
Autogenous Mill Operators	6	18
Spiral Separator Operator (Leader)	1	3
Spiral Separator Operators	6	18
Sample & Sample Handling	3	9
Pump Operator (Leader)	1	3
Pump Operators	2	6
Labourers	6	18
Total No. of Men		102

29 additional operators will be required for a 40-hour week.
Total number of men required = 131.

SCANNED IMAGE

CANADIAN JAVELIN LTD.

Cost Per Long Ton of Ore

3. CRUSHING, GRINDING & CONCENTRATING (Cont'd)

(3) Operating Labour (Hourly) (Cont'd)

The hourly rates of pay of these men will range from $2.50 to $3.90 per hour, an average of $3.20 per hour.

102 x $3.20 x 8 = $2,611.20

Cost per long ton of ore processed	=	$0.061
Fringe Benefits 20%	=	0.012
Contingencies	=	0.007
Cost per long ton of ore processed		$0.080

Fringe Benefits are made up as follows:

Workmen's Compensation	6.00%
Silicosis	1.50
Vacation Pay	5.00
Legal Holidays	2.50
Unemployment Insurance	0.75
Medical Plan	1.25
Insurance Plan	0.75
Miscellaneous	2.25
	20.00%

(4) Power	Installed H.P.	HPH/Day
Primary Crushing Layout @ 20 hrs./day	1,440	28,800
No. 2 Conveyor	1,000	20,000
Ore Storage Layout	620	12,400
Concentrator Layout	11,240	224,800
Proportion of Auxiliary Services	2,135	42,700
	16,435	328,700

Demand Load 80% = 262,960, say 263,000 H.P.H.

Power cost at this location will be approx. 3.5 mills per H.P.H.

Total cost per day	=	$920.50
Contingencies	=	92.05
		1012.55
Cost per long ton of ore processed		$0.024

SCANNED IMAGE

CANADIAN JAVELIN LTD.

Cost Per Long Ton of Ore

3. CRUSHING, GRINDING & CONCENTRATING (Cont'd)

(5) Supplies

A. Steel Consumption
1.0#/ton @ 0.11/lb. = $0.11 per ton

B. Miscellaneous
Screen Cloth & Misc. Repair Materials = $0.06 per ton

Total cost per long ton of ore processed $0.170

(6) Water Cost per long ton of ore processed $0.002

(7) Fuel

Heating water for autogenous mills and heating buildings only.
Average 12,000 gallons/day.
Cost per gallon = $0.12.

Cost per day	=	$1,440.00
Contingencies	=	144.00
		$1,584.00

Cost per long ton of ore processed $0.037

(8) Maintenance

4% of estimatedbuilding cost	=	$249,600
2% of estimated equipment cost	=	353,280
		$602,880

Cost per long ton of ore processed	=	$0.040
Contingencies	=	0.004

Maintenance cost per long ton of ore processed $0.044

(9) Auxiliary Services
Proportion of Auxiliary Services
Maintenance Cost per Long ton of ore processed $0.014

TOTAL COST OF CRUSHING, GRINDING & CONCENTRATING
PER LONG TON OF ORE PROCESSED $0.442

SCANNED IMAGE

CANADIAN JAVELIN LTD.

Cost per Long Ton of Ore

4. PELLETIZING & LOADOUT
(42,900 long tons per day, 350 days per year)

(1) Administration

Proportion of cost per long ton of ore processed — $0.053

(2) Supervision (Salaried)

	Per Year Labour	Per Year Supplies
1 Mill Superintendent @ $16,000 per year	$16,000	
1 Assistant Mill Supt. @ $14,000 per year	14,000	
1 Metallurgist @ $14,000 per year	14,000	
4 Mill Foremen @ $10,000 per year	40,000	
1 Chemist @ $12,000 per year	12,000	
6 Technicians @ $7,200 per year	43,200	
6 Technicians @ $6,000 per year	36,000	
3 Clerks @ $2.30 per hour	13,800	
Office supplies		15,000
Total yearly Supervision Labour	$189,000	
Fringe Benefits 20%	37,800	
	$226,800	
Total yearly Supervision Labour & Supplies	241,800	
Contingencies	24,180	
	265,980	

Cost per long ton of ore processed — $0.018

(3) Operating Labour (Hourly)

	No. of Men Per Shift	No. of Men Per Day
Ball Mill Operator (Leader)	1	3
Ball Mill Operator (Helper)	3	9
Filter Operator (Leader)	1	3
Filter Operators	3	9
Raw Material Operator (Leader)	1	3
Raw Material Operators	3	9
Pelletizing Operator (Leader)	1	3
Pelletizing Operators	4	12
Grate Operator (Leader)	1	3
Grate Operators	5	15
Sample & sample handling	2	6
Belt attendants	2	6
Loadout Man (Leader)	1	3
Loadout Men	6	18
Labourers	9	27
Total number of men required		129
37 Additional operators will be required for a 40-hour week =		
Total number of men required		166

SCANNED IMAGE

CANADIAN JAVELIN LTD.

Cost Per Long Ton of Ore

4. PELLETIZING & LOADOUT (Cont'd)

(3) Operating Labour (Hourly) (Cont'd)

The hourly rate of pay for these men will range from $2.60 to $4.00 per hour, an average of $3.30 per hour.

$3.30 x 129 x 8 = $3,405.60

Cost per long ton of ore processed	$0.079
Fringe Benefits 20%	0.016
Contingencies	0.010
Cost per ton of ore processed	$0.105

(4) Power	Installed H.P.	HPH/Day
Grinding @ 20 hrs. per day	24,900	498,000
Pelletizing	2,640	52,800
Drying, Hardening & Cooling	27,000	540,000
Raw Material Handling	860	17,200
Miscellaneous	2,050	41,000
Loadout	500	10,000
Proportion of Auxiliary Services	1,960	39,200
	59,910	1,198,200

Demand Load 80% = 958,560, say 959,000 HPH

Power cost at this location will be approx. 3.5 mills per HPH = $3,356.50

Contingencies 335.65

$3,692.15

Cost per long ton of ore processed $0.086

(5) Water Cost per long ton of ore processed $0.002

(6) Supplies

A. Steel Consumption
Mill Liners, Balls, etc.
1.5#/ton @ $0.11/lb. $0.165 per ton

B. Miscellaneous
Filter cloth, screen cloth, fire brick & miscellaneous $0.029

Cost per long ton of ore processed $0.194

SCANNED IMAGE

CANADIAN JAVELIN LTD.

		Cost per Long Ton of ore
4. PELLETIZING & LOADOUT (Cont'd)		
(7) Fuel		
Drying, Hardening, etc. per day	120,000 gallons	
Heating etc. per day	3,000 gallons	
	123,000 gallons	
123,000 gallons @ $0.12/gallon	$14,760.00	
Contingencies	1,476.00	
	$16,236.00	
Cost per long ton of ore processed		$0.378
(8) Maintenance		
4% of Estimated Building Cost	$577,400	
2% of Estimated Equipment Cost	917,500	
	$1,494,900	
Cost per long ton of ore processed	$0.100	
Contingencies	0.010	
Cost per long ton of ore processed		$0.110
(9) Auxiliary Services		
Proportion of auxiliary services maintenance cost per long ton of ore processed		$0.015
TOTAL COST OF PELLETIZING & LOADOUT PER LONG TON OF ORE PROCESSED		$0.961

SCANNED IMAGE

CANADIAN JAVELIN LTD.

				Cost per Long Ton of Ore
AUXILIARY SERVICES				
Maintenance on Auxiliary Mill Structures covering Boiler House, Shops & Stores, Dry, Administration Office, Assay Office, Garage, etc.				
4% on Building	=	$120,800		
2% on Equipment	=	32,440		
		$153,240	=	$0.010
4% on Townsite				$0.020
2% on Roads & Yards				$0.005
				$0.035
Contingencies				$0.004
Total cost per long ton of ore processed				$0.039

Subdivided as follows:

Mining	$0.010
Crushing, Grinding & Concentrating	$0.014
Pelletizing & Loadout	$0.015

SCANNED IMAGE

KILBORN ENGINEERING LTD.

CONSULTING ENGINEERS

K. M. DEWAR, B.Sc., P.ENG.
PRESIDENT

B. S. CROCKER, M.A.Sc., P.ENG.
VICE-PRESIDENT

J. T. DEW, B.A.Sc., P.ENG.
GENERAL MANAGER

N. FARRAR, B.Sc., P.ENG.
CHIEF MECHANICAL ENG.

September 14, 1967

36 PARK LAWN ROAD
TORONTO 18, ONTARIO, CANADA
TELEPHONE: AREA CODE 416, 252-1101
TELEX: 02-2765

FILE NO.

23 G(120)

Mr. W. H. Roxburgh,
Secretary,
Canadian Javelin Limited,
100 Bronson Avenue,
Ottawa 4, Ontario.

Re: Capital and Operating Cost Estimates for Julian Iron Ore Pellet Project

Dear Sir:

We enclose herewith twenty copies of our Preliminary Estimates of Capital and Operating Costs dated September 1967, for Mining, Concentrating and Pelletizing plant, located at Julienne Lake, Labrador, of 4,000,000 long tons per year of iron ore pellets and the expansion of this plant to 6,000,000 long tons per year.

This estimate is based on current costs, and if the expansion of the plant to 6,000,000 long tons per year is deferred for several years it will be necessary to add escalation to our estimate.

You had requested that separate estimates be made for the Dravo-Lurgi and the Allis-Chalmers method of making iron pellets. However, we have found that the cost of the two methods is almost identical, and you will see by comparing the two flow sheets that the auxiliary equipment is also identical and only the grate-furnace of the Dravo-Lurgi process differs from the grate-kiln-cooler system used by Allis-Chalmers.

At this early stage we could not clearly bring out the cost differences between the above two methods, and only more complete investigations could give you a recommendation which of these two methods is best for your application.

We have taken the liberty of including only one cost estimate for the pelletizing plant, however we have included drawings showing the flow sheet and general arrangement of both the Dravo plant and the Allis-Chalmers plant.

SCANNED IMAGE

We have refrained from making an Architectural Presentation of the plant, since you suggested that you would have someone make a perspective drawing of the plant. Perhaps this drawing could also be added to the front of our capital cost estimate? Should you not have the time to make such a perspective drawing we could make one for you.

May we express our sincere appreciation of your request to prepare this estimate, which we trust provides you with all the information you require at this time. Should you wish us to discuss this project with European steel companies we would be pleased to accompany your staff, at your convenience, and participate in any conferences that may be deemed desirable.

Yours very truly,

KILBORN ENGINEERING LTD.

K. M. Dewar, P. Eng.,
President.

KMD:jp

SCANNED IMAGE

CAPITAL COST
4,000,000 MTPY PLANT

SCANNED IMAGE

CANADIAN JAVELIN LTD.

PRELIMINARY ESTIMATE

OF

CAPITAL COSTS

FOR

A MINING, CONCENTRATING & PELLETIZING PLANT

TO MINE & BENEFICIATE

10,000,000 LONG TONS OF IRON ORE TO PRODUCE

4,000,000 LONG TONS OF IRON PELLETS PER YEAR

AT

JULIENNE LAKE, LABRADOR

September, 1967

Prepared and submitted by:

KILBORN ENGINEERING LTD.
Consulting Engineers
36 Park Lawn Road
Toronto 18, Ontario

SCANNED IMAGE

CANADIAN JAVELIN LTD.

PRELIMINARY ESTIMATED CAPITAL COSTS

FOR A MINING, CRUSHING, GRINDING,

CONCENTRATING & PELLETIZING PLANT

TO MINE & BENEFICATE

10,000,000 LONG TONS OF IRON ORE TO PRODUCE

4,000,000 LONG TONS OF IRON PELLETS PER YEAR

INDEX

	Page
General Data Furnished by Owner	1
Assumed Operating Data on which Estimated Capital Costs are Based	2
Design Criteria	4
Preliminary Estimated Capital Cost of Mining, Crushing, Grinding, Concentrating & Pelletizing Plant - SUMMARY	6
Preliminary Estimated Capital Cost of Mining, Crushing, Grinding, Concentrating & Pelletizing Plant - DETAILS	8
Estimated Horsepower Requirements	20
General Specifications & Descriptions of Mining Equipment & Surface Plant	23

SCANNED IMAGE

CANADIAN JAVELIN LTD.

GENERAL DATA FURNISHED BY OWNER

1. 4,000,000 long tons of pellets are to be produced per year.

2. 10,000,000 long tons of ore are required to produce 4,000,000 long tons of pellets (2.5:1).

3. Preliminary pit preparation consists of a relatively small amount of clean-up stripping.

4. Mining rate to be based on three shifts per day, 250 days per year operation.

$$\frac{10,000,000}{250} = 40,000 \text{ long tons of ore per day.}$$

5. The Concentrator is to be operated on three shifts per day, 350 days per year.

$$\frac{10,000,000}{350} = 28,571, \text{ say } 28,600 \text{ long tons of ore per day.}$$

6. Concentrating is to be by autogenous grinding and spiral classification method.

7. The concentrating plant is to be based on a 4-line layout.

8. Pellet production is to be by balling drums and the grate furnace method, or grate-kiln furnace method.

9. A grind of 80% minus 325 mesh will be required to produce a satisfactory pellet.

10. Concentrates are to be handled to the pelletizing plant by pipe lines.

11. The pelletizing plant is based on a 2-line layout, each line being capable of producing approximately 2,000,000 long tons of pellets per year.

12. Power costs of 3.5 mills per horsepower hour have been established by Canadian Javelin Ltd.

13. Fuel oil costs of $0.12 per Imperial gallon have been established by Canadian Javelin Ltd.

SCANNED IMAGE

CANADIAN JAVELIN LTD.

ASSUMED OPERATING DATA ON WHICH

ESTIMATED CAPITAL COSTS ARE BASED

1. The pit will be operated on a 3 shifts per day, 5 days per week, 250 days per year basis. The production rate will be 40,000 long tons of ore per day.

2. The assumed average effective working time per shift is 6½ hours. During this period the equipment will operate at 85% capacity.

3. The average production rate for a 9 cu. yd. electric shovel is 1,100 long tons per hour.

   Shovel shifts required = $\frac{40,000}{1,100 \times 0.85 \times 6.5}$ = 6.6 shifts

   The net number of shovels required will be - 3.
   The gross number of shovels required will be - 4.

   1 - 2½ yard diesel shovel will be provided for clean-up work, to be supplemented later as required.

4. Ore haulage to the crusher will be by 100 ton rear dump trucks which have an assumed capacity of 250 long tons per hour.

   Truck shifts required = $\frac{40,000}{250 \times 0.85 \times 6.5}$ = 29 shifts.

   The net number of trucks required = 10.

   Based on an assumed availability of 70%,
   the gross number of trucks required = 14.

5. The average drilling rate for a Quarry Master Q.M.5-DHD 500 drill, using a 9" bit, is estimated to be 175 ft. per shift, with allowances for sub-drilling, lost time, etc. Assuming an average drilling depth of 55 ft. and a 27 ft. x 31 ft. pattern, each drill hole will provide approximately 70 long tons of ore per ft. of hole.

   Tons produced per shift = 175 x 70 = 12,250 long tons.

   Drill shifts required = $\frac{40,000}{12,250}$ = 3.26

   Based on an assumed availability of 70%,
   the gross number of shifts is = 4.66

   Drills required = 2. (one diesel and one electric).

   Also included are costs for two additional machines; one a mobile drilling unit with a 3300 LT/shift capacity, and the other a smaller unit.

SCANNED IMAGE

CANADIAN JAVELIN LTD.

6. Number of Bulldozers required initially:

   Allowing 1 bulldozer per large shovel = 3.
   Ultimate bulldozer requirement will be 4.

7. A 60" x 109" gyratory crusher is included in the estimate. This unit is capable of handling ore from 9 cu. yd. shovels and will provide considerable surplus capacity for the operation. A detailed study must be undertaken prior to design to consider whether a smaller gyratory crusher or perhaps two jaw crushers would prove to be sufficient. In any event, the estimated cost of the crusher building and equipment will be reduced if either of the two latter alternatives is adopted.

8. The cost of a 72" belt conveyor is included in the estimate. A 72" belt conveyor is recommended between the crusher building and the ore storage building. This width will permit the satisfactory handling of the size of ore and tonnages expected. It will also permit future expansion of the plant to 6,000,000 long tons per year of pellet production without necessitating extensive alterations to the crusher and ore storage areas.

9. Ore storage capacity is approximately $2\frac{1}{2}$ days mill feed requirements both in the covered and exterior storage areas.

10. All production is pelletized.

11. Two days of pellet storage is provided in the loadout area silos, as well as an emergency exterior stockpile of approximately 7 days.

SCANNED IMAGE

CANADIAN JAVELIN LTD.

DESIGN CRITERIA

General

The general design criteria detailed in this section were established by Kilborn Engineering Ltd. in collaboration with Canadian Javelin Ltd.

The concentrator flowsheet resulted from pilot plant studies at Lakefield Research Ltd. and from the present practice in the industry.

Both Dravo of Canada and Canadian Allis Chalmers were responsible for the design of their own pelletizing plant flowsheet, which is based on their considerable experience in Canada and the U.S.A.

The building designs are based on similar cold weather structures designed by Kilborn Engineering for other Canadian locations.

The concentrator and pelletizing plant have been considered an integral unit with the normal flow of material continuous from crushed ore storage through to pellet storage. Intermediate emergency concentrate storage is included in order to obtain maximum plant capacity while still retaining flexibility for maintenance.

Provision is included for easy expansion of all production facilities.

Pellets will be shipped via unit trains to a storage pile at Pointe Noire, Quebec. Existing car dump and shiploading facilities will be used.

The plant will have its own townsite area with minimum shopping facilities. Full use will be made of available facilities in the present towns.

Design Factors

The plant is to be capable of producing 4,000,000 long tons per year of iron ore pellets on a continuous 7 days per week basis. An availability of 95% or 350 days per year has been used for equipment selection and hourly tonnage rates.

The mine will work on a 3 shift basis, 5 days per week, with provision for 2½ days storage of crushed ore. An availability of 250 days per year has been used for equipment selection and hourly tonnage rates.

SCANNED IMAGE

Design Factors (Cont'd)

The head analysis is as follows:-

34.2% Iron
0.32% Manganese
0.05% Phosphorus
0.05% Sulphur

The ratio of concentration is 2.5 to 1.

Pellet specifications are:-

66.0% Iron
4.0% Silica
0.5% Max. Manganese
0.02% Max. Phosphorus
0.02% Max. Sulphur
0.5% Max. Al_2O_3+CaO+MgO

Guaranteed Min. Iron = 65%

Guaranteed Max. Silica= 5.0%

SCANNED IMAGE

CANADIAN JAVELIN LTD.

PRELIMINARY ESTIMATED CAPITAL COST FOR A MINING, CRUSHING, GRINDING, CONCENTRATING & PELLETIZING PLANT TO MINE AND BENEFICIATE 10,000,000 LONG TONS OF IRON ORE TO PRODUCE 4,000,000 LONG TONS OF PELLETS PER YEAR

SUMMARY

			Canadian Dollars	
1.	MINING			
	(a) Pit Preparation and Roads		440,000	
	(b) Initial Pit Equipment		6,720,000	7,160,000
2.	CRUSHING, GRINDING & CONCENTRATING			
	(a) Primary Crushing			
	A. Building	1,020,000		
	B. Equipment	2,660,000	3,680,000	
	(b) Belt Conveyor, Crusher Building to Ore Storage			
	A. Building	380,000		
	B. Equipment	1,220,000	1,600,000	
	(c) Ore Storage			
	A. Building	1,130,000		
	B. Equipment	960,000	2,090,000	
	(d) Concentrator			
	A. Building	2,300,000		
	B. Equipment	8,365,000	10,665,000	18,035,000
3.	PELLETIZING & LOADOUT			
	(a) Pelletizing Plant			
	A. Building	9,000,000		
	B. Equipment	30,530,000		
	Suppliers Engineering, Overhead, etc.	3,953,000	43,483,000	
	(b) Pellet Storage & Loadout			
	A. Building	1,110,000		
	B. Equipment	335,000	1,445,000	44,928,000

SCANNED IMAGE

CANADIAN JAVELIN LTD.

				Canadian Dollars
4.	TAILINGS DISPOSAL, SEWAGE DISPOSAL & WATER SUPPLY			1,000,000
5.	SERVICE BUILDINGS			
	(a) Boiler House			
	A. Building (part of Concentrator)			
	B. Equipment		375,000	
	(b) Shops, Stores, Offices, Laboratory, Assay Office & Washrooms			
	A. Building	1,280,000		
	B. Equipment	960,000	2,240,000	
	(c) Garage			
	A. Building	940,000		
	B. Equipment	187,000	1,127,000	3,742,000
6.	ADMINISTRATION OFFICES & SECURITY			800,000
7.	SUBSTATION & GENERAL DISTRIBUTION			1,050,000
8.	FUEL OIL TANKS & DISTRIBUTION LINES			300,000
9.	HEATING DISTRIBUTION LINES			220,000
10.	R.R. TRACKS IN PLANT AREA			700,000
11.	ROADS & YARDS IN PLANT AREA			400,000
12.	TOWNSITE (Allowance)			7,000,000
13.	RAILWAY LINE FROM WABUSH RAILWAY LINE			2,750,000
14.	ACCESS ROAD FROM TOWN OF WABUSH			1,250,000
15.	ELECTRICAL TRANSMISSION LINE AND STANDBY DIESEL POWER PLANT			650,000
	Total for Items 4 to 15 inclusive			19,862,000
	Engineering Design & Construction Supervision, Company Overhead, Insurance, etc.			18,115,000
	TOTAL ESTIMATED CAPITAL COST OF PLANT AT SITE, not including working capital, Dominion and/or Provincial taxes if applicable, dock costs, transportation of pellets to market, interest on borrowed money, head office and sales costs			$108,100,000

SCANNED IMAGE

CANADIAN JAVELIN LTD.

PRELIMINARY ESTIMATED CAPITAL COST OF PIT PREPARATION AND INITIAL PIT EQUIPMENT TO MINE 10,000,000 LONG TONS OF IRON ORE PER YEAR

DETAILS

		Canadian Dollars	
1. MINING			
(a) Pit Preparation and Roads		400,000	
Contingencies		40,000	440,000
(b) Initial Pit Equipment			
3 - 9 cu.yd. Electric Shovels		1,800,000	
1 - 2½ cu.yd. Diesel Shovel		150,000	
1 - Quarry Master drill (QM5-DHD 500) Electric		200,000	
1 - Quarry Master drill (QM5-DHD 500) Diesel		190,000	
Miscellaneous drilling equipment for above drills		30,000	
2 - Gardiner-Denver Air-Tac or equivalent including misc. drilling equipment		60,000	
3 - D-8 Caterpillar tractors or equivalent		180,000	
3 - 600 CFM Portable Compressors		90,000	
10 - Jack hammers and misc. drilling equipment for same		20,000	
2 - Road graders		74,000	
1 - Rubber mounted crane		90,000	
10 - 100 ton rear dump trucks		2,750,000	
1 - 5 ton panel truck		12,000	
1 - 3½ ton service truck		6,000	
1 - Truck for transporting men		7,000	
10 - 1 ton pickup trucks		35,000	
Pit pumps and piping		110,000	
Electric power and lighting around pit		120,000	
Pit change house and office		100,000	
Oil storage, explosion storage and misc. small buildings		45,000	
Misc. small tools and equipment		40,000	
Contingencies		611,000	
Total for Initial Pit Equipment			6,720,000
TOTAL FOR 1. MINING			7,160,000

SCANNED IMAGE

CANADIAN JAVELIN LTD.

PRELIMINARY CAPITAL COST ESTIMATE FOR
CRUSHING, GRINDING & CONCENTRATING PLANT
TO MAKE
4,000,000+ LONG TONS OF IRON CONCENTRATES
TO PRODUCE 4,000,000 LONG TONS OF
65% IRON PELLETS PER YEAR

DETAILS		Canadian Dollars
2. CRUSHING, GRINDING AND CONCENTRATION		
(a) Primary Crusher		
A. Building		
Excavation & preparation of site	100,000	
Backfill	20,000	
Concrete	660,000	
Structural Steel	100,000	
Sidewalls	15,000	
Roof deck and roofing	7,500	
Doors and windows	14,000	
Lighting	3,000	
Heating & Ventilation	2,000	
Finishing & Miscellaneous	6,000	
Contingencies	92,500	1,020,000
B. Equipment		
1 - 60" x 109" Gyratory Crusher complete with motors, etc.	1,250,000	
1 - 120/25 ton Service crane	100,000	
2 - 84" Vibrating Feeders	35,000	
1 - 80" Dribble belt	50,000	
Dust Control	16,000	
Bearing cooling water system	8,000	
Water supply & piping	20,000	
Spares	250,000	
Chutes & spouts	80,000	
Electrical & controls	181,000	
Installation & freight	430,000	
Contingencies	240,000	2,660,000
Total for (a) Primary Crusher		3,680,000

SCANNED IMAGE

CANADIAN JAVELIN LTD.

Canadian Dollars

2. Crushing, Grinding & Concentrating (Cont'd)

(b) Belt Conveyor - Crusher Building to Ore Storage

A 72" cable belt conveyor approx. 3000 ft. long between crushing plant and ore storage bins.

A. Building		
Excavation & preparation of site	6,000	
Backfill	3,000	
Concrete	14,000	
Structural steel	200,000	
Sidewalls & roofing	100,000	
Ventilation	3,000	
Lighting	15,000	
Finishing & Miscellaneous	6,000	
Contingencies	33,000	380,000
B. Equipment		
1 - 72" cable belt conveyor approx. 3000 ft. long complete with drive, idlers, belts and supporting table	800,000	
Electrical & controls	60,000	
Installation & freight	250,000	
Contingencies	110,000	1,220,000
Total for (b) Belt Conveyor		1,600,000

(c) Ore Storage

Covered sections 340' x 160' by approx. 100' high. Emergency open section overhead distributing conveyor only (no floor structure).

A. Building		
Excavation & preparation of site	30,000	
Backfill	10,000	
Concrete	396,000	
Structural steel	430,000	
Sidewalls & roofing	120,000	
Lighting	15,000	
Finishing & Misc.	26,000	
Contingencies	103,000	1,130,000

SCANNED IMAGE

CANADIAN JAVELIN LTD.

Canadian Dollars

2. Crushing, Grinding & Concentrating (Cont'd)

(c) Ore Storage (Cont'd)

E. Equipment			
1 - 72" Tripper belt 600' long including carriage	129,000		
20 - 48" x 72" Feeders	80,000		
4 - 48" Conveyor belts approx. 300' long	204,000		
4 - Weightometers for 48" belts	32,000		
Ventilation & dust control	50,000		
2 - Bulldozers	90,000		
Electrical & controls	85,000		
Installation & freight	202,000		
Contingencies	88,000	960,000	
Total for (c) Ore Storage			2,090,000

(d) Concentrating

Building approx:-

Control & Transformer section	16' x 260' x 60'		
Main Grinding Bay including Repair Area	64' x 320' x 85'		
Concentrator High section	55' x 260' x 92'		
Concentrator Low section	14' x 260' x 30'		
Boiler Plant area	60' x 89' x 30'		
Lab. & Offices	20' x 100' x 30'		
A. Building			
Excavation & preparation of site		36,000	
Backfill		24,000	
Concrete		715,000	
Structural steel		863,000	
Sidewalls		156,000	
Roof deck & roofing		140,000	
Lighting		50,000	
Heating & ventilating		45,000	
Finishing & miscellaneous		60,000	
Contingencies		211,000	2,300,000
B. Equipment			
Grinding Area			
4 - 22' x 7' Autogenous Mills complete with motors, drives and auxiliary equipment		1,600,000	
4 - sets pumps, pump boxes & launders		84,000	
24 - 4' x 10' product screens including drives, etc.		150,000	
Chutes & spouts		60,000	
Pipes & piping		100,000	

SCANNED IMAGE

CANADIAN JAVELIN LTD.

Canadian Dollars

2. Crushing, Grinding & Concentrating (Cont'd)

(d) Concentrator (Cont'd)

B. Equipment (Cont'd)

Grinding Area (Cont'd)			
1 - 40 ton service crane with an auxiliary 5 ton hook, all electric	80,000		
Electrical & controls	202,000		
Installation & freight	474,000		
Contingencies	275,000		
Total for Grinding Area Equipment	3,025,000		
Spiral Separator Area			
1024 Rougher spirals including auxiliaries	919,000		
640 Cleaner spirals incl. auxiliaries	576,000		
640 Recleaner spirals incl. auxiliaries	576,000		
Pumps & pump boxes	200,000		
Mill water tank & auxiliaries	50,000		
Reclaim water pumps, etc.	75,000		
12 - 24" cyclones	18,000		
Chutes & Launders	180,000		
Pipes & piping	200,000		
Electrical & controls	55,000		
Installation & freight	796,000		
Contingencies	365,000		
Total for Spiral Separator Area Equip.	4,010,000		
Miscellaneous			
Product pumps & lines	150,000		
Tailings pumps & lines	75,000		
Service piping	120,000		
Laboratory equipment	8,000		
4 - Heat Exchange units	48,000		
Drainage & sewerage	24,000		
Vacuum pumps, compressor & misc.	90,000		
Air lines	50,000		
Misc. finishing, etc.	20,000		
Instrumentation	230,000		
Sampling & misc.	20,000		
Electrical & controls	85,000		
Installation & freight	290,000		
Contingencies	120,000		
Total for Miscellaneous Equipment	1,330,000		
Total for B. Equipment		8,365,000	
Total for (d) Concentrator			10,665,000
TOTAL FOR 2. CRUSHING, GRINDING & CONCENTRATING			18,035,000

SCANNED IMAGE

CANADIAN JAVELIN LTD.

PRELIMINARY ESTIMATED CAPITAL COST

FOR A PELLETIZING PLANT TO PRODUCE

4,000,000 LONG TONS OF PELLETS PER YEAR

Canadian Dollars

3. PELLETIZING & LOADOUT

(a) Pelletizing Plant

A. Building

Raw Material Handling structure	50' x 50' x 95'
Concentrate Storage Area	33' x 264' x 95'
Grinding Area	80' x 264' x 73'
Balling Area	150' x 251' x 95'
Furnace Area	180' x 340' x 95'
Cooling Area	180' x 50' x 120'
Misc. Lab. Office, etc.	

- All are approx. only.

Excavation & preparation of site	100,000	
Backfill	120,000	
Concrete	2,200,000	
Structural steel	3,200,000	
Sidewalls	500,000	
Roof Deck & Roofing	400,000	
Heating & Ventilating	850,000	
Doors & Windows	100,000	
Lighting	260,000	
Sewerage & Drainage	100,000	
Painting & Misc.	320,000	
Contingencies	850,000	
Total for A. Building		9,000,000

B. Equipment

Grinding

6 - 72' x 18' Surge Tanks	10,000
2 - 30' x 24' Surge Agitators	30,000
6 - 6'-9" x 10' Disc Taconite filters	240,000
Belt & tripper	60,000
6 - 30' x 45' Concentrate bins	75,000
6 - 14' x 28' Ball Mills	3,900,000
6 - Belt scales	24,000
2 - Pumps & pump boxes	36,000
1 - 25 ton Service Crane	10,000
Chutes & launders	45,000
Pipes & piping	60,000
Electric & controls	512,000
Installation & freight	1,200,000
Contingencies	618,000
Total for Grinding Equipment	6,820,000

SCANNED IMAGE

CANADIAN JAVELIN LTD.

3. Pelletizing & Loadout (Cont'd)

(a) Pelletizing Plant (Cont'd)

B. Equipment (Cont'd)

	Canadian Dollars
Pelletizing	
Monorail & Hoists	35,000
[illegible] - 6'-9" x 10' Disc Taconite filters	480,000
[illegible] - Cone shaped bins	48,000
12 - Bentonite bins	90,000
12 - Table feeders	96,000
24 - Roll Feeders	24,000
12 - 98" x 30' Balling drums complete	800,000
12 - Pellet screens	120,000
12 - Weightometers	108,000
Belts & belting	300,000
Chutes & spouts	200,000
Electrical & controls	269,000
Installation & freight	630,000
Contingencies	320,000
Total for Pelletizing Equipment	3,520,000
Drying, Hardening & Cooling	
2 Furnaces	8,000,000
2 Product Screens	30,000
2 Splitter screens	30,000
4 Elevators	75,000
2 Return belts	100,000
Chutes & spouts	250,000
Pipes & piping	50,000
Stacks & Misc.	1,200,000
Monorails, Hoists, etc.	100,000
Spares	800,000
Steel supports, etc.	500,000
Tracks, etc.	100,000
Electrical & controls	1,565,000
Installation & freight	3,600,000
Contingencies	1,600,000
Total for Drying, Hardening & Cooling Equipment	18,000,000

SCANNED IMAGE

CANADIAN JAVELIN LTD.

Canadian Dollars

3. Pelletizing & Loadout (Cont'd)

(a) Pelletizing Plant (Cont'd)

B. Equipment (Cont'd)

Raw Materials Handling			
Air Lifts		80,000	
Elevators		60,000	
Bins & silos		130,000	
Air Chutes		20,000	
Feeders		20,000	
Conveyors, etc.		40,000	
Chutes & spouts		30,000	
Pipes & piping		40,000	
Dust control		50,000	
Electrical & controls		60,000	
Installation & freight		160,000	
Contingencies		70,000	
Total for Raw Materials Handling Equip.		760,000	
Miscellaneous			
4 - 3000 CFM Vacuum pumps complete with drives, moisture trap, etc.		120,000	
2 - 2000 CFM Compressors		100,000	
Laboratory equipment		20,000	
Service piping		100,000	
Plumbing		30,000	
Vacuum lines		50,000	
Instrumentation		220,000	
Sampling & Misc.		50,000	
Sumps, sump pumps, drainage, etc.		80,000	
Painting & misc.		100,000	
Electrical & controls		130,000	
Installation & freight		300,000	
Contingencies		130,000	
Total for Miscellaneous Equipment	1,430,000		
Total for B. Equipment		30,530,000	
Total for A. & B. Building & Equipment			39,530,000
Suppliers Engineering, Overhead, etc.			3,953,000
Total for (a) Pelletizing Plant			43,483,000

SCANNED IMAGE

CANADIAN JAVELIN LTD.

Canadian Dollars

3. Pelletizing & Loadout (Cont'd)

(b) Pellet Storage & Loadout
(Connecting Conveyors & Silos)

A. Building			
Excavation & preparation of site	12,000		
Backfill	20,000		
Concrete	625,000		
Structural steel	180,000		
Sidewalls	70,000		
Roof deck & roofing	28,000		
Windows & doors	9,000		
Lighting	7,000		
Heating	35,000		
Finishing & Misc.	18,000		
Contingencies	106,000	1,110,000	
B. Equipment			
1 - 42" Belt conveyor, 520' long	70,000		
2 - 42" belt conveyors approx. 100' long each	30,000		
2 - 42" Shuttle conveyors approx. 100' long each	50,000		
Gates & chutes	60,000		
Electrical & controls	25,000		
Installation & freight	70,000		
Contingencies	30,000	335,000	
Total for (b) Pellet Storage & Loadout			1,445,000
TOTAL FOR 3. PELLETIZING & LOADOUT			44,928,000

SCANNED IMAGE

CANADIAN JAVELIN LTD.

PRELIMINARY CAPITAL COST ESTIMATE
FOR NECESSARY AUXILIARY SERVICES
FOR A PLANT TO PRODUCE
4,000,000 LONG TONS OF PELLETS PER YEAR

DETAILS			Canadian Dollars
4. TAILINGS DISPOSAL, SEWAGE DISPOSAL & WATER SUPPLY			1,000,000
5. SERVICE BUILDINGS			
(a) Boiler House			
A. Building			
Building incorporated as part of Concentrator layout.			
B. Equipment			
4 - 500 HP Boilers complete	90,000		
Breaching, stacks, etc.	60,000		
Pumps & Misc.	20,000		
Oil tanks & piping (day)	25,000		
Service piping (in building)	35,000		
Electrical & controls	28,000		
Installation & freight	80,000		
Contingencies	37,000	375,000	
Total for (a) Boiler House			375,000
(b) Shops, Stores, Offices, Laboratory, Assay Office & Wash Rooms			
A. Building			
Excavation & preparing site	26,000		
Backfill	18,000		
Concrete	200,000		
Structural steel	300,000		
Sidewalls	100,000		
Roof deck & roofing	240,000		
Doors & windows	120,000		
Lighting	100,000		
Finishing & Misc.	60,000		
Contingencies	116,000	1,280,000	

SCANNED IMAGE

CANADIAN JAVELIN LTD.

Canadian Dollars

5. Service Buildings (Cont'd)

(b) Shops, Stores, Offices, etc. (Cont'd)

B. Equipment			
Laboratory equipment	60,000		
Lockers, washroom, toilets, etc.	50,000		
Office furnishings	20,000		
Equipment for the following:			
Machine Shop, Electrical Shop, Blacksmith Shop & Carpenter Shop	230,000		
Shelving & furnishings	60,000		
Heating & Ventilating	140,000		
Plumbing	40,000		
Service Cranes	60,000		
Electrical & controls	70,000		
Installation & freight	140,000		
Contingencies	90,000	960,000	
Total for (b) Shops, Stores, Offices, etc.			2,240,000

(c) Garage

A. Building			
Excavation & preparation of site	15,000		
Backfill	12,000		
Concrete	140,000		
Structural steel	260,000		
Sidewalls	80,000		
Roof deck & roofing	100,000		
Doors & windows	120,000		
Lighting	80,000		
Finishing & Misc.	50,000		
Contingencies	83,000	940,000	
B. Equipment			
Service Cranes	40,000		
Jacks, Hoists, & Misc.	20,000		
Benches & small tools	30,000		
Compressor & misc.	30,000		
Electrical & controls	15,000		
Installation & freight	35,000		
Contingencies	17,000	187,000	
Total for (c) Garage			1,127,000
TOTAL FOR 5. SERVICE BUILDINGS			3,742,000

SCANNED IMAGE

CANADIAN JAVELIN LTD.

		Canadian Dollars
6.	ADMINISTRATION OFFICE & SECURITY	800,000
7.	SUBSTATION AND GENERAL DISTRIBUTION	1,050,000
8.	FUEL OIL TANKS & DISTRIBUTION LINES	300,000
9.	HEATING DISTRIBUTION LINES	220,000
10.	R.R. TRACKS IN PLANT AREA	700,000
11.	ROADS & YARDS IN PLANT AREA	400,000
12.	TOWNSITE (Allowance)	7,000,000
13.	RAILWAY LINE FROM WABUSH RAILWAY LINE	2,750,000
14.	ACCESS ROAD FROM TOWN OF WABUSH	1,250,000
15.	ELECTRICAL TRANSMISSION LINE AND STAND-BY DIESEL-ELECTRIC POWER PLANT	650,000
	Total for Items 4-15 inclusive	19,862,000
	Engineering Design & Construction Supervision on Items 2-15 inclusive, Company Overhead, Insurance, etc.	18,115,000
	TOTAL ESTIMATED CAPITAL COST OF PLANT AT SITE not including working capital, Dominion and/or Provincial taxes if applicable, dock costs, transportation of pellets to market, interest on borrowed money, head office and sales costs	$108,100,000

SCANNED IMAGE

CANADIAN JAVELIN LTD.

ESTIMATED HORSEPOWER REQUIREMENTS FOR A PLANT TO PRODUCE 4,000,000 LONG TONS OF PELLETS PER YEAR

1. MINING				
3 - 9 cu. yd. Shovels @ 600 H.P. each		1,800		
1 - Quarry Master Drill		400		
Lighting & Misc. Equipment		160		2,360
2. CRUSHING, GRINDING & CONCENTRATING				
1. Primary Crushing Layout				
1 - 60" x 109" Gyratory crusher		1,100		
1 - Service Crane		100		
Belt conveyor		150		
Feeders		20		
Lighting & Misc. Equipment		70	1,440	
2. No. 2 Conveyor From Crushing Plant to Ore Storage			1,000	
3. Ore Storage				
Tripper Belt		150		
Feeders		80		
Pickup belts		120		
Dust control and lighting		100	450	
4. Concentrator				
1. Autogenous Grinding				
4 - Autogenous Mills	5,000			
Pumps	800			
Screens	120			
Misc. Equipment	100			
Service Crane	60	6,080		
2. Spiral Separator Section				
Pumps & Misc.	600	600		
3. Miscellaneous				
Product & Tailing Pumps	700			
Laboratory & Misc.	100	800	7,480	
TOTAL FOR CRUSHING, GRINDING & CONCENTRATING				10,370

SCANNED IMAGE

CANADIAN JAVELIN LTD.

3. PELLETIZING & LOADOUT

1. Pelletizing

1. Grinding			
6 - Ball Mills	16,000		
Pumps & Misc.	600	16,600	
2. Balling & Pelletizing			
Filters	100		
Table Feeders	120		
Roll Feeders	120		
Conveyor Belts	450		
Screens	150		
Balling drums	600		
Miscellaneous	200	1,740	
3. Drying, Hardening & Cooling			
Grates, Fans, Burners, etc.		18,000	
4. Raw Material Handling			
1 - Crusher	50		
Elevators	100		
Air Lifts	250		
Conveyors	120		
Miscellaneous	200	720	
5. Miscellaneous			
2 - 2000 CFM Compressors	800		
4 - 3000 CFM Vacuum Pumps	500		
Laboratory & Misc.	80	1,380	38,440
2. Loadout			300
TOTAL FOR PELLETIZING & LOADOUT			38,740

4. AUXILIARY SERVICES

Shops	450	
Garage	160	
Water Supply	2,200	
Misc. Plant Area	600	3,410

Auxiliary Services H.P. Requirements may be divided as follows:-

1.	Mining	300
2.	Crushing, Grinding & Concentration	1,600
3.	Pelletizing & Loadout	1,510

SCANNED IMAGE

CANADIAN JAVELIN LTD.

TOTAL ESTIMATED INSTALLED HORSEPOWER = 54,880 H.P.

Demand Load 80% = 43,904 H.P. = 32,708 K.W.

INSTALL 40,000 K.W. SUBSTATION.

SCANNED IMAGE

CANADIAN JAVELIN LTD.

GENERAL SPECIFICATIONS AND DESCRIPTIONS OF MINING EQUIPMENT AND SURFACE PLANT

1. MINING

The equipment covered by this report is the basic minimum necessary to start operations. Additional shovels, trucks, etc. will be required as the pit operations expand.

The only buildings included under Mining operations are a pit change house and office, powder magazine and miscellaneous day tanks for diesel oil, tool sheds, pump houses, etc.

The pit change house and office will be a standard type frame building on a concrete foundation with insulated panel walls, insulated panel pitch roof, and with the necessary doors, windows, interior partitions, toilets and washroom facilities, lighting, heating and required finish, etc.

The power magazine will conform with Underwriters' requirements.

Pit tool sheds etc. to be light weight structural steel, metal clad buildings on skids.

Pit lighting is to be of the floodlight type with the necessary permanent and movable towers.

Oil supply at the pit is to include a small tank for the heating plant for the change house and office, and an emergency supply for the compressors and drills as required.

2. CRUSHING, GRINDING, SCREENING AND CONCENTRATING

(a) Primary Crusher

The crusher house is located at the mine, at the edge of the maximum pit limits. A gyratory crusher is located in this building. Both the crusher feed hopper and discharge bin are sized to retain up to two loads of ore delivered by 100 ton capacity trucks.

The crusher building itself will be a structural steel frame building on reinforced concrete foundations. Floors will be of reinforced concrete, walls above grade of metal sheeting, and the roof will consist of cold process built-up roofing supported by Q-decking or similar system.

SCANNED IMAGE

CANADIAN JAVELIN LTD.

2. (a) Primary Crusher (Cont'd)

Crusher operation is on a 3 shift, 5 day per week basis to coincide with the mining operation. The crusher operating time is considered to be 19.5 hours per day at an average rate of 2050 long tons per hour. A single 60" x 109" gyratory crusher has been selected. This crusher is capable of handling run-of-pit ore and will be of sufficient capacity to handle the ore requirements of a 6,000,000 long tons per year plant.

The estimate includes the cost of the building, ore hopper, surge bin and chutes, concrete foundations, feeders, pick-up belt, service crane, dust control for the surge bin employing a cyclone collector, heating for the operator's cabin including a source to provide temporary heating to the repair area, and general grading and access road construction.

Consideration should be given to the installation of a calcium chloride system to permit this chemical to be added to the discharge belt conveyor to facilitate ore handling in the ore storage area during inclement weather. An allowance has been included in the estimate for this feature but no details have been shown on the report drawings.

(b) Belt Conveyor - Crusher Building to Ore Storage Area

Included in this estimate is the cost of a housed 72" cable belt system conveyor, selected for its ability to handle the size of ore and tonnages anticipated, both for the 4,000,000 long tons per year plant and the possible future extension to 6,000,000 long tons per year. This conveyor will be carried in a structural steel, metal covered gallery.

No heat is provided for this area.

(c) Ore Storage

A covered storage to contain approximately 72,000 long tons of ore has been selected for the purpose of this estimate. The storage provides for 2½ days of mill feed requirements. The above tonnage covers the live storage capacity only. In addition, exterior storage containing approximately 72,000 long tons of ore is included. Ore handling from this latter storage area, as well as the "dead" ore in the covered section, will be by shovel and trucks or by bulldozer to the reclaim tunnels.

A structural steel hip roof type canopy has been selected as the most economical housing. Four reinforced concrete reclaim tunnels are located under the ore pile in the covered section. Feed to the mill feed conveyors will be by vibrating feeders.

SCANNED IMAGE

2. (c) Ore Storage (Cont'd)

Ore is distributed in both the covered and exterior areas by tripper conveyor.

No heat will be provided in this area.

(d) Concentrator

The concentrating plant is located in a building complex housing, in addition to the above, offices, laboratories and a heating plant.

The concentrator area, which consists of autogenous grinding mills, screens, spirals, concentrate pump boxes, distributor, cyclones, pumps, reclaim water systems and instrumentation, will be operated wet. For this estimate, the concentrator complex has been assumed to be a structural steel frame building, complete with reinforced concrete foundations and floors, insulated metal panel walls, and an insulated cold process built-up roofing supported by Q-decking. Also included in the estimate is the cost of necessary partitions, doors, heating, instrumentation, lighting and electrical power distribution systems.

The plant is laid out on a four line basis, each line being capable of producing 1,000,000 long tons of concentrates per year. Concentrates will be pumped in slurry form to the pelletizing plant in an adjacent building. Tailings will be pumped to the tailings area.

A pilot plant was run at Lakefield Research Ltd. using a 6 ft. x 6 ft. Cascade mill in closed circuit with a 14 mesh screen. The results of this work indicated a design power of 2.3 KWH/long ton. This optimizes the plant to a four line flowsheet with each autogenous mill handling 315 long tons per hour.

Mill discharge is pumped to a distributor feeding 4' x 10' wet cascading screens. Screen capacity for this ore is taken at 25 long tons per hour per square foot with a circulating load of 50%. Screen oversize is laundered to the autogenous mill feed while undersize goes to the rougher spiral feed pump.

One pump per line handles each product, while a second standby is provided for process pumps. All pump boxes have a quick opening drain valve.

The rougher spirals are arranged in 16 banks of 16 spirals each per line. A nominal rougher spiral loading of 1.25 long tons per hour of new feed per spiral has been selected for design purposes. The actual loading using standard spiral groupings is 1.23 long tons per hour per spiral. Both cleaners and recleaners have been used with a

SCANNED IMAGE

2. (d) Concentrator (Cont'd)

nominal ratio of 6-4-4. The actual ratio using standard spiral groupings is 6-3.75-3.75. The three stages of spirals will afford better grade and recovery control and less critical operation.

Rougher concentrate is laundered to the cleaner spiral feed pump which feeds 10 banks of 16 cleaner spirals each per line. Cleaner concentrate falls directly into recleaner spirals producing a finished product. Rougher middlings, cleaner tails and recleaner tails are laundered to a reclaim cyclone feed pump which feeds the D30L reclaim water cyclones. Cyclone underflow goes to the rougher spiral pump box, while the overflow is collected in the reclaim water surge tank. The final concentrate is pumped to a surge tank feeding the regrind mills via dewatering cyclones to obtain mill feed density.

Common offices, assay laboratory, test laboratory, change rooms, maintenance areas and supply rooms are provided for the concentrator and pelletizing plant.

3. PELLETIZING AND LOADOUT

(a) Pelletizing Plant

The pelletizing plant is located in an individual building adjacent to both the concentrator complex and the loadout area.

This building houses all units required for pellet production including regrind mills, filters, pumps, cyclones, surge bins, the Bentonite feed system, balling drums, grate furnaces, dryers, offices, test laboratory, washrooms, etc.

No separate estimates are provided in this report for the Dravo-Lurgi and Canadian Allis-Chalmers pellet production systems, since the difference in cost between the two systems is small.

The pelletizing plant will be a structural steel frame building, including reinforced concrete foundation and floors, insulated metal panel sidewalls and cold process built-up roofing supported by Q-decking. The estimate for this building includes the cost of all interior partitions, doors, lighting, heating, plumbing, power distribution, etc.

In both pellet production systems, the estimate is based on a two line layout, with each line being capable of producing 2,000,000 long tons of pellets per year.

SCANNED IMAGE

3. (a) Pelletizing Plant (Cont'd)

(i) Dravo-Lurgi Pelletizing Plant

The concentrate is fed from the concentrate storage bins by table feeder into a balling drum feed conveyor where Bentonite is also added. The discharge from the balling drum is screened, the undersize being returned to the drum feed belt and used as seeds.

The pellets are then laid on to a Dravo-Lurgi travelling grate furnace which is divided into a drying zone, a heating zone and burning zone, and a cooling zone.

The discharge from the furnace goes over a sizing screen which separates the finished pellets from the undersize. The finished pellets go to the pellet storage and loadout area, while the undersize is returned to the feed end of the furnace and used as a side and grate protection layer.

(ii) Canadian Allis Chalmers Pelletizing Plant

The concentrate balling system is the same as for the Dravo-Lurgi system explained above.

The pellets are then laid on to an Allis-Chalmers travelling grate divided into a drying zone and a pre-heating zone, then the pellets enter a rotary kiln and are discharged into a reciprocating grate cooler. The finished pellets go to the pellet storage and loadout area, while the undersize is returned to the feed end.

(b) Pellet Storage and Loadout

The pellet loadout building is located adjacent to the pelletizing plant and straddles the railroad spur. Pellet storage of two days pellet production or 23,000 long tons will be provided in silos. In addition, an exterior emergency pellet storage area is included which provides storage for approximately seven days production or 30,000 long tons. Reclaim from this area will be by front-end loader and truck directly into railroad cars.

Screened pellets are transferred by conveyor belt from the pelletizing plant to the loadout silos. The cost of 16 reinforced concrete silos is included in the estimate. Due to the free flowing characteristics of the pellets, loadout from the silos can be accomplished via chutes with pneumatically operated cut-off gates only.

SCANNED IMAGE

3. (b) Pellet Storage and Loadout (Cont'd)

The estimate provides for the cost of a structural steel penthouse to be constructed over the silos, and includes the cost of concrete foundations, structural steel, insulated metal panel decking, insulated cold process built-up roofing supported by Q-decking, all necessary doors, partitions, lighting, heating, power distribution, etc. Conveyor galleries will be of structural steel construction covered with metal sheeting on the roof and walls.

The loadout area will be heated, but no heat will be provided to the conveyor galleries.

Loadout requirements will be approximately 130 - 90 ton center dump ore cars per day at full production. This estimate does not include the cost of any railway cars, maintenance and service, but does include the cost of all railway sidings, switches and similar components. Similarly, the cost of storage facilities, etc. at Seven Islands, Quebec, is not included in this report.

4. TAILINGS DISPOSAL AND WATER SUPPLY

The tailings will be pumped from the mill via two wood stave tailings lines. A third pump and complete line will be available as standby and is included in this report. The tailings disposal area will be Julienne Lake immediately to the south of the ore body and east of the mill site.

Automatic dump valves will be installed at low points to drain the tailings lines in case of pump shut-down or failure.

Portable mounted cyclones will be used to construct retaining dykes for the tailings, as required.

Fresh water requirements are as follows:-

Concentrator	13,000 U.S. gallons per minute
Pellet Plant	600 " " " "
Power House	400 " " " "
Misc. Services	200 " " " "
Total	14,200 U.S. gallons per minute

The fresh water requirements should provide sufficient water for all fire requirements. Both pressure requirements and storage capacity are available in the elevated water storage tank. No stand-by pumps will be provided.

SCANNED IMAGE

4. Tailings Disposal and Water Supply (Cont'd)

The total water requirements for the concentrator area is 29,000 U.S. gallons per minute, of which 16,000 U.S. gallons per minute will be reclaimed internally. The cooling water from the pellet plant and the power house will be pumped to the reclaim water surge tank.

The reclaim water is obtained primarily from cycloning the rougher middlings, cleaner tails, and recleaner tails. Other sources are recleaner concentrate cycloning, filtrate, as well as pellet plant, vacuum pump and compressor coolant. The material to be cycloned contains 1% -325 mesh material.

Reclaim water will be used for all dilution purposes such as grinding, screening, pump boxes and spiral feeds, where minor quantities of solids will not plug pipes or valves. Fresh water will be used for pump glands, coolant water, spiral wash water and services.

Fresh water will be obtained from the south arm of Julienne Lake. In order to avoid contamination from Wabush Lake and the mill tailings, a causeway type dam will be built to raise the level of Julienne Lake by approximately one foot. This causeway will also carry the railroad plus a service road. A spillway and control structure will be incorporated in the causeway. The water pumphouse will be located on the shore of Julienne Lake, immediately southeast of the mill site.

Prior to design, a detailed study of the Julienne Lake watershed will have to be undertaken. It is unlikely that sufficient water is presently in the Lake to provide a 14,200 U.S. gallons per minute supply. It is conceivable that the watershed can be increased significantly by diverting part of the Shabogamo Lake watershed.

A dam would have to be constructed between Shabogamo Lake and Lac Michel, and water from Lac Michel could be pumped to the Julienne Lake watershed. It may also be possible to construct a diversion channel rather than necessitate pumping. Tentative costs for this watershed diversion are included in this report.

All service water from Julienne Lake will be pumped to an insulated elevated storage tank adjacent to the mill site. Distribution mains from this tank will have to be insulated and traced, either by electricity or stream or, where possible, enclosed in the heated service tunnels. Provision will also be made to add heat to the water tank when required.

The ore and water balance per 1,000,000 long tons per year line is shown on pages 30 and 31.

SCANNED IMAGE

CANADIAN JAVELIN LTD.

ORE AND WATER BALANCE PER LINE

Item	Dry Solids LTPH	% Solids	Water LTPH	Water USgpm	Pulp USgpm	S.G.	% Fe
Cascade Milling (1 Mill)							
Ore	315	98.5	3	13			34.2
Screen Oversize	81	91	8	36			34.2
Dilution water			159	713			
Total	396	70	170	762	1269	2.1	34.2
Screening (6 screens)							
Mill discharge	396	70	170	762	1269	2.1	
Discharge dilution water			226	1013			
Total pumping	396	50	396	1775	2282	1.58	
Spray water			134	600			
Total to Screen	396	43	530	2375	2882		
Screen oversize	81	91	8	36			
Screen undersize	315	38	522	2339	2742	1.39	34.2
Rougher Spirals (256 spirals)							
Screen undersize	315	38	522	2339	2742		
Dewatering cycl. U'flow	92	70	40	179	297		
Pump box dilution water			388	1740			
Total pumping	407	30	950	4258	4779	1.28	
Spiral wash water			570	2560			
Total to R. Spirals	407		1520	6818	7339		
Rougher spiral conc.	190	55	155	694	907	1.73	54
Rougher spiral midds.	28	57	21	94	130	1.70	21
Rougher spiral tails	189	12.3	1344	6030	6302	1.10	12.9
Cleaner Spirals (160 spirals)							
Rougher concentrate	190	55	155	694	907		
Pump box dilution water			605	2710			
Total pumping	190	20	760	3404	3617	1.19	
Spiral wash water			285	1280			
Total to Cl.Spirals	190		1045	4684	4897		
Cleaner spiral conc.	155	50	155	694	862	1.66	60
Cleaner spiral tails	35	3.8	890	3990	4035	[illegible]	28

SCANNED IMAGE

CANADIAN JAVELIN LTD.

ORE AND WATER BALANCE PER LINE (CONT'D)

Item	Dry Solids LTPH	% Solids	Water LTPH	Water USgpm	Pulp USgpm	S.G.	% Fe
Recleaner Spirals (160 spirals)							
Cleaner Concentrate	155	50	155	694	862		
Dilution Water			465	2080			
Spiral Wash Water			285	1280			
Total to Re-Cl.Spirals	155		905	4054	4222		
Re-Cl. Spiral Conc.	126	50	126	565	696	1.67	66
Re-Cl. Spiral Tails	29	3.6	779	3489	3526	1.03	34
Dewatering Cyclones							
Rougher Middlings	28	57	21	94	130	1.70	21
Cleaner Tails	35	3.8	890	3990	4035	1.03	28
Re-Cleaner Tails	29	3.6	779	3489	3526	1.03	34
Feed to Cyclones	92	5.2	1690	7573	7691	1.04	27
Cyclone Underflow	92	70	40	179	297	2.06	27
Cyclone Overflow			1650	7394	7394	1.0	
Re-Cleaner Concentrate Dewatering Cyclones							
Feed	126	50	126	565	696	1.67	66
Underflow	126	70	54	242	373	2.2	66
Overflow			72	323			
Disc Filters							
Feed	126	70	54	242	373	2.2	66
Cake	126	89	14	63			
Filtrate			40	179			
Reclaim Water Tank							
Cascade Feed Dilution			159	713			
Cascade Discharge Dilution			226	1013			
Screen Wash Water			134	600			
Rougher Spiral Dilution			388	1740			
Cleaner Spiral Dilution			605	2710			
Recleaner Spiral Dilution			465	2080			
Total from Tank			1977	8846			
Dewatering Cyclone O'Flow			1650	7394			
Recleaner Concentrate Cyclone O'Flow			72	323			
Filtrate			40	179			
Pelletizing Plant Seal Water			115	515			
Compressor Coolant			45	202			
Fresh Water Make-up			55	233			
			1977	8846			

SCANNED IMAGE

5. INSTRUMENTATION

Instrumentation will generally be individual closed loops to control the operating variables and to sound alarms in case of circuit or equipment failures.

The crusher operator will signal the truck driver to dump with green or red signals. Closed circuit television will enable the operator to watch his belt loading point in the crusher house and also the shuttle conveyor and storage condition in the crushed ore storage shed. The vibrating feeders under the gyratory crusher will be speed controlled by a gamma gauge bin level controller. High-low level alarms will be used in the crusher discharge bin and the main ore storage shed. The usual equipment failure alarms will be employed on the crusher and conveyors.

Autogenous mill feed will be controlled by variable speed vibrating feeders under the ore storage. These feeders will be controlled by either the belt scale controlling a set tonnage with mill load override or the mill load controlling the tonnage with a belt scale override. Density control is by a proportioning water valve from the belt scale readings. Allowance is provided to vary this proportion based on operating circulating load. All pump boxes are level controlled to maintain a constant volume of feed to the screens, spirals and cyclones.

Wash and dilution water additions are controlled from the mains to each bank so that, once the individual lines are set, each bank of spirals can be controlled by one valve.

Magnetic flow recorders are used for all pulp-flow measurements and gamma gauges for all pulp-density measurements.

6. AUXILIARY SERVICES

General

Similar to the mill complex, all auxiliary service structures are arranged to conform with the general topography and the elevation of all railroad sidings. All buildings, with the exception of the Crusher Building, are located approximately 3000 feet from the final pit limits.

Service tunnels will connect main buildings and provide for personnel passage, as well as housing for steam, air, water, oil, electric distribution and possibly sewerage services.

It is assumed in this report that rock is at surface elevation and that plant site grading will require rock removal.

SCANNED IMAGE

6. Auxiliary Services (Cont'd)

(a) Boiler House

The boiler house is located in the concentrator complex.

The estimate includes the cost of all necessary oil fired package boilers, day tanks, oil handling equipment, steam lines and auxiliaries.

Heat is required for all buildings as well as for the warming of process water.

(b) Mill Offices, Laboratory, Assay Office & Washrooms

These areas have been included in the estimate of cost and form part of the Concentrator complex.

(c) Service Center

This building is located in the plant site area, adjacent to the Concentrator complex and Administration Office. It is connected to the adjacent areas by service tunnels.

This service complex incorporates a garage, machine shop, electrical shop, carpentry shop, warehouse, offices, as well as mine and service washrooms and dry.

The estimated cost includes a structural steel frame building complete with reinforced concrete foundations and floors, insulated metal panel walls, insulated cold process built-up roofing supported by Q-decking, garage pits, doors, windows, interior partitions, heating, plumbing, ventilation and power distribution.

Also included in the estimate are allowances for shop tools, service cranes, steam cleaning equipment, and all items necessary to permit handling of all emergency repairs and general maintenance requirements of all plant and equipment.

This building will be heated from the central heating plant.

7. ADMINISTRATION OFFICE AND SECURITY

The administration office is located in the plant site area adjacent, and connected by service tunnels, to the Service and Concentrator areas. This building will house the following services and personnel:-

SCANNED IMAGE

CANADIAN JAVELIN LTD.

7. Administration Office and Security (Cont'd)

Managerial
Administration
Personnel
Accounting
Mining
Engineering
Geology
Security

The building will consist of a structural steel frame, on reinforced concrete foundations and floors, insulated metal panel walls, insulated cold process built-up roofing supported by Q-decking and complete with all necessary interior partitions, doors, windows, lighting, heating and ventilation. Washrooms, conference rooms, vaults, supply rooms, printing room, drafting rooms, and storage rooms will be provided.

The security office or gatehouse will be a separate structure but of similar construction.

Both areas will be heated from the central heating plant.

8. SUBSTATION, GENERAL DISTRIBUTION AND POWER HOUSE

(a) Substation and Distribution

The plant transformer station would include switching for three transformers with provision for future expansion. Each transformer would be sized at 15,000 KVA with provision for fan cooling. This would ensure that two transformers could carry the estimated demand load of 37,000 KVA in the event of a breakdown of the other one.

Primary voltage would be at 4160 volts to load centres located in the various buildings. A radial system would be employed with provision for secondary ties between load centres. Large motors would be supplied at 4160 volts.

Secondary voltage would be at 600 volts supplied from load centres. This voltage would be distributed to service buildings as well as motor control centres.

Motor control centres would be centralized in each area in clean ventilated switchrooms. Wiring to motors and control devices would utilize PVC jacketted multiconductor cables run on cable racks.

It is expected that the plant power factor would be fairly high, due to a large part of the load being composed of synchronous motors. It should therefore not be necessary to improve the power factor further.

SCANNED IMAGE

CANADIAN JAVELIN LTD.

8. Substation, General Distribution and Power House (Cont'd)

(b) Power House

The power house building will be located at the plant site adjacent to the substation. The structure will be of similar construction to the Administration building.

A fully automatic standby diesel generator of 1000 KW capacity will be provided. This would permit a limited standby capacity for the townsite, fire pumps, boiler and heating services and production essentials.

9. FUEL STORAGE AND DISTRIBUTION

The oil requirements will include gasoline, diesel fuel oil and bunker oil. The tank farm will be capable of storing approx. one month's supply. Heating and pumping facilities and distribution lines to be supplied to handle oil to points of usage, except for the mine requirements which will be handled by truck to storage tanks located at the mine.

10. HEATING DISTRIBUTION LINES

All structures except the crushing plant, mine change house and office, and ore storage building, are to be heated from the central heating plant. All distribution lines will be insulated and carried in pipe troughs and service tunnels where possible.

11. RAILROAD TRACKS AND SIDINGS IN THE PLANT SITE AREA

Railroad tracks and sidings will be provided, capable of handling approx. 260 cars per day, together with facilities for loading and unloading at shops and stores area and tank farm.

12. ROADS AND YARDS IN THE PLANT SITE AREA

This item includes the general yard area and roadways from Concentrator to Mine and Townsite, and covers the cost of road construction with a crushed rock surface only, and includes all grading, ditching, etc.

SCANNED IMAGE

13. TOWNSITE

(a) General

The townsite is located south of the Julian Deposit, between Wabush and Leila Wynne Lakes. The soil in the area is generally sandy, which facilitates construction and installation of services.

(b) Housing

Housing will consist of individual private dwellings, bunkhouses and staff houses. This estimate includes the cost of approximately 200 dwellings, together with bunkhouses. Consideration will have to be given to the use of apartments but the total housing requirements can only be properly assessed when staff requirements are finalized.

(c) Services

Included in this report are the costs of the following services and facilities:-

Water supply and purification.
Sanitary Sewerage System including Treatment.
Heating Services to a limited area.
Electrical Distribution.
Roads, Ditches and Lighting.
Recreation Centre.
Commissary and Cafeteria.

14. RAILROAD FROM THE WABUSH LINE

This item covers the estimated cost of constructing from 10 to 11 miles of a single line railroad from the Wabush Line to the plant site area.

15. ACCESS ROAD FROM WABUSH

This item covers the estimated cost of constructing approx. 24 miles of standard first class gravel all weather highway from Wabush to the plant site area.

16. ELECTRICAL TRANSMISSION LINE

Electricity will be supplied by the Twin Falls Power Co. from the generating station at Twin Falls. While the transmission line from the generating station to Wabush passes within 10 miles of the

SCANNED IMAGE

CANADIAN JAVELIN LTD.

16. Electrical Transmission Line (Cont'd)

Julian deposit, the power will probably be transmitted back to Julian from the Wabush transformer station. This will entail a capital outlay for approximately 20 miles of 46 KV overhead lines. This line would be single circuit on wood pole structures.

SCANNED IMAGE

CAPITAL COST
4,000,000 TO 6,000,000 MTPY PLANT

SCANNED IMAGE

CANADIAN JAVELIN LTD.

PRELIMINARY ESTIMATE

OF

CAPITAL COSTS

FOR

A MINING, CONCENTRATING & PELLETIZING PLANT

TO INCREASE PELLET PRODUCTION

FROM

4,000,000 LONG TONS OF IRON PELLETS PER YEAR

TO

6,000,000 LONG TONS OF IRON PELLETS PER YEAR

AT

JULIENNE LAKE, LABRADOR

Prepared and submitted by:

KILBORN ENGINEERING LTD.
Consulting Engineers
36 Park Lawn Road
Toronto 18, Ontario

September, 1967

SCANNED IMAGE

CANADIAN JAVELIN LTD.

PRELIMINARY ESTIMATED CAPITAL COSTS FOR A MINING, CRUSHING, GRINDING, CONCENTRATING & PELLETIZING PLANT TO INCREASE PRODUCTION FROM 4,000,000 LONG TONS OF IRON PELLETS PER YEAR TO 6,000,000 LONG TONS OF IRON PELLETS PER YEAR

INDEX

	Page
General Data Furnished by Owner	1
Assumed Operating Data on which Estimated Capital Costs are Based	2
Design Criteria	3
Preliminary Estimated Additional Capital Costs of Mining, Crushing, Grinding, Concentrating & Pelletizing Plant - SUMMARY	4
Preliminary Estimated Additional Capital Costs of Mining, Crushing, Grinding, Concentrating & Pelletizing Plant - DETAILS	7
Estimated Additional Horsepower Requirements	17
General Specifications and Descriptions of Additional Mining Equipment & Surface Plant	19

SCANNED IMAGE

CANADIAN JAVELIN LTD.

GENERAL DATA FURNISHED BY OWNER

1. Increase production from 4,000,000 long tons of pellets per year to 6,000,000 long tons of pellets per year.

2. An additional 5,000,000 long tons of ore will be required to produce 2,000,000 long tons of pellets (2.5:1).

3. No additional work on pit preparation is anticipated for the additional tonnage required as most of the work will follow a set production pattern.

4. Mining rate to be based on three shifts per day, 250 days per year operation.

$$\frac{5,000,000}{250} = 20,000 \text{ long tons of ore per day.}$$

5. The Concentrator is to be operated on three shifts per day, 350 days per year.

$$\frac{5,000,000}{350} = 14,285, \text{ say } 14,300 \text{ long tons of ore per day.}$$

6. Concentrating is to be by autogenous grinding and spiral classification method.

7. It will be necessary to add two additional lines to the concentrating plant.

8. Pellet production is to be by balling drums and the grate furnace method or grate kiln furnace method.

9. A grind of 80% minus 325 mesh will be required to produce a satisfactory pellet.

10. Concentrates are to be handled to the pelletizing plant by pipe lines.

11. It will be necessary to add one additional line capable of producing 2,000,000 long tons of pellets per year.

12. Power costs of 3.5 mills per horsepower hour have been established by Canadian Javelin Ltd.

13. Fuel oil costs of $0.12 per Imperial gallon have been established by Canadian Javelin Ltd.

SCANNED IMAGE

CANADIAN JAVELIN LTD.

ASSUMED OPERATING DATA ON WHICH

ESTIMATED CAPITAL COSTS ARE BASED

1. The pit will be operated on a 3 shifts per day, 5 days per week, 250 days per year basis. The additional production rate will be 20,000 long tons of ore per day.

2. The assumed average effective working time per shift is $6\frac{1}{2}$ hours. During this period the equipment will operate at 85% capacity.

3. The average production rate for a 9 cu. yd. electric shovel is 1,100 long tons per hour.

$$\text{Shovel shifts required} = \frac{20,000}{1,100 \times 0.85 \times 6.5} = 3.3 \text{ shifts}$$

Due to excess shovel capacity provided in the previous 4,000,000 tons per year plant, only one additional shovel will be needed.

Due to the additional clean-up work it will be advisable to add one additional $2\frac{1}{2}$ yard diesel shovel.

4. Ore haulage to the crusher will be by 100 ton rear dump trucks which have an assumed capacity of 250 long tons per hour.

$$\text{Truck shifts required} = \frac{20,000}{250 \times 0.85 \times 6.5} = 14.5 \text{ shifts}$$

The net number of additional trucks required is 5.

Based on an assumed availability of 70%, the gross number of additional trucks required is 7.

5. The average drilling rate for a Quarry Master Q.M.5-DHD 500 drill, using a 9" bit, is estimated to be 175 ft. per shift, with allowances for sub-drilling, lost time, etc. Assuming an average drilling depth of 55 ft. and a 27 ft. x 31 ft. pattern, each drill hole will provide approximately 70 long tons of ore per foot of hole.

$$\text{Tons produced per shift} = 175 \times 70 = 12,250 \text{ long tons.}$$

$$\text{Drill shifts required} = \frac{20,000}{12,250} = 1.632$$

Based on an assumed availability of 70%, the gross number of shifts is 2.33. Therefore, one additional electric drill has been added.

Also, the cost for one additional mobile drilling unit with a 1650 long tons/shift capacity has been added.

SCANNED IMAGE

CANADIAN JAVELIN LTD.

6. One additional bulldozer for the large shovel has been added.

7. The gyratory crusher in the previous layout is capable of handling the increased tonnage.

8. The 72" belt conveyor between the crusher building and the ore storage building is capable of handling the increased production without necessitating alterations.

9. The covered ore storage section will be extended to accommodate the two additional concentrator lines. The exterior emergency open storage has not been extended.

10. All production is pelletized.

11. The loadout silos will be extended by 50% to allow for two days of pellet storage. The emergency exterior stockpile will not be expanded and will now amount to about 4-2/3 days of plant production.

DESIGN CRITERIA

The design criteria are identical to those shown on sheets 4 and 5 of the 4,000,000 long tons of iron pellets per year estimate, except that an additional 2,000,000 long tons of iron pellets per year capacity is added and an allowance has been made to increase the Townsite to accommodate the additional employees.

SCANNED IMAGE

CANADIAN JAVELIN LTD.

PRELIMINARY ESTIMATED CAPITAL COST
FOR ADDITIONAL PLANT REQUIRED FOR
MINING, CRUSHING, GRINDING, CONCENTRATING
& PELLETIZING TO INCREASE PRODUCTION
FROM 4,000,000 LONG TONS OF PELLETS PER YEAR
TO 6,000,000 LONG TONS OF PELLETS PER YEAR

SUMMARY

		Canadian Dollars
1. MINING		
(a) Pit Preparation		-
(b) Additional Pit Equipment	2,850,000	
Total additional costs for 1. Mining		2,850,000
2. CRUSHING, GRINDING & CONCENTRATING		
(a) Primary Crushing		-
(b) Belt Conveyor - Crusher Building to Ore Storage		-
(c) Ore Storage		
A. Building	370,000	
B. Equipment	319,000	689,000
(d) Concentrating		
A. Building	1,040,000	
B. Equipment	4,140,000	5,180,000
Total additional costs for 2. Crushing, Grinding & Concentrating		5,869,000
3. PELLETIZING & LOADOUT		
(a) Pelletizing Plant		
A. Building	3,700,000	
B. Equipment	14,890,000	
Suppliers Engineering, Overhead, etc.	1,859,000	20,449,000

SCANNED IMAGE

CANADIAN JAVELIN LTD.

			Canadian Dollars
3.	PELLETIZING & LOADOUT (Cont'd)		
	(b) Pellet Storage & Loadout		
	A. Building	625,000	
	B. Equipment	120,000	745,000
	Total additional cost for 3. Pelletizing & Loadout		21,194,000
4.	TAILINGS DISPOSAL, SEWAGE DISPOSAL & WATER SUPPLY		
	Additional Cost		200,000
5.	SERVICE BUILDINGS		
	(a) Boiler House		
	A. Building (part of Concentrator)	-	
	B. Equipment	100,000	
	(b) Shops, Stores, Office, Assay Office, Laboratory & Washrooms	-	
	(c) Garage	-	
	Total additional cost for 5. Service Buildings		100,000
6.	ADMINISTRATION		-
7.	SUBSTATION & DISTRIBUTION LINES		400,000
8.	FUEL OIL TANKS & DISTRIBUTION LINES		50,000
9.	HEATING DISTRIBUTION LINES		80,000
10.	R.R. TRACKS IN PLANT AREA		-
11.	ROADS & YARDS IN PLANT AREA		50,000
12.	TOWNSITE (Allowance)	2,000,000	
13.	RAILWAY FROM WABUSH RAILWAY LINE	-	
14.	ACCESS ROAD FROM TOWN OF WABUSH	-	
15.	ELECTRICAL TRANSMISSION LINE	-	
	Net addition for Items 4-15 inclusive		2,880,000

SCANNED IMAGE

CANADIAN JAVELIN LTD.

	Canadian Dollars
Engineering Design & Construction Supervision, Items 2 - 15 inclusive, Company Overhead, Insurance, etc.	6,607,000
TOTAL ESTIMATED ADDITIONAL CAPITAL COST of plant at site to increase production from 4,000,000 long tons of pellets per year to 6,000,000 long tons of pellets per year, not including working capital, Dominion and/or Provincial taxes if applicable, dock costs, transportation of pellets to market, interest on borrowed money, head office and sales costs, or possible escalation if addition should be deferred several years	39,400,000

SCANNED IMAGE

CANADIAN JAVELIN LTD.

PRELIMINARY ESTIMATED CAPITAL COST OF PIT PREPARATION AND ADDITIONAL PIT EQUIPMENT REQUIRED TO INCREASE PIT PRODUCTION FROM 10,000,000 LONG TONS OF ORE PER YEAR TO 15,000,000 LONG TONS OF ORE PER YEAR

DETAILS

Canadian Dollars

1. MINING

(a) Pit Preparation and Roads

No additional changes required in this phase of the operation for start-up

(b) Additional Pit Equipment

1 - 9 cu.yd. electric shovel	600,000		
1 - 2½ cu.yd. diesel shovel	150,000		
1 - Quarry Master drill (QM5-DH-D500) electric	200,000		
1 - Gardiner-Denver Air-tac or equivalent including misc. drilling equipment	30,000		
1 - D-8 caterpillar tractor or equivalent	60,000		
1 - 600 CFM portable compressor	30,000		
5 - Jack hammers and miscellaneous drilling equipment for same	10,000		
1 - Road grader	37,000		
5 - 100 ton rear dump trucks	1,375,000		
1 - 3½ ton service truck	6,000		
1 - truck for transporting men	7,000		
4 - 1 ton pick-up trucks	14,000		
Pit pumps and piping additions	10,000		
Electric power and lighting around pit	30,000		
Pit change house and offices additions	10,000		
Oil storage, explosive storage and misc. small buildings additions	15,000		
Misc. small tools and equipment	10,000		
Contingencies	256,000	2,850,000	
Total for additional Pit Preparation and Pit Equipment			2,850,000

SCANNED IMAGE

CANADIAN JAVELIN LTD.

PRELIMINARY CAPITAL COST ESTIMATE FOR
ADDITIONAL CRUSHING, GRINDING & CONCENTRATING PLANT
TO INCREASE PRODUCTION FROM 4,000,000+ LONG TONS PER YEAR
TO 6,000,000+ LONG TONS PER YEAR

DETAILS

Canadian Dollars

2. CRUSHING, GRINDING & CONCENTRATING

(a) Primary Crushing

The crushing unit installed is capable of handling the additional tonnage without any modification in size of equipment.

(b) Belt Conveyor - Crusher Building to Ore Storage

The 72" belt conveyor is capable of handling the increased tonnage without modification.

(c) Ore Storage

The covered section will have to be increased from 340' to 460' long, no change being made to the emergency open storage which will be somewhat reduced.

A. Building			
Excavation and preparing site	12,000		
Backfill	4,000		
Concrete, including connections	160,000		
Structural steel, incl. connections	110,000		
Sidewalls & roofing, incl. connections	40,000		
Lighting	5,000		
Finishing & Misc.	4,000		
Contingencies	35,000		
Total for Addition to Building		370,000	
B. Equipment			
Modify and extend 72" tripper belt	25,000		
10 - 48" x 72" Feeders	40,000		
2 - 48" conveyor belts approx. 300' long	102,000		
2 - Weightometers	16,000		
Addition to ventilation system	5,000		
Electrical and controls - modify and extend	40,000		
Installation and freight	62,000		
Contingencies	29,000		
Total for Additions to Equipment		319,000	
Total for Additions to Ore Storage Area			689,000

SCANNED IMAGE

CANADIAN JAVELIN LTD.

Canadian Dollars

2. CRUSHING, GRINDING & CONCENTRATING (Cont'd)

(d) Concentrator

This structure will be enlarged to accommodate 2 more autogenous mills with attendant spirals etc., which entails the addition of approx. 120' to the north side of the structure.

A. Building		
Excavation and preparing site	16,000	
Backfill	12,000	
Concrete, including connection to present structure	345,000	
Structural steel, including connection to present structure	400,000	
Sidewalls, not allowing for salvage but including connection to present structure	55,000	
Roof deck and roofing, including connection to present structure	50,000	
Lighting, including modifications	20,000	
Heating and ventilating, including modifications	25,000	
Finishing and misc.	20,000	
Contingencies	97,000	
Total for Addition to Building		1,040,000
B. Equipment		
Grinding Area		
2 - 22' x 7' Autogenous Mills complete with motors, drives and auxiliary equipment	800,000	
2 - sets of pumps, pump boxes and launders	42,000	
12 - 4' x 10' product screens Including drives, etc.	75,000	
Chutes & spouts	30,000	
Pipes & piping including modifications	52,000	
Electrical & controls including modifications	106,000	
Installation & freight	242,000	
Contingencies	133,000	
Total for Additional Equipment in Grinding Area	1,480,000	

SCANNED IMAGE

CANADIAN JAVELIN LTD.

Canadian Dollars

2. CRUSHING, GRINDING & CONCENTRATING (CONT'D)

(d) Concentrator (Cont'd)

B. Equipment (Cont'd)

Spiral Separator Area			
512 Rougher spirals including auxiliaries	460,000		
320 Cleaner spirals including auxiliaries	288,000		
320 Recleaner spirals including auxiliaries	288,000		
Pumps & pump boxes	100,000		
Reclaim water pumps & modifications	40,000		
6 - 24" cyclones	9,000		
Chutes & launders & modifications	95,000		
Pipes & piping & modifications	105,000		
Electrical & controls & modifications	34,000		
Installation & freight	398,000		
Contingencies	183,000		
Total for Additional Equipment in Spiral Separator Area	2,000,000		
Miscellaneous			
Product Pumps & Lines including modifications	80,000		
Tailings Pumps & Boxes including modifications	30,000		
Service Piping	60,000		
2 - Heat exchanger units	24,000		
Drainage & sewerage, including modifications	15,000		
Vacuum pumps, compressors and misc. including modifications	45,000		
Air lines & modifications	30,000		
Instrumentation & modifications	125,000		
Sampling & Misc.	10,000		
Electrical & controls including modifications	45,000		
Installation & freight	140,000		
Contingencies	56,000		
Total for Additional Miscellaneous Equipment	660,000		
Total for B. Additional Equipment		4,140,000	
Total for (d) Concentrator			5,180,000
Total Additional Cost for 2. Crushing, Grinding & Concentrating			5,869,000

SCANNED IMAGE

CANADIAN JAVELIN LTD.

PRELIMINARY ESTIMATED CAPITAL COST FOR
A PELLETIZING PLANT TO INCREASE PRODUCTION
FROM 4,000,000 LONG TONS OF IRON PELLETS
TO 6,000,000 LONG TONS OF IRON PELLETS PER YEAR

DETAILS

Canadian Dollars

3. PELLETIZING & LOADOUT

(a) Pelletizing Plant

To increase the production from 4,000,000 long tons of iron pellets per year to 6,000,000 long tons of iron pellets per year will necessitate approximately a 50% increase in both equipment and building requirements.

A. Building

Excavation & preparing site	50,000	
Backfill	60,000	
Concrete and connections	750,000	
Structural steel, incl. connections	1,200,000	
Sidewalls, not allowing for salvage but including connections to present structure	300,000	
Roof deck & roofing, including connections	200,000	
Doors & windows	20,000	
Heating & ventilation	420,000	
Lighting	140,000	
Sewerage & drainage, including modifications	60,000	
Painting & Miscellaneous	160,000	
Contingencies	340,000	
Total for Addition to Building		3,700,000

B. Equipment

Grinding	
3 - 12' x 18' Surge Tanks	5,000
3 - 6'-9" x 10' Disc Taconite filters	120,000
Modifications to Belt & Tripper layout	20,000
3 - 30' x 45' Concentrate Bins	40,000
3 - 14' x 28' Balls Mills	1,950,000
3 - Belt Scales	15,000
1 - Pump & pump box	5,000
1 - 30' x 24' Surge Agitator	13,000
Extension to Service Crane wiring etc.	3,000
Chutes & Launders & modifications	25,000
Pipe & Piping & Modifications	40,000
Electrical & controls & modifications	288,000
Installation & freight	631,000
Contingencies	315,000
Total for Additional Equipment in Grinding Area	3,470,000

SCANNED IMAGE

CANADIAN JAVELIN LTD.

Canadian Dollars

3. PELLETIZING & LOADOUT (Cont'd)

(a) Pelletizing Plant (Cont'd)

B. Equipment (Cont'd)

Pelletizing	
Monorails & Hoists	20,000
6 - 6'-9" x 10' Disc Taconite filters	240,000
6 - Cone shaped bins	24,000
6 - Bentonite bins	45,000
6 - Table feeders	48,000
12 - Roll Feeders	12,000
6 - 9'-6" x 30' Balling drums complete	400,000
6 - Pellet screens	60,000
6 - Weightometers	54,000
Belts & belting	200,000
Chutes & spouts	100,000
Electrical & controls	217,000
Installation & freight	330,000
Contingencies	180,000
Total for Additional Equipment in Pelletizing Area	1,930,000
Drying, Hardening & Cooling	
1 - Furnace	4,000,000
1 - Product screen	15,000
1 - Splitter screen	15,000
2 - Elevators	38,000
1 - Return belt	50,000
Chutes & spouts	125,000
Pipes & piping	30,000
Stack & misc.	600,000
Monorails, Hoists, etc.	60,000
Spares	400,000
Steel supports, etc.	250,000
Tracks, etc.	50,000
Electrical & controls	667,000
Installation & freight	1,700,000
Contingencies	800,000
Total for Additional Equipment in Drying, Hardening & Cooling Area	8,800,000

Raw Material Handling

The raw material handling equipment supplied with the original plant should be able to handle the additional requirements.

SCANNED IMAGE

CANADIAN JAVELIN LTD.

Canadian Dollars

3. PELLETIZING & LOADOUT (Cont'd)

(a) Pelletizing Plant (Cont'd)

B. Equipment (Cont'd)

Miscellaneous			
2 - 3000 CFM Vacuum pumps complete with drives, moisture traps etc.	60,000		
1 - 2000 CFM Compressors	50,000		
Additional laboratory equipment	5,000		
Service piping & modifications	50,000		
Plumbing & modifications	10,000		
Vacuum lines & modifications	30,000		
Instrumentation	110,000		
Sampling & Misc.	20,000		
Sumps, sump pumps, drainage, etc. with connections & modifications	25,000		
Painting & Misc.	30,000		
Electrical & controls & modifications	70,000		
Installation & freight	170,000		
Contingencies	60,000		
Total for Additional Miscellaneous Equipment	690,000		
Total for B. Additional Equipment		14,890,000	
Total for A. & B. Building & Equipment			18,590,000
Suppliers Engineering, Overhead, etc.			1,859,000
Total Addition for (a) Pelletizing Plant			20,449,000

(b) Pellet Storage & Loadout
(Connecting Conveyors & Silos)

A. Building		
Excavation & preparing site	6,000	
Backfill	10,000	
Concrete & connections	350,000	
Structural steel & connections	110,000	
Sidewalls & connections	40,000	
Roof deck & roofing & connections	16,000	
Windows & doors	3,000	
Lighting & connections	5,000	
Heating & connections	20,000	
Finishing & Misc.	9,000	
Contingencies	56,000	
Total for A. Addition to Building		625,000

SCANNED IMAGE

CANADIAN JAVELIN LTD.

Canadian Dollars

3. PELLETIZING & LOADOUT (Cont'd)

(b) Pellet Storage & Loadout (Cont'd)

B. Equipment

Extend shuttle belts to supply additional loadout storage	40,000		
Gates & chutes	30,000		
Electrical & controls & modifications	10,000		
Installation & freight	30,000		
Contingencies	10,000		
Total for B. Additional Equipment		120,000	
Total for (b) Pellet Storage & Loadout Addition			745,000
Total Additional Cost for 3. Pelletizing & Loadout			21,194,000

SCANNED IMAGE

CANADIAN JAVELIN LTD.

PRELIMINARY CAPITAL COST ESTIMATE
FOR ADDITION TO AUXILIARY SERVICES
FOR A PLANT TO INCREASE PRODUCTION
FROM 4,000,000 LONG TONS OF PELLETS PER YEAR
TO A PLANT TO PRODUCE 6,000,000 LONG TONS OF PELLETS PER YEAR

DETAILS

		Canadian Dollars	
4. TAILINGS DISPOSAL, SEWAGE DISPOSAL & WATER SUPPLY			200,000
5. SERVICE BUILDINGS			
(a) Boiler House			
A. Building			
Building is incorporated as part of the Concentrator layout			-
B. Equipment			
1 - 500 H.P. Boiler complete	25,000		
Breaching, stacks, etc. and connections	20,000		
Pumps & Misc. & connections	6,000		
Oil tanks & piping (day) and connections	8,000		
Service Piping (in building) and connections	5,000		
Electrical & controls & modifications	3,000		
Installation & freight	24,000		
Contingencies	9,000		
Total Additional Equipment		100,000	
Total for Additions to Boiler House			100,000
(b) Shops, Stores, Office, Assay Office, Laboratory & Washrooms			
It is expected that this unit will be suitable without extensions.			
(c) Garage			
It is expected that this building will be able to accommodate repairs etc. for additional requirements. It may be necessary to store some equipment outside.			

SCANNED IMAGE

CANADIAN JAVELIN LTD.

		Canadian Dollars
6.	ADMINISTRATION No addition is anticipated for this building	-
7.	SUBSTATION & DISTRIBUTION LINES	400,000
8.	FUEL OIL TANKS & DISTRIBUTION LINES	50,000
9.	HEATING DISTRIBUTION LINES	80,000
10.	R.R. TRACKS IN PLANT AREA No additions are anticipated	-
11.	ROADS & YARDS IN PLANT AREA	50,000
12.	TOWNSITE (Allowance)	2,000,000
13.	RAILWAY FROM WABUSH RAILWAY LINE No change required	-
14.	ACCESS ROAD FROM TOWN OF WABUSH No change required	-
15.	ELECTRICAL TRANSMISSION LINE No change required	-
	Total for Additions to Items 4-15 inclusive	2,880,000
	Engineering Design & Construction Supervision on Items 2-15 inclusive, Company Overhead, Insurance, etc.	6,607,000
	TOTAL ESTIMATED ADDITIONAL CAPITAL COST OF PLANT AT SITE to increase production from 4,000,000 long tons of pellets per year to 6,000,000 long tons of pellets per year, not including working capital, Dominion and/or Provincial taxes if applicable, dock costs, transportation of pellets to market, interest on borrowed money, head office and sales costs, or possible escalation if additions should be deferred several years	39,400,000

SCANNED IMAGE

CANADIAN JAVELIN LTD.

ESTIMATED HORSEPOWER REQUIREMENTS FOR A PLANT TO PRODUCE 6,000,000 LONG TONS OF PELLETS PER YEAR

		H.P.	TOTAL H.P.
1. MINING			
4 - 9 cu.yd. Shovels @ 600 H.P. each		2,400	
2 - Quarry Master Drills		800	
Lighting & Misc. Equipment		200	3,400
2. CRUSHING, GRINDING & CONCENTRATION			
(a) Primary Crushing Layout			
1 - 60" x 109" Gyratory crusher	1,100		
1 - Service crane	100		
Belt conveyor	150		
Feeders	20		
Lighting & Misc. Equipment	70	1,440	
(b) No. 2 Conveyor			
From Crushing Plant to Ore Storage		1,000	
(c) Ore Storage			
Tripper belt	150		
Feeders	120		
Pick-up belts	200		
Dust control & lighting	150	620	
(d) Concentrator			
(1) Autogenous Grinding			
6 - Autogenous Mills	7,500		
Pumps	1,200		
Screens	180		
Misc. Equipment	150		
Service Crane	60	9,090	
(2) Spiral Separator Area			
Pumps & Misc.		900	
(3) Miscellaneous			
Product & tailing pumps	1,150		
Laboratory & Misc.	100	1,250	
Total for 2. Crushing, Grinding & Concentration			14,300

SCANNED IMAGE

CANADIAN JAVELIN LTD.

		H.P.	TOTAL H.P.
3. PELLETIZING & LOADOUT			
(a) Grinding			
9 - Ball Mills	24,000		
Pumps & Misc.	900	24,900	
(b) Balling Pelletizing			
Filters	150		
Table Feeders	180		
Roller Feeders	180		
Conveyor belts	700		
Screens	230		
Balling drums	900		
Miscellaneous	300	2,640	
(c) Drying, Hardening & Cooling			
Grates, Fans, Burners, etc.		27,000	
(d) Raw Material Handling			
1 - Crusher	50		
Elevators	120		
Air Lifts	300		
Conveyors	140		
Miscellaneous	250	860	
(e) Miscellaneous			
3 - 2000 CFM Compressors	1,200		
6 - 3000 CFM Vacuum Pumps	750		
Laboratory & Misc.	100	2,050	
(f) Loadout		500	
Total for 3. Pelletizing & Loadout			57,950
4. AUXILIARY SERVICES			
Shops		450	
Garage		200	
Water Supply		3,000	
Misc. Plant Area		900	
Total for 4. Auxiliary Services			4,550
TOTAL ESTIMATED INSTALLED HORSEPOWER			80,200

Demand Load 80% = 64,160 H.P. = 47,800 K.W.

SCANNED IMAGE

CANADIAN JAVELIN LTD.

GENERAL SPECIFICATIONS AND DESCRIPTIONS OF MINING EQUIPMENT AND SURFACE PLANT

1. MINING

The equipment added by this report is the basic minimum for operations. Additional shovels, trucks, etc. will be required as the pit operation expands.

Cost allowances have been made for the expansion of the pit pumping system which will be added when new areas under development cannot be drained to the existing water disposal system.

Additions to the pit lighting and power system have been included in this report, together with increased facilities in the change house and mine office.

An allowance has been made for additional oil storage tanks, powder storage building and pit tool shed to service the new mining area.

2. CRUSHING, GRINDING AND CONCENTRATING

(a) Primary Crusher

The gyratory crusher unit installed is capable of handling the additional tonnage without modification, and no capital cost addition is needed in this area.

(b) Belt Conveyor - Crusher Building to Ore Storage Area

The 72" cable belt has been selected to handle the large size of ore coming from the gyratory crusher, and will initially be operated at a speed sufficient to handle the ultimate tonnage of the plant. Therefore, no additional capital cost has been included for this area.

(c) Ore Storage

The covered storage area has been increased to correspond with the two additional autogenous mill lines and no change has been made to the open emergency storage area.

This will result in a $2\frac{1}{2}$ day "live" storage capacity in the covered area, about 108,000 long tons, an open emergency exterior storage capacity of 72,000 long tons, as well as the "dead" storage

SCANNED IMAGE

2. (c) Ore Storage (Cont'd)

areas in the covered building, which can be reclaimed by bulldozer or shovel and trucks in an emergency.

Two sets of vibrating feeders and belt conveyors with weightometers have been added to convey the ore to the autogenous grinding mills.

(d) Concentrator

The concentrator building has been expanded to accommodate the additional two 1,000,000 long tons per year autogenous grinding mill lines, together with their pumps, screens, spirals, cyclones and tailings disposal systems.

The addition has been so arranged that it can be completed without disrupting the operation of the existing plant.

It has been assumed that the existing offices, assay laboratory, test laboratory, change rooms, maintenance areas and supply rooms need not be extended when the additional process equipment is installed.

3. PELLETIZING AND LOADOUT

(a) Pelletizing Plant

An additional pellet production line, capable of producing 2,000,000 long tons of pellets per year, has been added next to the existing plant in such a way that production of the existing two lines can continue while the construction of the new line is in progress.

(b) Pellet Storage and Loadout

Eight concrete storage silos have been added over the railroad spur and the shuttle belts over the silos have also been extended. The exterior emergency storage pile has not been extended.

This will result in a two days "live" storage capacity of 34,500 long tons of pellets, plus a "dead" storage capacity, in the emergency storage pile, of 30,000 long tons.

4. TAILINGS AND WATER SUPPLY

An allowance has been made to extend the tailings disposal system by adding one more wood stave tailings line to the existing system, resulting in three lines being in operation and one line being available as a standby.

The capacity of the fresh water system has been increased by 50% to correspond with the increase in plant capacity.

SCANNED IMAGE

4. TAILINGS AND WATER SUPPLY (Cont'd)

Fresh water requirements will be about 21,300 U.S. gallons per minute for the expanded plant.

The reclaimed water system has been increased by 50% to a capacity of about 24,000 U.S. gallons per minute. Reclaiming of water is accomplished by cycloning concentrator rougher spiral middlings, cleaner spiral tails and recleaner spiral tails as well as cycloning recleaner spiral concentrate, using all filtrate and cooling water from the pellet plant, vacuum pumps and compressors.

It has been assumed that no additional water storage dams would have to be built and the water supply from the existing water sheds is of sufficient capacity to meet plant requirements.

5. INSTRUMENTATION

Appropriate allowances have been made for the extension of the instrumentation systems to allow for the increased plant capacity.

6. AUXILIARY SERVICES

(a) Boiler House

Since this building is part of the Concentrator, the building extension has been estimated with the Concentrator estimate.

One boiler has been added to the boiler house to allow for the increased building and process heat requirements of the expanded plant.

(b) Mill Offices, Laboratory, Assay Office and Warehouse

It has been assumed that no additions to these areas are needed when the production capacity of the plant is increased.

(c) Service Centre

No additions have been made to this building. It may be necessary to store some of the additional mobile equipment outdoors when it is not in use. Block heaters can be cheaply added to such equipment or the engines left running during the winter, as is usual practice in many northern Canadian operations.

7. ADMINISTRATION OFFICE AND SECURITY

No additions to these areas are foreseen when the plant is increased in capacity.

SCANNED IMAGE

8. SUBSTATION, GENERAL DISTRIBUTION AND POWERHOUSE

(a) Substation and Distribution

Additional transformer capacity and new load centres have been added to allow for the greater electrical load that will result when the plant is expanded.

(b) Powerhouse

No allowance has been made to increase the 1000 KW standby diesel generator capacity.

9. FUEL STORAGE AND DISTRIBUTION

An allowance has been made for extending the distribution system to correspond with the increased plant capacity.

10. HEATING DISTRIBUTION LINES

Appropriate allowances have been made to extend the heating system to the added buildings.

11. RAILROAD TRACKS AND SIDINGS IN THE PLANT AREA

It has been assumed that the size of trains going to Seven Islands will remain the same, but that trains will run more frequently. Therefore no increase in yard trackage is needed.

12. ROADS AND YARDS IN THE PLANT SITE AREA

The roads system in the plant site area has been expanded to allow for the greater traffic and to connect with the additional buildings. It is foreseen that during the construction period the roads will be damaged and an allowance has also been included for these repairs.

13. TOWNSITE

(a) Housing

An allowance has been made for additional houses to accommodate the increased operating staff. Some of these facilities will have to be built prior to plant expansion so that they can serve as temporary accommodation for the construction work force.

SCANNED IMAGE

CANADIAN JAVELIN LTD.

13. TOWNSITE (Cont'd)

(b) Services

The additional cost of connecting to existing services in the townsite has been included.

It is anticipated that the relative cost in this area will be quite small since the major facilities will have been provided with the initial townsite construction.

14. RAILROAD FROM THE WABUSH LINE
15. ACCESS ROAD FROM WABUSH
16. ELECTRICAL TRANSMISSION LINE TO PLANT SUBSTATION

No allowances have been made for the expansion of the above.

SCANNED IMAGE

APPENDIX I
DRAWING INDEX

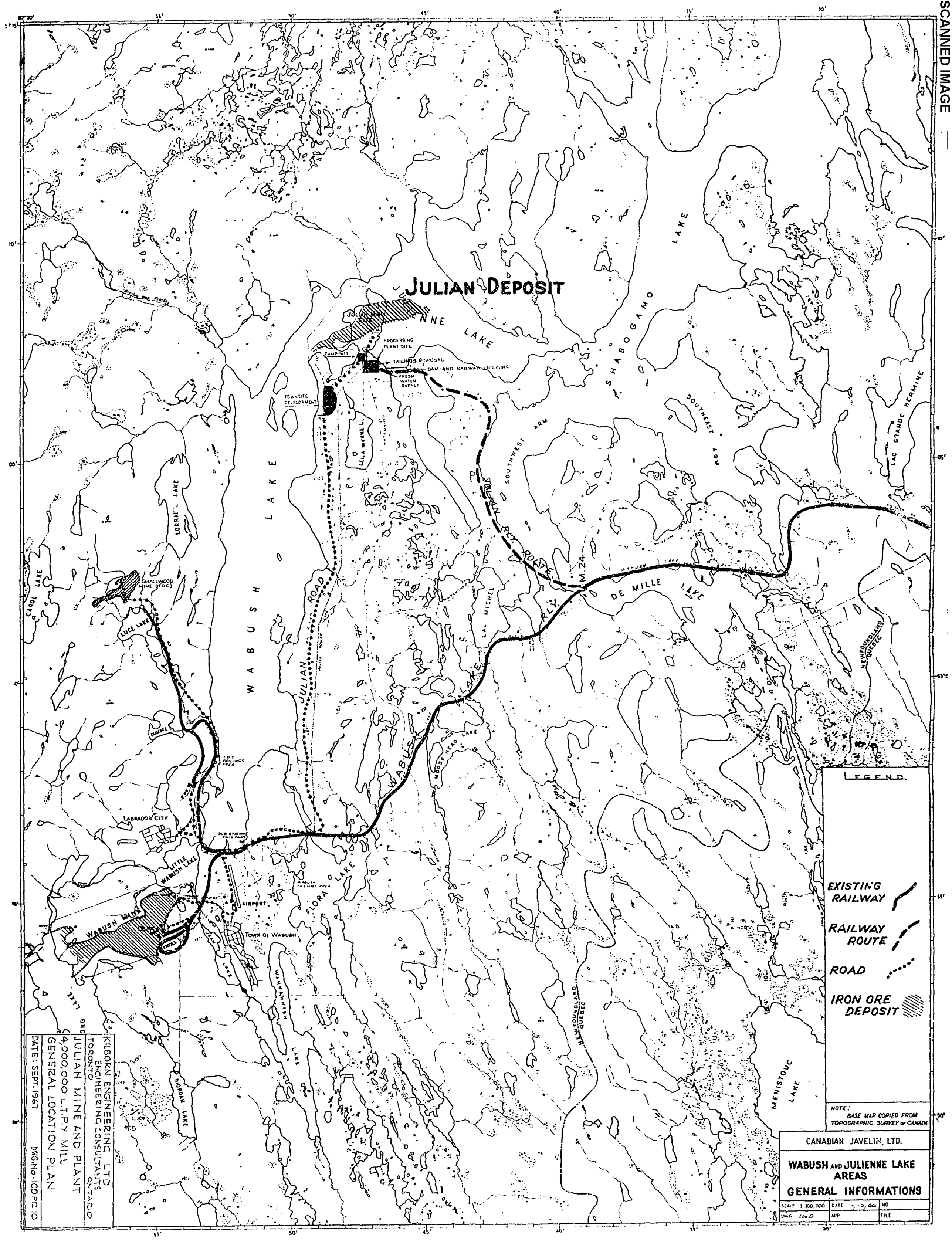
SCANNED IMAGE

CANADIAN JAVELIN LTD.

APPENDIX I

LIST OF DRAWINGS

Title	Drawing Number
GENERAL LOCATION PLAN	100 PR 10
FLOWSHEET NO. 1; CRUSHING, ORE STORAGE, GRINDING AND SCREENING	100 PR 11
FLOWSHEET NO. 2; SPIRALS CIRCUIT	100 PR 12
FLOWSHEET NO. 3; TAILINGS AND WATER SYSTEMS	100 PR 13
FLOWSHEET NO. 4; DRAVO-LURGI SYSTEM, REGRIND AND PELLETIZING	100 PR 14
FLOWSHEET NO. 5; ALLIS-CHALMERS SYSTEM, REGRIND AND PELLETIZING	100 PR 15
PROPOSED PLOT PLAN	100 PR 16
PRIMARY CRUSHING PLANT, GENERAL ARRANGEMENT, ELEVATIONS	100 PR 17
PRIMARY CRUSHER, GENERAL ARRANGEMENT, PLANS	100 PR 18
RAW ORE STORAGE BUILDING, GENERAL ARRANGEMENT, PLANS AND SECTIONS	100 PR 19
CONCENTRATOR, GENERAL ARRANGEMENT, PLANS & ELEVATIONS, GRINDING SECTION	100 PR 20
CONCENTRATOR, GENERAL ARRANGEMENT, PLANS & ELEVATIONS, SPIRALS SECTION	100 PR 21
RAW ORE STORAGE & CONCENTRATOR, GENERAL ARRANGEMENT, PLANS & SECTIONS	100 PR 22
PELLETIZING PLANT, DRAVO SYSTEM, GENERAL ARRANGEMENT	100 PR 23
PELLETIZING PLANT, ALLIS-CHALMERS SYSTEM, GENERAL ARRANGEMENT	100 PR 24
CONVEYORS AND PELLET LOADOUT, GENERAL PLAN AND ELEVATIONS	100 PR 25
ELECTRICAL, SINGLE LINE DIAGRAM	100 PR 26

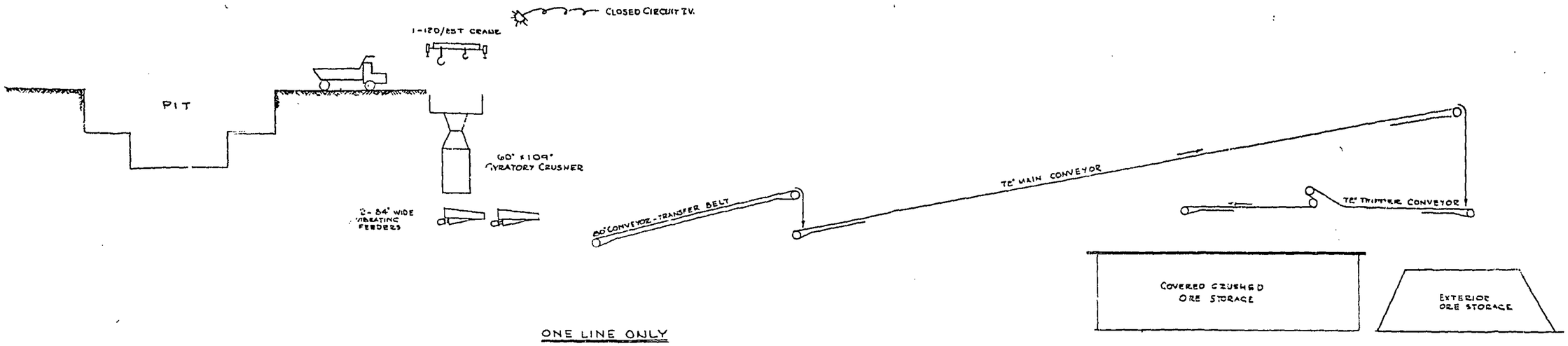


SCANNED IMAGE

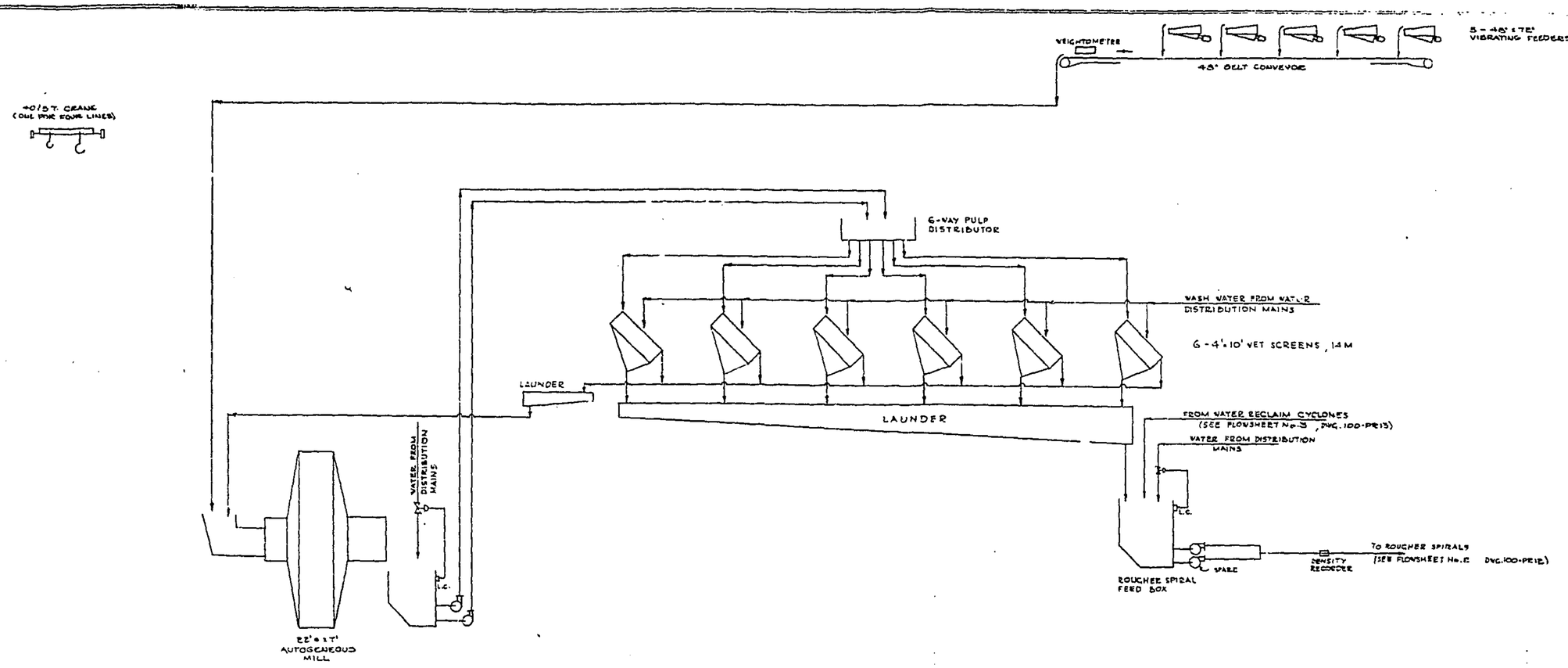
SCANNED IMAGE

100-PR11

BILL OF MATERIAL					
MARK	QTY.	DESCRIPTION	REQ. BY	REQ. No.	P.O. No.



ONE LINE ONLY



ONE OF FOUR LINES

Dwg. No.	REFERENCE DRAWINGS
100-PR15	FLOWSHEET No 5
100-PR14	FLOWSHEET No 4
100-PR13	FLOWSHEET No 3
100-PR12	FLOWSHEET No 2

No.	DESCRIPTION	DATE	BY
	REVISIONS		
	REVISIONS		
0	ORIGINAL	SEP. 11 '67	A.K.
	REVISIONS		

SECTION: GENERAL LAYOUT
SCALE: DATE:
DESIGNED BY:
DRAWN BY: A.K. SEP. 11.67
CHECKED BY:
APPROVED BY:

CLIENT: CANADIAN JAVELIN LTD
LOCATION: JULIENNE LAKE, LABRADOR

KILBORN ENGINEERING LTD.
ENGINEERING CONSULTANTS
TORONTO — ONTARIO

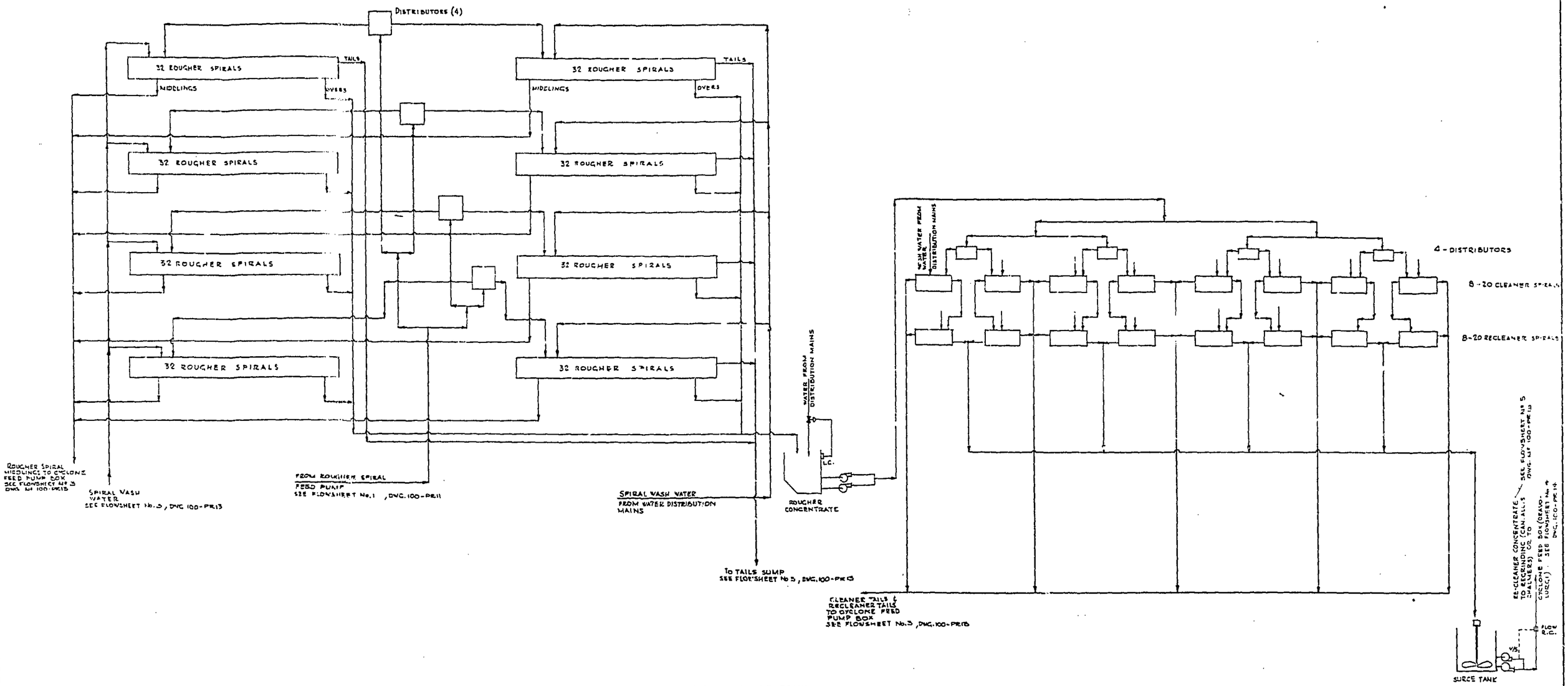
TITLE
JULIAN MINE & PLANT
4,000,000 L.T.P.Y. MILL
CONCENTRATOR
FLOWSHEET No. 1
CRUSHING, ORE STORAGE, GRINDING & SCREENING

POCKET
FOLDER
PROJECT No. 140
DWG. No. 100-PR11
REV. 0

SCANNED IMAGE

100-PR12

BILL OF MATERIAL					
MARK	QTY	DESCRIPTION	REQ. BY	REQ. No.	P.O. No.



ONE LINE OF FOUR

100-PR10	FLOWSHEET No 5
100-PR13	FLOWSHEET No 4
100-PR11	FLOWSHEET No 1
DWG. No.	REFERENCE DRAWINGS

No.	DESCRIPTION	DATE	BY
	REVISIONS		

No.	DESCRIPTION	DATE	BY
	REVISIONS		

No.	DESCRIPTION	DATE	BY
0	ORIGINAL	SEP 8 67	A.K.
	REVISIONS		

SECTION: GENERAL LAYOUT
SCALE: ——— DATE:
DESIGNED BY:
DRAWN BY: A.K. SEP.11 '67
CHECKED BY:
APPROVED BY:

CLIENT: CANADIAN JAVELIN LTD
LOCATION: JULIENNE LAKE, LABRADOR

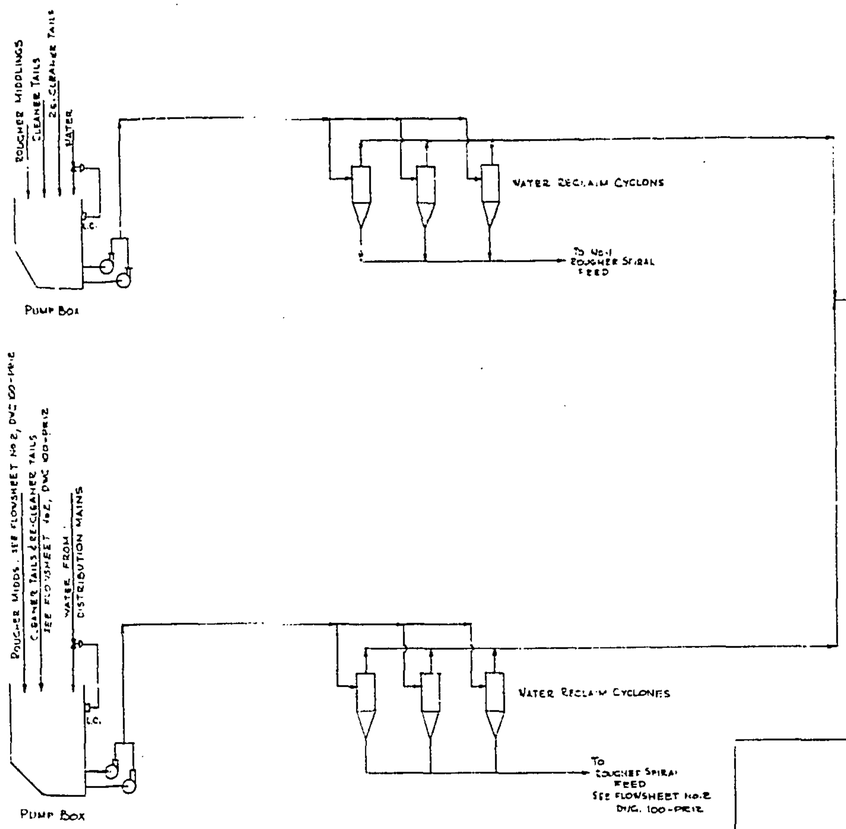
KILBORN ENGINEERING LTD.
ENGINEERING CONSULTANTS
TORONTO — ONTARIO

TITLE
JULIAN MINE & PLANT
4,000,000 L.T.P.Y MILL
CONCENTRATOR
FLOWSHEET No. 2
SPIRALS CIRCUIT

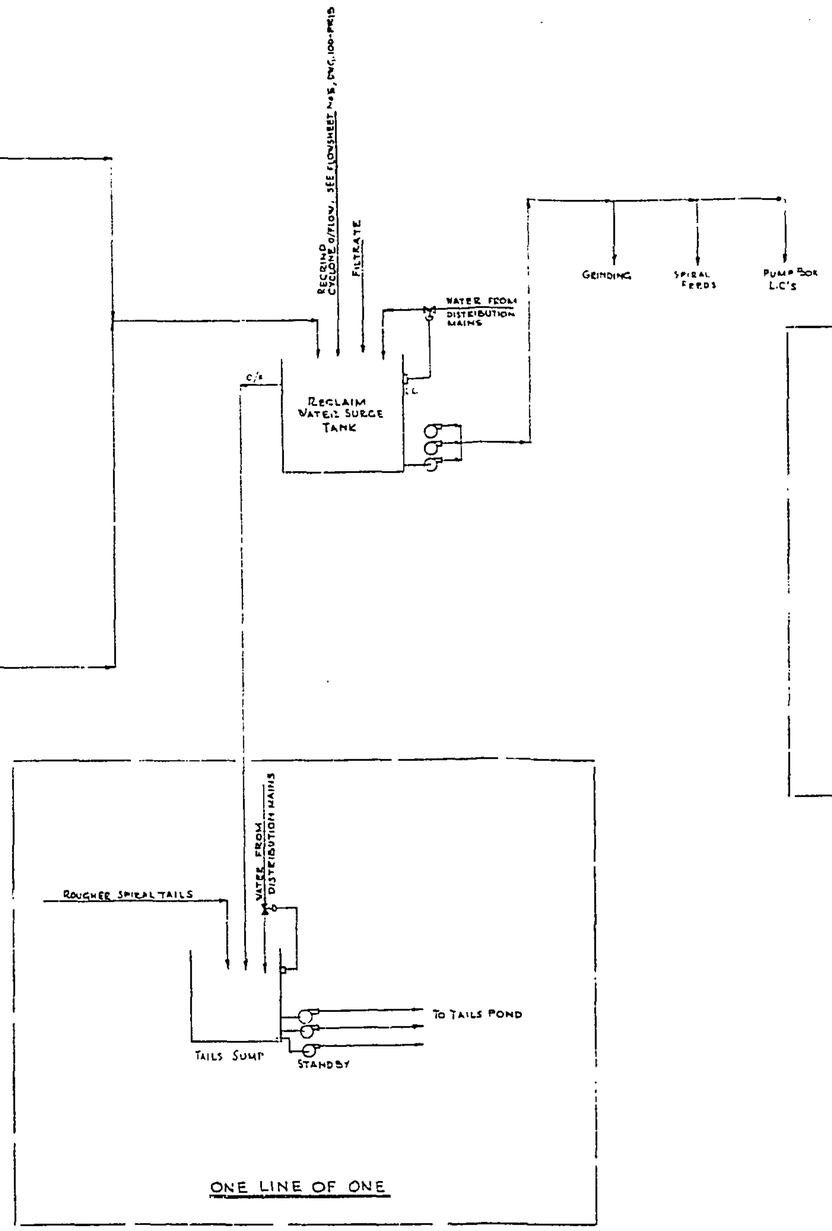
POCKET:
FOLDER:
PROJECT No. 140
DWG. No. 100-PR12 REV C

SCANNED IMAGE
100-PR13

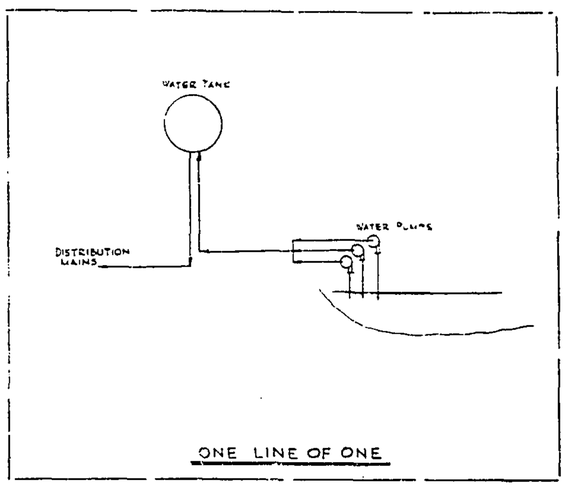
BILL OF MATERIAL					
MARK	QTY.	DESCRIPTION	REQ BY	REQ No.	P.O. No.



ONE LINE OF TWO



ONE LINE OF ONE



ONE LINE OF ONE

DWG. No.	REFERENCE DRAWINGS
100-PR15	FLOWSHEET No 5
100-PR14	FLOWSHEET No 4
100-PR12	FLOWSHEET No 2
100-PR11	FLOWSHEET No 1

No.	DESCRIPTION	DATE	BY
0	ORIGINAL	SEP.11	A.K.

REVISIONS

SECTION: GENERAL LAYOUT
SCALE: —
DATE:
DESIGNED BY:
DRAWN BY: A.K. SEP.11, 67
CHECKED BY:
APPROVED BY:

CLIENT: CANADIAN JAVELIN LTD.
LOCATION: JULIENNE LAKE, LABRADOR

KILBORN ENGINEERING LTD.
ENGINEERING CONSULTANTS
TORONTO — ONTARIO

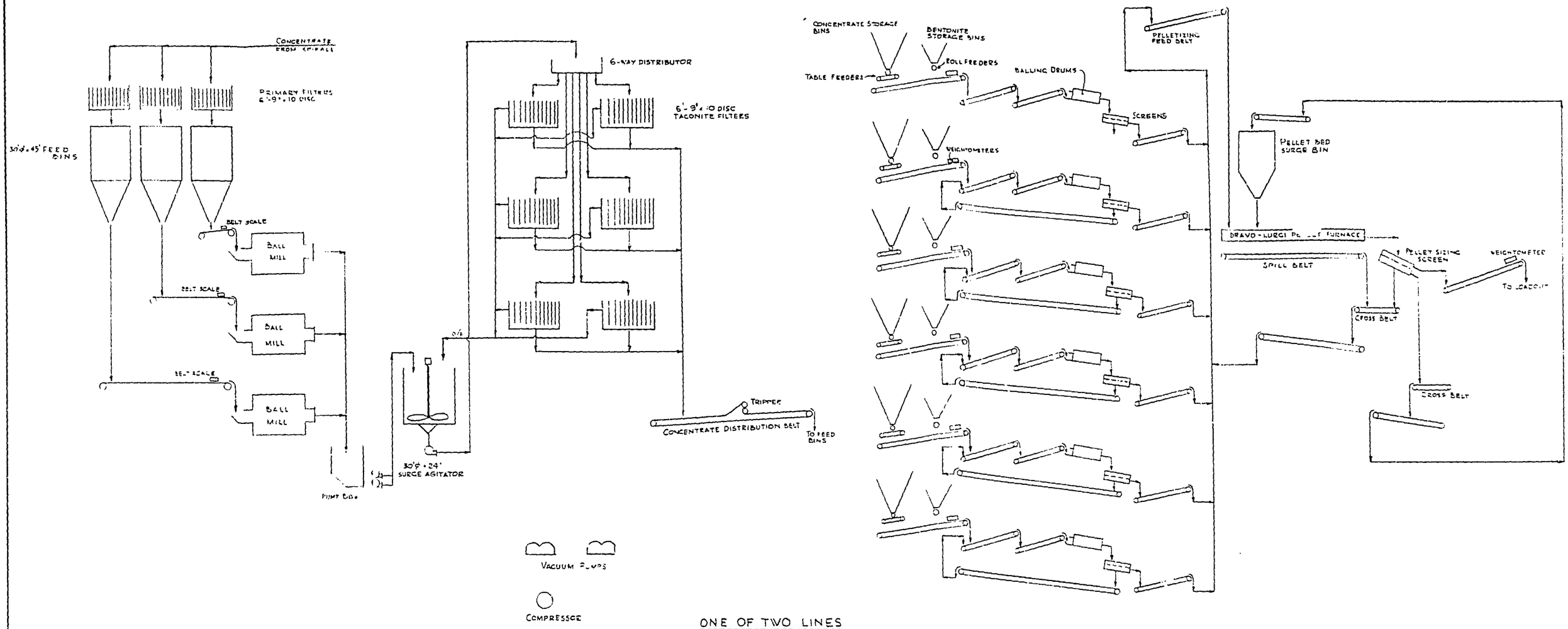
TITLE
JULIAN MINE & PLANT
4,000,000 LT.P.Y MILL
PELLET PLANT
FLOWSHEET No. 3
TAILINGS & WATER SYSTEMS

POCKET
FOLDER
PROJECT No. 140
DWG. No. 100-PR13
REV. 0

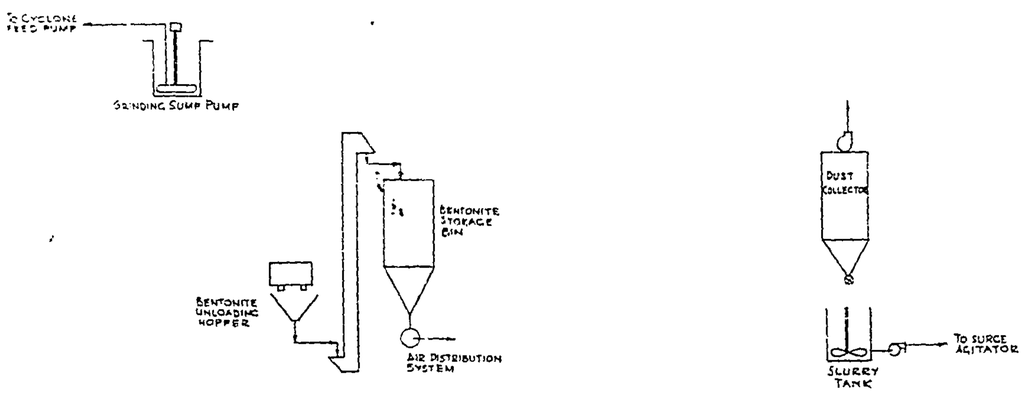
SCANNED IMAGE

100 PZ 14

BILL OF MATERIAL					
MARK	QTY.	DESCRIPTION	REQ. BY	REQ. No.	P.O. No.



ONE OF TWO LINES

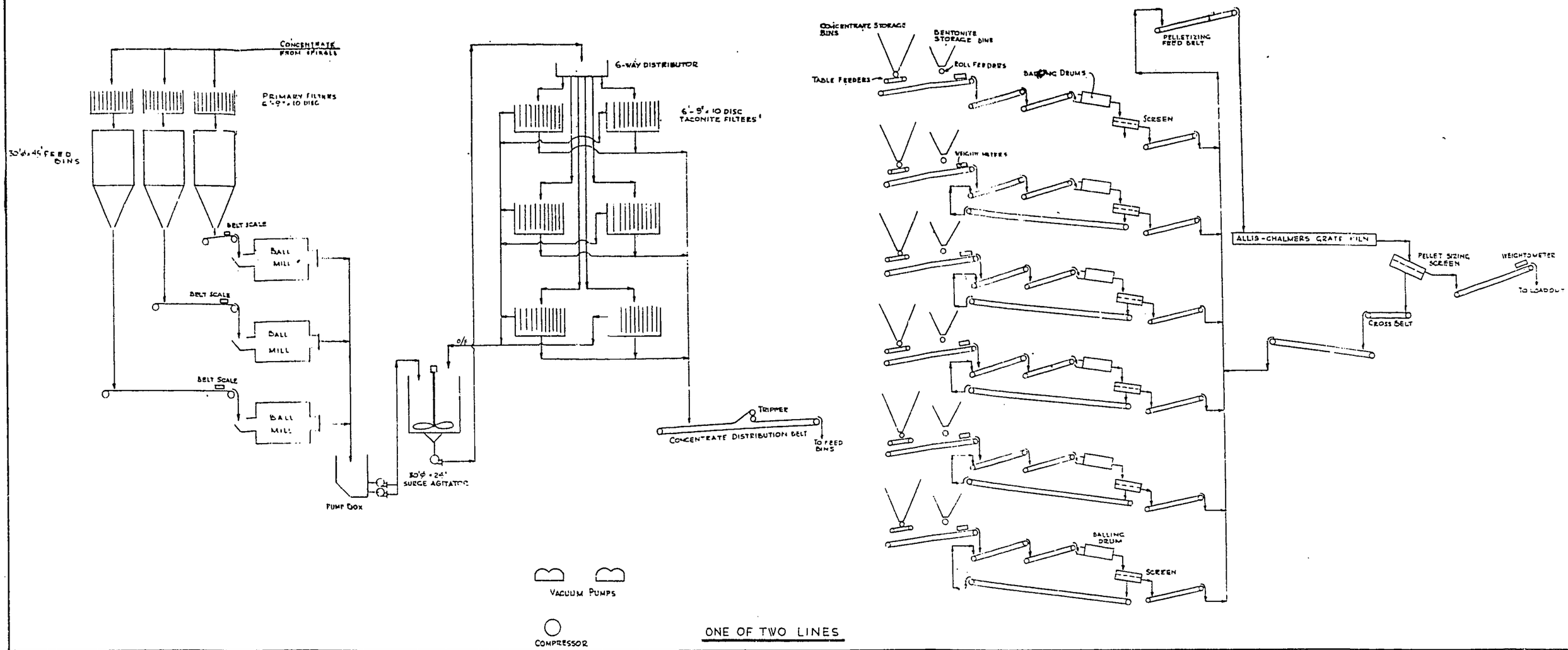


ONE LINE ONLY

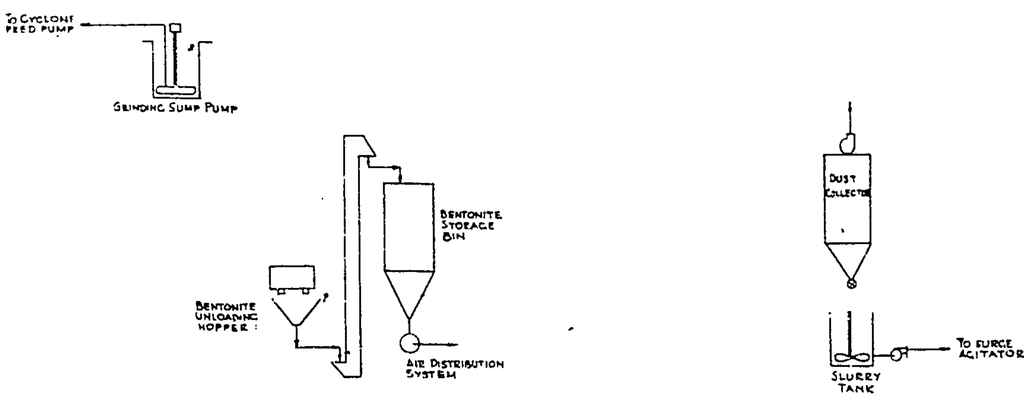
| | | | | |

SCANNED IMAGE

MARK	QTY.	BILL OF MATERIAL DESCRIPTION	REQ. BY	REQ. No.	P.O. No.



ONE OF TWO LINES



ONE LINE ONLY

DWG. No.	REFERENCE DRAWINGS
100 PR 14	FLOWSHEET No 4
100 PR 13	FLOWSHEET No 3
100 PR 12	FLOWSHEET No 2
100 PR 11	FLOWSHEET No 1

REVISIONS					
NO.	DESCRIPTION	DATE	BY	NO.	DESCRIPTION
0	ORIGINAL	SEPT. 61	A.K.		

SECTION: GENERAL LAYOUT		
SCALE:		DATE
DESIGNED BY: C.F.		
DRAWN BY: A.K.		SEPT. 11, 61
CHECKED BY:		
APPROVED BY:		

CLIENT: CANADIAN JAVELIN LTD.
LOCATION: JULIENNE LAKE, LABRADOR

KILBORN ENGINEERING LTD.
ENGINEERING CONSULTANTS
TORONTO — ONTARIO

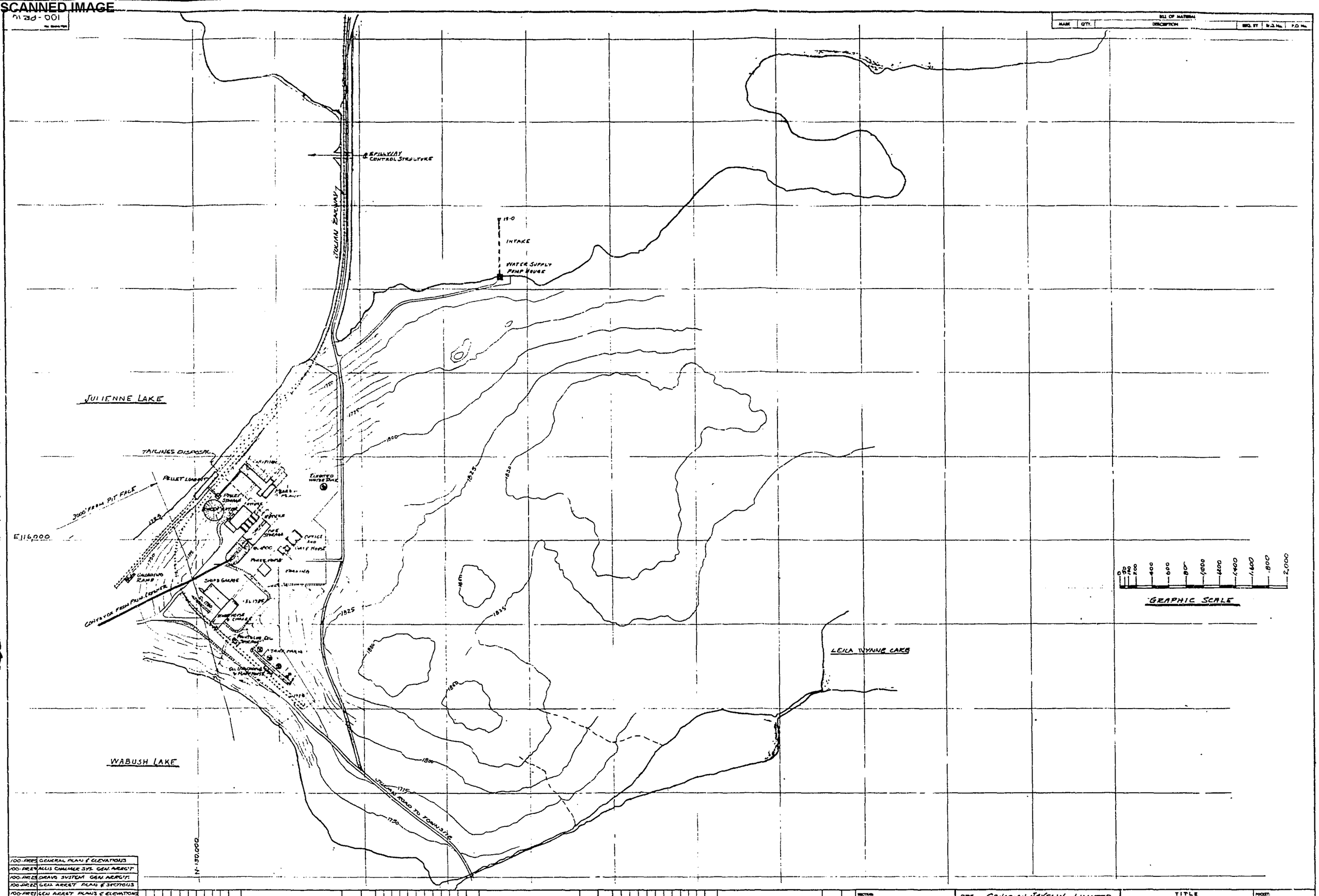
TITLE
JULIAN MINE AND PLANT
4,000,000 LT. BY MILL
PELLETIZING PLANT
ALLIS-CHALMERS SYSTEM. - FLOWSHEETS
REGRIND & PELLETIZING

PROJECT	
FOLDER	
PROJECT No.	1162
DWG. No.	100 PR 15
REV.	0

SCANNED IMAGE

100-PR10

BILL OF MATERIAL					
MARK	QTY.	DESCRIPTION	REQ. BY	B.J. No.	P.O. No.



Dwg. No.	REFERENCE DRAWINGS
100-PR01	GENERAL PLAN & ELEVATIONS
100-PR02	ALLIS CHALMER SYS. GEN. ARRG'T
100-PR03	DRAVO SYSTEM GEN. ARRG'T.
100-PR22	GEN. ARRGT PLAN & SECTIONS
100-PR21	GEN. ARRGT PLANS & ELEVATIONS
100-PR20	GEN. ARRG'T. PLANS & ELEVATIONS
100-PR19	GEN. ARRG'T PLANS & SECTIONS
100-PR18	GENERAL ARRG'T PLANS
100-PR17	GENERAL ARRG'T ELEVATIONS

No.	DESCRIPTION	DATE	BY
	REVISIONS		
	REVISIONS		
0	ORIGINAL		
	REVISIONS		

SECTIONS:
SCALE: SHOWN
DATE
DESIGNED BY:
DRAWN BY: JP
CHECKED BY:
APPROVED BY:

CLIENT: CANADIAN JAVELIN LIMITED
LOCATION: JULIENNE LAKE, LABRADOR

KILBORN ENGINEERING LTD.
ENGINEERING CONSULTANTS
TORONTO — ONTARIO

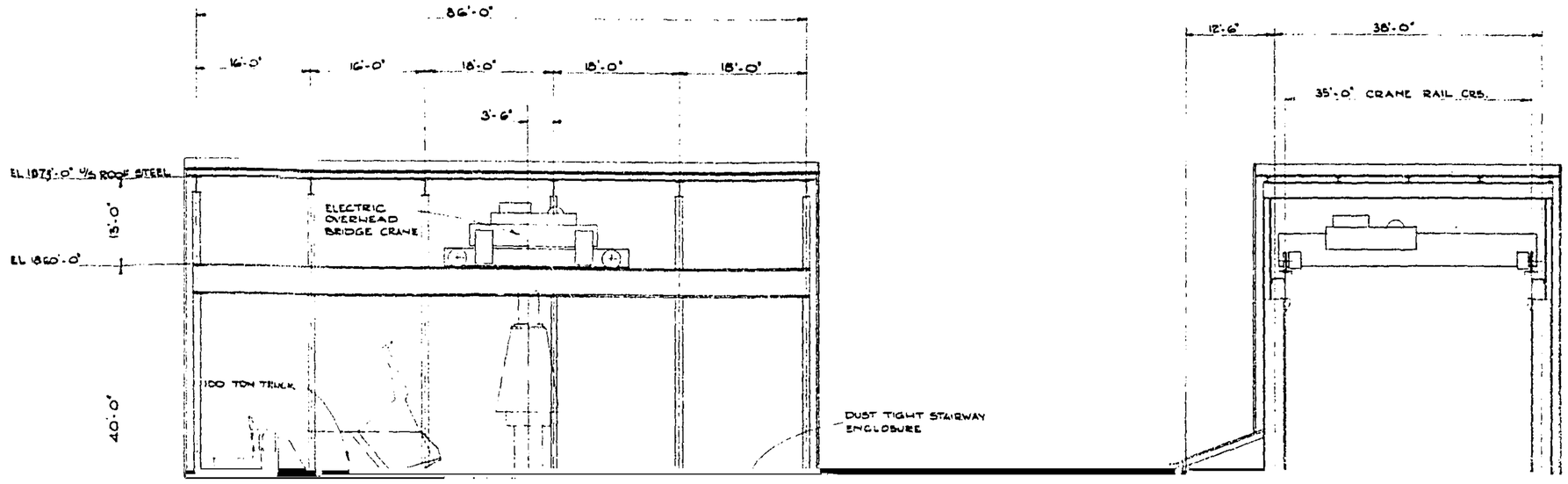
TITLE
JULIAN MINE & PLANT
4,000,000 S.T.P.A. MILL
PROPOSED PLOT PLAN

POCKET:
FOLDER:
PROJECT No. 140
DWG. No. 100-PR16
REV. 0

SCANNED IMAGE

100 PR 17

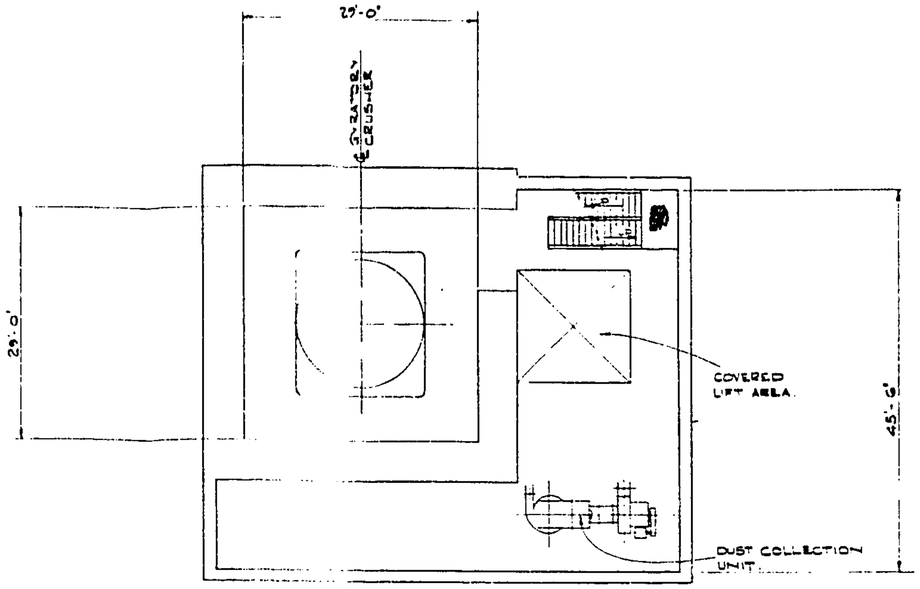
BILL OF MATERIAL					
MARK	QTY.	DESCRIPTION	REQ. BY	REQ. No.	F.O. No.



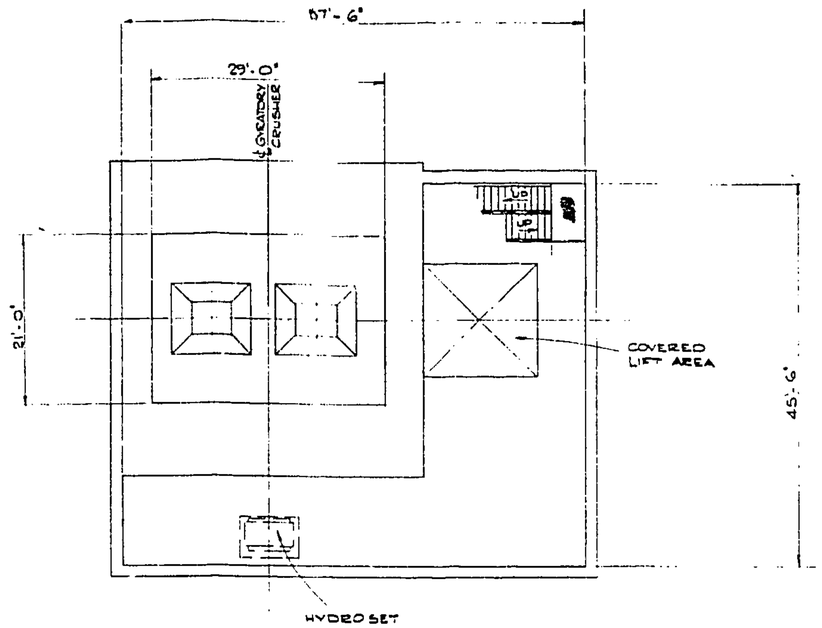
SCANNED IMAGE

100 PR 18

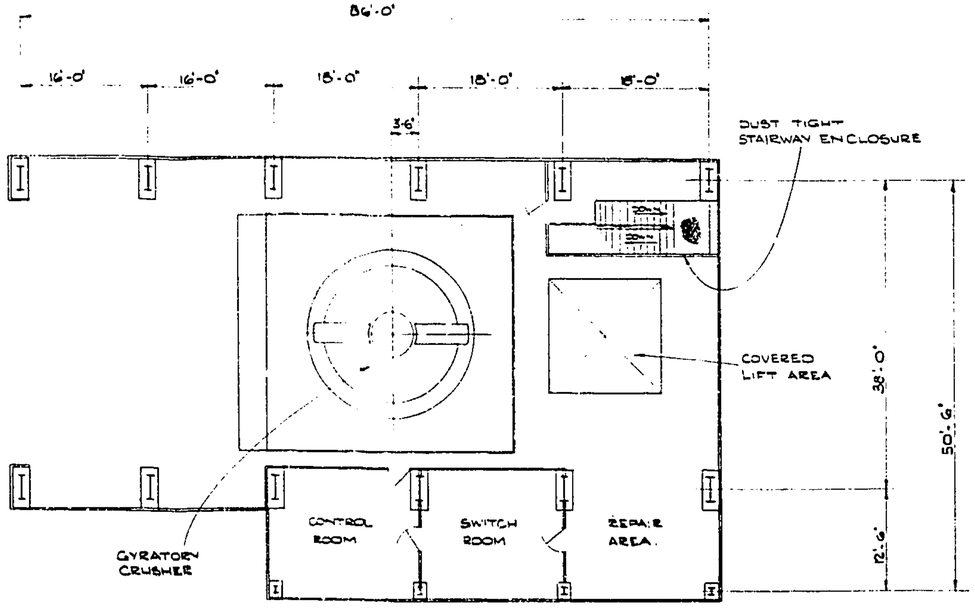
BILL OF MATERIAL					
MARK	QTY.	DESCRIPTION	REQ. BY	REQ. No.	P.O. No.



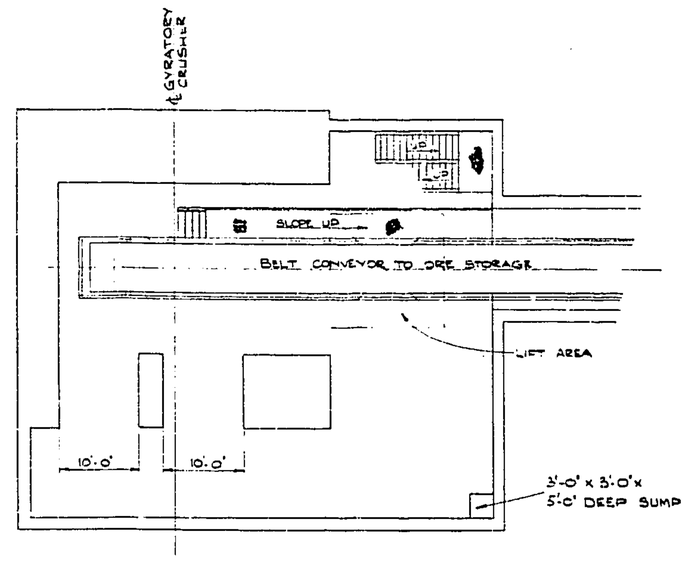
FLOOR PLAN @ FIN FL. EL 1783'-6



FLOOR PLAN @ FIN FL EL 1757'-0"



FLOOR PLAN @ FIN. FL. EL 1820'-0"



FLOOR PLAN @ FIN FL. EL. 1736'-6"

0 5 10 15 20 25 30

SCALE ft

DWG No.	REFERENCE DRAWINGS
100-PR E3	GENERAL PLAN & ELEVATIONS
100-PR E4	ALLIS CHALMER SYS. GEN. ARRG'T.
100-PR E5	DEAD SYSTEM GEN. ARRG'T.
100-PR E6	GEN. ARRG'T. PLANS & SECTIONS
100-PR E8	GEN. ARRG'T. PLANS & ELEVATIONS
100-PR E9	GEN. ARRG'T. PLANS & ELEVATIONS
100-PR E10	GEN. ARRG'T. PLANS & SECTIONS
100-PR E11	GENERAL ARRG'T. ELEVATIONS
100-PR E16	PROPOSED PLOT PLAN

No.	DESCRIPTION	DATE	BY
	REVISIONS		
	REVISIONS		
0	ORIGINAL	Sept 11/67	DB
	REVISIONS		

SECTION	LAYOUT
SCALE	AS SHOWN
DESIGNED BY	
DRAWN BY	D. BURNS 11 Sept. 67
CHECKED BY	
APPROVED BY	

CLIENT: CANADIAN JAVELIN LTD.

LOCATION: JULIENNE LAKE, LABRADOR

KILBORN ENGINEERING LTD.
ENGINEERING CONSULTANTS
TORONTO — ONTARIO

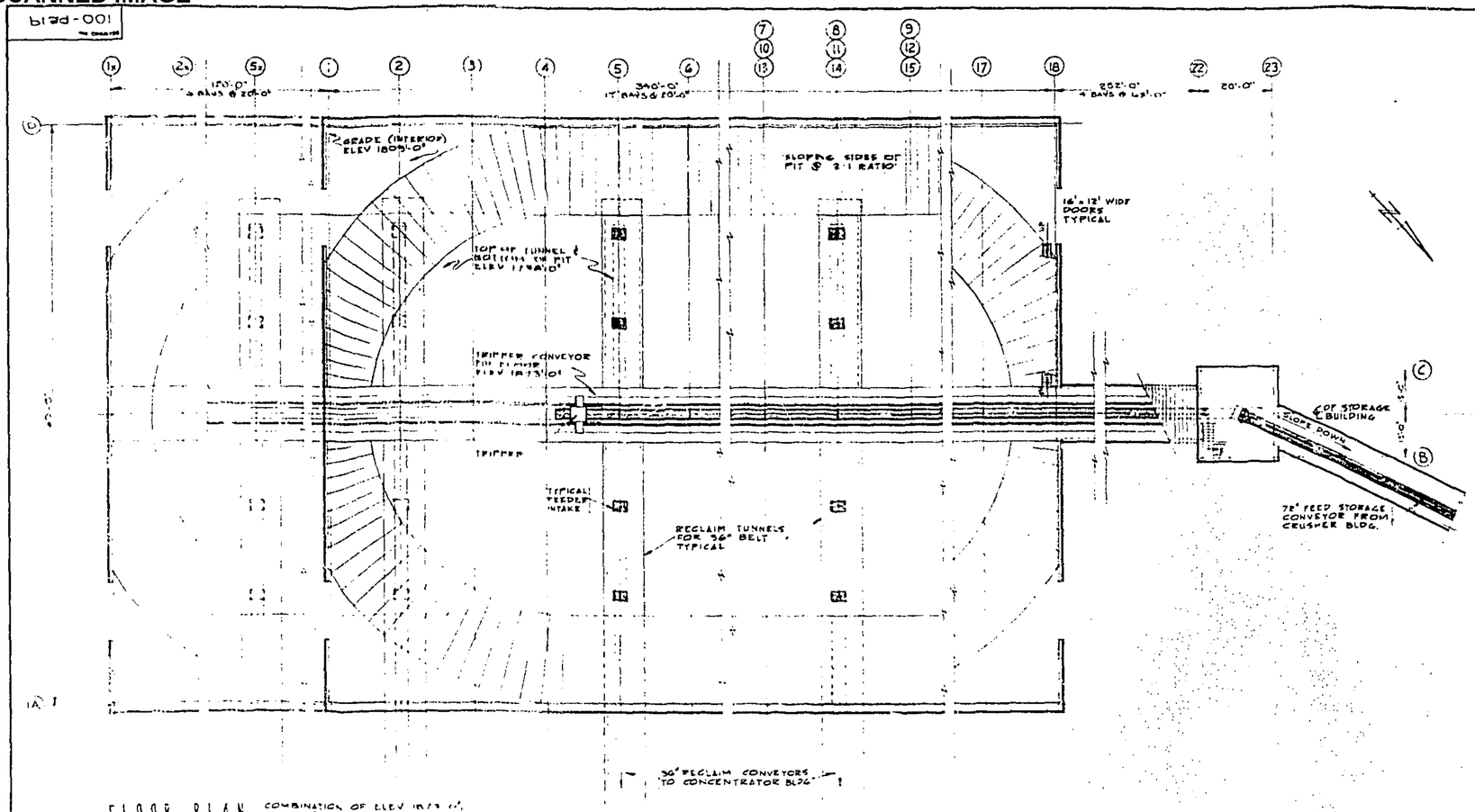
TITLE
JULIAN MINE & PLANT
4,000,000 L.T.P.Y. MILL
PRIMARY CRUSHER
GENERAL ARRANGEMENT
PLANS

POCKET
FOLDER
PROJECT No. 140
DWG No. 100PR18
REV 0

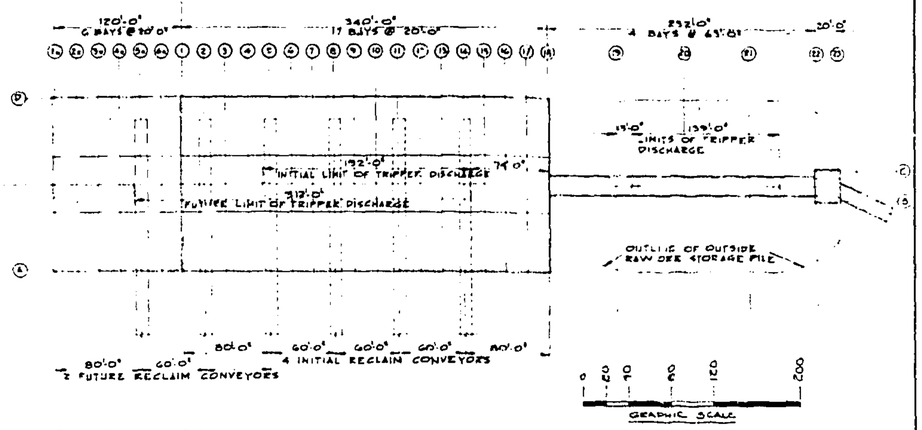
SCANNED IMAGE

100-PR19

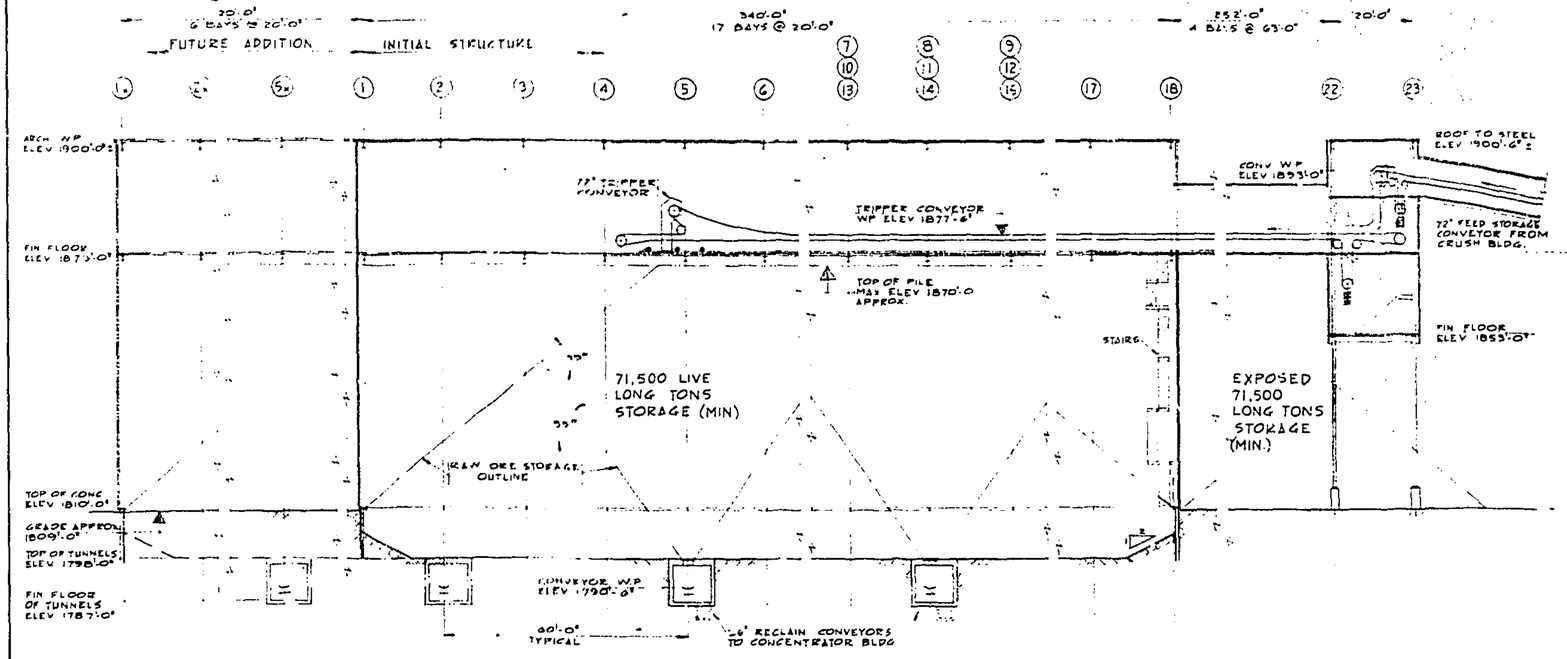
BILL OF MATERIAL					
MARK	QTY.	DESCRIPTION	REQ. BY	REQ. No.	P.O. No.



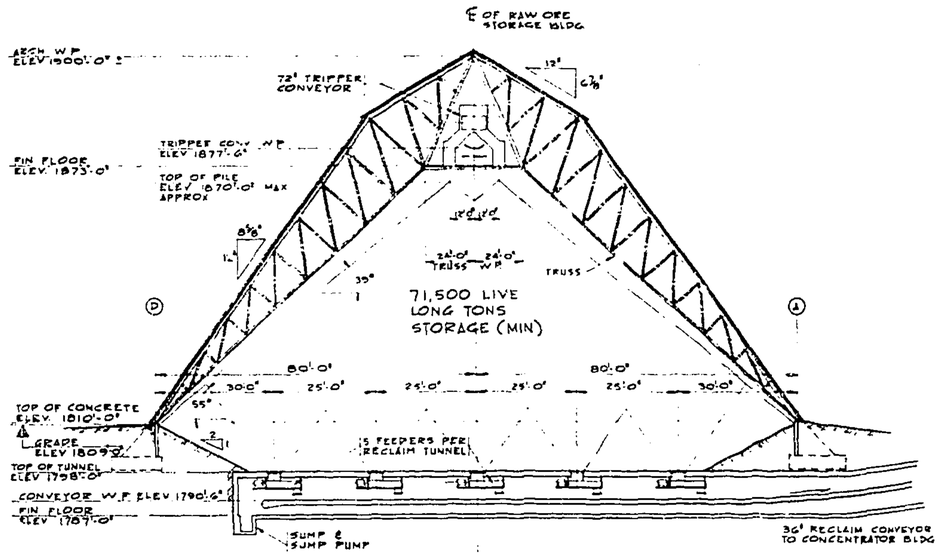
FLOOR PLAN COMBINATION OF ELEV 1873'-0", 1809'-0" & 1798'-0" LEVELS
SCALE 1/16" = 1'-0"



OVERALL ROOF PLAN
SCALE 1" = 60'-0"



LONGITUDINAL SECTION
SCALE 1/16" = 1'-0"



TYPICAL CROSS-SECTION
SCALE 1/16" = 1'-0"

GRAPHIC SCALE

DWG No	REFERENCE DRAWINGS
100-PR25	GENERAL PLAN & ELEVATIONS
100-PR24	ALLIS CHALMER SYS GEN ARRGT
100-PR23	DRAWD SYSTEM GEN ARRGT
100-PR22	GEN ARRGT PLAN & SECTIONS
100-PR21	GEN ARRGT PLANS & ELEVATIONS
100-PR20	GEN. ARRGT. PLANS & ELEVATIONS
100-PR18	GENERAL ARRGT PLANS
100-PR17	GENERAL ARRGT ELEVATIONS
100-PR16	PROPOSED PLOT PLAN

No	DESCRIPTION	DATE	BY
	REVISIONS		
	REVISIONS		
0	ORIGINAL	SEPT/67	BPR
	REVISIONS		

SECTION: GENERAL LAYOUT
SCALE: AS NOTED
DATE
DESIGNED BY
DRAWN BY: B. ROSS — 11 SEPT. 67
CHECKED BY
APPROVED BY

CLIENT: CANADIAN JAVELIN LTD.
LOCATION: JULIENNE LAKE LABRADOR

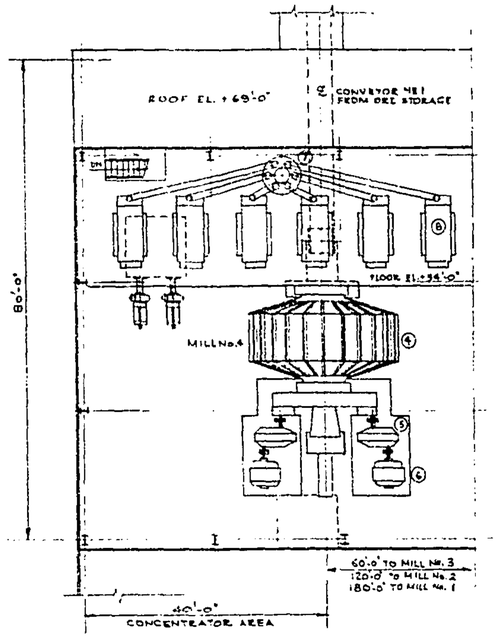
KILBORN ENGINEERING LTD.
ENGINEERING CONSULTANTS
TORONTO — ONTARIO

TITLE
JULIAN MINE & PLANT
4,000,000 L.T.P.Y. MILL
RAW ORE STORAGE BLDG.
GENERAL ARRANGEMENT
PLANS & SECTIONS

POCKET
FOLDER
PROJECT No. 146
DWG. No. 100 PR.19
REV 0

SCANNED IMAGE
100 PR 20

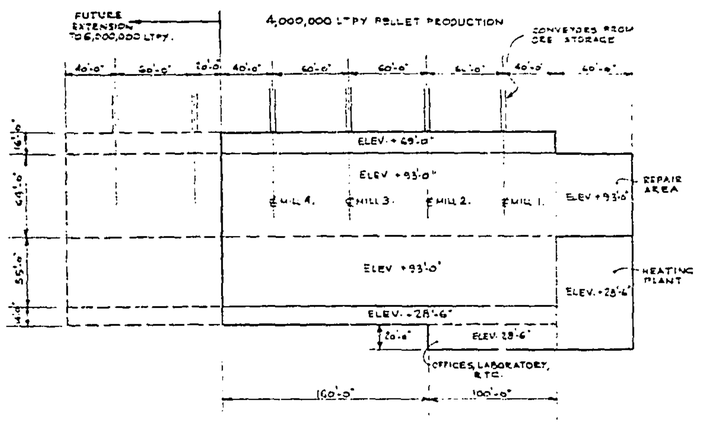
BILL OF MATERIAL					
MARK	QTY	DESCRIPTION	REQ BY	REQ. No.	P.O. No.



GROUND FLOOR PLAN

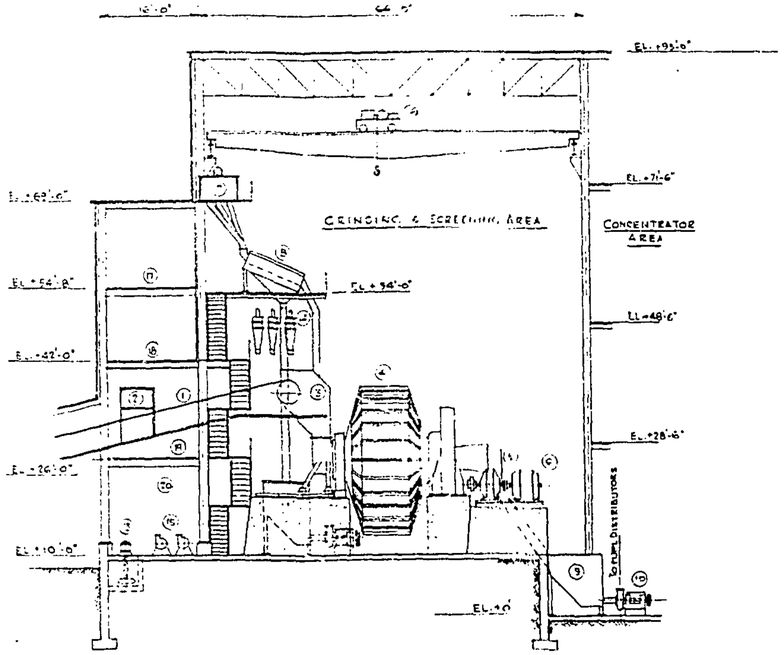
LEGEND

ITEM	EQUIPMENT
1.	FEED CONVEYOR FROM ORE STORAGE
2	WEIGHTOMETER
3	ORE CHUTE
4.	AUTOGENEOUS MILL
5	SPEED REDUCERS
6	MOTORS
7	PULP DISTRIBUTOR
8	WET SCREENS
9	MILL DISCHARGE PUMP BOX
10.	PUMPS
11	SCREEN UNDERSIZE PUMP BOX
12	PUMPS
13	BUILDING SUMP PUMP
14	CYCLONES
15	GLAND WATER PUMPS
16	BRIDGE CRANE
17	CONTROL ROOM
18	SWITCH ROOM
19.	EMPLOYEES SERVICE
20	REPAIR SHOP

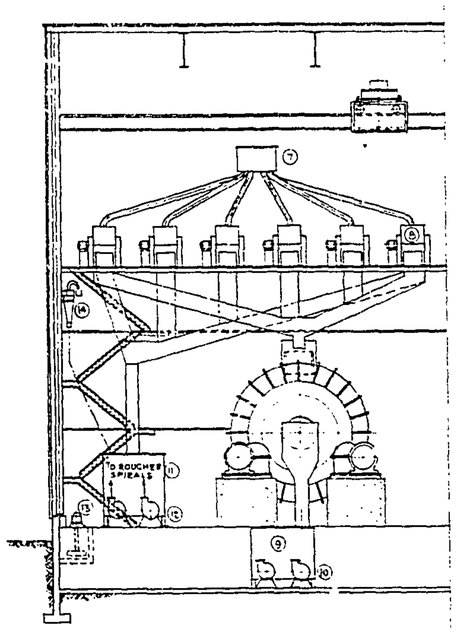


ROOF PLAN

GRAPHIC SCALE



SIDE ELEVATION



END ELEVATION

0 5 10 15 20 25 30 35 40

GRAPHIC SCALE

DWG No	REFERENCE DRAWINGS
100-PR E5	GENERAL PLAN & ELEVATIONS
100-PR E4	ALLIS CHALMERS SYS GEN ARRG'T
100-PR E3	DRAVO SYSTEM GEN ARRG'T
100-PR E2	GEN. ARRG'T. PLANS & SECTIONS
100-PR E1	GEN. ARRG'T. PLANS & ELEVATIONS
100-PR 19	GEN. ARRG'T. PLANS & SECTIONS
100-PR 18	GENERAL ARRG'T PLANS
100-PR 17	GENERAL ARRG'T ELEVATIONS
100-PR 16	PROPOSED PLOT PLAN

No	DESCRIPTION	DATE	BY
	REVISIONS		
0	ORIGINAL	SEPT. 11	A.K.

SECTION: GENERAL LAYOUT		
SCALE: AS SHOWN		DATE
DESIGNED BY: J.P.		AUG. 16, 67
DRAWN BY: A.K.		SEPT. 11, 67
CHECKED BY:		
APPROVED BY:		

CLIENT: CANADIAN JAVELIN LTD
LOCATION: JULIENNE LAKE, LABRADOR

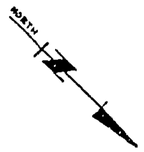
KILBORN ENGINEERING LTD.
ENGINEERING CONSULTANTS
TORONTO — ONTARIO

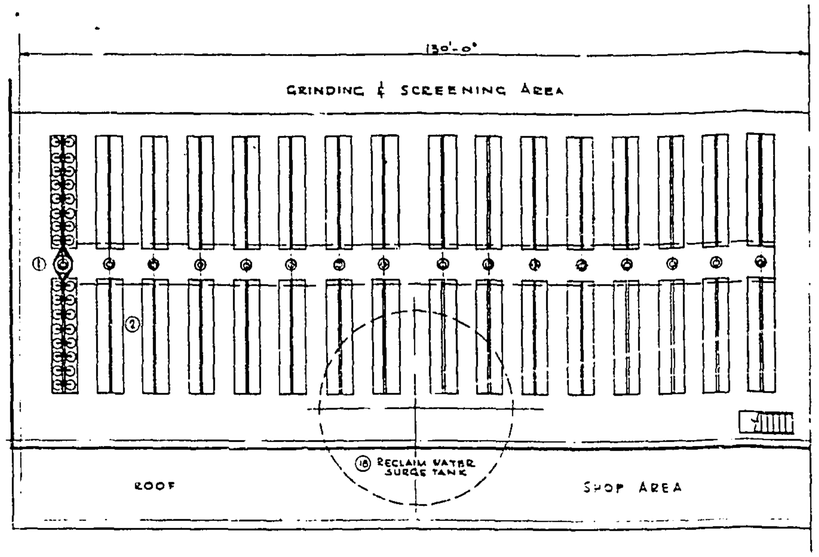
TITLE
JULIAN MINE & PLANT
4,000,000 L.T.P.Y. MILL
CONCENTRATOR
GENERAL ARRANGEMENT
PLANS & ELEVATIONS

POCKET
FOLDER
PROJECT No 45
DWG No 100 PR 00 REV 0

SCANNED IMAGE

BILL OF MATERIAL					
MARK	QTY.	DESCRIPTION	REQ. BY	REQ. No.	P.O. No.

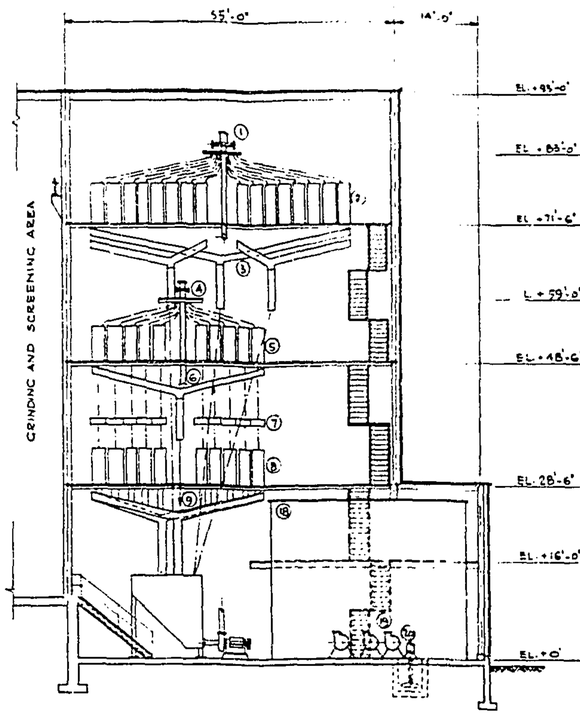




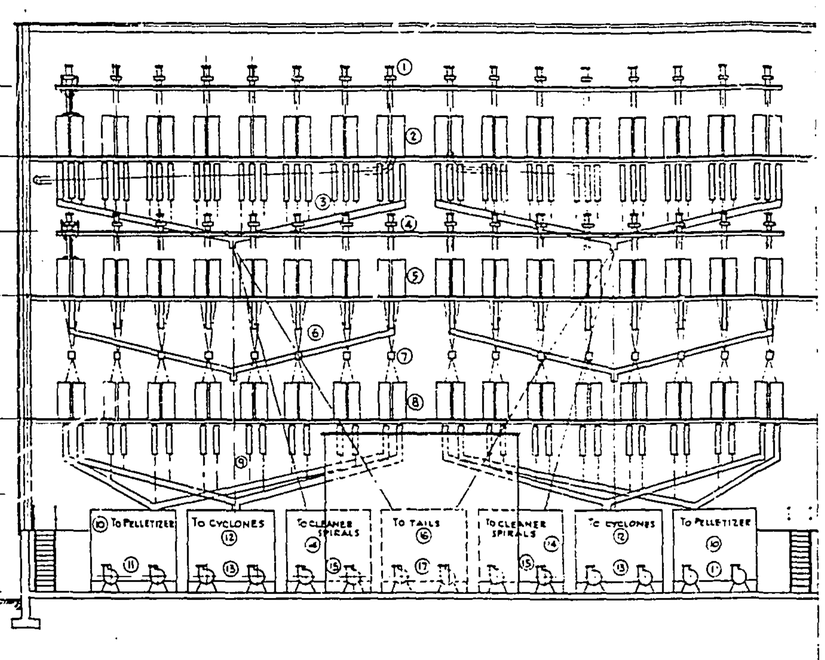
TOP FLOOR PLAN

LEGEND

ITEM	EQUIPMENT
1.	ROUGHER SPIRAL FEED HEADS
2.	ROUGHER SPIRALS
3.	ROUGHER SPIRAL LAUNDERS
4.	CLEANER SPIRAL FEED HEADS
5.	CLEANER SPIRALS
6.	CLEANER SPIRAL LAUNDERS
7.	RECLEANER SPIRAL FEED BOXES
8.	RECLEANER SPIRALS
9.	RECLEANER SPIRAL LAUNDERS
10.	RECLEANER CONCENTRATE PUMP BOX
11.	RECLEANER CONCENTRATE PUMPS
12.	CYCLONE PUMP BOX
13.	CYCLONE PUMPS
14.	CLEANER SPIRAL PUMP BOX
15.	CLEANER SPIRAL PUMPS
16.	TAILS PUMP BOX
17.	TAILS PUMPS
18.	RECLAIM WATER SURGE TANK
19.	RETURN WATER PUMPS
20	SUMP PUMP

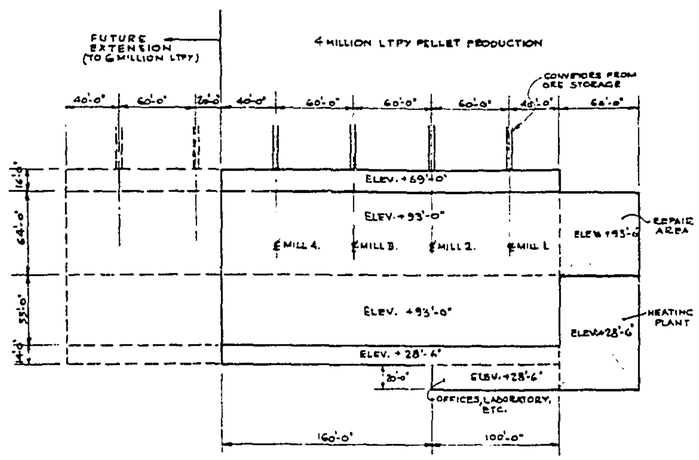


SIDE ELEVATION



CONCENTRATOR AREA BUILDING SYMMETRICAL ABOUT THIS LINE EXCEPT AS SHOWN ON ROOF PLAN.

END ELEVATION



ROOF PLAN

GRAPHIC SCALE

0 5 10 15 20 25 30 35

GRAPHIC SCALE

DWG No.	REFERENCE DRAWINGS
100-PR-25	GENERAL PLANS & ELEVATIONS
100-PR-24	ALLIS CHALMER ENG. GEN. ARRG'T
100-PR-23	DRAVO SYSTEM GEN. ARRG'T
100-PR-22	GEN. ARRG'T PLANS & SECTIONS
100-PR-20	GEN. ARRG'T PLANS & ELEVATIONS
100-PR-19	GEN. ARRG'T PLANS & SECTIONS
100-PR-18	GENERAL ARRG'T. PLANS
100-PR-17	GENERAL ARRG'T. ELEVATIONS
100-PR-16	PROPOSED MILL PLAN

No.	DESCRIPTION	DATE	BY
0	ORIGINAL	SEPT. 11, 67	A.K.

REVISIONS

SECTION:	GENERAL LAYOUT
SCALE:	AS SHOWN
DATE:	
DESIGNED BY:	J.P.
DATE:	AUG. 17, 67
DRAWN BY:	A.K.
DATE:	SEPT. 11, 67
CHECKED BY:	"
APPROVED BY:	

CLIENT: CANADIAN JAVELIN LTD

LOCATION: JULIENNE LAKE, LABRADOR

KILBORN ENGINEERING LTD.
ENGINEERING CONSULTANTS
TORONTO — ONTARIO

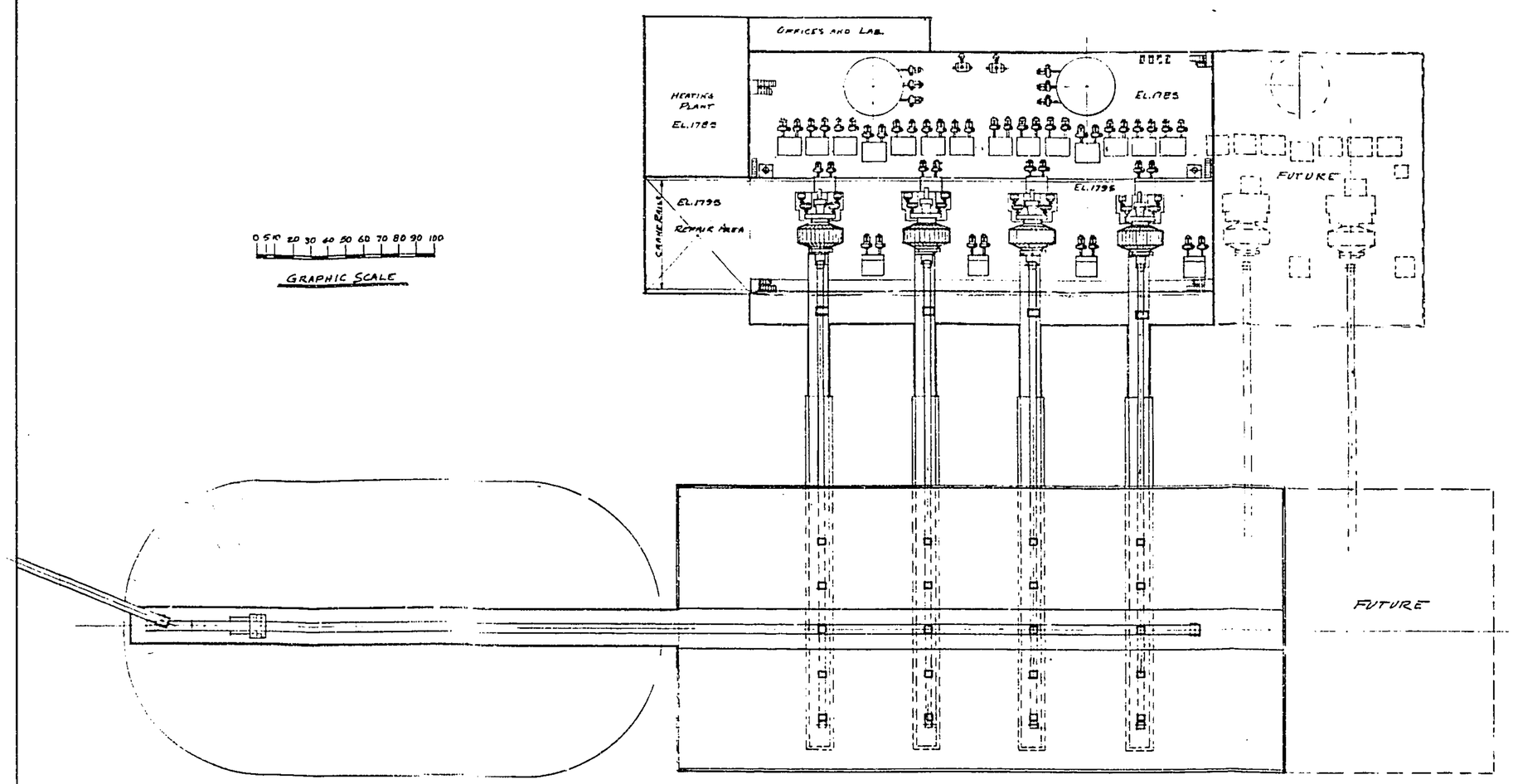
TITLE
JULIAN MINE & PLANT
4,000,000 L.T.P.Y MILL
CONCENTRATOR
GENERAL ARRANGEMENT
PLANS & ELEVATIONS

POCKET
FOLDER
PROJECT No. 140
DWG No. 100 PR 21
REV 0

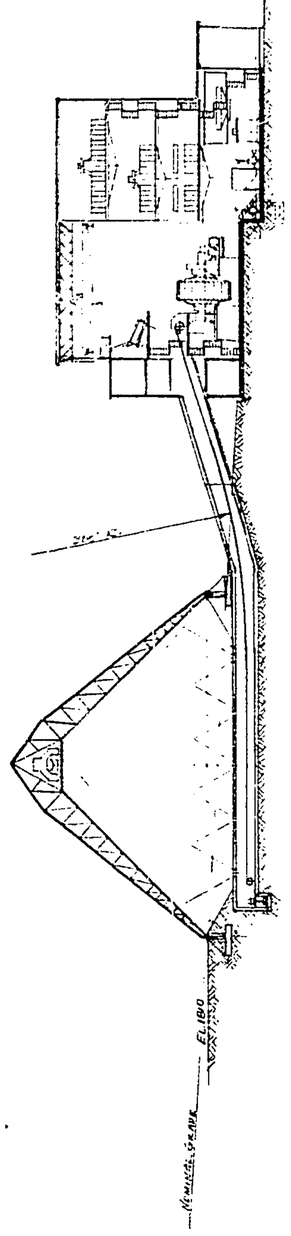
SCANNED IMAGE

100-PR22

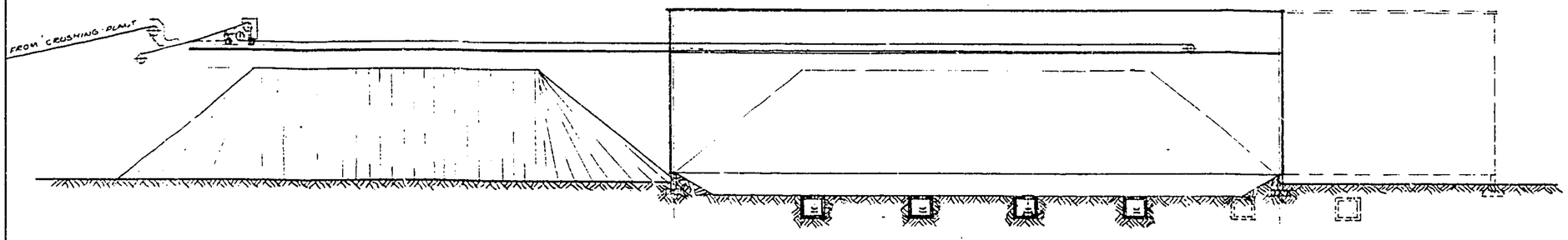
BILL OF MATERIAL				
MARK	QTY.	DESCRIPTION	MTG BY	MTG No	F.G. No



PLAN VIEW



SECTIONAL ELEVATION



SECTION THROUGH ORE STORAGE

Dwg. No	REFERENCE DRAWINGS
100-PR25	GENERAL PLANS & ELEVATIONS
100-PR24	ALLIS CHALMER SYS. GEN. ARRG'T
100-PR23	DEMO SYSTEM GEN. ARRG'T
100-PR21	GEN. ARRG'T. PLANS & ELEVATIONS
100-PR20	GEN. ARRG'T. PLANS & ELEVATIONS
100-PR17	GEN. ARRG'T. PLANS & SECTIONS
100-PR15	GENERAL ARRG'T PLANS
100-PR11	GENERAL ARRG'T. ELEVATIONS
100-PR10	PROPOSED PLOT PLAN

No	DESCRIPTION	DATE	BY
	REVISIONS		
	REVISIONS		
0	ORIGINAL	Sept 9/67	JP
	REVISIONS		

SECTION:
SCALE: AS SHOWN
DATE
DESIGNED BY:
DRAWN BY: JP
SEPT. 11-67
CHECKED BY:
APPROVED BY:

CLIENT: CANADIAN JAVELIN LTD.
LOCATION: JULIENNE LAKE, LABRADOR.

KILBORN ENGINEERING LTD.
ENGINEERING CONSULTANTS
TORONTO — ONTARIO

TITLE
JULIAN MINE & PLANT
2,000,000 LTS/H MILL
RAW ORE STORAGE & CONCENTRATOR
GENERAL ARRANGEMENT
PLANS & SECTIONS

POCKET
FOLDER
PROJECT No 140
DWG No 100-PR22
REV 0

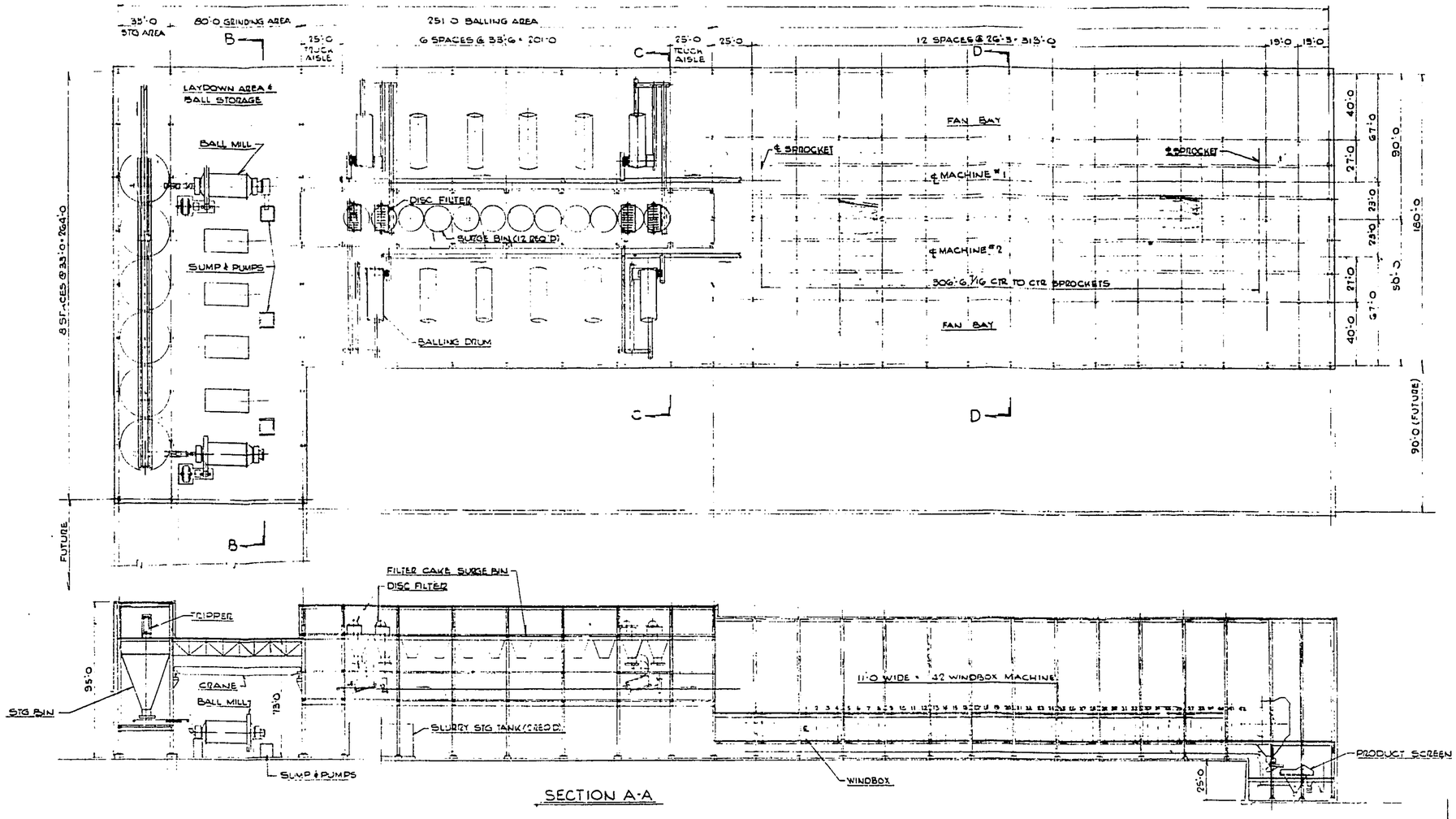
SCANNED IMAGE

DRAWING NO.

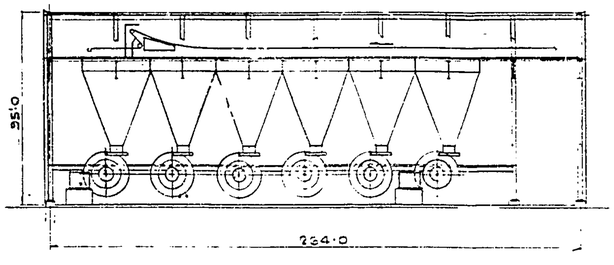
MAIN SECT'S: A-A, B-B, C-C, D-D, E-E, F-F, G-G, H-H, J-J, K-K, L-L, M-M

DETAIL SECT'S: 1-1, 2-2, 3-3, 4-4, 5-5, 6-6, 7-7, 8-8, 9-9, 10-10

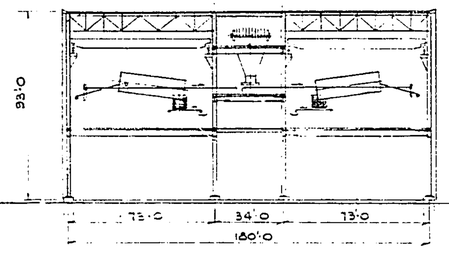
DETAILS: A, B, C, D, E, F, G, H, J, K, L, M



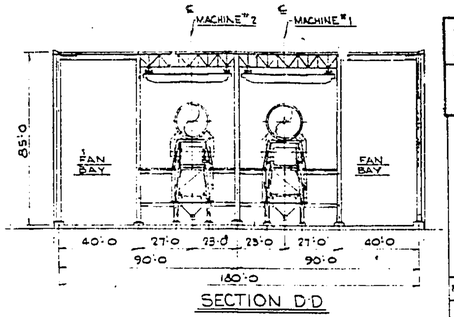
SECTION A-A



SECTION B-B



SECTION C-C



SECTION D-D

CLIENT: CANADIAN JAVELIN LTD.	TITLE: JULIAN MINE AND PLANT 4,000,000 LTPY MILL PELLETIZING PLANT DRAVO SYSTEM GENERAL ARRANGEMENT
LOCATION: JULIENNE LAKE, LABRADOR	POCKET / FOLDER / PROJECT No / DWG No: 100 P2 23 / REV
KILBORN ENGINEERING LTD. ENGINEERING CONSULTANTS TORONTO — ONTARIO	CANADIAN JAVELIN LTD JULIAN IRON CORPORATION JULIAN MINE AND PLANT 4,000,000 LTPY PELLETIZING FACILITY GENERAL ARRANGEMENT PLAN AND SECTIONS
	SCALE: 1"=20'-0" / APP'D
	DR: TEDRICK / CH
	SECT: PROPOSAL / DATE: 8-10-67

NO.	DATE	DESCRIPTION	BY	CH	APP'D

REVISIONS

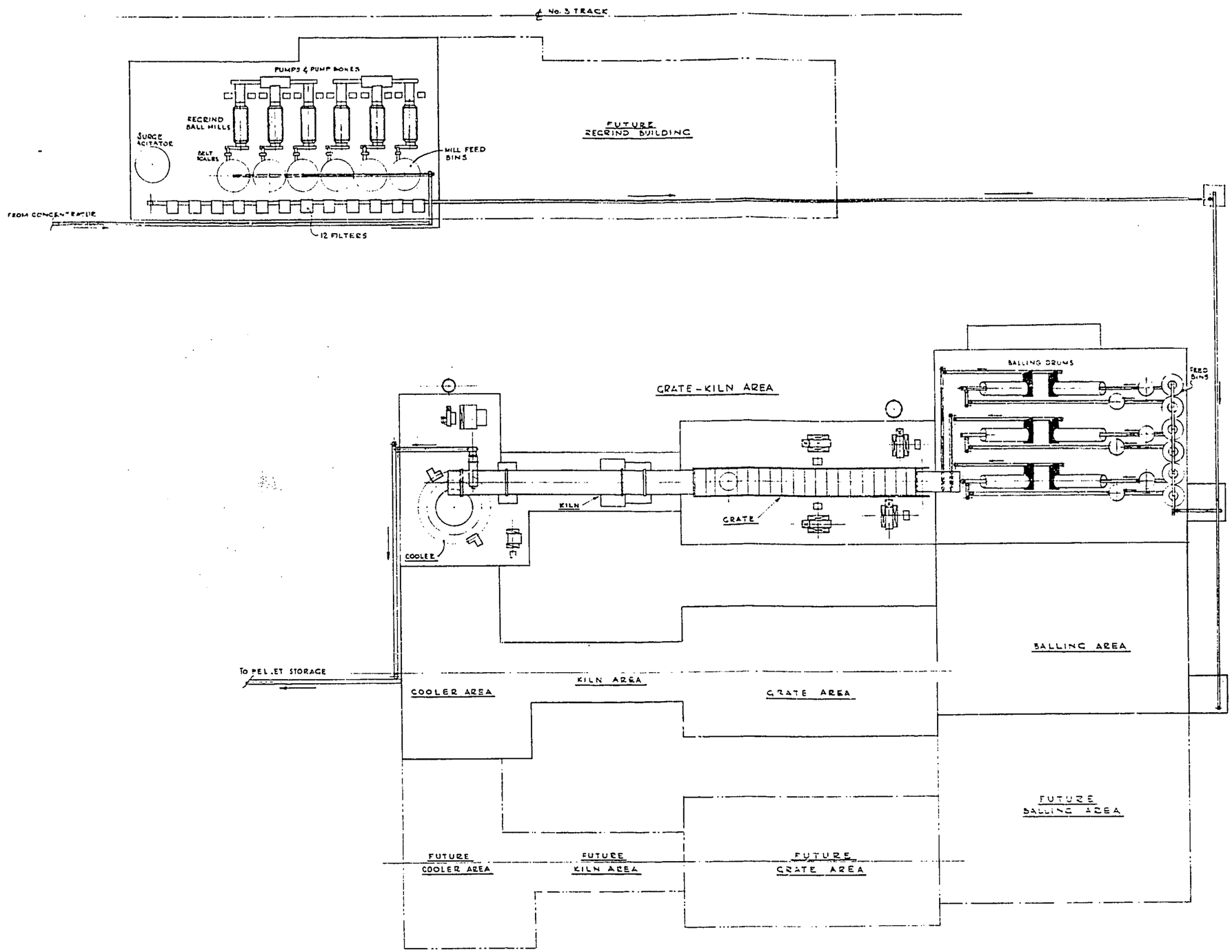
This drawing, including the information it contains, is the property of Dravo Corporation. It is submitted only in connection with the transaction to which it pertains and must not be used in any manner detrimental to the interests of Dravo Corporation. The drawing is not to be copied and must be returned upon request.

Dravo

DRAWING NO. P1372-1

SCANNED IMAGE

MARK	QTY.	BILL OF MATERIAL DESCRIPTION	REQ. BY	REQ. No.	P.O. No.



DWG. NO.	REFERENCE DRAWINGS	PRELIMINARY	CHECKED	PLANT	P.F.	M.B.P.	STRUCT.	ELEC.	P.E.	MECH.	PROC.	PIPING	HEATG.

No.	DESCRIPTION	DATE	BY
	REVISIONS		

No.	DESCRIPTION	DATE	BY
	REVISIONS		

No.	DESCRIPTION	DATE	BY
0	ORIGINAL	Sept 11/67	

REVISIONS

SECTION: GENERAL LAYOUT
SCALE: ——— DATE:
DESIGNED BY:
DRAWN BY: A.K. SEPT 11/67
CHECKED BY:
APPROVED BY:

CLIENT: CANADIAN JAVELIN LTD
LOCATION: JULIENNE LAKE, LABRADOR

KILBORN ENGINEERING LTD.
ENGINEERING CONSULTANTS
TORONTO — ONTARIO

ALLIS-CHALMERS LTD.

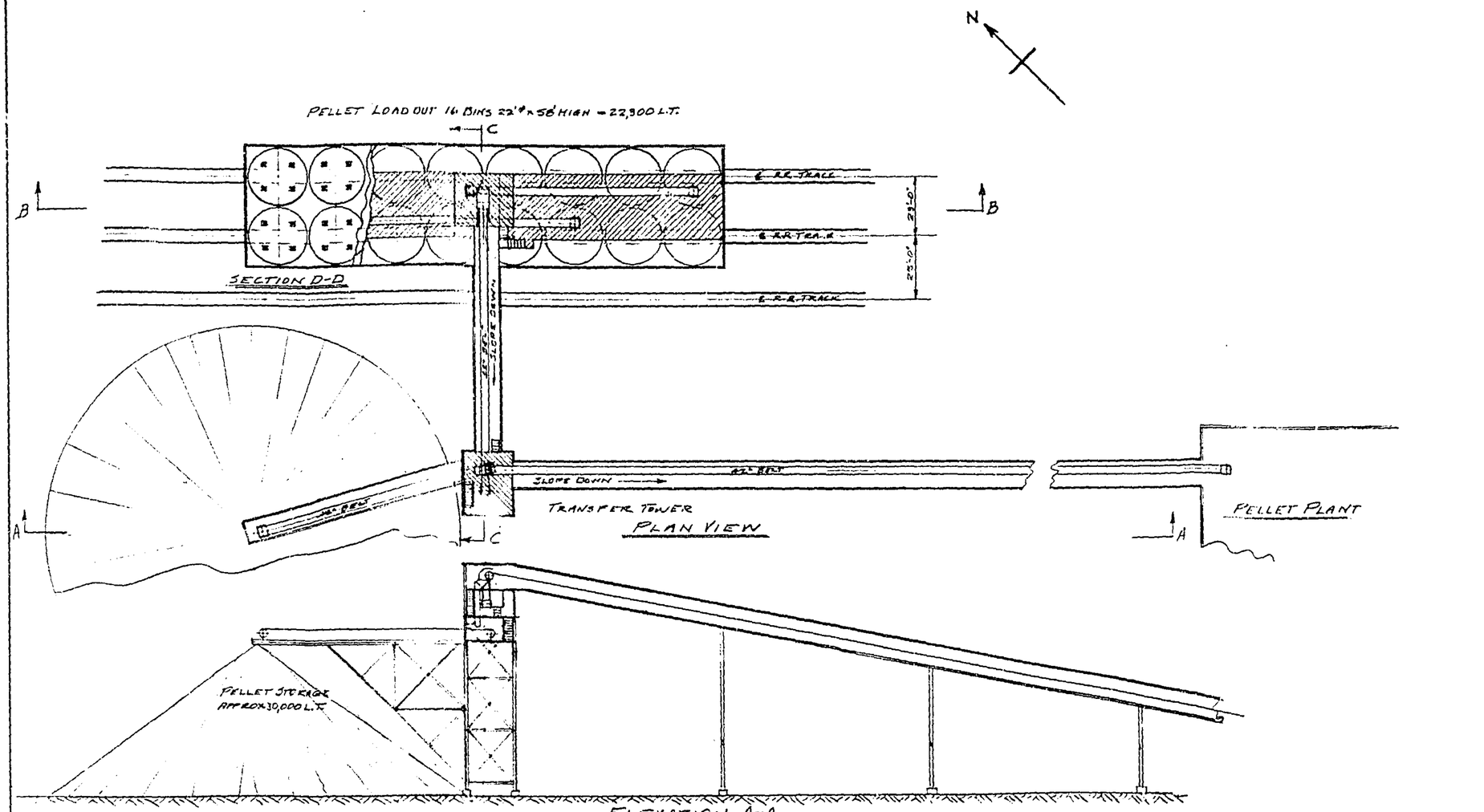
TITLE
JULIAN MINE AND PLANT
4,000,000 L.T.P.Y MILL
PELLETIZING PLANT
ALLIS-CHALMERS SYSTEM
GENERAL ARRANGEMENT

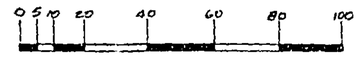
POCKET
FOLDER
PROJECT No. 140
DWG. No. 100 PR 24
REV. 0

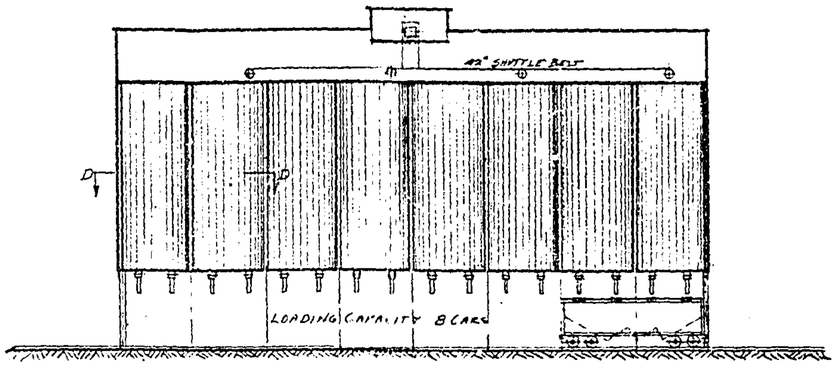
SCANNED IMAGE

100-PR25

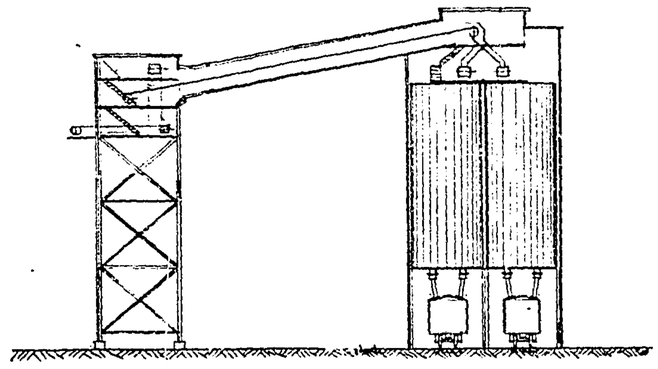
BILL OF MATERIAL					
MARK	QTY.	DESCRIPTION	REQ. BY	REQ. No.	P.O. No.







ELEVATION B-B



ELEVATION C-C

DWG No	REFERENCE DRAWINGS
100-PR24	ALLIS CHALMER SYS. GEN ARRG'T
100-PR23	DRAWO SYSTEM GEN ARRG'T
100-PR22	GEN ARRG'T PLANS & SECTIONS
100-PR21	GEN ARRG'T PLANS & ELEVATIONS
100-PR20	GEN ARRG'T PLANS & ELEVATIONS
100-PR19	GEN ARRG'T PLANS & SECTIONS
100-PR18	GENERAL ARRG'T PLANS
100-PR17	GENERAL ARRG'T ELEVATIONS
100-PR16	PROPOSED PLOT PLAN

REVISIONS			
NO	DESCRIPTION	DATE	BY
0	ORIGINAL	SEPT. 11/67	JP

SECTION:
SCALE AS SHOWN
DATE
DESIGNED BY
DRAWN BY: JP SEPT. 11/67
CHECKED BY:
APPROVED BY:

CLIENT: CANADIAN JAVELIN LTD.
LOCATION: JULIENNE LAKE, LABRADOR

KILDORN ENGINEERING LTD.
ENGINEERING CONSULTANTS
TORONTO — ONTARIO

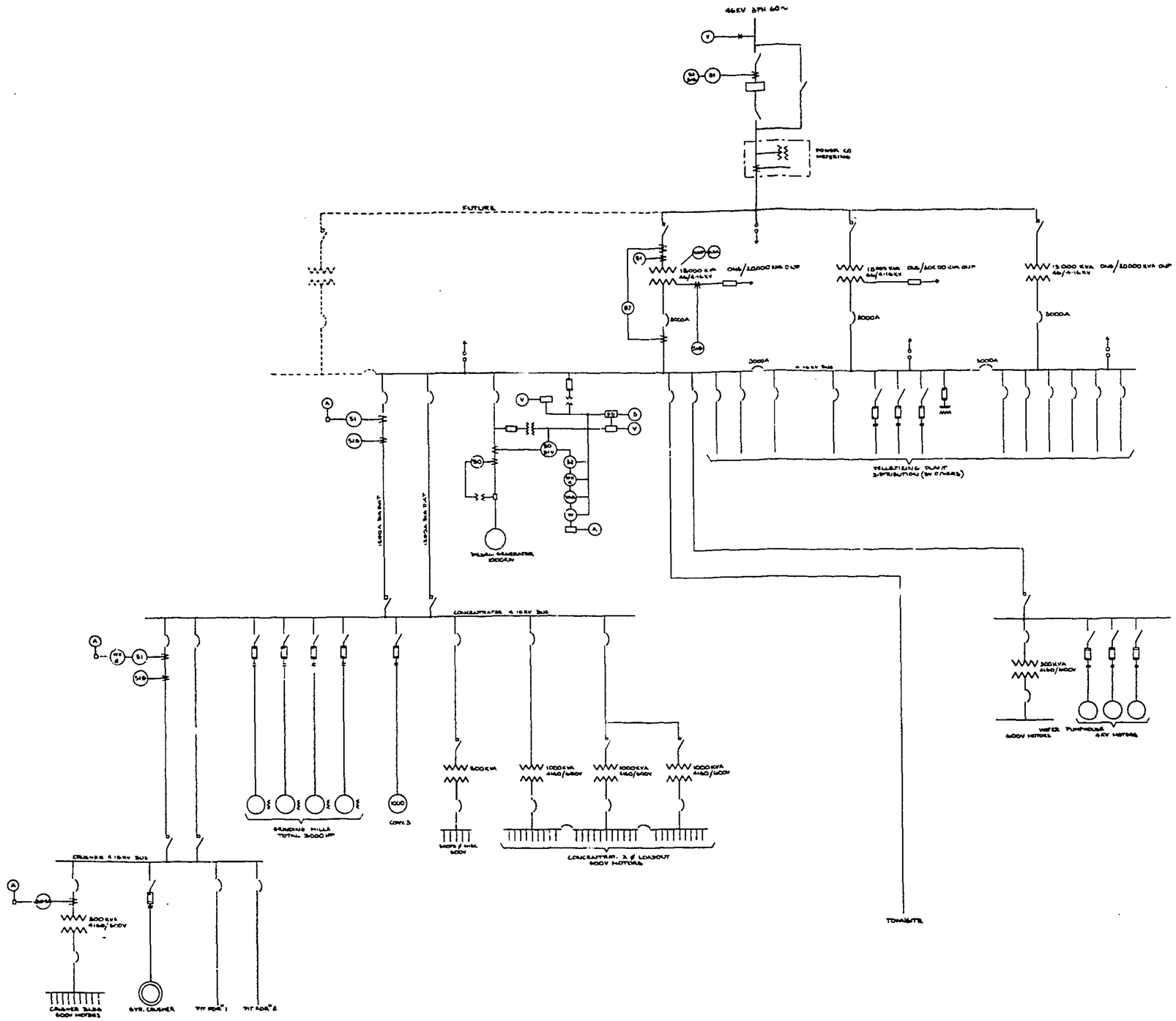
TITLE
JULIAN MINE & PLANT
4,000,000 C.T.P.Y. MILL
CONVEYORS & PELLET LOADOUT
GENERAL PLAN & ELEVATIONS

POCKET
FOLDER
PROJECT No 140
DWG No 100-PR25
REV 0

SCANNED IMAGE

100 PR. 26

MARK	QTY.	DESCRIPTION	REQ. BY	REQ. No.	P.O. No.



LEGEND

- MANUALLY OPERATED DISCONNECT SWITCH
- OIL CIRCUIT BREAKER
- AIR CIRCUIT BREAKER
- FUSE
- FUSED DISCONNECT SWITCH
- CONTROL TRANSFORMER
- TRANSFORMER.
- CURRENT TRANSFORMER
- (A) AMMETER
- (V) VOLTMETER
- (WH) WATTHOUR METER WITH DEMAND ATTACHMENT
- (VAR) VARMETER
- (W) WATTMETER
- (51) PHASE TIME OVERCURRENT RELAY
- (51G) GROUND OC RELAY-TIME.
- (S) SYNCHROSCOPE.
- (50/51) GROUND & OC RELAY-TIME & INST.
- (63P) GAS PRESSURE RELAY
- (63A) GAS ACCUMULATION RELAY
- (87) DIFFERENTIAL RELAY
- (90) VOLTAGE REGULATOR.
- (32) DIRECTIONAL POWER RELAY

REFERENCE DRAWINGS	No.	DESCRIPTION	DATE	BY
		REVISIONS		
		REVISIONS		
	0	ORIGINAL	SEPT. 7/62	S.J.V.
		REVISIONS		

SECTION: ELECTRICAL
SCALE: ~
DESIGNED BY: P. MARTHINTRE — DATE: SEPT 7/62
DRAWN BY: — DATE: SEPT 7/62
CHECKED BY:
APPROVED BY:

CLIENT: CANADIAN JAVELIN LTD
LOCATION: JULIENNE LAKE LABRADOR

KILBORN ENGINEERING LTD.
ENGINEERING CONSULTANTS
TORONTO — ONTARIO

TITLE
JULIAN MINE & PLANT
4,000,000 LT.PY. MILL
ELECTRICAL
SINGLE LINE DIAGRAM

PROJECT:
FOLDER:
PROJECT No. 140
DWG. No. 100PR26 — REV. 0