

CODE 68-B

(1)

MATERIAL BALANCE / COST

CANADA ORE START UP - 3000 METRIC TONS / YEAR

DESIGN CAPACITY - 5000 METRIC TONS / YEAR

	<u>LBS - CODE 68</u>	<u>EXPRESSED AS CUO</u>	<u>EXPRESSED AS As_2O_5</u>	<u>ANNUAL POUNDS EXPRESSED AS CCA-C</u>	<u>ADDITIONAL As_2O_3 REQUIRED FOR CCA-C</u>
START UP RATE	11.54 m	4.49 m	5.89 m	48.8 m	2.48 m
DESIGN RATE	19.23 m	7.49 m	9.28 m	81.4 m @ 50% CCA	4.16 m

COST of CODE 68-B / LB MOLE As_2O_3

<u>INPUT MATERIAL</u>	<u>POUNDS</u>	<u>COST/LB</u>	<u>COST</u>
ORE	233 LBS	\$.075	\$17.48
(1) O_2	32	\$.09	2.88
(2) AIR	154	.002	0.31
NH_3	100	.108 (90% REC)	1.08
COPPER METAL	127.3	.64 (HAWKINS) (MAY USE SEVERAL)	81.48
REFINED ORE	37	.075	2.76

(1) OXYGEN PROCESS TOTAL COST \$105.68

(1) OXYGEN PROCESS COST/LB = .2885 @ 100% OXIDES

OUTPUT = 406.9 LBS AT 38.94% CUO, 51.08% As_2O_5 , 9.98% ADJUVANTS

(2) AIR PROCESS TOTAL COST \$103.11

(2) AIR PROCESS COST/LB = .2815 @ 100% OXIDES

(2)

COST/SELLING PRICE OF CODE 68-B

SELLING PRICE IS ASSUMED TO BE AT
THE COST OF PRODUCING CODE 68-B FROM
CuO @ \$.78/LB AND As_2O_5 (60.9%) @ \$.3675/LB

FOR 100 LBS CODE 68-B

MATERIAL	POUNDS	COST/LB	TOTAL COST
CuO	38.94	(\$.78 ÷ .965)	\$ 31.46
As_2O_5	57.08	(.3675 ÷ .609)	30.82
	9.98 LBS	NON OXIDES, H_2O , ETC	\$ —
TOTAL	100 LBS		\$ 62.28
		AS 100% OXIDES	\$ 69.19
		COST/LB	<u>\$.6919</u>

GROSS MATERIAL MARGIN

OXYGEN	START UP RATE	11.54 m LBS X 90.02% OXIDES X $\frac{\$.4034}{\$.6919 - \$.2885}$	= \$ 4.19/m
AIR	START UP RATE	11.54 m LBS X 90.02% OXIDES X $\frac{\$.4034}{\$.6919 - \$.2815}$	= \$ 4.26/m
	DESIGN RATE		
OXYGEN	DESIGN RATE	19.23 m LBS X 90.02% X $\$.4034$	= \$ 6.98 m/m
AIR	DESIGN RATE	19.23 m LBS X 90.02% X $\$.4104$	= \$ 7.10 m/m

CUSTOMER COST OF MAKING CCA-C FROM CODE 68-B
USING CuO_3 @ \$.834/LB AND 60.9% As_2O_5 @ \$.3675/LB
50% CCA-C = \$.3731/LB, 100% CCA-C = \$.7463/LB

(3)

CHEMICAL USAGE AND MATERIAL FLOW

MATERIAL	ANNUAL USE - M LBS		DAILY (365) USE IN LBS	
	<u>START-UP</u>	<u>DESIGN</u>	<u>START-UP</u> <u>RATE</u>	<u>DESIGN</u> <u>RATE</u>
CANADA ORE	6.6	11.0	18,082	30,137
LIQUID O ₂	0.91	1.51	2,493	4,155
NH ₃ (LIQUID)	2.83	4.72	7,753	12,922
RECOVERY	2.55	4.25	6,978	11,630
MAKE UP	.28	.47	.775	1,292
COPPER METAL	3.61	6.01	9,890	16,484
RET ORE TO CANADA	1.05	1.75	2,877	4,794
CODE 68-B	11.54	19.23	31,616	53,694
TOTALS IN	—	18.99 or 19.0		52,055
TRUCK LOADS				1.16 / DAY
TOTALS OUT	—	20.98 or 21.0		57,534
TRUCK LOADS				1.3 / DAY

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DISSOLVER

8 HOUR BATCH CYCLE

RUN CONTINUOUSLY @ 90% UTILIZATION

= 328.5 days / year

$$3 \text{ BATCHES / DAY} \times 328.5 \text{ DAYS / yr} = 985.5 \text{ BATCHES}$$

ORE PER BATCH

$$\text{STARTUP} = 6.6 \text{ M } \frac{\text{LBS}}{\text{Yr}} \div 985.5 \frac{\text{BATCHES}}{\text{Yr}} = 6697 \text{ LBS / BATCH}$$

$$\text{DESIGN} = 11.0 \text{ M } \frac{\text{LBS}}{\text{Yr}} \div 985.5 \frac{\text{BATCHES}}{\text{Yr}} = 11,162 \text{ LBS / BATCH}$$

DISSOLVER BATCH FORMULA

STARTUP RATE

DESIGN RATE

ORE	6700 LBS (^{LB} 28.8 moles As_2O_3)
29% Aq. NH_3	40,200
TOTAL	46,900 LBS
@ 12 LBS / gal	3908 gal

11,162 (^{LB} 48 moles As_2O_3)
76,746
66,972
77,280
78,134 gal
6511 gal

REACTOR SIZE / NO 5000 gal (1)

5000 gal (2)

(5)

COPPER ARSENATE REACTOR

8 HOUR CYCLE 90% UTILIZATION, 985.5 BATCHES/YR

BATCH FORMULA

	<u>STARTUP RATE</u>	<u>DESIGN RATE</u>
FROM ORE DISSOLVER	46,900 LBS LBS	366,912 LBS
H ₂ O	67,000 LBS	111,620 LBS
COPPER METAL	5807 LBS	9674 LBS
O ₂	<u>922 LBS</u>	<u>1536 LBS</u>
	120,629 LBS	189,802 LBS
@ 10 LBS / gal	= 12,063 gal	18,980 gal
REACTOR SIZE / NO	7500 gal (2)	7500 gal (3)
	= 80% FULL	84% FULL

NH₃ 17.4 parts per 100 parts H₂O PP AT 60°C ≈ 600 mm Hg

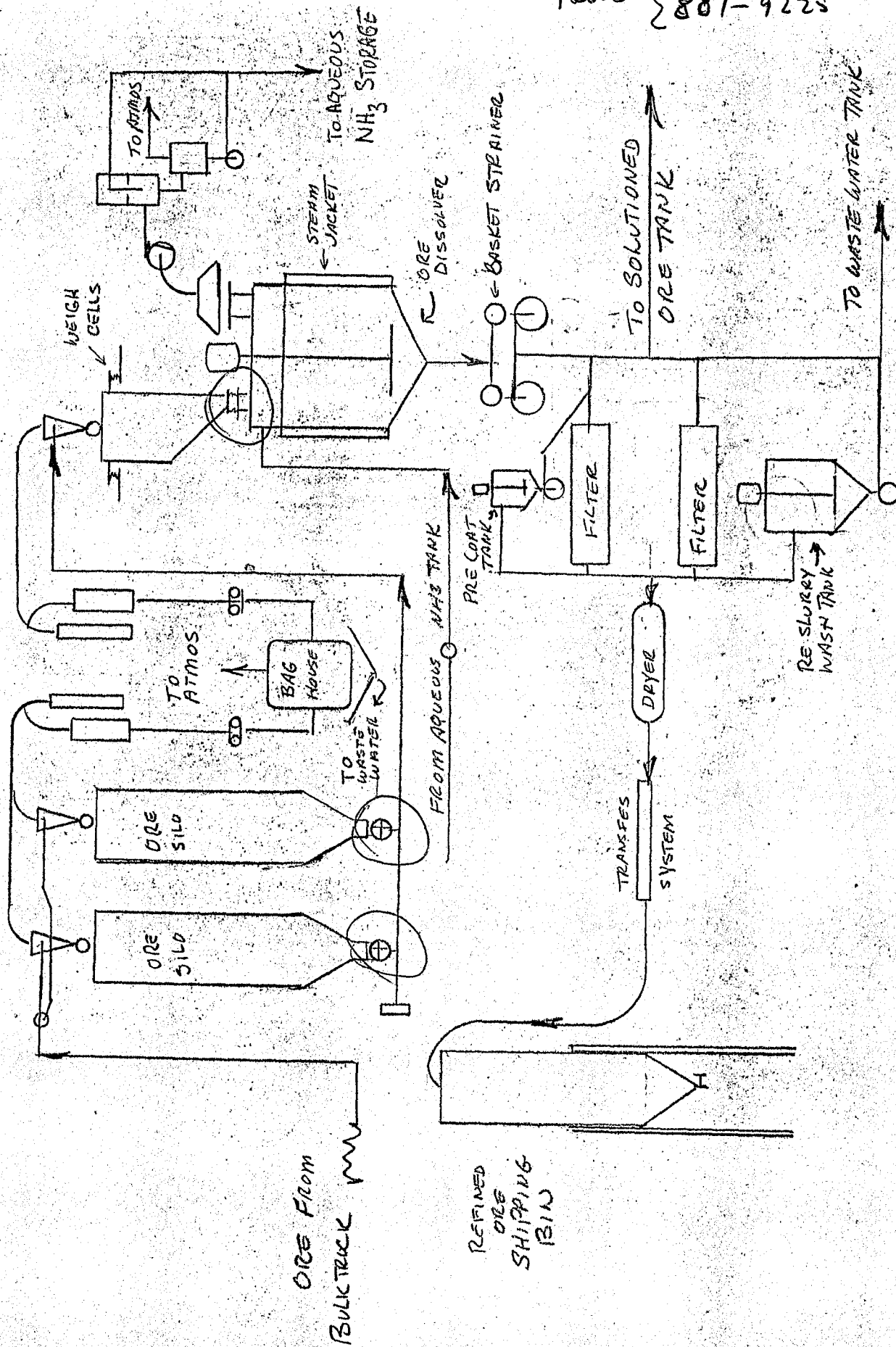
(6)

TANK SIZES AND NUMBER AT DESIGN CAPACITY

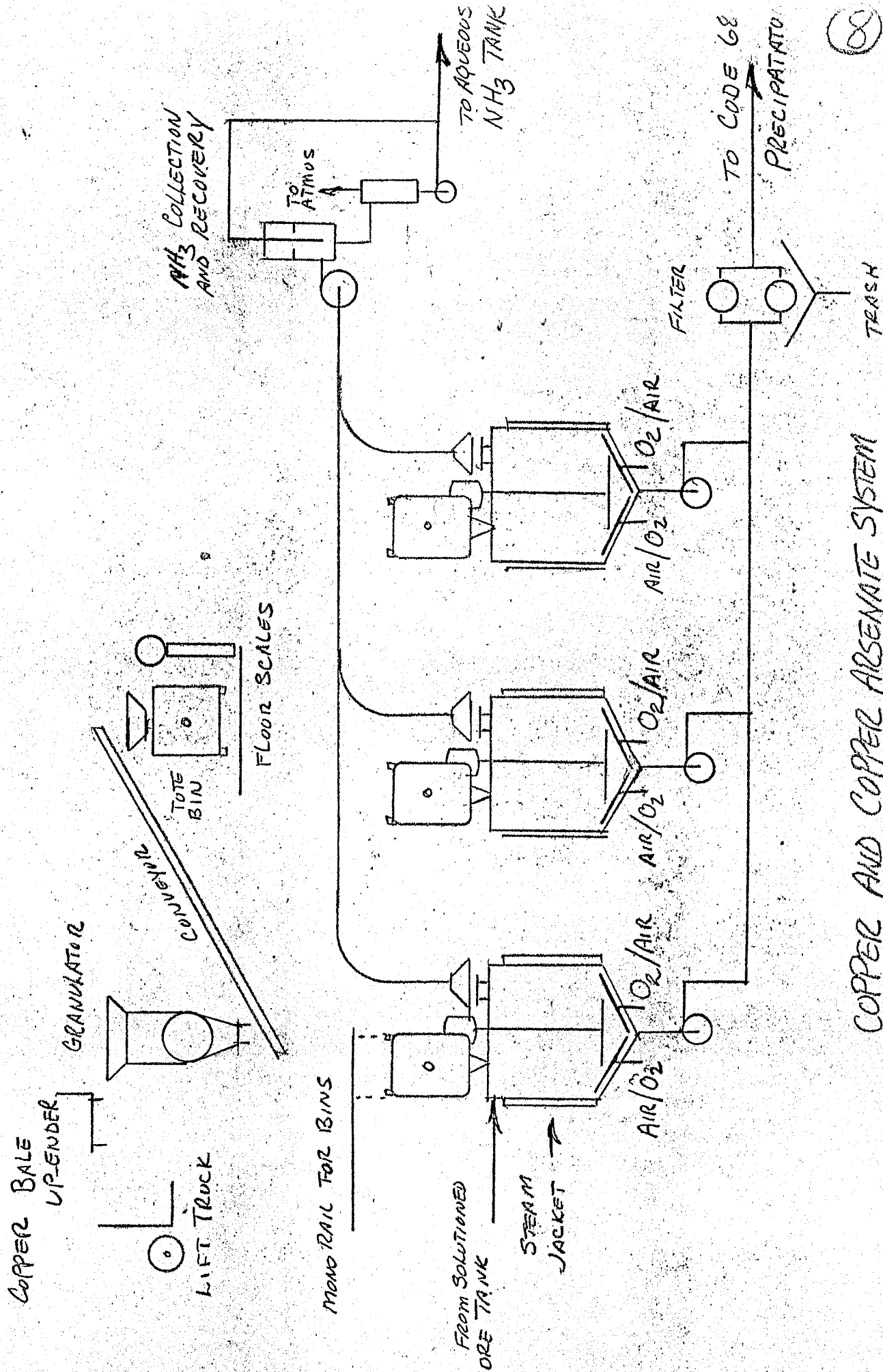
ITEM	INVENTORY		TANK SIZE		NO of TANKS	MATERIAL of CONST
	<u>DAYS</u>	<u>POUNDS</u>	<u>GALLONS</u>			
ORE SILO	10 DAYS	300,000	30,000g	2		304 SS
ORE DISSOLVER	8 HRS	11,200 LBS	5000	2		304 SS
SOLN - ORE STORAGE	3 DAYS	880,000 LBS	35,000	2		304 SS
COPPER ARSENATE REACTOR	8 HRS	190,000 LBS	7500	3		304 SS
COPPER ARSENATE PRECIPITATOR	4 HRS	190,000 LBS	10000	2		304 SS
NH ₃ (ANHYDROUS)	7 DAYS	90454 LBS	12000	1		SUPPLIED BY VENDOR
NH ₃ (AQUEOUS)	3 DAYS	662,750	35,000	2		304 SS
O ₂	7 DAYS	29,100	6000g	1		SUPPLIED BY VENDOR
REFINED ORE	30 DAYS	144,000	30,000	1		MS
CODE G8-B	7 DAYS	370,000	30,000	1		304 SS
WASTE WATER	3	130,000	35000	4		MS?

Peas { 883-1653
881-9225

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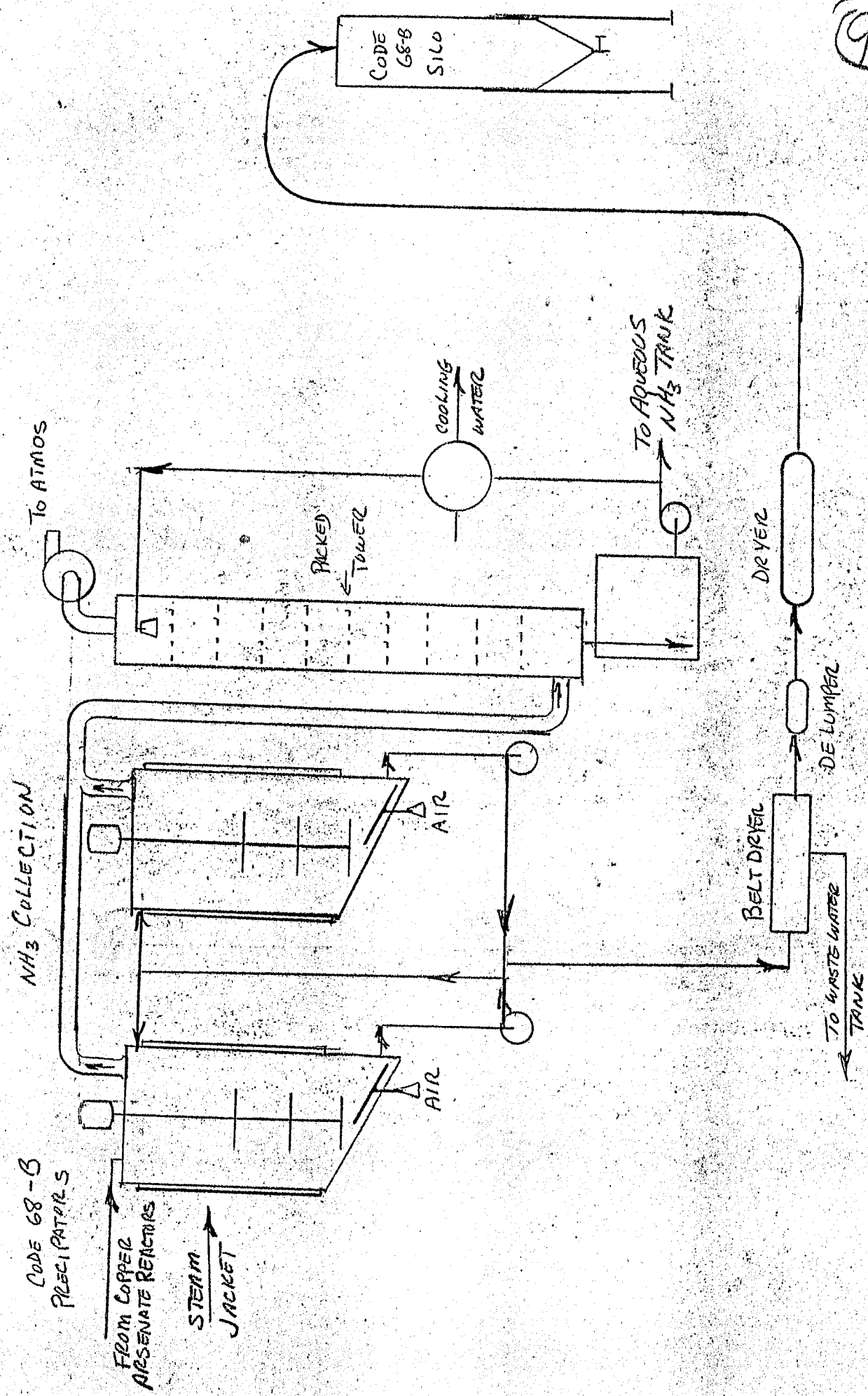


ORE SOLUTIONING SYSTEM

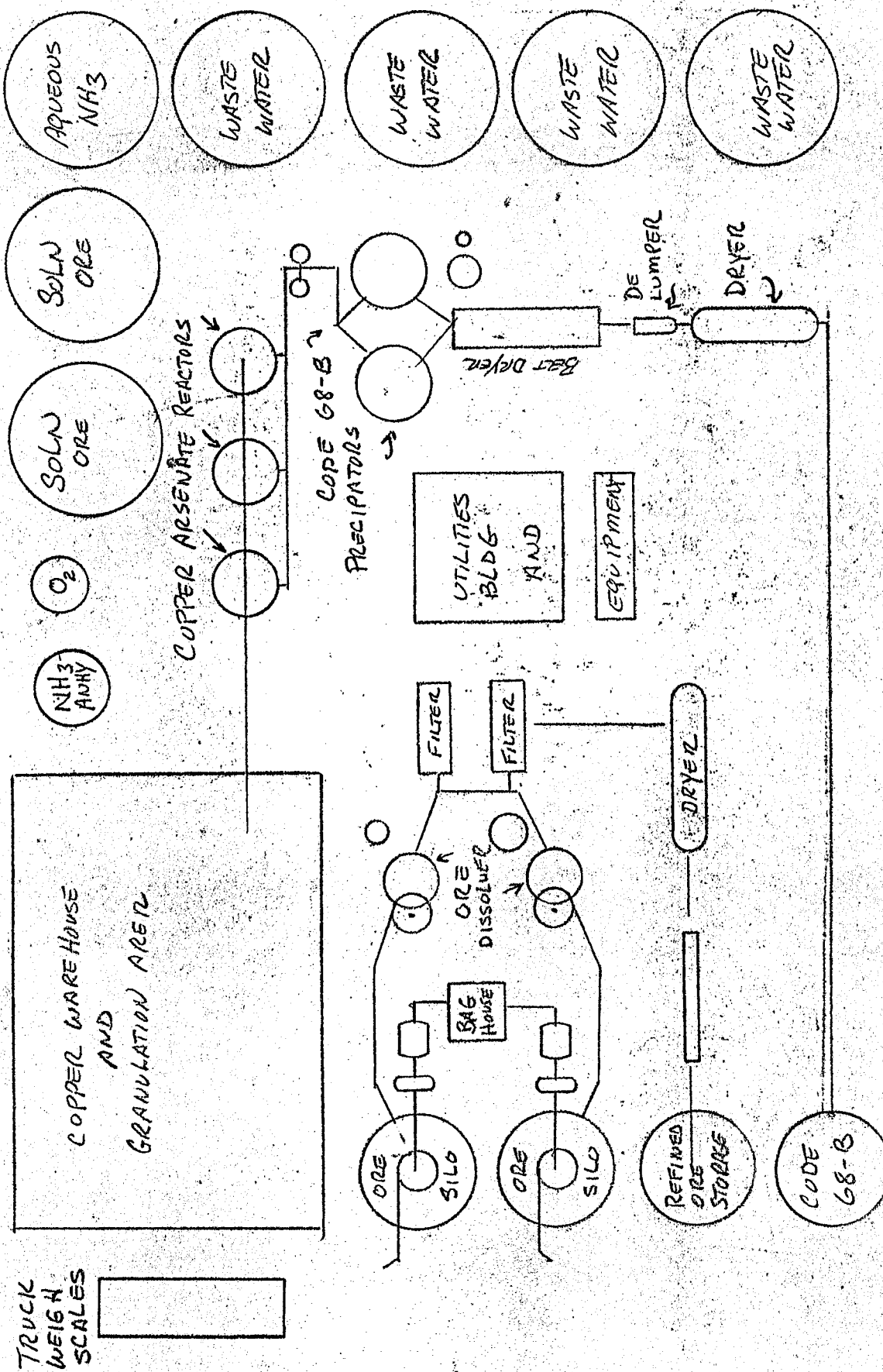


COPPER AND COPPER ARSENATE SYSTEM

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CODE 68-B PRECIPITATION AND NH₃ RECOVERY SYSTEM



SUBJECT: CODE 68-B
EQUIPMENT LIST
AND COST ESTIMATE
GENERAL AREASDATE DEC 1984

DESCRIPTION	SIZE	NUMBER	COST	
			MATERIAL	LABOR
1) SITE PURCHASE	3-5 acres	1	150 000	
2) SITE PREPARATION			10 000	60 000
3) PLANT SECURITY			10 000	5 000
4) UTILITIES / MAINT BUILDING			25 000	30 000
5) STEAM BOILER WITH ANCILLARYS AND DISTRIBUTION			100 000	25 000
6) AIR COMPRESSOR WITH ANCILLARYS AND DISTRIBUTION				
a) OXYGEN PROCESS			30 000	5 000
b) AIR PROCESS			50 000	7 000
7.) COOLING TOWER WITH ANCILLARYS			25 000	15 000
8.) TRUCK WEIGHT SCALES 100,000 LB CAP			75 000	PACKAGES
9) ELECTRICAL SWITCH GEAR AND DISTRIBUTION			25 000	75 000
GENERAL AREAS TOTAL			OXYGEN	
			AIR	
			450 000	215 000
			470 000	217 000

SUBJECT:

CODE G8-B

(12)

EQUIPMENT LIST
AND COST ESTIMATE

ORE HANDLING AND SOLUTIONING SYSTEM

DATE DEC 1984

DESCRIPTION		SIZE	NUMBER	COST	
				MATERIAL	LABOR
BULK HANDLING SYSTEM					
1)	STORAGE SILOS (STAINLESS STEEL)	30000g	2	360000	80000
2)	VACUUM PRODUCER	8" x 20HP	2	20000	10000
3)	CYCLONE SEPARATORS	TO BE CALCULATED	4	60000	30000
4)	ROTARY VALVES	6"	6	60000	12000
5)	VELOCITY TRAPS	2 ft ³	2	4000	12000
6)	DIVERTER VALVES	3"	4	12000	6000
7)	FILTERS	6 ft ²	2	18000	3000
8)	LEVEL INDICATORS	INDICATOR	3	3000	3000
9)	3" SS TUBING, FITTINGS, FLEX HOSE	3"	1 LOT	10000	12000
10)	INSTRUMENTATION & ELECTRICAL	PKG	1 LOT	28000	35000
11)	CONCRETE FOOTINGS, STEEL, LADDERS ETC			6000	36000
BULK HANDLING/SUBTOTAL				571000	829000
ORE WEIGH HOPPERS					
		2300g	2	22000	10000
1)	DISCHARGE VALVES	6"	2	2000	2000
2)	VIBRATOR UNITS	1 ft ²	2	1000	1000
3)	HIGH LEVEL CUTOFF	INDICATOR	2	2000	2000
4)	LOAD CELLS	15,000 LB CAP	2 SETS	20000	15000
5)	INSTRUMENTATION			3000	2000
WEIGH HOPPER SUBTOTAL				50000	32000
ORE SOLUTIONING TANKS (JACKETED)					
		5000g	2	60000	6000
1)	AGITATORS, GEAR BOXES, MOTORS	7 1/2 HP	2	18000	3000
2)	AQUEOUS NH ₃ METER & CONTROLS	100 gpm	1	2000	1000
3)	BASKET STRAINERS	2" PIPE	4	3000	1500
4)	PUMPS, MOTORS, BASE	2 1/2 x 1 1/2 x 6"	4	8000	2500
5)	INSTRUMENTATION & ELECTRICAL		2 SETS	4000	1500
6)	VALVES, PIPE, FITTINGS, SUPPORT		2 SETS	3000	2000
NH₃ COLLECTION AND RECOVERY					
1)	HOOD, DUCT, FAN, PUMP, SPRAY, ABSORBER, PIPE TANKS			4000	2000
SUB TOTAL				102000	19500

SUBJECT:

CODE 68-B

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EQUIPMENT LIST
AND COST ESTIMATE

ORE HANDLING AND SOLUTIONING SYSTEM

DATE DEC 1984

DESCRIPTION				SIZE	NUMBER	COST	
FILTRATION SYSTEM						MATERIAL	LABOR
1) FILTER PRESSSES				36X36X50 FRMS	2	50 000	5 000
2) PRECOAT TANK AND ASSOC EQUIPMENT				2000 g	1	6 000	2 000
3) RESLURRY TANK AND WASH SYSTEM				3000 g	1	6 000	2 000
4) CAKE HANDLING SYSTEM				TBD	1	12 000	5 000
5) CAKE DRYING AND TRANSFER				TBD	1	25 000	5 000
				SUB TOTAL		99 000	19 000
REFINED ORE SHIPPING HOPPER				20000 g	1	35 000	13 000
1.) LEVEL INDICATORS				INDICATOR	3	3 000	3 000
2) DISCHARGE VALVE				6"	1	2 000	1 000
3) INSTRUMENTATION				—	—	1 000	500
4) CONCRETE, STEEL, LADDERS, ETC				—	—	3 000	18 000
				SUB TOTAL		44 000	30 000
SOLUTIONED ORE STORAGE TANKS				35 000 g	2	200 000	3 000
1) FOUNDATIONS, STEEL, SUPPORTS, DIKES						6 000	36 000
2) LEVEL GARGES AND INSTRUMENTATION						3 000	2 000
3) PUMPS, METER, VALVES, PIPE, SUPPORTS						17 000	8 000
4) DASHPOT MANOMETER, VENT						2 000	1 000
				SUB TOTAL		228 000	50 000
ORE HANDLING AND SOLUTIONING SYSTEM TOTAL						1094 000	379 500

DESCRIPTION	SIZE	NUMBER	COST	
COPPER			MATERIAL	LABOR
1) WAREHOUSE	4000 ft ²	1	40000	70000
2) LIFT TRUCK	5000 LB	1	20000	—
3) BALE UPENDER	—	1	15000	4000
4) GRANULATOR	150 HP CUMPERLAND	1	60000	20000
5) CONVEYOR	20 ft	1	6000	4000
6) FLOOR MOUNTED SCALES	10,000 LB CAP	1	7000	5000
7) TOTE BINS AND FUNNELS	50 Cu ft	20	10000	500
8) BIN CRANE AND MONORAIL	15,000 LB CAP	1	20000	10000
9) BIN INVERTER		1	6000	2000
			184000	115500
COPPER ARSENATE				
1) REACTORS (JACKETED)	7500 g	3	105000	15000
2) AGITATORS, GEARBOXES, MOTORS	10 Hp	3	21000	4500
3) AIR / O ₂ SPARGERS	10 ft ²	3	12000	6000
4) TRASH FILTERS	6 ft ²	2	3000	1000
5) PUMPS, MOTORS, BASE	2 1/2 x 1 1/2 x 6"	6	12000	3750
6) INSTRUMENTATION AND ELECTRICAL		3 SETS	6000	2250
7) VALVES, PIPE, FITTINGS, AND SUPPORT		3 SETS	4500	3000
8) NH ₃ COLLECTION AND RECOVERY			5000	3000
			168500	38500
COPPER AND COPPER ARSENATE SYSTEM TOTAL =			352500	154000

SUBJECT:

CODE 68-B

(15)

EQUIPMENT LIST

AND COST ESTIMATE

CODE 68-B PRECIPITATION AND NH_3 RECOVERY SYSTEM

DATE

DEC 1984

DESCRIPTION	SIZE	NUMBER	COST	
			MATERIAL	LABOR
1) PRECIPITATION TANKS (JACKETED)	10,000 g	2	80,000	20,000
2) AGITATORS, MOTORS, GEARBOXES	25 HP	3	36,000	12,000
3) AIR SPARGERS	20 ft ²	2	12,000	6,000
4) PACKED COLUMN AND PACKING	3' X 20'	1	100,000	20,000
5) HOODS, DUCT, FAN, SPRAY, HEAT EXCHANGER, SUMPTANK		2	30,000	15,000
LEVEL AND TEMP CONTROLS, PUMPS, VALVES, PIPES		SUB	258,000	73,000
6) PRECIPITATOR, PUMPS, VALVES, PIPES, TEMP CONTROL			11,000	3,000
7) BELT DRIVER			20,000	15,000
8) WATER PUMP, PIPE, VALVES, CONTROLS			6,000	3,000
9) DE LUMPER			3,000	2,000
10) DRYER AND CONTROLS			20,000	6,000
11) TRANSFER SYSTEM			10,000	6,000
		SUB TOTAL	70,000	35,000

CODE 68-B STORAGE

1) SHIPPING BIN	30,000 g	1	125,000	18,000
2) CONCRETE FOOTINGS, STEEL, LADDERS			3,000	18,000
3) LEVEL INDICATORS AND INSTRUMENTS			4,000	3,500
4) DISCHARGE VALVE, CHUTE			2,000	1,000
5) VENT FILTER			2,000	1,000
			136,000	41,500

CODE 68-B PRECIPITATION AND NH_3 RECOVERY SYSTEM	464,000	149,500
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CODE 68-B

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EQUIPMENT LIST AND COST ESTIMATE

TANK FARM AND WASTE WATER SYSTEM

DATE DEC 1984

DESCRIPTION	SIZE	NUMBER	COST	
			MATERIAL	LABOR
LIQUID O ₂	6000g	1	SUPPLIED BY VENDOR	
ANHYDROUS NH ₃	12000g	1	SUPPLIED BY VENDOR	
WASTE WATER TANKS	35000g	4	200000	10000
1) CONCRETE, STEEL, LADDERS, DIKES			20000	35000
2) LEVEL GUNGES	DIFF PRESS	4	3000	1500
3) METERS	700gpm	2	2000	1000
4) PUMPS, VALVES, PIPE FITTINGS			10000	6000
WASTE WATER SUBTOTAL			235000	53500

SUBJECT: CODE 68-B
EQUIPMENT LIST
AND COST ESTIMATE
SUMMARY OF COST

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DATE DEC 1984

AREA	MATERIAL	LABOR	TOTAL COST
1) GENERAL			
OXYGEN	450,000	215,000	665,000
AIR	470,000	217,000	687,000
2) ORE HANDLING + SOLN	1,094,000	379,500	1,473,500
3) COPPER + COPPER ARSENATE	352,500	154,000	506,500
4) CODE 68-B PRECIPITATE + NH ₃ RECOVERY SYSTEM	464,000	149,500	613,500
5) WASTE WATER SYSTEM	235,000	53,500	288,500
TOTAL COST (O ₂)	2,595,500	951,000	\$ 3,546,500
(AIR)	2,615,500	953,000	\$ 3,568,500
PROJECT COST			\$ 3,546,500
5% CONSTRUCTION FEE			177,325
10% OVERHEAD			354,650
10% CONTINGENCY			354,650
TOTAL PROJECT COST			\$ 4,433,125

SUBJECT:

CODE 68-B

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PROJECT ECONOMICS

DATE DECEMBER 1984

OXYGEN PROCESS

GROSS SALES	19.23 m @ \$.6919 / LB CODE 68-B	= \$ 13 305 237
MATERIAL COST	19.23 m @ \$.2885 / LB	- 5 547 885
DIRECT MANUFACTURING COST		- 340 000
ENERGY COST		- 1 750 000
S.A.R.		- 385 000
	GROSS PROFIT BEFORE TAXES	6 857 352
	TAXES AT 51%	3 497 250
	NET PROFIT AFTER TAXES	\$ 3 090 102

AIR PROCESS

PAY BACK =	MTL COST @ \$.2815 / LB	= 5 413 245
	NET PROFIT AFTER TAX =	3 224 742

TOTAL PROJECT COST \$ 4 433 125 ÷ \$ 3 090 102 NET PROFIT PER YEAR

OXYGEN = 1.43 YEARS

AIR = 1.37 YEARS