

THE VALLEY CONCENTRATOR

The Valley Concentrator was first opened in 1962. The mill was originally designed to process 2,800 SDTPD. Over the last 22 years the plant has expanded to it's present capacity of 25,000 DMTPD.

The main copper minerals are bornite and chalcopyrite in a host rock which consists mainly of porphyritic granodiorite, the head grade is 0.5% copper. The mill produces a concentrate of 43% copper with a recovery of 90%.

THE CRUSHING PLANT

Crushing is achieved in three stages. Run of mine ore is fed to a Allis-Chalmers 42x65 Gyratory crusher. The product is fed onto a conveyor to the coarse ore stockpile. The coarse ore is fed onto a screen which separates fine material to be sent to the fine ore bin, a middling product which goes to tertiary crushing, pebbles for the pebble mills, and a coarse fraction which is crushed in a Symons 7' standard crusher. The product from the 7' standard crusher joins the middlings stream for further classification and crushing. The final crushing stage uses two Symons 7' short head crushers in closed circuit with vibratory screens. The -3/4 inch final crushed product is feed for the primary grinding mills.

THE GRINDING CIRCUIT

The grinding circuit uses three stages of grinding; rod mills, ball mills and pebble mills. The grinding circuit at

VALLEY
COPPER
OUTS

Valley is unique in that grinding is not done in a series of streams, instead feed is distributed to the individual mills by splitting larger streams.

Primary grinding is done in three 12.5x15' rod mills operated in open circuit. The rod mill feed rate is controlled automatically with the use of variable speed belts, a wieghtometer, and an analog controller. The tonnage set point is determined manually by the operator.

Secondary grinding is done by three 11x14' and one 10.5x14' ball mill. Two of these mills are in closed circuit with 40" hydrocyclones while the other two are in closed circuit with a single 50" hydrocyclone.

Overflow from the 40" and 50" hydrocyclones is fed to two 16.5x32' pebble mills. Pebbles added as grinding media in the two pebble mills account for about 10% of the total mill tonnage. The pebble mills are run in closed circuit with cyclopacs of ten 20" hydrocyclones.

The final ground product is a slurry running 50% solids with a final size of 40% -200 mesh.

THE FLOTATION CIRCUIT

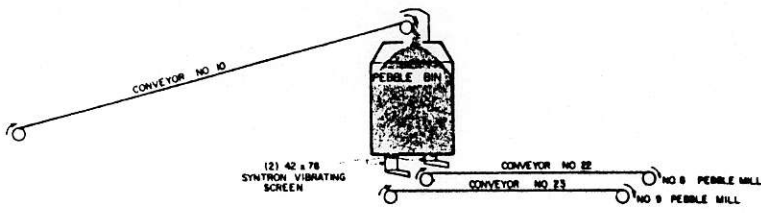
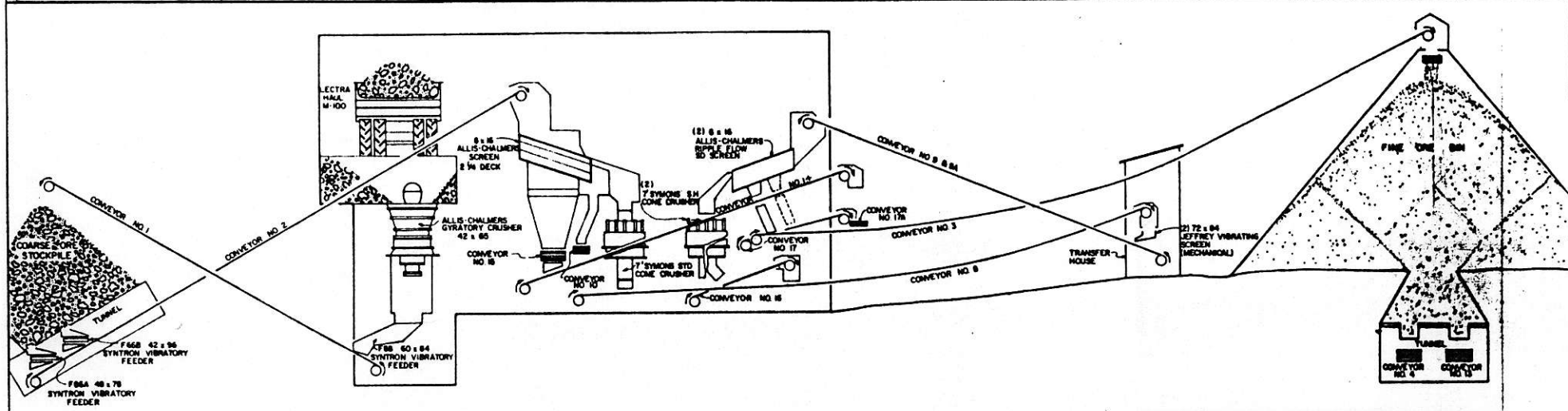
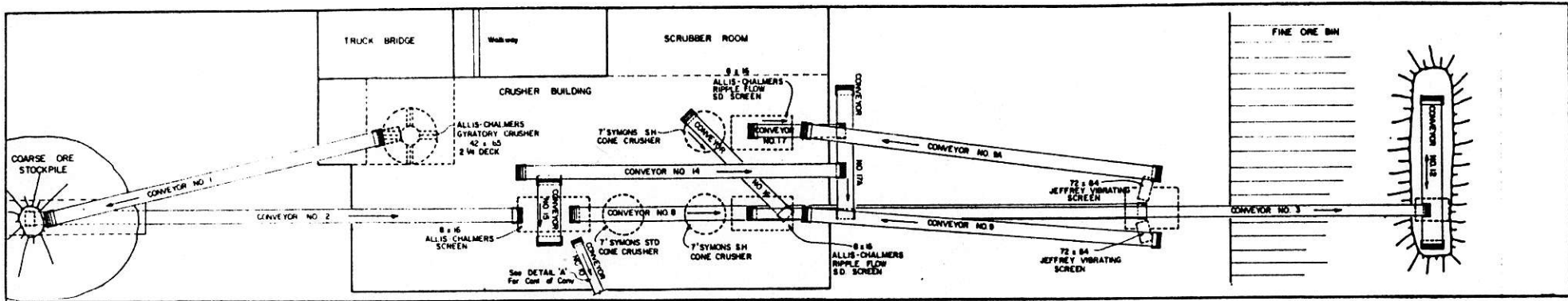
Roughing is done by two O.K. 38 cells, a bank of 32 Agitair 120 cells, and 2 banks of 16 Denver 30 cells. The rougher tails is pumped to a cyclopac containing ten 20" hydrocyclones. Overflow from these cyclones feed the slime scavenger circuit while the underflow feeds the sand scavenger circuit. The tailing from both the sand and slime scavenger

circuits go to final tailings. Concentrate from the slime scavenger is sent to the head of the rougher circuit while the sand scavenger concentrate is reground and undergoes further concentration.


The rougher concentrate is pumped to the first cleaner cells. The concentrate from the first cleaner is combined with the recleaned sand concentrate and reground to feed the second cleaners. Tailing from the 1st cleaner, the second cleaner and the sand cleaner are all pumped back to the head of the roughers. The second cleaner concentrate goes to the 35' thickener in preparation for filtering and drying.

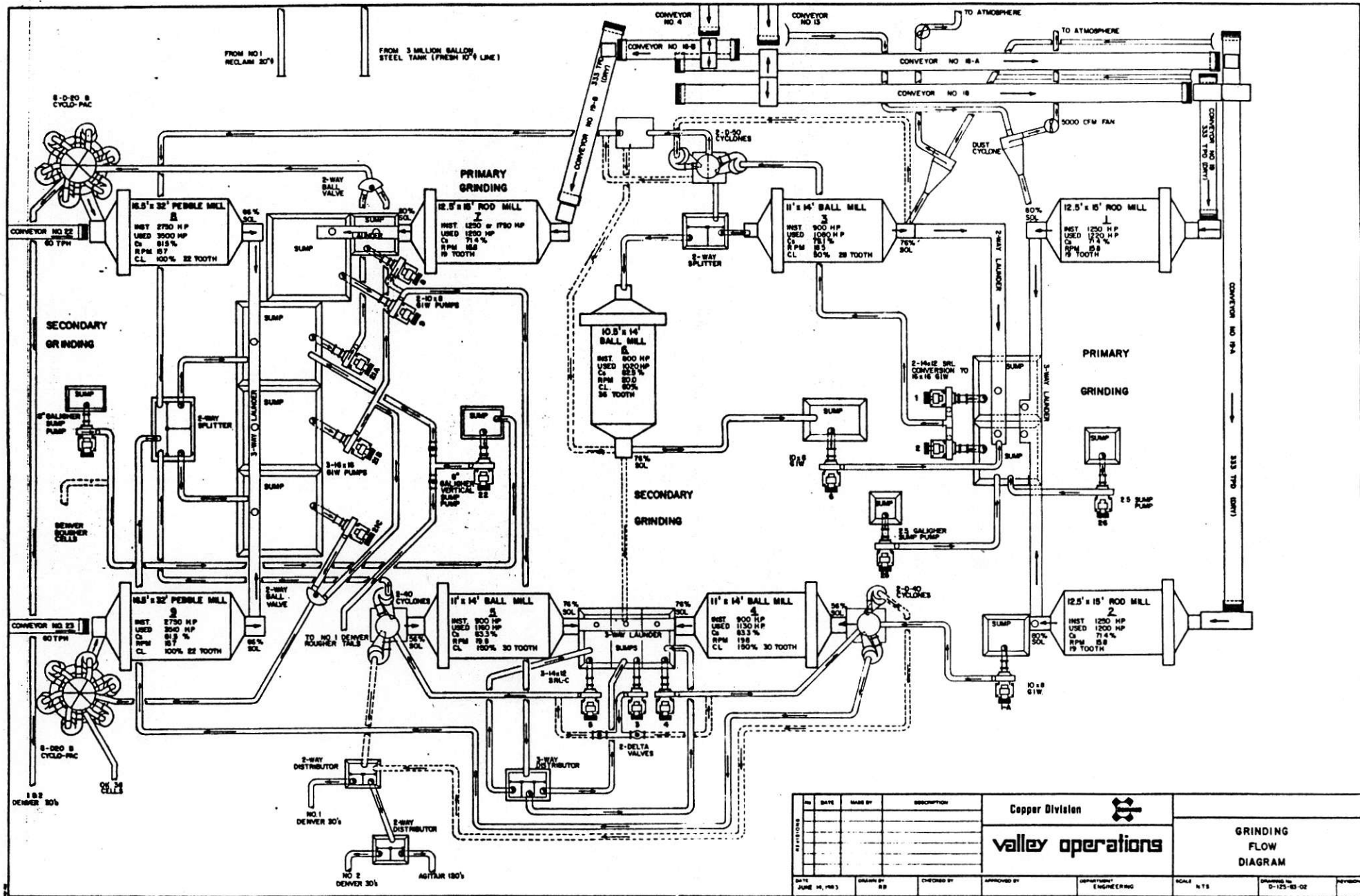
FILTERING AND DRYING

The thickened concentrate is stored in a 12x12' stock tank. From the stock tank the concentrate is pumped to a 6x6' Dorr-Oliver disc filter, the filtered product is then dried to 8% moisture in a 4x28' Lockhead-Haggarty rotary dryer. The final dry concentrate is stored for shipment in two concentrate bins.

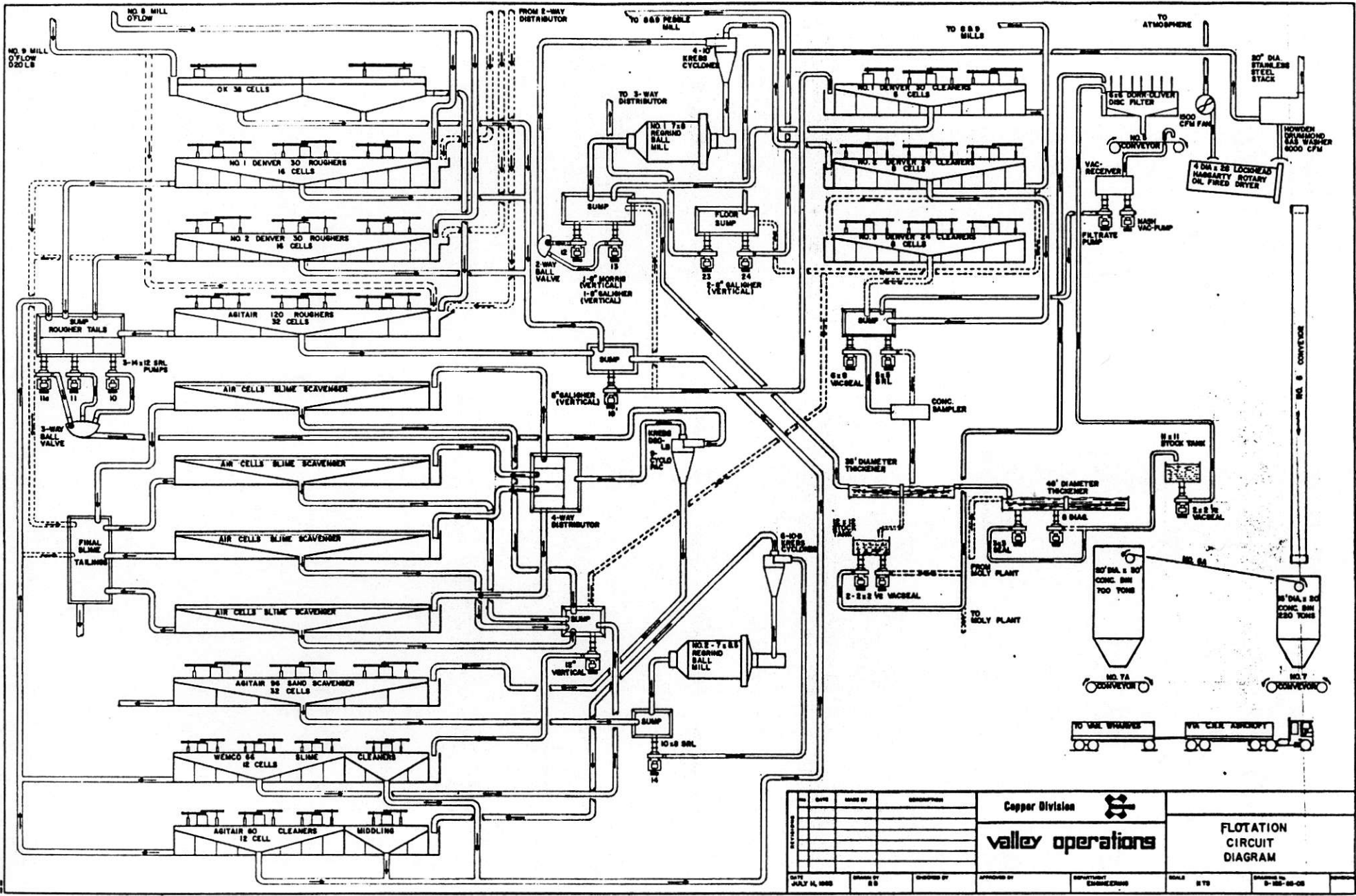



| CONVEYOR DATA | | | | | | | | |
|---------------|-------|------|--------|-----|----|-------|-----|---------------|
| NO | WIDTH | PPH | LENGTH | | NO | WIDTH | PPH | LENGTH |
| 17 | 36" | 2-58 | 66' | 66' | 1 | 42" | 600 | 835' |
| 17A | 42" | | 62' | 62' | 2 | 36" | 600 | 830' |
| 22 | 30" | 185 | 180' | | 3 | 36" | 600 | 830' |
| 23 | 80" | 86 | 176' | | 4 | 30" | 840 | 842' |
| | | | | | 5 | 48" | 600 | 387' |
| | | | | | 6 | 36" | 400 | 295' |
| | | | | | 7A | 36" | 304 | 295' |
| | | | | | 8 | 30" | 304 | 295' |
| | | | | | 9 | 36" | 600 | 193' |
| | | | | | 10 | 36" | 600 | 184' + SPLICE |
| | | | | | 11 | 36" | 600 | 387' |
| | | | | | 12 | 36" | 400 | 184' + SPLICE |
| | | | | | 13 | 60" | 172 | 43' |
| | | | | | 14 | 36" | 180 | 72' |

| | | | | |
|--|-----|------|---------|---|
| REVISIONS | NO. | DATE | MADE BY | DESCRIPTION |
| | | | | |
| <p>Copper Division </p> <p>valley operations</p> | | | | |
| <p>DATE: JUNE 8, 1965 DRAWN BY: RB CHECKED BY: APPROVED BY: SUPERVISOR: ENGINEERING</p> | | | | |
| <p>CRUSHER FLOW DIAGRAM</p> | | | | <p>SCALE: 1/4" = 1'-0"</p> <p>ISSUED: 6-15-65</p> |



| Copper Division | | | | valley operations | | GRINDING FLOW DIAGRAM | |
|-----------------|------|---------|-------------|-------------------|-------------|-----------------------|-------------|
| DATE | DATE | MADE BY | DESCRIPTION | APPROVED BY | DEPARTMENT | SCALE | DRAWING NO. |
| JUNE 14, 1953 | | RB | | | ENGINEERING | N.T.S. | D-125-83-02 |



| | | | | | | | | | | | | | |
|-----------------|--|----------|--|------------|--|---|--|-------------|--|--------|--|--|--|
| DATE | | DRAWN BY | | CHECKED BY | | APPROVED BY | | DEPARTMENT | | SCALE | | DRAWN BY | |
| JULY 14, 1968 | | S.S. | | | | | | ENGINEERING | | 8 1/2" | | S-102-05-05 | |
| Copper Division | | | | | |  valley operations | | | | | | FLOTATION CIRCUIT DIAGRAM | |