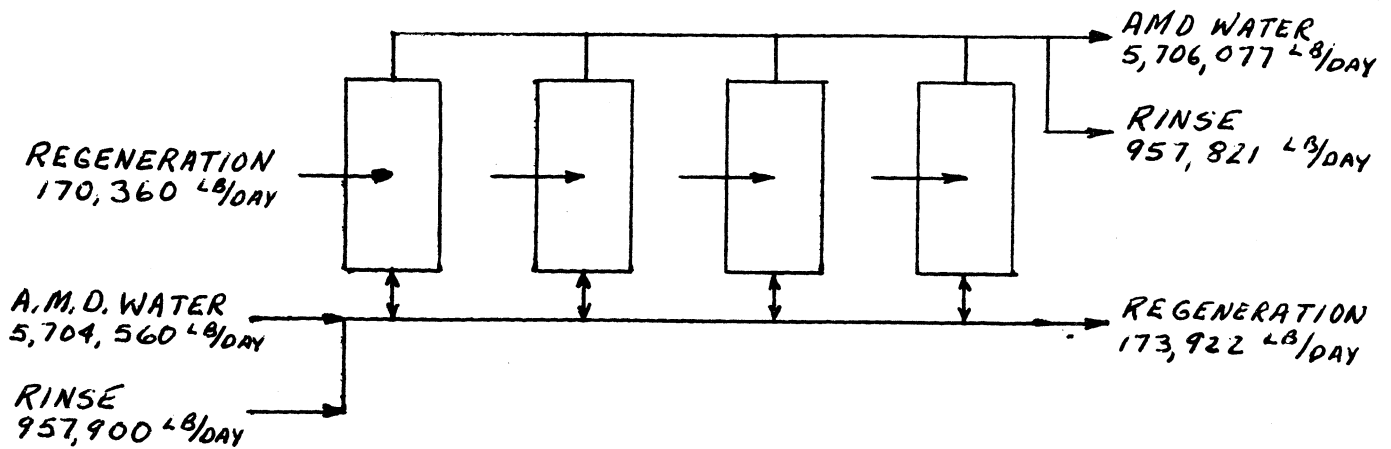


| | WITH ION EXCHANGE RINSE RECOVERY | WITHOUT ION EXCHANGE RINSE RECOVERY |
|-----------------------------------|----------------------------------|-------------------------------------|
| MATERIALS IN | | |
| CHEMICALS IN | | |
| AMMONIA - NH ₃ | 1 6 0 ^{LB} /DAY | 1 6 0 ^{LB} /DAY |
| CARBON DIOXIDE - CO ₂ | 6 2 3 8 " | 6 2 3 8 " |
| LIME - Ca(OH) ₂ - 100% | 8 0 7 3 " | 8 0 7 3 " |
| SUB-TOTAL | 1 4 4 7 1 " | 1 4 4 7 1 " |
| A. M. D. WATER | 5 7 0 4 5 6 0 " | 5 7 0 4 5 6 0 " |
| TOTAL MATERIAL IN | 5 7 1 8 0 3 1 " | 5 7 1 8 0 3 1 " |
| MATERIAL OUT | | |
| CHEMICALS OUT | | |
| ION EXCHANGE RINSE | | 9 5 2 8 2 1 ^{LB} /DAY |
| VAPOR, AERATOR | 1 3 2 2 0 " | 1 3 2 2 0 " |
| SLUDGE, SETTLER | 4 5 0 3 3 " | 4 5 0 3 3 " |
| SLUDGE, SOFTNER | 3 0 0 0 0 0 " | 3 0 0 0 0 0 " |
| SLUDGE, PRESSURE FILTER | 2 0 4 8 4 " | 2 0 4 8 4 " |
| BOTTOMS, STILL | 1 9 8 7 9 8 " | 1 9 8 7 9 8 " |
| SUB-TOTAL | 5 7 7 5 3 5 " | 1 5 3 0 3 9 2 " |
| MATERIAL IN | 5 7 1 8 0 3 1 ^{LB} /DAY | 5 7 1 8 0 3 1 ^{LB} /DAY |
| CHEMICALS OUT | 5 7 7 5 3 5 " | 1 5 3 0 3 9 2 " |
| PRODUCT WATER OUT | 5 1 4 0 4 9 6 " | 4 1 8 7 6 3 9 " |
| PRODUCT WATER - GPD | 6 1 6 3 6 7 ^{GAL} /DAY | 5 0 2 1 2 0 ^{GAL} /DAY |
| PRODUCT WATER - GPM | 4 2 8 ^{GAL} /MIN | 3 4 9 ^{GAL} /MIN |

ION EXCHANGE PLANT



MATERIAL IN

ACID MINE DRAINAGE WATER

| | | |
|-------------------|------------------|----------|
| CALCIUM SULFATE | 2327 | LB/DAY |
| MAGNESIUM SULFATE | 1716 | " |
| SODIUM CHLORIDE | 67 | " |
| SULFURIC ACID | 391 | " |
| FERROUS SULFATE | 2165 | " |
| MANGANOUS SULFATE | 258 | " |
| ALUMINUM SULFATE | 650 | " |
| WATER | 5,696,986 | " |
| SUB-TOTAL | 5,704,560 | " |

MATERIAL OUT

ACID MINE DRAINAGE WATER

| | | |
|-----------------------|------------------|----------|
| CALCIUM BICARBONATE | 2772 | LB/DAY |
| MAGNESIUM BICARBONATE | 2085 | " |
| SODIUM BICARBONATE | 96 | " |
| CARBONIC ACID | 247 | " |
| FERROUS BICARBONATE | 2534 | " |
| MANGANOUS BICARBONATE | 302 | " |
| ALUMINUM BICARBONATE | 798 | " |
| WATER | 5,697,243 | " |
| SUB-TOTAL | 5,706,077 | " |

REGENERATION

| | | |
|------------------------------------|----------------|----------|
| AMMONIA | 2960 | LB/DAY |
| WATER, DILUTION | 34,000 | " |
| WATER, 1 ST STAGE RINSE | 133,400 | " |
| SUB-TOTAL | 170,360 | " |

REGENERATION

| | | |
|------------------------------------|----------------|----------|
| AMMONIUM CHLORIDE | 75 | LB/DAY |
| AMMONIUM SULFATE | 7524 | " |
| AMMONIA, FREE | 975 | " |
| WATER, DILUTION | 31,924 | " |
| WATER, 1 ST STAGE RINSE | 133,400 | " |
| SUB-TOTAL | 173,922 | " |

RINSE

| | | |
|------------------------------------|----------------|----------|
| CARBON DIOXIDE | 6000 | LB/DAY |
| WATER, 2 ND STAGE RINSE | 951,900 | " |
| SUB-TOTAL | 957,900 | " |

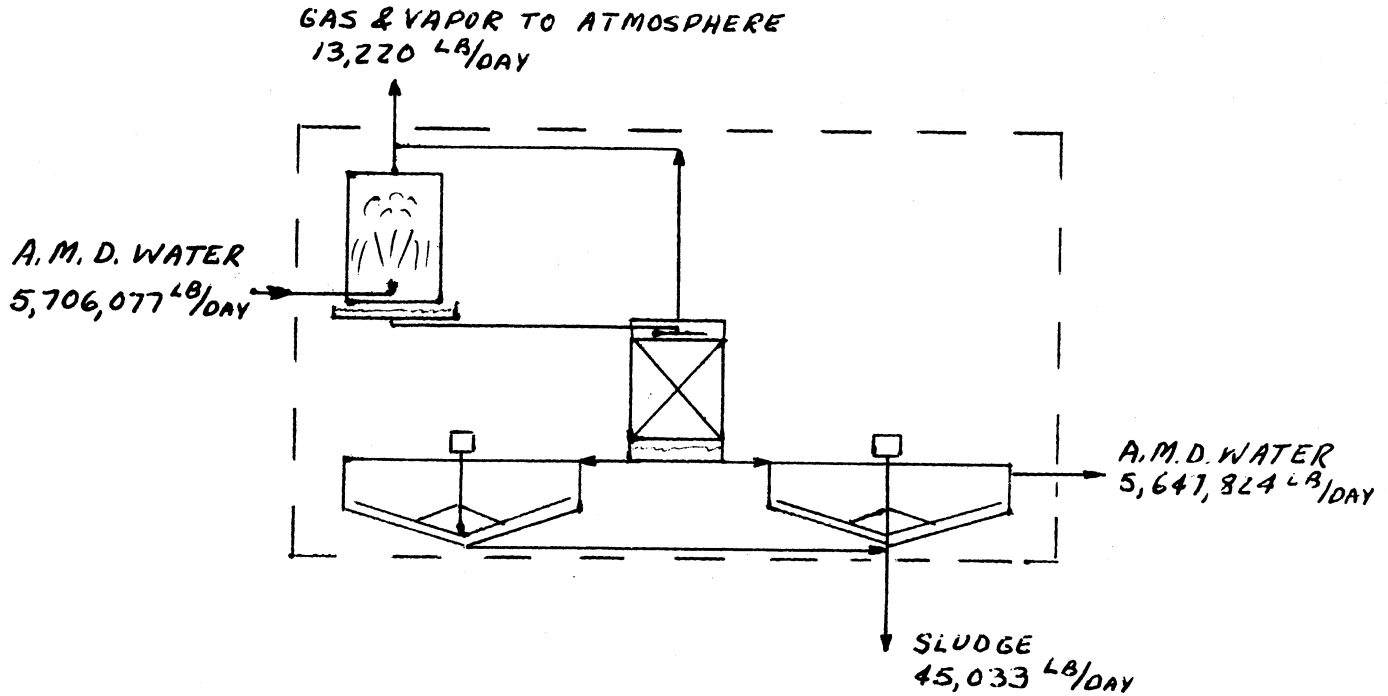
RINSE

| | | |
|------------------------------------|----------------|----------|
| CARBON DIOXIDE | 921 | LB/DAY |
| WATER, 2 ND STAGE RINSE | 951,900 | " |
| SUB-TOTAL | 952,821 | " |

TOTAL

6,832,820 LB/DAY TOTAL

6,832,820 LB/DAY



MATERIAL IN
ACID MINE DRAINAGE WATER

| | | |
|-----------------------|-----------|--------|
| CALCIUM BICARBONATE | 2772 | LB/DAY |
| MAGNESIUM BICARBONATE | 2085 | " |
| SODIUM BICARBONATE | 96 | " |
| CARBONIC ACID | 247 | " |
| FERROUS BICARBONATE | 2534 | " |
| MANGANOUS BICARBONATE | 302 | " |
| ALUMINUM BICARBONATE | 798 | " |
| WATER | 5,697,243 | " |
| SUB-TOTAL | 5,706,077 | " |

MATERIAL OUT
ACID MINE DRAINAGE WATER

| | | |
|-----------------------|-----------|--------|
| CALCIUM BICARBONATE | 2772 | LB/DAY |
| MAGNESIUM BICARBONATE | 2085 | " |
| SODIUM BICARBONATE | 96 | " |
| MANGANOUS HYDROXIDE | 112 | " |
| CARBON DIOXIDE | 86 | " |
| WATER | 5,642,673 | " |
| SUB-TOTAL | 5,647,824 | " |

GAS TO ATMOSPHERE

| | | |
|----------------|--------|--------|
| CARBON DIOXIDE | 1826 | LB/DAY |
| WATER | 11,394 | " |
| SUB-TOTAL | 13,220 | " |

SLUDGE

| | | |
|---------------------|----------------------|--------|
| FERRIC HYDROXIDE | 1017 1525 | LB/DAY |
| MANGANOUS HYDROXIDE | 41 | " |
| ALUMINUM HYDROXIDE | 297 | " |
| WATER | 43,179 | " |
| SUB-TOTAL | 45,033 | " |

TOTAL

5,706,077 LB/DAY TOTAL

5,706,077 LB/DAY

W.O. NO. 2674-01

BURNS AND ROE, INC.

REV 7-11-69

DRAWING NO. _____

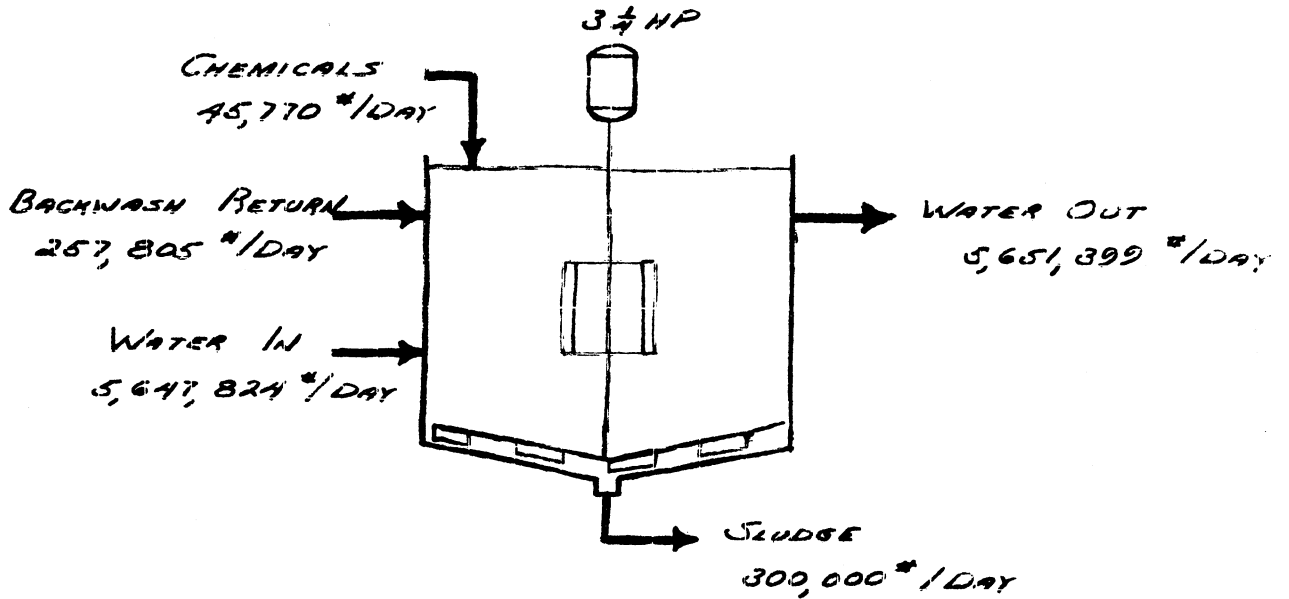
ORADELL, N. J.

DATE: 5-2-69

TITLE: MATERIAL BALANCE - LIME SOFTENER

BY: CAM

SHEET 3 OF 4



| <u>MATERIAL IN</u> | <u>#/DAY</u> | <u>MATERIAL OUT</u> | <u>#/DAY</u> |
|------------------------|------------------|---------------------|------------------|
| <u>INFLUENT</u> | | <u>EFFLUENT</u> | |
| CALCIUM BICARBONATE | 2,772 | CALCIUM CARBONATE | 130 |
| MAGNESIUM BICARBONATE | 2,085 | MAGNESIUM CARBONATE | 200 |
| CARBON DIOXIDE | 86 | MAGNESIUM HYDROXIDE | 50 |
| SODIUM BICARBONATE | 96 | SODIUM HYDROXIDE | 46 |
| MANGANOUS HYDROXIDE | 112 | WATER | <u>5,650,973</u> |
| WATER | <u>5,642,673</u> | | <u>5,651,399</u> |
| | <u>5,647,824</u> | | |
| <u>CHEMICALS</u> | | <u>SLUDGE</u> | |
| LIME (7 1/2% SLURRY) | 3,430 | CALCIUM CARBONATE | 6,258 |
| WATER | <u>42,340</u> | MAGNESIUM HYDROXIDE | 646 |
| | <u>45,770</u> | MANGANOUS HYDROXIDE | 112 |
| | | WATER | <u>292,984</u> |
| | | | <u>300,000</u> |
| <u>BACKWASH RETURN</u> | | | |
| CALCIUM CARBONATE | 50 | | |
| MAGNESIUM HYDROXIDE | 5 | | |
| WATER | <u>257,750</u> | | |
| | <u>257,805</u> | | |
| <u>TOTAL IN</u> | <u>5,951,399</u> | <u>TOTAL OUT</u> | <u>5,951,399</u> |

POWER

MIXER 3 HP

W.O. NO. 2674-01

BURNS AND ROE, INC.

REV 7-14-69

DRAWING NO. _____

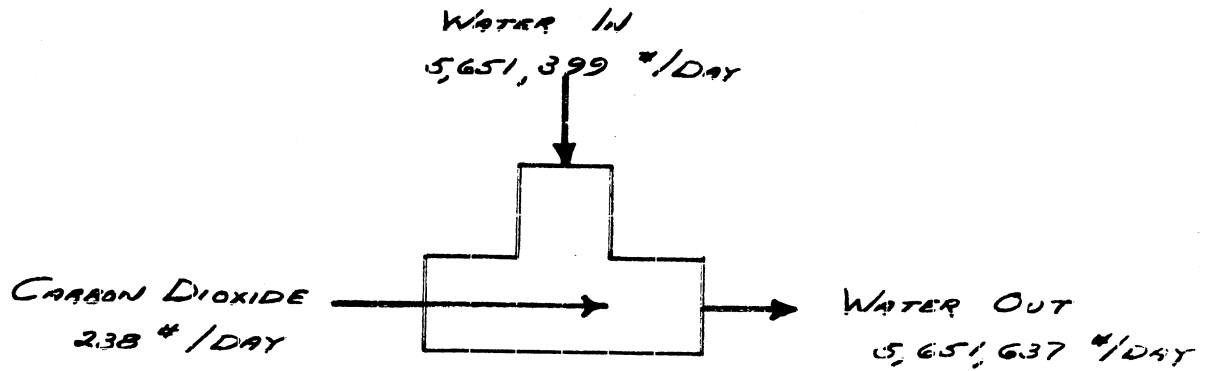
ORADELL, N. J.

DATE: 6-2-69

BY: CAM

TITLE: MATERIAL BALANCE - CARBONATION

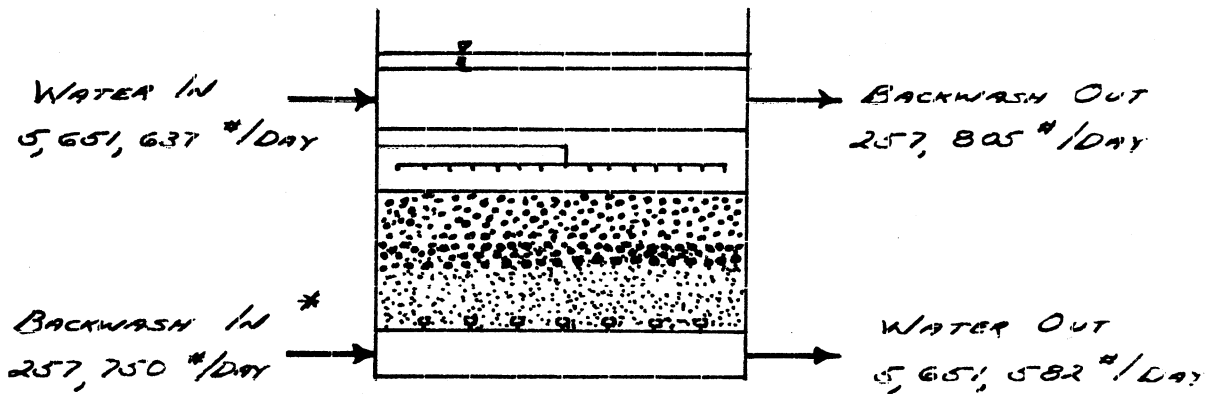
SHEET 4 OF 4



| <u>MATERIAL IN</u> | | <u>MATERIAL OUT</u> | |
|---------------------|------------------|-----------------------|------------------|
| | <u>#/DAY</u> | | <u>#/DAY</u> |
| CALCIUM CARBONATE | 130 | CALCIUM BICARBONATE | 130 |
| MAGNESIUM CARBONATE | 200 | MAGNESIUM BICARBONATE | 393 |
| MAGNESIUM HYDROXIDE | 50 | MAGNESIUM CARBONATE | 38 |
| SODIUM HYDROXIDE | 46 | MAGNESIUM HYDROXIDE | 5 |
| WATER | 5,650,973 | CALCIUM CARBONATE | 50 |
| CARBON DIOXIDE | 238 | SODIUM BICARBONATE | 96 |
| | | WATER | 5,650,925 |
| TOTAL IN | 5,651,637 | TOTAL OUT | 5,651,637 |

W.O. NO. 2674-01 **BURNS AND ROE, INC.**
 DRAWING NO. _____ **ORADELL, N. J.**
 TITLE: MATERIAL BALANCE - FILTERS

REV. 7-14-69
 DATE: 6-2-69
 BY: CPM
 SHEET 5 OF 4

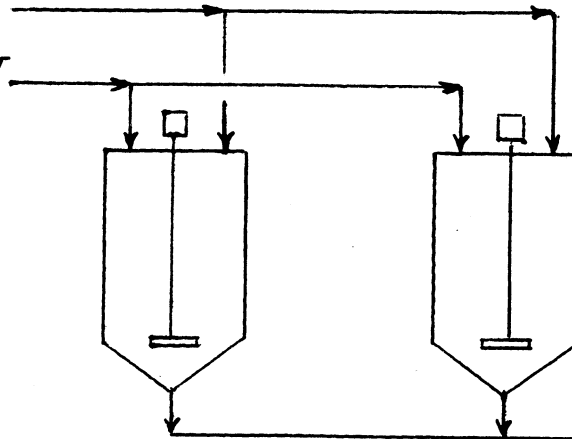


* BACKWASH WATER INCLUDES SURFACE WASH AND FINAL RINSE WATER

| MATERIAL IN | #/DAY | MATERIAL OUT | #/DAY |
|-----------------------|----------------|-----------------------|------------------|
| CALCIUM BICARBONATE | 130 | CALCIUM BICARBONATE | 130 |
| MAGNESIUM BICARBONATE | 393 | MAGNESIUM BICARBONATE | 393 |
| MAGNESIUM CARBONATE | 38 | SODIUM BICARBONATE | 96 |
| MAGNESIUM HYDROXIDE | 5 | MAGNESIUM CARBONATE | 38 |
| CALCIUM CARBONATE | 50 | WATER | 5,650,925 |
| SODIUM BICARBONATE | 96 | | <u>5,651,582</u> |
| WATER | 5,650,925 | BACKWASH WATER | 257,750 |
| BACKWASH WATER | <u>257,750</u> | CALCIUM CARBONATE | 50 |
| | | MAGNESIUM HYDROXIDE | 5 |
| | | | <u>257,805</u> |
| TOTAL IN | 5,909,387 | TOTAL OUT | 5,909,387 |

CHEMICAL PRECIPITATORS

LIME SLURRY
46,430 LB/DAY
SPENT REGENERANT
173,922 LB/DAY



PRECIPITATED SLURRY
220,352 LB/DAY

MATERIAL IN

SPENT REGENERANT
AMMONIUM CHLORIDE
AMMONIUM SULFATE
AMMONIA, EXCESS
WATER
SUB-TOTAL

75 LB/DAY
75 24 "
975 "
165,324 "
173,922 "

MATERIAL OUT

PRECIPITATED SLURRY
CALCIUM CHLORIDE
CALCIUM SULFATE
CALCIUM HYDROXIDE
AMMONIA, FREE
WATER
SUB-TOTAL

78 LB/DAY
9781 "
422 "
2960 "
207,111 "
220,352 "

LIME SLURRY

CALCIUM HYDROXIDE
WATER
SUB-TOTAL

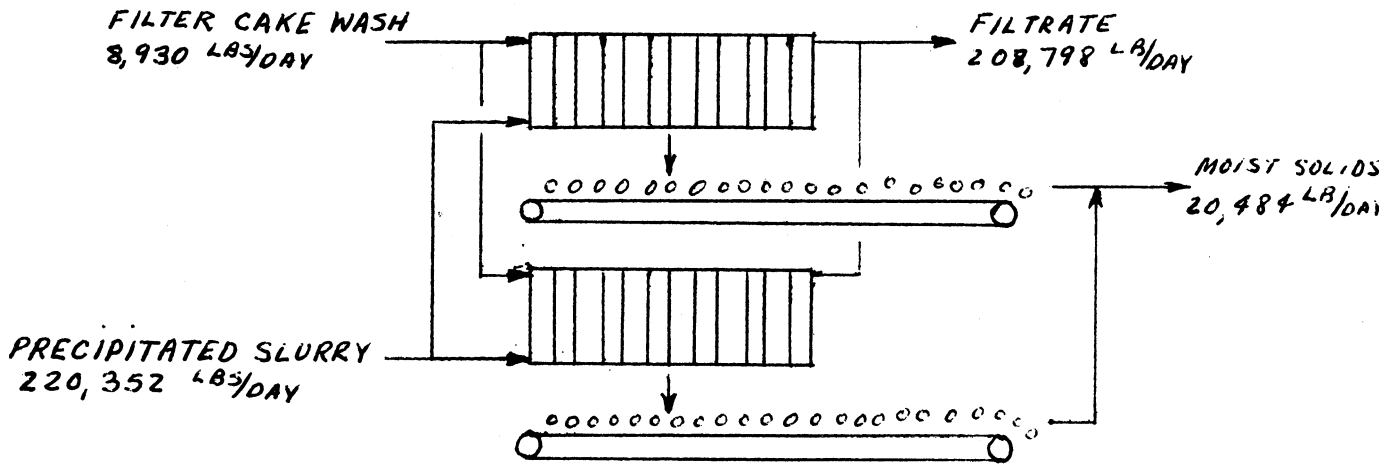
4643 LB/DAY
41,787 "
46,430 "

TOTAL

220,352 " TOTAL

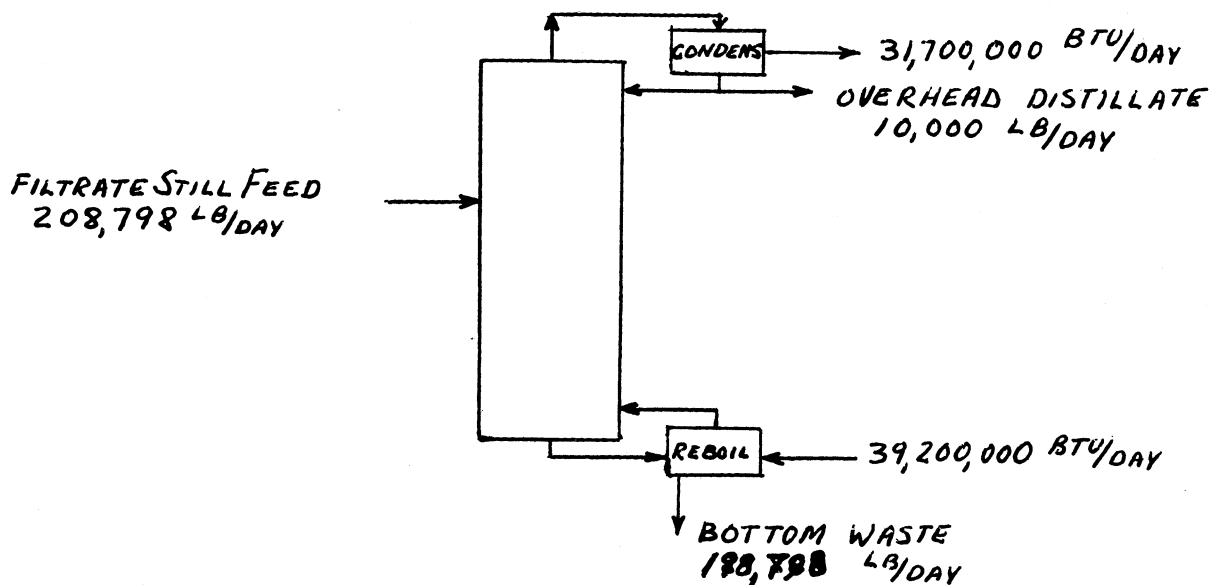
220,352 LB/DAY

PLATE AND FRAME FILTERS



| <u>MATERIAL IN</u> | | <u>MATERIAL OUT</u> | |
|----------------------------|--|----------------------------|----------------------------------|
| <u>PRECIPITATED SLURRY</u> | | <u>FILTRATE</u> | |
| CALCIUM CHLORIDE | 78 ^{LB} /DAY | AMMONIA, FREE | 2960 ^{LB} /DAY |
| CALCIUM SULFATE | 9781 " | WATER | 205,838 " |
| CALCIUM HYDROXIDE | 422 " | SUB-TOTAL | 208,798 " |
| AMMONIA, FREE | 2960 " | <u>MOIST SLUDGE SOLIDS</u> | |
| WATER | 207,111 " | CALCIUM CHLORIDE | 78 ^{LB} /DAY |
| SUB-TOTAL | 220,352 " | CALCIUM SULFATE | 9781 " |
| <u>FILTER CAKE WASH</u> | | CALCIUM HYDROXIDE | 422 " |
| WATER | 8930 ^{LB} /DAY | WATER | 10,203 " |
| SUB-TOTAL | 8930 " | SUB-TOTAL | 20,484 " |
| TOTAL | 229,282 ^{LB}/DAY TOTAL | TOTAL | 229,282 ^{LB}/DAY |

AMMONIA STRIPPER STILL



MATERIAL IN
FILTRATE FEED

| | |
|-----------|-------------|
| AMMONIA | 2960 LB/DAY |
| WATER | 205,838 " |
| SUB-TOTAL | 208,798 " |

MATERIAL OUT
OVERHEAD DISTILLATE

| | |
|-----------|-------------|
| AMMONIA | 2800 LB/DAY |
| WATER | 7200 " |
| SUB-TOTAL | 10,000 " |

BOTTOM WASTE

| | |
|-----------|------------|
| AMMONIA | 160 LB/DAY |
| WATER | 198,638 " |
| SUB-TOTAL | 198,798 " |

TOTAL 208,798 LB/DAY

TOTAL 208,798 LB/DAY

ENERGY IN

| | |
|---------------|--------------------|
| FILTRATE FEED | 10,000,000 BTU/DAY |
| REBOILER | 39,200,000 BTU/DAY |

ENERGY OUT

| | |
|---------------------|------------------|
| OVERHEAD DISTILLATE | -100,000 BTU/DAY |
| BOTTOM WASTE | 17,600,000 " |
| CONDENSER | 31,700,000 " |

TOTAL 49,200,000 BTU/DAY

TOTAL 49,200,000 BTU/DAY

W.O. NO. 2674-01

BURNS AND ROE, INC.

DATE: JULY 11, 1969

DRAWING NO. _____

ORADELL, N. J.

BY: HJ RODRIGUEZ

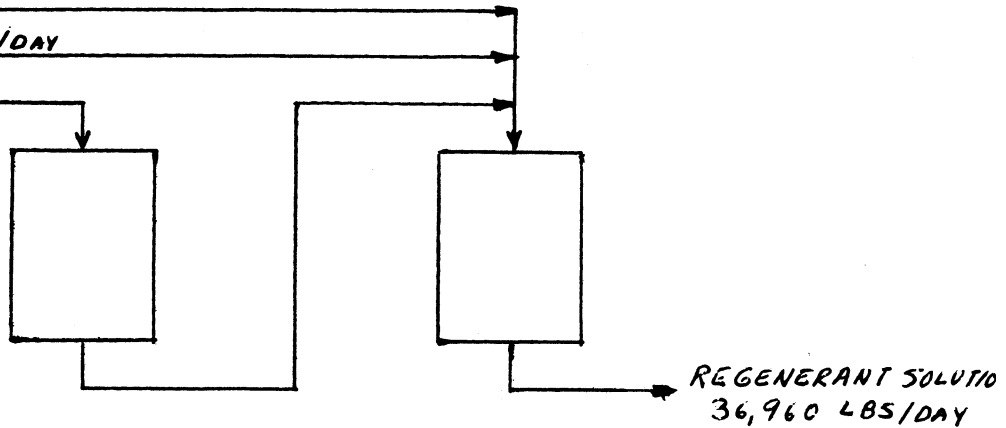
TITLE: A.M.D. PLANT - MATERIAL BALANCE - BASIS - 1 DAY - 24 HRS. SHEET 9 OF 9

STORAGE TANK - FRESH REGENERANT DAY TANK

MAKE UP WATER - 26,800 LBS/DAY

MAKE UP AMMONIA - 160 LB/DAY

DISTILLATE - 10,000 LB/DAY



MATERIAL IN

DISTILLATE PRODUCT

| | | |
|-----------|--------|---------|
| AMMONIA | 2800 | LBS/DAY |
| WATER | 7200 | " |
| SUB-TOTAL | 10,000 | " |

MAKEUP

| | | |
|-----------|--------|---------|
| AMMONIA | 160 | LBS/DAY |
| WATER | 26,800 | " |
| SUB-TOTAL | 26,960 | " |

TOTAL 36,960 LBS/DAY

MATERIAL OUT

REGENERATION SOLUTION

| | | |
|-----------|--------|---------|
| AMMONIA | 2960 | LBS/DAY |
| WATER | 34,000 | " |
| SUB-TOTAL | 36,960 | " |

TOTAL 36,960 LBS/DAY