

Royster

DER
APR 03 1984
BAQM

March 29, 1984

CERTIFIED MAIL

Mr. Bill Thomas, Engineer
Department of Environmental Regulation
Twin Towers Office Building
2600 Blairstone Road
Tallahassee, Florida 32301-8241

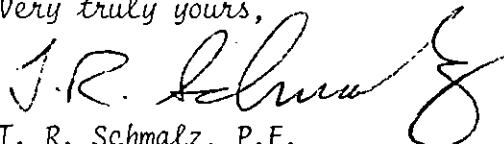
Dear Mr. Thomas:

In accord with our telephone conversation of March 27, 1984 herewith is an application for a Permit To Construct along with a check for \$1000 for the processing fee. The application is in triplicate with a fourth copy having been sent to Mr. Bill Thomas at the Southwest District office in Tampa.

As I explained to you and as is reflected in the permit application the modifications to be made to the Sulfuric Acid Plant do not change any of the process conditions or the emissions except as related to higher operating rate capabilities.

Lurgi Corporation, our engineering/construct firm is planning to commence field work sometime this summer so if there are any additional requirements for processing the Construction Permit please notify me at the earliest possible time in order that I may expedite acquisition and transmittal.

Very truly yours,



T. R. Schmalz, P.E.
Manager, Engineering &
Environmental Services

TRS:sk

cc: Mr. Bill Thomas
Department of Environmental Regulation
7601 Highway 301 North
Tampa, Florida 33610-9544

R. W. Heinz

R. T. Van Arsdall



Company

FERTILIZERS & AGRICULTURAL CHEMICALS

P. O. BOX 797, MULBERRY, FLORIDA 33860

NO. 87011186

PAYABLE THROUGH
FIRST UNION NATIONAL BANK OF
NORTH CAROLINA
CHAPEL HILL, NORTH CAROLINA

66-156
531

VOID AFTER 90 DAYS

PAY TO THE ORDER OF:

DATE
3-30-84

AMOUNT
\$1,000.00*****

Department of Environmental Regulations
2600 Blairstone Rd.
Tallahassee, Fl. 32301

John Lawrence
AUTHORIZED SIGNATURE

⑈87011186⑈ ⑆053101561⑆ 7999807142⑈

STATE OF FLORIDA
DEPARTMENT OF ENVIRONMENTAL REGULATION

Nº 76023

RECEIPT FOR APPLICATION FEES AND MISCELLANEOUS REVENUE

Received from R. J. Star Company Date 3-25-84

Address P. O. Box 797 Mulberry Fla. 33860 Dollars \$ 1000.00

Applicant Name & Address Same as above

Source of Revenue _____

Revenue Code 1201 Application Number AC 53-39201

By Patricia Williams



AC 53-85261

DER

APR 03 1984

STATE OF FLORIDA
DEPARTMENT OF ENVIRONMENTAL REGULATION
APPLICATION TO OPERATE/CONSTRUCT AIR POLLUTION SOURCES

Source Type: Air Pollution Incinerator
 Type application: Operation Construction
 Source Status: New Existing Modification
 Source Name: ROYSTER COMPANY County: POLK
 Source Location: Street: S.R. 60 EAST City: N/A
 UTM: East: 17-406.70E North: 3085.20N
 Appl. Name and Title: R. W. HEINZ, VICE PRESIDENT - FLORIDA OPERATIONS
 Appl. Address: P.O. DRAWER 797, MULBERRY, FLORIDA 33860

STATEMENTS BY APPLICANT AND ENGINEER

A. APPLICANT
 The undersigned owner or authorized representative of * ROYSTER COMPANY
 is fully aware that the statements made in this application for a CONSTRUCTION permit are true, correct and complete to the best of his knowledge and belief. Further, the undersigned agrees to maintain and operate the pollution control source and pollution control facilities in such a manner as to comply with the provisions of Chapter 403, Florida Statutes, and all the rules and regulations of the Department or revisions thereof. He also understands that a permit, if granted by the Department, will be non-transferable and he will promptly notify the Department upon sale or legal transfer of the permitted establishment.

R.W. Heinz
 Signature of the Owner or Authorized Representative

Date: 3/29/84 Telephone No.: (813) 425-1176

*Attach a letter of authorization. If applicant is a corporation, a Certificate of Good Standing must be submitted with application. This may be obtained, for a \$5.00 charge, from the Secretary of State, Bureau of Corporate Records, Tallahassee, Florida 32304.

B. PROFESSIONAL ENGINEER REGISTERED IN FLORIDA
 This is to certify that the engineering features of this pollution control project have been designed/examined by me and found to be in conformity with modern engineering principles applicable to the treatment and disposal of pollutants characterized in the permit application. There is reasonable assurance, in my professional judgment, that the pollution control facilities, when properly maintained and operated, will discharge an effluent that complies with all applicable statutes of the State of Florida and the rules and regulations of the Department. It is also agreed that the undersigned will furnish the applicant a set of instructions for the proper maintenance and operation of the pollution control facilities and, if applicable, pollution sources.

Signature: *T.R. Schmalz*
 Name: T. R. SCHMALZ Mailing Address: P.O. DRAWER 797
 MULBERRY, FLORIDA 33860
 Company Name: ROYSTER COMPANY Telephone No.: (813) 425-1176
 Florida Registration Number: 13656 Date: 3/29/84
 (Affix Seal)

DETAILED DESCRIPTION OF SOURCE

A. Describe the nature and extent of the project. Refer to existing pollution control facilities, expected improvement in performance of the facilities and state whether the project will result in full compliance. Attach additional sheet if necessary.

MODIFICATION OF AN EXISTING DOUBLE ABSORPTION, CONTACT SULFURIC ACID PLANT TO IMPLEMENT THE ADDITION OF ELECTRIC CO-GENERATION EQUIPMENT. REFER TO ATTACHED ADDENDUM FOR COMPLETE DETAILS.

B. Schedule of Project Covered in this Application (Construction Permit Application Only).

Start of Construction JULY 1, 1984

Completion of Construction OCTOBER 31, 1985

C. Costs of Construction (Show a breakdown of costs for individual components/units of the project serving pollution control purpose only). Information on actual costs shall be furnished with the application for operation permit.

TOTAL PROJECT COST OF ACID PLANT MODIFICATIONS EXCLUSIVE OF CO-GENERATION EQUIPMENT IS PROJECTED AT APPROXIMATELY \$8,000,000. NONE OF THIS COST IS DIRECTLY RELATED TO POLLUTION CONTROL PURPOSES.

D. For this source indicate any previous DER permit: issuance dates, and expiration dates; and orders and notices.

AC53-2584 ISSUE DATE: DEC. 16, 1974

CONSENT ORDER #74

EXPIRY DATE: SEPT. 16, 1975

DATED SEPT. 27, 1978

CONSENT ORDER, CASE #75-1600 LEON

A053-17115 ISSUE DATE: MAR. 1, 1978

COUNTY DATED OCT. 27, 1975

EXPIRY DATE: FEB. 1, 1984

A053-6050 ISSUE DATE: MARCH 14, 1978

A053-78016 ISSUE DATE: JAN. 31, 1978

EXPIRY DATE: JAN. 31, 1983

EXPIRY DATE: JAN. 15, 1984

AC53-6458A ISSUE DATE: AUG. 28, 1978

EXPIRY DATE: AUG. 30, 1979

E. Is this application associated with or part of a Development of Regional Impact (DRI) pursuant to Chapter 380, Florida Statutes, and Chapter 22F-2, Florida Administrative Code ?Yes No

DETAILED DESCRIPTION OF SOURCE

- A. Describe the nature and extent of the project. Refer to existing pollution control facilities, expected improvement in performance of the facilities and state whether the project will result in full compliance. Attach additional sheet if necessary.

MODIFICATION OF AN EXISTING DOUBLE ABSORPTION, CONTACT SULFURIC ACID PLANT TO IMPLEMENT THE ADDITION OF ELECTRIC CO-GENERATION EQUIPMENT. REFER TO ATTACHED ADDENDUM FOR COMPLETE DETAILS.

- B. Schedule of Project Covered in this Application (Construction Permit Application Only).

Start of Construction: JULY 1, 1984
Completion of Construction: OCTOBER 31, 1985

- C. Costs of Construction (Show a breakdown of costs for individual components/units of the project serving pollution control purpose only). Information on actual costs shall be furnished with the application for operation permit.

TOTAL PROJECT COST OF ACID PLANT MODIFICATIONS EXCLUSIVE OF CO-GENERATION EQUIPMENT IS PROJECTED AT APPROXIMATELY \$8,000,000. NONE OF THIS COST IS DIRECTLY RELATED TO POLLUTION CONTROL PURPOSES.

- D. For this source indicate any previous DER permit: issuance dates, and expiration dates, and orders and notices.

AC53-2584 ISSUE DATE: DEC. 16, 1974 CONSENT ORDER #74
EXPIRY DATE: SEPT. 16, 1975 DATED SEPT. 27, 1978
CONSENT ORDER, CASE #75-1600 LEON A053-17115 ISSUE DATE: MAR. J, 1979
COUNTY DATED OCT. 27, 1975 EXPIRY DATE: FEB. 1, 1984
A053-6050 ISSUE DATE: MARCH 14, 1978 A053-78016 ISSUE DATE: JAN. 31, 1982
EXPIRY DATE: JAN. 31, 1983 EXPIRY DATE: JAN. 15, 1986
AC53-6458A ISSUE DATE: AUG. 28, 1978
EXPIRY DATE: AUG. 30, 1979

- E. Is this application associated with or part of a Development of Regional Impact (DRI) pursuant to Chapter 380, Florida Statutes, and Chapter 22F-2, Florida Administrative Code ?Yes X.....No

DER

APR 03 1984



AC 53-85261

BAOM

STATE OF FLORIDA
DEPARTMENT OF ENVIRONMENTAL REGULATION

APPLICATION TO OPERATE/CONSTRUCT AIR POLLUTION SOURCES

Source Type Air Pollution [] Incinerator []
 Type application: [] Operation [] Construction
 Source Status: [] New [] Existing [] Modification

Source Name: ROYSTER COMPANY County POLK
 Source Location: Street S.R. 60 EAST City N/A
 UTM: East 17-406.70E North 3085.20N
 Appl. Name and Title: R. W. HEINZ, VICE PRESIDENT - FLORIDA OPERATIONS
 Appl. Address: P.O. DRAWER 797, MULBERRY, FLORIDA 33860

STATEMENTS BY APPLICANT AND ENGINEER

A. APPLICANT

The undersigned owner or authorized representative of * ROYSTER COMPANY is fully aware that the statements made in this application for a CONSTRUCTION permit are true, correct and complete to the best of his knowledge and belief. Further, the undersigned agrees to maintain and operate the pollution control source and pollution control facilities in such a manner as to comply with the provisions of Chapter 403, Florida Statutes, and all the rules and regulations of the Department or revisions thereof. He also understands that a permit, if granted by the Department, will be non-transferable and he will promptly notify the Department upon sale or legal transfer of the permitted establishment.

Signature of the Owner or Authorized Representative

Date: 3/29/84 Telephone No.: (813) 425-1176

*Attach a letter of authorization. If applicant is a corporation, a Certificate of Good Standing must be submitted with application. This may be obtained, for a \$5.00 charge, from the Secretary of State, Bureau of Corporate Records, Tallahassee, Florida 32304.

B. PROFESSIONAL ENGINEER REGISTERED IN FLORIDA

This is to certify that the engineering features of this pollution control project have been designed/examined by me and found to be in conformity with modern engineering principles applicable to the treatment and disposal of pollutants characterized in the permit application. There is reasonable assurance, in my professional judgment, that the pollution control facilities, when properly maintained and operated, will discharge an effluent that complies with all applicable statutes of the State of Florida and the rules and regulations of the Department. It is also agreed that the undersigned will furnish the applicant a set of instructions for the proper maintenance and operation of the pollution control facilities and, if applicable, pollution sources.

Signature
Name: T. R. SCHMALZ
(Please Type)
Company Name: ROYSTER COMPANY

Mailing Address: P.O. DRAWER 797
MULBERRY, FLORIDA 33860
Telephone No.: (813) 425-1176

Florida Registration Number 13656
(Affix Seal)

Date 3/29/84

DETAILED DESCRIPTION OF SOURCE
ADDENDUM TC Pg. 2, ITEM A

The modifications to the existing Sulfuric Acid Plant will consist of installation of a new 900 PSIG waste heat boiler with an attendant steam superheater, economizers for boiler feedwater pre-heating, and deaeration, and demineralization of boiler feedwater. A new electric motor driven main air blower will also be installed. Acid cooling will be accomplished by newly installed shell and tube heat exchangers and a new cooling tower will be provided to replace two existing towers and provide additional cooling required for the 100% condensation of the turbo-generator supplied steam. In addition new ring type improved catalyst will be installed in the third pass of the converter.

These modifications will in no way effect the process nor the emission rates from the Plant. It is anticipated however that a higher rate of operation will be achievable due to the modifications. A process guarantee by Lurgi Corporation, the engineering/construct firm supplying the new equipment, stipulates an operating rate of 1500 STPD 100% basis sulfuric acid is achievable at recovery efficiency of 99.7%, which is the same as our present operation. An additional stipulation is that all new equipment shall perform within design conditions at 1600 STPD.

AIR POLLUTION SOURCES & CONTROL DEVICES
(other than incinerators)

A. Identification of Air Contaminants

- 1) Particulates
 a) Dust b) Fly Ash c) Smoke d) Other (Identify)
- 2) Sulfur Compounds
 a) SO_x as SO₂ b) Reduced Sulfur as H₂S c) Other (Identify)
- 3) Nitrogen Compounds
 a) NO_x as NO₂ b) NH₃ c) Other (Identify)
- 4) Fluorides 5) Acid Mist 6) Odor
- 7) Hydrocarbons 8) Volatile Organic Compounds
- 9) Other (Specify) _____

B. Raw Materials and Chemicals Used (Be Specific)

Description	Utilization Rate lbs./hr.	Approximate Contaminant Content		Relate to Flow Diagram
		Type	% Wt.	
SULFUR	43,652	SO ₂	200	SULFUR
AIR	343,073	N/A	N/A	AIR
WATER	24,552	N/A	N/A	WATER

C. Process Rate:

- 1) Total Process input Rate* 4935 TPD Units.
- 2) Product Weight* 1600 TPD - 100% H₂SO₄ Units.
- 3) Normal Operating Time YEAR ROUND, if seasonal describe: N/A
 hrs./day 24 days/wk. 7 wks/yr. 50

D. Airborne Contaminants Discharged:

Name of Contaminant	Actual** Discharge		Discharge Criteria Rate*	Allowable Discharge Lbs./hr.	Relate to Flow Diagram
	lbs./hr.	T/yr.			
SO ₂	230	918	4.0 SO ₂ /T H ₂ SO ₄	267	TO ATMOSPHERE
ACID MIST	4.0	16	0.15#ACID MIST/T	10.0	TO ATMOSPHERE
			10% OPACITY		

*Refer to Chapter 17-2.04(2), Florida Administrative Code.
 (Discharge Criteria: Rate=#/ton P₂O₅, #/M BTU/hr., etc.)

**Estimate only if this is an application to construct.

D. Airborne Contaminants Discharged. (Cont'd.)

Name of Contaminant	Hourly Emission (lb./hr.)	Daily Emission (lb./day)	Yearly Emission (T/yr.)	Basis for Emission Estimate (Test Data, Material Balance)
SO ₂	230	5520	918	TEST DATA
ACID MIST	4.0	96	16	TEST DATA

E. Control Devices:

Name and Type (Model and Serial No.)	Contaminant	Efficiency*	Conditions of Operations	Basis for Efficiency Operational Data, Test, Design, Data)
DC/DA CONTACT				
SULFURIC ACID PROCESS	SO ₂	99.74	GAS	TEST DATA
BRINK HE & HV DEMISTER	ACID MIST	99.99	PARTICULATE	TEST DATA

*See required supplement.
(Include any test data and/or design data for efficiency substantiation)

F. Fuels

Type (Be Specific, includes %S, etc.)	Daily Consumption *		Maximum Heat Input MBTU/hr.
	Avg./hr.	Max./hr.	

* Units: Natural Gas-MCF/hr.; Fuel Oils, Coal-lbs./hr.

Fuel Analysis:

Percent Sulfur _____ Percent Ash _____

Density _____ lb./gal.

Heat Capacity _____ BTU/lb. _____ BTU/gal.

Other Fuel Contaminants _____

D. Airborne Contaminants Discharged. (Cont'd.)

Name of Contaminant	Hourly Emission (lb./hr.)	Daily Emission (lb./day)	Yearly Emission (T/yr.)	Basis for Emission Estimate (Test Data, Material Balance)
SO ₂	230	5520	918	TEST DATA
ACID MIST	4.0	96	16	TEST DATA

E. Control Devices:

Name and Type (Model and Serial No.)	Contaminant	Efficiency*	Conditions of Operations	Basis for Efficiency (Operational Data, Test, Design, Data)
DC/DA CONTACT SULFURIC ACID PROCESS	SO ₂	99.74	GAS	TEST DATA
BRINK HE & HV DEMISTER	ACID MIST	99.99	PARTICULATE	TEST DATA

*See required supplement.
(Include any test data and/or design data for efficiency substantiation)

F. Fuels

Type (Be Specific, includes %S, etc.)	Daily Consumption *		Maximum Heat Input MBTU/hr.
	Avg./hr.	Max./hr.	

* Units: Natural Gas—MCF/hr.; Fuel Oils, Coal—lbs./hr.

Fuel Analysis:

Percent Sulfur _____ Percent Ash _____

Density _____ lb./gal.

Heat Capacity _____ BTU/lb. _____ BTU/gal.

Other Fuel Contaminants _____

AIR POLLUTION SOURCES & CONTROL DEVICES
(other than incinerators)

A. Identification of Air Contaminants

- 1) Particulates
 a) Dust b) Fly Ash c) Smoke d) Other (Identify)
- 2) Sulfur Compounds
 a) SO_x as SO₂ b) Reduced Sulfur as H₂S c) Other (Identify)
- 3) Nitrogen Compounds
 a) NO_x as NO₂ b) NH₃ c) Other (Identify)
- 4) Fluorides 5) Acid Mist 6) Odor
- 7) Hydrocarbons 8) Volatile Organic Compounds
- 9) Other (Specify) _____

B. Raw Materials and Chemicals Used (Be Specific)

Description	Utilization Rate lbs./hr.	Approximate Contaminant Content		Relate to Flow Diagram
		Type	% Wt.	
SULFUR	43,652	SO ₂	200	SULFUR
AIR	343,073	N/A	N/A	AIR
WATER	24,552	N/A	N/A	WATER

C. Process Rate:

- 1) Total Process input Rate* 4935 TPD Units.
- 2) Product Weight* 1600 TPD - 100% H₂SO₄ Units.
- 3) Normal Operating Time YEAR ROUND, if seasonal describe: N/A
 hrs./day 24 days/wk. 7 wks/yr. 50

D. Airborne Contaminants Discharged:

Name of Contaminant	Actual** Discharge		Discharge Criteria Rate*	Allowable Discharge Lbs./hr.	Relate to Flow Diagram
	lbs./hr.	T/yr.			
SO ₂	230	918	4.0 SO ₂ /T H ₂ SO ₄	267	TO ATMOSPHERE
ACID MIST	4.0	16	0.15#ACID MIST/T 10% OPACITY	10.0	TO ATMOSPHERE

*Refer to Chapter 17-2.04(2), Florida Administrative Code.
 (Discharge Criteria: Rate= #/ton P₂O₅, #/M BTU/hr., etc.)
 **Estimate only if this is an application to construct.

G. Describe briefly, without revealing trade secrets, the processes/operations generating the airborne emissions identified in this application.

DOUBLE CATALYSIS/DOUBLE ABSORPTION CONTACT SULFURIC ACID PLANT

H. Indicate liquid or solid wastes generated and method of disposal.

WASTE HEAT BOILER AND COOLING TOWER BLOWDOWN TO IMPOUNDMENT AREA

I. Emission Stack Geometry and Flow Characteristics, (Provide Date for each Stack).

Stack Height 200 ft, Stack Diameter 7 ft

Gas Flow Rate 75,000 ± ACFM, Gas Exit Temperature 200 ± °F

J. Required Supplements:

1. Total process input rate and product weight — show deviation.

2. Efficiency Estimation.

3. An 8½" x 11" flow diagram, which will, without revealing trade secrets, identify the individual operations and/or processes. Indicate whether raw materials enter, where solid and liquid waste exit, where gaseous emissions and/or airborne particulates are evolved and where finished products are obtained.

4. An 8½" x 11" plot plan showing the exact location of manufacturing processes and outlets for airborne emissions. Relate all flows to the flow diagram.

5. An 8½" x 11" plot plan showing the exact location of the establishment, and points of airborne emissions in relation to the surrounding area, residences and other permanent structures and roadways.

6. If applicable, provide a brief description of the control device or treatment system serving the discharge point for airborne contaminants identified in this application. Include details of the manufacturer, model, size, type and capacity for control/treatment device and the features of the discharge point (height above ground, diameter, period(s) of discharge and discharge temperature).

7. Plans for storm water control during and after construction.

INCINERATOR INFORMATION

NOT APPLICABLE

Type of Waste	Type O (Plastics)	Type I (Rubbish)	Type II (Refuse)	Type III (Garbage)	Type IV (Patho- logical)	Type V (Liq. & Gas By-prod.)	Type VI (Solid By-prod.)
Lbs./Hr. incinerated							

Description of Waste _____

Total Weight Incinerated lbs./hr. _____ Design Capacity lbs./hr. _____

Approximate Number of Hours of Operation per Day _____, days/week _____

Manufacturer _____ Model No. _____

Date Constructed: _____

	Volume (ft. *) ³	Heat Release (BTU/hr.)	Fuel		Temp. (° F)
			Type	BTU/hr.	
Primary Chamber					
Secondary Chamber					

Stack Height: _____ ft. Stack Diameter: _____ Stack Temp.: _____ °F

Type of Pollution Control Device Cyclone Wet scrubber Afterburner
 Other (Specify): _____

Brief Description of Operating Characteristics of Control Device: _____

Ultimate disposal of any effluent other than that emitted from the stack (scrubber water, ash, etc.) _____

INCINERATOR INFORMATION

NOT APPLICABLE

Type of Waste	Type O (Plastics)	Type I (Rubbish)	Type II (Refuse)	Type III (Garbage)	Type IV (Patho- logical)	Type V (Liq. & Gas By-prod.)	Type VI (Solid By-prod.)
Lbs./Hr. incinerated							

Description of Waste _____

Total Weight Incinerated lbs./hr. _____ Design Capacity lbs./hr. _____

Approximate Number of Hours of Operation per Day _____, days/week _____

Manufacturer _____ Model No.: _____

Date Constructed: _____

	Volume (ft. ³ /hr.)	Heat Release (BTU/hr.)	Fuel		Temp. (° F)
			Type	BTU/hr.	
Primary Chamber					
Secondary Chamber					

Stack Height: _____ ft. Stack Diameter: _____ Stack Temp.: _____ °F

Type of Pollution Control Device [] Cyclone [] Wet scrubber [] Afterburner
[] Other (Specify): _____

Brief Description of Operating Characteristics of Control Device: _____

Ultimate disposal of any effluent other than that emitted from the stack (scrubber water, ash, etc.) _____

- G. Describe briefly, without revealing trade secrets, the processes/operations generating the airborne emissions identified in this application.

DOUBLE CATALYSIS/DOUBLE ABSORPTION CONTACT SULFURIC ACID PLANT

- H. Indicate liquid or solid wastes generated and method of disposal.

WASTE HEAT BOILER AND COOLING TOWER BLOWDOWN TO IMPOUNDMENT AREA

- I. Emission Stack Geometry and Flow Characteristics, (Provide Date for each Stack).

Stack Height 200 ft, Stack Diameter 7 ft

Gas Flow Rate 75,000 ± ACFM, Gas Exit Temperature 200 ± °F

- J. Required Supplements:

1. Total process input rate and product weight— show deviation:

2. Efficiency Estimation.

3. An 8½" x 11" flow diagram, which will, without revealing trade secrets, identify the individual operations and/or processes. Indicate whether raw materials enter, where solid and liquid waste exit, where gaseous emissions and/or airborne particulates are evolved and where finished products are obtained.

4. An 8½" x 11" plot plan showing the exact location of manufacturing processes and outlets for airborne emissions. Relate all flows to the flow diagram.

5. An 8½" x 11" plot plan showing the exact location of the establishment, and points of airborne emissions in relation to the surrounding area, residences and other permanent structures and roadways.

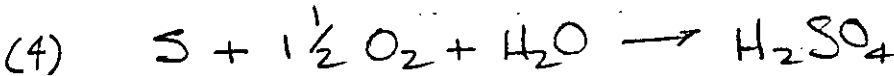
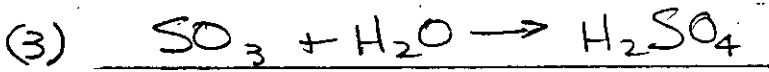
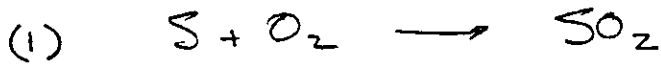
6. If applicable, provide a brief description of the control device or treatment system serving the discharge point for airborne contaminants identified in this application. Include details of the manufacturer, model, size, type and capacity for control/treatment device and the features of the discharge point (height above ground, diameter, period(s) of discharge and discharge temperature).

7. Plans for storm water control during and after construction.

CONTACT SULFURIC ACID PLANT
MATERIAL BALANCE FOR
1600 STPD H₂SO₄ - 100% BASIS

STOICHIOMETRY

MOLE WTS



S = 32
O₂ = 32
H₂O = 18
H₂SO₄ = 98
AIR = 29

MATERIAL BALANCE

PARAMETERS:

FURNACE EXIT GAS AT 11.5% SO₂ BY VOLUME (MOLAR)
STACK GAS AT 3.45 # SO₂ / T H₂SO₄ - 100% BASIS
NO DILUTION AIR

a. SULFUR

$$1600 / 24 \times \frac{32}{98} \times 2000 = 43,537 \text{ \# / HR. S IN PROD.}$$

$$1600 / 24 \times \frac{32}{64} \times 3.45 = \underline{115 \text{ \# / HR. S IN STACK}}$$

$$\underline{\underline{43,652 \text{ \# / HR. S INPUT}}}$$

b. AIR

$$43,652 / 32 = 1364 \text{ mols S / HR IN PUT}$$

$$\text{FROM EQUATION (1)} \quad 1364 \text{ mols S / HR} = 1364 \text{ mols SO}_2 \text{ / HR.}$$

AT 11.5% SO_2 BY VOLUME (MOLAR):

$$1364 / .115 = 11,861 \text{ mols GAS (ALSO AIR)}$$

$$11,861 \times 29 = \underline{\underline{343,073 \text{ \# / HR AIR INPUT}}}$$

C. WATER

FROM EQUATION (4)

$$43,652 / 32 = 1364 \text{ mols S}$$

$$1364 \text{ mols (H}_2\text{O)} \times 18 = \underline{\underline{24,552 \text{ \# / HR H}_2\text{O}}}$$

CALCULATION OF EFFICIENCY AND EMISSIONS

STACK TEST DATA

FDEIR COMPLIANCE TESTS ON MAR 10 & 14, 1983
 AND SEPT. 15 & 16, 1983

	3/10-14	9/15-16
OPERATING RATE :	1498 TPD	1413 TPD
SO ₂ EMISSIONS :	3.45 #/T	3.43 #/T
ACID MIST EMISSIONS:	0.06 #/T	0.06 #/T

DAILY EMISSION

$$1600 \text{ TPD} \times 3.45 \text{ #/T} = \underline{5520 \text{ #/D SO}_2}$$

$$1600 \text{ TPD} \times 0.06 \text{ #/T} = \underline{96 \text{ #/D ACID MIST}}$$

HOURLY EMISSION

$$5520 / 24 = \underline{230 \text{ #/HR SO}_2}$$

$$96 / 24 = \underline{4.0 \text{ #/HR ACID MIST}}$$

ANNUAL EMISSION

ASSUME 95% OPERATING FACTOR

$$5520 \times 7 \times 50 \times .95 / 2000 = \underline{918 \text{ TPY SO}_2}$$

$$96 \times 7 \times 50 \times .95 / 2000 = \underline{16 \text{ TPY ACID MIST}}$$

SULFUR RECOVERY EFFICIENCY

FROM SUPPLEMENT # 1 SHT. 1

SULFUR INPUT 43,652 #/HR

SULFUR IN PRODUCT 43,537 #/HR.

$$\frac{43,537}{43,652} \times 100 = \underline{\underline{99.74\% \text{ S RECOVERY}}}$$

ACID RECOVERY EFFICIENCY

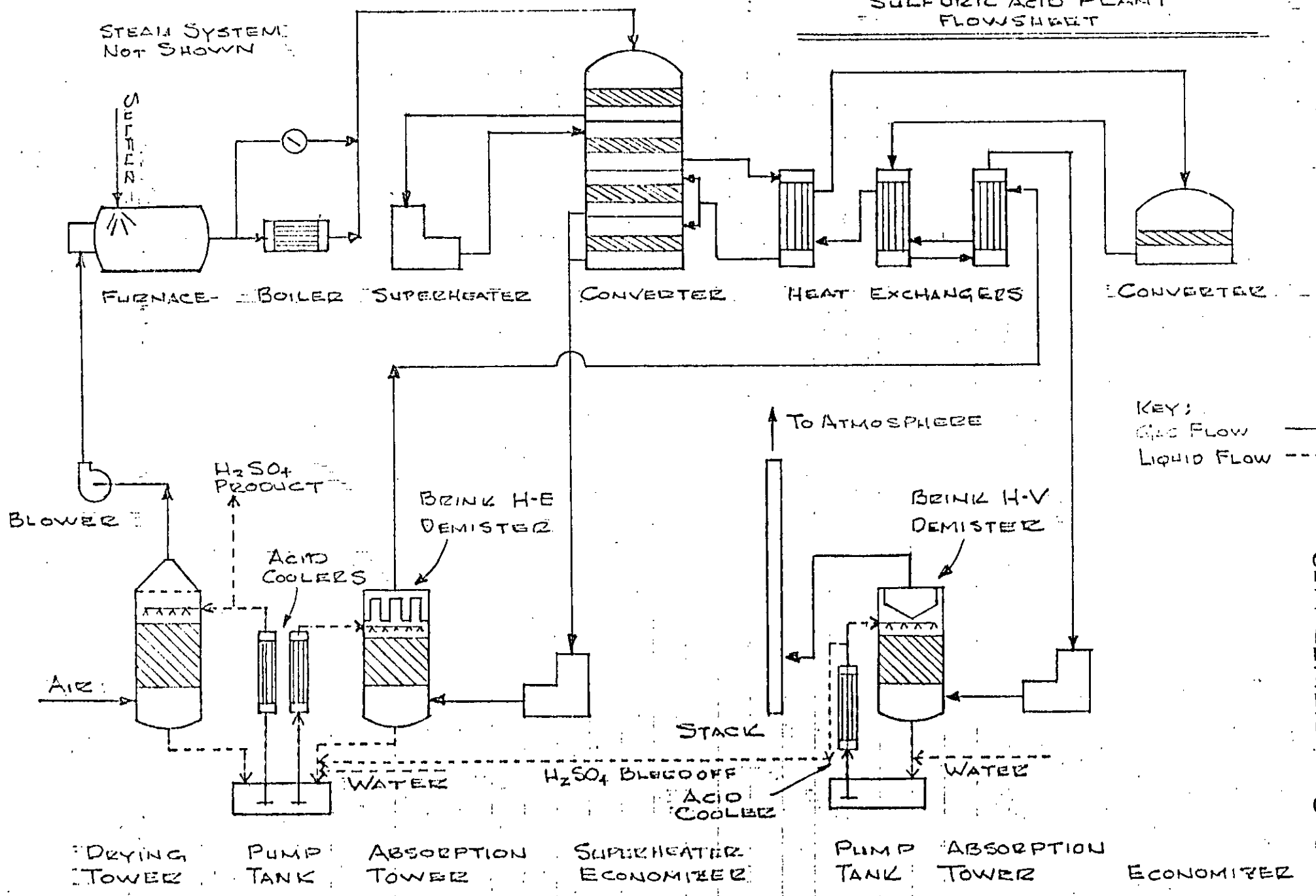
ACID MIST = 0.06 #/T H₂SO₄

$$\frac{2000 - 0.06}{2000} = \underline{\underline{99.99\% \text{ H}_2\text{SO}_4 \text{ RECOVERY}}}$$

OVERALL PLANT EFFICIENCY

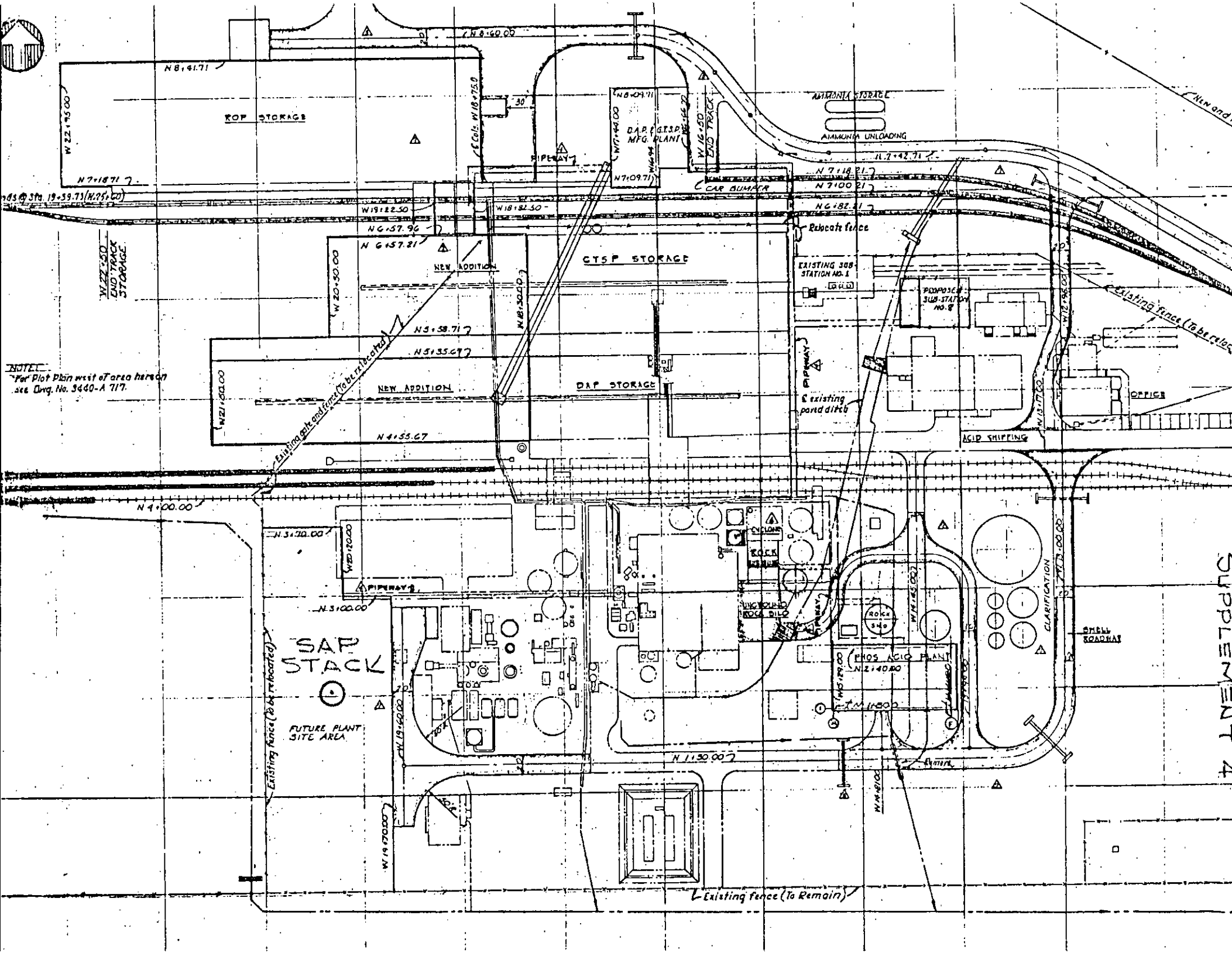
$$0.9974 \times 0.9999 \times 100 = \underline{\underline{99.74\%}} \text{ OVERALL RECOVERY EFFICIENCY}$$

ROYSTER COMPANY
 DOUBLE CONTACT/DOUBLE ABSORPTION
 SULFURIC ACID PLANT
 FLOW SHEET



KEY:
 GAS FLOW ———
 LIQUID FLOW - - -

SUPPLEMENT #3



NOTE:
For Plot Plan west of area hereon
see Div. No. 3440-A 717.

SAP
STACK

FUTURE PLANT
SITE AREA

D.P.F. STORAGE

G.T.S.P. STORAGE

EXISTING SUB-
STATION NO. 1

PROPOSED
SUB-STATION
NO. 2

ACID SHIPPING

PHOS. ACID PLANT

CLARIFICATION

SHELL
ROADWAY

SUPPLEMENT 4

TO LAKE LAND

GN MN
0° 26' 0°
8 MILS

UTM GRID AND 1972 MAGNETIC NORTH DECLINATION AT CENTER OF SHEET

SCALE 1:24000.

T. 29 S.

T. 30 S.

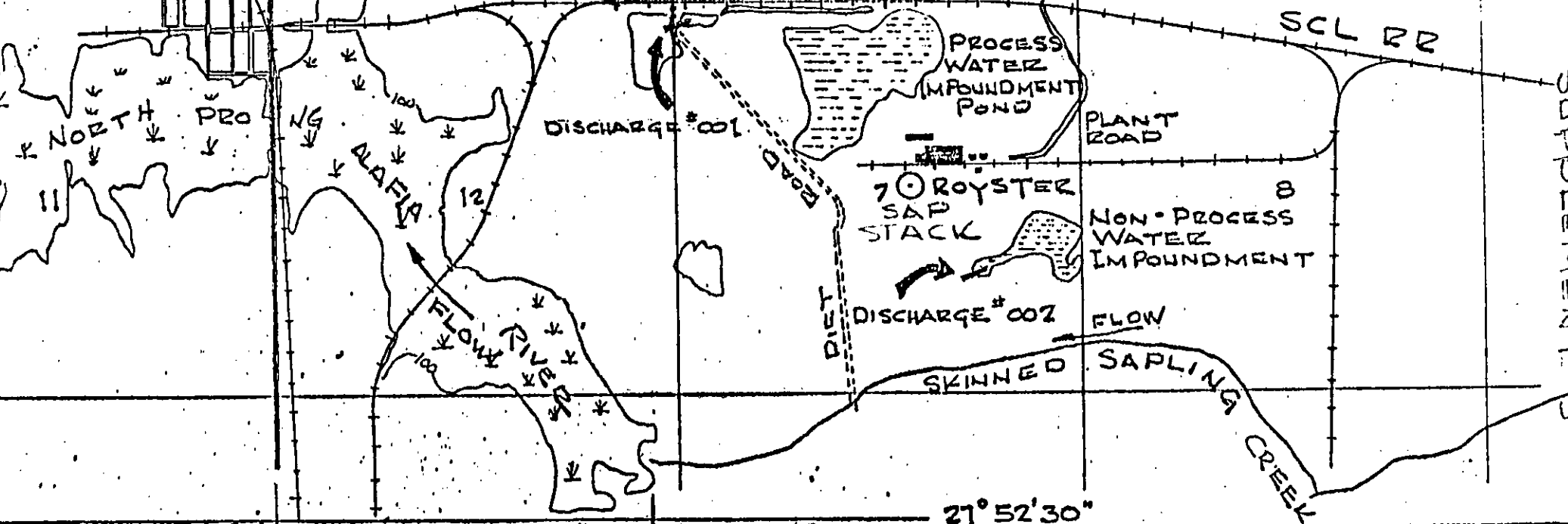
STATE ROAD 37

MULBERRY 1

EAST MULBERRY

STATE ROAD 60 TO BART

SCL RR



PIERCE 2.5 MI.

R23E R24E

81° 57' 30"

21° 52' 30"

LOCATION MAP FROM U.S. GEOLOGICAL SURVEY 194 ROYSTER COMPANY (REV. 197)

DESCRIPTION OF ACID MIST ELIMINATOR ON
2ND ABSORPTION TOWER:

MANUFACTURER: MONSANTO COMPANY

MODEL: BRINK H-V

SIZE: 38 ELEMENTS - 18.5" x 53" TO HANDLE
73,000 ACFM @ 8" W.C. ΔP, 190°F.

SEPERATION SPECIFICATION: WILL REMOVE ACID
MIST AT 100% LARGER THAN 3 MICRON
PARTICLES, 85% OF PARTICLES 1-3 MICRONS,
70% OF PARTICLES 1/2 TO 1 MICRON, LESS
THAN 70% OF PARTICLES SMALLER THAN
1/2 MICRON.

DETAILED DESCRIPTION OF SOURCE
ADDENDUM TO Pg. 2, ITEM A

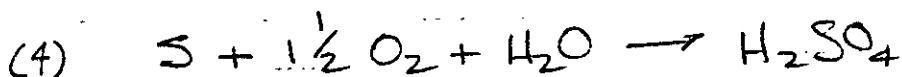
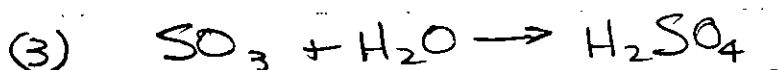
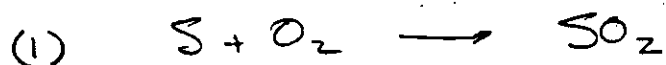
The modifications to the existing Sulfuric Acid Plant will consist of installation of a new 900 PSIG waste heat boiler with an attendant steam superheater, economizers for boiler feedwater pre-heating, and deaeration, and demineralization of boiler feedwater. A new electric motor driven main air blower will also be installed. Acid cooling will be accomplished by newly installed shell and tube heat exchangers and a new cooling tower will be provided to replace two existing towers and provide additional cooling required for the 100% condensation of the turbo-generator supplied steam. In addition new ring type improved catalyst will be installed in the third pass of the converter.

These modifications will in no way effect the process nor the emission rates from the Plant. It is anticipated however that a higher rate of operation will be achievable due to the modifications. A process guarantee by Lurgi Corporation, the engineering/construct firm supplying the new equipment, stipulates an operating rate of 1500 STPD 100% basis sulfuric acid is achievable at recovery efficiency of 99.7%, which is the same as our present operation. An additional stipulation is that all new equipment shall perform within design conditions at 1600 STPD.

CONTACT SULFURIC ACID PLANT
MATERIAL BALANCE FOR
1600 STPD H₂SO₄ - 100% BASIS

STOICHIOMETRY

MOLE WTS



S = 32
O₂ = 32
H₂O = 18
H₂SO₄ = 98
AIR = 29

MATERIAL BALANCE

PARAMETERS:

FURNACE EXIT GAS AT 11.5% SO₂ BY VOLUME (MOLAR)
STACK GAS AT 3.45 # SO₂ / T H₂SO₄ - 100% BASIS
NO DILUTION AIR

a. SULFUR

$$1600 / 24 \times \frac{32}{98} \times 2000 = 43,537 \text{ \# / HR. S IN PROD.}$$

$$1600 / 24 \times \frac{32}{64} \times 3.45 = \underline{115 \text{ \# / HR. S IN STACK}}$$

$$\underline{\underline{43,652 \text{ \# / HR. S INPUT}}}$$

b. AIR

$$43,652 / 32 = 1364 \text{ mols S / HR INPUT}$$

$$\text{FROM EQUATION (1)} \quad 1364 \text{ mols S / HR} = 1364 \text{ mols SO}_2 \text{ / HR}$$

CALCULATION OF EFFICIENCY AND EMISSIONS

STACK TEST DATA

FDEIZ COMPLIANCE TESTS ON MAR. 10 & 14, 1983
AND SEPT. 15 & 16, 1983

	3/10-14	9/15-16
OPERATING DATE :	1498 TPD	1413 TPD
SO ₂ EMISSIONS :	3.45 #/T	3.43 #/T
ACID MIST EMISSIONS:	0.06 #/T	0.06 #/T

DAILY EMISSION

1600 TPD x 3.45 #/T = 5520 #/D SO₂

1600 TPD x 0.06 #/T = 96 #/D ACID MIST

HOURLY EMISSION

5520 / 24 = 230 #/HR SO₂

96 / 24 = 4.0 #/HR ACID MIST

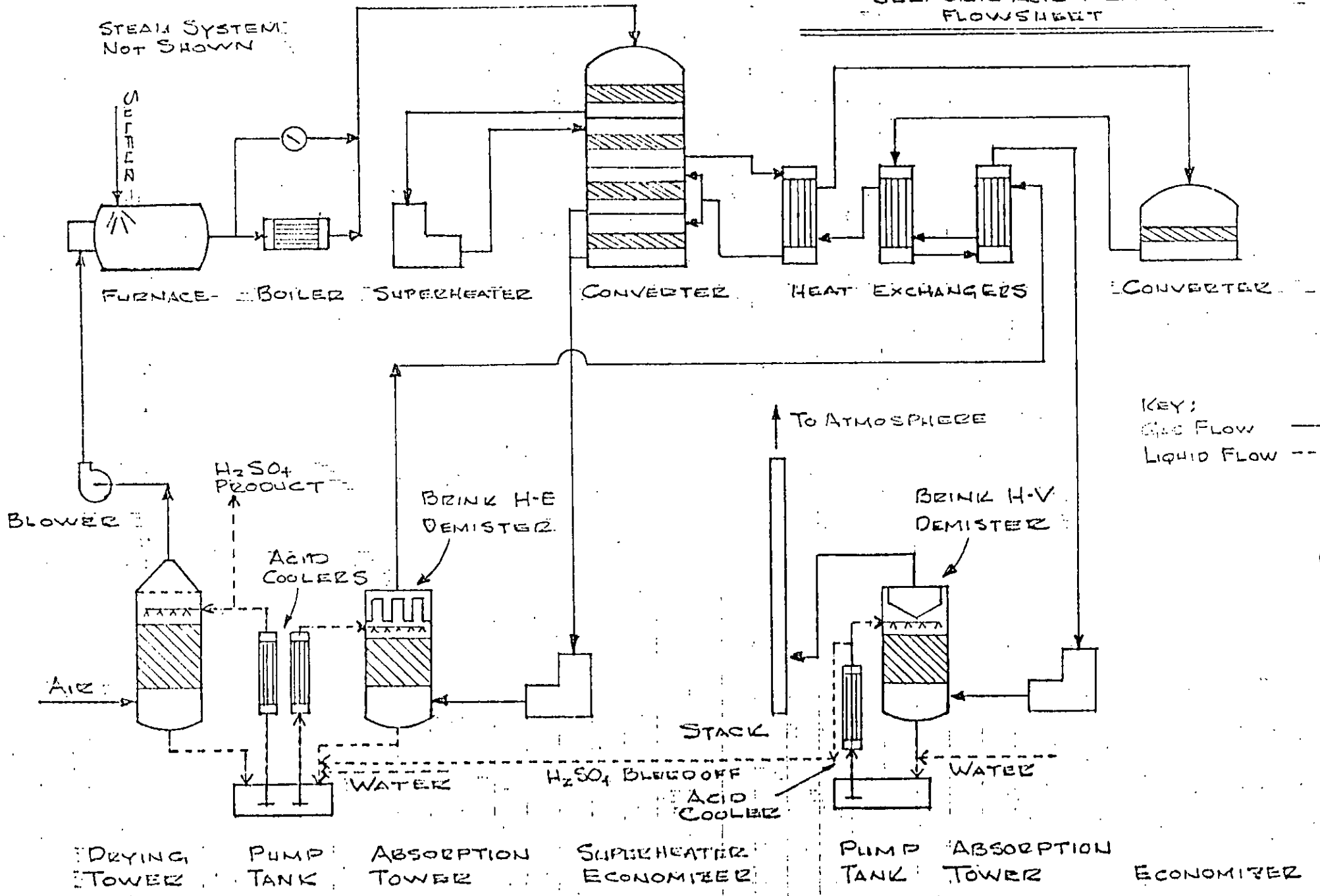
ANNUAL EMISSION

ASSUME 95% OPERATING FACTOR

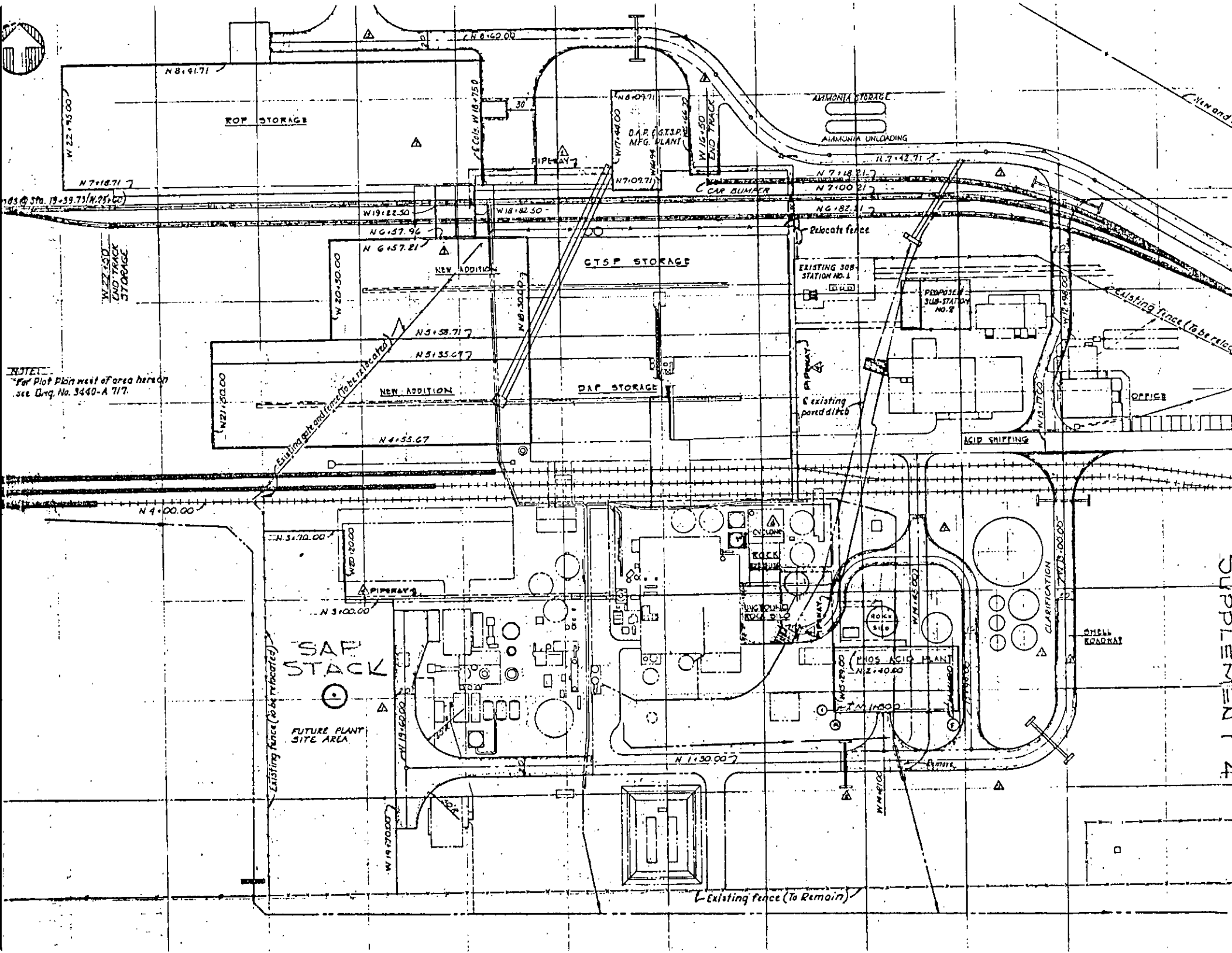
5520 x 7 x 50 x .95 / 2000 = 918 TPY SO₂

96 x 7 x 50 x .95 / 2000 = 16 TPY ACID MIST

ROYSTER COMPANY
 DOUBLE CONTACT/DOUBLE ABSORPTION
 SULFURIC ACID PLANT
 FLOWSHEET



SUPPLEMENT #3



ROP STORAGE

DAP (CTSP) MFG. PLANT

AMMONIA STORAGE
AMMONIA UNLOADING

CTSP STORAGE

DAP STORAGE

EXISTING SUB-STATION NO. 1

PROPOSED SUB-STATION NO. 2

OFFICE

ACID SHIPPING

PHOS ACID PLANT

CLARIFICATION

SHELL STORAGE

SAP STACK

FUTURE PLANT SITE AREA

Existing fence (To Remain)

Existing fence (to be relocated)

Existing gate and fence (to be relocated)

Existing fence (to be relocated)

NOTE:
For Plot Plan west of area herein
see Ord. No. 3440-A 717.

SUPPLEMENT 14

SPR. 19-39.73/N.25.60

New end

TO LAKELAND

GN
0°26'
8MILS
MN
0°

UTM GRID AND 1972 MAGNETIC NORTH DECLINATION AT CENTER OF SHEET

T.29S.

T.30S.

SCALE 1:24000.

STATE ROAD 37

MULBERRY 1

EAST MULBERRY

STATE ROAD 60 TO BART

SCL RR

PROCESS WATER IMPOUNDMENT POND

PLANT ROAD

7 ROYSTER SAP STACK

NON-PROCESS WATER IMPOUNDMENT

DISCHARGE #002

FLOW

SKINNED SAPLING CREEK

DISCHARGE #001

ALAFIA

FLOW RIVER

NORTH PRO

PIERCE 2.5MI.

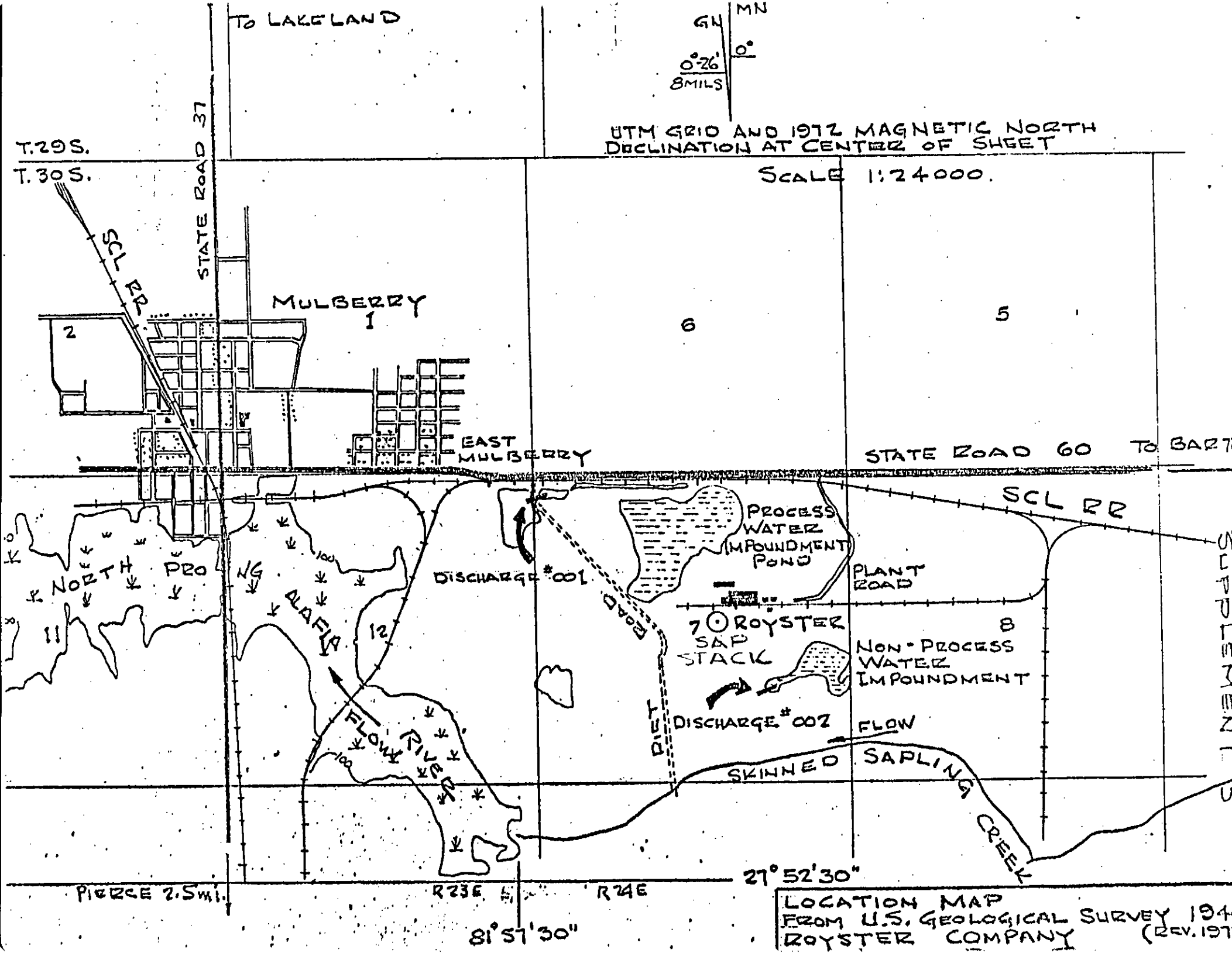
R23E

R24E

27° 52' 30"

81° 57' 30"

LOCATION MAP FROM U.S. GEOLOGICAL SURVEY 194 ROYSTER COMPANY (REV. 197



DESCRIPTION OF ACID MIST ELIMINATOR ON
2ND ABSORPTION TOWER:

MANUFACTURER: MONSANTO COMPANY

MODEL: BRINK H-V

SIZE: 38 ELEMENTS - 18.5" x 53" TO HANDLE
73,000 ACFM @ 8" W.C. ΔP, 190°F.

SEPERATION SPECIFICATION: WILL REMOVE ACID
MIST AT 100% LARGER THAN 3 MICRON
PARTICLES, 85% OF PARTICLES 1-3 MICRONS,
70% OF PARTICLES 1/2 TO 1 MICRON, LESS
THAN 70% OF PARTICLES SMALLER THAN
1/2 MICRON.