KOOGLER & ASSOCIATES
ENVIRONMENTAL SERVICES
4014 NW THIRTEENTH STREET
GAINESVILLE, FLORIDA 32609
904/377-5822 ■ FAX 377-7158

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July 29, 1991

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Division of Air
Resources Management

Mr. Willard Hanks
Florida Department of
Environmental Regulation
Twin Towers Office Building
2600 Blair Stone Road
Tallahassee, FL 32399-2400

Subject: Application for Modification of Molten Sulfur System
Agrico Chemical Company
Mulberry, Florida

Dear Mr. Hanks:

Enclosed are four signed copies of the modification application and a check for $1,000 (permit application fee) for Agrico Chemical Company's molten sulfur system in Mulberry, Polk County, Florida.

If you have any questions concerning this application, please do not hesitate to contact me.

Very truly yours,

KOOGLER & ASSOCIATES

Pradeep A. Raval

Pradeep A. Raval

PAR:wa
Enc.

c: Mr. Phillip Steadham
W. Hanks
B. Thomas, SW Dist.

1031

Air Reg.

AGRICO
Division of Freeport-McMoRan Resource Partners

Agrico Chemical Company
P. O. Box 1110
Mulberry, FL 33860
(813) 428-1431

To Whom It May Concern:

Please be advised that the undersigned is Senior Vice President, Florida Operations, of Agrico Chemical Company, a division of Freeport-McMoRan Resource Partners Limited Partnership, with its principal office at 1615 Poydras Street, New Orleans, Louisiana 70112, hereinafter called "Agrico".

The Environmental Manager of Agrico is authorized to make, execute and submit to any appropriate federal, state or local government authority, in behalf of Agrico, any statement, application, request or the like, that is or shall be necessary, appropriate, or useful, for normal business activities.

Very truly yours,

AGRICO CHEMICAL COMPANY

By [signature]
T. P. Fowler
Senior Vice President,
Florida Operations

AGRICO
Division of Freeport-McMoRan Resource Partners
Agrico Chemical Company

98876

50-937/213

JULY 17, 1991

Pay ********1000*DOLLARS AND 00*CENTS $1,000.00

To The Order Of
FLORIDA DEPT OF ENVIRONMENTAL
REGULATION
2600 BLAIR STONE ROAD
TALLAHASSEE, FL 323992405

Two Signatures Required over $10,000

FREEPORT
Lawrence Glater

Chase Manhattan Bank, Syracuse, New York

⑈098876⑈ ⑆021309379⑆ 601⑈2⑈64542⑈

$1,000 pd.
8-12-91
Recpt. #151295

STATE OF FLORIDA

DEPARTMENT OF ENVIRONMENTAL REGULATION

AC 53-201152

APPLICATION TO [redacted]/CONSTRUCT AIR POLLUTION SOURCES

SOURCE TYPE: Molten Sulfur Storage & Handling System [ ] New[1] [X] Existing[1]

APPLICATION TYPE: [ ] Construction [ ] Operation [X] Modification

COMPANY NAME: Agrico Chemical Company - South Pierce COUNTY: Polk

Identify the specific emission point source(s) addressed in this application (i.e. Lime Kiln No. 4 with Venturi Scrubber; Peaking Unit No. 2, Gas Fired) See Attachment 7

SOURCE LOCATION: Street S.R. 630 City Mulberry

UTM: East (17) 407.5 km North 3071.3 km

Latitude 27 ° 45 ' 52 "N Longitude 81 ° 56 ' 19 "W

APPLICANT NAME AND TITLE: Selwyn Presnell, Environmental Manager

APPLICANT ADDRESS: P.O. Box 1110, Mulberry, Florida 33860

SECTION I: STATEMENTS BY APPLICANT AND ENGINEER

A. APPLICANT

I am the undersigned owner or authorized representative* of Agrico Chemical Company

I certify that the statements made in this application for a construction permit are true, correct and complete to the best of my knowledge and belief. Further I agree to maintain and operate the pollution control source and pollution control facilities in such a manner as to comply with the provision of Chapter 403, Florida Statutes, and all the rules and regulations of the department and revisions thereof. I also understand that a permit, if granted by the department, will be non-transferable and I will promptly notify the department upon sale or legal transfer of the permitted establishment.

*Attach letter of authorization

Signed: Selwyn Presnell

Selwyn Presnell, Environmental Manager
Name and Title (Please Type)

Date: 8-5-91 Telephone No. (813) 428-1431

B. PROFESSIONAL ENGINEER REGISTERED IN FLORIDA (where required by Chapter 471, F.S.)

This is to certify that the engineering features of this pollution control project have been [redacted]/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

[1] See Florida Administrative Code Rule 17-2.100(57) and (104)

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, if authorized by the owner, the applicant a set of instructions for the proper maintenance and operation of the pollution control facilities and, if applicable, pollution sources.

Signed ______________________

John B. Koogler, Ph.D., P.E.
Name (Please Type)

Koogler & Associates, Environmental Services
Company Name (Please Type)

4014 N.W. 13th Street, Gainesville, FL 32609
Mailing Address (Please Type)

Florida Registration No. 12925 Date: 7/29/91 Telephone No. (904) 377-5822

SECTION II: GENERAL PROJECT INFORMATION

A. Describe the nature and extent of the project. Refer to pollution control equipment, and expected improvements in source performance as a result of installation. State whether the project will result in full compliance. Attach additional sheet if necessary.

Application for an increase in the molten sulfur throughput rate from 550,000 tons per year to 650,000 tons per year for the existing molten sulfur storage and handling system at the Agrico South Pierce facility. The project will be in full compliance with all of the applicable regulations.

B. Schedule of project covered in this application (Construction Permit Application Only)

Start of Construction October 1991 Completion of Construction October 1992

C. Costs of pollution control system(s): (Note: Show breakdown of estimated costs only for individual components/units of the project serving pollution control purposes. Information on actual costs shall be furnished with the application for operation permit.)

None

D. Indicate any previous DER permits, orders and notices associated with the emission point, including permit issuance and expiration dates.

AC53-167779 issued: 12/14/89 expired: 01/01/91

AO53-187290, issued: 12/05/90 expires: 12/1/95

E. Requested permitted equipment operating time: hrs/day 24 ; days/wk 7 ; wks/yr 52 ;

if power plant, hrs/yr ____; if seasonal, describe: ____________________

F. If this is a new source or major modification, answer the following questions. (Yes or No) Not Applicable

1. Is this source in a non-attainment area for a particular pollutant? ________

   a. If yes, has "offset" been applied? ________

   b. If yes, has "Lowest Achievable Emission Rate" been applied? ________

   c. If yes, list non-attainment pollutants. ________

2. Does best available control technology (BACT) apply to this source? If yes, see Section VI. ________

3. Does the State "Prevention of Significant Deteriorlation" (PSD) requirement apply to this source? If yes, see Sections VI and VII. ________

4. Do "Standards of Performance for New Stationary Sources" (NSPS) apply to this source? ________

5. Do "National Emission Standards for Hazardous Air Pollutants" (NESHAP) apply to this source? ________

H. Do "Reasonably Available Control Technology" (RACT) requirements apply to this source? No

   a. If yes, for what pollutants? ________

   b. If yes, in addition to the information required in this form, any information requested in Rule 17-2.650 must be submitted.

Attach all supportive information related to any answer of "Yes". Attach any justification for any answer of "No" that might be considered questionable.

SECTION III: AIR POLLUTION SOURCES & CONTROL DEVICES (Other than Incinerators)

A. Raw Materials and Chemicals Used in your Process, if applicable:

Description	Contaminants		Utilization Rate - lbs/hr	Relate to Flow Diagram
	Type	% Wt		
Molten Sulfur	Ash	0.005	150,000	

(See also Attachment 1)

B. Process Rate, if applicable: (See Section V, Item 1)

1. Total Process Input Rate (lbs/hr): 150,000

2. Product Weight (lbs/hr): 150,000

C. Airborne Contaminants Emitted: (Information in this table must be submitted for each emission point, use additional sheets as necessary)

See Attachments 3A, 3B, and 3C

Name of Contaminant	Emission[1]		Allowed[2] Emission Rate per Rule 17-2	Allowable[3] Emission lbs/hr	Potential[4] Emission		Relate to Flow Diagram
	Maximum lbs/hr	Actual T/yr			lbs/yr	T/yr	

[1]See Section V, Item 2.

[2]Reference applicable emission standards and units (e.g. Rule 17-2.600(5)(b)2. Table II, E. (1) - 0.1 pounds per million BTU heat input)

[3]Calculated from operating rate and applicable standard.

[4]Emission, if source operated without control (See Section V, Item 3).

D. Control Devices: (See Section V, Item 4) NONE

Name and Type (Model & Serial No.)	Contaminant	Efficiency	Range of Particles Size Collected (in microns) (If applicable)	Basis for Efficiency (Section V Item 5)

E. Fuels NONE

Type (Be Specific)	Consumption*		Maximum Heat Input (MMBTU/hr)
	avg/hr	max./hr	

*Units: Natural Gas--MMCF/hr; Fuel Oils--gallons/hr; Coal, wood, refuse, other--lbs/hr.

Fuel Analysis:

Percent Sulfur: ______________ Percent Ash: ______________

Density: ______________ lbs/gal Typical Percent Nitrogen: ______________

Heat Capacity: ______________ BTU/lb ______________ BTU/gal

Other Fuel Contaminants (which may cause air pollution): ______________

F. If applicable, indicate the percent of fuel used for space heating. NA

Annual Average ______________ Maximum ______________

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

Small spills of molten sulfur may occur from time to time. The sulfur solidifies upon cooling and is then recovered and sold for recycling.

H. Emission Stack Geometry and Flow Characteristics (Provide data for each stack): NA

Stack Height: ______________ ft. Stack Diameter: ______________ ft.

Gas Flow Rate: __________ ACFM __________ DSCFM Gas Exit Temperature: ______________ °F.

Water Vapor Content: ______________ % Velocity: ______________ FPS

SECTION IV: INCINERATOR INFORMATION

NA

Type of Waste	Type O (Plastics)	Type I (Rubbish)	Type II (Refuse)	Type III (Garbage)	Type IV (Patholog-ical)	Type V (Liq.& Gas By-prod.)	Type VI (Solid By-prod.)
Actual lb/hr Inciner-ated							
Uncon-trolled (lbs/hr)							

Description of Waste ______________________________

Total Weight Incinerated (lbs/hr) ______________ Design Capacity (lbs/hr) ______________

Approximate Number of Hours of Operation per day ______ day/wk ______ wks/yr. ______________

Manufacturer ______________________________

Date Constructed ______________ Model No. ______________

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

Stack Height: __________ ft. Stack Diamter: ______________ Stack Temp. ______________

Gas Flow Rate: ______________ ACFM ______________ DSCFM* Velocity: ______________ FPS

*If 50 or more tons per day design capacity, submit the emissions rate in grains per standard cubic foot dry gas corrected to 50% excess air.

Type of pollution control device: [ ] Cyclone [ ] Wet Scrubber [ ] Afterburner

[ ] Other (specify) ______________________________

Brief description of operating characteristics of control devices: ____________________

____

____

____

____

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

____

____

____

____

NOTE: Items 2, 3, 4, 6, 7, 8, and 10 in Section V must be included where applicable.

SECTION V: SUPPLEMENTAL REQUIREMENTS

Please provide the following supplements where required for this application.

1. Total process input rate and product weight -- show derivation [Rule 17-2.100(127)]
   SEE ATTACHMENT 2
2. To a construction application, attach basis of emission estimate (e.g., design calculations, design drawings, pertinent manufacturer's test data, etc.) and attach proposed methods (e.g., FR Part 60 Methods 1, 2, 3, 4, 5) to show proof of compliance with applicable standards. To an operation application, attach test results or methods used to show proof of compliance. Information provided when applying for an operation permit from a construction permit shall be indicative of the time at which the test was made. SEE ATTACHMENTS 3A, 3B and 3C.
3. Attach basis of potential discharge (e.g., emission factor, that is, AP42 test).
   SEE ATTACHMENTS 3A, 3B and 3C.
4. With construction permit application, include design details for all air pollution control systems (e.g., for baghouse include cloth to air ratio; for scrubber include cross-section sketch, design pressure drop, etc.) NA
5. With construction permit application, attach derivation of control device(s) efficiency. Include test or design data. Items 2, 3 and 5 should be consistent: actual emissions = potential (1-efficiency). NA
6. An 8 1/2" x 11" flow diagram which will, without revealing trade secrets, identify the individual operations and/or processes. Indicate where raw materials enter, where solid and liquid waste exit, where gaseous emissions and/or airborne particles are evolved and where finished products are obtained.
   SEE ATTACHMENT 4
7. An 8 1/2" x 11" plot plan showing the location of the establishment, and points of airborne emissions, in relation to the surrounding area, residences and other permanent structures and roadways (Example: Copy of relevant portion of USGS topographic map).
   SEE ATTACHMENT 5
8. An 8 1/2" x 11" plot plan of facility showing the location of manufacturing processes and outlets for airborne emissions. Relate all flows to the flow diagram.
   SEE ATTACHMENT 6

9. The appropriate application fee in accordance with Rule 17-4.05. The check should be made payable to the Department of Environmental Regulation. $1,000 (similar sources)

10. With an application for operation permit, attach a Certificate of Completion of Construction indicating that the source was constructed as shown in the construction permit. NA

SECTION VI: BEST AVAILABLE CONTROL TECHNOLOGY

NOT APPLICABLE

A. Are standards of performance for new stationary sources pursuant to 40 C.F.R. Part 60 applicable to the source?

[ ] Yes [ ] No

Contaminant	Rate or Concentration

B. Has EPA declared the best available control technology for this class of sources (If yes, attach copy)

[ ] Yes [ ] No

Contaminant	Rate or Concentration

C. What emission levels do you propose as best available control technology?

Contaminant	Rate or Concentration

D. Describe the existing control and treatment technology (if any).

1. Control Device/System:
2. Operating Principles:
3. Efficiency:*
4. Capital Costs:

*Explain method of determining

5. Useful Life:

6. Operating Costs:

7. Energy:

8. Maintenance Cost:

9. Emissions:

Contaminant	Rate or Concentration

10. Stack Parameters

a. Height: ft.

b. Diameter: ft.

c. Flow Rate: ACFM

d. Temperature: °F.

e. Velocity: FPS

E. Describe the control and treatment technology available (As many types as applicable, use additional pages if necessary).

1.

a. Control Device:

b. Operating Principles:

c. Efficiency:[1]

d. Capital Cost:

e. Useful Life:

f. Operating Cost:

g. Energy:[2]

h. Maintenance Cost:

i. Availability of construction materials and process chemicals:

j. Applicability to manufacturing processes:

k. Ability to construct with control device, install in available space, and operate within proposed levels:

2.

a. Control Device:

b. Operating Principles:

c. Efficiency:[1]

d. Capital Cost:

e. Useful Life:

f. Operating Cost:

g. Energy:[2]

h. Maintenance Cost:

i. Availability of construction materials and process chemicals:

[1]Explain method of determining efficiency.
[2]Energy to be reported in units of electrical power - KWH design rate.

j. Applicability to manufacturing processes:

k. Ability to construct with control device, install in available space, and operate within proposed levels:

3.

a. Control Device:

b. Operating Principles:

c. Efficiency:[1]

d. Capital Cost:

e. Useful Life:

f. Operating Cost:

g. Energy:[2]

h. Maintenance Cost:

i. Availability of construction materials and process chemicals:

j. Applicability to manufacturing processes:

k. Ability to construct with control device, install in available space, and operate within proposed levels:

4.

a. Control Device:

b. Operating Principles:

c. Efficiency:[1]

d. Capital Costs:

e. Useful Life:

f. Operating Cost:

g. Energy:[2]

h. Maintenance Cost:

i. Availability of construction materials and process chemicals:

j. Applicability to manufacturing processes:

k. Ability to construct with control device, install in available space, and operate within proposed levels:

F. Describe the control technology selected:

1. Control Device:

2. Efficiency:[1]

3. Capital Cost:

4. Useful Life:

5. Operating Cost:

6. Energy:[2]

7. Maintenance Cost:

8. Manufacturer:

9. Other locations where employed on similar processes:

a. (1) Company:

(2) Mailing Address:

(3) City:

(4) State:

[1]Explain method of determining efficiency.
[2]Energy to be reported in units of electrical power - KWH design rate.

(5) Environmental Manager:

(6) Telephone No.:

(7) Emissions:[1]

Contaminant	Rate or Concentration

(8) Process Rate:[1]

b. (1) Company:

(2) Mailing Address:

(3) City: (4) State:

(5) Environmental Manager:

(6) Telephone No.:

(7) Emissions:[1]

Contaminant	Rate or Concentration

(8) Process Rate:[1]

10. Reason for selection and description of systems:

[1]Applicant must provide this information when available. Should this information not be available, applicant must state the reason(s) why.

SECTION VII - PREVENTION OF SIGNIFICANT DETERIORATION

NOT APPLICABLE

A. Company Monitored Data

1. ________ no. sites ________ TSP ________ ( ) SO^2* ________ Wind spd/dir

Period of Monitoring ____/____/____ to ____/____/____
month day year month day year

Other data recorded ________________________________

Attach all data or statistical summaries to this application.

*Specify bubbler (B) or continuous (C).

2. Instrumentation, Field and Laboratory

a. Was instrumentation EPA referenced or its equivalent? [ ] Yes [ ] No

b. Was instrumentation calibrated in accordance with Department procedures?

[ ] Yes [ ] No [ ] Unknown

B. Meteorological Data Used for Air Quality Modeling

1. _____ Year(s) of data from ____/____/____ to ____/____/____
month day year month day year

2. Surface data obtained from (location)________________________________

3. Upper air (mixing height) data obtained from (location)________________________

4. Stability wind rose (STAR) data obtained from (location)______________________

C. Computer Models Used

1. ______________________________ Modified? If yes, attach description.

2. ______________________________ Modified? If yes, attach description.

3. ______________________________ Modified? If yes, attach description.

4. ______________________________ Modified? If yes, attach description.

Attach copies of all final model runs showing input data, receptor locations, and principle output tables.

D. Applicants Maximum Allowable Emission Data

Pollutant	Emission Rate	
TSP	______________________	grams/sec
SO^2	______________________	grams/sec

E. Emission Data Used in Modeling

Attach list of emission sources. Emission data required is source name, description of point source (on NEDS point number), UTM coordinates, stack data, allowable emissions, and normal operating time.

F. Attach all other information supportive to the PSD review.

G. Discuss the social and economic impact of the selected technology versus other applicable technologies (i.e., jobs, payroll, production, taxes, energy, etc.). Include assessment of the environmental impact of the sources.

H. Attach scientific, engineering, and technical material, reports, publications, journals, and other competent relevant information describing the theory and application of the requested best available control technology.

ATTACHMENT 1

MOLTEN SULFUR CONTAMINANTS

The following contaminants are present in the vapor space above molten sulfur in the concentrations shown:

	Concentration, lb/acf
Sulfur Particulate	1.757×10^{-5}
Hydrogen Sulfide	$1.719 \times 10^{-2} x (V^{-0.938})$*
Sulfur Dioxide	5.472×10^{-6}
Volatile Organic Compounds	5.224×10^{-5}
Total Reduced Sulf. Compounds	$1.719 \times 10^{-2} x (V^{-0.938})$*

* where V - ventilation rate (acf) to the -0.938 power

ATTACHMENT 2

SECTION V.I: SULFUR THROUGHPUT RATES

All the molten sulfur received by the molten sulfur system is supplied to the sulfuric acid plants. The molten sulfur throughput rates for the purpose of permitting are as follows:

TRUCK RECEIVING THROUGHPUT	=	585,000 TPY
RAIL RECEIVING THROUGHPUT	=	65,000 TPY
TOTAL SYSTEM THROUGHPUT	=	650,000 TPY
MAXIMUM DAILY RECEIVING RATE	=	2050 TPD

Individual transfer operation rates are presented in Attachment 3.

ATTACHMENT 3A

BASIS OF EMISSIONS ESTIMATE FOR TRUCK RECEIVING PIT

ASSUMPTIONS

1. Plant sulfur throughput is 650,000 tpy based on two sulfuric acid plants operating at 2700 tpd, 365 dpy.

   = (2 plants x 2700 tpd)(365 dpy)(0.329 ton S/ton H_2SO_4)
   = 648,459 tpy ~ 650,000 tpy

2. Truck receiving pit throughput is 90% of plant throughput, or 585,000 tpy.

3. Rail receiving pit throughput is 10% of plant throughput, or 65,000 tpy.

4. Truck pit has forced ventilation rate of 2700 cfm, by two fans, 1350 cfm each and a capacity of 600 tons.

5. The head space over the molten sulfur is 3000 cu. ft., based on dimensions of the pit and freeboard.

6. Sulfur particle concentration in vent gas when pit is being filled is 0.2 grains/dscf (based on data obtained from Koogler and Enviroplan).

7. Sulfur vapor concentration in the truck pit at a 300 minute/turnover ventilation rate is at equilibrium with an equilibrium concentration of 0.2 grains/cu. ft. At a 0 minute/turnover ventilation rate (infinite dilution), the sulfur vapor concentration would be 0 grains/cu. ft. The sulfur vapor concentration was approximated with a first order equation (see attached curve), which uses the above boundary conditions and forces the concentration to 10% of the equilibrium value at a one minute/turnover ventilation rate.

EMISSIONS

Sulfur Particulate

= (2 vents x 1350 cfm) x 60 min/hr x 0.2 grains/cu ft

x 0.1 x 1/7000 lb/grain

= 0.46 lb/hr

x 8760 hrs/yr x ton/2000 lbs

= 2.03 tpy

Hydrogen Sulfide, Sulfur Dioxide, and Volatile Organics

Equilibrium concentrations:

H2S = 0.303 grains/cu ft
SO2 = 0.515 grains/cu ft
VOC = 5.224×10^{-5} lb/cu ft

Total ventilation = 2700 cu ft/min

H2S Emissions = 2700 cu ft/min x 60 min/hr x 0.303 grains/cu ft

x 0.1 x 1/7000 lb/grain

= 0.70 lb/hr

x 8760 hrs/yr x ton/2000 lbs

= 3.07 tpy

SO2 Emissions = 2700 cu ft/min x 60 min/hr x 0.515 grains/cu ft

x 0.1 x 1/7000 lb/grain

= 1.19 lb/hr

x 8760 hrs/yr x ton/2000 lbs

= 5.22 tpy

VOC Emissions = 2700 cu ft/min x 60 min/hr x 5.224×10^{-5} lb/cu ft

x 0.1

= 0.85 lb/hr

x 8760 hrs/yr x ton/2000 lbs

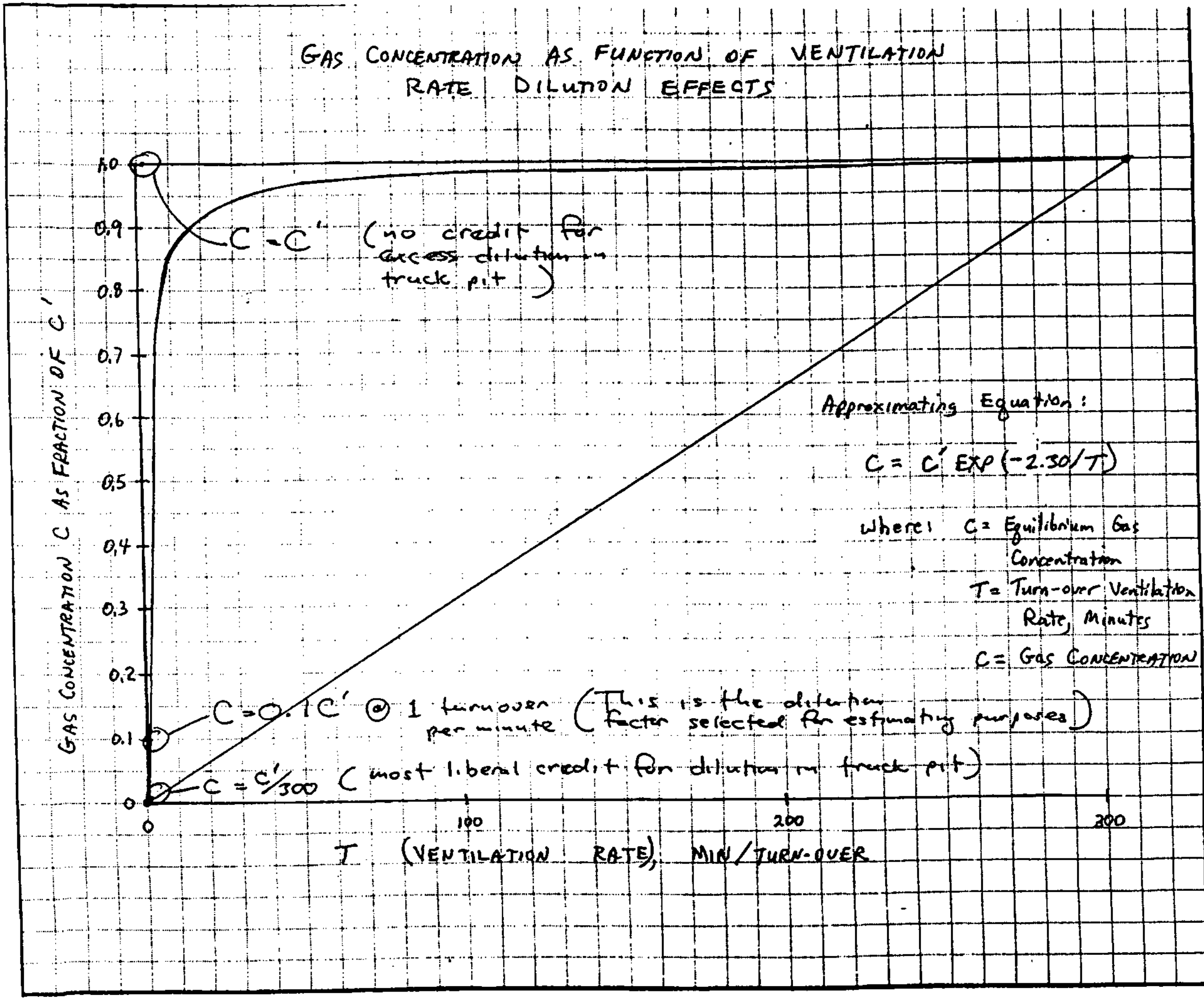
= 3.71 tpy

REFERENCES FOR EMISSION ESTIMATES

1. SULFUR PARTICULATE -- prepared by Dr. John B. Koogler, Koogler & Associates, Gainesville, Florida, for Agrico Chemical Company using actual measurements of a similar system and data obtained from Enviroplan, Inc.

2. HYDROGEN SULFIDE, SULFUR DIOXIDE and VOLATILE ORGANICS -- prepared by Dr. John B. Koogler for Agrico Chemical Company using data collected at Sulfur Terminals (Tampa) in November 1983 and other data collected by Enviroplan, Inc.

3. VOLATILE ORGANIC COMPOUNDS -- prepared by Dr. John B. Koogler for Agrico Chemical Company using concentration data obtained from Enviroplan, Inc.



ENVIRONMENTAL SERVICES
4014 NW THIRTEENTH STREET
GAINESVILLE, FLORIDA 32609
904/377-5822 • FAX 377-7158

JOB
CALCULATED BY ______ DATE
SHEET NO. ______ OF

ATTACHMENT 3B

BASIS OF EMISSION ESTIMATES FOR RAIL RECEIVING PIT

ASSUMPTIONS

Applicable assumptions incorporated by reference from Attachment 3A.

In addition, the following assumptions are noted:

1. Rail receiving pit capacity is 100 tons.

2. The pit has two vents with a ventilation rate of 18 cu ft/min/vent plus the volume of air displaced during filling of the pit.

3. Sulfur is transferred from a 90 ton rail car at a rate of one car/hr. Sulfur is pumped to the west storage tank at a rate of 90 tph.

4. The rail pit is empty when sulfur transfer is not occurring.

5. The ventilation rate during filling is 3767 cu ft/hr. This is based on the following:

   = (2 vents x 18 cfm/vent x 60 min/hr) + volume displaced by the sulfur during filling of the pit.

   = 2160 + 1607 = 3767 cu ft/hr

6. The sulfur particulate concentration = 0.2 grains/cu ft.

7. Annual use of the pit is about 65,000 tpy/90 tph, or about 722 hrs/yr.

EMISSIONS

Sulfur Particulate

= 3767 cu ft/hr x 0.2 grains/cu ft

x 1/7000 lb/grain

= 0.11 lb/hr

x 722 hrs/yr x ton/2000 lbs

= 0.04 tpy

x 2000/8760

= 0.01 lb/hr, average

Hydrogen Sulfide, Sulfur Dioxide and Volatile Organics

Equilibrium concentrations:

H2S = 0.303 grains/cu ft
SO2 = 0.515 grains/cu ft
VOC = 5.224×10^{-5} lb/cu ft

Total Ventilation = 3767 cu ft/hr

Transfer Time = 722 hrs/yr

H2S Emissions = 3767 cu ft/hr x 0.303 grains/cu ft

x 1/7000 lb/grain

= 0.16 lb/hr

x 722 hrs/yr x ton/2000 lbs

= 0.06 tpy

x 2000/8760

= 0.01 lb/hr, average

SO_2 Emissions = 3767 cu ft/hr x 0.515 grains/cu ft

x 1/7000 lb/grain

= 0.28 lb/hr

x 722 hrs/yr x ton/2000 lbs

= 0.10 tpy

x 2000/8760

= 0.02 lb/hr, average

VOC Emissions = 3767 cu ft/hr x 5.224 x 10^{-5} lb/cu ft

= 0.20 lb/hr

x 722 hrs/yr x ton/2000 lbs

= 0.07 tpy

x 2000/8760

= 0.02 lb/hr, average

REFERENCES

1. SULFUR PARTICULATE -- prepared by Dr. John B. Koogler, Koogler & Associates, Gainesville, Florida, for Agrico Chemical Company using actual measurements of a similar system and data obtained from Enviroplan, Inc.

2. HYDROGEN SULFIDE, SULFUR DIOXIDE and VOLATILE ORGANICS -- prepared by Dr. John B. Koogler for Agrico Chemical Company using data collected at Sulfur Terminals (Tampa) in November 1983 and other data collected by Enviroplan, Inc.

3. VOLATILE ORGANIC COMPOUNDS -- prepared by Dr. John B. Koogler for Agrico Chemical Company using concentration data obtained from Enviroplan, Inc.

ATTACHMENT 3C

BASIS OF EMISSION ESTIMATE FOR STORAGE TANKS

ASSUMPTIONS

Applicable assumptions incorporated by reference from Attachment 3A.

In addition, the following assumptions are noted:

1. All sulfur delivered by rail and 20% delivered by truck is transferred to storage tanks. This is about:

   = 65,000 + (0.2 x 585,000) = 182,000 tpy

2. The transfer rate from truck pit to storage tanks is 425 gpm, or about 190 tph.

   = 425 gpm x 60 min/hr x 1/7.5 gal/cu ft x 112 lb sulfur/cu ft

   x 1/2000 ton/lb

   = 190 tph

3. Sulfur throughput is divided evenly between the two tanks.

4. Ventilation rates are:

   a. 65,000 tpy from rail cars is transferred at a rate of 90 tph, which displaces 27 cu ft/min.

   b. 117,000 tpy from truck pit is transferred at a rate of 190 tph, which displaces about 57 cu ft/min.

   c. Wind induced ventilation from each 5 vent tank is about 90 cu ft/min (5 vents x 18 cfm/vent).

EMISSIONS

Sulfur Particulate

A. During filling from truck pit, based on 57 + 90 = 147 cu ft/min total ventilation rate and a sulfur particle concentration of 0.2 grains/cu ft:

Transfer time = 117,000 tons/190 tph = 616 hrs/yr

Time per tank = 616/2 = 308 hrs/yr

Emissions = 147 cu ft/min x 60 min/hr

x 0.2 grains/cu ft x 1/7000 lb/grain

= 0.25 lb/hr

x 308 hrs/yr x ton/2000 lbs

= 0.04 tpy

B. During filling from rail pit, based on 27 + 90 = 117 cu ft total ventilation rate and a sulfur particle concentration of 0.2 grains/cu ft:

Transfer time = 65,000 tons/90 tph = 722 hrs/yr

Time per tank = 722/2 = 361 hrs/yr

Emissions = 117 cu ft/min x 60 min/hr

x 0.2 grains/cu ft x 1/7000 lb/grain

= 0.20 lb/hr

x 361 hrs/yr x ton/2000 lbs

= 0.04 tpy

C. During withdrawal or when idle, based on a 90 cu ft total ventilation rate and a sulfur particle concentration of 0.2 grains/cu ft:

Time = 8760 hrs/yr - (308 + 361) = 8091 hrs/yr

Emissions = 90 cu ft/min x 60 min/hr

x 0.2 grains/cu ft x 1/7000 lb/grain

= 0.15 lb/hr

x 8091 hrs/yr x ton/2000 lbs

= 0.62 tpy

Total Tank Emissions:

= 0.04 + 0.04 + 0.62 = 0.70 tpy, for each tank

x 2000/8760

= 0.16 lb/hr, average, for each tank

Hydrogen Sulfide, Sulfur Dioxide and Volatile Organics

Equilibrium concentrations:

H_2S = 0.303 grains/cu ft
SO_2 = 0.515 grains/cu ft
VOC = 5.224×10^{-5} lb/cu ft

A. Emissions from tank during filling from truck pit:

Total ventilation = 147 cu ft/min

Transfer Time = 308 hrs/yr (per tank)

H_2S Emissions = 147 cu ft/min x 60 min/hr

x 0.303 grains/cu ft x 1/7000 lb/grain

= 0.38 lb/hr

x 308 hrs/yr x ton/2000 lbs

= 0.06 tpy

On the same basis, using equilibrium concentrations shown above, the emissions of SO_2 and VOCs may be calculated.

SO_2 Emissions = 147 cu ft/min x 60 min/hr

x 0.515 grains/cu ft x 1/7000 lb/grain

= 0.65 lb/hr

x 308 hrs/yr x ton/2000 lbs

= 0.10 tpy

VOC Emissions = 147 cu ft/min x 60 min/hr

x 5.224×10^{-5} lb/cu ft

= 0.46 lb/hr

x 308 hrs/yr x ton/2000 lbs

= 0.07 tpy

B. Emissions from tank during filling from rail pit:

Total ventilation = 117 cu ft/min

Transfer Time = 361 hrs/yr (per tank)

H2S Emissions = 117 cu ft/min x 60 min/hr

x 0.303 grains/cu ft x 1/7000 lb/grain

= 0.30 lb/hr

x 361 hrs/yr x ton/2000 lbs

= 0.05 tpy

On the same basis, using equilibrium concentrations shown above, the emissions of SO2 and VOCs may be calculated.

SO2 Emissions = 117 cu ft/min x 60 min/hr

x 0.515 grains/cu ft x 1/7000 lb/grain

= 0.52 lb/hr

x 361 hrs/yr x ton/2000 lbs

= 0.09 tpy

VOC Emissions = 117 cu ft/min x 60 min/hr

x 5.224×10^{-5} lb/cu ft

= 0.37 lb/hr

x 361 hrs/yr x ton/2000 lbs

= 0.07 tpy

C. Emissions from tank when idle or sulfur is withdrawn:

Total ventilation = 90 cu ft/min

Ventilation Time = 8091 hrs/yr (per tank)

H2S Emissions = 90 cu ft/min x 60 min/hr

x 0.303 grains/cu ft x 1/7000 lb/grain

= 0.23 lb/hr

x 8091 hrs/yr x ton/2000 lbs

= 0.95 tpy

On the same basis, using equilibrium concentrations shown above, the emissions of SO2 and VOCs may be calculated.

SO2 Emissions = 90 cu ft/min x 60 min/hr

x 0.515 grains/cu ft x 1/7000 lb/grain

= 0.40 lb/hr

x 8091 hrs/yr x ton/2000 lbs

= 1.6 tpy

VOC Emissions = 90 cu ft/min x 60 min/hr

x 5.224 x 10^{-5} lb/cu ft

= 0.28 lb/hr

x 8091 hrs/yr x ton/2000 lbs

= 1.14 tpy

D. H2S, SO2 and VOC Emissions for each tank:

H2S = 0.06 + 0.05 + 0.95 = 1.06 tpy

x 2000/8760

= 0.24 lb/hr, average

SO2 = 0.10 + 0.09 + 1.6 = 1.79 tpy

x 2000/8760

= 0.41 lb/hr, average

VOC = 0.07 + 0.07 + 1.14 = 1.28 tpy

x 2000/8760

= 0.29 lb/hr, average

MOLTEN SULFUR STORAGE AND HANDLING SYSTEM

EMISSION ESTIMATES SUMMARY

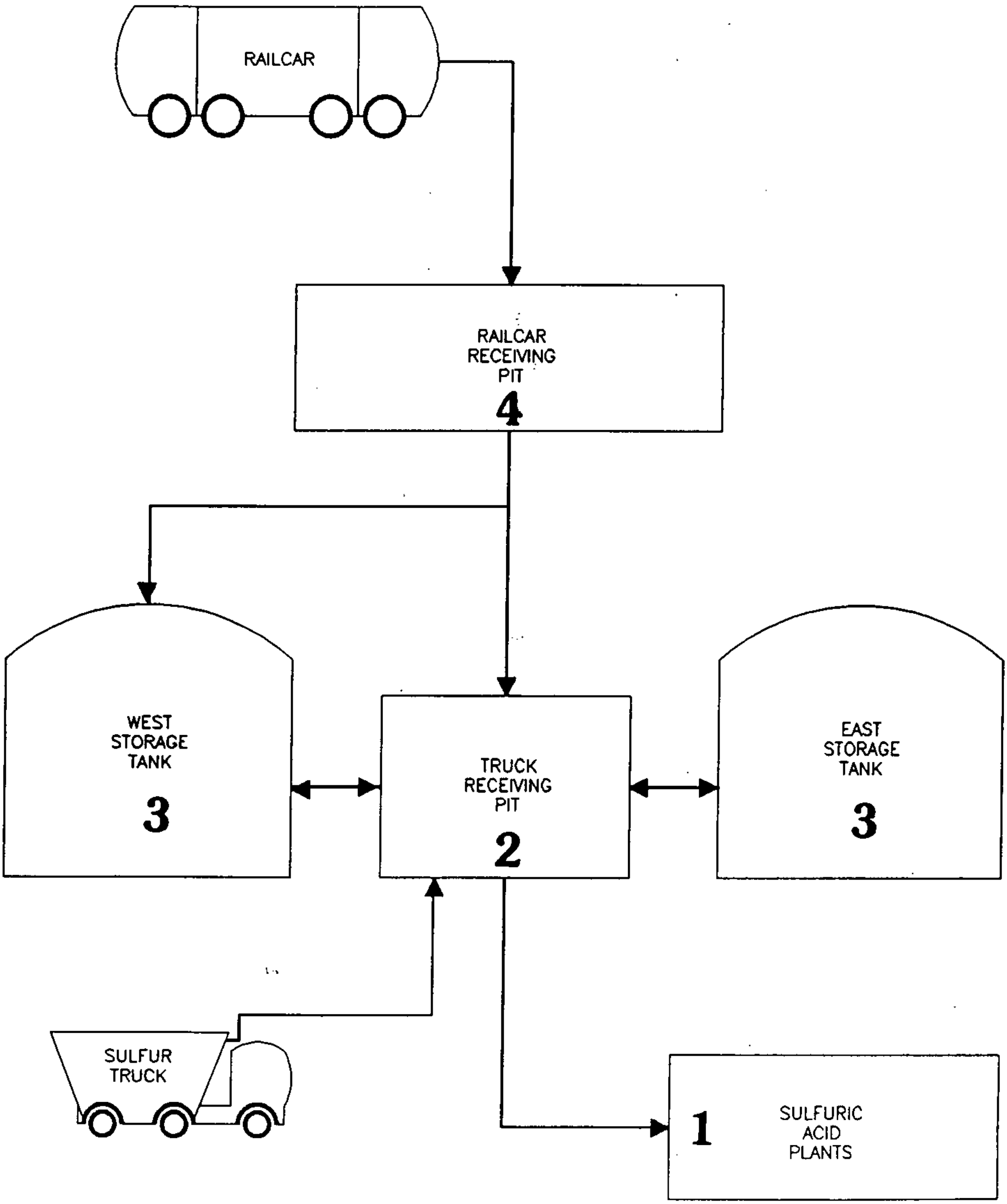
SOURCE		PM/PM10	SP	SO_2	TRS/H_2S	VOC
East Tank	lb/hr (max)	0.50	0.25	0.65	0.38	0.46
	lb/hr (avg)	0.32	0.16	0.41	0.24	0.29
(No. 1)	TPY	1.40	0.70	1.79	1.06	1.28
West Tank	lb/hr (max)	0.50	0.25	0.65	0.38	0.46
	lb/hr (avg)	0.32	0.16	0.41	0.24	0.29
(No. 2)	TPY	1.40	0.70	1.79	1.06	1.28
Truck Pit	lb/hr (max)	0.92	0.46	1.19	0.70	0.85
	TPY	4.06	2.03	5.22	3.07	3.71
Rail Pit	lb/hr (max)	0.22	0.11	0.28	0.16	0.20
	lb/hr (avg)	0.02	0.01	0.02	0.01	0.02
	TPY	0.08	0.04	0.10	0.06	0.07

NOTE: PM/PM10 emissions are assumed to be approximately double the SP (sulfur particulate) emissions as per the original air construction permit, AC53-167779.

NET EMISSIONS INCREASE

TONS PER YEAR	PM/PM10	SP	SO_2	TRS/H_2S	VOC
Permitted	5.8	2.9	7.1	4.2	5.2
Proposed	6.9	3.5	8.9	5.3	6.3
Net Change	1.1	0.6	1.8	1.1	1.1

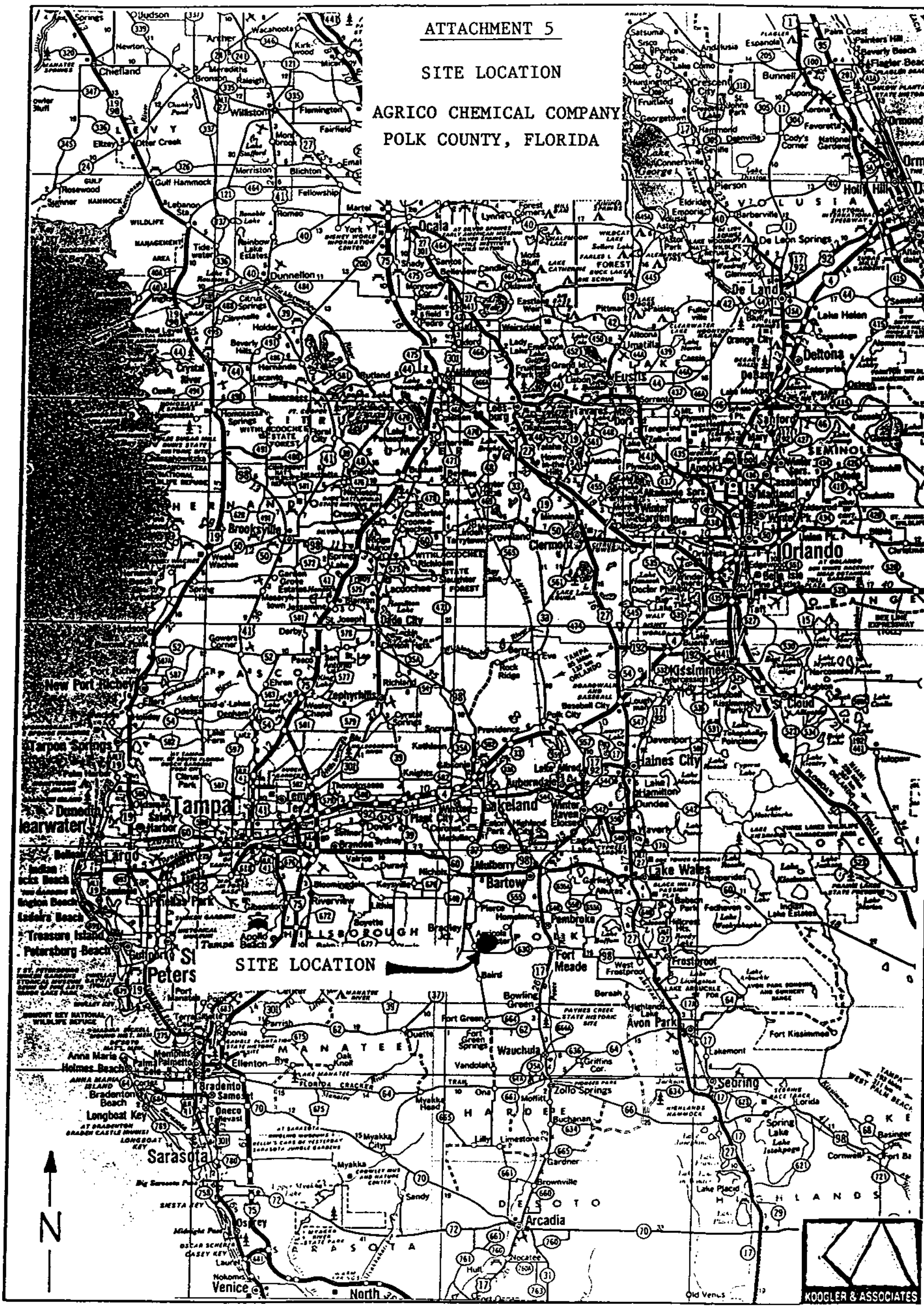
MOLTEN SULFUR STORAGE AND HANDLING FACILITY

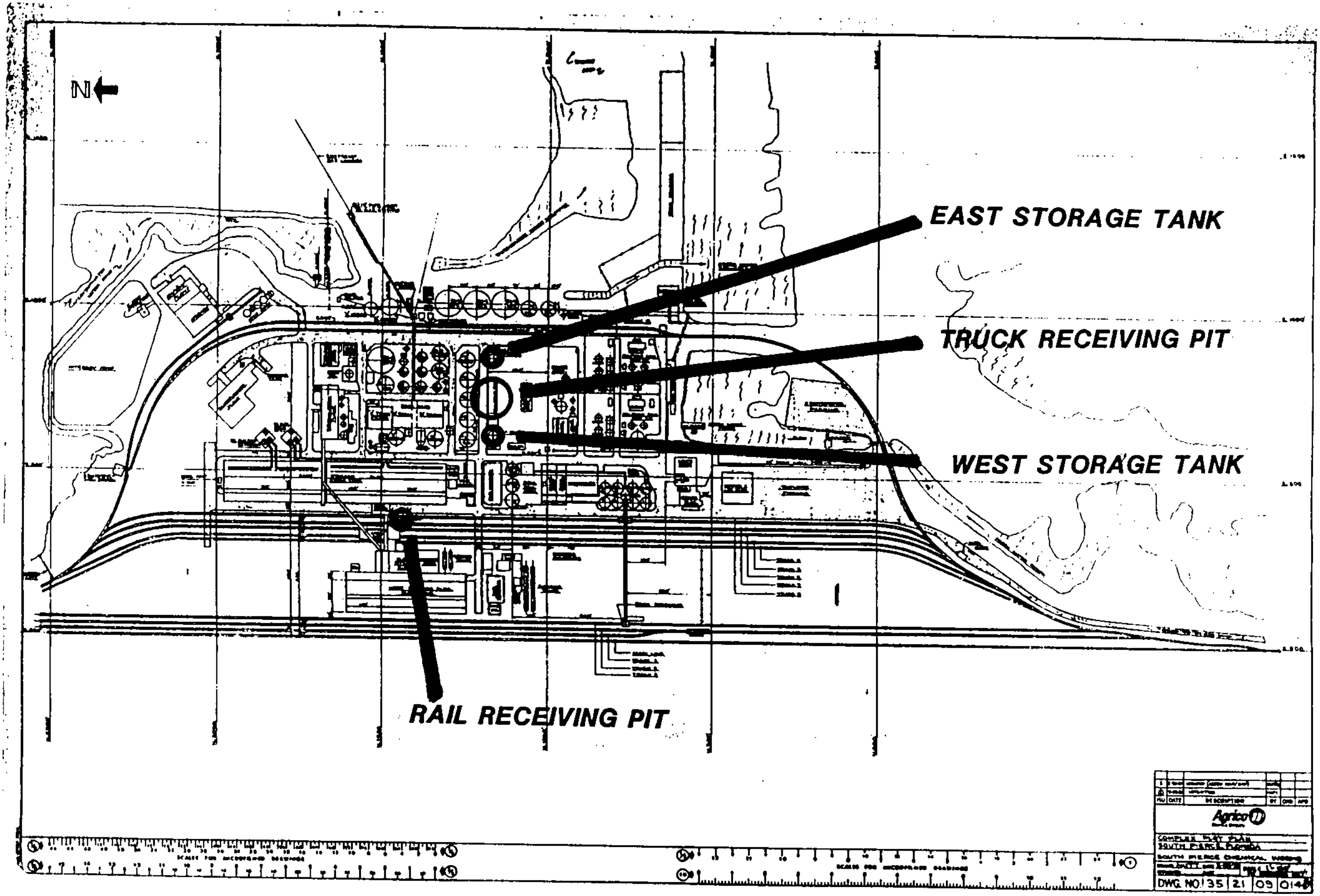


ATTACHMENT 5

SITE LOCATION

AGRICO CHEMICAL COMPANY
POLK COUNTY, FLORIDA




N
EAST STORAGE TANK
TRUCK RECEIVING PIT
WEST STORAGE TANK
RAIL RECEIVING PIT
Agrico
DWG NO 35 21 09 014

ATTACHMENT 7

PHYSICAL DESCRIPTION

The molten sulfur storage and handling facility at South Pierce consists of the following:

1. Two 1050-ton storage tanks measuring 32 feet in diameter and 24 feet in height. Each tank has five vents with no forced ventilation - one in the center and four at the periphery at 90 degree angles. Material throughput is approximately 182,000 tons per year.

2. One 670-ton truck receiving pit measuring 83 feet in length and 24 feet in width. The pit has four vents, two of which have vent fans providing ventilation at a rate of 1350 cfm. Material throughput is approximately 585,000 tons per years.

3. One 100-ton railcar receiving pit measuring 45 feet in length and seven feet in width. The pit has two vents with no forced ventilation. Material throughput is approximately 65,000 tons per year.

OPERATION PROCEDURES

Operation procedures for minimizing spills/fugitive emissions consist of the applicable work practice standards established by Chapter 17-2.600(11)(a) 1-9, FAC.