STATE OF FLORIDA
DEPARTMENT OF ENVIRONMENTAL REGULATION
NOTICE OF PERMIT

In the matter of an
Application for Permit by:

DER File No. AC 53-190667
Polk County

Mr. C. M. Ferris, General Manager
Farmland Industries, Inc.
Green Bay Complex
P. O. Box 960
Bartow, Florida 33830

_____/

Enclosed is Permit Number AC 53-190667 to construct/modify an existing sulfur storage and handling facility in Bartow, Polk County, Florida, pursuant to Section(s) 403, Florida Statutes.

Any party to this Order (permit) has the right to seek judicial review of the permit pursuant to Section 120.68, Florida Statutes, by the filing of a Notice of Appeal pursuant to Rule 9.110, Florida Rules of Appellate Procedure, with the Clerk of the Department in the Office of General Counsel, 2600 Blair Stone Road, Tallahassee, Florida 32399-2400; and by filing a copy of the Notice of Appeal accompanied by the applicable filing fees with the appropriate District Court of Appeal. The Notice of Appeal must be filed within 30 days from the date this Notice is filed with the Clerk of the Department.

Executed in Tallahassee, Florida.

STATE OF FLORIDA DEPARTMENT
OF ENVIRONMENTAL REGULATION

C. H. Fancy, P.E., Chief
Bureau of Air Regulation
2600 Blair Stone Road
Tallahassee, FL 32399-2400
904-488-1344

CERTIFICATE OF SERVICE

The undersigned duly designated deputy agency clerk hereby certifies that this NOTICE OF PERMIT and all copies were mailed before the close of business on 11-27-91 to the listed persons.

Clerk Stamp

FILING AND ACKNOWLEDGMENT FILED,
on this date, pursuant to
§120.52(11), Florida Statutes,
with the designated Department
Clerk, receipt of which is hereby
acknowledged.

(Clerk) 11-27-91 (Date)

Copies furnished to:

John Koogler, P.E.
U. K. Custred, P.E.
Bill Thomas, SW District

Final Determination

Farmland Industries Inc.-Green Bay Complex
Polk County
Bartow, Florida

Construction Permit No.
AC 53-190667

Department of Environmental Regulation
Division of Air Resources Management
Bureau of Air Regulation

November 19, 1991

Final Determination

The construction permit application package has been reviewed by the Department. Public Notice of the Department's Intent to Issue was published in The Ledger on October 25, 1991. The Technical Evaluation and Preliminary Determination was distributed on October 9, 1991, and available for public inspection at the Department's Southwest District office and the Department's Bureau of Air Regulation office.

There were no comments received during the public notice period. Therefore, it is recommended that the construction permit be issued as drafted.

Florida Department of Environmental Regulation

Twin Towers Office Bldg. • 2600 Blair Stone Road • Tallahassee, Florida 32399-2400

Lawton Chiles, Governor

Carol M. Browner, Secretary

PERMITTEE:
Farmland Industries, Inc.
P. O. Box 960
Bartow, Florida 33830

Permit Number: AC 53-190667
Expiration Date: Dec. 1, 1992
County: Duval
Latitude/Longitude: 27°50'37"N
81°56'05"W
Project: Modification to Molten Sulfur Storage & Handling System

This permit is issued under the provisions of Chapter 403, Florida Statutes, and Florida Administrative Code Chapters 17-2 and 17-4. The above named permittee is hereby authorized to perform the work or operate the facility shown on the application and approved drawings, plans, and other documents attached hereto or on file with the Department and made a part hereof and specifically described as follows:

For the modification to molten sulfur storage and handling system to allow an increase in the annual throughput from 450,000 tons to 670,000 and a daily maximum throughput of 2020 tons. The system consists of the following one 91 ton rail pit; one 72 ton truck pit; 6000 ton storage tank; two 2500 ton storage tanks; No. 3, 4, and 5 supply pits; and the associated transfer pumps and piping. The molten sulfur system is located at Farmland's Green Bay Complex in Bartow, Polk County, Florida.

The UTM coordinates of this facility are Zone 17, 409.5 km East and 3079.5 km North.

The source shall be constructed in accordance with the permit application, plans, documents, amendments and drawings, except as otherwise noted in the General and Specific Conditions.

Attachments are listed below:

1. Farmland's modification/construction permit application received December 17, 1990.
2. DER's letter dated January 16, 1991.
3. Farmland's response received February 18, 1991.
4. DER's letter dated March 19, 1991.
5. Farmland's response received April 5, 1991.
6. Updated information received May 10, 1991.
7. Revised application/information received July 23, 1991.

GENERAL CONDITIONS:

1. The terms, conditions, requirements, limitations, and restrictions set forth in this permit are "Permit Conditions" and are binding and enforceable pursuant to Sections 403.161, 403.727, or 403.859 through 403.861, Florida Statutes. The permittee is placed on notice that the Department will review this permit periodically and may initiate enforcement action for any violation of these conditions.

2. This permit is valid only for the specific processes and operations applied for and indicated in the approved drawings or exhibits. Any unauthorized deviation from the approved drawings, exhibits, specifications, or conditions of this permit may constitute grounds for revocation and enforcement action by the Department.

3. As provided in Subsections 403.087(6) and 403.722(5), Florida Statutes, the issuance of this permit does not convey any vested rights or any exclusive privileges. Neither does it authorize any injury to public or private property or any invasion of personal rights, nor any infringement of federal, state or local laws or regulations. This permit is not a waiver of or approval of any other Department permit that may be required for other aspects of the total project which are not addressed in the permit.

4. This permit conveys no title to land or water, does not constitute State recognition or acknowledgement of title, and does not constitute authority for the use of submerged lands unless herein provided and the necessary title or leasehold interests have been obtained from the State. Only the Trustees of the Internal Improvement Trust Fund may express State opinion as to title.

5. This permit does not relieve the permittee from liability for harm or injury to human health or welfare, animal, or plant life, or property caused by the construction or operation of this permitted source, or from penalties therefore; nor does it allow the permittee to cause pollution in contravention of Florida Statutes and Department rules, unless specifically authorized by an order from the Department.

GENERAL CONDITIONS:

6. The permittee shall properly operate and maintain the facility and systems of treatment and control (and related appurtenances) that are installed or used by the permittee to achieve compliance with the conditions of this permit, as required by Department rules. This provision includes the operation of backup or auxiliary facilities or similar systems when necessary to achieve compliance with the conditions of the permit and when required by Department rules.

7. The permittee, by accepting this permit, specifically agrees to allow authorized Department personnel, upon presentation of credentials or other documents as may be required by law and at a reasonable time, access to the premises, where the permitted activity is located or conducted to:

a. Have access to and copy any records that must be kept under the conditions of the permit;

b. Inspect the facility, equipment, practices, or operations regulated or required under this permit; and

c. Sample or monitor any substances or parameters at any location reasonably necessary to assure compliance with this permit or Department rules.

Reasonable time may depend on the nature of the concern being investigated.

8. If, for any reason, the permittee does not comply with or will be unable to comply with any condition or limitation specified in this permit, the permittee shall immediately provide the Department with the following information:

a. a description of and cause of non-compliance; and

b. the period of noncompliance, including dates and times; or, if not corrected, the anticipated time the non-compliance is expected to continue, and steps being taken to reduce, eliminate, and prevent recurrence of the non-compliance.

GENERAL CONDITIONS:

The permittee shall be responsible for any and all damages which may result and may be subject to enforcement action by the Department for penalties or for revocation of this permit.

9. In accepting this permit, the permittee understands and agrees that all records, notes, monitoring data and other information relating to the construction or operation of this permitted source which are submitted to the Department may be used by the Department as evidence in any enforcement case involving the permitted source arising under the Florida Statutes or Department rules, except where such use is prescribed by Sections 403.73 and 403.111, Florida Statutes. Such evidence shall only be used to the extent it is consistent with the Florida Rules of Civil Procedure and appropriate evidentiary rules.

10. The permittee agrees to comply with changes in Department rules and Florida Statutes after a reasonable time for compliance, provided, however, the permittee does not waive any other rights granted by Florida Statutes or Department rules.

11. This permit is transferable only upon Department approval in accordance with Florida Administrative Code Rules 17-4.120 and 17-30.300, F.A.C., as applicable. The permittee shall be liable for any non-compliance of the permitted activity until the transfer is approved by the Department.

12. This permit or a copy thereof shall be kept at the work site of the permitted activity.

13. The permittee shall comply with the following:

a. Upon request, the permittee shall furnish all records and plans required under Department rules. During enforcement actions, the retention period for all records will be extended automatically unless otherwise stipulated by the Department.

b. The permittee shall hold at the facility or other location designated by this permit records of all monitoring information (including all calibration and maintenance records and all original strip chart recordings for continuous monitoring instrumentation) required by the permit, copies of all reports required by this permit, and

GENERAL CONDITIONS:

records of all data used to complete the application for this permit. These materials shall be retained at least three years from the date of the sample, measurement, report, or application unless otherwise specified by Department rule.

c. Records of monitoring information shall include:

- the date, exact place, and time of sampling or measurements;
- the person responsible for performing the sampling or measurements;
- the dates analyses were performed;
- the person responsible for performing the analyses;
- the analytical techniques or methods used; and
- the results of such analyses.

14. When requested by the Department, the permittee shall within a reasonable time furnish any information required by law which is needed to determine compliance with the permit. If the permittee becomes aware that relevant facts were not submitted or were incorrect in the permit application or in any report to the Department, such facts or information shall be corrected promptly.

SPECIFIC CONDITIONS:

1. Farmland's molten sulfur storage and handling system shall be allowed to operate continuously, (i.e., 8760 hours/year).

2. The molten sulfur storage and handling facility shall operate with the maximum rates as follows: The daily throughput shall not exceed 2020 tons and annual throughput shall not exceed 670,000 tons; only four railcars may be unloaded simultaneously at the railpit at a maximum rate of 578 TPH; only two trucks may be unloaded simultaneously into the truck pit at a maximum rate of 167 TPH; the maximum permitted loading/unloading rate for the 6000 ton storage tank is 448 TPH; the maximum loading/unloading rate for each of the two 2500 ton storage tank is 297 TPH; the maximum permitted No. 3 and No. 4 supply pit feed and pumpout rates are 48.1 tons/hour; and, the maximum permitted No. 5 supply pit feed and pumpout rate is 36.1 TPH.

3. Visible emissions (VE) from any source in the molten sulfur system shall not exceed 20% opacity.

4. The permittee shall employ procedures to minimize emissions, from the molten sulfur system pursuant to the applicable requirements of F.A.C. Rule 17-2.600(11)(a) [Molten Sulfur Storage and Handling Facilities]. The permittee shall also comply with other applicable provisions of F.A.C. Rules 17-2 and 17-4.

5. No objectionable odors shall be allowed, in accordance with F.A.C. Rule 17-2.620(2) [Objectionable Odor Prohibited].

6. Compliance with the visible emission (VE) limitation contained in Specific Condition No. 3 shall be conducted within 120 days of issuance of this permit in accordance with the July 1, 1988, version of 40 CFR 60, Appendix A, using EPA Method 9. The visible emissions tests shall be conducted while four railcars and two trucks are being unloaded simultaneously for at least 60 minutes or the time it takes to completely unload a truck or railcar, whichever is greater, along with visible emissions test at each vent at rail and truck pits and each vent at each storage tank. The minimum requirements for stack sampling facilities, source sampling, and reporting shall be in accordance with F.A.C. Rule 17-2.700. The Department may require a retest annually if it is deemed necessary or at the time of permit renewal.

7. Any change in the method of operation, equipment, or operating hours shall be submitted to the DER's Southwest District office for approval.

8. For emission inventory and PSD purposes, the estimated maximum emissions from the molten sulfur storage and handling system shall not exceed the following:

Contaminant	Total Emissions (TPY)
Particulate Matter	7.71
TRS (measured as H_2S)	9.45
SO_2	14.22
VOC	14.02

9. A minimum of 15 days prior written notification of the compliance tests shall be given to DER's Southwest District office. The compliance test results shall be submitted to the DER's Southwest District office within 45 days of test completion.

10. The permittee, for good cause, may request that this construction permit be extended. Such a request shall be submitted to the DER's Bureau of Air Regulation prior to 60 days before the expiration of the permit (F.A.C. Rule 17-4.090).

11. An application for an operation permit must be submitted to the DER's Southwest District office at least 90 days prior to the expiration date of this construction permit. To properly apply for an operation permit, the applicant shall submit the appropriate application form, fee, certification that construction was completed noting any deviations from the conditions in the construction permit, and compliance test reports as required by this permit (F.A.C. Rules 17-4.055 and 17-4.220).

Issued this 26th day
of November, 1991

STATE OF FLORIDA DEPARTMENT
OF ENVIRONMENTAL REGULATION

STEVE SMALLWOOD, P.E., Director
Division of Air Resources
Management

State of Florida
DEPARTMENT OF ENVIRONMENTAL REGULATION

For Routing To Other Than The Addressee	
To:	Location:
To:	Location:
To:	Location:
From:	Date:

Interoffice Memorandum

Steve. Looks OK
Clair has seen
also. His changes
made Barry

TO: Steve Smallwood

FROM: ~~for~~ Clair Fancy BA

DATE: November 19, 1991

SUBJ: Approval of Construction Permit No. AC 53-190667
Farmland Industries, Inc.-Green Bay Complex

Attached for your approval and signature is a construction permit for a modification prepared by the Bureau of Air Regulation for the above referenced company to allow an increase in the annual molten sulfur throughput from 450,000 tons to 670,000 tons. The facility is located on State Road 640 West in Bartow, Polk County, Florida. There were no comments received during the public notice period.

Day 90, after which this permit will be issued by default, is November 29, 1991.

I recommend your approval and signature.

CF/BM/rbm

CHF- Needs specific conditions as indicated. If this not ready for my sign Tuesday 26th you should as soon as it is ready. 11-25-91

CHF- Thank you. 11-26-91

PERMITS

Things to do!

Date: Monday 11-25-91

1. [redacted] Patty the
2. first one in this
3. folder needs to be
4. redone today!
5. return for my
6. signature in the
7. morning 11-25-91
8.

Post-it™ Brand Notes

P 832 538 750

Certified Mail Receipt

No Insurance Coverage Provided
Do not use for International Mail
(See Reverse)

UNITED STATES POSTAL SERVICE

Sent to Mr. C. M. Ferris, Farmland Ind.	
Street & No. P. O. Box 960	
P.O., State & ZIP Code Bartow, FL 33830	
Postage	$
Certified Fee	
Special Delivery Fee	
Restricted Delivery Fee	
Return Receipt Showing to Whom & Date Delivered	
Return Receipt Showing to Whom, Date, & Address of Delivery	
TOTAL Postage & Fees	$
Postmark or Date Mailed: 11-17-91 Permit: AC 53-190667	

PS Form **3800**, June 1990

SENDER:

- Complete items 1 and/or 2 for additional services.
- Complete items 3, and 4a & b.
- Print your name and address on the reverse of this form so that we can return this card to you.
- Attach this form to the front of the mailpiece, or on the back if space does not permit.
- Write "Return Receipt Requested" on the mailpiece next to the article number.

I also wish to receive the following services (for an extra fee):

1. ☐ Addressee's Address
2. ☐ Restricted Delivery

Consult postmaster for fee.

3. Article Addressed to:

Mr. C. M. Ferris
General Manager
Farmland Industries, Inc.
Green Bay Complex
P. O. Box 960
Bartow, FL 33830

4a. Article Number
P 832 538 750

4b. Service Type
☐ Registered ☐ Insured
XX Certified ☐ COD
☐ Express Mail ☐ Return Receipt for Merchandise

7. Date of Delivery
DEC 0 2 1991

5. Signature (Addressee)
Linda Thompson

6. Signature (Agent)

8. Addressee's Address (Only if requested and fee is paid)

PS Form **3811**, October 1990 ☆U S GPO 1990—273-861 **DOMESTIC RETURN RECEIPT**

United States Postal Service

Official Business

PENALTY FOR PRIVATE USE, $300

Division of Air Resources Management

Print your name, address and ZIP Code here

Dept. of Environmental Regulation
Bureau of Air Regulation
2600 Blair Stone Road
Tallahassee, FL 32399-2400
Attn: Patty Adams

→P 4/20

Check Sheet

Company Name: Farmland
Permit Number: AQ 53-190667
PSD Number:
County:
Permit Engineer:
Others involved:

Application:

- [ ] Initial Application
- [x] Incompleteness Letters
- [ ] Responses
- [ ] Final Application (if applicable)
- [ ] Waiver of Department Action
- [ ] Department Response
- [ ] Other

Intent:

- [x] Intent to Issue
- [x] Notice to Public
- [x] Technical Evaluation
- [ ] BACT Determination
- [x] Unsigned Permit
- [ ] Correspondence with:
  - [ ] EPA
  - [ ] Park Services
  - [ ] County
  - [ ] Other
- [x] Proof of Publication
- [ ] Petitions - (Related to extensions, hearings, etc.)
- [ ] Other

Final Determination:

- [x] Final Determination
- [x] Signed Permit
- [ ] BACT Determination
- [ ] Other

Post Permit Correspondence:

- [ ] Extensions
- [ ] Amendments/Modifications
- [ ] Response from EPA
- [ ] Response from County
- [ ] Response from Park Services
- [ ] Other

Farmland

Farmland Industries, Inc.
Fertilizer Phosphate Manufacturing
County Road 640
Post Office Box 960
Bartow, Florida 33830-0960
Telephone: 813 533-1141
Facsimile: 813 533-8793

Charles W. Jenkins
Environmental Coordinator

October 30, 1991

Mr. C. H. Fancy, P.E.
Chief Bureau of Air Regulation
Florida Department of Environmental Regulation
Twin Towers Office Bldg.
2600 Blair Stone Road
Tallahassee, FL 32399-2400

Re: Sulfur Handling System Air Permit AC53-190667

Dear Mr. Fancy:

Enclosed is the Affidavit of Publication concerning the Sulfur Storage & Handling System.

Sincerely,

Charles W. Jenkins

Charles W. Jenkins
Environmental Coordinator

CWJ:dr/cwj7191

cc: Gene Meier
Merle Farris
U. K. Custred
B. Mitchell
M. Bair

AFFIDAVIT OF PUBLICATION

THE LEDGER

Lakeland, Polk County, Florida

Case No .....

STATE OF FLORIDA)
COUNTY OF POLK)

Before the undersigned authority personally appeared Stephen DeWitt, who on oath says that he is Controller of The Ledger, a daily newspaper published at Lakeland in Polk County, Florida; that the attached copy of advertisement, being a .....

Notice of Intent

.....

in the matter of .....

Sulfur Storage

.....

in the .....

Court, was published in said newspaper in the issues of .....

October 25;

1991

Affiant further says that said The Ledger is a newspaper published at Lakeland, in said Polk County, Florida, and that the said newspaper has heretofore been continuously published in said Polk County, Florida, daily, and has been entered as second class matter at the post office in Lakeland, in said Polk County, Florida, for a period of one year next preceding the first publication of the attached copy of advertisement; and affiant further says that he has neither paid nor promised any person, firm or corporation any discount, rebate, commission or refund for the purpose of securing this advertisement for publication in the said newspaper.

Signed Stephen DeWitt
Controller

Sworn to and subscribed before me this 25th day of October A.D. 1991

(Seal) Barbara Thigpen
Notary Public

Notary Public, State of Florida at Large
My Commission Expires Nov. 11, 1994

My Commission Expires .....
#10643
Farmland

STATE OF FLORIDA
DEPARTMENT OF ENVIRONMENTAL REGULATION
NOTICE OF INTENT TO ISSUE PERMIT

The Department of Environmental Regulation gives notice of its intent to issue a permit to Farmland Industries, Inc.-Green Bay Complex, P.O. Box 960, Bartow, Florida 33830, to construct/modify an existing sulfur storage and handling facility to allow an increase in the annual molten sulfur throughput from 450,000 tons to 670,000 tons. The facility is located at the Green Bay Complex on State Road 640 West in Bartow, Polk County, Florida. A determination of Best Available Control Technology (BACT) was not required. The Department is issuing this intent to issue for the reasons stated in the Technical Evaluation and Preliminary Determination.

A person whose substantial interests are affected by the Department's proposed permitting decision may petition for an administrative proceeding (hearing) in accordance with Section 120.57, Florida Statutes. The petition must contain the information set forth below and must be filed (received) in the Office of General Counsel of the Department at 2600 Blair Stone Road, Tallahassee, Florida 32399-2400, within 14 days of publication of this notice. Petitioner shall mail a copy of the petition to the applicant at the address indicated above at the time of filing. Failure to file a petition within this time period shall constitute a waiver of any right such person may have to request an administrative determination (hearing) under Section 120.57, Florida Statutes.

The Petition shall contain the following information; (a) The name, address, and telephone number of each petitioner, the applicant's name and address, the Department Permit File Number and the county in which the project is proposed; (b) A statement of how and when each petitioner received notice of the Department's action or proposed action; (c) A statement of how each petitioner's substantial interests are affected by the Department's action or proposed action; (d) A statement of the material facts disputed by Petitioner, if any; (e) A statement of facts which petitioner contends warrant reversal or modification of the Department's action or proposed action; (f) A statement at which rules or statutes petitioner contends require reversal or modification of the Department's action or proposed action; and (g) A statement of the relief sought by petitioner, stating precisely the action petitioner wants the Department to take with respect to the Department's action or proposed action.

If a petition is filed, the administrative hearing process is designed to formulate agency action. Accordingly, the Department's final action may be different from the position taken by it in this Notice. Persons whose substantial interests will be affected by any decision of the Department with regard to the application have the right to petition to become a party to the proceeding. The petition must conform to the requirements specified above and be filed (received) within 14 days of publication of this notice in the Office of General Counsel of the above address of the Department. Failure to petition within the allowed time frame constitutes a waiver of any right such person has to request a hearing under Section 120.57, F.S., and to participate as a party to this proceeding. Any subsequent intervention will only be at the approval of the presiding officer upon motion filed pursuant to Rule 28-5.207, F.A.C.

The application is available for public inspection during normal business hours, 8:00 a.m. to 5:00 p.m., Monday through Friday, except legal holidays, at:

Department of Environmental Regulation
Bureau of Air Regulation
2600 Blair Stone Road
Tallahassee, Florida 32399-2400

Department of Environmental Regulation
Southwest District
4520 Oak Fair Boulevard, Tampa, Florida 33610-7347.

Any person may send written comments on the proposed action to Mr. Barry Andrews at the Department's Tallahassee address. All comments received within 14 days of the publication of this notice will be considered in the Department's final determination.

C-862 — 10-25; 1991

C 862

P 832 538 732

Certified Mail Receipt
No Insurance Coverage Provided
Do not use for International Mail
(See Reverse)

UNITED STATES POSTAL SERVICE

Sent to Mr. C. M. Ferris, Farmland	
Street & No. P. O. Box 960	
P.O., State & ZIP Code Bartow, FL 33830	
Postage	$
Certified Fee	
Special Delivery Fee	
Restricted Delivery Fee	
Return Receipt Showing to Whom & Date Delivered	
Return Receipt Showing to Whom, Date, & Address of Delivery	
TOTAL Postage & Fees	$
Postmark or Date Mailed: 10-9-91 Permit : AC 53-190667	

PS Form **3800**, June 1990

SENDER:
- Complete items 1 and/or 2 for additional services.
- Complete items 3, and 4a & b.
- Print your name and address on the reverse of this form so that we can return this card to you.
- Attach this form to the front of the mailpiece, or on the back if space does not permit.
- Write "Return Receipt Requested" on the mailpiece next to the article number.

I also wish to receive the following services (for an extra fee):

1. ☐ Addressee's Address
2. ☐ Restricted Delivery

Consult postmaster for fee.

3. Article Addressed to:

Mr. C. M. Ferris
General Manager
Farmland Industries, Inc.
Green Bay Complex
P. O. Box 960
Bartow, FL 33830

4a. Article Number
P 832 538 732

4b. Service Type
☐ Registered ☐ Insured
☒ Certified ☐ COD
☐ Express Mail ☐ Return Receipt for Merchandise

7. Date of Delivery
10/11/91

5. Signature (Addressee)
Linda Thompson

6. Signature (Agent)

8. Addressee's Address (Only if requested and fee is paid)

PS Form **3811**, October 1990 ☆U.S. GPO: 1990—273-861 **DOMESTIC RETURN RECEIPT**

United States Postal Service

Official Business

RECEIVED

1991

Division of Air
Resources Management

U.S. MAIL

PENALTY FOR PRIVATE
USE, $300

Print your name, address and ZIP Code here

Dept. of Environmental Regulation
Bureau of Air Regulation
2600 Blair Stone Road
Tallahassee, FL 32399-2400
Attn: Patty Adams

Florida Department of Environmental Regulation

Twin Towers Office Bldg. ● 2600 Blair Stone Road ● Tallahassee, Florida 32399-2400

Lawton Chiles, Governor

Carol M. Browner, Secretary

October 9, 1991

CERTIFIED MAIL-RETURN RECEIPT REQUESTED

Mr. C. M. Ferris, General Manager
Farmland Industries, Inc.
Green Bay Complex
P. O. Box 960
Bartow, Florida 33830

Dear Mr. Ferris:

Attached is one copy of the Technical Evaluation and Preliminary Determination and proposed permit to construct/modify an existing sulfur storage and handling facility.

Please submit any written comments you wish to have considered concerning the Department's proposed action to Mr. Barry Andrews of the Bureau of Air Regulation.

Sincerely,

Barry D. Andrews

for C. H. Fancy, P.E.
Chief
Bureau of Air Regulation

CHF/MB/plm

Attachments

c: Bill Thomas, SWD
U. K. Custard, P.E.
John Koogler, P.E.

STATE OF FLORIDA
DEPARTMENT OF ENVIRONMENTAL REGULATION

CERTIFIED MAIL

In the Matter of an
Application for Permit by:

DER File No. AC 53-190667
Polk County

Farmland Industries, Inc.
Green Bay Complex
P. O. Box 960
Bartow, Florida 33830

_____/

INTENT TO ISSUE

The Department of Environmental Regulation gives notice of its intent to issue a permit (copy attached) for the proposed project as detailed in the application specified above, for the reasons stated in the attached Technical Evaluation and Preliminary Determination.

The applicant, Farmland Industries, Inc., applied on December 19, 1990, to the Department of Environmental Regulation for a permit to construct/modify an existing sulfur storage and handling facility to allow an increase in the annual molten sulfur throughput from 450,000 tons to 670,000 tons. The facility is located at the Green Bay Complex on State Road 640 West in Bartow, Polk County, Florida.

The Department has permitting jurisdiction under the provisions of Chapter 403, Florida Statutes and Florida Administrative Code Chapters 17-2 and 17-4. The project is not exempt from permitting procedures. The Department has determined that a construction permit is required for the proposed work.

Pursuant to Section 403.815, Florida Statutes and DER Rule 17-103.150, F.A.C., you (the applicant) are required to publish at your own expense the enclosed Notice of Intent to Issue Permit. The notice shall be published one time only within 30 days in the legal ad section of a newspaper of general circulation in the area affected. For the purpose of this rule, "publication in a newspaper of general circulation in the area affected" means publication in a newspaper meeting the requirements of Sections 50.011 and 50.031, F.S., in the county where the activity is to take place. The applicant shall provide proof of publication to the Department's Bureau of Air Regulation, 2600 Blair Stone Road, Tallahassee, Florida 32399-2400 (904-488-1344), within seven days

of publication. Failure to publish the notice and provide proof of publication within the allotted time may result in the denial of the permit.

The Department will issue the permit with the attached conditions unless a petition for an administrative proceeding (hearing) is filed pursuant to the provisions of Section 120.57, F.S.

A person whose substantial interests are affected by the Department's proposed permitting decision may petition for an administrative proceeding (hearing) in accordance with Section 120.57, Florida Statutes. The petition must contain the information set forth below and must be filed (received) in the Office of General Counsel of the Department at 2600 Blair Stone Road, Tallahassee, Florida 32399-2400. Petitions filed by the permit applicant and the parties listed below must be filed within 14 days of receipt of this intent. Petitions filed by other persons must be filed within 14 days of publication of the public notice or within 14 days of their receipt of this intent, whichever first occurs. Petitioner shall mail a copy of the petition to the applicant at the address indicated above at the time of filing. Failure to file a petition within this time period shall constitute a waiver of any right such person may have to request an administrative determination (hearing) under Section 120.57, Florida Statutes.

The Petition shall contain the following information;

(a) The name, address, and telephone number of each petitioner, the applicant's name and address, the Department Permit File Number and the county in which the project is proposed;
(b) A statement of how and when each petitioner received notice of the Department's action or proposed action;
(c) A statement of how each petitioner's substantial interests are affected by the Department's action or proposed action;
(d) A statement of the material facts disputed by Petitioner, if any;
(e) A statement of facts which petitioner contends warrant reversal or modification of the Department's action or proposed action;
(f) A statement of which rules or statutes petitioner contends require reversal or modification of the Department's action or proposed action; and
(g) A statement of the relief sought by petitioner, stating precisely the action petitioner wants the Department to take with respect to the Department's action or proposed action.

If a petition is filed, the administrative hearing process is designed to formulate agency action. Accordingly, the Department's final action may be different from the position taken by it in this intent. Persons whose substantial interests will be affected by any decision of the Department with regard to the application have

the right to petition to become a party to the proceeding. The petition must conform to the requirements specified above and be filed (received) within 14 days of receipt of this intent in the Office of General Counsel at the above address of the Department. Failure to petition within the allowed time frame constitutes a waiver of any right such person has to request a hearing under Section 120.57, F.S., and to participate as a party to this proceeding. Any subsequent intervention will only be at the approval of the presiding officer upon motion filed pursuant to Rule 28-5.207, F.A.C.

Executed in Tallahassee, Florida.

STATE OF FLORIDA DEPARTMENT
OF ENVIRONMENTAL REGULATION

Barry D. Andrews

for C. H. Fancy, P.E., Chief
Bureau of Air Regulation
2600 Blair Stone Road
Tallahassee, Florida 32399
904-488-1344

CERTIFICATE OF SERVICE

The undersigned duly designated deputy clerk hereby certifies that this INTENT TO ISSUE and all copies were mailed by certified mail before the close of business on 10-9-91 to the listed persons.

Clerk Stamp

FILING AND ACKNOWLEDGMENT
FILED, on this date, pursuant to §120.52(11), Florida Statutes, with the designated Department Clerk, receipt of which is hereby acknowledged.

Kyri Taber 10-9-91
Clerk Date

Copies furnished to:
Bill Thomas, SWD
U. K. Custard, P.E.
John Koogler, P.E.

STATE OF FLORIDA
DEPARTMENT OF ENVIRONMENTAL REGULATION
NOTICE OF INTENT TO ISSUE PERMIT

The Department of Environmental Regulation gives notice of its intent to issue a permit to Farmland Industries, Inc.-Green Bay Complex, P. O. Box 960, Bartow, Florida 33830, to construct/modify an existing sulfur storage and handling facility to allow an increase in the annual molten sulfur throughput from 450,000 tons to 670,000 tons. The facility is located at the Green Bay Complex on State Road 640 West in Bartow, Polk County, Florida. A determination of Best Available Control Technology (BACT) was not required. The Department is issuing this Intent to Issue for the reasons stated in the Technical Evaluation and Preliminary Determination.

A person whose substantial interests are affected by the Department's proposed permitting decision may petition for an administrative proceeding (hearing) in accordance with Section 120.57, Florida Statutes. The petition must contain the information set forth below and must be filed (received) in the Office of General Counsel of the Department at 2600 Blair Stone Road, Tallahassee, Florida 32399-2400, within 14 days of publication of this notice. Petitioner shall mail a copy of the petition to the applicant at the address indicated above at the time of filing. Failure to file a petition within this time period shall constitute a waiver of any right such person may have to request an administrative determination (hearing) under Section 120.57, Florida Statutes.

The Petition shall contain the following information; (a) The name, address, and telephone number of each petitioner, the applicant's name and address, the Department Permit File Number and the county in which the project is proposed; (b) A statement of how and when each petitioner received notice of the Department's action or proposed action; (c) A statement of how each petitioner's substantial interests are affected by the Department's action or proposed action; (d) A statement of the material facts disputed by Petitioner, if any; (e) A statement of facts which petitioner contends warrant reversal or modification of the Department's action or proposed action; (f) A statement of which rules or statutes petitioner contends require reversal or modification of the Department's action or proposed action; and (g) A statement of the relief sought by petitioner, stating precisely the action petitioner wants the Department to take with respect to the Department's action or proposed action.

If a petition is filed, the administrative hearing process is designed to formulate agency action. Accordingly, the Department's final action may be different from the position taken by it in this Notice. Persons whose substantial interests will be affected by any decision of the Department with regard to the application have

the right to petition to become a party to the proceeding. The petition must conform to the requirements specified above and be filed (received) within 14 days of publication of this notice in the Office of General Counsel at the above address of the Department. Failure to petition within the allowed time frame constitutes a waiver of any right such person has to request a hearing under Section 120.57, F.S., and to participate as a party to this proceeding. Any subsequent intervention will only be at the approval of the presiding officer upon motion filed pursuant to Rule 28-5.207, F.A.C.

The application is available for public inspection during normal business hours, 8:00 a.m. to 5:00 p.m., Monday through Friday, except legal holidays, at:

Department of Environmental Regulation
Bureau of Air Regulation
2600 Blair Stone Road
Tallahassee, Florida 32399-2400

Department of Environmental Regulation
Southwest District
4520 Oak Fair Boulevard
Tampa, Florida 33610-7347

Any person may send written comments on the proposed action to Mr. Barry Andrews at the Department's Tallahassee address. All comments received within 14 days of the publication of this notice will be considered in the Department's final determination.

Technical Evaluation
and
Preliminary Determination

Farmland Industries, Inc.
Bartow, Polk County, Florida

Sulfur Storage & Handling System

Permit Number: AC 53-190667

Florida Department of Environmental Regulation
Division of Air Resources Management
Bureau of Air Regulation

October 9, 1991

I. Application

A. Applicant

Farmland Industries, Inc.
P. O. Box 960
Bartow, Florida 33830

B. Project and Location

The applicant has applied for a construction/modification permit to increase the annual molten sulfur throughput from 450,000 tons to 670,000 tons at Farmland's existing Green Bay Phosphate facility on State Road 640 West in Bartow, Polk County, Florida.

The UTM coordinates of this facility are Zone 17, 490.5 km East and 3079.5 km North.

C. Facility Category

Farmland's facility is major in accordance with Rule 17-2.100 of the Florida Administrative Code (F.A.C.). The molten sulfur storage and handling system consists of several minor sources within the facility.

The Standard Industrial Classification (SIC) Code is Industry No. 2819, Sulfuric Acid/Phosphate Processing.

The NEDs Source Classification Code (SCC) is 3-01-070-02, Storage and Transfer, Industrial Inorganic Chemicals Production.

Farmland applied for a construction modification permit on December 19, 1990, and the application was deemed complete on July 23, 1991.

II. Project Description

Farmland's molten sulfur storage and handling system consists of the following:

(a) Rail Pit: The maximum rate that this pit can sustain is 578 TPH. There are two dump stations and each station can dump three rail cars. Although six rail cars can be dumped simultaneously, the applicant has applied for a permit to unload only four rail cars simultaneously. The rail car pit has a capacity of 91 tons.

(b) Truck Pit: Two trucks can be unloaded simultaneously at a maximum rate of 167 TPH. The truck pit has a capacity of about 72 tons of molten sulfur.

(c) 6000 Ton Storage Tank: The maximum input rate to this tank is 448 TPH.

(d) 2500 Ton Storage Tanks: There are two storage tanks with a capacity of 2500 tons per tank, with a maximum fill rate of 297 TPH.

(e) Numbers 3 and 4 Supply Pits: The maximum feed and pumpout rates for these pits are 48.1 TPH.

(f) Number 5 Supply Pit: The maximum feed and pumpout rate for this pit is 36.1 TPH.

The molten sulfur is delivered by 100 ton capacity rail cars and 20 ton capacity trucks. Sulfur from the rail cars and trucks is gravity fed to the respective pits. All of the molten sulfur from the rail pit is transferred to the 6000 ton storage tank. Sulfur received in the truck pit is transferred to one of the 2500 ton storage tanks. As needed, the sulfur from the rail pit can be conveyed to the 2500 ton storage tanks. The molten sulfur is then pumped from these two molten sulfur storage tanks through the supply pits to the three sulfuric acid plants. Plant Nos. 3 and 4 are rated at 1600 short tons per day of 100% H_2SO_4, while plant No. 5 is rated at 2400 shourt tons per day.

The size and venting configuration of the sources are:

Source	Capacity	Dimensions	Vents
Tank 1	6000 tons	65′ dia. x 32′5" high	1 center 24"
Tanks 2 & 3	2500 tons	45′ dia. x 32′5" high	2 20" Center & 8 10" Rim
Rail Pit	91 tons	18′ x 18′ x 5′	1 10"
Truck Pit	72 tons	34′8" x 8′ x 6′6"	1 8"
Nos. 3 & 4 Supply Pit	28 tons	8′ x 8′ x 7′	1 6"
No. 5 Supply Pit	31 tons	8′ x 10′ x 7′	1 4"

The vent on the rail pit has forced ventilation provided by a 1650 cfm fan. The vents on the truck pit, the supply pits, and the storage tanks have natural ventilation.

The increased emissions expected from the sulfur system are emissions of particulate matter (PM), including sulfur particulate (SP), particulates less than 10 microns in size (PM_{10}), sulfur dioxide (SO_2), hydrogen sulfide (H_2S), reduced sulfur compounds (TRS), and volatile organic compounds (VOCs).

III. Rule Applicability

The existing Farmland facility is major in accordance with F.A.C. Rule 17-2.100. The molten sulfur storage and handling system will emit particulate matter and will be permitted in accordance with F.A.C. Rules 17-2 and 17-4; and, Chapter 403 of the Florida Statutes.

The facility is located in Polk County, an area designated as attainment for all the criteria pollutants, in accordance with F.A.C. Rule 17-2.420.

The project is not subject to the new source review requirements of F.A.C. Rule 17-2.500(5), Prevention of Significant Deterioration-Preconstruction Review Requirements, because the projected emissions do not exceed significance levels in Table 500-2.

The project is subject to F.A.C. Rule 17-2.520, Sources Not Subject to PSD or Nonattainment Requirements.

The project is subject to F.A.C. Rule 17-2.600(11), Specific Emission Limiting and Performance Standards for Sulfur Storage and Handling Facilities, which lists specific operational emission reduction procedures that are to be followed. Visible emissions (VE) will be limited to 20% opacity.

The project is subject to F.A.C. Rule 17-2.620, General Pollutant Emission Limiting Standards, which prohibits objectionable odors.

The project is subject to compliance testing and reporting requirements in accordance with F.A.C. Rule 17-2.700. Compliance testing for the sources shall be conducted using EPA Method 9 for visible emissions in accordance with F.A.C. Rule 17-2.700(6)(b)9. VE tests will be required to be conducted for every emission point in the sulfur system (every vent) for the initial compliance demonstration. Several emission points may be read simultaneously, if approved in writing by the Department and if it meets the requirements of EPA Method 9. The Department will require a retest at the time of operation permit renewals.

IV. Source Impact Analysis

A. Emission Limitations

The original modification permit application had unreasonably low estimates that showed only about 1/2 percent increase in emissions, although the molten sulfur throughput increased by about 45%. The Department has reached an agreement with the applicant and will accept their revised higher estimates of 38% as resubmitted in their letter dated July 23, 1991. The maximum emissions from the entire molten sulfur handling and storage system are as follows:

Contaminant	Total Emissions TPY
Particulate Matter	7.71
TRS (H_2S)	9.45
SO_2	14.22
VOC	14.01

B. Air Quality Impacts

The technical evaluation of this project determined that ambient air monitoring or modeling would not be required to provide reasonable assurance that Florida'a air quality standards would not be violated.

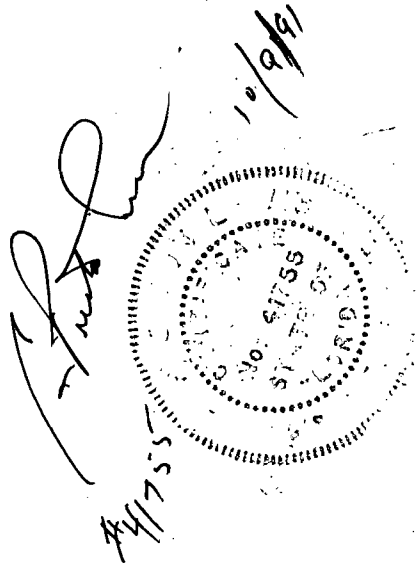
However, since the H_2S emission estimates were nearly 10 tons per year (9.95), the Department performed air quality dispersion modeling for H_2S emissions for information purpose. The maximum predicted impacts of these H_2S emissions are as follows:

Concentration	Averaging Time
333 ug/m^3	1 - hour
83 ug/m^3	8 - hour
44 ug/m^3	24 - hour
5 ug/m^3	Annual

The Department does not have any published H_2S ambient standards which apply to this project. The maximum predicted 8-hour concentration is less than one percent of the threshold limit value (TLV) of 14,000 ug/m^3 which is an 8-hour occupational exposure level. The maximum predicted 8-hour concentration is also less than the Department's unpublished guideline level of 140 ug/m^3 for H_2S. This level is intentionally very conservative because an ample margin of safety is incorporated in developing the ambient guidelines.

V. Conclusion

Based on the information provided by Farmland Industries, Inc., the Department has reasonable assurance that the existing molten sulfur storage and handling system, as described in this evaluation, and subject to the conditions proposed herein, will not cause or contribute to a violation of any air quality standard, PSD increment, or any other technical provision of Chapter 17-2 of the Florida Administrative Code.



Florida Department of Environmental Regulation

Twin Towers Office Bldg. ● 2600 Blair Stone Road ● Tallahassee, Florida 32399-2400

Lawton Chiles, Governor

Carol M. Browner, Secretary

PERMITTEE:
Farmland Industries, Inc.
P. O. Box 960
Bartow, Florida 33830

Permit Number: AC 53-190667
Expiration Date: Dec. 1, 1992
County: Duval
Latitude/Longitude: 27°50'37"N
81°56'05"W
Project: Modification to Molten Sulfur Storage & Handling System

This permit is issued under the provisions of Chapter 403, Florida Statutes, and Florida Administrative Code Chapters 17-2 and 17-4. The above named permittee is hereby authorized to perform the work or operate the facility shown on the application and approved drawings, plans, and other documents attached hereto or on file with the Department and made a part hereof and specifically described as follows:

For the modification to molten sulfur storage and handling system to allow an increase in the annual throughput from 450,000 tons to 670,000 and a daily maximum throughput of 2020 tons. The system consists of the following one 91 ton rail pit; one 72 ton truck pit; 6000 ton storage tank; two 2500 ton storage tanks; No. 3, 4, and 5 supply pits; and the associated transfer pumps and piping. The molten sulfur system is located at Farmland's Green Bay Complex in Bartow, Polk County, Florida.

The UTM coordinates of this facility are Zone 17, 409.5 km East and 3079.5 km North.

The source shall be constructed in accordance with the permit application, plans, documents, amendments and drawings, except as otherwise noted in the General and Specific Conditions.

Attachments are listed below:

1. Farmland's modification/construction permit application received December 17, 1990.
2. DER's letter dated January 16, 1991.
3. Farmland's response received February 18, 1991.
4. DER's letter dated March 19, 1991.
5. Farmland's response received April 5, 1991.
6. Updated information received May 10, 1991.
7. Revised application/information received July 23, 1991.

GENERAL CONDITIONS:

1. The terms, conditions, requirements, limitations, and restrictions set forth in this permit are "Permit Conditions" and are binding and enforceable pursuant to Sections 403.161, 403.727, or 403.859 through 403.861, Florida Statutes. The permittee is placed on notice that the Department will review this permit periodically and may initiate enforcement action for any violation of these conditions.

2. This permit is valid only for the specific processes and operations applied for and indicated in the approved drawings or exhibits. Any unauthorized deviation from the approved drawings, exhibits, specifications, or conditions of this permit may constitute grounds for revocation and enforcement action by the Department.

3. As provided in Subsections 403.087(6) and 403.722(5), Florida Statutes, the issuance of this permit does not convey any vested rights or any exclusive privileges. Neither does it authorize any injury to public or private property or any invasion of personal rights, nor any infringement of federal, state or local laws or regulations. This permit is not a waiver of or approval of any other Department permit that may be required for other aspects of the total project which are not addressed in the permit.

4. This permit conveys no title to land or water, does not constitute State recognition or acknowledgement of title, and does not constitute authority for the use of submerged lands unless herein provided and the necessary title or leasehold interests have been obtained from the State. Only the Trustees of the Internal Improvement Trust Fund may express State opinion as to title.

5. This permit does not relieve the permittee from liability for harm or injury to human health or welfare, animal, or plant life, or property caused by the construction or operation of this permitted source, or from penalties therefore; nor does it allow the permittee to cause pollution in contravention of Florida Statutes and Department rules, unless specifically authorized by an order from the Department.

GENERAL CONDITIONS:

6. The permittee shall properly operate and maintain the facility and systems of treatment and control (and related appurtenances) that are installed or used by the permittee to achieve compliance with the conditions of this permit, as required by Department rules. This provision includes the operation of backup or auxiliary facilities or similar systems when necessary to achieve compliance with the conditions of the permit and when required by Department rules.

7. The permittee, by accepting this permit, specifically agrees to allow authorized Department personnel, upon presentation of credentials or other documents as may be required by law and at a reasonable time, access to the premises, where the permitted activity is located or conducted to:

a. Have access to and copy any records that must be kept under the conditions of the permit;

b. Inspect the facility, equipment, practices, or operations regulated or required under this permit; and

c. Sample or monitor any substances or parameters at any location reasonably necessary to assure compliance with this permit or Department rules.

Reasonable time may depend on the nature of the concern being investigated.

8. If, for any reason, the permittee does not comply with or will be unable to comply with any condition or limitation specified in this permit, the permittee shall immediately provide the Department with the following information:

a. a description of and cause of non-compliance; and

b. the period of noncompliance, including dates and times; or, if not corrected, the anticipated time the non-compliance is expected to continue, and steps being taken to reduce, eliminate, and prevent recurrence of the non-compliance.

GENERAL CONDITIONS:

The permittee shall be responsible for any and all damages which may result and may be subject to enforcement action by the Department for penalties or for revocation of this permit.

9. In accepting this permit, the permittee understands and agrees that all records, notes, monitoring data and other information relating to the construction or operation of this permitted source which are submitted to the Department may be used by the Department as evidence in any enforcement case involving the permitted source arising under the Florida Statutes or Department rules, except where such use is prescribed by Sections 403.73 and 403.111, Florida Statutes. Such evidence shall only be used to the extent it is consistent with the Florida Rules of Civil Procedure and appropriate evidentiary rules.

10. The permittee agrees to comply with changes in Department rules and Florida Statutes after a reasonable time for compliance, provided, however, the permittee does not waive any other rights granted by Florida Statutes or Department rules.

11. This permit is transferable only upon Department approval in accordance with Florida Administrative Code Rules 17-4.120 and 17-30.300, F.A.C., as applicable. The permittee shall be liable for any non-compliance of the permitted activity until the transfer is approved by the Department.

12. This permit or a copy thereof shall be kept at the work site of the permitted activity.

13. The permittee shall comply with the following:

a. Upon request, the permittee shall furnish all records and plans required under Department rules. During enforcement actions, the retention period for all records will be extended automatically unless otherwise stipulated by the Department.

b. The permittee shall hold at the facility or other location designated by this permit records of all monitoring information (including all calibration and maintenance records and all original strip chart recordings for continuous monitoring instrumentation) required by the permit, copies of all reports required by this permit, and

GENERAL CONDITIONS:

records of all data used to complete the application for this permit. These materials shall be retained at least three years from the date of the sample, measurement, report, or application unless otherwise specified by Department rule.

c. Records of monitoring information shall include:

- the date, exact place, and time of sampling or measurements;
- the person responsible for performing the sampling or measurements;
- the dates analyses were performed;
- the person responsible for performing the analyses;
- the analytical techniques or methods used; and
- the results of such analyses.

14. When requested by the Department, the permittee shall within a reasonable time furnish any information required by law which is needed to determine compliance with the permit. If the permittee becomes aware that relevant facts were not submitted or were incorrect in the permit application or in any report to the Department, such facts or information shall be corrected promptly.

SPECIFIC CONDITIONS:

1. Farmland's molten sulfur storage and handling system shall be allowed to operate continuously, (i.e., 8760 hours/year).

2. The molten sulfur storage and handling facility shall operate with the maximum rates as follows: The daily throughput shall not exceed 2020 tons and annual throughput shall not exceed 670,000 tons; only four railcars can be unloaded simultaneously at the railpit at a maximum rate of 578 TPH; only two trucks can be unloaded simultaneously into the truck pit at a maximum rate of 167 TPH; the maximum loading/unloading rate for the 6000 ton storage tank is 448 TPH; the maximum loading/unloading rate for each of the two 2500 ton storage tank is 297 TPH; the No. 3 and No. 4 supply pit feed and pumpout rates are 48.1 tons/hour; and for the No. 5 supply pit the maximum feed and pumpout rate for this pit is 36.1 TPH.

3. Visible emissions (VE) from any source in the molten sulfur system shall not exceed 20% opacity.

4. The permittee shall employ procedures to minimize emissios, from the molten sulfur system pursuant to the applicable requirements of F.A.C. Rule 17-2.600(11)(a) [Molten Sulfur Storage and Handling Facilities]. The permittee shall also comply with other applicable provisions of F.A.C. Rules 17-2 and 17-4.

5. No objectionable odors shall be allowed, in accordance with F.A.C. Rule 17-2.620(2) [Objectionable Odor Prohibited].

6. Compliance with visible emission (VE) limitation contained in Specific Condition Nos. 2 and 3 shall be conducted within 120 days of issuance of this permit in accordance with the July 1, 1988, version of 40 CFR 60, Appendix A, Using EPA Method 9. The visible emissions tests shall be conducted while four railcars and two trucks are being unloaded simultaneously for at least 60 minutes or the time it takes to completely unload a truck or railcar, whichever is greater, along with visible emissions test at each vent at rail and truck pits and each vent at each storage tank. The minimum requirements for stack sampling facilities, source sampling, and reporting shall be in accordance with F.A.C. Rule 17-2.700. The Department may require a retest annually if it deems necessary or at the time of permit renewal.

7. Any change in the method of operation equipment or operating hours shall be submitted to the DER's Southwest District office for approval.

8. For emission inventory and PSD purposes, the estimated maximum emissions from the molten sulfur storage and handling system shall not exceed the following:

Contaminant	Total Emissions (TPY)
Particulate Matter	7.71
TRS (H_2S)	9.45
SO_2	14.22
VOC	14.02

9. A minimum of 15 days prior written notification of the compliance tests shall be given to DER's Southwest District office. The compliance test results shall be submitted to the Southwest District office within 45 days of test completion.

10. The permittee, for good cause, may request that this construction permit be extended. Such a request shall be submitted to the Bureau of Air Regulation prior to 60 days before the expiration of the permit (F.A.C. Rule 17-4.090).

PERMITTEE:
Farmland Industries, Inc.
SPECIFIC CONDITIONS:

Permit Number: AC 53-190667
Expiration Date: December 1, 1992

11. An application for an operation permit must be submitted to the Southwest District office at least 90 days prior to the expiration date of this construction permit. To properly apply for an operation permit, the applicant shall submit the appropriate application form, fee, certification that construction was completed noting any deviations from the conditions in the construction permit, and compliance test reports as required by this permit (F.A.C. Rules 17-4.055 and 17-4.220).

Issued this _____ day
of _____, 1991

STATE OF FLORIDA DEPARTMENT
OF ENVIRONMENTAL REGULATION

_____
STEVE SMALLWOOD, P.E., Director
Division of Air Resources Mgmt.

Farmland

Farmland Industries, Inc.
Fertilizer Phosphate Manufacturing
County Road 640
Post Office Box 960
Bartow, Florida 33830-0960
Telephone: 813 533-1141
Facsimile: 813 533-8793

Charles W. Jenkins
Environmental Coordinator

Mr. Marza Baig
Florida Department of Environmental Regulation
Twin Towers Office Bldg.
2600 Blair Stone Road
Tallahassee, FL 32399-2400

July 23, 1991

Re: Sulfur Handling System Air Permit AC53-190667

Dear Mr. Baig:

It has been suggested by the Department that if we reconsider increasing the expected total emissions from all the sources under this Modification Application, that the Department would issue the Construction Permit. Since Farmland Industries has applied for an amendment to increase sulfur throughput by 48.9% (from 450,000 tons per year to 670,000) and it is our contention that according to the established methods of estimating total emissions, these emission totals remain basically the same however; we understand the Department's insistence that emissions must surely increase with increased throughput. Therefore; we are prepared to propose a compromise between the two extremes of no increase and a 48.9% increase. I have prepared the following table to reflect an increase in emissions of 38%.

TABLE 1

Contaminant	Original Application Total ton per year	Modified Application Total ton per year
Part. Matter	5.58	7.71
TRS (H_2S)	6.48	9.45
SO_2	14.22	19.71
VOC	10.14	14.02

I trust this will be a satisfactory agreement between both parties. If there are any further questions please write or call me at (813) 533 - 1141 ext. 384.

Sincerely,

Charles W. Jenkins

Charles W. Jenkins
Environmental Coordinator

CWJ:dr/cwj4591
Enclosures

cc: Gene Meier
U. K. Custred
Merle Farris

Farmland

Facsimile Cover Letter

Farmland Industries, Inc.
Fertilizer Phosphate Manufacturing
Post Office Box 960
Bartow, Florida 33830-0960

Return Facsimile Number

813 533-8793

To/Company: Maria Baig

Facsimile Number:

From: Charles Jenkins

Telephone Number:

Extension:

Division:

Department:

Date: 7-23-91

Time:

Number of Pages (including cover): 3

Comments:

FII-7003 (07/90)

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

KA 123-90-01

May 9, 1991

RECEIVED
MAY 10 1991
Bureau of
Air Regulation

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

Subject: Farmland Industries, Inc.
Emission Estimates for
Sulfur Handling System
File No. AC53-190667

Dear Mr. Fancy:

This is in response to our telephone conversation of last week regarding the emission estimates submitted by Farmland as part of the permit modification request for an increase in the molten sulfur throughput rate at the existing fertilizer complex in Polk County, Florida.

Farmland applied to FDER on December 14, 1990, for an increase in the molten sulfur throughput rate allowed under permit No. AC53-169874 to accommodate the molten sulfur requirements of the new No. 5 sulfuric acid plant. Farmland proposes an increase in the sulfur throughput rate from the permitted 450,000 tons per year to 670,000 tons per year.

Although there will be an almost 50% increase in the sulfur throughput rate, no increases are expected in the emissions of sulfur particulates, reduced sulfur compounds, sulfur dioxide and volatile organic compounds for the reasons explained below.

The emission estimates for the various pollutants are calculated based on a known concentration of a given pollutant exhausted at certain ventilation rates. Attachment 1 provides the background information on how natural ventilation rates and various pollutant concentration levels in the molten sulfur facilities were obtained.

The emission sources addressed in the Farmland application consist of a truck unloading pit, a rail unloading pit, storage tanks, and sulfur supply pits. These sources are typical of most molten sulfur systems at fertilizer complexes.

Emission Estimates for Molten Sulfur Pits

The level of molten sulfur in the unloading and supply pits is kept fairly constant by automatic level controllers. As a result, the ventilation rate of the pits remains fairly constant and is primarily dependent upon natural (or wind) ventilation as opposed to ventilation forced by changes in liquid level. Since the concentration of a given pollutant is constant in the vented air, the product of the ventilation rate and the pollutant concentration yields a constant emission rate. Note that because the increase in molten sulfur throughput rate does not alter the ventilation rate, the emission rates are independent of the sulfur throughput rate. It is for this reason that the estimated emissions from the sulfur pits remain unchanged despite an increase in sulfur throughput.

Emission Estimates for Molten Sulfur Tanks

Unlike the sulfur pits, the ventilation rates of the storage tanks vary depending on whether the tank is being filled, unloaded, or sitting idle. The ventilation rates for the three operating scenarios can be estimated by accounting for air displaced by molten sulfur as follows:

Tank Filling = Natural Ventilation + Air Displaced During Filling
Tank Unloading = Natural Ventilation - Air Displaced During Unloading
Tank Idle = Natural Ventilation Only.

Again, the emission estimates are based on the product of the ventilation rates and the pollutant concentrations in the exhausted air. It can be readily seen that maximum hourly emissions are expected to occur during tank filling (highest ventilation rates) and lowest emission rates will occur during tank unloading (lowest ventilation rates). The annual emission rates are simply the product of hourly emission rates and annual hours of operation in each of the three operating modes.

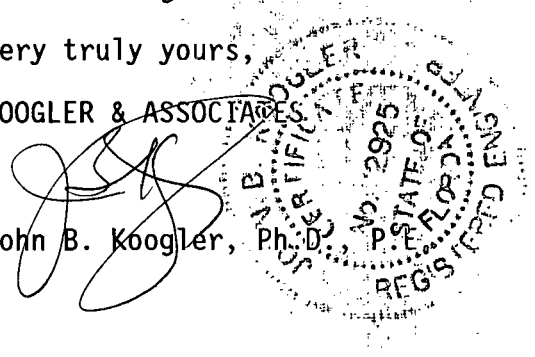
The increase in sulfur throughput for a tank results in an increase in the hours per year necessary for tank filling and likewise, an increase in the hours necessary to unload the tanks as the sulfur transfer rates remain unchanged (same pumps and transfer capacities). As a result, the annual hours remaining in which the tank sits idle are greatly reduced. Recognizing that the pollutant concentration in the gas stream remains a constant, the sum of the emissions in the three operating modes therefore depends on the net change in volumetric flow. Since the volumetric flow increases due to tank filling are equal to the volumetric flow decreases due to tank unloading, they offset each other, and so the net or average ventilation rate is equal to the natural tank ventilation at 8760 hours per year. Again, it can be seen that overall emissions from the sulfur storage tanks are independent of the sulfur throughput rates.

It is for the reasons explained above that an increase in the molten sulfur throughput rate would not result in an increase in projected emissions from Farmland's molten sulfur system.

If you have any questions, please do not hesitate to give me a call.

Very truly yours,

KOOGLER & ASSOCIATES



John B. Koogler, Ph.D., P.E.

JBK:PAR:wa
Enc.

cc: Mr. C. Jenkins, Farmland
Mr. G. Meier, Farmland
M. Baird
B. Thomas, SW Dist

ATTACHMENT 1

EMISSION FACTORS FOR SULFUR PARTICLES, TRS, SO_2 AND VOC IN MOLTEN SULFUR STORAGE AND HANDLING SYSTEMS

Sulfur particle emissions have been measured by Koogler & Associates (November 1988) from molten sulfur storage tanks in the phosphate chemical fertilizer industry. The measured sulfur particle concentrations in the gases vented from the storage tanks have ranged from 0.3-0.5 grains/ft^3. The higher concentrations were measured when the tanks were being filled with molten sulfur, and the lower concentrations when the tanks were idle. The average natural ventilation rates on multi-vent tanks were measured at about 18 cfm/vent.

Measurements of sulfur particle emissions at the Pennzoil terminals in Tampa, Florida, in October 1986 by Enviroplan were measured at 0.46 grains/ft^3 (NOTE: Data was corrected by Koogler and comments were transmitted to FDER, December 30, 1986). However, later tests conducted by Enviroplan (1987) at Sulfur Storage Company, Inc. in Tampa, Florida, measured sulfur particle concentrations at 0.12 grain/ft^3. It is believed that the Pennzoil tests and the Koogler tests during tank filling could contain condensed organics. Enviroplan (1987) indicated the total particulate concentrations including condensible hydrocarbons could be 2.5 times the sulfur particulate concentration.

Therefore, a reasonable estimate of sulfur particle concentration under all conditions is:

$$(0.3 + 0.12)/2 = 0.2 \text{ grains/ft}^3$$

Air vented from molten sulfur storage tanks and pits is also expected to contain small quantities of total reduced sulfur compounds, including H_2S (TRS), sulfur dioxide and volatile organic compounds (VOCs). The volatile organic compounds result from small quantities of petroleum products contained in Frasch sulfur (approximately 0.25%) and the vaporization of these compounds at the storage temperature of molten sulfur. The reduced sulfur compounds result from the reduction of elemental sulfur in the presence of carbon supplied by the petroleum products and the SO_2 results from the oxidation of elemental sulfur.

A limited number of measurements have been made on molten sulfur storage tanks at Frasch sulfur terminals in the Tampa area to determine TRS, SO_2, and VOC concentrations in the headspace of the tanks over molten sulfur. These measurements have been made on molten sulfur storage tanks with capacities in the range of 10,000 tons which are air purged at rates between 10 and 63 cfm to prevent the accumulation of H_2S. Because of the size of the tanks, the fact that they are air purged and the fact that sulfur delivered to the Port of Tampa most probably has a higher fraction of VOCs (due to the fact that there has been less time for the volatile fraction of the petroleum products to vaporize), measurements made in Tampa will overestimate TRS, SO_2 and VOC emissions from phosphate chemical fertilizer facilities which later receive the sulfur. However, as no other

data is available, the Tampa data will be used to estimate TRS (including H_2S), SO_2 and VOC emissions factors for molten sulfur storage tanks and molten sulfur pits. It should be recognized that the application of these emission factors will overstate the actual emissions by some unknown amount.

Measurements of TRS made in November 1983 by TRC and reported in the FDER "Sulfur Report" (February 1984) show the following:

Tank Purge Rate (CFM)	TRS (as H2S) in Headspace Over Molten Sulfur (ppm, vol)
43	280
63	403

Measurements made by Enviroplan, Inc. in 1987 in the headspace over molten sulfur in a tank purged at the rate of 10 cfm showed an average TRS concentration of 638 ppm (vol).

A "typical" concentration of TRS (as H_2S) in the headspace over molten sulfur can be estimated from these data:

$$[280 + 403 + 2(638)]/4 = 490 \text{ ppm (vol)}$$

$$= 3.5 \times 10^{-5} \text{ lb/ft}^3 \text{ at } 200^{\circ}\text{F}$$

Measurements of SO_2 made by TRC (1983) in the tank headspace over molten sulfur at purge rates of 43 and 63 cfm averaged 553 ppm (vol). This converts to an SO_2 concentration of 7.3×10^{-5} lb/ft^3 at 200°F.

Measurements made by Enviroplan, Inc. (1987) in the tank headspace over molten sulfur at STI in Tampa showed VOC concentrations that averaged 5.2×10^{-5} lb/ft^3.

Table 1 summarizes the above emission factors for molten sulfur storage and handling systems.

TABLE 1
SUMMARY OF EMISSION FACTORS FOR
MOLTEN SULFUR STORAGE AND
HANDLING SYSTEMS

Air Pollutant	Emission Factor
Sulfur Particle	0.2 grains/ft^3
TRS (as H_2S)	3.5×10^{-5} lb/ft^3
SO_2	7.3×10^{-5} lb/ft^3
VOC	5.2×10^{-5} lb/ft^3

REFERENCES

1. "Preliminary Report on Emissions From Tank No. 4 at Sulfur Terminal Co.,Inc., Tampa, Florida." TRC Environmental Consultants, Inc., East Hartford, Connecticut, December 30, 1983.

2. "Sulfur Report." Bureau of Air Quality Management, Florida Department of Environmental Regulation, Tallahassee, Florida, February 1984.

3. "Sulfur Particulate Emission Measurement Project at the Pennzoil Terminals in Tampa, Florida." Enviroplan, Inc., West Orange, New Jersey, October 1986.

4. Comments in a letter dated December 30, 1986, by Dr. John Koogler, Koogler & Associates to Mr. Steve Smallwood, FDER, on Enviroplan's Pennzoil Sulfur Company emission measurement report.

5. "Technical Report Supporting Application to the Florida DER For An Alternate Sulfur Particulate Emissions Sampling Procedure." Enviroplan, Inc., West Orange, New Jersey, October 30, 1987.

6. "Particulate Matter Emission Measurements From Molten Sulfur Storage Tanks at Gardinier, Inc., Tampa, Florida." Koogler & Associates, Gainesville, Florida, November 7-8, 1988.

7. Discussions with Enviroplan, Inc. at a meeting in New Orleans, Louisiana, on July 6, 1989. Enviroplan supplied measurement data on TRS and VOC concentrations in the headspace over molten sulfur storage tanks at the Sulfur Terminals Company, Inc. in Tampa, Florida, for testing which was conducted during September 1987.

CM: P 271 140 250
4-3-91
Bartow, FL

File Copy

Farmland

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Fertilizer Phosphate Manufacturing
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Telephone: 813 533-1141
Facsimile: 813 533-8793

Charles W. Jenkins
Environmental Coordinator

April 2, 1991

Mr. C. H. Fancy, P.E.
Chief Bureau of Air Regulation
Florida Department of Environmental Regulation
Twin Towers Office Bldg.
2600 Blair Stone Road
Tallahassee, FL 32399-2400

Re: Sulfur Handling System Air Permit AC53-190667

Dear Mr. Fancy:

In response to your letter of March 19, 1991, addressed to Mr. C. M. Farris, concerning the Sulfur Storage & Handling System, the following answers are supplied to the three major questions yet remaining.

In answer to question 1: *"In the permit application the maximum molten sulfur throughput requested was 525,000 tons/year (or 1438 tons/day). According to your letter dated February 12, 1991, the anticipated annual consumption is 670,000 tons (or 1836 tons/day), but you would like to be permitted for a maximum throughput of 2020 tons/day. Please clarify the maximum amount of molten sulfur you would like to be permitted for, in tons/day and tons/year."*

There is a basic misunderstanding that has arisen here; as stated on page 2a of the Application to Construct Modification submitted on December 12, 1991, paragraph two states that we expect to receive approximately 75% of our sulfur from rail cars which is expected to amount to 502,500 tons per year or a maximum of 525,000 tons per year. The 525,000 ton figure is the rail car maximum not the total complex maximum. The next sentence describes the expected annual tonnage delivered by truck to be 167,500 with a maximum of 175,000. The total plant usage is therefore expected not to exceed 525,000 + 175,000 = **670,000** tons per year. This has always been the working figure since the Modification was submitted.

If we divide this 670,000 tons by 365 days in a year we get 1,835.6 tons per day. The problem with specifying this number is that on any given day we could exceed this figure with ideal operating conditions. We have therefore requested a daily figure 10% higher than 1,836 or **2,020** tons per day, so we will not have the worry of exceeding the 1,836 tons in a 24 hour period and therefore risk non-compliance. The bottom line is that we request a permit maximum of 2,020 tons per day of molten sulfur throughput and annual maximum of 670,000 tons. If the numbers have to work out that the annual is 365 times the daily, then we request an annual of 365 x 2020 = 737,300 tons per year.

In answer to question 2: *"Please specify the maximum amount of molten sulfur throughput you would like to be permitted (in tons/hr) for the rail pit, the truck pit, the 6000 and 2500 ton storage tanks and the supply pits. How many railcars and trucks would you like to be permitted to unload simultaneously ?"*

The following table is submitted in answer to this question:

ITEM NO.	DESCRIPTION	PERMITTED MAXIMUM in tons/hour
1	Rail Pit	578.0
2	Truck Supply Pit	167.0
3	6000 Ton Storage Tank	448.0
4	2500 Ton Storage Tank	297.0
5	# 3 & 4 Supply Pit	48.1
6	# 5 Supply Pit	36.1

In answer to the last part of this question; we would like to be permitted to unload up to four rail cars and two trucks simultaneously.

In answer to question 3: *"The sulfur storage and handling system is not vented to any control devices, therefore, if system throughput increases the emissions from the system would also increase in equal proportions to material throughput. Please resubmit your emission calculations based on increased molten sulfur throughput."*

The above stated premise just does not prove to be true according to the accepted method of calculating emissions for this system. I have included a copy of my letter to Mr. Marza Baig dated March 18, 1991, which addresses this fact with a page by page detail of the revised calculations.

If there are any further questions needing answered or any further clarifications please write or call me at (813) 533 - 1141. Xn 334

Xn 384
Charles J.

Sincerely,

Charles W. Jenkins

Charles W. Jenkins
Environmental Coordinator

CWJ:dr/cwj2391

cc: Gene Meier
Merle Farris
U. K. Custred
BAICHF c/o Att. Mirza Bai, Bill Thomas, SWD } 4-5-91 RAM

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Charles W. Jenkins
Environmental Coordinator

Mr. Marza Baig
Florida Department of Environmental Regulation
Twin Towers Office Bldg.
2600 Blair Stone Road
Tallahassee, FL 32399-2400

March 18, 1991

Re: Sulfur Handling System Air Permit AC53-190667

Dear Mr. Baig:

With regard to our phone conversation of March 14, 1991, I have drafted the following explanation regarding the seeming paradox that the anticipated emissions would not appreciably increase when we applied for an amendment to increase sulfur throughput by 48.9% (from 450,000 tons per year to 670,000). I have enclosed a copy of the calculations as they appeared on the original Application to Construct dated August 30, 1989, and have red marked each change caused by the increased sulfur rate. The following is a page by page explanation of these marks.

TRUCK DUMP PIT:

All four equations remain the same on this one page of calculations; sulfur rate is not involved.

RAIL CAR PIT:

Page 7a is an explanation of the rational that the forced ventilation air from this pit will be diluted by outside air to the point where the concentration of each contaminant will be conservatively 10% of the equilibrium values. Page 7b lists each of the four pollutants of primary concern and their estimated loading per cubic foot of exhaust gas. The bottom of page 7b and the top of 7c show where the expected pollutant emissions from the pit per year is found by the product of pollutant per cubic foot times exhaust air flow in cubic feet per minute times 60 minutes per hour times 8,760 hours per year. Therefore, the emissions are independent of sulfur through-put and these values would hold even for an anticipated 670,000 tons per year.

6,000 TON STORAGE TANK:

Page 7a, equations 2 and 3 are modified by using the more exact sulfur flow rates of 448 TPH input and 130 TPH out. This changes the volumetric displacement caused by sulfur flows. Equations 4,5 & 6 show the changes in tank fill, empty and idle times respectively caused by the increased sulfur throughput and flow rates of 448 and 130 TPH.

Equations 7 & 8 show the minor change in ventilation rate during tank filling and emptying caused by the small refinement in sulfur flow rates from 400 TPH to 448 TPH during fill and from 120 TPH to 130 TPH during emptying. The idle tank ventilation rate of equation 9 on the top of the next page is unchanged.

Equations 11, 12 & 13 are modified by the ventilation rates during fill and unloading found earlier and by the total hours these functions occur. The net result is that the total annual anticipated sulfur particle emissions is the same as it was with the 450,000 ton per year usage rate. The maximum hourly emission rate has increased however by 6.3%.

On page 7c the emissions for TRS in equations 15, 16 & 17 have been modified the same as for particulate and again the maximum hourly rate of emissions has increased. It can be seen in equation 19 that the annual anticipated pollutant loading for H_2S is apparently increased from 1.14 to 1.49 TPY. Closer examination reveals that Mr. Tedder mistakenly used the value of 0.59 lb/hr instead of the correct value of 0.94 TPY as the third value in the sum of annual emissions. Correcting this error gives a total of 1.49 TPY, the exact same value arrived at with 450,000 TPY sulfur rate.

The bottom of page 7c and the top of 7d show the corrected equations for SO_2 emissions and again the total value of tons per year remains unchanged from 450,000 to 670,000 tons per year of sulfur handling. The same is true of the VOC emissions on the bottom of page 7d.

2,500 TON STORAGE TANKS:

On Page 7a, a basic error was made in the original work concerning the sulfur rates used in equations 1 and 2. Since the tanks are operated simultaneously, the feed rate from the rail car pit should have been 60 tons/hour for each tank, not 120 which is the total rate. Correcting this logic error and substituting the more accurate rate of 130 TPH yields the 19.35 ft^3/min. as shown in red. The second equation true rate per tank is 167/2 or 83.5 TPH, giving the resultant 24.85 ft^3/min.

Equations 3 & 4 are corrected by the new sulfur out-flow rates per tank. Equations 5 & 6 at the bottom of this page were corrected using the annual consumption volume of 670,000 TPY and give the total number of hours per year that the tanks are being filled from the rail and the truck pits. It should be noted here that in the modified Application to Construct, I used the absolute maximum figure of 700,000 TPY knowing it would yield a slightly higher emission result.

On the next page, 7b equations 7 & 8 show the revised calculations for hours of operation where the tanks are emptying to the two plant pump pits. Equation 9 was originally figured wrong, the tank idle time should be the total number of hours in a year (8760) minus the largest hourly usage time (8683.3). This is based on the assumption that the tanks will not filled during those times when the plants are down. This is a safe assumption since the resulting idle time id only 76.7 hours a year.

The tank ventilation rates are shown modified in equations 10, 11 & 12 according to the revised sulfur flow rates of equations 1 thru 4. There are three more rates which should be shown but were not included in the original work. They are the total vent rate for filling from the rail pit while supplying the plants (187.9 CFM), filling from truck pit while supplying the plants (193.5 CFM), and filling from both the truck and rail pit while supplying the plants (212.8 CFM). Because of this oversight the emissions calculations done on pages 7c thru 7e of the original work are in error.

I have modified the emissions calculations, summing the total emissions for the following four conditions. 1, the tank is being filled from both the rail and truck sumps while supplying the plants; 2, the tank is being filled from the rail sump only while supplying the plants; 3, the tank is supplying the plants only; and 4, the tank is idle. The assumption made by this approach is that the tanks are not being filled when idle and that filling from the truck sump occurs only while rail cars are filling. The following table will summarize the four pollutants for each of the four conditions.

TABLE 1

Condition number	Sulfur TPY	TRS TPY	SO_4 TPY	VOC TPY
1	0.183	0.224	0.467	0.333
2	0.461	0.565	1.178	0.839
3	0.698	0.855	1.783	1.270
4	0.011	0.014	0.028	0.020
TOTAL	1.353	1.658	3.456	2.462

SUPPLY PIT NO. 1:

The only change here is that the pit is numbered 5 now instead of 1. None of the calculations have sulfur rate involved in them, so the emissions estimates remain the same.

SUPPLY PIT NO. 3 & 4:

The same is true of this pit as the above.

GENERAL:

One further point that may need some discussion is that of total annual sulfur throughput. We have asked for a daily maximum usage rate of 2,020 tons per day which should allow us to be able to operate at our anticipated daily rate of 1,836 TPD without fear of exceeding it. We have made reference to an annual consumption of 670,000 tons which is approximately 365 x 1,836. You have made note that 2,020 TPD x 365 days per year is much higher than our stated maximum of 700,000 tons per year (actually = 737,300 TPY). This is true; however, our operating factor is about 95% at best and 95% of 737,300 is almost exactly 700,000.

I hope this is sufficient to explain the rational behind our most recent Modification of Application to Construct a Molten Sulfur System. If there are any further questions needing answered or any further clarifications please write or call me at (813) 533 - 1141.

Sincerely,

Charles W. Jenkins/dr

Charles W. Jenkins
Environmental Coordinator

CWJ:dr/cwj2191
Enclosures

cc: Gene Meier
U. K. Custred
Merle Farris

TRUCK PIT

KOOGLER & ASSOCIATES
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JOB TRUCK PIT
CALCULATED BY R. B. TEDDER DATE
SHEET NO. 7a OF

The truck pit has one vent with no forced draft. Sulfur is always in the pit. Emission factors are based on the data presented in APPENDIX A.

Ventilation Rate ≅ 18 ft^3/min/vent (natural)
TRANSFER TIME = 8760 hr/yr

Emissions

1. Sulfur Particle = 18 cfm/vent × 1 vent × 60 min/hr × 0.2 grain/ft^3 × 1/7000 lb/grain
= 0.031 lb/hr × 8760 hr/yr × 1/2000 ton/lb
= 0.14 TPY

2. TRS (as H_2S) = 18 cfm/vent × 1 vent × 60 min/hr × 3.5×10^{-5} lb/ft^3
= 0.038 lb/hr × 8760 hr/yr × 1/2000 ton/lb
= 0.17 TPY

3. SO_2 = 18 cfm/vent × 1 vent × 60 min/hr × 7.3×10^{-5} lb/ft^3
= 0.079 lb/hr × 8760 hr/yr × 1/2000 ton/lb
= 0.35 TPY

4. VOC = 18 cfm/vent × 1 vent × 60 min/hr × 5.2×10^{-5} lb/ft^3
= 0.056 lb/hr × 8760 hr/yr × 1/2000 ton/lb
= 0.25 TPY

RAIL CAR PIT

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JOB RAIL CAR PIT
CALCULATED BY R.B. Tedder DATE
SHEET NO. 7a OF

The Rail Car Pit always has molten sulfur in the pit, stays at a fairly constant level and has one vent with a forced draft ventilation rate of 1650 ft^3/min.

TRANSFER TIME = 8760 hr/yr

The emission factors of APPENDIX A are based on measurements at molten sulfur storage tanks which based on their ventilation rates have one air turn-over in the head space every 300-400 minutes. In these tanks the sulfur particle concentration in the vented gases is estimated to be 0.2 grains/ft^3 (APPENDIX A).

In contrast the Rail Car Pit would have a head space over molten sulfur of approximately:

$\hat{=}$ 18' x 18' x 2.5' (free board)
= 810 ft^3

Turn-over Rate = 810 ft^3 / 1650 ft^3/min
= 0.49 min per turnover.

It seems reasonable to assume this large increase in turn-over rate will result in some dilution of the pollutant concentrations in the vented gases.

At a 300 min/turn-over rate, one can assume the equilibrium sulfur particle concentration is 0.2 grains/ft^3. At a 0 min/turn-over rate (i.e. infinite dilution), the sulfur particle concentration would be 0 grains/ft^3. Since fan performance will decrease as sulfur accumulates on the fan blades, assume under normal conditions the RAIL CAR PIT will achieve a 1 min/turn-over ventilation rate. The sulfur particle concentration will be approximated with a first order equation (see attached curve) which

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JOB RAIL CAR PIT
CALCULATED BY R. B. TEDDER DATE
SHEET NO. 76 OF

uses the above boundary conditions and forces the concentration to 10% of the equilibrium value at a 1 min / turn-over ventilation rate.

Using a 10% factor, the Emission Factors of APPENDIX A become:

Sulfur Particle = 0.2 x 0.1 = 0.02 grain/ft^3

TRS (as H_2S) = $3.5 \times 10^{-5} \times 0.1 = 3.5 \times 10^{-6}$ lb/ft^3

SO_2 = $7.3 \times 10^{-5} \times 0.1 = 7.3 \times 10^{-6}$ lb/ft^3

VOC = $5.2 \times 10^{-5} \times 0.1 = 5.2 \times 10^{-6}$ lb/ft^3

Emissions

1. Sulfur Particle = 1650 ft^3/min x 60 min/hr x 0.02 grain/ft^3
x 1/7000 lb/grain
= 0.28 lb/hr
x 8760 hr/yr x 1/2000 ton/lb
= 1.24 TPY

2. TRS (as H_2S) = 1650 ft^3/min x 60 min/hr x 3.5×10^{-6} lb/ft^3
= 0.35 lb/hr
x 8760 hr/yr x 1/2000 ton/lb
= 1.52 TPY

3. SO_2 = 1650 ft^3/min x 60 min/hr x 7.3×10^{-6} lb/ft^3
= 0.72 lb/hr
x 8760 hr/yr x 1/2000 ton/lb
= 3.17 TPY

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JOB RAIL CAR PIT

CALCULATED BY R.B. TEDDER DATE

SHEET NO. 7c OF

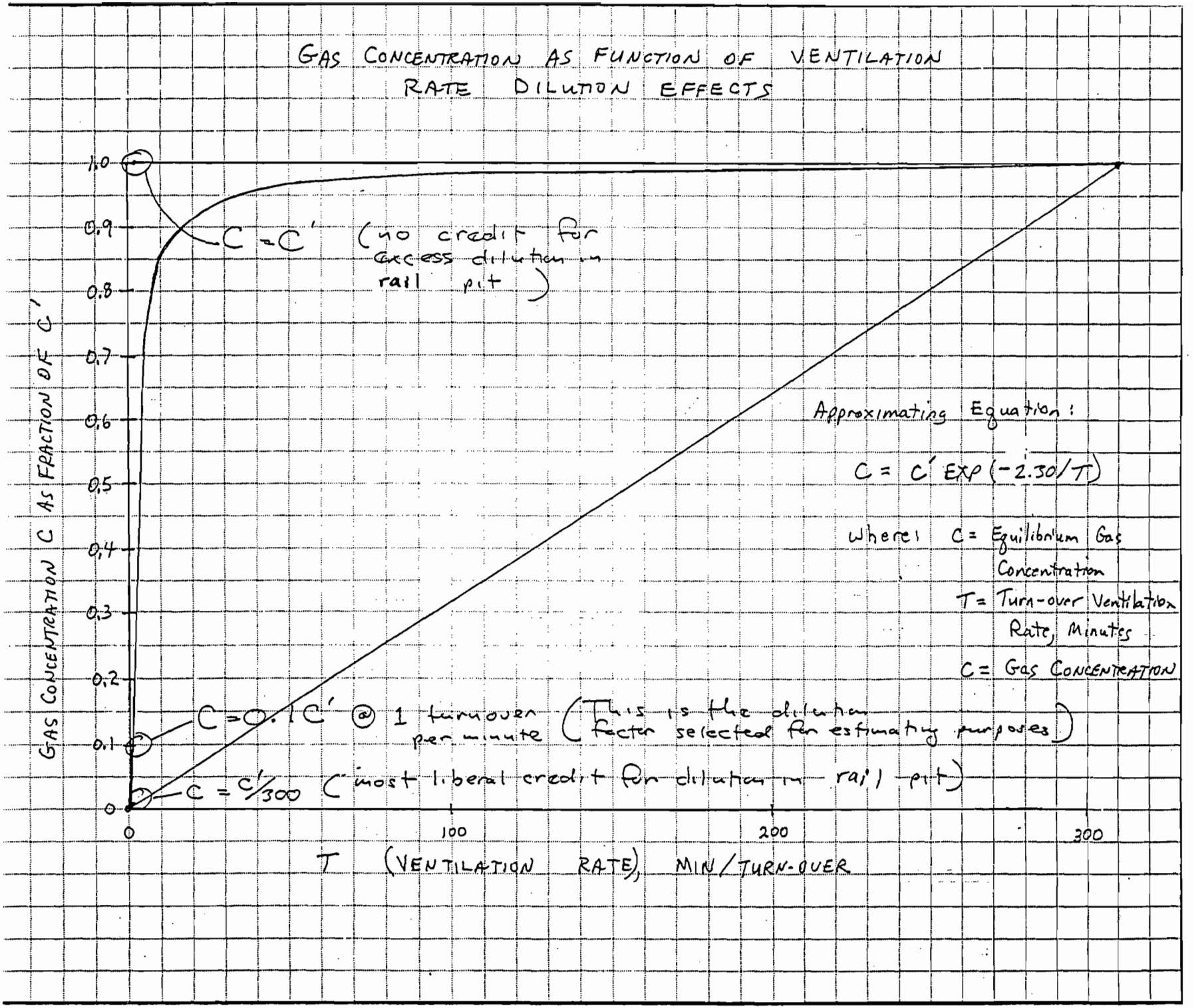
4. VOC = 1650 ft^3/min x 60 min/hr x 5.2×10^{-6} lb/ft^3

= 0.51 lb/hr

x 8760 hr/yr x 1/2000 ton/lb

= 2.25 TPY

GAS CONCENTRATION AS FUNCTION OF VENTILATION RATE DILUTION EFFECTS



Approximating Equation:

$$C = C' \exp(-2.30/T)$$

where: C = Equilibrium Gas Concentration

T = Turn-over Ventilation Rate, Minutes

C = Gas Concentration

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JOB RAIL CAR PIT

CALCULATED BY R. B. TEDDER DATE

SHEET NO. 7d OF

6000 TON STORAGE TANK

KOOGLER & ASSOCIATES
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JOB 6000 TON STORAGE TANK
CALCULATED BY R. B. TEDDER DATE
SHEET NO. 7a OF

EMISSION Factors are IN APPENDIX A

TRANSFER VOLUMETRIC FLOWRATES

(1) Sulfur density = 112 lb/ft³ @ 280°F

(2) Loading Tank = ~~400~~ 448 TON/hr × 2000 lb/TON × 1/60 hr/min
= ~~119~~ 133.3 × 1/112 ft³/lb
= ~~119~~ ft³/min

(3) Unloading tank = ~~120~~ 130 TON/hr × 2000 lb/TON × 1/60 hr/min
= ~~36~~ 38.7 × 1/112 ft³/lb
= ~~36~~ ft³/min

TRANSFER TIMES

(4) Loading Tank = ~~300000~~ 75%/100 × 670,000 TON/yr × ~~1/400~~ 1/448 hr/TON
= ~~750~~ 1121.7 hr/yr

(5) Unloading Tank = ~~300000~~ 75%/100 × 670,000 TON/yr × ~~1/120~~ 1/130 hr/TON
= ~~2500~~ 3,865.4 hr/yr

(6) Tank Idle = 8760 hr/yr − (~~750~~ + ~~2500~~) (1121.7 + 3865.4) hr/yr
= ~~5510~~ hr/yr
= 3,772.9

Ventilation Rates

Natural ventilation estimated at 18 cfm/vent (see APPENDIX A). TANK has 9 roof vents.

(7) Loading Tank = 18 cfm/vent × 9 vents + ~~119~~ 133.3 cfm
= ~~284~~ ft³/min
= 295.3

(8) Unloading Tank = 18 cfm/vent × 9 vents = ~~36~~ 38.7 cfm
= ~~126~~ ft³/min
= 123.3

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JOB 6000 TON STORAGE TANK
CALCULATED BY R. B. Tedder DATE
SHEET NO. 7b OF

(9) TANK Idle = 18 cfm/vent x 9 vents
= 162 ft³/min

EMISSIONS – SULFUR PARTICLE

Emission factors used for calculations are in APPENDIX A.

(10) Loading Tank = ~~284~~ 295.3 ft³/min x 60 min/hr
x 0.2 grain/ft³ x 1/7000 lb/grain
= ~~0.48~~ 0.506 lb/hr
x ~~2500~~ 1121.7 hr/yr x 1/2000 ton/lb
= ~~0.48~~ TPY
~~0.284~~ 0.284 TPY

(11) Unloading Tank = ~~700~~ 123.3 ft³/min x 60 min/hr
x 0.2 grain/ft³ x 1/7000 lb/grain
= ~~0.22~~ 0.211 lb/hr
x ~~2500~~ 3865.4 hr/yr x 1/2000 ton/lb
= ~~0.27~~ TPY
0.409 TPY

(12) Tank Idle = 162 ft³/min x 60 min/hr
x 0.2 grain/ft³ x 1/7000 lb/grain
= 0.28 lb/hr
x ~~5510~~ 3772.9 hr/yr x 1/2000 ton/lb
= ~~0.77~~ TPY
0.524 TPY

(13) MAX HOURLY = ~~0.48~~ 0.51 lb/hr

(14) TOTAL Annual = (~~0.18~~ 0.284 + 0.27 + 0.77) TPY
= 1.22 TPY
1.22 TPY

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JOB 6000 TON STORAGE TANK
CALCULATED BY R. B. TEDDER DATE
SHEET NO. 7C OF

Emissions – TRS (as H_2S)

(15) Loading Tank = ~~284~~ 295.3 ft^3/min × 60 min/hr × 3.5×10^{-5} lb/ft^3
= ~~0.59~~ 0.620 lb/hr
× ~~750~~ 1121.7 hr/yr × 1/2000 ton/lb
= ~~0.22~~ TPY
0.348 TPY

(16) Unloading Tank = ~~126~~ 123.3 ft^3/min × 60 min/hr × 3.5×10^{-5} lb/ft^3
= ~~0.26~~ 0.259 lb/hr
× ~~2500~~ 3865.4 hr/yr × 1/2000 ton/lb
= ~~0.33~~ TPY
0.500 TPY

(17) Tank Idle = 162 ft^3/min × 60 min/hr × 3.5×10^{-5} lb/ft^3
= 0.34 lb/hr
× ~~5512~~ 3772.9 hr/yr × 1/2000 ton/lb
= ~~0.94~~ TPY
0.642 TPY

(18) MAX HOURLY = ~~0.59~~ 0.62 lb/hr

(19) TOTAL Annual = (~~0.22~~ 0.348 + ~~0.33~~ 0.5 + ~~0.59~~ 0.642) TPY
= 1.14 TPY
1.49 TPY

Emissions – SO_2

(20) Loading Tank = ~~284~~ 295.3 ft^3/min × 60 min/hr × 7.3×10^{-5} lb/ft^3
= ~~1.393~~ 1.3393 lb/hr
× ~~250~~ 1121.7 hr/yr × 1/2000 ton/lb
= ~~0.46~~ TPY
0.725 TPY

(21) Unloading Tank = ~~126~~ 123.3 ft^3/min × 60 min/hr × 7.3×10^{-5} lb/ft^3
= ~~0.55~~ 0.540 lb/hr
× ~~2500~~ 3865.4 hr/yr × 1/2000 ton/lb
= ~~0.69~~ TPY
1.044 TPY

KOOGLER & ASSOCIATES
ENVIRONMENTAL SERVICES

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904/377-5822 • FAX 377-7158

JOB 6000 TON STORAGE TANK
CALCULATED BY R. B. TEDDER DATE
SHEET NO. 7d OF

(22) TANK IDLE = 162 ft³/min × 60 min/hr × 7.3×10⁻⁵ lb/ft³
= 0.71 lb/hr
× ~~3772.9~~ 3773.9 hr/yr × 1/2000 ton/lb
= ~~1.95~~ TPY
1.339 TPY

(23) MAX HOURLY = ~~4.33~~ 1.293 lb/hr

(24) TOTAL Annual = ~~3.1~~ TPY
= (0.725 + 1.044 + 1.339) = 3.108 TPY

EMISSIONS – VOC

(25) Loading tank = ~~284~~ 295.3 ft³/min × 60 min/hr × 5.2×10⁻⁵ lb/ft³
= ~~0.88~~ 0.921 lb/hr
× ~~1350~~ 1321.7 hr/yr × 1/2000 ton/lb
= ~~0.33~~ TPY
0.517 TPY

(26) Unloading tank = ~~126~~ 123.3 ft³/min × 60 min/hr × 5.2×10⁻⁵ lb/ft³
= ~~0.39~~ 0.385 lb/hr
× ~~2580~~ 3865.4 hr/yr × 1/2000 ton/lb
= ~~0.49~~ TPY
0.744 TPY

(27) TANK Idle = 162 ft³/min × 60 min/hr × 5.2×10⁻⁵ lb/ft³
= 0.51 lb/hr
× ~~3772.9~~ 3773.9 hr/yr × 1/2000 ton/lb
= ~~1.4~~
0.953 TPY

(28) MAX Hourly = ~~0.88~~ 0.921 lb/hr

(29) TOTAL Annual = ~~(0.33 + 0.49 + 1.4)~~ (0.517 + 0.744 + 0.953) TPY
= ~~2.22~~ TPY
= 2.214 TPY

2500 TON STORAGE TANKS

KOOGLER & ASSOCIATES
ENVIRONMENTAL SERVICES

4014 NW THIRTEENTH STREET
GAINESVILLE, FLORIDA 32609
904/377-5822 ▪ FAX 377-7158

JOB 2500 TON STORAGE TANKS
CALCULATED BY R. B. TEDDER DATE
SHEET NO. 7a OF

EMISSION FACTORS ARE IN APPENDIX A.

TRANSFER VOLUMETRIC FLOWRATES

Sulfur Density = 112 lb/ft³ @ 280°F

(1) Loading tank from Rail Car Pit 130/2

= ~~120~~ ton/hr x 2000 lb/ton x 1/60 hr/min x 1/112 ft³/lb

= ~~36~~ ft³/min

19.35

(2) Loading tank from TRUCK PIT 167/2

= ~~290~~ ton/hr x 2000 lb/ton x 1/60 hr/min x 1/112 ft³/lb

= ~~86~~ ft³/min

24.85

(3) Unloading tank to Supply Pit No. 1

= ~~12~~ 15 ton/hr x 2000 lb/ton x 1/60 hr/min x 1/112 ft³/lb

= ~~3.6~~ ft³/min

4.46

(4) Unloading tank to Supply Pit No 3 & No. 4

= ~~12~~ 22 ton/hr x 2000 lb/ton x 1/60 hr/min x 1/112 ft³/lb

= ~~13~~ ft³/min

6.55

TRANSFER TIMES

(5) Loading tank from Rail Car Pit 75%/100 x 670,000

= ~~300,000~~ ton/year x 1/~~120~~ 65 hr/ton x 1/2

= ~~1250~~ hr/yr / tank

3865.4

(6) Loading tank from TRUCK PIT 25%/100 x 670,000

= ~~160,000~~ ton/yr x 1/~~290~~ 83.5 hr/ton x 1/2

= ~~259~~ hr/yr / tank

1003.0

KOOGLER & ASSOCIATES
ENVIRONMENTAL SERVICES

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JOB 2500 TON STORAGE TANKS
CALCULATED BY R.B. TEDDER DATE
SHEET NO. 26 OF

(7) Unloading tank to Supply Pit No. 1 & 5
= ~~260,300~~ TON/yr × 1/~~46~~ 15 hr/TON × 1/2
= ~~4167~~ 8683.3 hr/yr/tank

(8) Unloading tank to Supply Pit No. 3 and No. 4
= ~~409,500~~ ~~350,000~~ TON/yr × 1/~~56~~ 26 hr/TON × 1/2
= ~~4467~~ 7,875.0 hr/yr/tank

NOTE: Supply Pit feed rates assume 95% operating factors for Sulfuric Acid Plants No. 1, No. 3 and No. 4. Also assume Supply Pits are operated simultaneously.

(9) TANK IDLE = 8760 hr/yr − (1250 + 259 + 4167) hr/yr
= 3084 hr/yr/tank
= 8760 − 8683.3 = 76.7 hrs/tank/yr
maximum value

VENTILATION RATES

Natural ventilation estimated at 18 cfm/vent (see APPENDIX A). Each tank has 10 vents.

(10) Loading tank from Rail Car Pit
= 18 cfm/vent × 10 vents + ~~36~~ 19.35 cfm
= ~~216~~ 199.4 ft³/min

(11) Loading tank from TRUCK PIT
= 18 cfm/vent × 10 vents + ~~86~~ 24.85 cfm
= ~~2016~~ 204.9 ft³/min

(12) Unloading Tank to Supply Pits
= 18 cfm/vent × 10 vents − ~~36~~ 4.46 − ~~13~~ 6.55
= ~~169~~ 169.0 ft³/min

(13) TANK IDLE = 18 cfm/vent × 10 vents
= 180 ft³/min

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GAINESVILLE, FLORIDA 32609
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JOB 2500 TON STORAGE TANKS
CALCULATED BY R. B. TEDDER DATE
SHEET NO. 7C OF

using 187.9 ft³/min for filling from rail while running
& 212.8 ft³/min for filling from both while running
assume we always unload trucks while unloading rails;
then hours for both = 1003 and
hours for rail only = 3865.4 - 1803 = 2862.4

EMISSIONS - SULFUR PARTICLE (Each Tank)

Loading tank from Rail Car Pit
= 216 ft³/min x 60 min/hr x 0.2 grain/ft³ x 1/7000 lb/grain
= 0.37 lb/hr
x 1250 hr/yr x 1/2000 ton/lb
= 0.23 TPY

Loading tank from Truck Pit
= 266 ft³/min x 60 min/hr x 0.2 grain/ft³
x 1/7000 lb/grain
= 0.46 lb/hr
x 259 hr/yr x 1/2000 ton/lb
= 0.06 TPY

Unloading to Supply Pits
= 163 ft³/min x 60 min/hr x 0.2 grain/ft³
x 1/7000 lb/grain
= 0.23 lb/hr
x 4167 hr/yr x 1/2000 ton/lb
= 0.58 TPY

TANK Idle = 180 ft³/min x 60 min/hr x 0.2 grain/ft³
x 1/7000 lb/grain
= 0.31 lb/hr
x 3084 hr/yr x 1/2000 ton/lb
= 0.48 TPY

MAX Hourly = 0.46 lb/hr

TOTAL Annual = (0.23 + 0.06 + 0.58 + 0.48) TPY
= ~~1.35~~ TPY
1.353 TPY see Table 1

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JOB 2500 TON STORAGE TANKS
CALCULATED BY R.B. TEDDER DATE
SHEET NO. 7d OF

Emissions - TRS (as H_2S) (Each Tank)

Loading Tank from Rail Car Pit

$= 216\ ft^3/min \times 60\ min/hr \times 3.5 \times 10^{-5}\ lb/ft^3$

$= 0.45\ lb/hr$

$\times 1250\ hr/yr \times 1/2000\ ton/lb$

$= 0.28\ TPY$

Loading Tank from Truck Pit

$= 266\ ft^3/min \times 60\ min/hr \times 3.5 \times 10^{-5}\ lb/ft^3$

$= 0.56\ lb/hr$

$\times 259\ hr/yr \times 1/2000\ ton/lb$

$= 0.07\ TPY$

Unloading to Supply Pits

$= 163\ ft^3/min \times 60\ min/hr \times 3.5 \times 10^{-5}\ lb/ft^3$

$= 0.34\ lb/hr$

$\times 4167\ hr/yr \times 1/2000\ ton/lb$

$= 0.71\ TPY$

TANK Idle $= 180\ ft^3/min \times 60\ min/hr \times 3.5 \times 10^{-5}\ lb/ft^3$

$= 0.38\ lb/hr$

$\times 3084\ hr/yr \times 1/2000\ ton/lb$

$= 0.58\ TPY$

MAX Hourly $= 0.56\ lb/hr$

Total Annual $= (0.28 + 0.07 + 0.71 + 0.58)\ TPY$

$= 1.64\ TPY$

1.658TPY see Table 1

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JOB 2500 TON STORAGE TANKS
CALCULATED BY R. B. TEDDER DATE
SHEET NO. 7e OF

Emissions – SO_2 (Each Tank)

Loading Tank from Rail Car Pit
= 216 ft^3/min x 60 min/hr x 7.3×10^{-5} lb/ft^3
= 0.95 lb/hr
x 1250 hr/yr x 1/2000 ton/lb
= 0.59 TPY

Loading Tank from TRUCK PIT
= 266 ft^3/min x 60 min/hr x 7.3×10^{-5} lb/ft^3
= 1.17 lb/hr
x 259 hr/yr x 1/2000 ton/lb
= 0.15 TPY

Unloading to Supply Pits
= 163 ft^3/min x 60 min/hr x 7.3×10^{-5} lb/ft^3
= 0.71 lb/hr
x 4107 hr/yr x 1/2000 ton/lb
= 1.49 TPY

TANK Idle = 180 ft^3/min x 60 min/hr x 7.3×10^{-5} lb/ft^3
= 0.79 lb/hr
x 3084 hr/yr x 1/2000 ton/lb
= 1.22 TPY

MAX Hourly = 1.17 lb/hr

Total Annual = (0.59 + 0.15 + 1.49 + 1.22) TPY

= 3.45 TPY

3.456 TPY see Table 1

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JOB 2500 TON STORAGE TANKS
CALCULATED BY R. B. TEDDER DATE
SHEET NO. 7 f. OF

Emissions — VOC (Each Tank)

Loading Tank from Rail Car Pit
$= 216\ ft^3/min \times 60\ min/hr \times 5.2 \times 10^{-5}\ lb/ft^3$
$= 0.67\ lb/hr$
$\times 1250\ hr/yr \times 1/2000\ ton/lb$
$= 0.42\ TPY$

Loading Tank from TRUCK Pit
$= 266\ ft^3/min \times 60\ min/hr \times 5.2 \times 10^{-5}\ lb/ft^3$
$= 0.83\ lb/hr$
$\times 259\ hr/yr \times 1/2000\ ton/lb$
$= 0.11\ TPY$

Unloading to Supply Pits
$= 163\ ft^3/min \times 60\ min/hr \times 5.2 \times 10^{-5}\ lb/ft^3$
$= 0.51\ lb/hr$
$\times 4167\ hr/yr \times 1/2000\ ton/lb$
$= 1.06\ TPY$

TANK Idle $= 180\ ft^3/min \times 60\ min/hr \times 5.2 \times 10^{-5}\ lb/ft^3$
$= 0.56\ lb/hr$
$\times 3084\ hr/yr \times 1/2000\ ton/lb$
$= 0.87\ TPY$

MAX Hourly $= 0.83\ lb/hr$

Total Annual $= (0.42 + 0.11 + 1.06 + 0.87)\ TPY$

$= \sout{2.46}\ TPY$

2.462 TPY see Table 1

SUPPLY PIT NO. 5

KOOGLER & ASSOCIATES
ENVIRONMENTAL SERVICES

4014 NW THIRTEENTH STREET
GAINESVILLE, FLORIDA 32609
904/377-5822 ▪ FAX 377-7158

JOB SUPPLY PIT No. X5
CALCULATED BY R. B. TEDDER DATE
SHEET NO. 7a OF

The SUPPLY pit has one vent with no forced draft. Sulfur is always in the pit. Emission factors are based on the data presented in APPENDIX A.

Ventilation Rate $\cong$ 18 ft^3/min/vent (natural)
TRANSFER TIME = 8760 hr/yr

Emissions

1. Sulfur Particle = 18 cfm/vent x 1 vent x 60 min/hr
x 0.2 grain/ft^3 x 1/7000 lb/grain
= 0.031 lb/hr
x 8760 hr/yr x 1/2000 ton/lb
= 0.14 TPY

2. TRS (as H_2S) = 18 cfm/vent x 1 vent x 60 min/hr
x 3.5×10^{-5} lb/ft^3
= 0.038 lb/hr
x 8760 hr/yr x 1/2000 ton/lb
= 0.17 TPY

3. SO_2 = 18 cfm/vent x 1 vent x 60 min/hr
x 7.3×10^{-5} lb/ft^3
= 0.079 lb/hr
x 8760 hr/yr x 1/2000 ton/lb
= 0.35 TPY

4. VOC = 18 cfm/vent x 1 vent x 60 min/hr
x 5.2×10^{-5} lb/ft^3
= 0.056 lb/hr
x 8760 hr/yr x 1/2000 ton/lb
= 0.25 TPY

SUPPLY PIT NO. 3/NO.4

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ENVIRONMENTAL SERVICES

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JOB Supply Pit No. 3 & No. 4
CALCULATED BY R. B. TEDDER DATE
SHEET NO. 7a OF

The Supply pit has one vent with no forced draft. Sulfur is always in the pit. Emission factors are based on the data presented in APPENDIX A.

Ventilation Rate $\cong$ 18 ft^3/min/vent (natural)
TRANSFER TIME = 8760 hr/yr

Emissions

1. Sulfur Particle = 18 cfm/vent x 1 vent x 60 min/hr
x 0.2 grain/ft^3 x 1/7000 lb/grain
= 0.031 lb/hr
x 8760 hr/yr x 1/2000 ton/lb
= 0.14 TPY

2. TRS (as H_2S) = 18 cfm/vent x 1 vent x 60 min/hr
x 3.5×10^{-5} lb/ft^3
= 0.038 lb/hr
x 8760 hr/yr x 1/2000 ton/lb
= 0.17 TPY

3. SO_2 = 18 cfm/vent x 1 vent x 60 min/hr
x 7.3×10^{-5} lb/ft^3
= 0.079 lb/hr
x 8760 hr/yr x 1/2000 ton/lb
= 0.35 TPY

4. VOC = 18 cfm/vent x 1 vent x 60 min/hr
x 5.2×10^{-5} lb/ft^3
= 0.056 lb/hr
x 8760 hr/yr x 1/2000 ton/lb
= 0.25 TPY

P 407 802 147

RECEIPT FOR CERTIFIED MAIL

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(See Reverse)

Sent to Mr. C. M. Farris, Farmland In	
Street and No. P. O. Box 960	
P.O., State and ZIP Code Bartow, FL 33830	
Postage	$
Certified Fee	
Special Delivery Fee	
Restricted Delivery Fee	
Return Receipt showing to whom and Date Delivered	
Return Receipt showing to whom, Date, and Address of Delivery	
TOTAL Postage and Fees	$
Postmark or Date Mailed: 3-19-91 Permit: AC 53-190667	

PS Form 3800, June 1985 ☆U.S.G.P.O. 1989-234-555

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Put your address in the "RETURN TO" Space on the reverse side. Failure to do this will prevent this card from being returned to you. The return receipt fee will provide you the name of the person delivered to and the date of delivery. For additional fees the following services are available. Consult postmaster for fees and check box(es) for additional service(s) requested.

1. ☐ Show to whom delivered, date, and addressee's address. *(Extra charge)*
2. ☐ Restricted Delivery *(Extra charge)*

3. Article Addressed to:

Mr. C. M. Farris, Gen. Mgr.
Farmland Industries, Inc.
County Road 640
P. O. Box 960
Bartow, FL 33830

4. Article Number
P 407 802 147

Type of Service:
☐ Registered ☐ Insured
☒ Certified ☐ COD
☐ Express Mail ☐ Return Receipt for Merchandise

Always obtain signature of addressee or agent and DATE DELIVERED.

5. Signature — Addressee
X Linda Thompson

6. Signature — Agent
X

7. Date of Delivery
3/21/91

8. Addressee's Address *(ONLY if requested and fee paid)*

PS Form 3811, Apr 1989 ★U.S.G.P.O. 1989-238-815 DOMESTIC RETURN RECEIPT

UNITED STATES POSTAL SERVICE

OFFICIAL BUSINESS

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- Complete items 1, 2, 3, and 4 on the reverse.
- Attach to front of article if space permits, otherwise affix to back of article.
- Endorse article "Return Receipt Requested" adjacent to number.

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MAR 25 1991

DER - BAQM

U.S.MAIL

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RETURN TO

Print Sender's name, address, and ZIP Code in the space below.

Dept. of Environmental Regulation
Bureau of Air Regulation
2600 Blair Stone Road
Tallahassee, FL 32399-2400
Attn: Patty Adams

Florida Department of Environmental Regulation

Twin Towers Office Bldg. ● 2600 Blair Stone Road ● Tallahassee, Florida 32399-2400

Lawton Chiles, Governor

Carol M. Browner, Secretary

March 19, 1991

CERTIFIED MAIL - RETURN RECEIPT REQUESTED

Mr. C. M. Farris, General Mgr.
Farmland Industries, Inc.
County Road 640
P. O. Box 960
Bartow, Florida 33830

Dear Mr. Farris:

Re: Polk County - A.P.
Farmland Industries, Inc.
Molten Sulfur Storage & Handling, AC 53-190667

Thank you for your letter dated February 12, 1991, in response to our request for additional information. The Department still considers your application incomplete. Please provide the following information:

1. In the permit application the maximum molten sulfur throughput requested was 525,000 tons/year (or 1438 tons/day). According to your letter dated February 12, 1991, the anticipated annual consumption is 670,000 tons (or 1836 tons/day), but you would like to be permitted for a maximum throughput of 2020 tons/day. Please clarify the maximum amount of molten sulfur you would like to be permitted for, in tons/day and tons/year.

2. Please specify the maximum amount of molten sulfur throughput you would like to be permitted (in tons/hr) for the rail pit, the truck pit, the 6000 and 2500 ton storage tanks and the supply pits. How many railcars and trucks would you like to be permitted to unload simultaneously?

3. The sulfur storage and handling system is not vented to any control devices, therefore, if system throughput increases the emissions from the system would also increase in equal proportions to material throughput. Please resubmit your emission calculations based on increased molten sulfur throughput.

Processing of this application will continue as soon as a satisfactory respone to the above referenced information has been received. If you have any questions, please call Mr. Mirza P. Baig at (904)488-1344.

Sincerely,

Barry D. Andrews

for C. H. Fancy, P.E.
Chief
Bureau of Air Regulation

CHF/MB/t

cc: B. Thomas, SW District
U.K. Custred, P.E.

Farmland Ind.

Mirza

I am going to call Mr Mier and tell them to submit data as Mike Harkey & Ed Huck discussed with their consultant (Bradley) about 10 days ago——

Clair

Farmland

Farmland Industries, Inc.
Fertilizer Phosphate Manufacturing
County Road 640
Post Office Box 960
Bartow, Florida 33830-0960
Telephone: 813 533-1141
Facsimile: 813 533-8793

Charles W. Jenkins
Environmental Coordinator

RECEIVED
FEB 18 1991
DER BAQM

February 12, 1991

Mr. C. H. Fancy, P.E.
Chief Bureau of Air Regulation
Florida Department of Environmental Regulation
Twin Towers Office Bldg.
2600 Blair Stone Road
Tallahassee, FL 32399-2400

Re: Sulfur Handling System Air Permit AC53-190667

Dear Mr. Fancy:

Your letter of January 16, 1991, to Mr. Farris was forwarded to me and I have organized the responses in the order that they were requests.

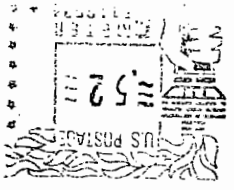
In answer to question 1: *"Submit a process flow diagram showing proposed maximum molten sulfur flow rates in tons/hour from each pit, each storage tank, and each supply pit. On the same diagram indicate the current allowable flow rates."*

See included process schematic labeled Sulfur Unloading System Figure 1. Each of the molten sulfur lines have been labeled with a letter from 'A' through 'K' and Table 1 shows the current, anticipated new, and maximum flow rates for each of these pipe lines. From this information the following rate summations can be made for each pit and tank.

Rail Pit: The absolute maximum rate that this pit can sustain is about 578 tons per hour (TPH). The normal rate is something like 240 TPH. These flow rate figures are derived from unloading times and pump curves and are not directly measured values. Sulfur rates in an unloading operation are of little concern since the only objective is to efficiently unload the sulfur and get it into the storage tank without spillage.

6,000 Ton Storage: The maximum input rate is 448 TPH, the normal rate is between 110 and 240 TPH. The maximum rate of empty must equal the pumping rate of the transfer pump (130 TPH) or the rail pit would overflow.

2,500 Ton Storage: These tanks were designed to be used in common, being filled and emptied together. The normal in feed rate varies from 65 to 149 TPH for each



Farmland Industries, Inc.
Fertilizer Phosphate Manufacturing
County Road 640
Post Office Box 960
Bartow, Florida 33830-0960

Mr. C. H. Fancy, P.E.
Chief Bureau of Air Regulation
FDER
Twin Towers Office Bldg.
2600 Blair Stone Road
Tallahassee, FL. 32399-2400

tank. The maximum occurs during those times when a truck is unloading at the same time that sulfur is being transferred from the rail terminal. It is possible to isolate either of these tanks in the event that it becomes necessary to take one out of service; in that case the remaining tank would experience all the sulfur flow for a maximum fill rate of 297 TPH.

Truck Pit: The maximum rate that sulfur can be dumped into this pit is during the rare occasion when two trucks dump simultaneously for a rate of about 150 TPH. The fixed rate that sulfur is pumped from the pit is about 167 TPH and again these are derived figures, not measured.

#3/4 Pit: Normal feed and pump-out rate is 44 TPH.

#5 Pit: Normal feed and pump-out rate is 30 TPH.

In answer to question 2: *"How many rail cars and trucks of molten sulfur can be unloaded simultaneously ?"*

There are dump stations for six rail cars; there are two stations under each of three separate rails. Although six cars could theoretically be unloaded at once, this is not done in practice because each rail can hold a maximum of fourteen cars which take a minimum of twenty four hours to apply steam and assure that the sulfur is molten. When the steaming operation is complete, it takes another eight hours to unload the track. It usually requires the rest of this second day for the railroad to remove the empties and deliver a fresh cut of cars. We normally dump one complete rail of cars each day, in which case we dump two cars at a time.

Only two trucks can be unloaded simultaneously.

In answer to question 3: *"What is the total maximum molten sulfur throughput and maximum sulfuric acid (100% H_2SO_4) production from all three plants you would like to be permitted for ?"*

We would like to be permitted for a maximum sulfur throughput of 2,020 tons per day (TPD) which is 10.0% greater than the 1,836 TPD needed to maintain our anticipated annual consumption of 670,000 tons. On an individual plant basis the maximum sulfur usage for each of the #3 and #4 Plants would be 617 TPD of sulfur which equals 1,885 TPD of 100% H_2SO_4. For Plant #5 the maximum sulfur usage would be 785 TPD for a sulfuric acid production max. of 2,400 TPD.

In answer to question 4: *"Please explain why the increase in emissions is only about 1/2 percent, while the maximum throughput of molten sulfur is increasing by about 45% (from 480,000 to 700,000 tons/year)."*

It can be seen that the calculation for determining contaminant loading for each of the pits is independent of the rate of sulfur throughput for the pit and is a function of the rate of vent gas flow only. These figures have remained the same.

The greatest difference in calculated emission loadings is found in that of the 2,500 ton tanks. This modification application uses the maximum total sulfur rate of 700,000 tons per year as the in-feed to both tanks while the calculated average rate of sulfur exiting the tank was based on the 670,000 ton per year figure. This is not of course physically possible but was done purposely to give the highest possible figure of contaminant loading.

If there are any further questions needing answered or any further clarifications please write or call me at (813) 533 - 1141.

Sincerely,

Charles W. Jenkins
Environmental Coordinator

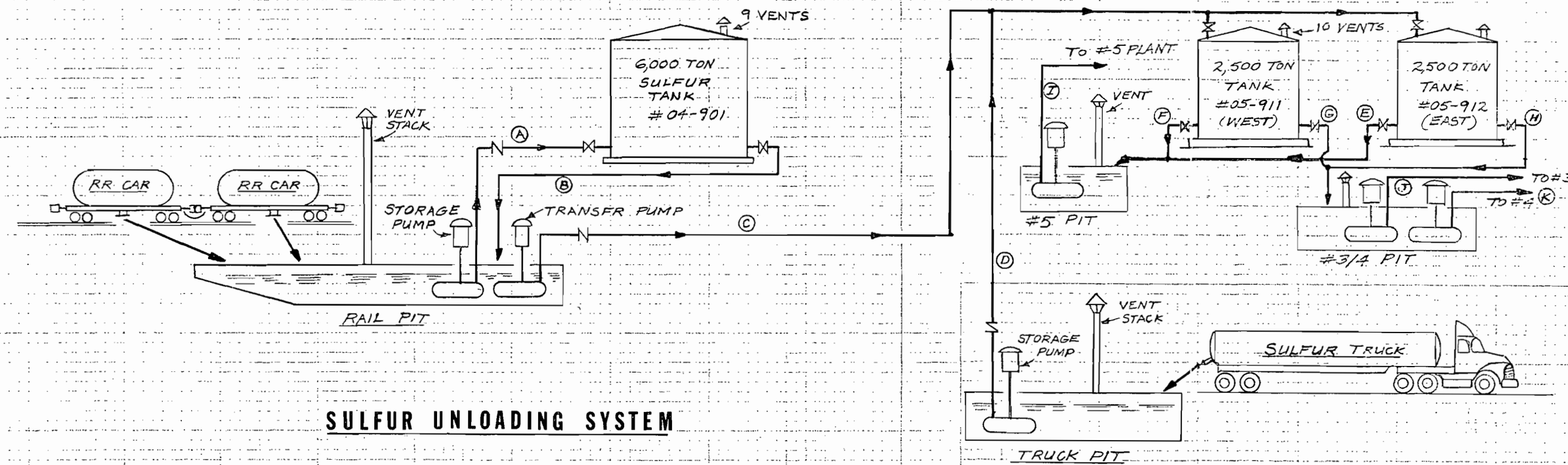
cc: Gene Meier
Merle Farris
Bob Pyburn
M. Baig
B. Thomas, SWDist.

PIPE LINE FLOW RATES IN TPH OF SULFUR
TABLE 1

Pipe Line	Present	Proposed Normal	Proposed Maximum
A	448	448	448
B	130	130	130
C	130	130	130
D	167	167	167
E	17	15	33 *
F	17	15	33 *
G	22	22	52 *
H	22	22	52 *
I	33	30	33
J	22	22	26
K	22	22	26

* = only when one tank is valved off.

FIGURE 1



SULFUR UNLOADING SYSTEM

P 407 852 926

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P.O., State and ZIP Code Bartow, FL 33830	
Postage	$
Certified Fee	
Special Delivery Fee	
Restricted Delivery Fee	
Return Receipt showing to whom and Date Delivered	
Return Receipt showing to whom, Date, and Address of Delivery	
TOTAL Postage and Fees	$
Postmark or Date Mailed: 1-16-90 Permit: AC 53-190667	

PS Form 3800, June 1985 ☆U.S.G.P.O. 1989-234-555

● **SENDER:** Complete items 1 and 2 when additional services are desired, and complete items 3 and 4.

Put your address in the "RETURN TO" Space on the reverse side. Failure to do this will prevent this card from being returned to you. The return receipt fee will provide you the name of the person delivered to and the date of delivery. For additional fees the following services are available. Consult postmaster for fees and check box(es) for additional service(s) requested.

1. ☐ Show to whom delivered, date, and addressee's address. *(Extra charge)*
2. ☐ Restricted Delivery *(Extra charge)*

3. Article Addressed to:

Mr. C. M. Farris, General Mgr.
Farmland Industries, Inc.
County Road 640
P. O. Box 960
Bartow, FL 33830

4. Article Number
P 407 852 926

Type of Service:
☐ Registered ☐ Insured
☒ Certified ☐ COD
☐ Express Mail ☐ Return Receipt for Merchandise

Always obtain signature of addressee or agent and DATE DELIVERED.

5. Signature — Addressee
X Linda Thompson

6. Signature — Agent
X

7. Date of Delivery 1-31-90

8. Addressee's Address *(ONLY if requested and fee paid)*

PS Form **3811**, Apr 1989 ★U.S.G.P.O. 1989-238-815 **DOMESTIC RETURN RECEIPT**

UNITED STATES POSTAL SERVICE

OFFICIAL BUSINESS

SENDER INSTRUCTIONS

Print your name, address and ZIP Code in the space below.

- Complete items 1, 2, 3, and 4 on the reverse.
- Attach to front of article if space permits, otherwise affix to back of article.
- Endorse article "Return Receipt Requested" adjacent to number.

RECEIVED

JAN 23 1991

DER-BAQM

U.S.MAIL

PENALTY FOR PRIVATE USE, $300

RETURN TO

Print Sender's name, address, and ZIP Code in the space below.

Dept. of Environmental Regulation
Bureau of Air Regulation
2600 Blair Stone Road
Tallahassee, FL 32399-2400
Attn: Patty Adams

Florida Department of Environmental Regulation

Twin Towers Office Bldg. ● 2600 Blair Stone Road ● Tallahassee, Florida 32399-2400

Lawton Chiles, Governor Carol M. Browner, Secretary

January 16, 1991

CERTIFIED MAIL - RETURN RECEIPT REQUESTED

Mr. C. M. Farris, General Manager
Farmland Industries, Inc.
County Road 640
Post Office Box 960
Bartow, Florida 33830

Re: Polk County - A.P.
Farmland Industries, Inc.
Molten Sulfur Storage & Handling
AC 53-190667

Dear Mr. Farris:

The Department has received a construction permit application for the above referenced project on December 19, 1990, and deemed it incomplete. Please provide the following information:

1. Submit a process flow diagram showing proposed maximum molten sulfur flow rates in tons/hour from each pit, each storage tank, and each supply pit. On the same diagram indicate the current allowable flow rates.

2. How many railcars and trucks of molten sulfur can be unloaded simultaneously?

3. What is the total maximum molten sulfur throughput and maximum sulfuric acid (100% H_2SO_4) production from all three plants you would like to be permitted for?

4. Please explain why the increase in emissions is only about ½ percent, while the maximum throughput of molten sulfur is increasing by about 45% (from 480,000 to 700,000 tons/year).

Processing of this application will continue as soon as a satisfactory response to the above referenced information has been received. If you have any questions, please feel free to contact Mirza P. Baig at 904-488-1344.

Sincerely,

C. H. Fancy, P.E.
Chief
Bureau of Air Regulation

CHF/MB/plm

c: Bill Thomas, SW District
U. K. Custred, P.E.

Farmland

Farmland Industries, Inc.
Fertilizer Phosphate Manufacturing
County Road 640
Post Office Box 960
Bartow, Florida 33830-0960
Telephone: 813 533-1141
Facsimile: 813 533-8793

Charles W. Jenkins
Environmental Coordinator

December 14, 1990

Mr. John Reynolds
Department of Environmental Regulation
Twin Towers Office Bldg.
2600 Blair Stone Road
Tallahassee, FL. 32399-2400

Re: Construction Permit Modification for Existing Molten Sulfur Storage and Handling Facility AC53-169874

Dear Mr. Reynolds,

As we discussed on the phone Friday, December 7, 1990, I am submitting a Modified Application to Construct the Sulfur Handling System. This modification is needed primarily because of the increased rate asked for on the new No. 5 Sulfuric Acid Plant. The following is a tabulation of total emissions as anticipated under these modifications.

	Previous Application Total Ton Per Year	Modification Total Ton Per Year
Part. Matter	5.58	5.59
TRS (H_2S)	6.48	6.85
SO_2	14.22	14.28
VOC	10.14	10.16

The largest change is less than $^1/_2$ percent except for the TRS which is greater because of a math error in the original application.

Enclosed with the Modified Application is a check for $200.00 for processing. If there are any questions please contact either myself or Mr. Gene Meier at 533-1141.

Sincerely,

Charles Jenkins
Environmental Coordinator

CWJ:dr/cwj6390

cc: Gene Meier
Merle Farris

STATE OF FLORIDA

DEPARTMENT OF EMVIRONMENTAL REGULATION

#200 pd 12-19-90 Rec't #151224

AC 53-190667

APPLICATION TO OPERATE/CONSTRUCT AIR POLLUTION SOURCES

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

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

COMPANY NAME: Farmland Industries, Inc. - Green Bay Complex 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 Attached Section)

SOURCE LOCATION: Street State Road 640 West City Bartow

UTM: East 17-409.5 km North 3079.5 km

Latitude 27 ° 50 ′ 37 ″ N Longitude 81 ° 56 ′ 05 ″ W

APPLICANT NAME AND TITLE: C. M. Farris, General Manager, Fertilizer Phosphate Mfg.

APPLICANT ADDRESS: P.O. Box 960, Bartow, FL 33830

SECTION I: STATEMENTS BY APPLICANT AND ENGINEER

A. APPLICANT

I am the undersigned owner or authorized representative* of Farmland Industries, Inc.

I certify that the statements made in this application for a construction modification 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: C M Farris

C. M. Farris, General Manager
Name and Title (Please Type)

Date: 12/12/90 Telephone No. (813) 533-1141

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 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

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 U. K. Custred

U. K. Custred
Name (Please Type)

FARMLAND INDUSTRIES, INC.
Company Name (Please Type)

P. O. Box 960 - Bartow, Florida 33830
Mailing Address (Please Type)

Florida Registration No. 8166 Date: 12/12/90 Telephone No. (813) 533-1141

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.

See Attached Process Description

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

Start of Construction NA Completion of Construction NA

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.)

No Control

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

None

PROCESS DESCRIPTION

Farmland industries, Inc. is located approximately six miles southwest of Bartow, Florida, on State Road 640 (see Figure 1). Farmland currently operates three sulfuric acid plants at the Green Bay Complex. Plants No. 3 and No. 4 are rated at 1,600 short tons per day of 100 percent H_2SO_4 and Plant No. 5 is rated at 2,400 short tons per day. Figure 2 shows the locations of the sulfuric acid plants and the sulfur storage tanks. The attached sulfur handling diagram (see Figure 3) is presented to clarify the operation of the sulfur system.

All of the sulfur used by Farmland is received in molten form. Approximately 75 percent 502,500 TPY (maximum of 525,000 tons per year) is delivered by 100 ton rail cars to the rail car receiving pit. The balance of 167,500 TPY (maximum of 175,000 tons per year), is delivered by truck to the truck receiving pit. As sulfur is dumped into the rail car pit (pit capacity approximately 91 tons) the automatic level contol activates the transfer pump causing liquid sulfur to be pumped directly to the two 2,500 ton storage tanks located in the north-east section of the operating complex. This pumping rate is about 130 tons per hour based on the pump curve (see Figure 4). The normal unloading process is to empty by gravity, two rail cars at a time into the rail car unloading pit. The normal time needed to empty these cars is 30 minutes, 20 minutes are required to move another pair of cars into position for emptying. This translates into an average unloading rate of 240 tons per hour, although instantaneous rates approach 400 tons per hour. The rail car pit level controller causes the second pump to startup and pump the excess sulfur to the 6,000 ton storage tank located at the west rail car terminal area. The excess sulfur that is pumped to the 6,000 ton tank is pumped at a rate of 1,000 US GPM (gallons per minute) according to the pump curve (see Figure 5), which equals about 448 tons per hour. The combined rate at which sulfur is pumped out of the pit is 130 + 448 = 578 TPH (tons per hour), which is faster than the filling rate of 240 TPH; therefore, the pump which feeds the 6,000 ton tank cycles on and off as required to maintain the level in the pit. In fact, this pump runs only about 15 minutes out of every hour that rail cars are being unloaded.

When rail cars are not being unloaded and inventory is needed in the two 2,500 ton plant supply tanks, sulfur is dumped back into the rail car dump pit by gravity with automatic level control from the 6,000 ton tank and pumped from there to these tanks with the above mentioned transfer pump.

The molten sulfur that is delivered by truck to the truck pit (capacity about 72 tons) is pumped directly into the two 2,500 ton tanks. This pump operates at a rate of about 375 US GPM which equals a rate of about 167 tons per hour (see Figure 6). This pump discharge line joins the rail car transfer pump line and the two discharge into both 2,500 ton tanks together. The maximum rate that sulfur can be pumped into these tanks is about 297 tons per hour. These two tanks are operated simultaneously and never isolated from each other except when one tank needs to be emptied for maintenance.

Sulfur from the two 2,500 ton storage tanks drains by gravity into the two plant supply pits as needed, by automatic level controls (see Figure 3). The pit supplying Sulfuric Acid Plant No. 5 (formarly refered to as pit No. 1) has a capacity of approximately 31 tons and is used to pump about 43 percent (300,000 tons per year) of the total sulfur used to Sulfuric Acid Plant No. 5. The pump pit referred to as the No. 3/No. 4 supply pit, has a capacity of approximately 28 tons and supplies the remaining 57 percent (400,000 tons per year) of sulfur to the two Sulfuric Acid Plants No. 3 and No. 4.

All the sulfur pits are equipped with level controls which causes the sulfur levels in these pits to be almost constant. The sources of emissions addressed in this permit application modification are the only sources associated with the Farmland molten sulfur handling system.

PROCESS DESCRIPTION

Farmland industries, Inc. is located approximately six miles southwest of Bartow, Florida, on State Road 640 (see Figure 1). Farmland currently operates three sulfuric acid plants at the Green Bay Complex. Plants No. 3 and No. 4 are rated at 1,600 short tons per day of 100 percent H_2SO_4 and Plant No. 5 is rated at 2,400 short tons per day. Figure 2 shows the locations of the sulfuric acid plants and the sulfur storage tanks. The attached sulfur handling diagram (see Figure 3) is presented to clarify the operation of the sulfur system.

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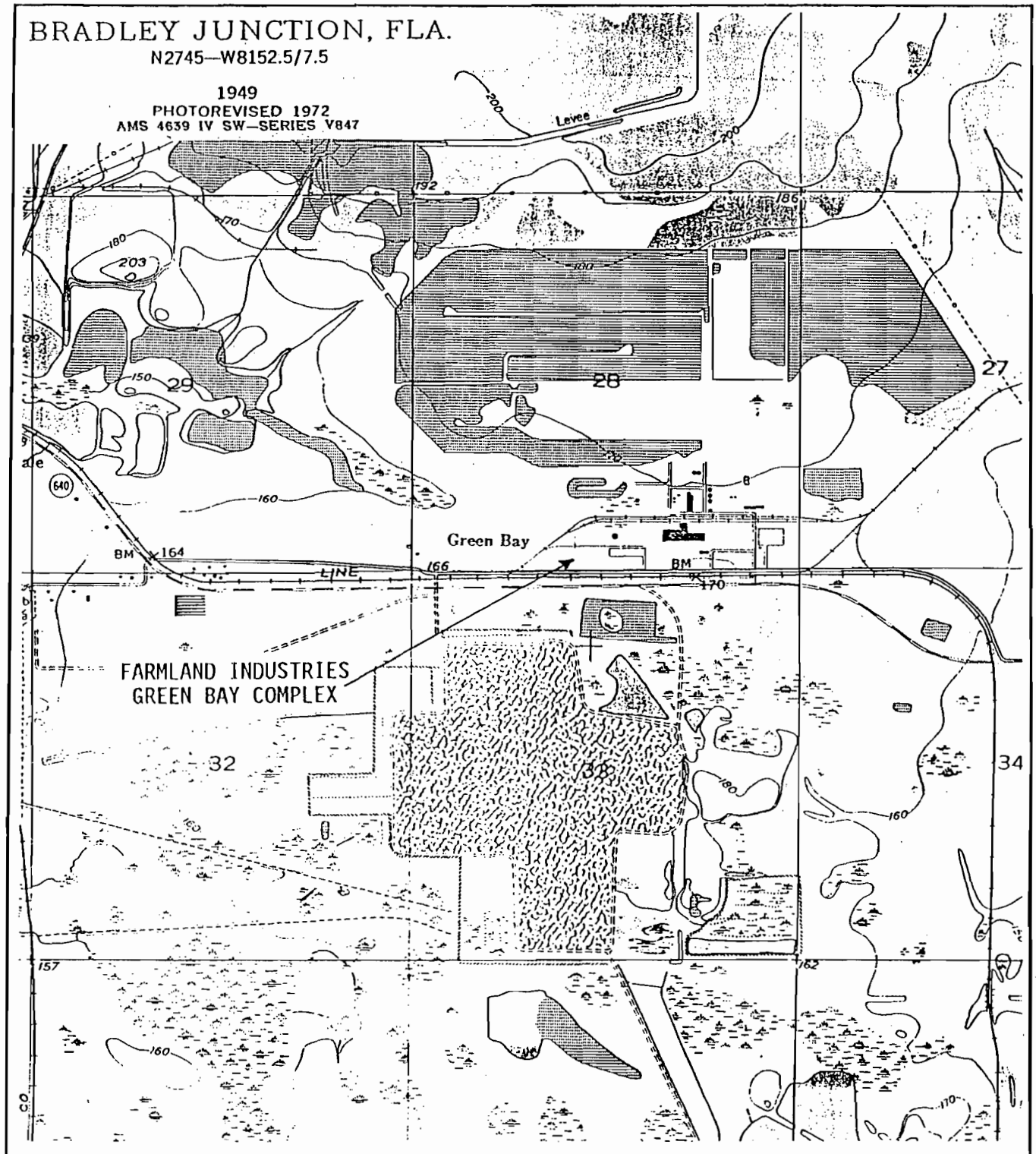
All the sulfur pits are equipped with level controls which causes the sulfur levels in these pits to be almost constant. The sources of emissions addressed in this permit application modification are the only sources associated with the Farmland molten sulfur handling system.



FLORIDA

QUADRANGLE LOCATION

GN MN 0°26' 8 MILS 0°

1 ½ 0 1 MILE

1000 0 1000 2000 3000 4000 5000 6000 7000 FEET

1 .5 0 1 KILOMETER

CONTOUR INTERVAL 10 FEET

DATUM IS MEAN SEA LEVEL

FIGURE 1

SITE LOCATION MAP
FARMLAND INDUSTRIES, INC.

SCALE 1:24000

KODGLER & ASSOCIATES

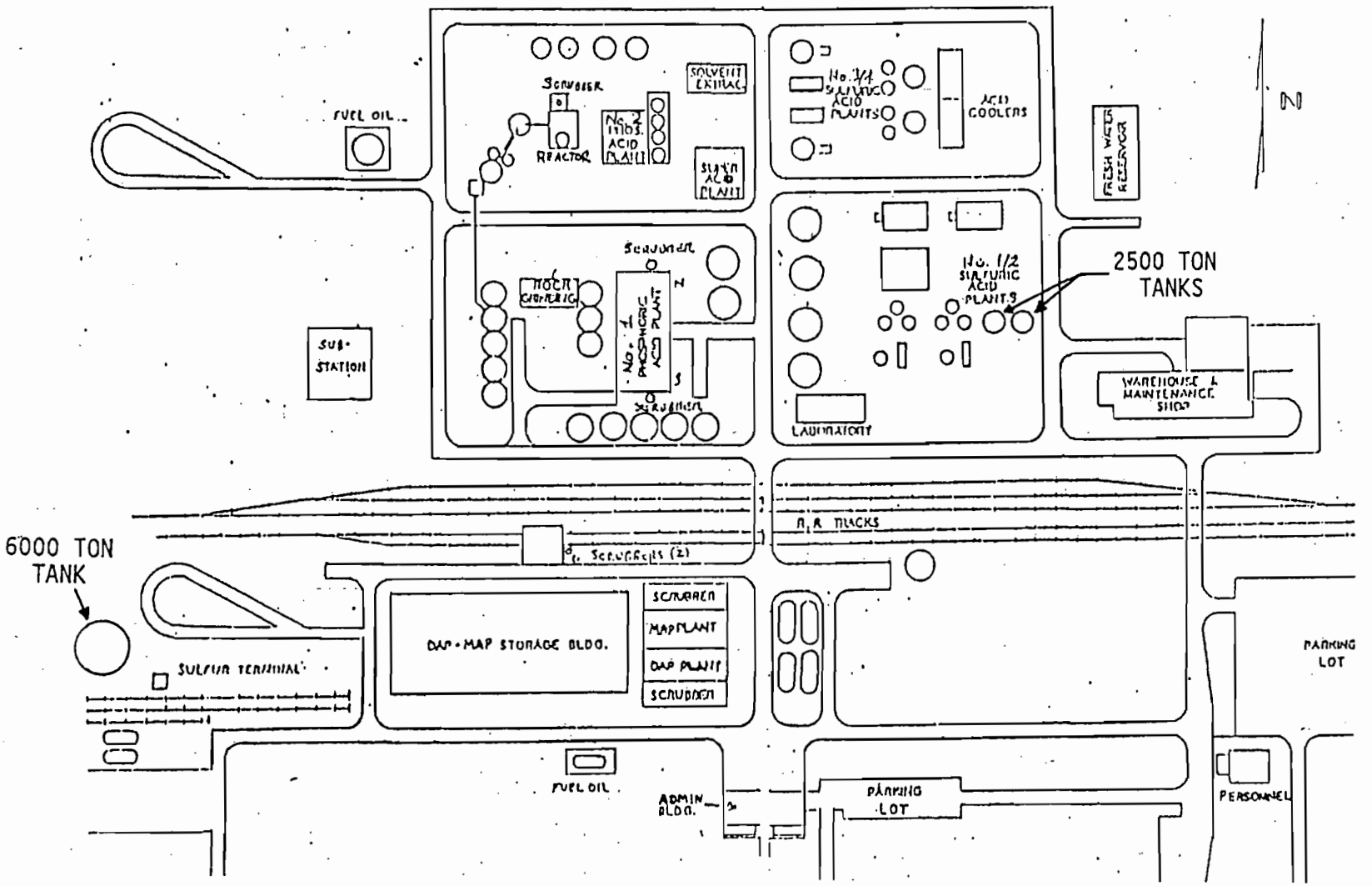


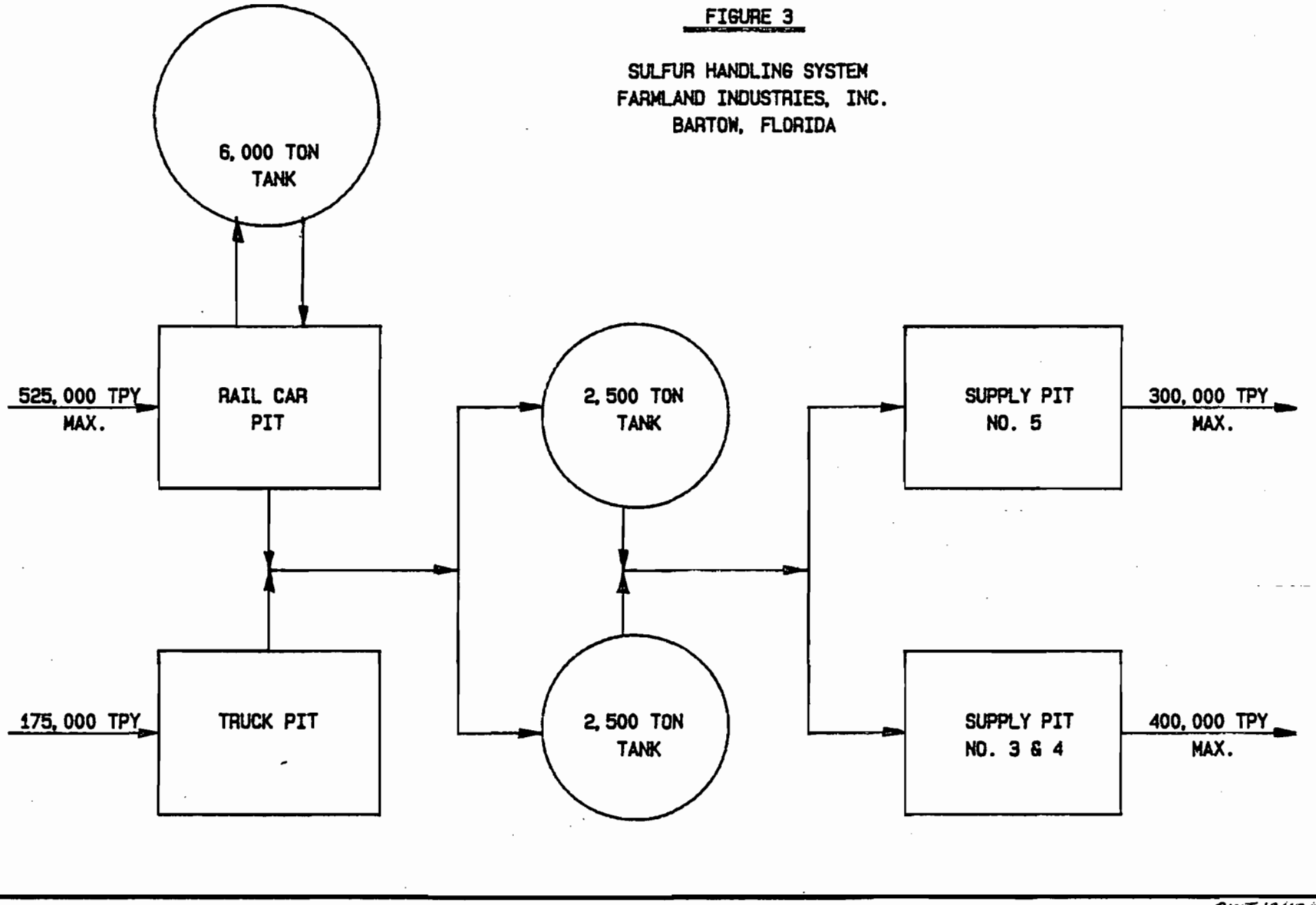
FIGURE 2

PLOT PLAN
FARMLAND INDUSTRIES, INC.

KOOGLER & ASSOCIATES

FIGURE 3

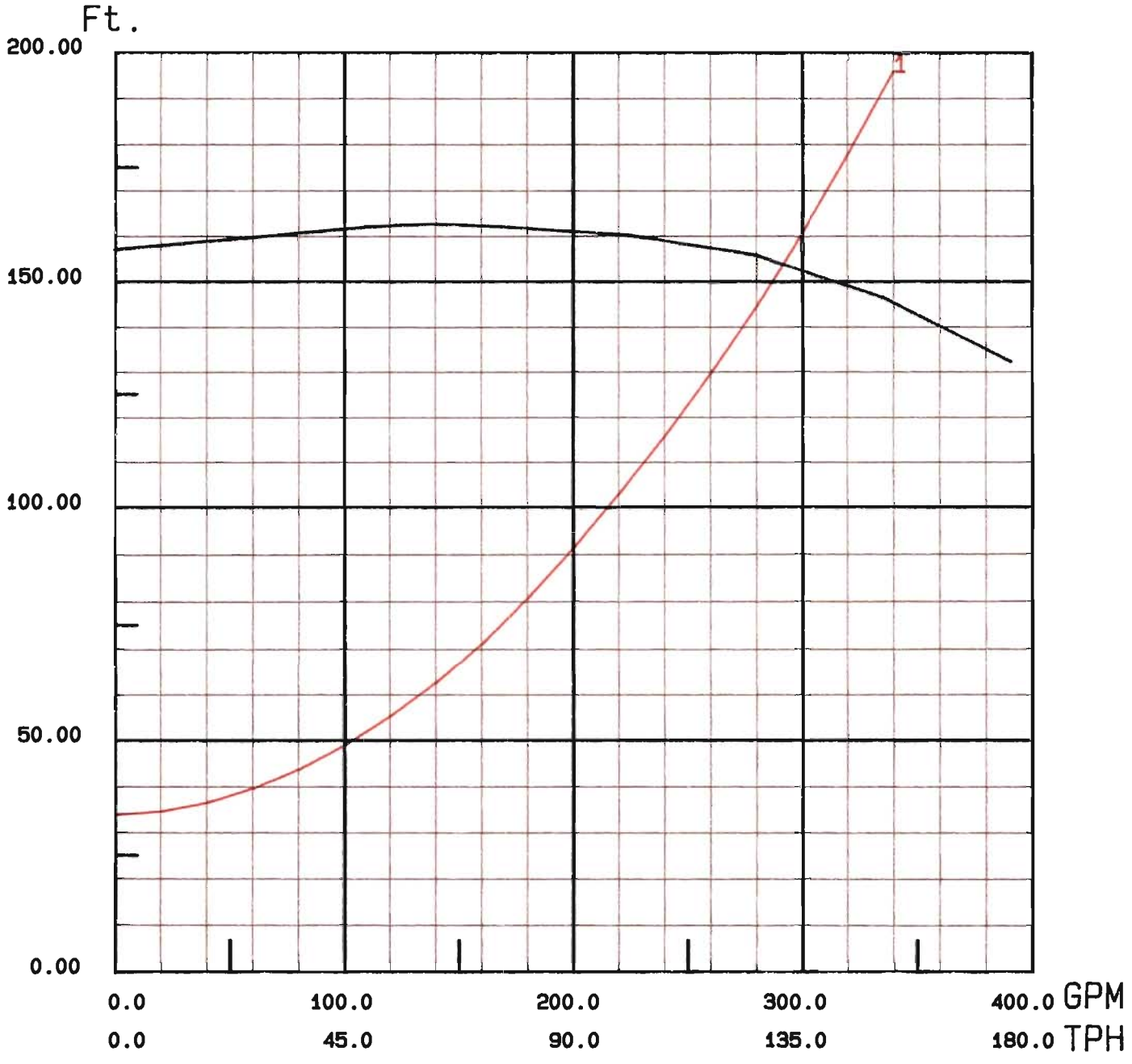
SULFUR HANDLING SYSTEM
FARMLAND INDUSTRIES, INC.
BARTOW, FLORIDA



CWJ 12/12/90

SULPHUR FROM TERMINAL TO 2,500 TON TANKS

Date 11-DEC-90 Time 13:18:22

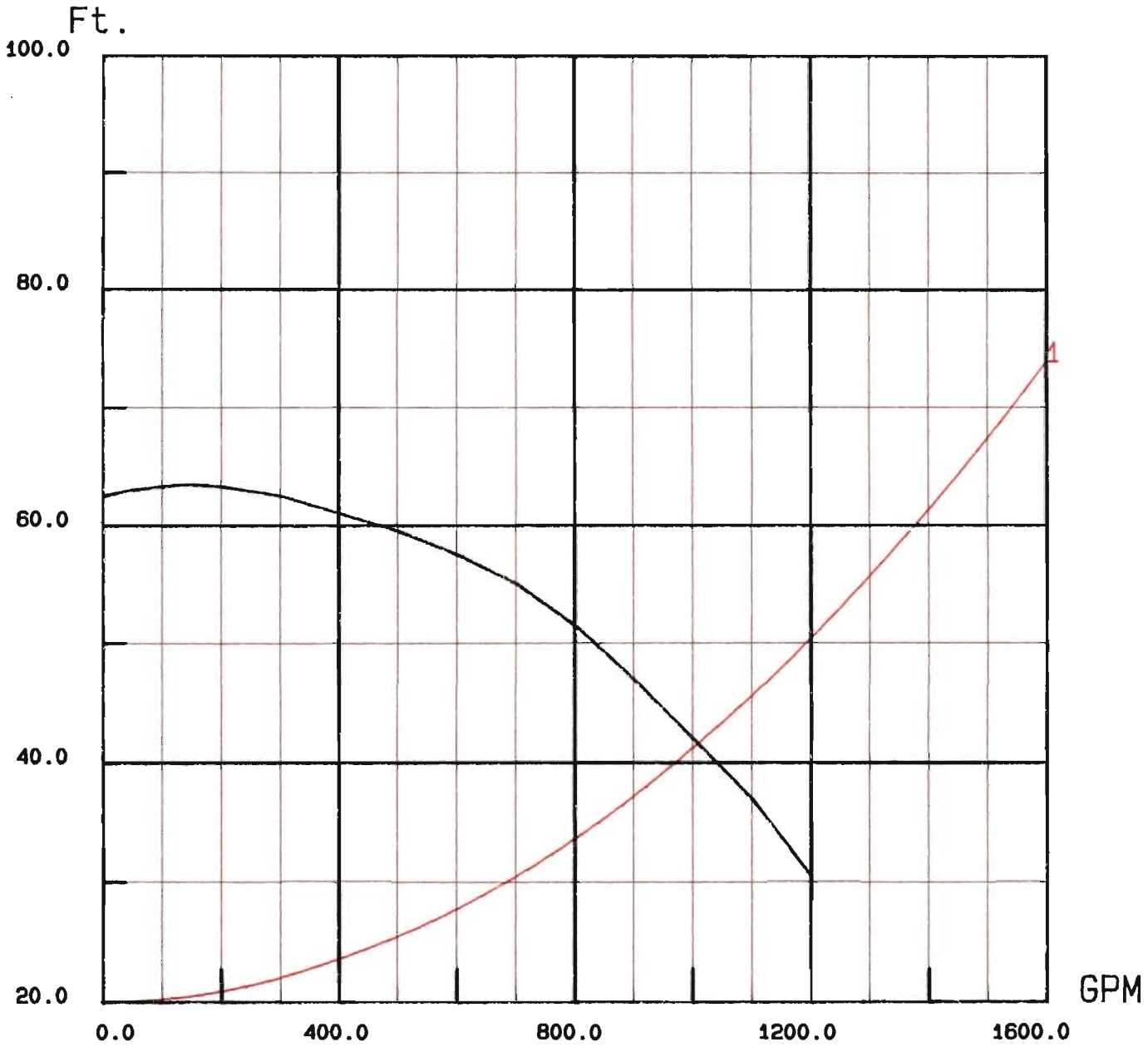


PUMP CURVE _____ C. S. LEWIS 4" @ 1750 RPM

FIGURE 4

Sulfur from Rail Pit to 6,000 ton Tank

Date 11-DEC-90 Time 13:37:07

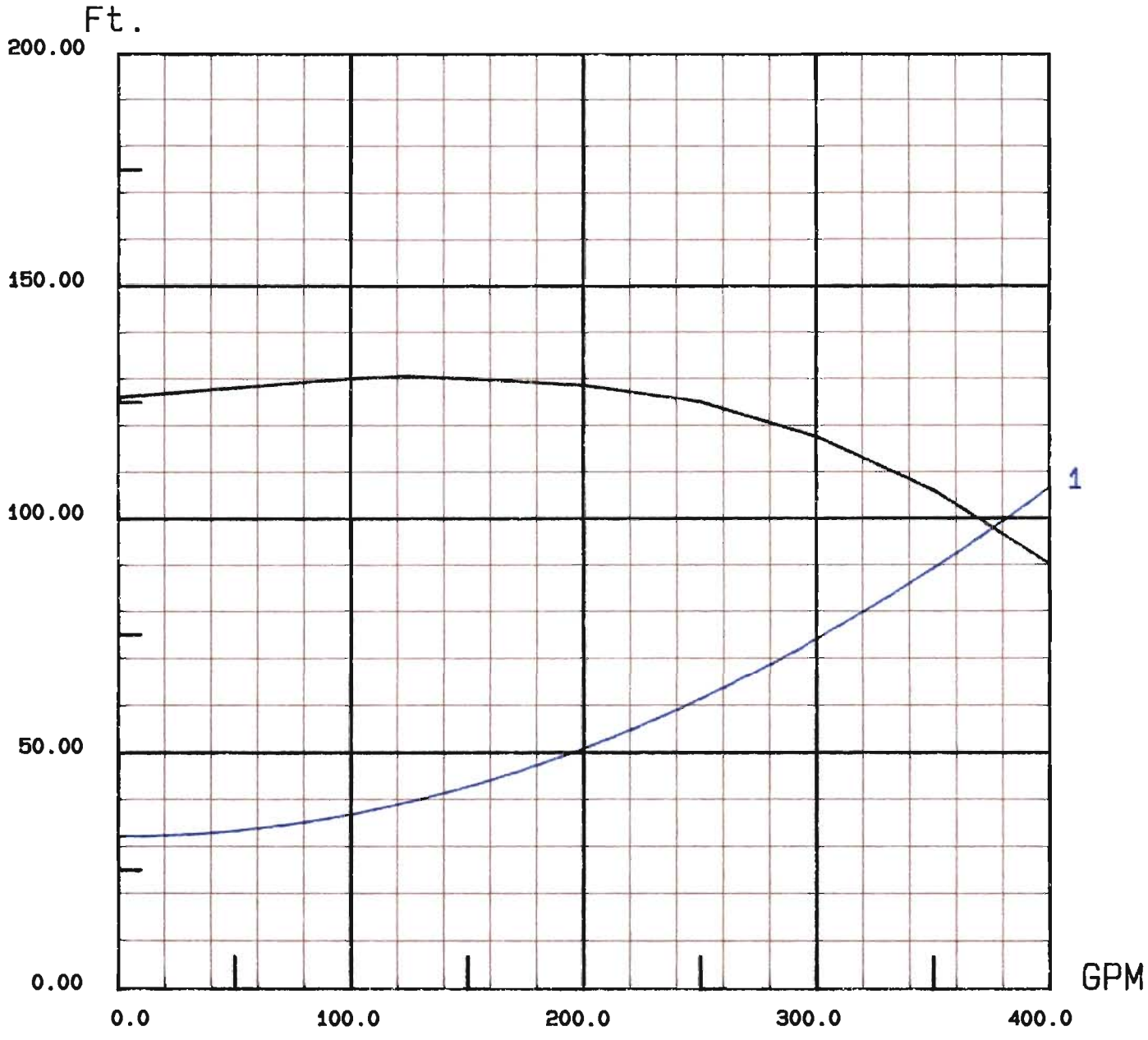


PUMP CURVE ____ C. S. LEWIS 6" @ 1750 RPM

FIGURE 5

SULFUR FROM TRUCK PUMP PIT TO TANKS

Date 7-DEC-90 Time 11:32:50



CURVE No. 1 = Piping system curve

PUMP CURVE _____ C. S. LEWIS 4" @ 1750 RPM

FIGURE 6

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) **Existing Facility**

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

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

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

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

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

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

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

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

H. Do "Reasonably Available Control Technology" (RACT) requirements apply to this source? NA

   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.

TRUCK PIT

STATE OF FLORIDA

DEPARTMENT OF EMVIRONMENTAL REGULATION

APPLICATION TO OPERATE/CONSTRUCT AIR POLLUTION SOURCES

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

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

COMPANY NAME: Farmland Industries, Inc. - Green Bay Complex 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) Truck Pit

The truck unloading pit is an inground rectangular tank of 34 feet 8 inches long by 8 feet wide and 6 feet 6 inches deep. It is covered with a tight fitting aluminum tread plate lid which has an 8 inch diameter natural draft exhaust vent. The pit holds about 72 tons of molten sulfur continuously and the sulfur that is dumped into it from trucks is pumped directly into the two 2,500 ton storage tanks.

Trucks are unloaded into the pit by attaching a dump hose to the unloading spout of the truck. The opposite end of this hose is inserted into a special opening in the top of the pit. The sulfur particle emissions and the sulfur gas emissions from the delivery vehicles are accounted for in the emission estimates for the truck pit.

STATE OF FLORIDA

DEPARTMENT OF EMVIRONMENTAL REGULATION

APPLICATION TO OPERATE/CONSTRUCT AIR POLLUTION SOURCES

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

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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	None		175,000 TPY	Max. Annual Thru-put
			167 TPH from	pit to storage tanks

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

1. Total Process Input Rate (lbs/hr): NA

2. Product Weight (lbs/hr): NA

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

Name of Contaminant	Emission[1]		Allowed[2] Emission Rate per Rule 17-2	Allowable[3] Emission lbs/hr	Potential[4] Emission		Rate to flow Diagram
	Maximum lbs/hr	Actual T/yr			lbs/hr	T/yr	
Part. Matter	0.031	0.14	17-2.600(11)	NA	0.031	0.14	
TRS (H_2S)	0.038	0.17	NA	NA	0.038	0.17	
SO_2	0.079	0.35	NA	NA	0.079	0.35	
VOC	0.056	0.25	NA	NA	0.056	0.25	

[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 standards.

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

D. Control Devices: (See Section V, Item 4)

Name and Type (Model & Serial No.)	Contaminant	Efficiency	Range of Particles Size Collected (in microns) (If applicable)	Basis for Efficiency (Section V Item 5)
None				

E. Fuels

Type (Be Specific)	Consumption*		Maximum Heat Input (MMBTU/hr)
	avg/hr	max./hr	
None			

*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.

Annual Average NA Maximum _____

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

None

1 Vent

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

Stack Height: 10 ft. Stack Diameter: 0.67 ft.

Gas Flow Rate: 18 ACFM - DSCFM Gas Exit Temperature: 200 °F.

Water Vapor Content: 2-3 % Velocity: 0.86 FPS

SECTION IV: INCINERATOR INFORMATION

NA - No Incineration

Type of Waste	Type 0 (Plastics)	Type I (Rubbish)	Type II (Refuse)	Type III (Garbage)	Type IV (Pathological)	Type V (Liq.& Gas By-prod.)	Type VI (Solid By-prod.)
Actual lb/hr Incinerated							
Uncontrolled (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 Sections IIA and IIIA)
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 Page 7a)
3. Attach basis of potential discharge (e.g., emission factor, that is, AP42 test).
   (See Page 7a)
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 Section IIA)
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 Section IIA)
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 Section IIA)

FARMLAND INDUSTRIES INC.

JOB Truck Pit
CALCULATED BY C. W. Jenkins
DATE: 12/9/90
SHEET NO. 1 OF 1

The truck pit has one vent with no forced draft. Sulfur is always in the pit. Emission factors are based on the data presented in Appendix A.

Ventilation Rate = (approx.) 18 ft^3/min/vent (natural)

Transfer time = 8,760 hr/yr

EMISSIONS

1. Sulfur Particulate = 18 CFM/vent X 1 vent X 60 min/hr X 0.2 grain/ft^3 X 1/7,000 lb/grain

   = 0.031 lb/hr

   Yearly = 0.031 lb/hr X 8,760 hr/yr X 1/2,000 ton/lb

   = 0.14 TPY

2. TRS (as H_2S) = 18 CFM/vent X 1 vent X 60 min/hr X 3.5×10^{-5} lbs/ft^3

   = 0.038 lb/hr

   Yearly = 0.038 lb/hr X 8,760 hr/yr X 1/2,000 ton/lb

   = 0.17 TPY

3. SO_2 = 18 CFM/vent X 1 vent X 60 min/hr X 7.3×10^{-5} lbs/ft^3

   = 0.079 lb/hr

   Yearly = 0.079 lb/hr X 8,760 hr/yr X 1/2,000 ton/lb

   = 0.35 TPY

4. VOC = 18 CFM/vent X 1 vent X 60 min/hr X 5.2×10^{-5} lbs/ft^3

   = 0.056 lb/hr

   Yearly = 0.056 lb/hr X 8,760 hr/yr X 1/2,000 ton/lb

   = 0.25 TPY

FARMLAND INDUSTRIES INC.

JOB Truck Pit
CALCULATED BY C. W. Jenkins
DATE: 12/9/90
SHEET NO. 1 OF 1

The truck pit has one vent with no forced draft. Sulfur is always in the pit. Emission factors are based on the data presented in Appendix A.

Ventilation Rate = (approx.) 18 ft^3/min/vent (natural)

Transfer time = 8,760 hr/yr

EMISSIONS

1. Sulfur Particulate = 18 CFM/vent X 1 vent X 60 min/hr X 0.2 grain/ft^3 X 1/7,000 lb/grain

= 0.031 lb/hr

Yearly = 0.031 lb/hr X 8,760 hr/yr X 1/2,000 ton/lb

= 0.14 TPY

2. TRS (as H_2S) = 18 CFM/vent X 1 vent X 60 min/hr X 3.5×10^{-5} lbs/ft^3

= 0.038 lb/hr

Yearly = 0.038 lb/hr X 8,760 hr/yr X 1/2,000 ton/lb

= 0.17 TPY

3. SO_2 = 18 CFM/vent X 1 vent X 60 min/hr X 7.3×10^{-5} lbs/ft^3

= 0.079 lb/hr

Yearly = 0.079 lb/hr X 8,760 hr/yr X 1/2,000 ton/lb

= 0.35 TPY

4. VOC = 18 CFM/vent X 1 vent X 60 min/hr X 5.2×10^{-5} lbs/ft^3

= 0.056 lb/hr

Yearly = 0.056 lb/hr X 8,760 hr/yr X 1/2,000 ton/lb

= 0.25 TPY

RAIL CAR PIT

STATE OF FLORIDA

DEPARTMENT OF EMVIRONMENTAL REGULATION

APPLICATION TO OPERATE/CONSTRUCT AIR POLLUTION SOURCES

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

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

COMPANY NAME: Farmland Industries, Inc. - Green Bay Complex 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) Rail Car Pit

The rail car pit is a 91 ton capacity pit which receives an average of about 502,500 tons per year of molten sulfur from rail cars only. The automatic level controls cause about 46 % of this sulfur to be pumped directly to the two 2,500 ton storage tanks and the remaining 54 % is pumped to the 6,000 ton storage tank through the second pump (during normal operation). All of the sulfur recovered from the 6,000 ton tank is transferred back to the rail car pit where it is pumped to the 2,500 ton storage tanks. This is done when rail cars are not unloading and there is room for additional inventory in the 2,500 tons tanks.

Sulfur is pumped to the 6,000 ton storage tank at a rate of 448 tons per hour on an instantaneous basis however over an hours time this rate is only 110 tons when the sulfur transfer pump is also operating. If sulfur is not being transferred to the two 2,500 ton tanks this rate is about 240 tons in an hours time. Sulfur is delivered at an average of 14 cars per eight hour shift.

The pit is 18 feet long, 18 feet wide and has a sloped bottom which averages five feet in depth. The pit is covered with aluminum plates and has a Hartzell fan providing a ventilation rate of 1,650 cubic feet per minute (at 1.5 inch WC). Molten sulfur remains in this pit continuously and level fluctuates only enough to activate the automatic level controls.

Sulfur is dumped into this pit through two closed trenches extending under the rails. A pipe is connected to the bottom dump valve of the rail cars which extends into an opening between the rails into the trench. Any sulfur particle emissions and sulfur gas emissions from the rail cars are accounted for in the emissions estimates for the rail car pit.

STATE OF FLORIDA

DEPARTMENT OF EMVIRONMENTAL REGULATION

APPLICATION TO OPERATE/CONSTRUCT AIR POLLUTION SOURCES

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

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

COMPANY NAME: Farmland Industries, Inc. - Green Bay Complex 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) Rail Car Pit

The rail car pit is a 91 ton capacity pit which receives an average of about 502,500 tons per year of molten sulfur from rail cars only. The automatic level controls cause about 46 % of this sulfur to be pumped directly to the two 2,500 ton storage tanks and the remaining 54 % is pumped to the 6,000 ton storage tank through the second pump (during normal operation). All of the sulfur recovered from the 6,000 ton tank is transferred back to the rail car pit where it is pumped to the 2,500 ton storage tanks. This is done when rail cars are not unloading and there is room for additional inventory in the 2,500 tons tanks.

Sulfur is pumped to the 6,000 ton storage tank at a rate of 448 tons per hour on an instantaneous basis however over an hours time this rate is only 110 tons when the sulfur transfer pump is also operating. If sulfur is not being transferred to the two 2,500 ton tanks this rate is about 240 tons in an hours time. Sulfur is delivered at an average of 14 cars per eight hour shift.

The pit is 18 feet long, 18 feet wide and has a sloped bottom which averages five feet in depth. The pit is covered with aluminum plates and has a Hartzell fan providing a ventilation rate of 1,650 cubic feet per minute (at 1.5 inch WC). Molten sulfur remains in this pit continuously and level fluctuates only enough to activate the automatic level controls.

Sulfur is dumped into this pit through two closed trenches extending under the rails. A pipe is connected to the bottom dump valve of the rail cars which extends into an opening between the rails into the trench. Any sulfur particle emissions and sulfur gas emissions from the rail cars are accounted for in the emissions estimates for the rail car pit.

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

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

Description	Contaminants Type	Contaminants % Wt	Utilization Rate - lbs/hr	Relate to Flow Diagram
Molten Sulfur	None		525,000 TPY	Max. Annual Thru-put
			110 TPH from	pit to 6,000 ton tank
			130 TPH from	pit to 2,500 ton tanks

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

1. Total Process Input Rate (lbs/hr): NA

2. Product Weight (lbs/hr): NA

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

Name of Contaminant	Emission[1] Maximum lbs/hr	Emission[1] Actual T/yr	Allowed[2] Emission Rate per Rule 17-2	Allowable[3] Emission lbs/hr	Potential[4] Emission lbs/hr	Potential[4] Emission T/yr	Rate to flow Diagram
Part. Matter	0.28	1.24	17-2.600(11)	NA	0.28	1.24	
TRS (H_2S)	0.35	1.52	NA	NA	0.35	1.52	
SO_2	0.72	3.17	NA	NA	0.72	3.17	
VOC	0.51	2.25	NA	NA	0.51	2.25	

[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 standards.

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

D. Control Devices: (See Section V, Item 4)

Name and Type (Model & Serial No.)	Contaminant	Efficiency	Range of Particles Size Collected (in microns) (If applicable)	Basis for Efficiency (Section V Item 5)
None				

E. Fuels

Type (Be Specific)	Consumption*		Maximum Heat Input (MMBTU/hr)
	avg/hr	max./hr	
None			

*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.

Annual Average NA Maximum _____

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

None

1 Vent (Forced Draft)

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

Stack Height: 10 ft. Stack Diameter: 0.83 ft.

Gas Flow Rate: 1650 ACFM - DSCFM Gas Exit Temperature: 200 °F.

Water Vapor Content: 2-3 % Velocity: 50.8 FPS

SECTION IV: INCINERATOR INFORMATION

NA - No Incineration

Type of Waste	Type 0 (Plastics)	Type I (Rubbish)	Type II (Refuse)	Type III (Garbage)	Type IV (Pathological)	Type V (Liq.& Gas By-prod.)	Type VI (Solid By-prod.)
Actual lb/hr Incinerated							
Uncontrolled (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 Sections IIA and IIIA)
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 Page 7a)
3. Attach basis of potential discharge (e.g., emission factor, that is, AP42 test).
   (See Page 7a)
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 Section IIA)
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 Section IIA)
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 Section IIA)

KOOGLER & ASSOCIATES
ENVIRONMENTAL SERVICES

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JOB RAIL CAR PIT
CALCULATED BY R.B. Tedder DATE
SHEET NO. 7a OF

The Rail Car Pit always has molten sulfur in the pit, stays at a fairly constant level and has one vent with a forced draft ventilation rate of 1650 ft^3/min.

TRANSFER TIME = 8760 hr/yr

The emission factors of APPENDIX A are based on measurements at molten sulfur storage tanks which based on their ventilation rates have one air turn-over in the head space every 300-400 minutes. In these tanks the sulfur particle concentration in the vented gases is estimated to be 0.2 grains/ft^3 (APPENDIX A).

In contrast the Rail Car Pit would have a head space over molten sulfur of approximately:

$\hat{=} 18' \times 18' \times 2.5'$ (free board)
$= 810\ ft^3$

Turn-Over Rate $= 810 ft^3 / 1650\ ft^3/min$
$= 0.49$ min per turnover.

* It seems reasonable to assume this large increase in turn-over rate will result in some dilution of the pollutant concentrations in the vented gases.

At a 300 min/turn-over rate, one can assume the equilibrium sulfur particle concentration is 0.2 grains/ft^3. At a 0 min/turn-over rate (i.e. infinite dilution), the sulfur particle concentration would be 0 grains/ft^3. Since fan performance will decrease as sulfur accumulates on the fan blades, assume under normal conditions the RAIL CAR PIT will achieve a 1 min/turn-over ventilation rate. The sulfur particle concentration will be approximated with a first order equation (see attached curve) which

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JOB RAIL CAR PIT
CALCULATED BY R. B. TEDDER DATE
SHEET NO. 7b OF

uses the above boundary conditions and forces the concentration to 10% of the equilibrium value at a 1 min / turn-over ventilation rate.

Using a (10%) factor, the Emission Factors of APPENDIX A become:

Sulfur Particle = 0.2 x 0.1 = 0.02 grain/ft^3

TRS (as H_2S) = $3.5 \times 10^{-5} \times 0.1 = 3.5 \times 10^{-6}$ lb/ft^3

SO_2 = $7.3 \times 10^{-5} \times 0.1 = 7.3 \times 10^{-6}$ lb/ft^3

VOC = $5.2 \times 10^{-5} \times 0.1 = 5.2 \times 10^{-6}$ lb/ft^3

Emissions

1. Sulfur Particle = 1650 ft^3/min x 60 min/hr x 0.02 grain/ft^3
x 1/7000 lb/grain
= 0.28 lb/hr
x 8760 hr/yr x 1/2000 ton/lb
= 1.24 TPY

2. TRS (as H_2S) = 1650 ft^3/min x 60 min/hr x 3.5×10^{-6} lb/ft^3
= 0.35 lb/hr
x 8760 hr/yr x 1/2000 ton/lb
= 1.52 TPY

3. SO_2 = 1650 ft^3/min x 60 min/hr x 7.3×10^{-6} lb/ft^3
= 0.72 lb/hr
x 8760 hr/yr x 1/2000 ton/lb
= 3.17 TPY

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JOB RAIL CAR PIT

CALCULATED BY R.B. TEDDER DATE

SHEET NO. 7C OF

4, VOC = 1650 ft^3/min x 60 min/hr x 5.2×10^{-6} lb/ft^3

= 0.51 lb/hr

x 8760 hr/yr x 1/2000 ton/lb

= 2.25 TPY

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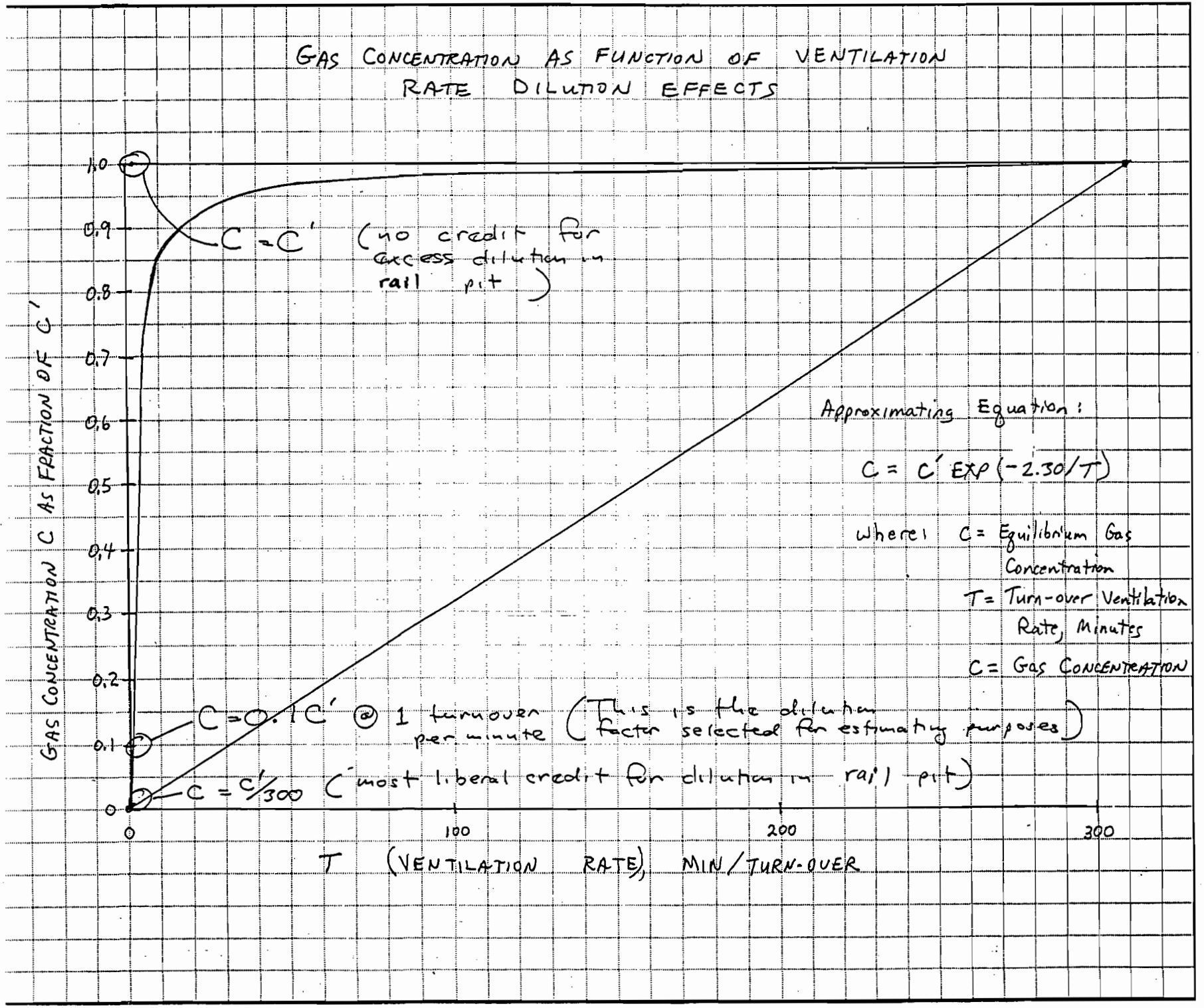
JOB Rail Car Pit
CALCULATED BY R. B. Tedder DATE
SHEET NO. 7d OF

GAS CONCENTRATION AS FUNCTION OF VENTILATION RATE DILUTION EFFECTS



Approximating Equation:

$$C = C' \exp(-2.30/T)$$

where: C = Equilibrium Gas Concentration
T = Turn-over Ventilation Rate, Minutes
C = Gas Concentration

6, 000 TON STORAGE TANK

STATE OF FLORIDA

DEPARTMENT OF EMVIRONMENTAL REGULATION

APPLICATION TO OPERATE/CONSTRUCT AIR POLLUTION SOURCES

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

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

COMPANY NAME: Farmland Industries, Inc. - Green Bay Complex 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) 6,000 Ton Storage Tank

The 6,000 ton storage tank located near the rail car unloading pit is 32 feet 5 inches tall by 65 feet diameter. The tank has one 24 inch diameter natural draft center roof vent and eight, 10 inch diameter rim roof vents.

The tank receives approximately 231,000 TPY of molten sulfur (maximum of 241,000 tons) at an average rate of 110 TPH and sulfur is emptied from this tank and transferred to the two 2,500 ton tanks at an average rate of 130 TPH.

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	None		241,000 TPY	Max. Annual Thru-put
			110 TPH from	pit to storage tanks
			130 TPH from	6,000 ton tank to 2,500 ton tanks via car pit

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

1. Total Process Input Rate (lbs/hr): NA

2. Product Weight (lbs/hr): NA

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

Name of Contaminant	Emission[1]		Allowed[2] Emission Rate per Rule 17-2	Allowable[3] Emission lbs/hr	Potential[4] Emission		Rate to flow Diagram
	Maximum lbs/hr	Actual T/yr			lbs/hr	T/yr	
Part. Matter	0.506	1.22 1.21	17-2.600(11)	NA	0.506	1.21	
TRS (H_2S)	0.620	1.14 1.49	NA	NA	0.620	1.49	
SO_2	1.293	3.10 3.11	NA	NA	1.293	3.11	
VOC	0.921	2.22 2.21	NA	NA	0.921	2.21	

[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 standards.

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

D. Control Devices: (See Section V, Item 4)

Name and Type (Model & Serial No.)	Contaminant	Efficiency	Range of Particles Size Collected (in microns) (If applicable)	Basis for Efficiency (Section V Item 5)
None				

E. Fuels

Type (Be Specific)	Consumption*		Maximum Heat Input (MMBTU/hr)
	avg/hr	max./hr	
None			

*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.

Annual Average NA Maximum _____

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

None

One Center Vent/Eight Rim Vents

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

Stack Height: 40/37 ft. Stack Diameter: 2.0/0.83 ft.

Gas Flow Rate: 18 (each) ACFM - DSCFM Gas Exit Temperature: 200 °F.

Water Vapor Content: 2-3 % Velocity: 0.10/0.55 FPS

SECTION IV: INCINERATOR INFORMATION

NA - No Incineration

Type of Waste	Type 0 (Plastics)	Type I (Rubbish)	Type II (Refuse)	Type III (Garbage)	Type IV (Pathological)	Type V (Liq.& Gas By-prod.)	Type VI (Solid By-prod.)
Actual lb/hr Incinerated							
Uncontrolled (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 Sections IIA and IIIA)
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 Page 7a)
3. Attach basis of potential discharge (e.g., emission factor, that is, AP42 test). (See Page 7a)
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 Section IIA)
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 Section IIA)
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 Section IIA)

FARMLAND INDUSTRIES INC.

JOB 6,000 Ton Storage Tank
CALCULATED BY C. W. Jenkins
DATE: 12/9/90
SHEET NO. 1 OF 3

Emissions factors are based on APPENDIX A

Transfer Volumetric Flow Rates:

Sulfur density = 112 lbs/ft^3

Loading tank flow = 448 ton/hr X 2,000 lb/ton X 1/60 hr/min X 1/112 ft^3/lb

= 133.3 ft^3/min

Unloading tank flow = 130 ton/hr X 2,000 lb/ton X 1/60 hr/min X 1/112 ft^3/lb

= 38.7 ft^3/min

Transfer Times:

Loading tank time = 46%/100 X 525,000 tons/yr X 1/448 hr/ton

= 539.1 hrs/yr

Unloading tank time = 54%/100 X 525,000 tons/yr X 1/130 hr/ton

= 2,180.8 hrs/yr

Idle time = 8,760 hr/yr - 539.1 hr - 2,180.8 hr

= 6,040.1 hr/yr

Ventilation Rates:

Natural ventilation estimated at 18 CFM/vent

Loading tank = 18 CFM/vent X 9 vents + 133.3 CFM

= 295.3 CFM

Unloading tank = 18 CFM/vent X 9 vents - 38.7 CFM

= 123.3 CFM

Idle tank = 18 CFV/vent X 9 vents

= 162 CFM

EMISSIONS

Particulate Sulfur:

Emission factors used for calculations are in APPENDIX A

Loading tank = 295.3 CFM X 60 min/hr X 0.2 grain/ft^3 X 1/7,000 lb/grain

= 0.506 lb/hr

Yearly = 0.506 lb/hr X 539.1 hr/yr X 1/2,000 ton/lb

= 0.136 TPY

Unloading tank = 123.3 CFM X 60 min/hr X 0.2 grain/ft^3 X 1/7,000 lb/grain

= 0.211 lb/hr

Yearly = 0.211 lb/hr X 2180.8 hr/yr X 1/2,000 ton/lb

= 0.230 TPY

Idle tank = 162 CFM X 60 min/hr X 0.2 grain/ft^3 X 1/7,000 lb/grain

= 0.278 lb/hr

Yearly = 0.278 lb/hr X 539.1 hr/yr X 1/2,000 ton/lb

= 0.839 TPY

Total annual emissions = 0.136 + 0.230 + 0.839 = 1.21 TPY

It can be seen from this analysis that the emissions are a function of the net amount of air exhausted from the tank since it is assumed that the tank does not gain or lose inventory from year to year; therefore, the air forced out of the tank from filling equals the air drawn into the tank from emptying and the net result is the same as an idle tank for the full 8,760 hour period.

Idle tank emissions = 0.278 lb/hr X 8,760 hr/yr X 1/2,000 ton/lb

= **1.21** TPY

FARMLAND INDUSTRIES INC.

JOB 6,000 Ton Storage Tank
CALCULATED BY C. W. Jenkins
DATE: 12/9/90
SHEET NO. 3 OF 3

TRS (as H_2S):

Loading tank = 295.3 CFM X 60 min/hr X 3.5×10^{-5}/ft^3

= 0.620 lb/hr (max. rate)

Idle tank = 162 CFM X 60 min/hr X 3.5×10^{-5}/ft^3

= 0.340 lb/hr

Total annual emissions = 0.340 lb/hr X 8,760 hr/yr X 1/2,000 ton/lb

= 1.489 TPY

SO_2:

Loading tank = 295.3 CFM X 60 min/hr X 7.3×10^{-5}/ft^3

= 1.293 lb/hr (max. rate)

Idle tank = 162 CFM X 60 min/hr X 7.3×10^{-5}/ft^3

= 0.710 lb/hr

Total annual emissions = 0.710 lb/hr X 8,760 hr/yr X 1/2,000 ton/lb

= 3.108 TPY

VOC:

Loading tank = 295.3 CFM X 60 min/hr X 5.2×10^{-5}/ft^3

= 0.921 lb/hr (max. rate)

Idle tank = 162 CFM X 60 min/hr X 5.2×10^{-5}/ft^3

= 0.505 lb/hr

Total annual emissions = 0.505 lb/hr X 8,760 hr/yr X 1/2,000 ton/lb

= 2.214 TPY

2, 500 TON STORAGE TANKS

STATE OF FLORIDA

DEPARTMENT OF EMVIRONMENTAL REGULATION

APPLICATION TO OPERATE/CONSTRUCT AIR POLLUTION SOURCES

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

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

COMPANY NAME: Farmland Industries, Inc. - Green Bay Complex 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) 2,500 Ton Storage Tanks

Farmland has two 2,500 ton molten sulfur storage tanks located near what was Sulfuric Acid Plant No. 2. Each tank is 45 feet in diameter and 32 feet 5 inches high at the top of the sidewall. Both tanks have two 20 inch diameter natural draft vents located near the center of the roof and eight 10 inch diameter rim roof vents.

The tanks receive approximately 502,500 TPY of molten sulfur (maximum of 525,000 tons) from the rail car pit at a rate of 130 TPH and 167,500 TPY (maximum of 175,000 tons) from the truck pit at a rate of 167 TPH. The total sulfur thru-put is distributed equally between the two tanks.

Approximately 43 % of the sulfur drains from these tanks into the Sulfuric Acid Supply pit No. 5 (formerly pit No. 1) at a maximum rate of 36.1 TPH, average rate of 32.8 TPH. The balance of the sulfur is drained into the Sulfuric Acid Plants No. 3 and No. 4 sulfur supply pit at a maximum rate of 48.1 TPH, average rate of 43.7 TPH.

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

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

Description	Contaminants Type	Contaminants % Wt	Utilization Rate - lbs/hr	Relate to Flow Diagram
Molten Sulfur	None		350,000 TPY	Max. Annual Thru-put
			65 TPH from	each tank rail pit to storage
			83.5 TPH from	each tank truck pit to storage
			42.3 TPH to	each tank plants from each tank

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

1. Total Process Input Rate (lbs/hr): NA

2. Product Weight (lbs/hr): NA

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

Name of Contaminant	Emission[1] Maximum lbs/hr	Emission[1] Actual T/yr	Allowed[2] Emission Rate per Rule 17-2	Allowable[3] Emission lbs/hr	Potential[4] Emission lbs/hr	Potential[4] Emission T/yr	Rate to flow Diagram
Part. Matter	0.332	1.359	17-2.600(11)	NA	0.332	1.359	
TRS (H_2S)	0.406	1.665	NA	NA	0.406	1.665	
SO_2	0.848	3.473	NA	NA	0.848	3.473	
VOC	0.604	2.474	NA	NA	0.604	2.474	

[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 standards.

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

D. Control Devices: (See Section V, Item 4)

Name and Type (Model & Serial No.)	Contaminant	Efficiency	Range of Particles Size Collected (in microns) (If applicable)	Basis for Efficiency (Section V Item 5)
None				

E. Fuels

Type (Be Specific)	Consumption*		Maximum Heat Input (MMBTU/hr)
	avg/hr	max./hr	
None			

*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.

Annual Average NA Maximum _____

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

None

Two Center Vents/Eight Rim Vents per Tank

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

Stack Height: 40/37 ft. Stack Diameter: 1.67/0.83 ft.

Gas Flow Rate: 18 (each) ACFM - DSCFM Gas Exit Temperature: 200 °F.

Water Vapor Content: 2-3 % Velocity: 0.14/0.55 FPS

SECTION IV: INCINERATOR INFORMATION

NA - No Incinerator

Type of Waste	Type 0 (Plastics)	Type I (Rubbish)	Type II (Refuse)	Type III (Garbage)	Type IV (Pathological)	Type V (Liq.& Gas By-prod.)	Type VI (Solid By-prod.)
Actual lb/hr Incinerated							
Uncontrolled (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 Sections IIA and IIIA)
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 Page 7a)
3. Attach basis of potential discharge (e.g., emission factor, that is, AP42 test).
   (See Page 7a)
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 preasure 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 Section IIA)
7. An 8 1/2" x 11" plot plan showing the location of the estsblishment, 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 Section IIA)
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 Section IIA)

FARMLAND INDUSTRIES INC.

JOB 2,500 Ton Tanks (Each)
CALCULATED BY C. W. Jenkins
DATE: 12/10/90
SHEET NO. 1 OF 3

Emissions factors are based on APPENDIX A

Transfer Volumetric Flow Rates:

Sulfur density = 112 lbs/ft^3

Loading tank from rail car pit
= 65 ton/hr X 2,000 lb/ton X 1/60 hr/min X 1/112 ft^3/lb

= 19.3 ft^3/min (per tank)

Loading tank from truck pit
= 83.5 ton/hr X 2,000 lb/ton X 1/60 hr/min X 1/112 ft^3/lb

= 24.9 ft^3/min (per tank)

Unloading tank to supply pits
= (16.4 to No. 5 + 21.9 to No. 3 & 4) ton/hr ave. X 2,000 lb/ton X 1/60 hr/min X 1/112 ft^3/lb

= 11.4 ft^3/min

Transfer Times:

Loading tank time
From rail car pit = 262,500 max. tons/yr X 1/65 hr/ton

= 4,038.5 hrs/yr

From truck pit = 87,500 max. tons/yr X 1/83.5 hr/ton

= 1,047.9 hrs/yr

Tank unloading time is considered to be equal to the plant operating factor of 95 % or in other words the tank is idle 5 % of the time.

Idle time = (5/100) X 8,760 hr/yr = 438 hr

Tank emptying only time = 8,760 hr/yr - 4,038.5 hr - 1,047.9 hr - 438 hr

= 3,235.6 hr/yr

Ventilation Rates:

Natural ventilation estimated at 18 CFM/vent

Idle tank = 18 CFM/vent X 10 vents = 180 CFM

Tank emptying = 180 CFM - 11.4 CFM = 168.6 CFM

Tank loading from rail pit while emptying
= 168.6 CFM + 19.3 CFM = 187.9 CFM

Tank loading from truck pit and emptying
= 168.6 CFM + 24.9 CFM = 193.5 CFM

Total ventilation = 180 CFM X 60 min/hr X 438 hrs
+ 168.6 CFM X 60 min/hr X 3,235.6 hrs
+ 187.9 CFM X 60 min/hr X 4,038.5 hrs
+ 193.5 CFM X 60 min/hr X 1,047.9 hrs

= 95,157,897.6 ft^3/year

Maximum ventilation = 193.5 CFM X 60 min/hr = 11,610 ft^3/hr

EMISSIONS

Particulate Sulfur:

Emission factors used for calculations are in APPENDIX A

Yearly = 95,157,897.6 ft^3/year X 0.2 grain/ft^3 X
1/7,000 lb/grain X 1/2,000 ton/lb

= 1.359 TPY (each tank)

Maximum rate = 11,610 ft^3/hr X 0.2 grain/ft^3 X
1/7,000 lb/grain

= 0.332 lb/hr

FARMLAND INDUSTRIES INC.

JOB 2,500 Ton Tanks (Each)
CALCULATED BY C. W. Jenkins
DATE: 12/10/90
SHEET NO. 3 OF 3

TRS (as H_2S):

Total annual emissions = 95,157,897.6 ft^3/year X $3.5x10^{-5}$ lb/ft^3 X 1/2,000 ton/lb

= 1.665 TPY (each tank)

Maximum rate = 11,610 ft^3/hr X $3.5x10^{-5}$ lb /ft^3

= 0.406 lb/hr

SO_2:

Total annual emissions = 95,157,897.6 ft^3/year X $7.3x10^{-5}$ lb/ft^3 X 1/2,000 ton/lb

= 3.473 TPY (each tank)

Maximum rate = 11,610 ft^3/hr X $7.3x10^{-5}$ lb /ft^3

= 0.848 lb/hr

VOC:

Total annual emissions = 95,157,897.6 ft^3/year X $5.2x10^{-5}$ lb/ft^3 X 1/2,000 ton/lb

= 2.474 TPY (each tank)

Maximum rate = 11,610 ft^3/hr X $5.2x10^{-5}$ lb /ft^3

= 0.604 lb/hr

SUPPLY PIT NO. 5

STATE OF FLORIDA

DEPARTMENT OF EMVIRONMENTAL REGULATION

APPLICATION TO OPERATE/CONSTRUCT AIR POLLUTION SOURCES

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

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

COMPANY NAME: Farmland Industries, Inc. - Green Bay Complex 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) Supply Pit No. 5

Supply Pit No. 5 has a capacity of 31 tons and transfers molten sulfur from the two 2,500 ton storage tanks to Sulfuric Acid Plant No. 5 at an average rate of 32.8 TPH, maximum rate of 36.1 TPH. An average of 287,100 tons per year of sulfur are transferred through the pit.

The pit is 8 feet long, 10 feet wide and 7 feet deep. It is covered with aluminum plate and has one 4 inch diameter natural draft vent exhausting at 10 feet above grade. There is always molten sulfur in the pit under normal conditions, and the level is maintained constant by automatic level control.

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	None		300,000 TPY	Max. Annual Thru-put
			36.1 TPH from	pit to Acid Plant No. 5
				maximum

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

1. Total Process Input Rate (lbs/hr): NA

2. Product Weight (lbs/hr): NA

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

Name of Contaminant	Emission[1]		Allowed[2] Emission Rate per Rule 17-2	Allowable[3] Emission lbs/hr	Potential[4] Emission		Rate to flow Diagram
	Maximum lbs/hr	Actual T/yr			lbs/hr	T/yr	
Part. Matter	0.031	0.14	17-2.600(11)	NA	0.031	0.14	
TRS (H_2S)	0.038	0.17	NA	NA	0.038	0.17	
SO_2	0.079	0.35	NA	NA	0.079	0.35	
VOC	0.056	0.25	NA	NA	0.056	0.25	

[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 standards.

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

D. Control Devices: (See Section V, Item 4)

Name and Type (Model & Serial No.)	Contaminant	Efficiency	Range of Particles Size Collected (in microns) (If applicable)	Basis for Efficiency (Section V Item 5)
None				

E. Fuels

Type (Be Specific)	Consumption*		Maximum Heat Input (MMBTU/hr)
	avg/hr	max./hr	
None			

*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.

Annual Average NA Maximum _____

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

None

1 Vent

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

Stack Height: 10 ft. Stack Diameter: 0.33 ft.

Gas Flow Rate: 18 ACFM - DSCFM Gas Exit Temperature: 200 °F.

Water Vapor Content: 2-3 % Velocity: 3.4 FPS

SECTION IV: INCINERATOR INFORMATION

NA - No Incineration

Type of Waste	Type 0 (Plastics)	Type I (Rubbish)	Type II (Refuse)	Type III (Garbage)	Type IV (Pathological)	Type V (Liq.& Gas By-prod.)	Type VI (Solid By-prod.)
Actual lb/hr Incinerated							
Uncontrolled (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 Sections IIA and IIIA)
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 Page 7a)
3. Attach basis of potential discharge (e.g., emission factor, that is, AP42 test).
   (See Page 7a)
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 Section IIA)
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 Section IIA)
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 Section IIA)

FARMLAND INDUSTRIES INC.

JOB Supply Pit No. 5
CALCULATED BY C. W. Jenkins
DATE: 12/11/90
SHEET NO. 1 OF 1

The supply pit has one vent with no forced draft. Sulfur is always in the pit. Emission factors are based on the data presented in Appendix A.

Ventilation Rate = (approx.) 18 ft^3/min/vent (natural)

Transfer time = 8,760 hr/yr

EMISSIONS

1. Sulfur Particulate = 18 CFM/vent X 1 vent X 60 min/hr X 0.2 grain/ft^3 X 1/7,000 lb/grain

= 0.031 lb/hr

Yearly = 0.031 lb/hr X 8,760 hr/yr X 1/2,000 ton/lb

= 0.14 TPY

2. TRS (as H_2S) = 18 CFM/vent X 1 vent X 60 min/hr X 3.5×10^{-5} lbs/ft^3

= 0.038 lb/hr

Yearly = 0.038 lb/hr X 8,760 hr/yr X 1/2,000 ton/lb

= 0.17 TPY

3. SO_2 = 18 CFM/vent X 1 vent X 60 min/hr X 7.3×10^{-5} lbs/ft^3

= 0.079 lb/hr

Yearly = 0.079 lb/hr X 8,760 hr/yr X 1/2,000 ton/lb

= 0.35 TPY

4. VOC = 18 CFM/vent X 1 vent X 60 min/hr X 5.2×10^{-5} lbs/ft^3

= 0.056 lb/hr

Yearly = 0.056 lb/hr X 8,760 hr/yr X 1/2,000 ton/lb

= 0.25 TPY

SUPPLY PIT NO. 3 / NO. 4

STATE OF FLORIDA

DEPARTMENT OF EMVIRONMENTAL REGULATION

APPLICATION TO OPERATE/CONSTRUCT AIR POLLUTION SOURCES

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

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

COMPANY NAME: Farmland Industries, Inc. - Green Bay Complex 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) Supply Pit No. 3/ No. 4

Supply Pit No. 3 / No. 4 has a capacity of 28 tons and transfers molten sulfur from the 2,500 ton storage tanks to Sulfuric Acid Plants No. 3 and No. 4 at a combined rate of approximately 43.7 tons per hour and a maximum of 48.1 tons per hour. About 382,900 tons per year of sulfur are transferred through this pit.

The pit is 8 feet 8 inches long, 8 feet 2 inches wide and 7 feet deep. It is covered with aluminum plate and has one 6 inch diameter natural draft vent at 10 feet above grade. There is always molten sulfur in the pit under normal conditions, and the level is maintained constant by an automatic level controller.

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	None		400,000 TPY	Max. Annual Thru-put
			48.1 TPH from	pit to Acid Plants No. 3
				and No. 4 maximum

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

1. Total Process Input Rate (lbs/hr): NA

2. Product Weight (lbs/hr): NA

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

Name of Contaminant	Emission[1]		Allowed[2] Emission Rate per Rule 17-2	Allowable[3] Emission lbs/hr	Potential[4] Emission		Rate to flow Diagram
	Maximum lbs/hr	Actual T/yr			lbs/hr	T/yr	
Part. Matter	0.031	0.14	17-2.600(11)	NA	0.031	0.14	
TRS (H_2S)	0.038	0.17	NA	NA	0.038	0.17	
SO_2	0.079	0.35	NA	NA	0.079	0.35	
VOC	0.056	0.25	NA	NA	0.056	0.25	

[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 standards.

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

D. Control Devices: (See Section V, Item 4)

Name and Type (Model & Serial No.)	Contaminant	Efficiency	Range of Particles Size Collected (in microns) (If applicable)	Basis for Efficiency (Section V Item 5)
None				

E. Fuels

Type (Be Specific)	Consumption*		Maximum Heat Input (MMBTU/hr)
	avg/hr	max./hr	
None			

*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.

Annual Average NA Maximum _____

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

None

1 Vent

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

Stack Height: 10 ft. Stack Diameter: 0.50 ft.

Gas Flow Rate: 18 ACFM - DSCFM Gas Exit Temperature: 200 °F.

Water Vapor Content: 2-3 % Velocity: 1.53 FPS

SECTION IV: INCINERATOR INFORMATION

NA - No Incineration

Type of Waste	Type 0 (Plastics)	Type I (Rubbish)	Type II (Refuse)	Type III (Garbage)	Type IV (Pathological)	Type V (Liq.& Gas By-prod.)	Type VI (Solid By-prod.)
Actual lb/hr Incinerated							
Uncontrolled (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 Type	Fuel BTU/hr	Temperature (°F)
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) _____

DER Form 17-1.202(1)
Effective November 30, 1982

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 Sections IIA and IIIA)
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 Page 7a)
3. Attach basis of potential discharge (e.g., emission factor, that is, AP42 test).
   (See Page 7a)
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 preasure 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 Section IIA)
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 Section IIA)
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 Section IIA)

FARMLAND INDUSTRIES INC.

JOB Supply Pit No. 3 & 4
CALCULATED BY C. W. Jenkins
DATE: 12/11/90
SHEET NO. 1 OF 1

The supply pit has one vent with no forced draft. Sulfur is always in the pit. Emission factors are based on the data presented in Appendix A.

Ventilation Rate = (approx.) 18 ft^3/min/vent (natural)

Transfer time = 8,760 hr/yr

EMISSIONS

1. Sulfur Particulate = 18 CFM/vent X 1 vent X 60 min/hr X 0.2 grain/ft^3 X 1/7,000 lb/grain

   = 0.031 lb/hr

   Yearly = 0.031 lb/hr X 8,760 hr/yr X 1/2,000 ton/lb

   = 0.14 TPY

2. TRS (as H_2S) = 18 CFM/vent X 1 vent X 60 min/hr X 3.5×10^{-5} lbs/ft^3

   = 0.038 lb/hr

   Yearly = 0.038 lb/hr X 8,760 hr/yr X 1/2,000 ton/lb

   = 0.17 TPY

3. SO_2 = 18 CFM/vent X 1 vent X 60 min/hr X 7.3×10^{-5} lbs/ft^3

   = 0.079 lb/hr

   Yearly = 0.079 lb/hr X 8,760 hr/yr X 1/2,000 ton/lb

   = 0.35 TPY

4. VOC = 18 CFM/vent X 1 vent X 60 min/hr X 5.2×10^{-5} lbs/ft^3

   = 0.056 lb/hr

   Yearly = 0.056 lb/hr X 8,760 hr/yr X 1/2,000 ton/lb

   = 0.25 TPY

BACT AND PSD
(NEITHER REQUIRED)

9. The appropriate application fee in accordance with Rule 17-4.05. The check should be made payable to the Department of Environmental Regulation.

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.

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:

5. 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 muat 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

. 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)_____

. 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.

Applicants Maximum Allowable Emission Data

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

. 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.

. Attach all other information supportive to the PSD review.

. 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.

. 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.

APPENDIX A

EMISSION FACTORS FOR SULFUR PARTICLES, TRS, SO_2 AND VOC IN MOLTEN SULFUR STORAGE AND HANDLING SYSTEMS

Sulfur particle emissions have been measured by Koogler & Associates (November 1988) from molten sulfur storage tanks in the phosphate chemical fertilizer industry. The measured sulfur particle concentrations in the gases vented from the storage tanks have ranged from 0.3-0.5 grains/ft^3. The higher concentrations were measured when the tanks were being filled with molten sulfur, and the lower concentrations when the tanks were idle. The average natural ventilation rates on multi-vent tanks were measured at about 18 cfm/vent.

Measurements of sulfur particle emissions at the Pennzoil terminals in Tampa, Florida, in October 1986 by Enviroplan were measured at 0.46 grains/ft^3 (NOTE: Data was corrected by Koogler and comments were transmitted to FDER, December 30, 1986). However, later tests conducted by Enviroplan (1987) at Sulfur Storage Company, Inc. in Tampa, Florida, measured sulfur particle concentrations at 0.12 grain/ft^3. It is believed that the Pennzoil tests and the Koogler tests during tank filling could contain condensed organics. Enviroplan (1987) indicated the total particulate concentrations including condensible hydrocarbons could be 2.5 times the sulfur particulate concentration.

Therefore, a reasonable estimate of sulfur particle concentration under all conditions is:

$$(0.3 + 0.12)/2 = 0.2 \text{ grains/ft}^3$$

Air vented from molten sulfur storage tanks and pits is also expected to contain small quantities of total reduced sulfur compounds, including H_2S (TRS), sulfur dioxide and volatile organic compounds (VOCs). The volatile organic compounds result from small quantities of petroleum products contained in Frasch sulfur (approximately 0.25%) and the vaporization of these compounds at the storage temperature of molten sulfur. The reduced sulfur compounds result from the reduction of elemental sulfur in the presence of carbon supplied by the petroleum products and the SO_2 results from the oxidation of elemental sulfur.

A limited number of measurements have been made on molten sulfur storage tanks at Frasch sulfur terminals in the Tampa area to determine TRS, SO_2, and VOC concentrations in the headspace of the tanks over molten sulfur. These measurements have been made on molten sulfur storage tanks with capacities in the range of 10,000 tons which are air purged at rates between 10 and 63 cfm to prevent the accumulation of H_2S. Because of the size of the tanks, the fact that they are air purged and the fact that sulfur delivered to the Port of Tampa most probably has a higher fraction of VOCs (due to the fact that there has been less time for the volatile fraction of the petroleum products to vaporize), measurements made in Tampa will overestimate TRS, SO_2 and VOC emissions from phosphate chemical fertilizer facilities which later receive the sulfur. However, as no other

data is available, the Tampa data will be used to estimate TRS (including H_2S), SO_2 and VOC emissions factors for molten sulfur storage tanks and molten sulfur pits. It should be recognized that the application of these emission factors will overstate the actual emissions by some unknown amount.

Measurements of TRS made in November 1983 by TRC and reported in the FDER "Sulfur Report" (February 1984) show the following:

Tank Purge Rate (CFM)	TRS (as H2S) in Headspace Over Molten Sulfur (ppm, vol)
43	280
63	403

Measurements made by Enviroplan, Inc. in 1987 in the headspace over molten sulfur in a tank purged at the rate of 10 cfm showed an average TRS concentration of 638 ppm (vol).

A "typical" concentration of TRS (as H_2S) in the headspace over molten sulfur can be estimated from these data:

$$[280 + 403 + 2(638)]/4 = 490 \text{ ppm (vol)}$$

$$= 3.5 \times 10^{-5} \text{ lb/ft}^3 \text{ at } 200^{\circ}\text{F}$$

Measurements of SO_2 made by TRC (1983) in the tank headspace over molten sulfur at purge rates of 43 and 63 cfm averaged 553 ppm (vol). This converts to an SO_2 concentration of 7.3×10^{-5} lb/ft^3 at 200°F.

Measurements made by Enviroplan, Inc. (1987) in the tank headspace over molten sulfur at STI in Tampa showed VOC concentrations that averaged 5.2×10^{-5} lb/ft^3.

Table 1 summarizes the above emission factors for molten sulfur storage and handling systems.

TABLE 1
SUMMARY OF EMISSION FACTORS FOR
MOLTEN SULFUR STORAGE AND
HANDLING SYSTEMS

Air Pollutant	Emission Factor
Sulfur Particle	0.2 grains/ft^3
TRS (as H_2S)	3.5×10^{-5} lb/ft^3
SO_2	7.3×10^{-5} lb/ft^3
VOC	5.2×10^{-5} lb/ft^3

REFERENCES

1. "Preliminary Report on Emissions From Tank No. 4 at Sulfur Terminal Co.,Inc., Tampa, Florida." TRC Environmental Consultants, Inc., East Hartford, Connecticut, December 30, 1983.

2. "Sulfur Report." Bureau of Air Quality Management, Florida Department of Environmental Regulation, Tallahassee, Florida, February 1984.

3. "Sulfur Particulate Emission Measurement Project at the Pennzoil Terminals in Tampa, Florida." Enviroplan, Inc., West Orange, New Jersey, October 1986.

4. Comments in a letter dated December 30, 1986, by Dr. John Koogler, Koogler & Associates to Mr. Steve Smallwood, FDER, on Enviroplan's Pennzoil Sulfur Company emission measurement report.

5. "Technical Report Supporting Application to the Florida DER For An Alternate Sulfur Particulate Emissions Sampling Procedure." Enviroplan, Inc., West Orange, New Jersey, October 30, 1987.

6. "Particulate Matter Emission Measurements From Molten Sulfur Storage Tanks at Gardinier, Inc., Tampa, Florida." Koogler & Associates, Gainesville, Florida, November 7-8, 1988.

7. Discussions with Enviroplan, Inc. at a meeting in New Orleans, Louisiana, on July 6, 1989. Enviroplan supplied measurement data on TRS and VOC concentrations in the headspace over molten sulfur storage tanks at the Sulfur Terminals Company, Inc. in Tampa, Florida, for testing which was conducted during September 1987.

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