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Golder Associates

September 30, 2008

063-7643

RECEIVED

OCT 02 2008

BUREAU OF AIR REGULATION

Florida Department of Environmental Protection
2600 Blair Stone Road
Tallahassee, FL 32399-2400

Attention: Scott M. Sheplak, P.E.

RE: PROJECT NUMBER 0570008-061-AC
BEST AVAILABLE RETROFIT TECHNOLOGY (BART) EXEMPTION REQUEST
MOSAIC FERTILIZER, LLC, RIVERVIEW FACILITY

Dear Mr. Sheplak:

Mosaic Fertilizer, LLC (Mosaic) has received the Department's request for additional information (RAI) dated September 9, 2008, regarding the Riverview BART exemption application. We appreciated the opportunity to meet with you on September 23, 2008 in Tallahassee to discuss the requests and the BART Exemption request. In accordance with the discussions at the recent meeting, each of the Department's requests is answered below, in the same order as they appear in the RAI letter. The revised application form pages and application attachments are included as part of this RAI response as attachments.

Comment 1. **Please update the previously submitted graphical representations of the most recent 5 years of data from each SAP to cover calendar years 2003-2007 data (a copy of the previously submitted graphs is enclosed).**

- **a. Include the prior data for each SAP, like:**
  - **i. the actual lb/ton 100% H_2SO_4 3-hour & 24-hour averages versus the 4 lb/ton 100% H_2SO_4;**
  - **ii. the actual tons of 100% H_2SO_4 produced from each SAP; and**
  - **iii. the dates of the turnarounds and the duration of the turnarounds for each SAP.**
- **b. Based on the 2003-2007 data, has the level of actual emissions in units of lb/ton 100% H_2SO_4 compared to the permit allowable in terms of a percentage (%) from each SAP for each averaging period changed?**
- **c. Using SO_2 continuous emissions monitoring system (CEMS) data, please provide the actual tons per year (TPY) of SO_2 for calendar years in the form of a chart for each SAP for calendar years 2003-2007.**
- **d. Please provide the actual tons of 100% H_2SO_4 produced from each SAP for calendar years 2003-2007 in the form of a chart.**

Response: Based on our September 23, 2008 meeting, it is our understanding that this information is not needed to deem the BART Exemption application complete. However, Mosaic has agreed to provide the requested information to the Department as soon as reasonably possible (hopefully within the next couple of weeks):

a. Updates of the previously submitted graphs are attached, covering the years 2003 through 2007.

b., c., d. The information requested in items b., c., and d. above will be provided within the next couple of weeks.

Comment 2. **As part of this application a Catalyst Supplier Study in Appendix C was provided.**

a. **In the provided study, a "larger cesium catalyst study" was referenced. Please provide a copy of this study. Was the use of the cesium promoted catalyst investigated? If so, what were the results and why was cesium promoted catalyst not proposed for use? (This application proposes to expand the volume of the beds and to use standard vanadium catalyst.)**

b. **Why is it not possible for the SAP No.8 to achieve the desired conversion efficiency with the existing converter?**

c. **The total volume of the catalyst shown on page 2 for SAP No.8 was "468320." This does not match the 575,000 liters cited in the text on page 5 of the BART Exemption analysis which prefaced the application. Please provide the support for the 575,000 liters mentioned?**

d. **Please provide the product literature from the catalyst supplier for the selected catalyst, Haldor Topsoe Inc.'s "VK, 12 mm Daisy."**

e. **Are the proposed new volumes in liters of each of the catalyst beds for each SAP Nos. 7, 8 & 9 shown as "passes"?**

f. **Is it possible to achieve the proposed SO_2 emission reductions without increasing the volumes of the catalyst?**

g. **Under the proposed changes to the SAPs is it anticipated that the SAPs will run longer? Will the time before a turnaround is necessary be extended?**

Response:

a. Similar to the Department's request #1 above, it is our understanding that the requested information is not required in order to deem the BART Exemption application complete. The requested larger cesium catalyst study was a confidential preliminary study to assess potential design requirements to achieve much lower emissions than those necessary to become BART-exempt. The study was in part in response to EPA initiatives focused on sulfuric acid plants and to EPA's comments on the initial BART application concerning the ability of cesium catalyst alone to meet emission limits in the 1.5 to 2.0 lb/ton range. That study was for a preliminary and limited purpose and has no applicability or relevance to the BART exemption application. Use of cesium promoted catalyst is not being proposed for the BART exemption application. It is more cost effective to continue use of vanadium catalyst.

b. It is not possible to achieve the desired conversion efficiency by increasing the catalyst loadings in the existing converter of the No. 8 SAP. The SAP is loaded to capacity in the fourth pass, the most critical pass for emissions control, and cannot accommodate any additional catalyst loading. This limitation is confirmed in the Haldor Topsoe study provided in the application. Haldor Topsoe states at the end of their cover letter, in reference to achieving an emission rate of 2.8 to 3.0 lb/ton:

"For the Riverview #8 plant it is not possible with the existing converter. However, since this converter will be replaced, it can be designed for sufficient catalyst loading."

and it needs to be replaced. Therefore, the new converter is being included in the BART exemption project and application. A separate air construction permit application is currently under review by FDEP which includes the converter replacement. This application was submitted because the timing of the BART permit at that time was unknown. As we discussed at the meeting, Mosaic needs to obtain approval for the No. 8 SAP converter replacement as soon as possible since Mosaic plans to implement the converter replacement in May 2009 and must begin on-site construction in November 2008.

c. The 468,320 liters total volume is the maximum volume for the existing converter. The 575,000 liters stated on Page 5 of the BART Exemption report to reliably and sustainably meet the proposed emission reductions is based on calculations by Haldor Topsoe at 2,900 TPD, adjusted for 2,700 TPD production rate, and applying a safety factor.

d. See attached literature. Note that the catalyst supplier will not be restricted to Haldor Topsoe; MECS has products that are essentially interchangeable with the Haldor Topsoe catalyst, and Mosaic may elect to use MECS or an equivalent product.

e. In this case, each catalyst bed is synonymous with "pass", although in some contexts a pass may represent more than one bed.

f. We do not believe it is possible to achieve the proposed emission rates while achieving the maximum permitted production rate with the existing volume of standard vanadium catalyst. If the existing vanadium catalyst were removed and replaced with cesium catalyst, it may be possible to achieve the proposed emission reductions within the existing volume. However, given the condition of the existing converter, Mosaic has determined it is more cost effective and reliable to use a larger volume of standard catalyst to achieve the emission reductions necessary to reach BART exempt status.

g. The purpose of the proposed changes is to meet the lower SO2 emission limits while maintaining the current production capability. It is not expected that the SAPs will operate any longer. The SAPs are expected to run in the same manner they are running now. Annual operation is highly dependent on turnaround schedules. Operating hours for each SAP are higher in years during which the plant does not experience a turnaround-. The time between turnarounds is dependent on many factors, such as dust build-up in the catalyst beds. The higher catalyst loadings proposed for the SAPs could result in catalyst fouling quicker, which would decrease operating time. Thus, the time between turnarounds could increase or decrease based on these and many other factors. However, the turnaround schedule is not anticipated to change as a result of the proposed changes; the turnaround schedule for each of the SAPs is approximately 30 months from the last turnaround, and the planned turnaround schedule for the future also reflects this, as shown in Table 2-2 of the BART Exemption report.

Comment 3. According to Department records, the SWD Office is processing an air construction permit, project number 0570008-060-AC. for changes to equipment at SAP No.8, specifically, for the replacement of the converter, super heater and cold heat exchanger.

a. What is the age of the current converter in SAP No.8?

b. Are the proposed changes to the equipment at the SAP No.8, replacement of the converter, super heater and cold heat exchanger, required to lower SO_2 emissions? Is it possible to achieve the proposed emission reductions without these physical changes?

c. Is the BART exemption project independent of this project?

Response:

a. The current converter in No. 8 SAP is approximately 43 years old. No. 8 SAP was constructed as a double-absorption plant in 1977. However, an existing converter was utilized in the plant. The existing converted was originally constructed in 1965.

b. All the proposed changes to the No. 8 SAP are necessary to achieve and maintain the lower SO_2 emissions over the long-term, while maintaining the current production capability. The existing converter could be used to achieve the lower SO_2 emissions, but due to the limited catalyst volume available, this would likely require a reduction in H_2SO_4 production. The new converter with the larger catalyst volume provides the ability to maintain production while meeting the lower SO_2 emission limit for the BART exemption, and to do so over an extended time period. The existing converter needs replacement anyway, due to its age and structural condition.

The superheater and cold heat exchanger replacements are necessary to remedy and repair gas leaks. These leaks cause higher SO_2 emissions, so these replacements are necessary to achieve the proposed lower SO_2 emissions.

Mosaic believes it is not possible to achieve the lower SO_2 emissions over the long-term without all of these physical changes to the No. 8 SAP.

c. The two projects are interconnected. The converter replacement project would be implemented regardless of BART, due to the condition of the converter. However, since additional catalyst will be loaded in the converter as a requirement for the BART project, the two projects are related. The superheater and cold gas heat exchanger are in need of repair regardless of BART, but are also needed to reduce gas leaks in order to meet the BART emission limits.

Comment 4. Are the proposed physical changes to the SAP No.7, i.e., replacement of the cold heat exchanger, necessary to lower SO_2 emissions? Are these requested physical changes solely in this permit application request?

Response: For the same reasons stated above for No. 8 SAP, the cold heat exchanger replacement is necessary to remedy and repair gas leaks. These leaks cause higher SO_2 emissions, so this replacement will aid in achieving the proposed lower SO_2 emissions. Replacement of the cold gas-to-gas heat exchanger is planned for the currently scheduled May 2010 turnaround, and is requested solely in this BART exemption application.

Comment 5. Are the proposed physical changes to the SAP No.9, i.e., replacement of the current interpass adsorption tower with a heat recovery system, necessary to lower SO_2 emissions? Are these requested physical changes solely in this permit application request?

Response: Replacement of the current interpass absorption tower with a heat recovery system are planned for the currently scheduled February 2010 turnaround. These changes are not directly necessary for the proposed lower SO_2 emissions and are primarily designed to increase energy recovery at the facility. These changes are being requested solely in the BART exemption application.

Comment 6. Please address prevention of significant deterioration (PSD) applicability to this proposed project. Does this project trigger PSD? [For PSD applicability in the State of Florida see Rule 62-212, Florida Administrative Code (F.A.C.)]

a. Will the capacity, tons per day (TPD) of 100% H_2SO_4, of each of the SAPs be changed under this project?

Response: The purpose of all the physical changes described in the BART Exemption application is to meet the proposed lower SO_2 emission limits. Some of the changes could be conducted in the absence of BART as routine maintenance, repair or replacement. Mosaic has not used production rate increases to internally justify any of these changes. Due to the lower SO_2 limits, short term H_2SO_4 production may actually decrease. As the agency recognizes, there is a correlation between SO_2 emissions and production rate in a SAP.

Mosaic is proposing to reduce SO_2 emissions, but is not requesting any increase in the permitting H_2SO_4 production rates of the SAPs. The SAPs at Riverview have routinely achieved their permitted production rates and we therefore are not projecting an emissions increase triggering PSD. To demonstrate this, Mosaic reviewed the last five years of daily production data. The results are presented in the attached graphs. The data show the following:

- No. 7 SAP has achieved 90% or more of the permitted production rate of 3,200 TPD on 290 days out of the last five years, and more that 95% of the permitted rate on 24 days in the last five years.
- No. 8 SAP has achieved 90% or more of the permitted production rate of 2,700 TPD on 438 days out of the last five years, and more that 95% of the permitted rate on 139 days in the last five years.
- No. 9 SAP has achieved 90% or more of the permitted production rate of 3,400 TPD on 436 days out of the last five years, and more that 95% of the permitted rate on 113 days in the last five years.

These data demonstrate that the three SAPs are currently capable of achieving their maximum permitted production rate, and therefore any difference in annual emissions results from fluctuations in demand and other factors and would not be caused by the proposed changes. Mosaic is not requesting any increase in the permitted capacities. Mosaic is requesting reductions in allowable SO_2 emissions in order to become BART-exempt. As a result, the project will not trigger PSD review.

Comment 7. **The Department requires a properly completed application form for the affected emission units, SAP Nos. 7, 8 & 9, specifically the Emissions Unit Information section [see Pages 15-28 of DEP Form No. 62-210.900(1) - Form, Effective 03/16/08]. The second page of Subsection A., Subsections B. - E. and Subsections H. - 1. were not included for each SAP. The maximum production rate tons per day (TPD) of 100% H_2SO_4 for each SAP under this project must be included. The engineering design information to support the capacity, i.e., process design drawings and specifications, is requested. Please submit a completed application form.**

Response: Mosaic is only requesting a change in the permitted SO_2 and SAM emission rates. No other aspects of the SAPs are changing. As a result, only pages of the DEP Form No. 62-210.900(1) that contain any change from the form submitted to FDEP previously (Title V renewal application) were submitted. To confirm the current production rates are being retained, we have attached pertinent pages of the emission unit sections of the form. Also attached are flow diagrams showing the components of the SAPs being replaced.

Comment 8. **The Department needs the input and output files for the exemption air dispersion modeling. Please send them to Mr. Tom Rogers.**

Response: The modeling files were recently sent to Mr. Tom Rogers on or about September 10, 2008.

Comment 9. **The Department requires a properly completed Owner/Authorized Representative Statement [Page 4 of DEP Form No. 62-210.900(1) - Form] for an AC permit application. The owner or authorized representative needs to sign this statement. The owner is typically a corporate officer or plant manager. A letter of authorization may be submitted by the owner to duly designate other persons.**

Response: Attached are forms signed by Alan Lulf, Plant Manager, Mosaic Riverview.

Comment 10. **Submit additional responses, any additional updates to the application and supporting documentation in quadruplicate as required by Rule 62-4.050(2), F.A.C.**

Response: This response letter is being supplied in quadruplicate.

Thank you for consideration of this information. If you have any questions, or would like to meet to discuss this information further, please do not hesitate to call me at (352)336-5600.

Sincerely,

GOLDER ASSOCIATES INC.

David A. Buff

David A. Buff, P.E., Q.E.P.
Principal Engineer

DB/sl

cc: Jeff Stewart
David Turley
Diana Jaigella
Rama Iyer
Robert Manning
Sal Mohammad

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Department of Environmental Protection

Division of Air Resource Management

APPLICATION FOR AIR PERMIT - LONG FORM

I. APPLICATION INFORMATION

Air Construction Permit – Use this form to apply for an air construction permit:

- For any required purpose at a facility operating under a federally enforceable state air operation permit (FESOP) or Title V air operation permit;
- For a proposed project subject to prevention of significant deterioration (PSD) review, nonattainment new source review, or maximum achievable control technology (MACT);
- To assume a restriction on the potential emissions of one or more pollutants to escape a requirement such as PSD review, nonattainment new source review, MACT, or Title V; or
- To establish, revise, or renew a plantwide applicability limit (PAL).

Air Operation Permit – Use this form to apply for:

- An initial federally enforceable state air operation permit (FESOP); or
- An initial, revised, or renewal Title V air operation permit.

To ensure accuracy, please see form instructions.

Identification of Facility

1. Facility Owner/Company Name: **Mosaic Fertilizer, LLC.**	
2. Site Name: **Riverview Plant**	
3. Facility Identification Number: **0570008**	
4. Facility Location... Street Address or Other Locator: **8813 U.S. Highway 41 South** City: **Riverview** County: **FL** Zip Code: **33569**	
5. Relocatable Facility? ☐ Yes ☒ No	6. Existing Title V Permitted Facility? ☒ Yes ☐ No

Application Contact

1. Application Contact Name: **Jeff Stewart, Environmental Superintendent**
2. Application Contact Mailing Address... Organization/Firm: **Mosaic Fertilizer, LLC** Street Address: **8813 U.S. Highway 41 South** City: **Riverview** State: **FL** Zip Code: **33569**
3. Application Contact Telephone Numbers... Telephone: (**813**) **671- 6369** ext. Fax: (**813**) **671- 6149**
4. Application Contact E-mail Address: **jeff.stewart@mosaicco.com**

Application Processing Information (DEP Use)

1. Date of Receipt of Application:	3. PSD Number (if applicable):
2. Project Number(s): 0570008-061-AC	4. Siting Number (if applicable):

Department of Environmental Protection

Division of Air Resource Management

APPLICATION FOR AIR PERMIT - LONG FORM

Purpose of Application

This application for air permit is being submitted to obtain: (Check one)

Air Construction Permit

☒ Air construction permit.

☐ Air construction permit to establish, revise, or renew a plantwide applicability limit (PAL).

☐ Air construction permit to establish, revise, or renew a plantwide applicability limit (PAL), and separate air construction permit to authorize construction or modification of one or more emissions units covered by the PAL.

Air Operation Permit

☐ Initial Title V air operation permit.

☐ Title V air operation permit revision.

☐ Title V air operation permit renewal.

☐ Initial federally enforceable state air operation permit (FESOP) where professional engineer (PE) certification is required.

☐ Initial federally enforceable state air operation permit (FESOP) where professional engineer (PE) certification is not required.

Air Construction Permit and Revised/Renewal Title V Air Operation Permit (Concurrent Processing)

☐ Air construction permit and Title V permit revision, incorporating the proposed project.

☐ Air construction permit and Title V permit renewal, incorporating the proposed project.

Note: By checking one of the above two boxes, you, the applicant, are requesting concurrent processing pursuant to Rule 62-213.405, F.A.C. In such case, you must also check the following box:

☐ I hereby request that the department waive the processing time requirements of the air construction permit to accommodate the processing time frames of the Title V air operation permit.

Application Comment

This application is to allow for upgrades to Nos. 7, 8, and 9 Sulfuric Acid Plants and implement lower emission limits for the purpose of obtaining a BART exemption for the BART-eligible emissions units at the Mosaic Riverview facility.

Facility Information

Scope of Application

Emissions Unit ID Number	Description of Emissions Unit	Air Permit Type	Air Permit Processing Fee
004	No. 7 Sulfuric Acid Plant	AC1F	
005	No. 8 Sulfuric Acid Plant	AC1F	
006	No. 9 Sulfuric Acid Plant	AC1F	

Application Processing Fee

Check one: ☐ Attached - Amount: $_____ ☒ Not Applicable

Owner/Authorized Representative Statement

Complete if applying for an air construction permit or an initial FESOP.

1. Owner/Authorized Representative Name :
   Alan Lulf, Plant Manager

2. Owner/Authorized Representative Mailing Address...
   Organization/Firm: **Mosaic Fertilizer, LLC.**
   Street Address: **8813 U.S. Highway 41 South**
   City: **Riverview** State: **FL** Zip Code: **33569**

3. Owner/Authorized Representative Telephone Numbers...
   Telephone: **(813) 672-7011** ext. Fax: **(813) 671-6149**

4. Owner/Authorized Representative E-mail Address: **Alan.Lulf@mosaicco.com**

5. Owner/Authorized Representative Statement:

   I, the undersigned, am the owner or authorized representative of the corporation, partnership, or other legal entity submitting this air permit application. To the best of my knowledge, the statements made in this application are true, accurate and complete, and any estimates of emissions reported in this application are based upon reasonable techniques for calculating emissions. I understand that a permit, if granted by the department, cannot be transferred without authorization from the department.

   Alan Lulf
   Signature

   9/29/08
   Date

Application Responsible Official Certification

Complete if applying for an initial, revised, or renewal Title V air operation permit or concurrent processing of an air construction permit and revised or renewal Title V air operation permit. If there are multiple responsible officials, the "application responsible official" need not be the "primary responsible official."

1. Application Responsible Official Name:

2. Application Responsible Official Qualification (Check one or more of the following options, as applicable):
   - ☐ For a corporation, the president, secretary, treasurer, or vice-president of the corporation in charge of a principal business function, or any other person who performs similar policy or decision-making functions for the corporation, or a duly authorized representative of such person if the representative is responsible for the overall operation of one or more manufacturing, production, or operating facilities applying for or subject to a permit under Chapter 62-213, F.A.C.
   - ☐ For a partnership or sole proprietorship, a general partner or the proprietor, respectively.
   - ☐ For a municipality, county, state, federal, or other public agency, either a principal executive officer or ranking elected official.
   - ☐ The designated representative at an Acid Rain source, CAIR source, or Hg Budget source.

3. Application Responsible Official Mailing Address...
   Organization/Firm:
   Street Address:
   City: State: Zip Code:

4. Application Responsible Official Telephone Numbers...
   Telephone: ( ) - ext. Fax: ( ) -

5. Application Responsible Official E-mail Address:

6. Application Responsible Official Certification:

   I, the undersigned, am a responsible official of the Title V source addressed in this air permit application. I hereby certify, based on information and belief formed after reasonable inquiry, that the statements made in this application are true, accurate and complete and that, to the best of my knowledge, any estimates of emissions reported in this application are based upon reasonable techniques for calculating emissions. The air pollutant emissions units and air pollution control equipment described in this application will be operated and maintained so as to comply with all applicable standards for control of air pollutant emissions found in the statutes of the State of Florida and rules of the Department of Environmental Protection and revisions thereof and all other applicable requirements identified in this application to which the Title V source is subject. I understand that a permit, if granted by the department, cannot be transferred without authorization from the department, and I will promptly notify the department upon sale or legal transfer of the facility or any permitted emissions unit. Finally, I certify that the facility and each emissions unit are in compliance with all applicable requirements to which they are subject, except as identified in compliance plan(s) submitted with this application.

   Signature Date

FACILITY INFORMATION

Professional Engineer Certification

1. Professional Engineer Name: **David A. Buff**
   Registration Number: **19011**
2. Professional Engineer Mailing Address...
   Organization/Firm: **Golder Associates Inc.****
   Street Address: **6241 NW 23rd Street, Suite 500**
   City: **Gainesville** State: **FL** Zip Code: **32653**
3. Professional Engineer Telephone Numbers...
   Telephone: **(352) 336-5600** ext.**545** Fax: **(352) 336-6603**
4. Professional Engineer Email Address: **dbuff@golder.com**
5. Professional Engineer Statement:

I, the undersigned; hereby certify, except as particularly noted herein, that:*

(1) To the best of my knowledge, there is reasonable assurance that the air pollutant emissions unit(s) and the air pollution control equipment described in this application for air permit, when properly operated and maintained, will comply with all applicable standards for control of air pollutant emissions found in the Florida Statutes and rules of the Department of Environmental Protection; and

(2) To the best of my knowledge, any emission estimates reported or relied on in this application are true, accurate, and complete and are either based upon reasonable techniques available for calculating emissions or, for emission estimates of hazardous air pollutants not regulated for an emissions unit addressed in this application, based solely upon the materials, information and calculations submitted with this application.

(3) If the purpose of this application is to obtain a Title V air operation permit (check here ☐, if so), I further certify that each emissions unit described in this application for air permit, when properly operated and maintained, will comply with the applicable requirements identified in this application to which the unit is subject, except those emissions units for which a compliance plan and schedule is submitted with this application.

(4) If the purpose of this application is to obtain an air construction permit (check here ☒, if so) or concurrently process and obtain an air construction permit and a Title V air operation permit revision or renewal for one or more proposed new or modified emissions units (check here ☐, if so), I further certify that the engineering features of each such emissions unit described in this application have been designed or examined by me or individuals under my direct supervision and found to be in conformity with sound engineering principles applicable to the control of emissions of the air pollutants characterized in this application.

(5) If the purpose of this application is to obtain an initial air operation permit or operation permit revision or renewal for one or more newly constructed or modified emissions units (check here ☐, if so), I further certify that, with the exception of any changes detailed as part of this application, each such emissions unit has been constructed or modified in substantial accordance with the information given in the corresponding application for air construction permit and with all provisions contained in such permit.

David A. Buff
Signature

9/30/08
Date

(seal)

* Attach any exception to certification statement.
** Board of Professional Engineers Certificate of Authorization #00001670

III. EMISSIONS UNIT INFORMATION

Title V Air Operation Permit Application - For Title V air operation permitting only, emissions units are classified as regulated, unregulated, or insignificant. If this is an application for an initial, revised or renewal Title V air operation permit, a separate Emissions Unit Information Section (including subsections A through I as required) must be completed for each regulated and unregulated emissions unit addressed in this application. Some of the subsections comprising the Emissions Unit Information Section of the form are optional for unregulated emissions units. Each such subsection is appropriately marked. Insignificant emissions units are required to be listed at Section II, Subsection C.

Air Construction Permit or FESOP Application - For air construction permitting or federally enforceable state air operation permitting, emissions units are classified as either subject to air permitting or exempt from air permitting. The concept of an "unregulated emissions unit" does not apply. If this is an application for an air construction permit or FESOP, a separate Emissions Unit Information Section (including subsections A through I as required) must be completed for each emissions unit subject to air permitting addressed in this application for air permit. Emissions units exempt from air permitting are required to be listed at Section II, Subsection C.

Air Construction Permit and Revised/Renewal Title V Air Operation Permit Application – Where this application is used to apply for both an air construction permit and a revised or renewal Title V air operation permit, each emissions unit is classified as either subject to air permitting or exempt from air permitting for air construction permitting purposes, and as regulated, unregulated, or insignificant for Title V air operation permitting purposes. A separate Emissions Unit Information Section (including subsections A through I as required) must be completed for each emissions unit addressed in this application that is subject to air construction permitting and for each such emissions unit that is a regulated or unregulated unit for purposes of Title V permitting. (An emissions unit may be exempt from air construction permitting but still be classified as an unregulated unit for Title V purposes.) Emissions units classified as insignificant for Title V purposes are required to be listed at Section II, Subsection C.

If submitting the application form in hard copy, the number of this Emissions Unit Information Section and the total number of Emissions Unit Information Sections submitted as part of this application must be indicated in the space provided at the top of each page.

A. GENERAL EMISSIONS UNIT INFORMATION

Title V Air Operation Permit Emissions Unit Classification

1. Regulated or Unregulated Emissions Unit? (Check one, if applying for an initial, revised or renewal Title V air operation permit. Skip this item if applying for an air construction permit or FESOP only.)

☐ The emissions unit addressed in this Emissions Unit Information Section is a regulated emissions unit.

☐ The emissions unit addressed in this Emissions Unit Information Section is an unregulated emissions unit.

Emissions Unit Description and Status

1. Type of Emissions Unit Addressed in this Section: (Check one)

☒ This Emissions Unit Information Section addresses, as a single emissions unit, a single process or production unit, or activity, which produces one or more air pollutants and which has at least one definable emission point (stack or vent).

☐ This Emissions Unit Information Section addresses, as a single emissions unit, a group of process or production units and activities which has at least one definable emission point (stack or vent) but may also produce fugitive emissions.

☐ This Emissions Unit Information Section addresses, as a single emissions unit, one or more process or production units and activities which produce fugitive emissions only.

2. Description of Emissions Unit Addressed in this Section:
No. 7 Sulfuric Acid Plant (SAP)

3. Emissions Unit Identification Number: **004**

4. Emissions Unit Status Code:	5. Commence Construction Date:	6. Initial Startup Date:	7. Emissions Unit Major Group SIC Code:
A			**28**

8. Federal Program Applicability: (Check all that apply)

☐ Acid Rain Unit

☐ CAIR Unit

☐ Hg Budget Unit

9. Package Unit:
Manufacturer: Model Number:

10. Generator Nameplate Rating:

11. Emissions Unit Comment:
Proposed emissions limits for No. 7 SAP to meet the Best Available Retrofit Technology (BART) exemption criteria.

B. EMISSIONS UNIT CAPACITY INFORMATION

(Optional for unregulated emissions units.)

Emissions Unit Operating Capacity and Schedule

1. Maximum Process or Throughput Rate:	
2. Maximum Production Rate: **3,200 tons/day of 100% H_2SO_4**	
3. Maximum Heat Input Rate: million Btu/hr	
4. Maximum Incineration Rate: pounds/hr tons/day	
5. Requested Maximum Operating Schedule:	
24 hours/day	**7** days/week
52 weeks/year	**8,760** hours/year
6. Operating Capacity/Schedule Comment:	

D. SEGMENT (PROCESS/FUEL) INFORMATION

Segment Description and Rate: Segment 1 of 1

1. Segment Description (Process/Fuel Type): **Industrial Processes; Chemical Manufacturing; Sulfuric Acid (Contact Process); Absorber at 99.9% Conversion**		
2. Source Classification Code (SCC): **3-01-023-01**	3. SCC Units: **Tons 100% H_2SO_4 Produced**	
4. Maximum Hourly Rate: **133.33**	5. Maximum Annual Rate: **1,168,000**	6. Estimated Annual Activity Factor:
7. Maximum % Sulfur:	8. Maximum % Ash:	9. Million Btu per SCC Unit:
10. Segment Comment: **Maximum rates based on 3,200 TPD of 100% H_2SO_4.**		

Segment Description and Rate: Segment _____ of _____

1. Segment Description (Process/Fuel Type):		
2. Source Classification Code (SCC):	3. SCC Units:	
4. Maximum Hourly Rate:	5. Maximum Annual Rate:	6. Estimated Annual Activity Factor:
7. Maximum % Sulfur:	8. Maximum % Ash:	9. Million Btu per SCC Unit:
10. Segment Comment:		

F1. EMISSIONS UNIT POLLUTANT DETAIL INFORMATION – POTENTIAL, FUGITIVE, AND ACTUAL EMISSIONS

(Optional for unregulated emissions units.)

Complete a Subsection F1 for each pollutant identified in Subsection E if applying for an air construction permit or concurrent processing of an air construction permit and a revised or renewal Title V operation permit. Complete for each emissions-limited pollutant identified in Subsection E if applying for an air operation permit.

Potential, Estimated Fugitive, and Baseline & Projected Actual Emissions

1. Pollutant Emitted: **SO_2**	2. Total Percent Efficiency of Control:
3. Potential Emissions: **400** lb/hour **1,752** tons/year	4. Synthetically Limited? ☐ Yes ☒ No
5. Range of Estimated Fugitive Emissions (as applicable): to tons/year	
6. Emission Factor: **400 lb/hr, 24-hr daily average** Reference: **Requested Limit**	7. Emissions Method Code: **0**
8.a. Baseline Actual Emissions (if required): tons/year	8.b. Baseline 24-month Period: From: To:
9.a. Projected Actual Emissions (if required): tons/year	9.b. Projected Monitoring Period: ☐ 5 years ☐ 10 years
10. Calculation of Emissions: **Annual Emissions = 400 lb/hr x 8,760 hrs/yr / 2,000 lb/ton = 1,752 TPY**	
11. Potential, Fugitive, and Actual Emissions Comment:	

F2. EMISSIONS UNIT POLLUTANT DETAIL INFORMATION - ALLOWABLE EMISSIONS

Complete Subsection F2 if the pollutant identified in Subsection F1 is or would be subject to a numerical emissions limitation.

Allowable Emissions Allowable Emissions **1** of **1**

1. Basis for Allowable Emissions Code: **OTHER**	2. Future Effective Date of Allowable Emissions:
3. Allowable Emissions and Units: **400 lb/hr, 24-hr average**	4. Equivalent Allowable Emissions: **400** lb/hour **1,752** tons/year
5. Method of Compliance: **Continuous Emission Monitoring System for SO_2**	
6. Allowable Emissions Comment (Description of Operating Method): **Allowable emissions based on 24-hour daily average, in order to meet BART exemption criteria.**	

Allowable Emissions Allowable Emissions _____ of _____

1. Basis for Allowable Emissions Code:	2. Future Effective Date of Allowable Emissions:
3. Allowable Emissions and Units:	4. Equivalent Allowable Emissions: lb/hour tons/year
5. Method of Compliance:	
6. Allowable Emissions Comment (Description of Operating Method):	

Allowable Emissions Allowable Emissions _____ of _____

1. Basis for Allowable Emissions Code:	2. Future Effective Date of Allowable Emissions:
3. Allowable Emissions and Units:	4. Equivalent Allowable Emissions: lb/hour tons/year
5. Method of Compliance:	
6. Allowable Emissions Comment (Description of Operating Method):	

F1. EMISSIONS UNIT POLLUTANT DETAIL INFORMATION – POTENTIAL, FUGITIVE, AND ACTUAL EMISSIONS

(Optional for unregulated emissions units.)

Complete a Subsection F1 for each pollutant identified in Subsection E if applying for an air construction permit or concurrent processing of an air construction permit and a revised or renewal Title V operation permit. Complete for each emissions-limited pollutant identified in Subsection E if applying for an air operation permit.

Potential, Estimated Fugitive, and Baseline & Projected Actual Emissions

1. Pollutant Emitted: **SAM**	2. Total Percent Efficiency of Control:
3. Potential Emissions: **6.7** lb/hour **29.3** tons/year	4. Synthetically Limited? ☐ Yes ☒ No
5. Range of Estimated Fugitive Emissions (as applicable): to tons/year	
6. Emission Factor: **6.7 lb/hr** Reference: **Requested Limit**	7. Emissions Method Code: **0**
8.a. Baseline Actual Emissions (if required): tons/year	8.b. Baseline 24-month Period: From: To:
9.a. Projected Actual Emissions (if required): tons/year	9.b. Projected Monitoring Period: ☐ 5 years ☐ 10 years
10. Calculation of Emissions: **6.7 lb/hr x 8,760 hrs/yr / 2,000 lb/ton = 29.3 TPY**	
11. Potential, Fugitive, and Actual Emissions Comment:	

F2. EMISSIONS UNIT POLLUTANT DETAIL INFORMATION - ALLOWABLE EMISSIONS

Complete Subsection F2 if the pollutant identified in Subsection F1 is or would be subject to a numerical emissions limitation.

Allowable Emissions Allowable Emissions 1 of 1

1. Basis for Allowable Emissions Code: **OTHER**	2. Future Effective Date of Allowable Emissions:
3. Allowable Emissions and Units: **6.7 lb/hr**	4. Equivalent Allowable Emissions: **6.7** lb/hour **29.3** tons/year
5. Method of Compliance: **EPA Methods 6 or 6C**	
6. Allowable Emissions Comment (Description of Operating Method): **Allowable emissions in order to meet BART exemption criteria.**	

Allowable Emissions Allowable Emissions _____ of _____

1. Basis for Allowable Emissions Code:	2. Future Effective Date of Allowable Emissions:
3. Allowable Emissions and Units:	4. Equivalent Allowable Emissions: lb/hour tons/year
5. Method of Compliance:	
6. Allowable Emissions Comment (Description of Operating Method):	

Allowable Emissions Allowable Emissions _____ of _____

1. Basis for Allowable Emissions Code:	2. Future Effective Date of Allowable Emissions:
3. Allowable Emissions and Units:	4. Equivalent Allowable Emissions: lb/hour tons/year
5. Method of Compliance:	
6. Allowable Emissions Comment (Description of Operating Method):	

I. EMISSIONS UNIT ADDITIONAL INFORMATION

Additional Requirements for All Applications, Except as Otherwise Stated

1. Process Flow Diagram: (Required for all permit applications, except Title V air operation permit revision applications if this information was submitted to the department within the previous five years and would not be altered as a result of the revision being sought)
   ☒ Attached, Document ID: **MR-EU1-I1** ☐ Previously Submitted, Date _____

2. Fuel Analysis or Specification: (Required for all permit applications, except Title V air operation permit revision applications if this information was submitted to the department within the previous five years and would not be altered as a result of the revision being sought)
   ☐ Attached, Document ID: _____ ☐ Previously Submitted, Date _____

3. Detailed Description of Control Equipment: (Required for all permit applications, except Title V air operation permit revision applications if this information was submitted to the department within the previous five years and would not be altered as a result of the revision being sought)
   ☐ Attached, Document ID: _____ ☒ Previously Submitted, Date **October, 2003**

4. Procedures for Startup and Shutdown: (Required for all operation permit applications, except Title V air operation permit revision applications if this information was submitted to the department within the previous five years and would not be altered as a result of the revision being sought)
   ☐ Attached, Document ID: _____ ☐ Previously Submitted, Date _____
   ☒ Not Applicable (construction application)

5. Operation and Maintenance Plan: (Required for all permit applications, except Title V air operation permit revision applications if this information was submitted to the department within the previous five years and would not be altered as a result of the revision being sought)
   ☐ Attached, Document ID: _____ ☐ Previously Submitted, Date _____
   ☒ Not Applicable

6. Compliance Demonstration Reports/Records:
   ☐ Attached, Document ID: _____
   Test Date(s)/Pollutant(s) Tested: _____
   _____
   ☐ Previously Submitted, Date: _____
   Test Date(s)/Pollutant(s) Tested: _____
   _____
   ☐ To be Submitted, Date (if known): _____
   Test Date(s)/Pollutant(s) Tested: _____
   _____
   ☒ Not Applicable
   Note: For FESOP applications, all required compliance demonstration records/reports must be submitted at the time of application. For Title V air operation permit applications, all required compliance demonstration reports/records must be submitted at the time of application, or a compliance plan must be submitted at the time of application.

7. Other Information Required by Rule or Statute:
   ☐ Attached, Document ID: _____ ☒ Not Applicable

I. EMISSIONS UNIT ADDITIONAL INFORMATION (CONTINUED)

Additional Requirements for Air Construction Permit Applications

1. Control Technology Review and Analysis (Rules 62-212.400(10) and 62-212.500(7), F.A.C.; 40 CFR 63.43(d) and (e)): ☐ Attached, Document ID: _____ ☒ Not Applicable
2. Good Engineering Practice Stack Height Analysis (Rules 62-212.400(4)(d) and 62-212.500(4)(f), F.A.C.): ☐ Attached, Document ID: _____ ☒ Not Applicable
3. Description of Stack Sampling Facilities: (Required for proposed new stack sampling facilities only) ☐ Attached, Document ID: _____ ☒ Not Applicable

Additional Requirements for Title V Air Operation Permit Applications

1. Identification of Applicable Requirements: ☐ Attached, Document ID: _____
2. Compliance Assurance Monitoring: ☐ Attached, Document ID: _____ ☐ Not Applicable
3. Alternative Methods of Operation: ☐ Attached, Document ID: _____ ☐ Not Applicable
4. Alternative Modes of Operation (Emissions Trading): ☐ Attached, Document ID: _____ ☐ Not Applicable

Additional Requirements Comment

III. EMISSIONS UNIT INFORMATION

Title V Air Operation Permit Application - For Title V air operation permitting only, emissions units are classified as regulated, unregulated, or insignificant. If this is an application for an initial, revised or renewal Title V air operation permit, a separate Emissions Unit Information Section (including subsections A through I as required) must be completed for each regulated and unregulated emissions unit addressed in this application. Some of the subsections comprising the Emissions Unit Information Section of the form are optional for unregulated emissions units. Each such subsection is appropriately marked. Insignificant emissions units are required to be listed at Section II, Subsection C.

Air Construction Permit or FESOP Application - For air construction permitting or federally enforceable state air operation permitting, emissions units are classified as either subject to air permitting or exempt from air permitting. The concept of an "unregulated emissions unit" does not apply. If this is an application for an air construction permit or FESOP, a separate Emissions Unit Information Section (including subsections A through I as required) must be completed for each emissions unit subject to air permitting addressed in this application for air permit. Emissions units exempt from air permitting are required to be listed at Section II, Subsection C.

Air Construction Permit and Revised/Renewal Title V Air Operation Permit Application – Where this application is used to apply for both an air construction permit and a revised or renewal Title V air operation permit, each emissions unit is classified as either subject to air permitting or exempt from air permitting for air construction permitting purposes, and as regulated, unregulated, or insignificant for Title V air operation permitting purposes. A separate Emissions Unit Information Section (including subsections A through I as required) must be completed for each emissions unit addressed in this application that is subject to air construction permitting and for each such emissions unit that is a regulated or unregulated unit for purposes of Title V permitting. (An emissions unit may be exempt from air construction permitting but still be classified as an unregulated unit for Title V purposes.) Emissions units classified as insignificant for Title V purposes are required to be listed at Section II, Subsection C.

If submitting the application form in hard copy, the number of this Emissions Unit Information Section and the total number of Emissions Unit Information Sections submitted as part of this application must be indicated in the space provided at the top of each page.

A. GENERAL EMISSIONS UNIT INFORMATION

Title V Air Operation Permit Emissions Unit Classification

1. Regulated or Unregulated Emissions Unit? (Check one, if applying for an initial, revised or renewal Title V air operation permit. Skip this item if applying for an air construction permit or FESOP only.)

   ☐ The emissions unit addressed in this Emissions Unit Information Section is a regulated emissions unit.

   ☐ The emissions unit addressed in this Emissions Unit Information Section is an unregulated emissions unit.

Emissions Unit Description and Status

1. Type of Emissions Unit Addressed in this Section: (Check one)

   ☒ This Emissions Unit Information Section addresses, as a single emissions unit, a single process or production unit, or activity, which produces one or more air pollutants and which has at least one definable emission point (stack or vent).

   ☐ This Emissions Unit Information Section addresses, as a single emissions unit, a group of process or production units and activities which has at least one definable emission point (stack or vent) but may also produce fugitive emissions.

   ☐ This Emissions Unit Information Section addresses, as a single emissions unit, one or more process or production units and activities which produce fugitive emissions only.

2. Description of Emissions Unit Addressed in this Section:
   No. 8 Sulfuric Acid Plant (SAP)

3. Emissions Unit Identification Number: **005**

4. Emissions Unit Status Code:	5. Commence Construction Date:	6. Initial Startup Date:	7. Emissions Unit Major Group SIC Code:
A			**28**

8. Federal Program Applicability: (Check all that apply)

   ☐ Acid Rain Unit

   ☐ CAIR Unit

   ☐ Hg Budget Unit

9. Package Unit:
   Manufacturer: Model Number:

10. Generator Nameplate Rating:

11. Emissions Unit Comment:
    Proposed emissions limits for No. 8 SAP to meet BART exemption criteria.

B. EMISSIONS UNIT CAPACITY INFORMATION

(Optional for unregulated emissions units.)

Emissions Unit Operating Capacity and Schedule

1. Maximum Process or Throughput Rate:	
2. Maximum Production Rate: **2,700 tons/day of 100% H_2SO_4**	
3. Maximum Heat Input Rate: million Btu/hr	
4. Maximum Incineration Rate: pounds/hr tons/day	
5. Requested Maximum Operating Schedule:	
24 hours/day	**7** days/week
52 weeks/year	**8,760** hours/year
6. Operating Capacity/Schedule Comment:	

D. SEGMENT (PROCESS/FUEL) INFORMATION

Segment Description and Rate: Segment 1 of 1

1. Segment Description (Process/Fuel Type): **Industrial Processes; Chemical Manufacturing; Sulfuric Acid (Contact Process); Absorber at 99.9% Conversion**		
2. Source Classification Code (SCC): **3-01-023-01**	3. SCC Units: **Tons 100% H_2SO_4 Produced**	
4. Maximum Hourly Rate: **112.5**	5. Maximum Annual Rate: **985,500**	6. Estimated Annual Activity Factor:
7. Maximum % Sulfur:	8. Maximum % Ash:	9. Million Btu per SCC Unit:
10. Segment Comment: **Maximum rate based on 2,700 TPD of 100% H_2SO_4.**		

Segment Description and Rate: Segment _____ of _____

1. Segment Description (Process/Fuel Type):		
2. Source Classification Code (SCC):	3. SCC Units:	
4. Maximum Hourly Rate:	5. Maximum Annual Rate:	6. Estimated Annual Activity Factor:
7. Maximum % Sulfur:	8. Maximum % Ash:	9. Million Btu per SCC Unit:
10. Segment Comment:		

F1. EMISSIONS UNIT POLLUTANT DETAIL INFORMATION – POTENTIAL, FUGITIVE, AND ACTUAL EMISSIONS

(Optional for unregulated emissions units.)

Complete a Subsection F1 for each pollutant identified in Subsection E if applying for an air construction permit or concurrent processing of an air construction permit and a revised or renewal Title V operation permit. Complete for each emissions-limited pollutant identified in Subsection E if applying for an air operation permit.

Potential, Estimated Fugitive, and Baseline & Projected Actual Emissions

1. Pollutant Emitted: **SO_2**	2. Total Percent Efficiency of Control:
3. Potential Emissions: **315** lb/hour **1,379.7** tons/year	4. Synthetically Limited? ☐ Yes ☒ No
5. Range of Estimated Fugitive Emissions (as applicable): to tons/year	
6. Emission Factor: **315 lb/hr, 24-hr daily average** Reference: **Requested Limit**	7. Emissions Method Code: **0**
8.a. Baseline Actual Emissions (if required): tons/year	8.b. Baseline 24-month Period: From: To:
9.a. Projected Actual Emissions (if required): tons/year	9.b. Projected Monitoring Period: ☐ 5 years ☐ 10 years
10. Calculation of Emissions: **Annual Emissions = 315 lb/hr x 8,760 hrs/yr / 2,000 lb/ton = 1,379.7 TPY**	
11. Potential, Fugitive, and Actual Emissions Comment:	

F2. EMISSIONS UNIT POLLUTANT DETAIL INFORMATION - ALLOWABLE EMISSIONS

Complete Subsection F2 if the pollutant identified in Subsection F1 is or would be subject to a numerical emissions limitation.

Allowable Emissions Allowable Emissions 1 of 1

1. Basis for Allowable Emissions Code: **OTHER**	2. Future Effective Date of Allowable Emissions:
3. Allowable Emissions and Units: **315 lb/hr, 24-hr average**	4. Equivalent Allowable Emissions: **315** lb/hour **1,379.7** tons/year
5. Method of Compliance: **Continuous Emission Monitoring System for SO_2**	
6. Allowable Emissions Comment (Description of Operating Method): **Allowable emissions based on 24-hour daily average, in order to meet BART exemption criteria.**	

Allowable Emissions Allowable Emissions _____ of _____

1. Basis for Allowable Emissions Code:	2. Future Effective Date of Allowable Emissions:
3. Allowable Emissions and Units:	4. Equivalent Allowable Emissions: lb/hour tons/year
5. Method of Compliance:	
6. Allowable Emissions Comment (Description of Operating Method):	

Allowable Emissions Allowable Emissions _____ of _____

1. Basis for Allowable Emissions Code:	2. Future Effective Date of Allowable Emissions:
3. Allowable Emissions and Units:	4. Equivalent Allowable Emissions: lb/hour tons/year
5. Method of Compliance:	
6. Allowable Emissions Comment (Description of Operating Method):	

F1. EMISSIONS UNIT POLLUTANT DETAIL INFORMATION – POTENTIAL, FUGITIVE, AND ACTUAL EMISSIONS

(Optional for unregulated emissions units.)

Complete a Subsection F1 for each pollutant identified in Subsection E if applying for an air construction permit or concurrent processing of an air construction permit and a revised or renewal Title V operation permit. Complete for each emissions-limited pollutant identified in Subsection E if applying for an air operation permit.

Potential, Estimated Fugitive, and Baseline & Projected Actual Emissions

1. Pollutant Emitted: **SAM**	2. Total Percent Efficiency of Control:
3. Potential Emissions: **5.6** lb/hour **24.5** tons/year	4. Synthetically Limited? ☐ Yes ☒ No
5. Range of Estimated Fugitive Emissions (as applicable): to tons/year	
6. Emission Factor: **5.6 lb/hr** Reference: **Requested Limit**	7. Emissions Method Code: **0**
8.a. Baseline Actual Emissions (if required): tons/year	8.b. Baseline 24-month Period: From: To:
9.a. Projected Actual Emissions (if required): tons/year	9.b. Projected Monitoring Period: ☐ 5 years ☐ 10 years
10. Calculation of Emissions: **5.6 lb/hr x 8,760 hrs/yr / 2,000 lb/ton = 24.5 TPY**	
11. Potential, Fugitive, and Actual Emissions Comment:	

F2. EMISSIONS UNIT POLLUTANT DETAIL INFORMATION - ALLOWABLE EMISSIONS

Complete Subsection F2 if the pollutant identified in Subsection F1 is or would be subject to a numerical emissions limitation.

Allowable Emissions Allowable Emissions 1 of 1

1. Basis for Allowable Emissions Code: **OTHER**	2. Future Effective Date of Allowable Emissions:
3. Allowable Emissions and Units: **5.6 lb/hr**	4. Equivalent Allowable Emissions: **5.6** lb/hour **24.5** tons/year
5. Method of Compliance: **EPA Methods 6 or 6C**	
6. Allowable Emissions Comment (Description of Operating Method): **Allowable emissions in order to meet BART exemption criteria.**	

Allowable Emissions Allowable Emissions _____ of _____

1. Basis for Allowable Emissions Code:	2. Future Effective Date of Allowable Emissions:
3. Allowable Emissions and Units:	4. Equivalent Allowable Emissions: lb/hour tons/year
5. Method of Compliance:	
6. Allowable Emissions Comment (Description of Operating Method):	

Allowable Emissions Allowable Emissions _____ of _____

1. Basis for Allowable Emissions Code:	2. Future Effective Date of Allowable Emissions:
3. Allowable Emissions and Units:	4. Equivalent Allowable Emissions: lb/hour tons/year
5. Method of Compliance:	
6. Allowable Emissions Comment (Description of Operating Method):	

I. EMISSIONS UNIT ADDITIONAL INFORMATION

Additional Requirements for All Applications, Except as Otherwise Stated

1. Process Flow Diagram: (Required for all permit applications, except Title V air operation permit revision applications if this information was submitted to the department within the previous five years and would not be altered as a result of the revision being sought)
   ☒ Attached, Document ID: **MR-EU2-I1** ☐ Previously Submitted, Date _____

2. Fuel Analysis or Specification: (Required for all permit applications, except Title V air operation permit revision applications if this information was submitted to the department within the previous five years and would not be altered as a result of the revision being sought)
   ☐ Attached, Document ID: _____ ☐ Previously Submitted, Date _____

3. Detailed Description of Control Equipment: (Required for all permit applications, except Title V air operation permit revision applications if this information was submitted to the department within the previous five years and would not be altered as a result of the revision being sought)
   ☐ Attached, Document ID: _____ ☒ Previously Submitted, Date **October, 2003**

4. Procedures for Startup and Shutdown: (Required for all operation permit applications, except Title V air operation permit revision applications if this information was submitted to the department within the previous five years and would not be altered as a result of the revision being sought)
   ☐ Attached, Document ID: _____ ☐ Previously Submitted, Date _____
   ☒ Not Applicable (construction application)

5. Operation and Maintenance Plan: (Required for all permit applications, except Title V air operation permit revision applications if this information was submitted to the department within the previous five years and would not be altered as a result of the revision being sought)
   ☐ Attached, Document ID: _____ ☐ Previously Submitted, Date _____
   ☒ Not Applicable

6. Compliance Demonstration Reports/Records:
   ☐ Attached, Document ID: _____
   Test Date(s)/Pollutant(s) Tested: _____
   _____
   ☐ Previously Submitted, Date: _____
   Test Date(s)/Pollutant(s) Tested: _____
   _____
   ☐ To be Submitted, Date (if known): _____
   Test Date(s)/Pollutant(s) Tested: _____
   _____
   ☒ Not Applicable
   Note: For FESOP applications, all required compliance demonstration records/reports must be submitted at the time of application. For Title V air operation permit applications, all required compliance demonstration reports/records must be submitted at the time of application, or a compliance plan must be submitted at the time of application.

7. Other Information Required by Rule or Statute:
   ☐ Attached, Document ID: _____ ☒ Not Applicable

I. EMISSIONS UNIT ADDITIONAL INFORMATION (CONTINUED)

Additional Requirements for Air Construction Permit Applications

1. Control Technology Review and Analysis (Rules 62-212.400(10) and 62-212.500(7), F.A.C.; 40 CFR 63.43(d) and (e)): ☐ Attached, Document ID: _____ ☒ Not Applicable
2. Good Engineering Practice Stack Height Analysis (Rules 62-212.400(4)(d) and 62-212.500(4)(f), F.A.C.): ☐ Attached, Document ID: _____ ☒ Not Applicable
3. Description of Stack Sampling Facilities: (Required for proposed new stack sampling facilities only) ☐ Attached, Document ID: _____ ☒ Not Applicable

Additional Requirements for Title V Air Operation Permit Applications

1. Identification of Applicable Requirements: ☐ Attached, Document ID: _____
2. Compliance Assurance Monitoring: ☐ Attached, Document ID: _____ ☐ Not Applicable
3. Alternative Methods of Operation: ☐ Attached, Document ID: _____ ☐ Not Applicable
4. Alternative Modes of Operation (Emissions Trading): ☐ Attached, Document ID: _____ ☐ Not Applicable

Additional Requirements Comment

III. EMISSIONS UNIT INFORMATION

Title V Air Operation Permit Application - For Title V air operation permitting only, emissions units are classified as regulated, unregulated, or insignificant. If this is an application for an initial, revised or renewal Title V air operation permit, a separate Emissions Unit Information Section (including subsections A through I as required) must be completed for each regulated and unregulated emissions unit addressed in this application. Some of the subsections comprising the Emissions Unit Information Section of the form are optional for unregulated emissions units. Each such subsection is appropriately marked. Insignificant emissions units are required to be listed at Section II, Subsection C.

Air Construction Permit or FESOP Application - For air construction permitting or federally enforceable state air operation permitting, emissions units are classified as either subject to air permitting or exempt from air permitting. The concept of an "unregulated emissions unit" does not apply. If this is an application for an air construction permit or FESOP, a separate Emissions Unit Information Section (including subsections A through I as required) must be completed for each emissions unit subject to air permitting addressed in this application for air permit. Emissions units exempt from air permitting are required to be listed at Section II, Subsection C.

Air Construction Permit and Revised/Renewal Title V Air Operation Permit Application – Where this application is used to apply for both an air construction permit and a revised or renewal Title V air operation permit, each emissions unit is classified as either subject to air permitting or exempt from air permitting for air construction permitting purposes, and as regulated, unregulated, or insignificant for Title V air operation permitting purposes. A separate Emissions Unit Information Section (including subsections A through I as required) must be completed for each emissions unit addressed in this application that is subject to air construction permitting and for each such emissions unit that is a regulated or unregulated unit for purposes of Title V permitting. (An emissions unit may be exempt from air construction permitting but still be classified as an unregulated unit for Title V purposes.) Emissions units classified as insignificant for Title V purposes are required to be listed at Section II, Subsection C.

If submitting the application form in hard copy, the number of this Emissions Unit Information Section and the total number of Emissions Unit Information Sections submitted as part of this application must be indicated in the space provided at the top of each page.

EMISSIONS UNIT INFORMATION
Section [3]
No. 9 SAP

A. GENERAL EMISSIONS UNIT INFORMATION

Title V Air Operation Permit Emissions Unit Classification

1. Regulated or Unregulated Emissions Unit? (Check one, if applying for an initial, revised or renewal Title V air operation permit. Skip this item if applying for an air construction permit or FESOP only.)

   ☒ The emissions unit addressed in this Emissions Unit Information Section is a regulated emissions unit.

   ☐ The emissions unit addressed in this Emissions Unit Information Section is an unregulated emissions unit.

Emissions Unit Description and Status

1. Type of Emissions Unit Addressed in this Section: (Check one)

   ☒ This Emissions Unit Information Section addresses, as a single emissions unit, a single process or production unit, or activity, which produces one or more air pollutants and which has at least one definable emission point (stack or vent).

   ☐ This Emissions Unit Information Section addresses, as a single emissions unit, a group of process or production units and activities which has at least one definable emission point (stack or vent) but may also produce fugitive emissions.

   ☐ This Emissions Unit Information Section addresses, as a single emissions unit, one or more process or production units and activities which produce fugitive emissions only.

2. Description of Emissions Unit Addressed in this Section:
   No. 9 Sulfuric Acid Plant (SAP)

3. Emissions Unit Identification Number: **006**

4. Emissions Unit Status Code: **A**	5. Commence Construction Date:	6. Initial Startup Date:	7. Emissions Unit Major Group SIC Code: **28**

8. Federal Program Applicability: (Check all that apply)

   ☐ Acid Rain Unit

   ☐ CAIR Unit

   ☐ Hg Budget Unit

9. Package Unit:
   Manufacturer: Model Number:

10. Generator Nameplate Rating:

11. Emissions Unit Comment:
    Proposed emissions limits for No. 9 SAP to meet BART exemption criteria.

B. EMISSIONS UNIT CAPACITY INFORMATION

(Optional for unregulated emissions units.)

Emissions Unit Operating Capacity and Schedule

1. Maximum Process or Throughput Rate:	
2. Maximum Production Rate: **3,400 tons/day of 100% H_2SO_4**	
3. Maximum Heat Input Rate: million Btu/hr	
4. Maximum Incineration Rate: pounds/hr tons/day	
5. Requested Maximum Operating Schedule:	
24 hours/day	**7** days/week
52 weeks/year	**8,760** hours/year
6. Operating Capacity/Schedule Comment:	

D. SEGMENT (PROCESS/FUEL) INFORMATION

Segment Description and Rate: Segment 1 of 1

1. Segment Description (Process/Fuel Type): **Industrial Processes; Chemical Manufacturing; Sulfuric Acid (Contact Process); Absorber at 99.9% Conversion**		
2. Source Classification Code (SCC): **3-01-023-01**	3. SCC Units: **Tons 100% H_2SO_4 Produced**	
4. Maximum Hourly Rate: **141.67**	5. Maximum Annual Rate: **1,241,000**	6. Estimated Annual Activity Factor:
7. Maximum % Sulfur:	8. Maximum % Ash:	9. Million Btu per SCC Unit:
10. Segment Comment: **Maximum rate based on 3,400 TPD of 100% H_2SO_4.**		

Segment Description and Rate: Segment _____ of _____

1. Segment Description (Process/Fuel Type):		
2. Source Classification Code (SCC):	3. SCC Units:	
4. Maximum Hourly Rate:	5. Maximum Annual Rate:	6. Estimated Annual Activity Factor:
7. Maximum % Sulfur:	8. Maximum % Ash:	9. Million Btu per SCC Unit:
10. Segment Comment:		

F1. EMISSIONS UNIT POLLUTANT DETAIL INFORMATION – POTENTIAL, FUGITIVE, AND ACTUAL EMISSIONS

(Optional for unregulated emissions units.)

Complete a Subsection F1 for each pollutant identified in Subsection E if applying for an air construction permit or concurrent processing of an air construction permit and a revised or renewal Title V operation permit. Complete for each emissions-limited pollutant identified in Subsection E if applying for an air operation permit.

Potential, Estimated Fugitive, and Baseline & Projected Actual Emissions

1. Pollutant Emitted: **SO_2**	2. Total Percent Efficiency of Control:
3. Potential Emissions: **425** lb/hour **1,861.5** tons/year	4. Synthetically Limited? ☐ Yes ☒ No
5. Range of Estimated Fugitive Emissions (as applicable): to tons/year	
6. Emission Factor: **425 lb/hr, 24-hr daily average** Reference: **Requested Limit**	7. Emissions Method Code: **0**
8.a. Baseline Actual Emissions (if required): tons/year	8.b. Baseline 24-month Period: From: To:
9.a. Projected Actual Emissions (if required): tons/year	9.b. Projected Monitoring Period: ☐ 5 years ☐ 10 years
10. Calculation of Emissions: **Annual Emissions = 425 lb/hr x 8,760 hrs/yr / 2,000 lb/ton = 1,861.5 TPY**	
11. Potential, Fugitive, and Actual Emissions Comment:	

F2. EMISSIONS UNIT POLLUTANT DETAIL INFORMATION - ALLOWABLE EMISSIONS

Complete Subsection F2 if the pollutant identified in Subsection F1 is or would be subject to a numerical emissions limitation.

Allowable Emissions Allowable Emissions 1 of 1

1. Basis for Allowable Emissions Code: **OTHER**	2. Future Effective Date of Allowable Emissions:
3. Allowable Emissions and Units: **425 lb/hr, 24-hr average**	4. Equivalent Allowable Emissions: **425** lb/hour **1,861.5** tons/year
5. Method of Compliance: **Continuous Emission Monitoring System for SO_2**	
6. Allowable Emissions Comment (Description of Operating Method): **Allowable emissions based on 24-hour daily average, in order to meet BART exemption criteria.**	

Allowable Emissions Allowable Emissions _____ of _____

1. Basis for Allowable Emissions Code:	2. Future Effective Date of Allowable Emissions:
3. Allowable Emissions and Units:	4. Equivalent Allowable Emissions: lb/hour tons/year
5. Method of Compliance:	
6. Allowable Emissions Comment (Description of Operating Method):	

Allowable Emissions Allowable Emissions _____ of _____

1. Basis for Allowable Emissions Code:	2. Future Effective Date of Allowable Emissions:
3. Allowable Emissions and Units:	4. Equivalent Allowable Emissions: lb/hour tons/year
5. Method of Compliance:	
6. Allowable Emissions Comment (Description of Operating Method):	

F1. EMISSIONS UNIT POLLUTANT DETAIL INFORMATION – POTENTIAL, FUGITIVE, AND ACTUAL EMISSIONS

(Optional for unregulated emissions units.)

Complete a Subsection F1 for each pollutant identified in Subsection E if applying for an air construction permit or concurrent processing of an air construction permit and a revised or renewal Title V operation permit. Complete for each emissions-limited pollutant identified in Subsection E if applying for an air operation permit.

Potential, Estimated Fugitive, and Baseline & Projected Actual Emissions

1. Pollutant Emitted: **SAM**	2. Total Percent Efficiency of Control:
3. Potential Emissions: **7.1** lb/hour **31.1** tons/year	4. Synthetically Limited? ☐ Yes ☒ No
5. Range of Estimated Fugitive Emissions (as applicable): to tons/year	
6. Emission Factor: **7.1 lb/hr** Reference: **Requested Limit**	7. Emissions Method Code: **0**
8.a. Baseline Actual Emissions (if required): tons/year	8.b. Baseline 24-month Period: From: To:
9.a. Projected Actual Emissions (if required): tons/year	9.b. Projected Monitoring Period: ☐ 5 years ☐ 10 years

10. Calculation of Emissions:
7.1 lb/hr x 8,760 hrs/yr / 2,000 lb/ton = 31.1 TPY

11. Potential, Fugitive, and Actual Emissions Comment:

F2. EMISSIONS UNIT POLLUTANT DETAIL INFORMATION - ALLOWABLE EMISSIONS

Complete Subsection F2 if the pollutant identified in Subsection F1 is or would be subject to a numerical emissions limitation.

Allowable Emissions Allowable Emissions 1 of 1

1. Basis for Allowable Emissions Code: **OTHER**	2. Future Effective Date of Allowable Emissions:
3. Allowable Emissions and Units: **7.1 lb/hr**	4. Equivalent Allowable Emissions: **7.1** lb/hour **31.1** tons/year
5. Method of Compliance: **EPA Methods 6 or 6C**	
6. Allowable Emissions Comment (Description of Operating Method): **Allowable emissions in order to meet BART exemption criteria.**	

Allowable Emissions Allowable Emissions _____ of _____

1. Basis for Allowable Emissions Code:	2. Future Effective Date of Allowable Emissions:
3. Allowable Emissions and Units:	4. Equivalent Allowable Emissions: lb/hour tons/year
5. Method of Compliance:	
6. Allowable Emissions Comment (Description of Operating Method):	

Allowable Emissions Allowable Emissions _____ of _____

1. Basis for Allowable Emissions Code:	2. Future Effective Date of Allowable Emissions:
3. Allowable Emissions and Units:	4. Equivalent Allowable Emissions: lb/hour tons/year
5. Method of Compliance:	
6. Allowable Emissions Comment (Description of Operating Method):	

I. EMISSIONS UNIT ADDITIONAL INFORMATION

Additional Requirements for All Applications, Except as Otherwise Stated

1. Process Flow Diagram: (Required for all permit applications, except Title V air operation permit revision applications if this information was submitted to the department within the previous five years and would not be altered as a result of the revision being sought)
   ☒ Attached, Document ID: **MR-EU3-I1** ☐ Previously Submitted, Date _____

2. Fuel Analysis or Specification: (Required for all permit applications, except Title V air operation permit revision applications if this information was submitted to the department within the previous five years and would not be altered as a result of the revision being sought)
   ☐ Attached, Document ID: _____ ☐ Previously Submitted, Date _____

3. Detailed Description of Control Equipment: (Required for all permit applications, except Title V air operation permit revision applications if this information was submitted to the department within the previous five years and would not be altered as a result of the revision being sought)
   ☐ Attached, Document ID: _____ ☒ Previously Submitted, Date **October, 2003**

4. Procedures for Startup and Shutdown: (Required for all operation permit applications, except Title V air operation permit revision applications if this information was submitted to the department within the previous five years and would not be altered as a result of the revision being sought)
   ☐ Attached, Document ID: _____ ☐ Previously Submitted, Date _____
   ☒ Not Applicable (construction application)

5. Operation and Maintenance Plan: (Required for all permit applications, except Title V air operation permit revision applications if this information was submitted to the department within the previous five years and would not be altered as a result of the revision being sought)
   ☐ Attached, Document ID: _____ ☐ Previously Submitted, Date _____
   ☒ Not Applicable.

6. Compliance Demonstration Reports/Records:
   ☐ Attached, Document ID: _____
   Test Date(s)/Pollutant(s) Tested: _____
   ☐ Previously Submitted, Date: _____
   Test Date(s)/Pollutant(s) Tested: _____
   ☐ To be Submitted, Date (if known): _____
   Test Date(s)/Pollutant(s) Tested: _____
   ☒ Not Applicable
   Note: For FESOP applications, all required compliance demonstration records/reports must be submitted at the time of application. For Title V air operation permit applications, all required compliance demonstration reports/records must be submitted at the time of application, or a compliance plan must be submitted at the time of application.

7. Other Information Required by Rule or Statute:
   ☐ Attached, Document ID: _____ ☒ Not Applicable

I. EMISSIONS UNIT ADDITIONAL INFORMATION (CONTINUED)

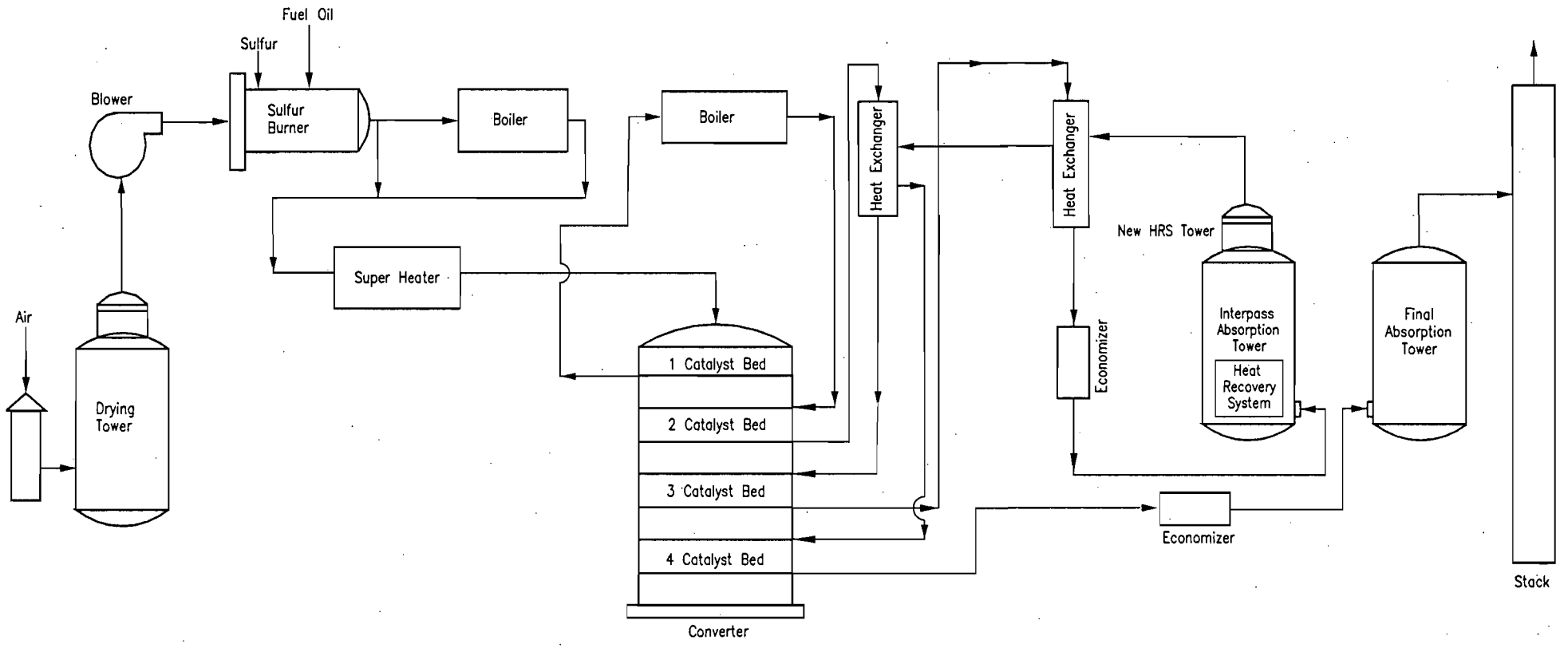
Additional Requirements for Air Construction Permit Applications

1. Control Technology Review and Analysis (Rules 62-212.400(10) and 62-212.500(7), F.A.C.; 40 CFR 63.43(d) and (e)): ☐ Attached, Document ID: _____ ☒ Not Applicable
2. Good Engineering Practice Stack Height Analysis (Rules 62-212.400(4)(d) and 62-212.500(4)(f), F.A.C.): ☐ Attached, Document ID: _____ ☒ Not Applicable
3. Description of Stack Sampling Facilities: (Required for proposed new stack sampling facilities only) ☐ Attached, Document ID: _____ ☒ Not Applicable

Additional Requirements for Title V Air Operation Permit Applications

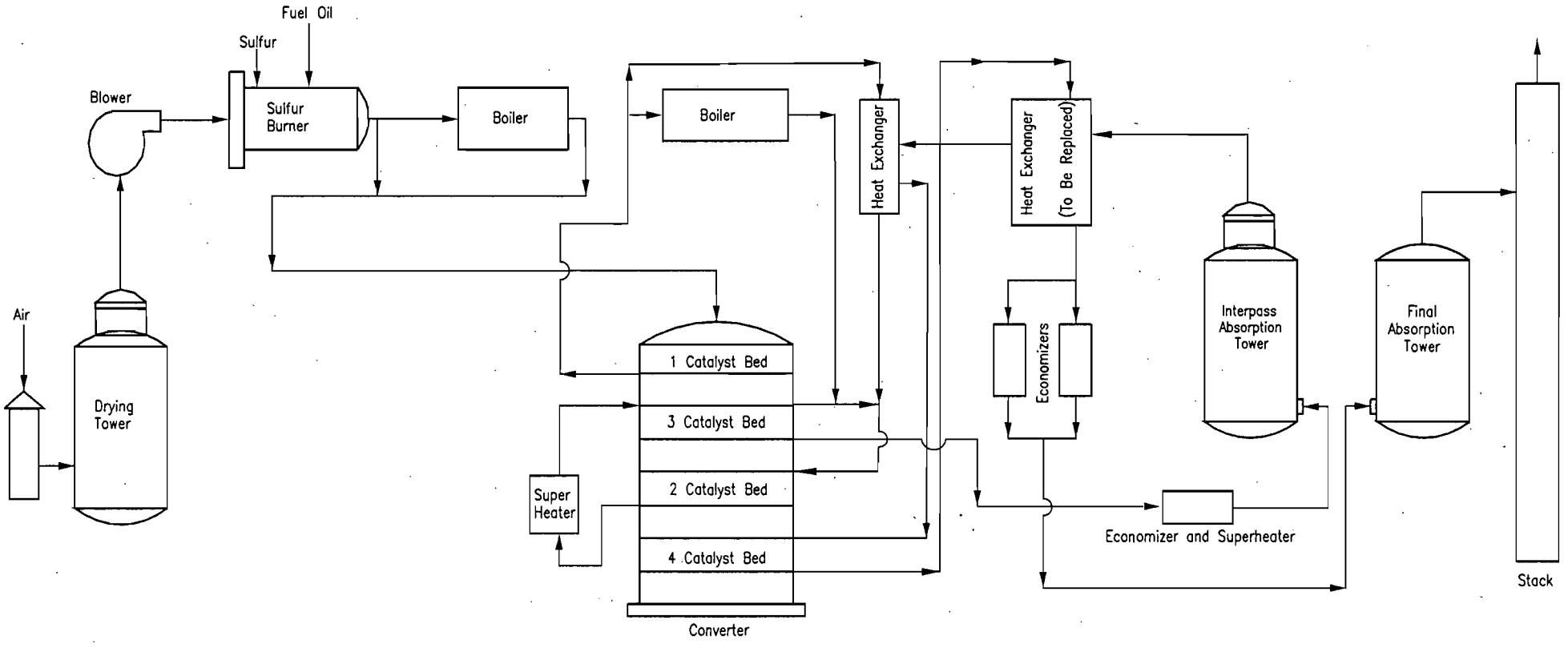
1. Identification of Applicable Requirements: ☐ Attached, Document ID: _____
2. Compliance Assurance Monitoring: ☐ Attached, Document ID: _____ ☐ Not Applicable
3. Alternative Methods of Operation: ☐ Attached, Document ID: _____ ☐ Not Applicable
4. Alternative Modes of Operation (Emissions Trading): ☐ Attached, Document ID: _____ ☐ Not Applicable

Additional Requirements Comment



Attachment MF-EU3-I1
No. 9 Sulfuric Acid Plant
Process Flow Diagram – Gas Flow
Cargill Riverview

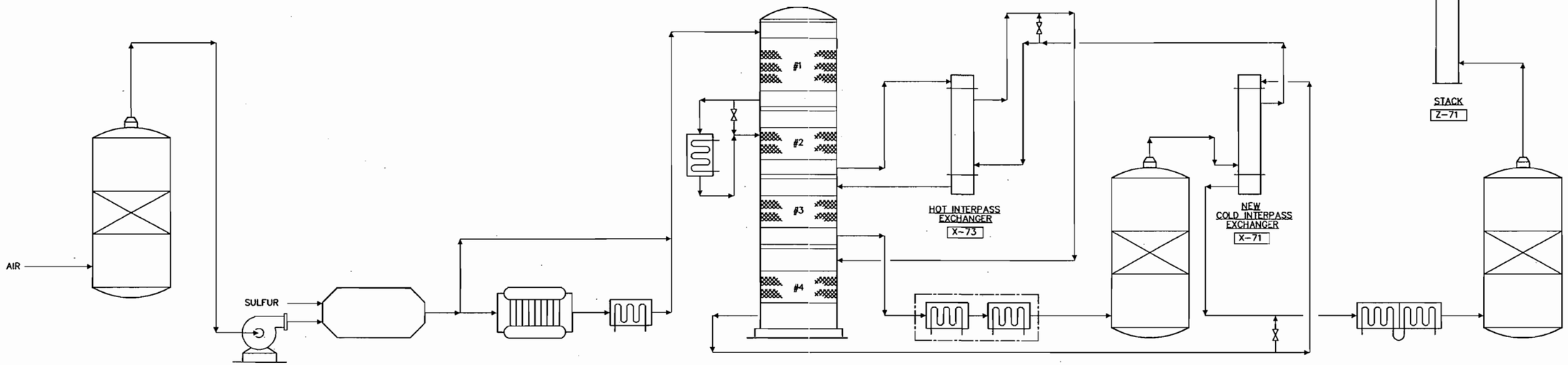
EMISSION UNIT:	No. 9 Sulfuric Acid Plant
PROCESS AREA:	H_2SO_4 Production
FILENAME:	0637643\MF-EU3-I1.dwg
LATEST REVISION:	10-01-08



Attachment MF–EU1–I1
No. 7 Sulfuric Acid Plant
Process Flow Diagram – Gas Flow
Cargill Riverview

EMISSION UNIT:	No. 7 Sulfuric Acid Plant
PROCESS AREA:	H_2SO_4 Production
FILENAME:	0637643\MF–EU1–I1.dwg
LATEST REVISION:	10–01–08

DR NO. 12-M-XXXX REV: P1



DRYING TOWER 503-1

MAIN COMPRESSOR C-100

SULFUR BURNER 521-1

WASTE HEAT BOILER 521-1

ECONOMIZER

NEW SUPERHEATER No.3 H-103

NEW CONVERTER 501-1

SUPERHEATER/ ECONOMIZER No.2 H102/101

INTERPASS TOWER U-200

ECONOMIZER No.1 H-100

FINAL TOWER U-100

REFERENCE DRAWINGS	NO.	DATE	REVISION	BY	CK	APP
	P1	2-13-08	PRELIMINARY REV.	GPR	ME	
	P0	12-04-07	PRELIMINARY	GPR	ME	

PLOT SCALE: 1=1 | ACTUAL SCALE: 1:3 | CAD FILE: 12M-XXXX.DWG | DRAWN BY: | CHECK BY: | APP BY: | DATE:

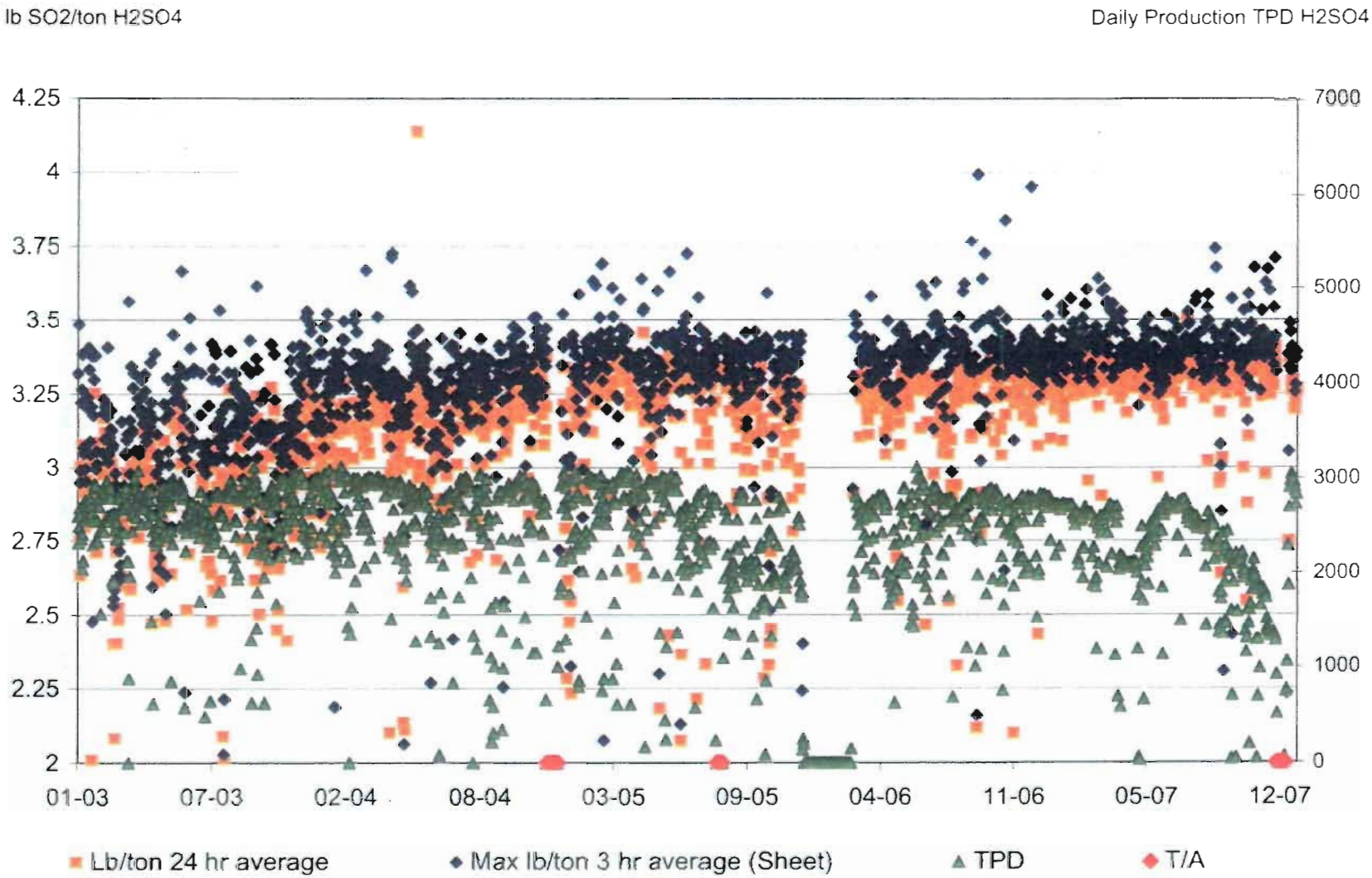
ATTACHMENT MF-EU2-I1
MOSAIC COMPANY - RIVERVIEW PLANT
PROCESS FLOW SHEET
ACID PLANT #8 GAS
DESIRED OPERATION

8133 HWY 41 S. Riverview, FL 33595 Mobile Phone: (813) 677-9111

DISCIPLINE: PROCESS | PROJECT: | SHEET NO. 12 | DWG NO. F-XXXX | REV. P1

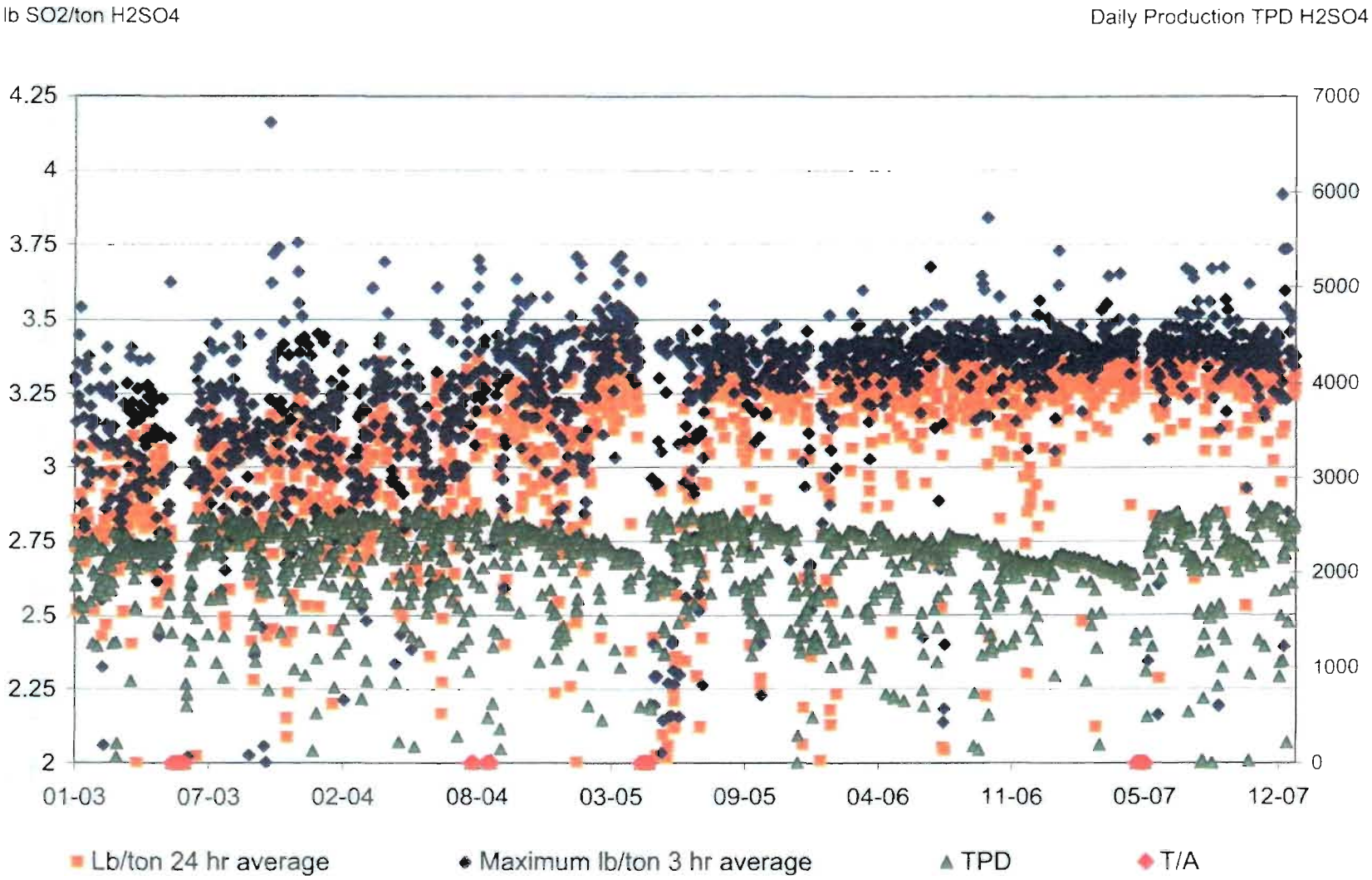
Mosaic

Riverview SAP 07
24 Hr Avg and 3 Hr Max lb OSO/Ton H2SO4 and Daily H2SO4 Production

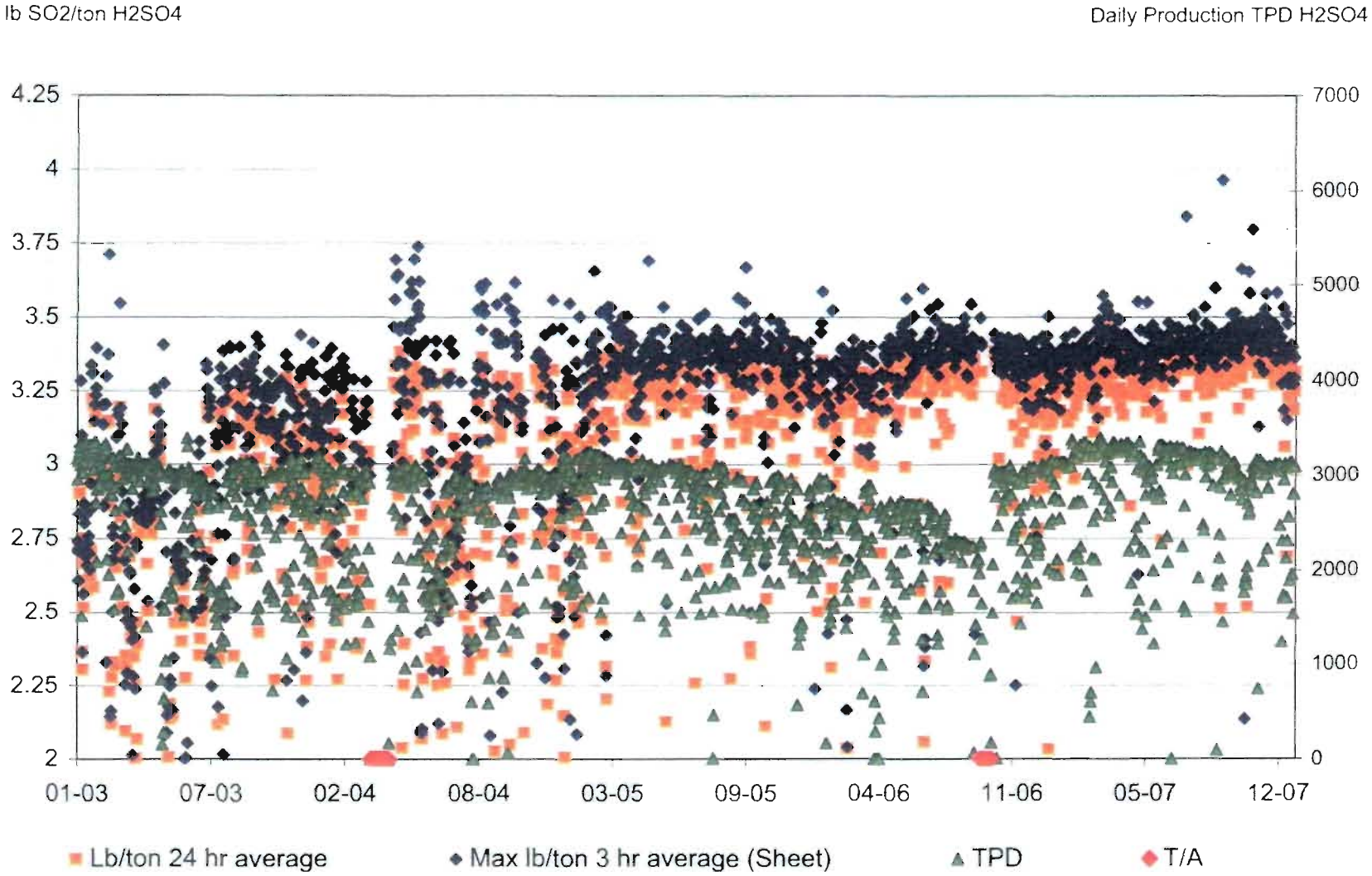


Riverview SAP 08

24 Hr Avg and 3 Hr Max lb OSO/Ton H2SO4 and Daily H2SO4 Production



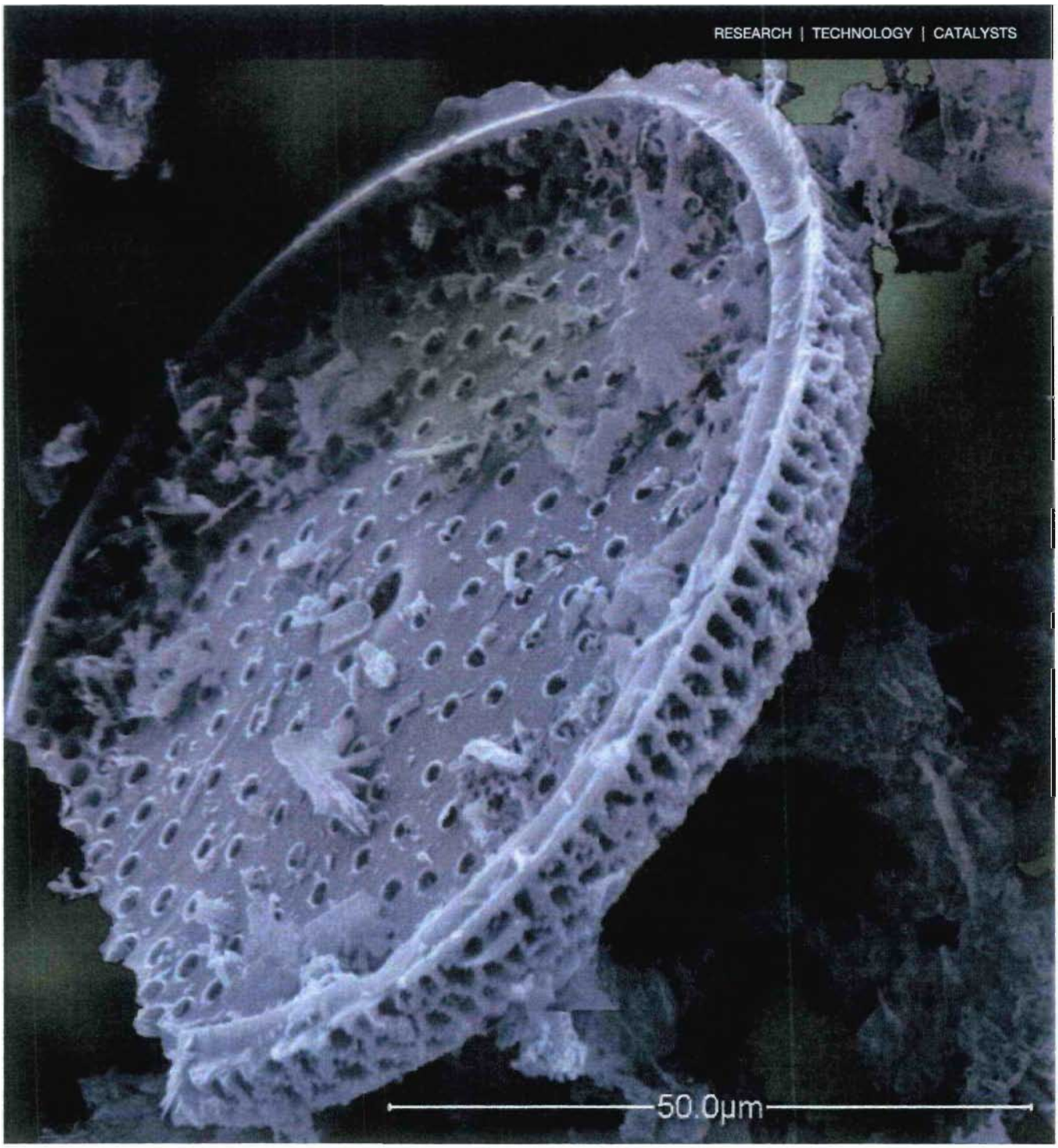
Riverview SAP 09
24 Hr Avg and 3 Hr Max lb OSO/Ton H2SO4 and Daily H2SO4 Production



VK series
Sulphuric acid catalysts

RESEARCH | TECHNOLOGY | CATALYSTS

HALDOR TOPSØE
CATALYSING YOUR BUSINESS



Scanning Electron Micrograph of a typical diatom skeleton.
Selected diatomaceous earths are used as essential raw material for the sulphuric acid catalyst carrier and are crucial for the final catalyst properties.

VK series – catalysts for today and for the future

The catalytic SO_2 converter is the heart of the sulphuric acid plant and the quality and characteristics of the selected catalysts are crucial to a reliable and energy-efficient operation.

The catalyst properties are influenced by the chemical composition, the physical properties including the nature of the support material and the manufacturing process. Topsøe VK catalysts are uniquely balanced to combine high and stable activity, robustness, low pressure drop and a long service life.

Continual improvement of the VK catalysts is achieved through close cooperation between Topsøe's Catalyst Group, R&D and the production facilities. Over the years this cooperation has resulted in major product breakthroughs, providing the industry with new catalysts for more energy-efficient operation, lower SO_2 emissions and higher production rates.

Topsøe's VK series comprises four different formulations in a variety of sizes and shapes, effectively covering all operating conditions in any sulphuric acid plant.

By combining outstanding activity with low pressure drop and exceptionally high mechanical strength, the VK catalysts ensure cost-effective plant operation by providing:

- high SO_2 conversion efficiency
- improved energy efficiency
- enhanced operating flexibility
- low screening losses
- long service life

Product range

VK38

The VK38 formulation provides excellent activity over a wide range of operating conditions. VK38 is the only catalyst on the market that can be used effectively in all beds of any SO_2 converter.

For continuous operation VK38 offers a broad temperature range of 400-630°C (750-1170°F) and can withstand repeated temperature spikes up to 650°C (1200°F).

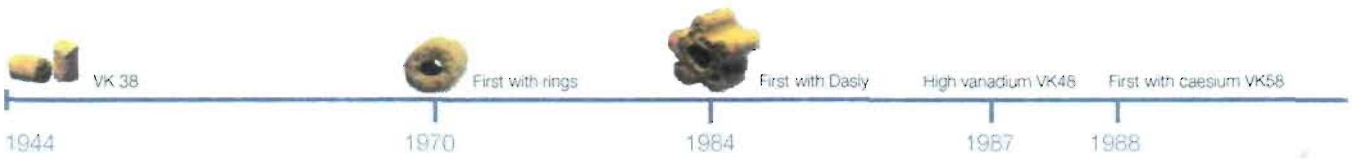
VK38 is designed to initiate the reaction at a temperature as low as 360°C (680°F), ensuring a smooth plant start-up, minimising pre-heat time due to its superior catalyst activity.

VK48

VK48 is a high-vanadium version of the standard all-round VK38 catalyst.

The catalyst composition is specifically formulated for lower pass service, particularly where the process gas contains large amounts of SO_3. The conversion ratio of SO_2 affects the balance between the active vanadium species in the catalyst. An optimised ratio of the alkali-metal promoters enables an increased vanadium content in VK48, resulting in a considerably enhanced activity.

In high SO_3 gas environments, such as the lower passes of single absorption plants, or the third pass of a 3:1 double absorption plant, VK48 offers a significant performance advantage.



Caesium catalysts

Incorporating caesium as an additional catalyst promoter enhances the action of the vanadium and activates the catalyst at a much lower temperature than conventional non-caesium catalysts.

Exceptionally high activity

Topsøe's caesium-promoted VK catalysts are up to three times more active than non-caesium catalysts, depending on the operating conditions. Topsøe's unique production techniques result in an optimised silica pore system that combines two important features: a very uniform distribution of the catalytically active melt within the pore system and better access for the process gas to the internal surfaces of the catalyst. This greatly improves the activity of the caesium-promoted VK catalysts.

Low ignition temperature

VK59 and VK69 have an exceptionally low ignition or "strike" temperatures of 320-330°C (610-625°F) that offer new possibilities for faster and cleaner start-ups. Autothermal restarts can be accomplished after a significantly longer idle time without the use of pre-heat.

VK59

VK59 is a caesium-promoted catalyst optimised for medium to high strength SO_2 gasses with continuous operation down to 370°C (700°F). A top layer of VK59 in the first pass makes it possible to accommodate high strength SO_2 feed gas without exceeding the maximum outlet temperature of 630°C (1165°F) and still maintain high bed conversion efficiency.

VK59 installed in the lower pass(es) of single absorption plants allows for significant conversion improvement.

Benefits

- accommodates strong SO_2 feed gas without excessive first pass exit temperatures
- greatly improved operating flexibility for rapidly changing feed gas composition
- low ignition temperature for faster and cleaner start-ups
- significantly extended idle time for autothermal restarts
- improved overall conversion in single absorption plants

VK69

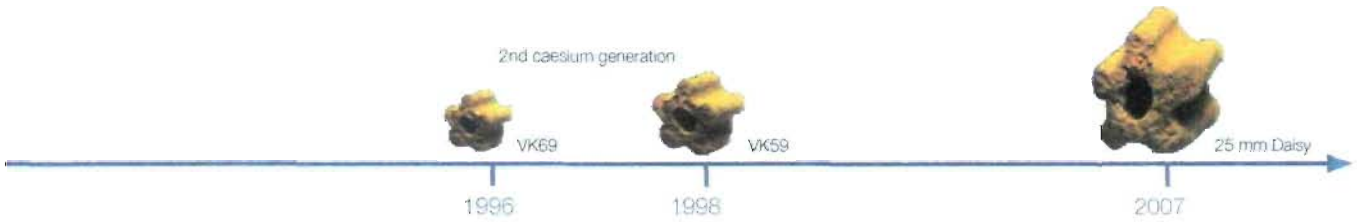
VK69 is designed specifically for the final pass(es) of double absorption plants. In the lean SO_2 gas environment after the inter-pass absorption tower, the unique VK69 formulation offers unmatched high activity throughout the entire operating temperature range. This affords existing plants the opportunity to greatly reduce SO_2 emissions and/or increase production rates. For new or revamped plants, SO_2 emissions of under 50 ppm are possible.

Using caesium as a promoter, VK69's extremely low ignition or "strike" temperature will significantly reduce pre-heat time and improve start-up performance.

VK69 is manufactured in a unique 9 mm Daisy-shape. The high surface area contributes to the high activity in this gas environment and the high void-fraction ensures a low pressure drop and good dust tolerance.

Benefits

- possibility for over 50% reduction in SO_2 emission from existing double absorption plants
- possibility for significantly increased production without increasing SO_2 emissions
- less than 50 ppm of SO_2 emissions possible from new or re-vamped plants
- low ignition temperature for faster and cleaner start-ups
- long lifetime and low screening losses industrially proven since 1996.



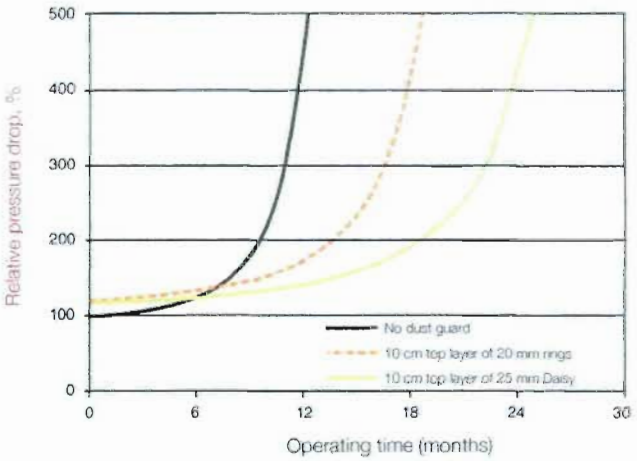
Sizes and shapes

25 mm Daisy - dust protection catalyst

For catalyst beds suffering from rapid pressure drop increase due to dust in the feed gas, a top layer of Topsoe's 25 mm Daisy-shape catalyst can provide a cost effective remedy. The extra void fraction and a lower specific surface area allow a significantly higher capacity for dust, distributing it throughout a larger volume of the catalyst bed. The result is a lower rate of pressure drop increase providing improved energy efficiency and longer intervals between catalyst screenings.

Benefits

- 30-50% longer on-stream time compared to existing ring-shaped dust-protection catalysts
- 100% longer on-stream time compared to 12 mm Daisy
- maintenance cost savings due to less frequent catalyst screening
- energy cost savings due to lower plant pressure drop
- production increase due to longer time at maximum rate before pressure drop forces production decay



Pressure drop development across various catalyst loadings in a dust laden feed gas. Installation of a 10-15 cm (4-6 inches) top layer of the 25 mm Daisy results in 30-35% longer production campaigns compared to the 20 mm rings or a doubling when compared to the 12 mm Daisy.

12 mm Daisy

The 12 mm Daisy has become the most widely used catalyst shape on the market since introduced by Topsoe in 1984. The high void fraction results in improved energy efficiency throughout the operating cycle due to low initial pressure drop and increased capacity for dust.

Topsoe's 12 mm Daisy-shape has proven to be robust as well, with reported screening losses typically well below 10%.

Topsoe's VK38, VK48, and VK59 formulations are all available in the 12 mm Daisy-shape.

Benefits

- low initial pressure drop
- high dust capacity yielding in a lower rate of pressure drop increase
- high activity
- low screening losses

9 mm Daisy

VK69 is produced in the unique 9 mm Daisy-shape. In the low SO_2 environment, after the intermediate absorption tower, the 9 mm size and Daisy-shape combination gives 30% extra activity compared to a 12 mm Daisy-shape, in part due to the higher surface area. Also, the Daisy-shape ensures remarkably low pressure drop.

10 mm rings and 6 mm cylinders

VK catalysts in the form of 10 mm rings and 6 mm cylinders remain available for plants that desire or require their continued use.

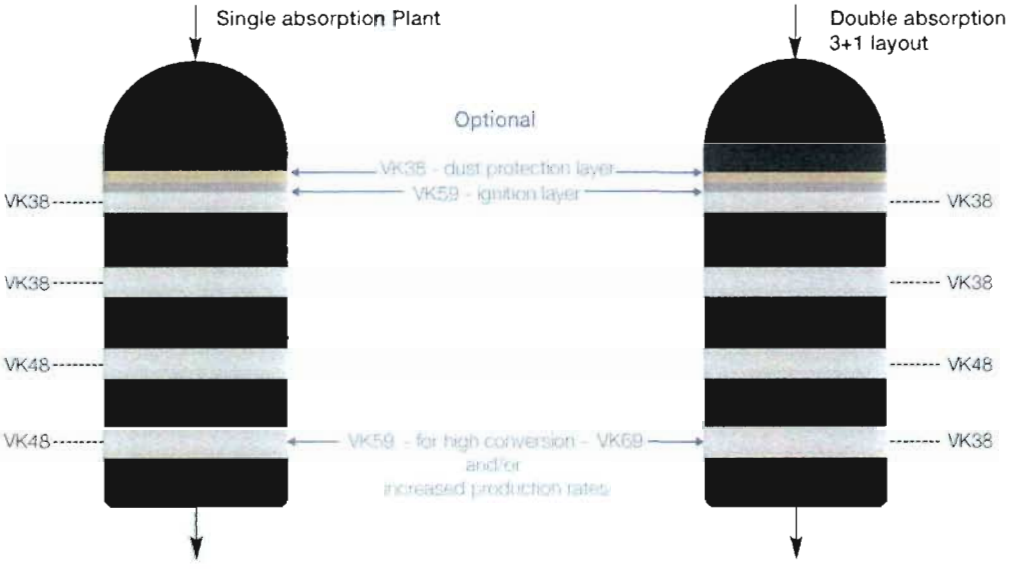
ISO

Catalyst manufacturing facilities are located in Denmark and in Houston, Texas, USA. Both plants are certified to the ISO 9001: 2000 and ISO 14001: 2004 standards. Topsøe's quality management system includes continuous improvement to achieve the highest quality.

Topsøe recognises its responsibility towards the local and global community in all its activities. We protect the external environment through responsible behaviour and are dedicated to a continual improvement of personal safety and internal work processes.

Packaging and storage

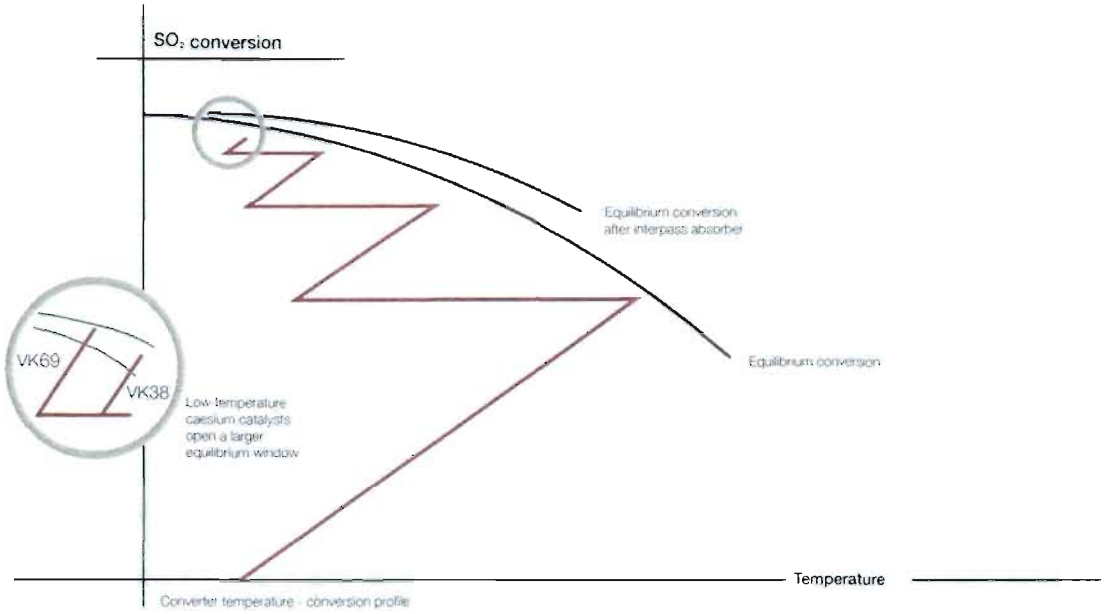
The standard packagings for VK catalysts are supersacks and 200 litre fibre drums. A polyethylene liner protects the catalyst from moisture. VK catalysts are very durable and can be stored for years without loss in activity or strength when kept dry and in the original packaging.



Tailored catalyst loadings

Topsøe's range of VK catalyst formulations and shapes allow tailored loadings for each plant's requirements. Topsøe's catalyst experts will assist in selecting the optimum catalyst type and shape for each pass in any converter design, keeping the client's objectives in mind.

	VK38	VK48
Type	Potassium-promoted	Potassium-promoted
Ignition temperature	360°C/680°F	360°C/680°F
Continuous operating temperature range	400-630°C 750-1165°F	410-550°C 770-1020°F
Thermostability	650°C/1200°F	650°C/1200°F
Size and shape	12 mm Daisy 25 mm Daisy 10 mm rings 6 mm cylinders	12 mm Daisy 10 mm rings 6 mm cylinders
Opportunities	Excellent activity in the full range of operating conditions. Suitable for use in all passes of all converters.	High-vanadium catalyst with enhanced activity for lower pass service, particularly where the process gas contains significant amounts of SO_3.



Technical service

Based on experience over more than half a century, Topsøe has established an extensive technical service programme available to our VK catalyst users. In addition to frequent contact, the service programme includes activity testing of catalyst samples, evaluations of catalyst performance, plant optimisation, trouble shooting and management of catalyst replacement.

Activity testing of catalyst samples represents a valuable source of information, which combined with computer evaluations of the plant performance enables Topsøe to optimise future catalyst management.

Topsøe's **P**ortable **G**as Analysis **U**nit, **TOPGUN** enables a thorough analysis of a sulphuric acid converter system. TOPGUN is a fully portable, infrared gas-analysis unit for SO_2 and O_2 analyses. The gas analyses are used as input to Topsøe's proprietary computer programs, which can accurately simulate the converter performance. TOPGUN has proven a very efficient tool for troubleshooting and optimising the plant performance.

	VK59	VK69
Type	Caesium-promoted	Caesium-promoted
Ignition temperature	320°C/610°F	320°C/610°F
Continuous operating temperature range	370-500°C 700-930°F	370-500°C 700-930°F
Thermostability	650°C/1200°F	650°C/1200°F
Size and shape	12 mm Daisy	9 mm Daisy
Opportunities	Optimised for medium to high-strength SO_2 gases. Use as an ignition layer in any bed. Improved conversion in single absorption plants.	Double absorption plants only - optimised for use in the pass(es) after the intermediate absorption tower. Extremely high activity throughout the entire temperature range.

RESEARCH | TECHNOLOGY | CATALYSTS

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HALDOR TOPSØE

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