P.O. Drawer L.
Plant City, Florida 33564-9007
Telephone: 813/782-1591

CF Industries, Inc.
Plant City Phosphate Complex

March 9, 2004

A.A. Linero
Administrator,
Permitting South Section
Department of Environmental Protection
Twin Towers Office Building
2600 Blair Stone Road
Tallahassee, FL 32399-2400

Subject: DEP File No. 0570005-019-AC; PSD-FL-339
Sulfuric Acid Production Increase, Plant City Phosphate Complex

Dear Mr. Linero:

The information requested in your February 20, 2004, letter regarding the CF Industries January 19, 2004 permit application for a sulfuric acid production rate increase is attached. This submittal includes the required responsible official certification and professional engineer's certification. Also included are supplemental information items regarding modifications to ancillary equipment components, which have been determined necessary to achieve the requested sulfuric acid production rates.

Please communicate any questions as they arise to Bob May (813-364-5603), Tom Edwards (813-364-5608), or David Buff, Golder Associates, (352-336-5600 ext. 545).

Sincerely,

Herschel E. Morris

Herschel E. Morris
Vice President Phosphate Operations and
General Manager

cc: G. Worley, EPA
J. Bunyak, NPS
J. Kissel, DEP-SWD
J. Campbell, EPCHC
D. Buff, Golder Associates
J.S. Alves, HGS
J.G. Sampson, CFI
T.A. Edwards, CFI

APPLICATION INFORMATION

Owner/Authorized Representative Statement

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

1. Owner/Authorized Representative Name :
   Herschel E. Morris, Vice President Phosphate Operations/General Manager
2. Owner/Authorized Representative Mailing Address...
   Organization/Firm: **CF Industries, Inc.**
   Street Address: **P.O. Drawer L**
   City: **Plant City** State: **FL** Zip Code: **33564**
3. Owner/Authorized Representative Telephone Numbers...
   Telephone: **(813) 782-1591** ext. Fax: **(813) 788-9126**
4. Owner/Authorized Representative Email Address: **hmorris@cfifl.com**
5. Owner/Authorized Representative Statement:

   I, the undersigned, am the owner or authorized representative of the facility 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 requirements identified in this application to which the facility 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.

   Herschel E Morris — Signature

   3/9/04 — Date

APPLICATION 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: **32653-1500**
3. Professional Engineer Telephone Numbers...
   Telephone: **(352) 336 - 5600** ext. 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

3/08/04 — Date

(seal)

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

RESPONSES TO FEBRUARY 20, 2004, DEP INFORMATION REQUESTS

CF INDUSTRIES, INC., PLANT CITY PHOSPHATE COMPLEX

SULFURIC ACID PRODUCTION RATE INCREASE

1. **The Department recently issued a PSD permit (PSD-FL-325) to IMC for increase in sulfuric acid production at the New Wales facility. The plants were required to show compliance with the 3-hour and 24-hour SO2 limit using continuous emissions monitoring system (CEMS). Please provide reasonable assurance to the Department that CF will be able to comply with the proposed BACT limits for SO2 using CEMS. Additionally, the BACT NOx limits were established as 0.12 lb/ton H2SO4. Please provide reasonable assurance to the Department that CF will be able to comply with this limit of NOx.**

   CF RESPONSE 1

   CF is already required by conditions in the existing Title V and past construction permits to continuously monitor and record SO2 emissions, and continues to operate its CEMS in accordance with those conditions and the applicable NSPS rules. CF is in the process of installing a continuous oxygen monitoring instrument to allow a more frequent indication of the emission rate in lbs. SO2 per ton H2SO4 as allowed by 40 CFR 60.84(d). The outputs from the two continuous monitoring instruments will be fed to a WDPF distributed control system (DCS). The DCS will convert the instrument readings to lbs. per ton, and will compute, display, and record the emission rate. The 3-hour and 24-hour averages will be calculated from this data. This system is planned to be operational by June 2004. A copy of the oxygen monitoring system specifications is provided in Appendix 1.

   With regard to the NOx limit, a consultant's statement is provided in Appendix 2 to show that the anticipated NOx emission rate will meet the BACT NOx limit cited. A test for NOx is proposed to be included in the initial performance test following the completion of the project, to confirm the emission rate of NOx.

2. **Please provide the Department with reasonable assurance that the efficiency of the absorbers and the mist eliminators will not be degraded while operating at the higher process rates.**

CF RESPONSE 2

The consultant's statement provided in Appendix 2 includes assurances that the efficiencies of the absorbers and mist eliminators will not be degraded by the proposed operating rates. A layer of 3-inch saddle packing will be placed on top of the Monsanto WavePak in the final tower to reduce loading to the mist eliminator elements. An additional element will be added if the initial performance test indicates there is a need.

3. **Please provide emissions data for SO2 in lb/ton of 100% H2SO4 for the last two years (monthly CEM averages) of operation for the "C" and "D" Sulfuric Acid Plants (SAP's). In providing this data, please present it in a graphical representation against time. On the same graph, indicate the production rate for the plant (monthly averages) and indicate the turn-around date, if any, for the two SAP's on the time axis.**

CF RESPONSE 3

The requested monthly average CEMS emission data and monthly average sulfuric acid production rates are provided in graphic form in Appendix 3. The turnaround dates are indicated on the graphs. The "C" Plant did not have a turnaround during the requested period, so the graph was extended to include the most recent "C" turnaround.

4. **Indicate what modifications were done to each plant during the turn-around. If catalysts were screened or replaced, indicate which conversion passes were selected for catalyst screening and/or replacement. Indicate the amount of catalyst replaced, if any.**

CF RESPONSE 4

No modifications to the plants occurred during the "C" and "D" maintenance turnarounds noted in CF Response 3. Catalyst was screened and losses were replenished with catalyst of the same style and size.

In the "C" Plant, catalyst was screened and replenished from all masses except the first half of the fourth mass, as follows:

First Mass - The entire 70,200 liters was screened. 11,000 L. replaced.
Second Mass - The entire 76,800 L. was screened. 10,600 L. replaced.
Third Mass - The entire 94,000 L. was screened. 16,000 L. replaced.
Fourth Mass, A Bed - None screened or replaced. Total loading is 80,000 L.
Fourth Mass, B Bed - The entire 78,000 L. was discarded without screening and replaced.

In the "D" Plant, catalyst was screened and replenished from all masses except the second half of the fourth mass, as follows:

First Mass - The entire 70,000 liters was screened. 31,000 L. replaced.
Second Mass - The entire 76,000 L. was screened. 3,000 L. replaced.
Third Mass - Half of the 94,000 L. was screened, the other half was discarded without screening. 60,000 L. replaced.

Fourth Mass, A Bed - Half of the 80,000 L. was screened, the other half was discarded without screening. 38,000 L. replaced.
Fourth Mass, B Bed - None screened or replaced. Total loading is 85,000 L.

5. **The application states that an economic analysis of meeting lower SO2 emissions limit using cesium catalyst will be submitted in the near future. Please provide that information.**

CF RESPONSE 5
The economic analysis referenced in the application was submitted to the Department by letter (Morris to Arif) on February 19, 2004. A copy is provided in Appendix 4.

6. **Please provide cost analyses in $/ton of SO2 and acid mist removed by using ammonia scrubbing with double absorption plants.**

CF RESPONSE 6

As requested, CF, in conjunction with its consultant Golder Associates Inc., has estimated the cost of installing and operating an ammonia scrubbing system on the C & D SAPs. The estimate is shown in Appendix 5. For the purpose of this estimate, the ammonia scrubbing systems were assumed to be similar to those already employed on the A & B SAPs. This would require installation of new ammonia absorber vessels, a new turbine and blower to account for the additional pressure drop through the system, and new mist eliminators.

The estimated capital cost of the ammonia scrubbing systems on C & D SAPs is $24 million. Using a standard capital recovery factor of 0.0944 (20 yrs @ 7% interest), the annualized cost of the capital investment is $2.3 million/yr. Additional annualized operating costs to operate the scrubbing systems are estimated at $1.6 million/yr.

This cost does not include any cost for handling or disposal of the liquid ammonium sulfate stream generated by the scrubbing process. At present, the liquid ammonium sulfate stream from the A & B SAPs ammonia scrubbing system is sent to the on-site granular fertilizer plants. However, no additional volume can be accommodated within these plants without diluting the phosphate content of the ammonium phosphate product.

As a result, the only feasible technical option for disposal of the liquid stream would be to construct an ammonium sulfate crystallizer, storage warehouse and shipping unit in order to market the ammonium sulfate product. These additional facilities are estimated to cost at least an additional $20 million. There is also no guarantee that an adequate market for ammonium sulfate will exist, or the revenue from such an operation.

Regardless of the SO2 reduction gained by ammonia scrubbing of C & D SAPs, the cost of these systems would be economically infeasible. It is emphasized that no other double adsorption sulfuric acid plant located at a phosphate fertilizer manufacturing plant has been required to employ add-on flue gas desulfurization (FGD) equipment. Requiring

ammonia scrubbing on the C & D SAPs would put CF at a significant economic disadvantage compared to its competitors, at a time when fertilizer prices are depressed and raw material costs (i.e., molten sulfur) have increased. In fact, these costs are so excessive that CF would cancel the project before being required to employ ammonia scrubbing. Based on the cost estimates above, the annual cost to CF would be on the order of $6 million/yr, which would increase the cost to produce its products (DAP, MAP) by $6/ton (based on 1 million TPY of DAP/MAP produced). This would be unacceptable in today's marketplace.

7. **Hillsborough County Environmental Protection Commission (HCEPC) expressed their concerns regarding the replacement of "C" SAP final and drying absorption towers packing. The replacement packing being considered is either "in kind" replacement or lower pressure drop packing such as Koch structured packing. Monsanto wave style packing or Cecebe HP perforated Intalox saddles. HCEPC would like CF to specify which packing they intend to use as the replacement packing or determine potential emissions with all the different packing options. Are the emissions going to vary from the final tower depending on what replacement packing is selected? Does CF plan to use two different sizes of packing as it exists now in the final and drying towers? If so, what will be the locations and respective depths of each packing material?**

CF RESPONSE 7

CF plans to replace the existing drying and final tower packing with Monsanto wave style packing. This packing has been in service for several years in a variety of sulfuric acid absorption towers in the fertilizer industry. The performance of the packing in these applications is consistent with the emissions standards CF has proposed.

CF is currently proposing to include in this permit application alterations to increase the main blower turbine horsepower by approximately 9%. This will provide for an approximate 5% increase in airflow. C and D Sulfuric Acid Plants' drying and final towers currently contain approximately 15 feet of 3-inch Intalox saddles as packing. The proposed project will replace the packing in both towers with approximately 14 feet of Monsanto WavePak packing plus 14 inches of 3-inch Intalox saddles for mist collection to reduce the load on the mist eliminators. Appendix 2 is attached as a reference supporting this modification.

CF requests that the permit allow for the substitution of other packing styles that have the same pressure drop and misting characteristics in the remaining four C and D Sulfuric Acid Plant absorption towers consistent with the proposed tower performance and design. These packing materials provide energy efficiency advantages that may justify the change during a future turnaround when the packing reaches the end of its service life.

8. **The modeling files submitted include ISC modeling files and BPIP files. However, building downwash is not included in the ISC input. Please include building downwash effects in the modeling and re-submit the results or please clarify where the downwash was included in the modeling already submitted to the Department. Please verify that building downwash was included in the Calpuff modeling input for the Class I analysis as well?**

CF RESPONSE 8

The proposed project (i.e., significant impact analysis in the Class I and Class II areas) involved only the C and D Sulfuric Acid Plants (SAPs). The BPIP output indicated that the D SAP stack was not within the influence of any significant building structures (i.e., no downwash effects). The BPIP output indicated that the C SAP is affected by nearby building structures in several directions. However, as the tallest structure affecting the C SAP stack is 20.12 meters (m) high, the C SAP stack has a height greater than 2.5 times the height of this building (20.12 m x 2.5 = 50.3 m, which is less than C SAP stack height of 60.66 m). For this reason, building downwash for the C SAP was not included in the modeling analysis.

9. **According to the application, the Sulfur Deposition Rate is predicted to be slightly above the DAT for the Class I area. Are there any control technologies or methods that can reduce impacts in the Class I area?**

CF RESPONSE 9

As shown in Table 7-6 of the application, the predicted maximum sulfur deposition rate due to the project upon the Class I area is 0.011 kg/ha/yr. This value, rounded to the same number of significant figures as the deposition analysis threshold (DAT) of 0.01 kg/ha/yr. in accordance with the principles of mathematics, does not exceed the DAT. Additionally, the maximum predicted impact was computed based on the overly conservative assumption that the C and D SAPs produce 2,750 tons/day (TPD) of sulfuric acid for 365 days per year. In reality, the SAPs are known to have an average operating factor in the range of 93 to 97 % and are operated most of the time at rates averaging well below the permitted maximum production rate because of the loss of operating efficiency during the periods between maintenance turnarounds. These operating considerations would lower the maximum predicted impact by at least 5%. The maximum predicted S deposition then becomes less than 0.011 x 0.95 = 0.010 kg/ha/yr. Therefore, the actual S deposition in the Class I area is expected to be less than the DAT of 0.01 kg/ha/yr. Further, the AQRV analysis presented in the application shows that S deposition due to the proposed project is not expected to have a significant effect on the Class I area, which is located on the Gulf coast and has a high buffering capacity due to the Gulf of Mexico's influence and naturally occurring limestone rock.

10. **Rule 62-4.070(5), F.A.C., requires the applicant to provide reasonable assurances that Department standards will be met at the installation. Please provide necessary information to show how CF will be able to comply with the requirements of 40 CFR Part 63 Subpart AA and Subpart BB relating to Phosphoric Acid and Phosphate Fertilizers Production Plants, respectively.**

CF RESPONSE 10

The emission limits in the current CF Title V permit, for the plants mentioned in this request, are the same as the MACT levels specified in Subparts AA and BB. The annual stack compliance test reports which are submitted to the Department show that CF has been complying with those limits since 1975.

Additionally, CF has agreed with the Department that CF will not object to the Department's determination that the Plant City Phosphate Complex is a "major source" of hydrogen fluoride emissions as defined by 40 CFR 63, with an accompanying provision that CF may request a reversal of that determination if additional testing and modeling demonstrate that the facility is not a major source (re: Letters of February 26, 2004, Vielhauer to Edwards, and March 3, 2004, Morris to Vielhauer). CF has proposed an alternative monitoring plan for its phosphoric acid production and phosphate fertilizer granulation and storage units as allowed under 40 CFR 63.8(b), and is working with the DEP Bureau of Air Monitoring and Mobile Sources toward the approval of the plan in lieu of the 40 CFR 63 Subpart AA and BB requirements.

SUPPLEMENTAL INFORMATION

CF has determined that ancillary alterations to some plant components will be needed in addition to those listed in the January 19, 2004, permit application, in order to achieve the requested production rates. Changes to the main blower turbines were discussed under Response No. 7, above. Additionally, alterations will be made to the boilers, boiler water feed pumps, de-aerator feed pumps, and acid cooling systems in both the "C" and "D" Sulfuric Acid Plants, in order to accommodate the increased heat load and steam production.

APPENDIX 1

OXYGEN MONITORING SYSTEM SPECIFICATIONS

Zirconia Oxygen Analyzer ZR22G/ZR402G

Separate Type In Situ Zirconia Oxygen Analyzer
Model ZR22G,ZR402G

Overview

Yokogawa's zirconia oxygen analyzers are used for combustion monitoring and control in a wide variety of applications. They help industries save energy and their applications range from energy-consuming industries such as iron and steel, electric power, oil and petrochemical, ceramics, pulp and paper, food, and textiles to various combustion facilities such as incinerators and small- and medium-sized boilers. Combustion monitoring and control using the analyzer also contribute to a lowering of CO2, SOx, and NOx emissions by allowing for more complete combustion, thus preventing global warming and air pollution.

Features

* Liquid-crystal touch panel display is easy to operate
* Interactive, menu-guided operation. Displays settings, oxygen concentration trends, and calibration options
* Can measure either oxygen concentration or humidity
* Graphical trend data display for highly reliable measurement
* Zirconia cell and heater assembly can be replaced in the field.

Improved Operation Panel

* Interactive for easy yet secure operation
* Extensive indication modes available ; Allows user-defined configuration
* Back-lit LCD permits viewing even in low-light conditions
* Error codes are accompanied with detailed descriptions. No need to refer to the Instruction Manual

Specifications

Measurement Object	Oxygen concentration in combustion exhaust gas and mixed gas.
Measurement System	Zirconia system
Oxygen Concentration	0.01 to 100 vol% O2
Output Signal	4 to 20 mA DC (maximum load resistance 550V)

About Us
Worldwide Lc
Category Sear
Industrial Automatior Control Bu
Environme Analytical I
Oxygen Ana
· Zirconia O Analyzer ZR22G/ZR
Infrared Gas Analyzers
Dust Monitc
Process Gas Chromatogr
Clean-room Monitors
Gas Density Meters
pH/ORP Me
Conductivit Meters
Turbidity Meters/Parti Counters
Residual Ch Analyzers
Alkalinity M
Dissolved O Converters
MLSS analy
Liquid densi meters
Water qualit monitors
Fourier Trar Near-Infrare Analyzers
Stack Gas

Measurement Range	Any setting in the range of 0 to 5 through 0 to 100 vol% O2 (in 1 vol% O2), or partial range.
Digital Communication (HART)	250 to 550V, depending on number of field devices connected to the loop (multi-drop mode). Note: HART is a registered trademark of the HART Communication Foundation.
Sample Gas Pressure	- 5 to + 250 kPa
Sample Gas Temperature	0 to 700 deg C (Probe only) 0 to 1400 deg C (with High Temperature Probe Adapter)
Probe Length	0.15, 0.4, 0.7, 1.0, 1.5, 2.0, 2.5, 3.0, 3.6,4.2, 4.8, 5.4 m 1m,1.5m (with High Temperature Probe Adapter)
Contact Output	Four points, contact capacity 30 V DC 3 A, 250 V AC 3 A (resistive load) Three of the output points can be selected to either normally energized or normally deenergized status. Delayed functions (0 to 255 seconds) and hysteresis function (0 to 9.9 vol%O2 can be added to high/low alarms. The following functions are programmable for contact outputs. (1) Abnormal, (2) High-high alarm, (3) High alarm, (4) Low-low alarm, (5) Low-alarm, (6) Maintenance,? (7) Calibration, (8) Range switching answer-back, (9) Warm-up, (10) Calibration-gas pressure decrease (answerback of contact input), (11) Temperature high-alarm, (12) Blowback start, (13) Flameout gas detection (answerback of contact input)
Calibration	Method ; zero/span calibration Calibration mode ; automatic, semi-automatic and manual (All are operated interactively with an LCD touch screen).
Construction of detector	Non-explosion proof and waterproof construction, NEMA4X/IP66
Construction of converter	Dustproof and waterproof construction, NEMA4X
Ambient temperature	Probe :-10 deg C to 150 deg C converter: -20 deg C to 55 deg C Power requirements: 85 to 264 V AC; 50/60 Hz
Power requirements	85 to 264 V AC; 50/60 Hz

Performance

Repeatability	±0.5% Maximum value of set range
Drift	±2% Maximum value of set range/month
Response speed	90% response within 5 sec

Principle of Zirconia Oxygen Analyzer

The principle of the zirconia oxygen analyzer is as follows:
At high temperatures the zinconia element, as a solid electrolyte, is a conductor of oxygen ions. Platinum electrodes are attached to the interior and exterior of the zirconia. Heating the element allows different partical oxygen concentrations of the gasses to come into contact with the opposite side of the zirconia creating an oxygen concentration cell. In other words, oxygen molecules gain electrons to form oxygen ions with higher partical oxygen concentrations. These ions travel through the zirconia element to the other electrode. At that point, electrons are released to form oxygen molecules (refer to the chemical formula). The Nernst expression can be applied to calculate the force by measuring the electromotive force E generated between the two electrodes.

Top of this page

APPENDIX 2

STATEMENT ON EFFICIENCY EFFECTS AND NOX EMISSIONS

ENVIRO-CHEM SYSTEMS

ENVIRO-CHEM SYSTEMS
A MONSANTO COMPANY
14522 SOUTH OUTER FORTY ROAD
CHESTERFIELD, MISSOURI 63017
PO BOX 14547
ST. LOUIS MISSOURI 63178
PHONE (314) 275-5700
FAX (314) 275-5701
envirocch@monsanto.com
www.enviro-chem.com

March 4, 2004

Mr. Bob May
CF Industries, Inc.
P.O. Drawer "L"
Plant City, FL 33565

Subject: C or D Plant Emissions

Dear Bob:

The purpose of this letter is to respond to the FDEP questions in your email to me dated March 1, 2004.

Regarding acid mist, the efficiency of the current 14 CS IIP elements in C and D Plant final absorbing tower will not be degraded when the plant is operated at 2750 STPD and 12% SO2 gas strength. In fact, the tower could operate up to 3040 STPD with the current elements. Above that rate, an additional element would need to be added.

As well, the acid mist emissions or absorption efficiency will not be degraded by replacing the wetted 14 feet of 3" saddle packing with 14 feet of WavePak. A layer of 14 inches of dry spray catcher packing consisting of 3" saddles will be placed on top of the wetted WavePak packing.

The Florida sulfuric acid plants that we have revamped typically measure stack NOX of 8 to 12 ppmv. Assuming that the NOX is NO2 then the 0.12 lb/ton 100% H2SO4 limit is approximately 18.6 ppmv in the stack. The production expansion of the CF plants is in line with the other Florida phosphate fertilizer plants. Therefore, we expect that the CF plant will be under the NOX limit of 0.12 lb/ton.

Please let me know if you need any additional information.

Sincerely,

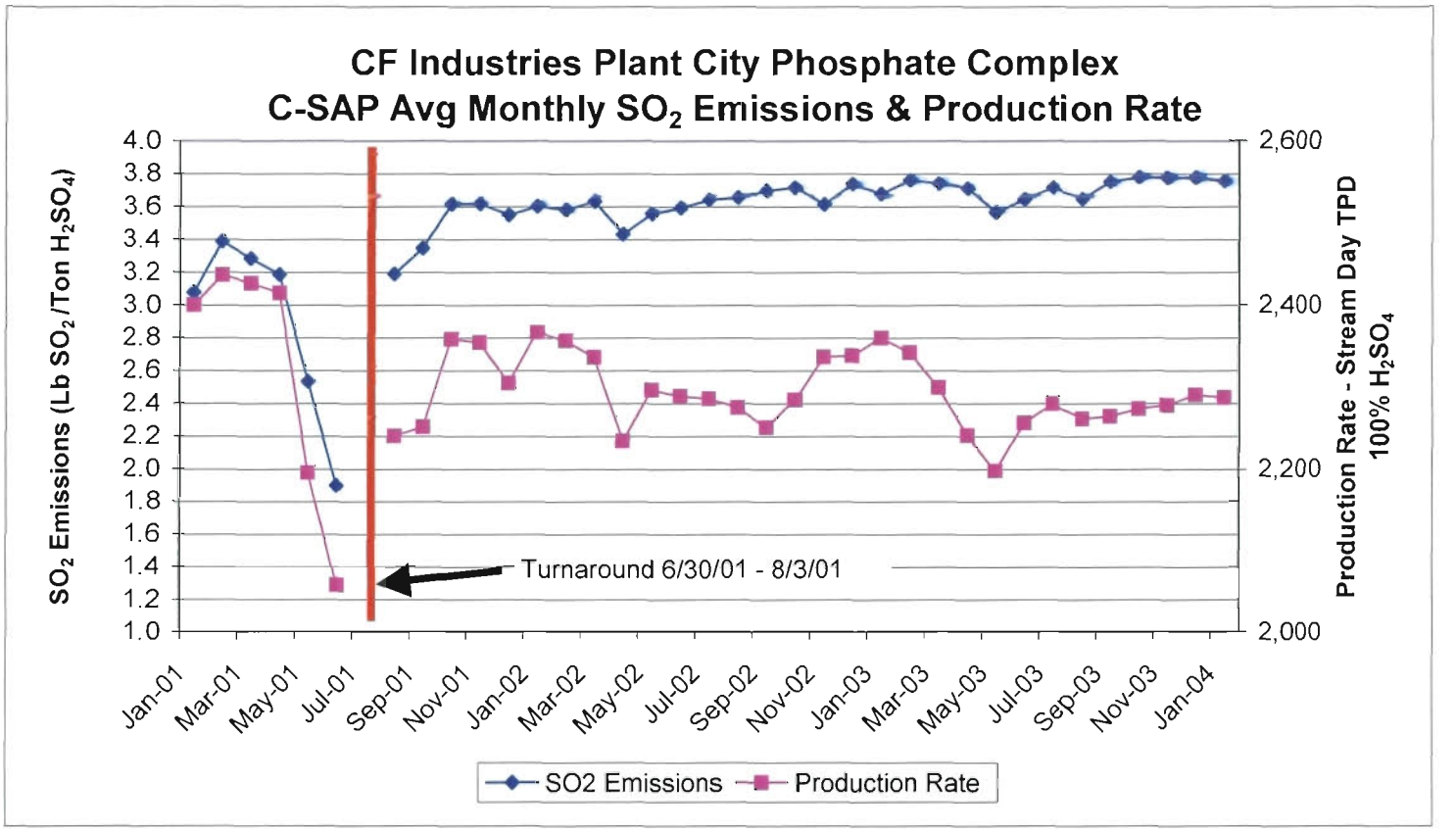
John R. Horne

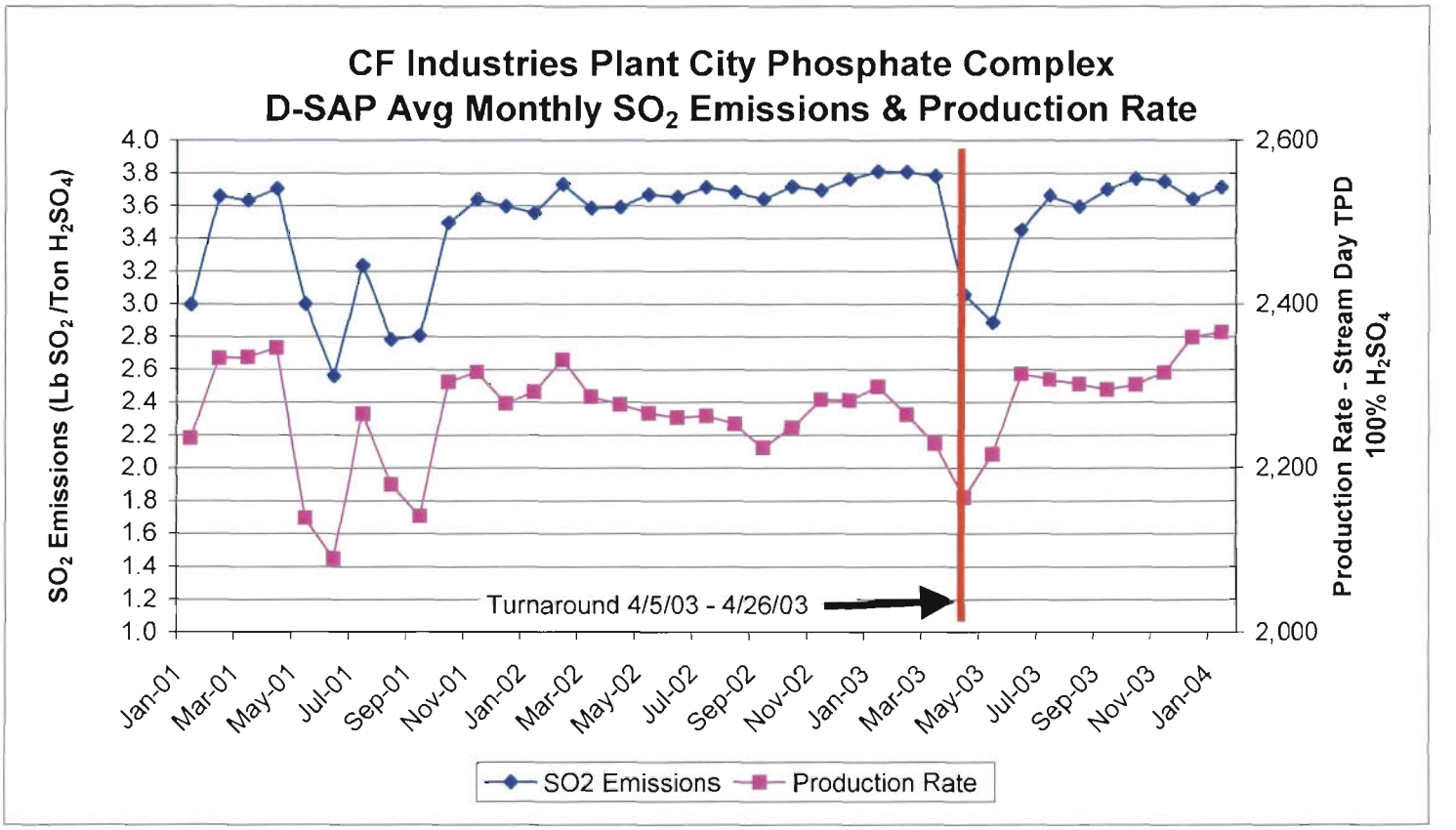
/jd

APPENDIX 3

CEMS AND PRODUCTION DATA

Figure 1


CF Industries Plant City Phosphate Complex
C-SAP Avg Monthly SO2 Emissions & Production Rate
SO2 Emissions (Lb SO2/Ton H2SO4)
Production Rate - Stream Day TPD 100% H2SO4
4.0
3.8
3.6
3.4
3.2
3.0
2.8
2.6
2.4
2.2
2.0
1.8
1.6
1.4
1.2
1.0
2,600
2,400
2,200
2,000
Turnaround 6/30/01 - 8/3/01
Jan-01
Mar-01
May-01
Jul-01
Sep-01
Nov-01
Jan-02
Mar-02
May-02
Jul-02
Sep-02
Nov-02
Jan-03
Mar-03
May-03
Jul-03
Sep-03
Nov-03
Jan-04
SO2 Emissions
Production Rate


CF Industries Plant City Phosphate Complex
D-SAP Avg Monthly SO2 Emissions & Production Rate
SO2 Emissions (Lb SO2/Ton H2SO4)
Production Rate - Stream Day TPD 100% H2SO4
4.0
3.8
3.6
3.4
3.2
3.0
2.8
2.6
2.4
2.2
2.0
1.8
1.6
1.4
1.2
1.0
2,600
2,400
2,200
2,000
Turnaround 4/5/03 - 4/26/03
Jan-01
Mar-01
May-01
Jul-01
Sep-01
Nov-01
Jan-02
Mar-02
May-02
Jul-02
Sep-02
Nov-02
Jan-03
Mar-03
May-03
Jul-03
Sep-03
Nov-03
Jan-04
SO2 Emissions
Production Rate

APPENDIX 4

BACT ECONOMIC ANALYSIS

P.O Drawer L.
Plant City, Florida 33564-9007
Telephone: 813/782-1591

CF Industries, Inc.
Plant City Phosphate Complex

February 19, 2004

Mr. Syed Arif
Bureau of Air Regulation,
Division of Air Resource Management
Department of Environmental Protection
Twin Towers Office Building
2600 Blair Stone Road
Tallahassee, Florida 32399-2400

Subject: CF Industries, Inc., PSD Permit Application,
Modifications to "C" and "D" Sulfuric Acid Plants

Dear Mr. Arif:

CF Industries, Inc., submitted a PSD permit application to the Bureau of Air Regulation on January 19, 2004. The application requests authorization to modify the "C" and "D" Sulfuric Acid Plants at the Plant City Phosphate Complex for the purpose of increasing the permitted production rates of the two plants from 2,600 tons of sulfuric acid per day to 2,750 tons per day.

As stated in the PSD Report in the BACT analysis, Part B of the application, page 5-6, the economic analysis of emission limits lower than the proposed limit was to be submitted in the near future. That analysis has now been completed and is enclosed for your review. The Owner/Authorized Representative Statement and Professional Engineer Certification for this submittal are also enclosed.

Please feel free to address any questions to Tom Edwards (863-364-5608), Bob May (863-364-5603) or David Buff, P.E. (352-336-5600, extension 545).

Sincerely,

Herschel E. Morris

Herschel E. Morris
Vice President Phosphate Operations and
General Manager

cc: Gerald Kissel, Southwest District
Jerry Campbell, HCEPC
J.S. Alves, HGS

APPLICATION 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: **32653-1500**
3. Professional Engineer Telephone Numbers...
   Telephone: **(352) 336 - 5600** ext. 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

2/18/04 — Date

(seal)

* Attach any exception to certification statement.

** **Board of Professional Engineers Certificate of Authorization #00001670**

Owner/Authorized Representative Statement
Complete if applying for an air construction permit or an initial FESOP.

1. Owner/Authorized Representative Name :
   Herschel E. Morris, Vice President Phosphate Operations/General Manager

2. Owner/Authorized Representative Mailing Address...
   Organization/Firm: CF Industries, Inc.
   Street Address: P.O. Drawer L
   City: Plant City State: FL Zip Code: 33564

3. Owner/Authorized Representative Telephone Numbers...
   Telephone: (813)782-1591 ext. Fax: (813)788-9126

4. Owner/Authorized Representative Email Address: hmorris@cfifl.com

5. Owner/Authorized Representative Statement:

   I, the undersigned, am the owner or authorized representative of the facility 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 requirements identified in this application to which the facility 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.

Herschel E. Morris — Signature

2/19/04 — Date

PSD Application for the "C" and "D" Sulfuric Acid Plants
CF Industries, Inc.,
Plant City Phosphate Complex, Plant City, Florida

Economic Analysis for Best Available Control Technology Determination

The BACT Analysis provided with the permit application on January 19, 2004, included a review of the most recent BACT determinations from the EPA RACT/BACT/LAER Clearinghouse, and of alternative pollution control technologies. The review concluded that BACT consists of the double absorption process with the addition of cesium catalyst in the fourth pass of the converter. This technology allows operation of the plants at the proposed 24-hour SO_2 emission limit of 3.5 lbs. SO_2 per ton H_2SO_4 and a 3-hour limit of 3.85 lb/ton.

An analysis of the economic feasibility of emission rates lower than 3.5 lb/ton has been completed, based upon modeled data provided by the Monsanto Company. Two approaches were used to calculate the cost of a reduction of the emission limit from the proposed 3.5 lb SO_2/ton H_2SO_4 to 3.25 lb/ton and 3.00 lb/ton.

The first approach shown in Table 1, uses the Monsanto reduction in production rate necessary to meet the lower limits, and calculates the incremental cost of lost DAP product and lost co-generated power. The annual incremental difference in SO_2 emissions is divided by the value of the annual production losses to arrive at an incremental cost per ton of SO_2 emissions.

The second approach, shown in Table 2, uses the same reduced production calculation, but compares the cost of sulfuric acid purchased to make up the loss in sulfuric acid production with the cost of producing the sulfuric acid on-site. CF believes this is not an economically viable alternative due to the limited availability of sulfuric acid. Changes in metallurgical industry processes, the development of foreign phosphate industry, and transportation restraints have combined to significantly reduce economically priced sulfuric acid.

The results show that the cost per ton of reduced SO2 emission exceeds $11,500 at the 3.25 lb/ton limit, and $12,800 at the 3.00 lb/ton limit.

Table 1

CF Plant City Phosphate Complex Proposed Rate Increase Economic Analysis For SO_2 BACT Determination

Comparison Based on Incremental DAP Production

	Basis	Case 1	Case 2
Nominal Average Annual Production Rate (TPD 100% H_2SO_4)	2,600	2,500	2,375
Emission Rate (Lb SO_2/Ton H_2SO_4)	3.50	3.25	3.00
Annual Change in Production (TPY 100% H_2SO_4)*		(34,675)	(78,019)
Annual Change in SO_2 Emissions (TPY SO_2)*		(169)	(342)
Net Cost Incremental DAP Production ($/Yr)**		($1,726,553)	($3,884,745)
Cost of Lost Power Production ($/Yr)**		($254,515)	($572,658)
Total Cost ($/Year)		($1,981,068)	($4,457,403)
Cost To Reduce SO_2 Emissions ($/Ton SO_2)		**$11,719**	**$13,018**

Note: Single plant economics using Monsanto modeling memo date 1/14/04.

*Note: Assumes 95% operating factor.

**Note: Uses January 2004 incremental cost basis.

Table 2

CF Plant City Phosphate Complex Proposed Rate Increase Economic Analysis For SO_2 BACT Determination

Comparison Based on Purchased VS Produced Sulfuric Acid

	Basis	Case 1	Case 2
Nominal Average Annual Production Rate (TPD 100% H_2SO_4)	2,600	2,500	2,375
Emission Rate (Lb SO_2/Ton H_2SO_4)	3.50	3.25	3.00
Annual Change in Production (TPY 100% H_2SO_4)*		(34,675)	(78,019)
Annual Change in SO_2 Emissions (TPY SO_2)*		(169)	(342)
Net Cost Purchased VS Produced H_2SO_4** ($/Yr)		($1,694,914)	($3,813,557)
Cost of Lost Power Production** ($/Yr)		($254,515)	($572,658)
Total Cost ($/Year)		($1,949,429)	($4,386,214)
Cost To Reduce SO_2 Emissions ($/Ton SO_2)		**$11,532**	**$12,810**

Note: Single plant economics using Monsanto modeling memo date 1/14/04.

*Note: Assumes 95% operating factor.

**Note: Uses incremental production cost and delivered industrial rate sulfuric acid cost for January 2004.

ENVIRO-CHEM SYSTEMS

ENVIRO-CHEM SYSTEMS
A MONSANTO COMPANY
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January 14, 2004

Mr. Randy Charlot
CF Industries, Inc.
P.O. Drawer "L"
Plant City, FL 33565

Subject: C or D Plant SO2 Emissions

Dear Randy:

Using the catalyst loadings as noted below, the following SO2 emissions can be obtained by varying the C or D plant rate:

EMISSIONS	PLANT RATE
4.0 #/ton	2700 STPD
3.5 #/ton	2600 STPD
3.25 #/ton	2500 STPD
3.0 #/ton	2375 STPD

The calculations above are just for the converter/catalyst system and assume the rest of the plant can deliver/handle the various production rates. The following catalyst loadings were used in the simulation:

Pass 1: 70K liters and 85% activity
Pass 2: 78K liters and 85% activity
Pass 3: 94.4K liters and 90% activity
Pass 4: 158.8K liters new SCX-2000 super cesium catalyst

Please let me know if you need any additional information.

Sincerely,

John R. Horne

/jd

APPENDIX 5

COST ANALYSIS OF AMMONIA SCRUBBERS

Table 1. Cost Effectiveness of Ammonia Scrubbing FGD for SO_2 and H_2SO_4 Control on C & D Sulfuric Acid Plants, CF Industries, Plant City

	Cost Items	Cost Factors[a]	Cost for C & D SAPs ($)
DIRECT CAPITAL COSTS (DCC):			
	Purchased Equipment Cost (PEC)		
A)	Absorber + packing + auxiliary equipment	Based on A & B SAPs: 100,000 SCFM [b]	16,000,000
B)	New blower	100,000 SCFM providing 30"	500,000
C)	Mist eliminator	~50 candles	600,000
D)	Instrumentation	10% of B + C	110,000
E)	Taxes	Florida sales tax, 6% of B + C	66,000
F)	Freight	5% of B + C	55,000
	Total PEC:		17,331,000
	Direct Installation		
	Items Excluded From Vendor Quote:		
	Ductwork for blower	200 ft @ $500/ft	100,000
	Liquid waste piping	100 ft @ $300/ft	30,000
	Foundations	12% of PEC (A & B SAPs did not require foundations)	2,079,720
	Water/air/electrical supply & piping	10% of B+C+D+E+F	133,100
	Thermal insulation and lagging	lump	75,000
	Total Direct Installation:		2,417,820
Total DCC (PEC + Direct Installation):			19,748,820
INDIRECT CAPITAL COSTS (ICC):			
	Engineering	2% of PEC for B-F (for items not in vendor quote)	26,620
	Construction and field expenses	5% of PEC for B-F (for items not in vendor quote)	66,550
	Contractor Fees	5% of PEC for B-F (for items not in vendor quote)	66,550
	Startup	1% of PEC for B-F	13,310
	Performance test	1% of PEC for B-F	13,310
	Contingencies	25% of PEC (for retrofit installation)	4,332,750
Total DCC:			4,519,090
TOTAL CAPITAL INVESTMENT (TCI):		DCC + ICC	24,267,910
DIRECT OPERATING COSTS (DOC):			
(1)	Operating Labor		
	Operator	0.5 hr/shift, $16/hr, 8760 hrs/yr	8,760
	Supervisor	15% of operator cost	1,314
(2)	Maintenance		
	Labor	0.5 hr/shift, $16/hr, 8760 hrs/yr	8,760
	Materials	100% of maintenance labor	8,760
(3)	Operating Materials		
	Ammonia	1 gal/min; $215/ton	272,421
(4)	Electriciy	800 KW, $0.03/KW-hr	210,240
(5)	Liquid Waste Disposal	Not acccounted for	0
Total DOC:			510,255
INDIRECT OPERATING COSTS (IOC):			
	Overhead	60% of total labor & materials costs	180,009
	Property Taxes	1% of total capital investment	242,679
	Insurance	1% of total capital investment	242,679
	Administration	2% of total capital investment	485,358
Total IOC:			1,150,725
CAPITAL RECOVERY COSTS (CRC):		CRF of 0.0944 times TCI (20 yrs @ 7%)	2,290,891
ANNUALIZED COSTS (AC):		DOC + IOC + CRC	3,951,871

Footnotes:

[a] Unless otherwise specified, factors and cost estimates reflect OAQPS Cost Manual, Section 5, Fifth edition.

[b] Based on actual costs of ammonia scrubbers on A & B SAPs ($1.8 million each), adjusted for higher gas flow rate and 2004 dollars.