

THOMAS L. CRAIG

Vice President &  
General Manager

*Garrett*  
*klw*

**D.E.R.**

FEB 12 1980



New Wales Chemicals, Inc.

A SUBSIDIARY OF INTERNATIONAL MINERALS & CHEMICAL CORPORATION

**SOUTHWEST DISTRICT**  
**TAMPA**

February 8, 1980

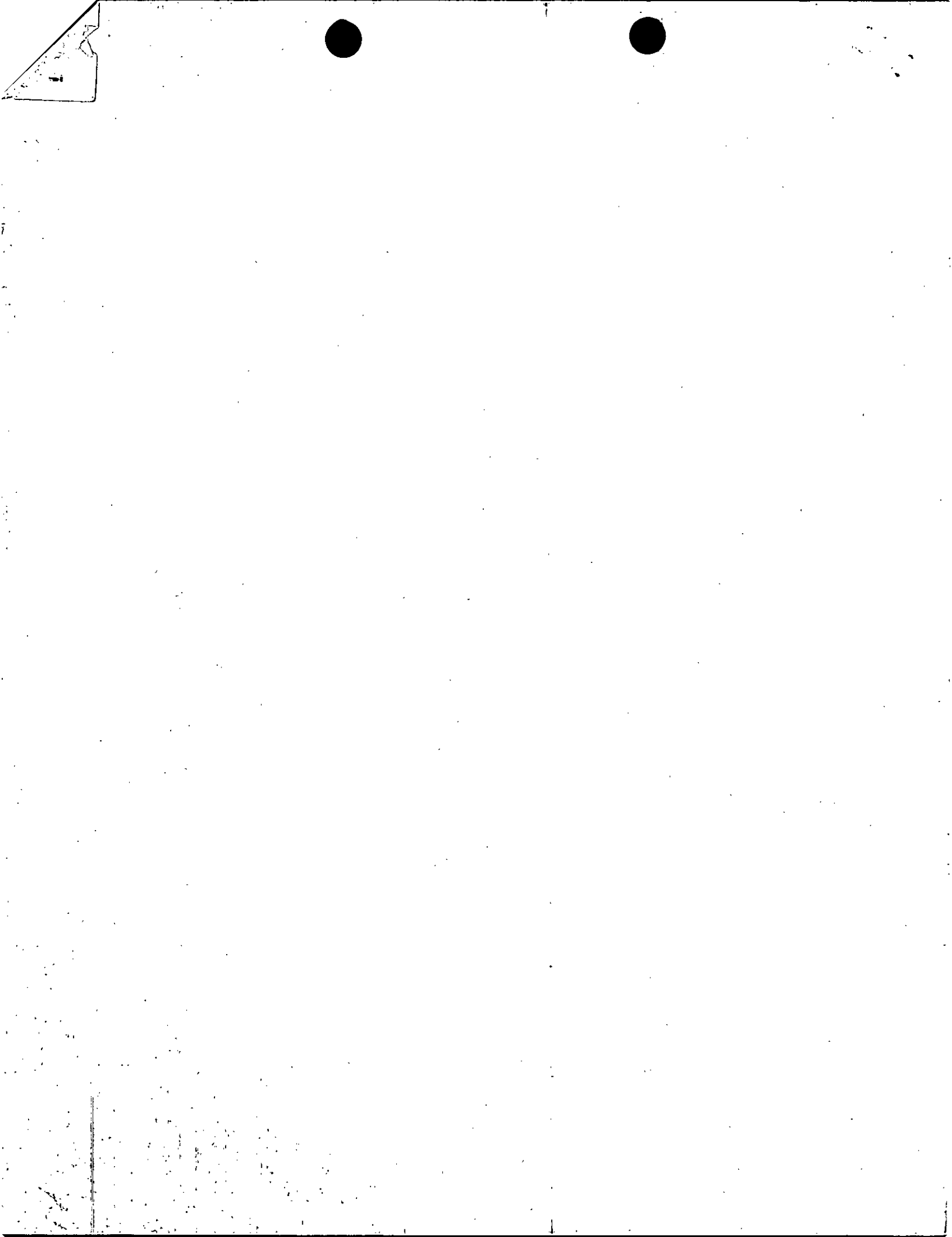
Mr. R. R. Garrett, P.E.  
Department of Environmental Regulation  
7601 Highway 301 N  
Tampa, Florida 33610



Dear Mr. Garrett:

As previously discussed with you and Mr. Williams, New Wales has undertaken extensive modifications to our DAP plant tail-gas scrubber. Most of the modifications were complete when your stack sampling team tested this plant for fluoride emissions. These modifications included the following:

- a. Exhaust gases from the reactor are now being ducted through a venturi scrubber to a Teller nucleator. These gases are primarily aerosol ammonium bifluoride and the nucleator causes a particle size enlargement. The large particle which is created is then removed by passage through tellerettes and a Munters mist eliminator.
- b. Exhaust gases from the dryer and cooler in the plant contain primarily silicon tetrafluoride and DAP dust. These contaminants are removed by passing then through cyclones for dust removal, venturis for micron size dust removal and the small amount of ammonia from these areas, and finally to a tailgas scrubber for removal of the  $\text{SiF}_4$ .
- c. The slurry header in the granulator has been repositioned to allow more efficient contact in the reactor with the ammonia. The off gases are then passed to a venturi where unreacted ammonia is removed and the remaining stream which is predominately  $\text{SiF}_4$  combines with the gas stream from the dryer/cooler stream and passes into the tailgas scrubber. Once the gases enter the tailgas scrubber they are cooled with preconditioning sprays and then passed through a wet packed section, a dry packed section and finally a Kimre mist elimination system.



New Wales Chemicals, Inc.

Mr. R. R. Garrett, P.E.  
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These modifications are what has been performed to date and approximately \$725,000 has been expended.

We have not made a final decision on whether or not to utilize a bag collector off of the cooler. This would decrease the airflow to the tailgas scrubber but at this time we do not know if it will be necessary. As soon as we make this decision, as we hope to make shortly, we will discuss this matter with you and attempt to explain our position.

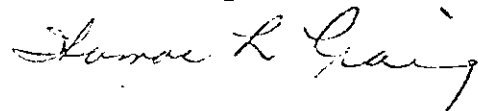
Additional ponding does not seem to be necessary for operation of the scrubber and we will certainly discuss our reasons for coming to this conclusion with you.

At this time the test performed by your stack team and several tests performed since that time by New Wales personnel, indicate that our DAP plant scrubber is generally performing its designed task. We are occasionally still seeing borderline fluoride emissions and we are continuing to look closely at our DAP scrubber operations and make every necessary improvement.

It is the intention of New Wales to conform to all applicable regulations. Therefore, as I have indicated earlier, we intend to work closely with your office and we will certainly keep you notified as to our progress.

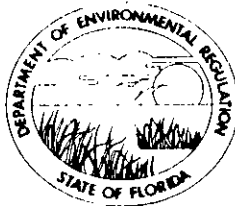
I hope this reply will answer questions as put forth in your letter of November 20, 1979.

Sincerely,



TLC:dma

TWIN TOWERS OFFICE BUILDING  
2600 BLAIR STONE ROAD  
TALLAHASSEE, FLORIDA 32301



BOB GRAHAM  
GOVERNOR  
JACOB D. VARN  
SECRETARY

STATE OF FLORIDA

## DEPARTMENT OF ENVIRONMENTAL REGULATION

January 18, 1980

NEW WALES CH. CO.

Dr. John B. Koogler, P. E.  
Sholtes and Koogler  
Environmental Consultants  
1213 N. W. 6th Street  
Gainesville, Fla 32601

Dear John:

I would like to bring you up to date on our review of the air quality analysis for the proposed new sources at the New Wales Chemical Company in Polk County. The Southwest District office is handling the construction permit applications for the two sulfuric acid plants, the granular products load-out system, and the liming station. The Central Air Permitting Section in Tallahassee is handling the application to construct the dual-train Di-ammonium phosphate (DAP) plant.

### Background

On October 4, 1979, we notified the company that the DAP plant application was incomplete and that we needed, among other things, a BACT recommendation for each source and a PSD air quality analysis. On December 6, 1979, I received from the District office a report entitled "Supplemental Data for PSD Review, New Wales Chemical Company, Polk County, Florida, November 1979". The District asked me to review the report in connection with the sulfuric acid plants. At the same time, they asked you for an emissions inventory of SO<sub>2</sub> sources used in the study. On December 11, 1979, you sent me two copies of the dispersion model output supporting the PSD report. I forwarded one copy of the output to the District office and confirmed with you that these materials, the PSD report and the associated model output, were intended to also comprise the required PSD analysis for the DAP plant.

To: John B. Koogler, P. E.  
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Although the modeling appeared complete, the PSD report did not address BACT. Therefore, we notified the company on December 20, 1979, that BACT recommendations for both particulate and SO<sub>2</sub> emissions from the DAP plant were still needed and that the PSD analysis should reflect the impact of emissions at the levels of proposed BACT. On January 14, 1980, we received the requested BACT recommendations.

While awaiting the BACT information, we began reviewing the PSD analysis for both the sulfuric acid plants and the DAP plant, bearing in mind that the final DAP plant BACT determinations could somewhat alter the analysis results. Preliminary results of this review are as follows.

#### General Comments

Often in reviewing analyses of this sort, we find minor errors in model input data, modeling technique, and tabulated results. Our policy in these cases has been to assess the significance of the errors, perhaps by repeating certain model runs ourselves, to determine whether or not we can support the conclusions of the analysis if not the exact results. If conclusions can be reasonably drawn, we have made it our practice not to delay administrative action by requiring such errors to be corrected by the company or consultant.

Adhering to this policy in this case, we have determined that the PSD analysis for SO<sub>2</sub>, though faulted, can be accepted; however, the analysis for TSP contains errors which can be corrected only by the submission of additional model runs and other information. Before discussing these problems in detail, we would like to point out some general deficiencies common to both the SO<sub>2</sub> and TSP analyses which in this case we can overcome but in future analyses should be avoided. They are as follows.

1. The meteorological data base used for CRSTER/PTMTPW modeling does not reflect the mixing height corrections made by the National Climatic Center, nor does it employ the standard EPA wind vector randomization scheme. If you send us a scratch tape, we will copy onto it the revised mixing heights and, if desired, a version of the CRSTER/RAM preprocessor program which uses the EPA random numbers.
2. It appears that one day of data has been inadvertently added to each year of meteorological data used. Comparing data sets, your day 222/1970, is our day 222/1970;

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your day 175/1972, is our day 173/1972; and your day 12/1973, is our day 9/1973.

3. In many of the PTMTPW runs, the critical receptor is on the edge of the receptor grid, thereby leaving open the possibility that higher concentrations might be predicted if the grid were expanded. The critical receptor should always be an internal receptor, and the grid itself should be large enough to verify that contributing sources would not produce a second, possibly greater, maximum at some other point. We will consider exceptions to this rule on a case-by-case basis (if, for example, the receptor grid were expanded to include the area within the secured perimeter of the immediate production complex).
4. Emission rates and stack parameters used in the modeling are somewhat inconsistent from run to run and in many cases are not traceable to information contained in current permits or permit applications. For example, DAP plant scrubber TSP emissions are given as 4.3 g/s in the PSD report, 3.8 g/s in the CRSTER runs, 4.8 g/s in the PTMTPW runs, and 7.8 g/s in the AQDM runs. We note similar variations in stack diameter, exit temperature, and volumetric flow rate. New sources should be modeled at proposed BACT emission rates. Existing sources should be modeled at emission rates equal to the maximum levels allowed by permit or rule. If the allowable emission rate of a company-owned source is unrealistically high and, as such, would contribute to a modeled violation of increments or standards, we would recommend that the company request an amendment to that source's operating permit to reduce its allowable emission rate to a realistic level.

#### Sulfur Dioxide Analysis

Since existing monitoring data in the area indicate low annual average SO<sub>2</sub> concentrations, we concur with EPA's decision that preconstruction SO<sub>2</sub> monitoring is unnecessary. Since the primary source of SO<sub>2</sub> in the atmosphere is stack emissions and since the modeling included all significant SO<sub>2</sub> emitters within 50 km of New Wales, we also concur with the use of a background SO<sub>2</sub> concentration of 0.0 ug/m<sup>3</sup> in the analysis.

The selection of worst-case meteorological periods for modeling the short-term impacts of a facility such as this is complicated by the fact that pollutants are being emitted at various rates from stacks of various heights with the result that what is

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worst-case for one source or group of sources may not correspond to what is worst-case for another source or group of sources. For this reason we ~~generally recommend that for such facilities CRSTER models be run for each scenario of interest, e.g., the, new source alone, all baseline sources, all increment-consuming sources, or all sources at the facility.~~ Although you have not done this in this case, we believe that CRSTER sets #2 and #3 adequately support your choice of worst-case periods. These sets model stacks typical of all significant SO<sub>2</sub> sources at New Wales, and both sets flag the same overall worst-case period.

The CRSTER and PTMTPW runs suggest that the limiting case for SO<sub>2</sub> impact analysis is likely the 24-hour average for either day 173/1972 or 174/1972. Not only do these days produce maximum plant-alone impacts, they also result in maximum upwind source contributions. We remodeled each day using larger receptor grids and setting emission rates equal to maximum allowable levels. The results are as follows.

<u>Second Maximum</u> <u>24-Hour Average</u>	<u>Day</u>	<u>Location</u>		<u>Concentration</u> <u>(ug/m<sup>3</sup>)</u>
		<u>UTM E</u>	<u>UTM N</u>	
Vs. PSD Increment	173	398.7	3078.6	52
Vs. AAQS <sup>1</sup>	173	398.8	3078.7	213
Vs. AAQS <sup>2</sup>	173	398.6	3078.8	<del>267</del>
Vs. AAQS <sup>3</sup>	173	398.7	3078.8	243

1. Without standby boiler (NEDS 59-13).
2. Standby boiler replacing sulfuric acid plant #1.
3. Same as 2. with boiler stack raised to 85 ft.

The above results indicate that operation of the new SO<sub>2</sub> sources together with the standby boiler and other sources at the facility could result in a violation of the 260 ug/m<sup>3</sup> 24-hour AAQS for SO<sub>2</sub>. The boiler's relatively short stack (35 ft.) is the chief problem. If the stack were raised to 85 feet, as the company has proposed, the maximum 24-hour average concentration would fall to an acceptable 243 ug/m<sup>3</sup>. We are recommending to the District, then, by copy of this letter, that permitting of the new sulfuric acid plants be conditioned upon the standby boiler's stack being raised. ~~If the stack height increase is accomplished, we are satisfied that SO<sub>2</sub> emissions from the DAP plant at the proposed rate of 4.4 lb/hr will not cause or contribute to any violation of increments or standards. Copies of our model runs are enclosed.~~

To: John B. Koogler, P. E.  
January 18, 1980  
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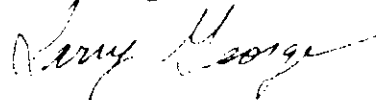
### Particulate Analysis

The determination of background TSP concentration is crucial in this case because of the history of high annual average TSP concentrations at monitoring sites throughout Polk County. For this reason, we are requesting that SAROAD side identification and site evaluation forms be completed for the proposed background monitoring station and that at least the most recent year of data from the site be submitted in SAROAD format. We will reserve judgment on whether or not these data are adequate until we have had a chance to review these materials.

The CRSTER modeling for TSP is inadequate for the following reasons: (1) no runs are included for the total facility to flag worst-case periods for comparison with AAQS, and (2) the runs made for the DAP plant should have receptor rings positioned closer to the plant (e.g. 0.5 - 2.5 km.) and include other increment-consuming sources at the facility. Because of these problems with the CRSTER modeling, we are unable to verify the selection of worst-case periods used for the PTMTPW runs. We recommend that at least two new sets of CRSTER runs be made, as described above, and that PTMTPW models be run for the resultant overall and azimuth-specific (220° - 270°) worst-case periods. These additional runs should be made using maximum allowable emission rates, consistent and traceable stack parameters, and sufficiently detailed receptor grids as discussed previously.

By copy of this letter, we are notifying the company that the DAP plant application is being considered incomplete pending the submittal of these additional materials and our evaluation of them. I would like to emphasize to you our willingness to cooperate with you and the company in any way we reasonably can to resolve these inadequacies and proceed with the expeditious review of this application.

Sincerely,



Lawrence A. George, Meteorologist  
Bureau of Air Quality Management

LAG/ht

cc: A. I. Girardin, III, New Wales Chemicals, Inc.  
D. A. Williams, Southwest District (w/attachments)  
W. Thomas





SHOLTÈS & KOOGLER, ENVIRONMENTAL CONSULTANTS  
1213 N.W. 6th Street Gainesville, Florida 32601 (904) 377-5822

SKEC 124-79-01

January 11, 1980

Mr. Willard Hanks  
Florida Department of  
Environmental Regulation  
Twin Towers Office Building  
2600 Blair Stone Road  
Tallahassee, FL 32301



Subject: New Wales Chemicals, Inc.  
PSD Application for a Diammonium Phosphate Fertilizer Plant

Dear Willard:

Pursuant to the Department's letter of December 20, 1979, I am enclosing an assessment of air pollution control technology applicable to the Diammonium Phosphate Fertilizer plant proposed by New Wales. The air quality impact analysis of emissions from the proposed plant were provided to the Department in December, 1979.

In the document I have reviewed the chemistry of the process and the control technology available for controlling emissions generated at various points within the manufacturing process. The document concludes with a recommendation for Best Available Control Technology for various pollutants generated by the process.

The information contained in the document is conceptual in nature and covers generic categories of control equipment. The information in the document should be combined with specific technical information on the proposed plant and control system provided by New Wales.

Regarding the request for material balances and specific information on pollution control equipment serving the process screens and cage mills, I have suggested to Jerry Girardin that he provide this information for you.

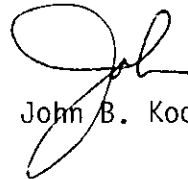
Mr. Willard Han  
Florida Dept. of Environmental Regulation  
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January 11, 1980

If you have any questions regarding the enclosed document or need additional information, please feel free to contact me.

Very truly yours,

SHOLTES & KOOGLER  
ENVIRONMENTAL CONSULTANTS



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

JBK:sc  
Enclosure  
cc: Mr. A. L. Girardin

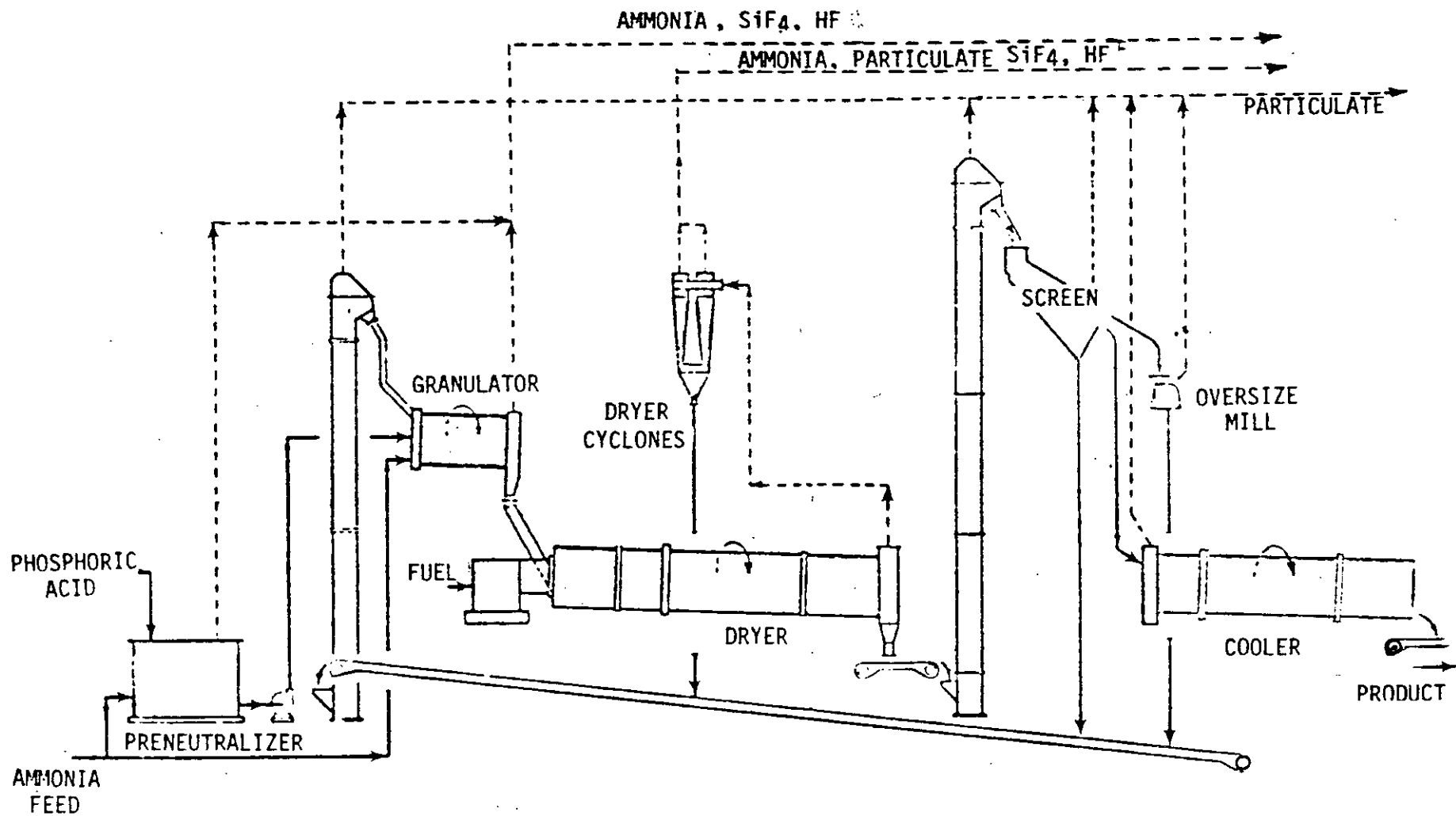


FIGURE 1-1

DIAMMONIUM PHOSPHATE PROCESS

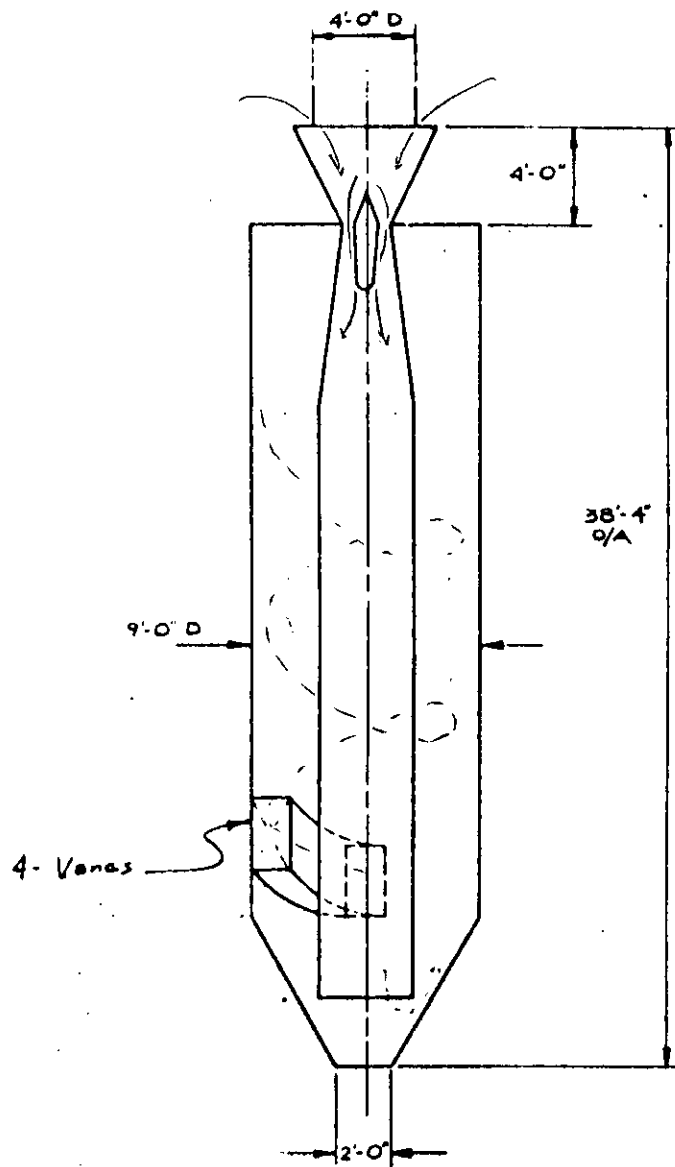


FIGURE 1-2

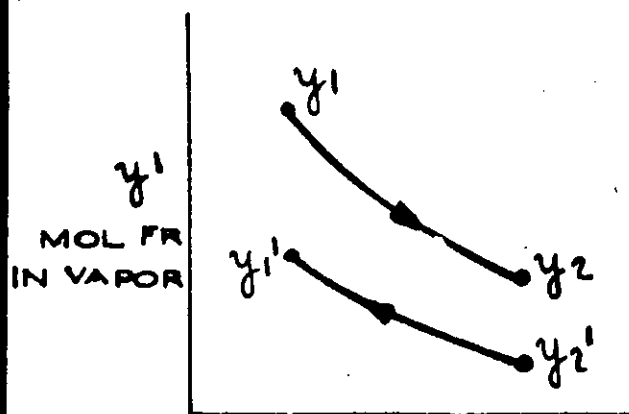
COAXIAL VENTURI SCRUBBER

NEW WALES CHEMICAL COMPANY  
POLK COUNTY, FLORIDA

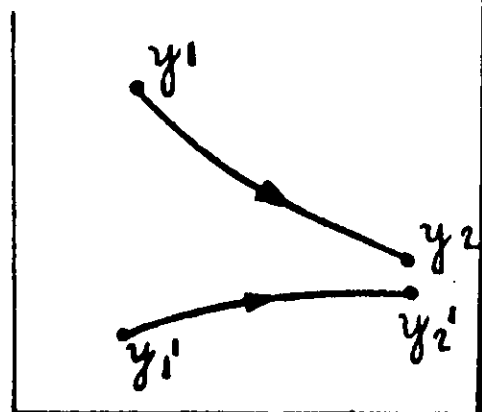
FIGURE 1-3

COMPARISON OF SCRUBBER TYPES

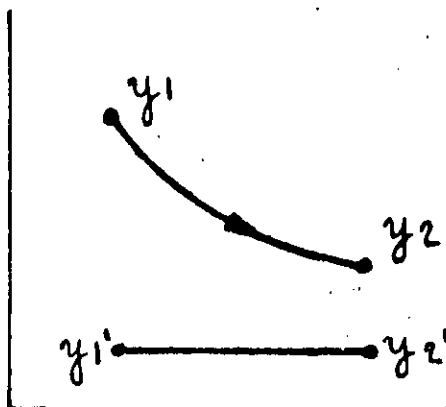
NEW WALES CHEMICAL COMPANY  
POLK COUNTY, FLORIDA



a. COUNTER CURRENT SCRUBBER



b. CON-CURRENT SCRUBBER



c. CROSS FLOW SCRUBBER

## 2.0 DIAMMONIUM PHOSPHATE PLANT BAG COLLECTOR

As discussed in Section 1.0, the air pollutant emissions from a DAP plant consist of ammonia and fluorides from the reactor/granulator system, ammonia, fluorides and particulate matter from the dryer system and particulate matter only from the cooler.

New Wales has selected scrubber systems to control the multiple emissions from the reactor/granulator and dryer systems as discussed in Section 1.0. A bag collector is proposed to control the emissions from the cooler since only particulate matter is emitted from this source.

The fertilizer diammonium phosphate (DAP) consists of two moles of ammonia for each mole of  $P_2O_5$ , hence the name DAP. In order to obtain this mole ratio excess ammonia must be added to the system. This excess ammonia reacts with and neutralizes all of the phosphoric acid, the free sulfuric acid and the free fluoride acids (HF and  $H_2SiF_6$ ). The resulting product therefore has a pH of approximately 7.2.

Because of the neutralization of all of the acids and in particular the fluoride acids, there is no chance for gaseous fluoride compounds to evolve from the DAP product. As a result of this there are no gaseous fluoride emissions from the DAP cooler nor from the DAP storage building.

Since there are only particulate matter emissions from the DAP cooler; it is the opinion of New Wales that BACT for the particulate matter would be a bag-collector. With a bag collector the particulate matter concentration in the tail gas stream from the cooler can be reduced to 0.01 grains per standard cubic foot, dry.

If a scrubber were used for the particulate matter control, the gas stream would be brought into intimate contact with pond water. Since the pond water contains approximately 8500 ppm of fluoride at New Wales, some of this fluoride would be stripped from the water and introduced to the gas stream. This would create a source of fluoride emissions where none had previously existed. Furthermore, the particulate matter concentration in the gas stream cannot be significantly reduced below 0.01 grains per standard cubic foot with a scrubber. Therefore, there is no advantage to be gained by considering a scrubber; only the disadvantage of adding fluorides to a gas stream previously free of fluorides.

Based on these considerations a bag collector is proposed as BACT for reducing particulate matter emissions from the DAP plant product cooler.

### 3.0 FUEL RELATED AIR POLLUTANT EMISSIONS IN THE DAP PLANT

#### 3.1 Introduction

Heat is required in the DAP product dryer to remove excess water from the product. New Wales is designing the dryers to use fuel oil combustion for the heat source.

For design purposes it is assumed that two gallons of fuel oil will be required to dry one ton of product. The rated production capacity of the proposed DAP plant is 140 tons per hour total (70 tons per hour in each of two identical trains). This production rate will require a maximum of 280 gallons per hour of fuel oil. New Wales is proposing to use a residual No. 6 fuel oil with a maximum 2.5 percent sulfur content.

*294 T DAP*  
*2-70 TPH DRYERS*  
*140 TPH TOTAL*  
*280 GPH FUEL*

#### 3.2 SO<sub>2</sub> Emissions

Since there is free ammonia in the product entering the dryer, it is expected that sulfur dioxide will be partially absorbed by a reaction with the ammonia. New Wales has conducted emission measurements and can commit to a maximum sulfur dioxide emission rate from the total DAP plant of 44 pounds per hour. This will be a maximum SO<sub>2</sub> emission rate of 22 pounds per hour from each of the two dryers.



This commitment is equivalent to a 60 percent reduction in the SO<sub>2</sub> emission rate with the dryers burning a 2.5 percent sulfur fuel at a combined rate of 280 gallons per hour. This is also equivalent to burning a fuel oil with 1.0 percent sulfur.

This commitment will reduce the actual sulfur dioxide emissions from the DAP plant from 457 tons per year to 183 tons per year which is only four percent of the total sulfur dioxide emissions from the "new sources" at the New Wales Chemical Complex. Because of the SO<sub>2</sub> sorption capacity inherent with the DAP process the combustion of fuel with a 2.5 percent sulfur is equivalent to using a 1.0 percent sulfur fuel. No expenditure of energy is required to achieve the sorption and the SO<sub>2</sub> remaining in the tail gas has been shown not to cause or contribute to a violation of secondary air quality standards or PSD increments. Because of these factors the use of a 2.5 percent sulfur fuel is considered BACT.

### 3.3 NO<sub>x</sub> Emissions

The combination of fuel oil in the DAP dryer will generate some NO<sub>x</sub> as a result of the oxidation of atmospheric nitrogen at the peak temperatures achieved in the flame. The quantity of NO<sub>x</sub> generated is expected to be low; however, because of the nature of the dryer performance.

The purpose of the burner in the DAP dryer is to heat and which in turn is used to drive excess moisture from the granular DAP product. If the temperature is too high the DAP will decompose. This performance differs from that of a boiler where the intent is to transfer the heat of combustion to water. The latter requires as little excess combustion air as possible since the heat transferred to the excess air is lost.

In a DAP dryer burner the heavy fuel oil is steam atomized. Additionally about 150 percent stoichiometric combustion air (50 percent excess air) is fed through the burner. Downstream of the burner nozzle quench air is added resulting in a total air flow equivalent to 300-500 percent excess air.

The use of steam atomization of the fuel and the addition of quench air results in a burner that functions much like a low  $\text{NO}_x$  burner(1). The addition of less than 50 percent excess air at the burner would probably result in lower  $\text{NO}_x$  emissions but it would also result in higher temperatures in the front of the kiln which in turn would cause DAP decomposition.

Because of the nature of the drying operation the DAP burner functions much like a low  $\text{NO}_x$  burner. Further modification of the burner to reduce  $\text{NO}_x$  emissions, such as by reducing primary combustion air is not possible. Temperatures resulting from the reduction in primary air would cause an increase in temperature at the end of the dryer that would cause product decomposition. Flue gas recirculation, likewise is not feasible because of the high excess air flow used in the dryer. The flue gas has an oxygen content not significantly lower than that of air.

It is the opinion of New Wales and the burner supplier (John Zink, Inc.) that the burners used in DAP plants represent BACT for  $\text{NO}_x$  control in this type source.

In response to a specific EPA request for information, the air flow to the burner and the quench air orifices is controlled by fixed orifices in the air line. The fuel flow rate is controlled by an orifice and the pressure of the oil pump.

REFERENCES  
SECTION 3

1. Personal communication with Lee Massey, John Zink, Inc., Tulsa, Oklahoma, December 7, 1979.