Farmland Hydro, L.P.

Charles W. Jenkins
Environmental Coordinator

Green Bay Plant
County Road 640
Post Office Box 960
Bartow, Florida 33830
Tele.: 813 533-1141

RECEIVED
DER - MAIL ROOM
1992 MAR 25 PM 1:20

March 24, 1992

Mr. Clair H. Fancy
State of Florida Department
of Environmental Regulation
2600 Blair Stone Road
Tallahassee, Florida 32301

Dear Mr. Fancy,

Please find enclosed one completed application for construction/modification for a granulation fertilizer plant.

Also enclosed is the application fee and supporting documentation.

If you should have any questions please contact me.

Very truly yours,

Charles Jenkins
Environmental Coordinator

CWJ:dr/cwj2192

Farmland Hydro, L.P.

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001031

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Environmental Coordinator

CWJ:dr/cwj2192

Farmland Hydro, L.P.
P.O. Box 7305
Kansas City, Missouri 64116

CHECK NO. 69982363

80-182
1019

CO. BR.	VEND. NO.	CHECK DATE
16 25	F0345	03/20/92

PAY EXACTLY $****7,500 DOLLARS AND 00 CENTS

CHECK AMOUNT $****7,500.00

VOID AFTER 180 DAYS

Boatmen's Bank of Marshall
Marshall, Missouri 65340

Farmland Hydro, L.P.

PAY TO THE ORDER OF
FLORIDA DEPARTMENT OF
ENVIRONMENTAL REGULATION
4520 OAK FAIR BLVD
TAMPA FL 33610

⑈69982363⑈ ⑆101901820⑆ 3901030008772⑈

Farmland

A Delaware Limited Partnership

HYDRO

FLH-7204 (01/91)

25 F0345 FLORIDA. DEPARTMENT OF

REMITTANCE ADVICE

82363 CHECK NUMBER 69982363

CO. BR. VENDOR NO. VENDOR NAME

DESCRIPTION	P.O.	VOUCHER	INVOICE NO.	INV. DATE	INVOICE AMOUNT	DISCOUNT TAKEN	AMOUNT PAID
		91211	31992	031992	7,500.00		7,500.00
			TOTALS		7,500.00		7,500.00

Farmland Hydro, L.P.
P.O. Box 7305
Kansas City, Missouri 64116

I-6310 (10/91)

Farmland Hydro, L.P.
P.O. Box 7305
Kansas City, Missouri 64116

CHECK NO. 69982363

80-182
1019

16 25 F0345 03/20/92

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4520 OAK FAIR BLVD
TAMPA FL 33610

⑈69982363⑈ ⑆101901820⑆ 3901030008 77⑈

STATE OF FLORIDA

DEPARTMENT OF ENVIRONMENTAL REGULATION

$7,500 pd.
3-25-92
Recpt.# 180750

AC53-210886
PSD-FL-186

TWIN TOWERS OFFICE BUILDING
2600 BLAIR STONE ROAD
TALLAHASSEE, FLORIDA 32399-2400

BOB MARTINEZ
GOVERNOR

DALE TWACHTMANN
SECRETARY

APPLICATION TO OPERATE/CONSTRUCT AIR POLLUTION SOURCES

SOURCE TYPE: MAP/DAP GRANULATION DRYER & R/G [ ] New[1] [X] Existing[1]

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

COMPANY NAME: Farmland Hydro, L.P. - Green Bay Complex COUNTY: Polk

Identify the specific emission point source(s) addressed in this application (i.e. Lime Kiln No. 4 with Venturi Scrubber; Peaking Unit No. 2, Gas Fired) MAP/DAP Granulation Plant North

SOURCE LOCATION: Street County Road 640 West City Bartow

UTM: East 17-409.5 km North 3079.5 km

Latitude 27 ° 50 ' 37 "N Longitude 81 ° 56 ' 05 "W

APPLICANT NAME AND TITLE: C. M. Farris - Vice President Operations

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

SECTION I: STATEMENTS BY APPLICANT AND ENGINEER

A. APPLICANT

I am the undersigned owner or authorized representative* of Farmland Hydro, L.P.

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

*Attach letter of authorization

Signed: CMFarris

C. M. Farris - Vice President Operations
Name and Title (Please Type)

Date: 3/24/92 Telephone No. (813) 533-1141

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

This is to certify that the engineering features of this pollution control project have been ~~designed~~/examined by me and found to be in conformity with modern engineering principles applicable to the treatment and disposal of pollutants characterized in the permit application. There is reasonable assurance, in my professional judgment, that

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

the pollution control facilities, when properly maintained and operated, will dischar[ge] an effluent that complies with all applicable statutes of the State of Florida and th[e] rules and regulations of the department. It is also agreed that the undersigned will furnish, if authorized by the owner, the applicant a set of instructions for the prop[er] maintenance and operation of the pollution control facilities and, if applicable, pollution sources.

Signed ______________________________

____
Name (Please Type)

____
Company Name (Please Type)

____
Mailing Address (Please Type)

Florida Registration No. ____________ Date: ______________ Telephone No. ____________

SECTION II: GENERAL PROJECT INFORMATION

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

____

____

____

____

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

Start of Construction ______________ Completion of Construction ______________

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

____

____

____

____

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

____

____

____

the pollution control facilities, when properly maintained and operated, will discharge an effluent that complies with all applicable statutes of the State of Florida and the rules and regulations of the department. It is also agreed that the undersigned will furnish, if authorized by the owner, the applicant a set of instructions for the proper maintenance and operation of the pollution control facilities and, if applicable, pollution sources.

Signed ____________________

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

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

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

Florida Registration No. 12925 Date: 3/23/92 Telephone No. (904) 377-5822

SECTION II: GENERAL PROJECT INFORMATION

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

See attached PSD Report for Process Description.

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

Start of Construction May 4, 1992 Completion of Construction July 3, 1993

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

Dual Mole Scrubber	$1,200,000.00
BFL Vaporizer After Scrubber	500,000.00
Product Cooler Scrubber	750,000.00
Total	$2,450,000.00

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

North DAP/MAP/GTSP Fertilizer Plant, DER File No. A053-171758 issued April 13, 1990 with expiration date of April 4, 1995.

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

if power plant, hrs/yr ____; if seasonal, describe: 8760 hrs/yr

F. If this is a new source or major modification, answer the following questions. (Yes or No)

1. Is this source in a non-attainment area for a particular pollutant? NO

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

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

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

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

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

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

5. Do "National Emission Standards for Hazardous Air Pollutants" (NESHAP) apply to this source? NO

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

   a. If yes, for what pollutants? NA

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

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

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

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

Description	Contaminants		Utilization Rate - lbs/hr	Relate to Flow Diagram
	Type	% Wt		
Phosphoric Acid	Fluoride	2.11	124,800 lb/hr MAP 92,000 lb/hr DAP	of P205 (62.4 tph P205) of P205 (46.0 tph P205)
Anhydrous Ammonia			32,060 lb/hr MAP 43,714 lb/hr DAP	

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

1. Total Process Input Rate (lbs/hr): 124,800 lb/hr P205 MAP; 92,000 lb/hr P205 DAP

2. Product Weight (lbs/hr): 240,000 lb/hr MAP; 200,000 lb/hr DAP

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

(See also Section 3 in PSD Report)

Name of Contaminant	Emission[1]		Allowed[2] Emission Rate per Rule 17-2	Allowable[3] Emission lbs/hr	Potential[4] Emission		Relate to Flow Diagram
	Maximum lbs/hr	Actual T/yr			lbs/yr	T/yr	
Part. Matter	22.5	98.6	17-2.610	37.2	22.5	98.6	
Fluoride	3.74	16.4	17-2.660	3.74	3.74	16.4	

[1]See Section V, Item 2.

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

[3]Calculated from operating rate and applicable standard.

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

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

Name and Type (Model & Serial No.)	Contaminant	Efficiency	Range of Particles Size Collected (in microns) (If applicable)	Basis for Efficiency (Section V Item 5)
Double Mole Scrubber	Particulate	98.5%	0 - 25	Mfr
Double Mole Scrubber	Fluoride	98.5%	NA	
BFL Vaporizer	Fluoride	95.0%	NA	
Prod. Cooler Scrubber	Particulate	98.0%	0 - 25	

E. Fuels

Type (Be Specific)	Consumption*		Maximum Heat Input (MMBTU/hr)
	avg/hr	max./hr	
Natural Gas	0.03	0.05	50

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

Fuel Analysis:

Percent Sulfur: - Percent Ash: -

Density: - lbs/gal Typical Percent Nitrogen: -

Heat Capacity: 1000 BTU/~~lb~~ cf ______ BTU/gal

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

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

Annual Average NA Maximum ______

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

Scrubber pond water recirculated.

MAP/DAP Main Stack (Existing)

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

Stack Height: 129 ft. Stack Diameter: 7.5 ft.

Gas Flow Rate: 114,000 ACFM 88,000 DSCFM Gas Exit Temperature: 108 °F.

Water Vapor Content: 16 % Velocity: 43.0 FPS

SECTION IV: INCINERATOR INFORMATION

NOT APPLICABLE

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

Description of Waste ______

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

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

Manufacturer ______

Date Constructed ______ Model No. ______

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

Stack Height: ______ ft. Stack Diamter: ______ Stack Temp. ______

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

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

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

[ ] Other (specify) ______

MAP/DAP Reactor-Granulator Stack (Proposed)

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

Stack Height: 129 ft. Stack Diameter: 5'6" ft.

Gas Flow Rate: 49,700 ACFM 27,000 DSCFM Gas Exit Temperature: 178 °F.

Water Vapor Content: 34 % Velocity: 34.9 FPS

SECTION IV: INCINERATOR INFORMATION

NOT APPLICABLE

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

escription of Waste ____

otal Weight Incinerated (lbs/hr) ____ Design Capacity (lbs/hr) ____

pproximate Number of Hours of Operation per day ____ day/wk ____ wks/yr. ____

anufacturer ____

ate Constructed ____ Model No. ____

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

ack Height: ____ ft. Stack Diamter: ____ Stack Temp. ____

s Flow Rate: ____ ACFM ____ DSCFM* Velocity: ____ FPS

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

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

[ ] Other (specify) ____

Brief description of operating characteristics of control devices: ______________

____

____

____

____

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

____

____

____

____

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

SECTION V: SUPPLEMENTAL REQUIREMENTS

SEE ATTACHED REPORT

Please provide the following supplements where required for this application.

1. Total process input rate and product weight -- show derivation [Rule 17-2.100(127)]

2. To a construction application, attach basis of emission estimate (e.g., design calculations, design drawings, pertinent manufacturer's test data, etc.) and attach proposed methods (e.g., FR Part 60 Methods 1, 2, 3, 4, 5) to show proof of compliance with applicable standards. To an operation application, attach test results or methods used to show proof of compliance. Information provided when applying for an operation permit from a construction permit shall be indicative of the time at which the test was made.

3. Attach basis of potential discharge (e.g., emission factor, that is, AP42 test).

4. With construction permit application, include design details for all air pollution control systems (e.g., for baghouse include cloth to air ratio; for scrubber include cross-section sketch, design pressure drop, etc.)

5. With construction permit application, attach derivation of control device(s) efficiency. Include test or design data. Items 2, 3 and 5 should be consistent: actual emissions = potential (1-efficiency).

6. An 8 1/2" x 11" flow diagram which will, without revealing trade secrets, identify the individual operations and/or processes. Indicate where raw materials enter, where solid and liquid waste exit, where gaseous emissions and/or airborne particles are evolved and where finished products are obtained.

7. An 8 1/2" x 11" plot plan showing the location of the establishment, and points of airborne emissions, in relation to the surrounding area, residences and other permanent structures and roadways (Example: Copy of relevant portion of USGS topographic map).

8. An 8 1/2" x 11" plot plan of facility showing the location of manufacturing processes and outlets for airborne emissions. Relate all flows to the flow diagram.

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

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

SECTION VI: BEST AVAILABLE CONTROL TECHNOLOGY

SEE ATTACHED REPORT

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

[ ] Yes [ ] No

Contaminant	Rate or Concentration

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

[ ] Yes [ ] No

Contaminant	Rate or Concentration

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

Contaminant	Rate or Concentration

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

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

xplain method of determining

5. Useful Life:

6. Operating Costs:

7. Energy:

8. Maintenance Cost:

9. Emissions:

Contaminant	Rate or Concentration

10. Stack Parameters

a. Height: ft.

b. Diameter: ft.

c. Flow Rate: ACFM

d. Temperature: °F.

e. Velocity: FPS

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

1.

a. Control Device:

b. Operating Principles:

c. Efficiency:[1]

d. Capital Cost:

e. Useful Life:

f. Operating Cost:

g. Energy:[2]

h. Maintenance Cost:

i. Availability of construction materials and process chemicals:

j. Applicability to manufacturing processes:

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

2.

a. Control Device:

b. Operating Principles:

c. Efficiency:[1]

d. Capital Cost:

e. Useful Life:

f. Operating Cost:

g. Energy:[2]

h. Maintenance Cost:

i. Availability of construction materials and process chemicals:

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

j. Applicability to manufacturing processes:

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

3.

a. Control Device:

b. Operating Principles:

c. Efficiency:[1]

d. Capital Cost:

e. Useful Life:

f. Operating Cost:

g. Energy:[2]

h. Maintenance Cost:

i. Availability of construction materials and process chemicals:

j. Applicability to manufacturing processes:

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

4.

a. Control Device:

b. Operating Principles:

c. Efficiency:[1]

d. Capital Costs:

e. Useful Life:

f. Operating Cost:

g. Energy:[2]

h. Maintenance Cost:

i. Availability of construction materials and process chemicals:

j. Applicability to manufacturing processes:

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

Describe the control technology selected:

1. Control Device:

2. Efficiency:[1]

3. Capital Cost:

4. Useful Life:

5. Operating Cost:

6. Energy:[2]

7. Maintenance Cost:

8. Manufacturer:

9. Other locations where employed on similar processes:

a. (1) Company:

(2) Mailing Address:

(3) City:

(4) State:

:xplain method of determining efficiency.
:nergy to be reported in units of electrical power - KWH design rate.

(5) Environmental Manager:

(6) Telephone No.:

(7) Emissions:[1]

Contaminant	Rate or Concentration

(8) Process Rate:[1]

b. (1) Company:

(2) Mailing Address:

(3) City: (4) State:

(5) Environmental Manager:

(6) Telephone No.:

(7) Emissions:[1]

Contaminant	Rate or Concentration

(8) Process Rate:[1]

10. Reason for selection and description of systems:

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

SECTION VII - PREVENTION OF SIGNIFICANT DETERIORATION

SEE ATTACHED REPORT

A. Company Monitored Data

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

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

Other data recorded ____________________

Attach all data or statistical summaries to this application.

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

2. Instrumentation, Field and Laboratory

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

b. Was instrumentation calibrated in accordance with Department procedures?

[ ] Yes [ ] No [ ] Unknown

B. Meteorological Data Used for Air Quality Modeling

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

2. Surface data obtained from (location)________________________________

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

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

C. Computer Models Used

1. ______________________________ Modified? If yes, attach description.

2. ______________________________ Modified? If yes, attach description.

3. ______________________________ Modified? If yes, attach description.

4. ______________________________ Modified? If yes, attach description.

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

D. Applicants Maximum Allowable Emission Data

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

E. Emission Data Used in Modeling

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

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

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

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

NORTH PLANT INFORMATION

Florida Department of Environmental Regulation

Southwest District • 4520 Oak Fair Boulevard • Tampa, Florida 33610-7347 • 813-623-5561

Bob Martinez, Governor | Dale Twachtmann, Secretary | John Shearer, Assistant Secretary
Dr. Richard Garrity, Deputy Assistant Secretary

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

PERMIT/CERTIFICATION
Permit No.: AO53-171758
County: Polk
Expiration Date: 04/04/95
Project: North DAP/MAP/GTSP Fertilizer Plant

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

For the operation of a MAP/DAP/GTSP plant consisting of the following components: a reactor/blunger system with emissions controlled by venturi/cyclonic acid scrubber; a natural gas-fired dryer with emissions controlled by a dry cyclone and a venturi/cyclonic acid scrubber; a mill/screens system with emissions controlled by a dry cyclone and a venturi/cyclonic acid scrubber; and a cooler with emissions controlled by a dry cyclone and the mills/screens system venturi/cyclonic acid scrubber. The exhausts from the reactor/blunger, dryer, and mills/screens/cooler scrubbers are further scrubbed with pond water in a shared cross-flow scrubber then emitted through a shared stack. The permitted production rates are as follows:

Product	Rate
MAP	70 TPH
GTSP	33.2 TPH
DAP	50 TPH

Location: S.R. 640 West, South of Bartow

UTM: 17-409.5E 3079.5N NEDS No.: 0053 Point ID: 29

Replaces Permit Nos. AC53-166067 and AO53-160330.
Old R/E Stack

PERMITTEE:
Farmland Industries, Inc.

PERMIT NO.: A053-171758
PROJECT: North MAP/DAP/GTSP
Fertilizer Plant

SPECIFIC CONDITIONS:

1. A part of this permit is the attached 15 General Conditions.

2. The maximum permitted production rate shall be dependent upon the specific product being manufactured as follows:

Product	Production Rate
MAP	70 TPH
GTSP	33.2 TPH
DAP	50 TPH

The permittee shall maintain logs that can be used to determine compliance with these restrictions. These logs shall include the hourly quantity of phosphate rock and phosphoric acid feed rate to the plant along with the P205 content.

3. Test the emissions for the following pollutants at intervals of 6 months from the date September 22, 1989 and submit a copy of test data to the Air Section of the Southwest District Office within 45 days of such testing (Subsection 17-2.700(2), Florida Administrative Code):

(X) Particulates
(X) Fluorides
(X) Opacity

Within 30 days of switching production to another one of the three permitted product types, emissions shall be tested for that product type if it has not previously been tested in that current six-month testing interval.

4. In accordance with the RACT particulate allocation, the maximum allowable particulate emissions for this source shall be 26.9 lbs/hour or as calculated by the Process Weight Table contained in F.A.C. Rule 17-2.610, whichever is less.

5. The visible emissions shall not be equal to or greater than 20% opacity in accordance with Subsection 17-2.610(2)(a), F.A.C.

PERMITTEE:
Farmland Industries, Inc.

PERMIT NO.: A053-171758
PROJECT: North MAP/DAP/GTSP Fertilizer Plant

SPECIFIC CONDITIONS (cont'd):

6. The maximum allowable fluoride emissions for the source shall be dependent upon the specific product being manufactured as follows:

Product	Allowable Fluoride Emissions		
	lbs/Ton P2O5 input	lbs/hr	TPY
GTSP	0.53	8.18	35.8
MAP	0.12	3.4	14.9
DAP	0.06	2.4	10.5

7. Compliance with the emission limitations of Specific Condition Nos. 4, 5 and 6 shall be determined using EPA Methods 1, 2, 4, 5, 9, and 13A or 13B, contained in 40 CFR 60, Appendix A and adopted by reference in Section 17-2.700, F.A.C. The minimum requirements for stack sampling facilities, source sampling and reporting, shall be in accordance with Section 17-2.700, F.A.C. and 40 CFR 60, Appendix A.

8. The average gas pressure drop across the mill/screens/cooler scrubber is 5 inches of water. The pressure drop shall be measured and logged at least twice per week, just before and right after a maintenance down-day, to establish a database of pressure drop ranges at which the scrubber operates. The pressure drop shall be measured during compliance tests and reported in the compliance test reports. Unless a stack test shows compliance at a lesser pressure drop, at no time shall the pressure drop fall below 4.9 inches of water.

9. Approved compliance testing of emissions shall be conducted while simultaneously operating the reactor/blunger, dryer, and mill/screens/cooler within ±10% of the permitted capacities. A compliance test submitted at operating levels less than 90% of the permitted capacity will automatically constitute an amended permit at the lesser rate until another test, showing compliance at a higher capacity is submitted. Any time the permitted operating capacity of the plant is exceeded by more than 10%, a compliance test shall be performed within 30 days of initiation of the higher rate and the results submitted to the Department. Acceptance of the test by the Department will automatically constitute an amended permit at the greater rate. Emission limitations are not automatically adjusted above the allowables established by this permit. Failure to submit the input rates and actual operating conditions may invalidate the test (Subsection 403.161(1)(c), Florida Statutes).

SPECIFIC CONDITIONS (cont'd):

10. The production rate during stack testing shall be included in the stack test report in units of tons/hour as well as tons P2O5/hour.

11. The visible emissions compliance test shall be conducted by a certified observer and be a minimum of 60 minutes.

12. The Southwest District Office of the Department of Environmental Regulation shall be notified in writing 15 days prior to compliance testing.

13. No objectionable odors shall be allowed, in accordance with F.A.C. Rule 17-2.620(2).

14. The dryer shall be fired by natural gas only. The normal firing rate is 25M cubic feet/hour or 25 MMBTU/hour. The maximum permitted firing rate is 50 MMBTU/hour.

15. The north fertilizer plant shall be allowed to operate continuously (8760 hours/year).

16. All reasonable precautions shall be taken to prevent and control generation of unconfined emissions of particulate matter in accordance with the provision in Section 17-2.610(3), F.A.C. These provisions are applicable to any source, including, but not limited to, vehicular movement, transportation of materials, construction, alteration, demolition or wrecking, or industrial related activities such as loading, unloading, storing and handling. The permittee shall minimize the escape of unconfined emissions by keeping covers on process equipment, prompt clean up of spills within the plant, and cleaning or wetting areas used by vehicles.

PERMITTEE:
Farmland Industries, Inc.

PERMIT NO.: AO53-171758
PROJECT: North MAP/DAP/GTSP Fertilizer Plant

SPECIFIC CONDITIONS (cont'd):

17. Submit for this source, each calendar year, on or before March 1, an emission report for the preceding calendar year containing the following information:

(A) Annual amount of materials and/or fuels utilized.
(B) Annual emissions (note calculation basis).
(C) Any changes in the information contained in the permit application.

This report shall be submitted to the Air Section of the Southwest District of the Department of Environmental Regulation.

18. An application to renew this operating permit shall be submitted to the Department at least 60 days prior to the expiration date of this permit.

Issued this 13 day of April 1990.

STATE OF FLORIDA DEPARTMENT OF ENVIRONMENTAL REGULATION

for Richard D. Garrity, Ph.D.
Deputy Assistant Secretary

STACK SAMPLE SUMMARY SHEET

PLANT: MAP
STACK: MAP Dryer (North)
TEST DATE: Sep 4, 1991

PERMIT NO. A053-171758
LIMITS: 26.9 lbs. Particulate/Hour; 0.12 lbs. F/Ton

	RUN NO. 1	RUN NO. 2	RUN NO. 3	AVERAGE
STACK DIAMETER (ft.)	7.500	7.500	7.500	7.500
NOZZLE DIAMETER (inches)	0.245	0.245	0.245	0.245
SAMPLING TIME (min.)	60	60	60	60
STACK TEMPERATURE (deg. F)	118.00	119.00	114.00	117.00
STACK STATIC PRESSURE (WC)	0.300	0.300	0.300	0.300
VOLUME SAMPLED (ACF)	44.336	42.870	46.186	44.464
VOLUME SAMPLED (SCF)	42.760	40.226	43.133	42.040
STACK MOISTURE (%)	9.833	10.105	9.622	9.853
STACK VELOCITY (ft./sec.)	42.925	40.157	43.519	42.200
VOLUMETRIC FLOWRATE (ACFM)	113783.16	106445.34	115355.60	111861.37
VOLUMETRIC FLOWRATE (SCFM)	93867.70	87398.06	96051.56	92439.11
FLUORIDE (mg. collected)	4.620	5.526	3.966	4.704
PARTICULATE (mg. collected)	19.800	23.800	15.800	19.800
FLUORIDE (lbs./hour)	1.342	1.588	1.168	1.366
PARTICULATE (lbs./hour)	5.750	6.841	4.655	5.749
STACK GAS MOLECULAR WT.	28.820	28.787	28.845	28.818
ISOKINETIC VARIATION %	102.479	103.543	101.022	102.348
PRODUCTION RATE(TPH of P2O5)	33.8	33.8	33.8	33.8
PRODUCTION RATE(TPH product)	65.0	65.0	65.0	65.0
FLUORIDE (lbs./ton)	0.021	0.024	0.018	0.021 0.040 ([illegible]
PARTICULATE (lbs./ton)	0.088	0.105	0.072	0.088 0.170 ([illegible]

PERMIT SPECIFIC CONDITIONS

8 Average gas pressure drop = 3.50 inch H2O (4.90 min.)

STACK SAMPLE SUMMARY SHEET

PLANT: MAP
STACK: MAP Dryer (North) PERMIT NO. A053-171758
TEST DATE: Dec 18, 1990 LIMITS: 26.9 lbs. Particulate/Hour; 0.12 lbs. F/Ton

	RUN NO. 1	RUN NO. 2	RUN NO. 3	AVERAGE
STACK DIAMETER (ft.)	7.500	7.500	7.500	7.500
NOZZLE DIAMETER (inches)	0.241	0.241	0.241	0.241
SAMPLING TIME (min.)	60	60	60	60
STACK TEMPERATURE (deg. F)	101.00	102.00	103.00	102.00
STACK STATIC PRESSURE (WC)	0.310	0.310	0.310	0.310
VOLUME SAMPLED (ACF)	36.009	36.352	37.142	36.501
VOLUME SAMPLED (SCF)	35.362	35.123	35.759	35.414
STACK MOISTURE (%)	7.072	7.117	6.999	7.063
STACK VELOCITY (ft./sec.)	33.929	34.687	35.135	34.584
VOLUMETRIC FLOWRATE (ACFM)	89937.25	91946.31	93134.50	91672.69
VOLUMETRIC FLOWRATE (SCFM)	79048.86	80631.98	81632.21	80437.68
FLUORIDE (mg. collected)	4.750	14.520	17.450	12.240
PARTICULATE (mg. collected)	41.800	49.500	40.900	44.067
FLUORIDE (lbs./hour)	1.405	4.410	5.270	3.695
PARTICULATE (lbs./hour)	12.362	15.034	12.353	13.250
STACK GAS MOLECULAR WT.	29.151	29.146	29.160	29.152
ISOKINETIC VARIATION %	104.004	101.271	101.841	102.372
PRODUCTION RATE(TPH of P2O5)	33.8	33.8	33.8	33.8
PRODUCTION RATE(TPH product)	65.0	65.0	65.0	65.0
FLUORIDE (lbs./ton)	0.022	0.068	0.081	~~0.057~~ .109
PARTICULATE (lbs./ton)	0.190	0.231	0.190	~~0.204~~ .392

PERMIT SPECIFIC CONDITIONS

8 Average gas pressure drop = 3.50 inch H2O (4.90 min.)

STACK SAMPLE SUMMARY SHEET

PLANT: MAP
STACK: MAP Dryer (North) PERMIT NO. A053-160330
TEST DATE: Apr 17, 1990 LIMITS: 30.2 lbs. Particulate/Hour;
0.12 lbs. F/Ton

	RUN NO. 1	RUN NO. 2	RUN NO. 3	AVERAGE
STACK DIAMETER (ft.)	7.500	7.500	7.500	7.500
NOZZLE DIAMETER (inches)	0.241	0.241	0.241	0.241
SAMPLING TIME (min.)	60	60	60	60
STACK TEMPERATURE (deg. F)	100.00	102.00	102.00	101.33
STACK STATIC PRESSURE (WC)	0.000	0.000	0.000	0.000
VOLUME SAMPLED (ACF)	41.097	41.013	42.387	41.499
VOLUME SAMPLED (SCF)	39.454	39.730	40.624	39.936
STACK MOISTURE (%)	6.277	6.236	6.107	6.207
STACK VELOCITY (ft./sec.)	38.456	38.607	39.297	38.787
VOLUMETRIC FLOWRATE (ACFM)	101935.67	102337.07	104164.68	102812.47
VOLUMETRIC FLOWRATE (SCFM)	90635.15	90707.74	92454.56	91265.81
FLUORIDE (mg. collected)	10.450	11.290	12.120	11.287
PARTICULATE (mg. collected)	46.000	39.500	35.600	40.367
FLUORIDE (lbs./hour)	3.176	3.410	3.649	3.412
PARTICULATE (lbs./hour)	13.980	11.931	10.719	12.210
STACK GAS MOLECULAR WT.	29.247	29.252	29.267	29.255
ISOKINETIC VARIATION %	101.205	101.830	102.155	101.730
PRODUCTION RATE(TPH of P205)	30.0	31.5	31.5	31.0
PRODUCTION RATE(TPH product)	57.7	60.6	60.6	59.6
FLUORIDE (lbs./ton)	0.055	0.056	0.060	0.057 0.110 (P205
PARTICULATE (lbs./ton)	0.242	0.197	0.177	0.205 0.394 (P205

PERMIT SPECIFIC CONDITIONS

8 Average gas pressure drop = 16.30 inch H2O

Form [illegible]
Effective Date
DER Application No.
(Filled in by DER)

ANNUAL OPERATION REPORT FORM FOR AIR EMISSIONS SOURCES

For each permitted emission point, please submit a separate report for calendar year 19[illegible] prior to March 1st of the following year.

I GENERAL INFORMATION

1. Source Name: Farmland Industries, Inc.

2. Permit Number: A053-17158

3. Source Address: P. O. Box 960
Bartow, Florida 33830

4. Description of Source: MAP/DAP/TSP Dryer Scrubber

II ACTUAL OPERATING HOURS: 24 hrs/day 7 days/wk 42.820 MAP / 2,943 DAP ~~wks~~/yr 76[illegible]

III RAW MATERIAL INPUT PROCESS WEIGHT: (List separately all materials put into proces[s] and specify applicable units if other than tons/yr)

Raw Material	Input Process Weight
30% Phosphoric Acid as P205 (MAP)	58,320 ton.
54% Phosphoric Acid as P205 (MAP)	141,699 ton.
Ammonia as NH3 (MAP)&(DAP)	34,339 ton.
30% Phosphoric Acid as P205 (DAP)	3,365 ton.
54% Phosphoric Acid as P205 (DAP)	3,669 ton.

IV PRODUCT OUTPUT (Specify applicable units)

398,065 Tons MAP
14,917 Tons DAP
0 Tons TSP

STATE OF FLORIDA
DEPARTMENT OF ENVIRONMENTAL REGULATION

SOUTHWEST DISTRICT
4520 OAK FAIR BLVD.
TAMPA, FLORIDA 33610-7347
813-623-5561
Suncom—552-7612

BOB MARTINEZ
GOVERNOR
DALE TWACHTMANN
SECRETARY
DR. RICHARD D. GARRITY
DISTRICT MANAGER

ANNUAL OPERATION REPORT FORM FOR AIR EMISSIONS SOURCES

For each permitted emission point, please submit a separate report for calendar year 1991 prior to March 1st of the following year.

I GENERAL INFORMATION

1. Source Name: Farmland Hydro, L.P.
2. Permit Number: AO53- 171758
3. Source Address: P. O. Box 960
   Bartow, Florida 33830
4. Description of Source: MAP/DAP/TSP DRYER SCRUBBER

II ACTUAL OPERATING HOURS: 24 hrs/day 7 days/wk 43.83 wks/yr

III RAW MATERIAL INPUT PROCESS WEIGHT: (List separately all materials put into process and specify applicable units if other than tons/yr)

Raw Material	Input Process Weight	
30% PHOSPHORIC ACID AS P_2O_5	55,939	tons/y
54% PHOSPHORIC ACID AS P_2O_5	153,228	tons/y
AMMONIA AS NH_3	53,118	tons/y
		tons/y
		tons/y

IV PRODUCT OUTPUT (Specify applicable units)

400,936 SHORT TONS OF MAP
1,291 SHORT TONS OF DAP
0 SHORT TONS OF TSP

SHUT DOWN SOURCES

Florida Department of Environmental Regulation
Southwest District • 4520 Oak Fair Boulevard • Tampa, Florida 33610-7347
Lawton Chiles, Governor 813-623-5561 FAX 813-272-2279 Carol M. Browner, Secretary

June 17, 1991

Mr. Charles W. Jenkins
Environmental Coordinator
Farmland Industries, Inc.
Post Office Box 960
Bartwo, Florida 33830-0960

Dear Mr. Jenkins:

Re: Polk County - AP
Deletion of Permits
A053-151296, A053-157062 & A053-157064

Thank you for your letter of June 13, 1991 informing the Department that the three above referenced operating permits will not longer be needed and the permits are to be considered surrendered. This will help us to keep our air files up to date. As of June 17, 1991 the three referenced operating permits for the rock unloading and storage conveyor system, the 100 and 120 TPH ball mills and 3 ground rock silos, & the 180 TPH ball mill at PAD 2 are deleted from our files.

If you have any questions, please contact George Richardson of my staff at (813)623-5561, extension 420.

Sincerely,

J. Harry Kerns

J. Harry Kerns, P.E.
District Air Engineer
Southwest District

JHK/gr

Florida Department of Environmental Regulation

Southwest District • 4520 Oak Fair Boulevard • Tampa, Florida 33610-7347 • 813-623-5561

Bob Martinez, Governor | Dale Twachtmann, Secretary | John Shearer, Assistant Secretary | Richard Garrity, Deputy Assistant Secretary

PERMITTEE:
Farmland Industries, Inc.
Post Office Box 960
Bartow, FL 33830

PERMIT/CERTIFICATION
Permit No.: A053-151296
County: Polk
Expiration Date: 11/30/93
Project: Phosphate Rock Unloading & Handling Facility

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

For the operation of rock unloading and storage conveyor system of a designed capacity of 200 TPH. Dust from 10 transfer/storage points is ducted to the scrubber. Emissions from this source are controlled by an Aerotron Venturi scrubber at a designed flow rate of 16950 ACFM.

Location: S.R. 640, Green Bay, Polk County

UTM: 17-409.5E 3079.5N NEDS NO: 0053 Point ID: 1

Replaces Permit No.:

PERMITTEE:
Farmland Industries, Inc.

PERMIT NO: A053-151296
PROJECT: Phosphate Rock Unloading & Handling Facility

SPECIFIC CONDITIONS:

1. A part of this permit is the attached 15 General Conditions.

2. Particulate emissions are limited to 35.5 lbs./hour at the permitted process rate of 200 TPH as requested by Farmland to exempt this facility from F.A.C. 17-2.650(2). At lower process rates, emissions are limited to 35.5 lbs./hour or as determined by the appropriate equation in 17-2.610, F.A.C., whichever is less.

3. Visible emissions shall not be equal to or greater than 20% opacity in accordance with Subsection 17-2.610(2)(a), F.A.C.

4. Test the emissions for the following pollutant(s) at intervals of 6 months from the date March 11, 1988 and submit a copy of test data to the Air Section of the Southwest District Office within forty-five days of such testing (Subsection 17-2.700(2), F.A.C.:

(X) Particulates
(X) Opacity

5. Compliance with Specific Conditions No. 2 and 3 shall be determined using EPA Methods 1, 2, 3, 4, 5, and 9 contained in 40 CFR 60, Appendix A and adopted by reference in Section 17-2.700, F.A.C. The EPA Method 9 test shall be for at least 60 minutes. The minimum requirements for stack sampling facilities, source sampling and reporting, shall be in accordance with Section 17-2.700, F.A.C. and 40 CFR 60, Appendix A.

6. All reasonable precautions shall be taken to prevent and control generation of unconfined emissions of particulate matter in accordance with the provision in Subsection 17-2.610 (3), F.A.C. These provisions are applicable to any source, including, but not limited to, vehicular movement, transportation of materials, construction, alteration, demolition or wrecking, or industrial related activities such as loading, unloading, storing and handling.

7. No objectionable odors will be allowed, as per Subsection 17-2.620(2), F.A.C.

Florida Department of Environmental Regulation

Southwest District • 4520 Oak Fair Boulevard • Tampa, Florida 33610-7347 • 813-623-5561

Bob Martinez, Governor | Dale Twachtmann, Secretary | John Shearer, Assistant Secretary
Richard Garrity, Deputy Assistant Secretary

PERMITTEE:
Farmland Industries, Inc.
Post Office Box 960
Bartow, Florida 33830

PERMIT/CERTIFICATION
Permit No.: A053-157064
County: Polk
Expiration Date: 1-17-94
Project: 120 Ton Ball Mill, PAD No. 2

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

For the operation of a 120 ton ball mill at PAD No. 2 with emissions controlled by a 17,000 ACFM Mikro-Pulsaire baghouse.

Location: SR 640 South of Bartow, Polk County

UTM: 17-409.5 E 3079.5 N NEDS NO: 0053 Point ID: 11

Replaces Permit No.: A053-79214

PERMITTEE:
Farmland Industries, Inc.

Permit/Certification No.: A053-157064
Project: 120 Ton Ball Mill,
PAD No. 2

SPECIFIC CONDITIONS

1. A part of this permit is the attached 15 General Conditions.

2. Test the emissions for the following pollutant(s) at intervals of 6 months from the date November 14, 1988 and submit a copy of test data to the Air Section of the Southwest District Office of the Department of Environmental Regulation within forty-five days of such testing (Section 17-2.700(2), Florida Administrative Code (F.A.C.)).

(X) Particulates
( ) Fluorides
(X) Opacity
( ) Sulfur Oxides
( ) Nitrogen Oxides
( ) Hydrocarbons

3. Testing of emissions must be accomplished within +10% of the process rate of 120 tons per hour. Failure to submit the input rates or operation at conditions which do not reflect actual operating conditions may invalidate the data (Section 403.161(1)(c), Florida Statutes).

4. At the request of the Permittee, the maximum allowable particulate emission rate from this baghouse shall not exceed 27.2 pounds/hour, in order to qualify for the particulate RACT exemption in Subsection 17-2.650(2)(b), F.A.C.

5. Visible emissions shall not be equal to or greater than 20% opacity in accordance with Subsection 17-2.610(2)(a), F.A.C.

6. Compliance with the emission limitations of Specific Conditions Nos. 4 and 5 shall be determined using EPA Methods 1,2,4,5 and 9 contained in 40 CFR 60, Appendix A and adopted by reference in Section 17-2.700, F.A.C. The minimum requirements for stack sampling facilities, source sampling and reporting, shall be in accordance with Section 17-2.700, F.A.C. and 40 CFR 60, Appendix A.

7. The maximum allowable emission rate for particulate matter for this source is set by Specific Condition No. 4. Because of the expense and complexity of conducting a stack test on minor sources of particulate matter, the Department pursuant to the authority granted under Subsection 17-2.700(3)(d), F.A.C. hereby waives the requirement for a stack test. The alternative standard set forth by this provision establishes a visible emission limitation not to exceed an opacity of 5%.

8. Should the Department have reason to believe the particulate emission standard is not being met, the Department may require that compliance with the particulate emission standards be demonstrated by testing in accordance with Section 17-2.700, F.A.C.

Florida Department of Environmental Regulation

Southwest District • 4520 Oak Fair Boulevard • Tampa, Florida 33610-7347 • 813-623-5561

Bob Martinez, Governor | Dale Twachtmann, Secretary | John Shearer, Assistant Secretary | Richard Garrity, Deputy Assistant Secretary

PERMITTEE:
Farmland Industries, Inc.
Post Office Box 960
Bartow, Florida 33830

PERMIT/CERTIFICATION
Permit No.: A053-157062
County: Polk
Expiration Date: 1-17-94
Project: 120 Ton Ball Mill, PAD No. 1

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

For the operation of a 120 ton ball mill at PAD No. 1 with emissions controlled by a 17,000 ACFM Mikro-Pulsaire baghouse.

Location: SR 640 South of Bartow, Polk County

UTM: 17-409.5 E 3079.5 N NEDS NO: 0053 Point ID: 27

Replaces Permit No.: A053-78873

PERMITTEE:
Farmland Industries, Inc.

Permit/Certification No.: A053-157062
Project: 120 Ton Ball Mill, PAD No. 1

SPECIFIC CONDITIONS

1. A part of this permit is the attached 15 General Conditions.

2. Test the emissions for the following pollutant(s) at intervals of 6 months from the date November 14, 1988 and submit a copy of test data to the Air Section of the Southwest District Office of the Department of Environmental Regulation within forty-five days of such testing (Section 17-2.700(2), Florida Administrative Code (F.A.C.)).

(X) Particulates
( ) Fluorides
(X) Opacity
( ) Sulfur Oxides
( ) Nitrogen Oxides
( ) Hydrocarbons

3. Testing of emissions must be accomplished within ±10% of the process rate of 120 tons per hour. Failure to submit the input rates or operation at conditions which do not reflect actual operating conditions may invalidate the data (Section 403.161(1)(c), Florida Statutes).

4. At the request of the Permittee, the maximum allowable particulate emission rate from this baghouse shall not exceed 26.2 pounds/hour, in order to qualify for the particulate RACT exemption in Subsection 17-2.650(2)(b), F.A.C.

5. Visible emissions shall not be equal to or greater than 20% opacity in accordance with Subsection 17-2.610(2)(a), F.A.C.

6. Compliance with the emission limitations of Specific Conditions Nos. 4 and 5 shall be determined using EPA Methods 1,2,4,5 and 9 contained in 40 CFR 60, Appendix A and adopted by reference in Section 17-2.700, F.A.C. The minimum requirements for stack sampling facilities, source sampling and reporting, shall be in accordance with Section 17-2.700, F.A.C. and 40 CFR 60, Appendix A.

7. The maximum allowable emission rate for particulate matter for this source is set by Specific Condition No. 4. Because of the expense and complexity of conducting a stack test on minor sources of particulate matter, the Department pursuant to the authority granted under Subsection 17-2.700(3)(d), F.A.C. hereby waives the requirement for a stack test. The alternative standard set forth by this provision establishes a visible emission limitation not to exceed an opacity of 5%.

8. Should the Department have reason to believe the particulate emission standard is not being met, the Department may require that compliance with the particulate emission standards be demonstrated by testing in accordance with Section 17-2.700, F.A.C.

STACK SAMPLE SUMMARY SHEET

PLANT: TSD Rock Unloading
STACK: Scrubber Stack   PERMIT NO. A053-151296
TEST DATE: Nov 13, 1990   LIMITS: 40.41 lbs. Particulate/Hour; 20% Visible Emission

	RUN NO. 1	RUN NO. 2	RUN NO. 3	AVERAGE
STACK DIAMETER (ft.)	3.000	3.000	3.000	3.000
NOZZLE DIAMETER (inches)	0.299	0.299	0.299	0.299
SAMPLING TIME (min.)	60	60	60	60
STACK TEMPERATURE (deg. F)	86.00	86.00	87.00	86.33
STACK STATIC PRESSURE (WC)	0.000	0.000	0.000	0.000
VOLUME SAMPLED (ACF)	43.718	45.035	45.135	44.629
VOLUME SAMPLED (SCF)	43.623	44.451	44.632	44.235
STACK MOISTURE (%)	3.096	3.040	3.028	3.055
STACK VELOCITY (ft./sec.)	26.251	27.132	27.247	26.877
VOLUMETRIC FLOWRATE (ACFM)	11133.41	11507.08	11556.08	11398.86
VOLUMETRIC FLOWRATE (SCFM)	10532.45	10892.23	10919.96	10781.55
PARTICULATE (mg. collected)	320.400	178.600	324.400	274.467
PARTICULATE (lbs./hour)	**10.234**	**5.790**	**10.501**	**8.842**
STACK GAS MOLECULAR WT.	28.659	28.666	28.667	28.664
ISOKINETIC VARIATION %	100.090	98.621	98.772	99.161
PRODUCTION RATE(TPH of rock)	437.0	437.0	437.0	437.0
PARTICULATE (lbs./ton)	0.023	0.013	0.024	0.020

STACK SAMPLE SUMMARY SHEET

PLANT: TSD Rock Unloading
STACK: Scrubber Stack PERMIT NO. A053-151296
TEST DATE: Jun 1, 1990 LIMITS: 40.41 lbs. Particulate/Hour; 20% Visible Emission

	RUN NO. 1	RUN NO. 2	RUN NO. 3	AVERAGE
STACK DIAMETER (ft.)	3.000	3.000	3.000	3.000
NOZZLE DIAMETER (inches)	0.241	0.241	0.241	0.241
SAMPLING TIME (min.)	60	60	60	60
STACK TEMPERATURE (deg. F)	93.00	94.00	98.00	95.00
STACK STATIC PRESSURE (WC)	0.000	0.000	0.000	0.000
VOLUME SAMPLED (ACF)	32.087	33.363	32.885	32.778
VOLUME SAMPLED (SCF)	31.328	31.938	31.479	31.582
STACK MOISTURE (%)	4.882	4.793	4.860	4.845
STACK VELOCITY (ft./sec.)	30.117	31.229	31.276	30.874
VOLUMETRIC FLOWRATE (ACFM)	12773.02	13244.74	13264.71	13094.16
VOLUMETRIC FLOWRATE (SCFM)	11691.29	12112.47	12035.37	11946.38
PARTICULATE (mg. collected)	379.800	333.400	236.100	316.433
PARTICULATE (lbs./hour)	**18.752**	**16.728**	**11.942**	**15.807**
STACK GAS MOLECULAR WT.	28.463	28.473	28.465	28.467
ISOKINETIC VARIATION %	99.676	98.083	97.294	98.351
PRODUCTION RATE(TPH of rock)	200.0	200.0	200.0	200.0
PARTICULATE (lbs./ton)	0.094	0.084	0.060	0.079

SUMMARY SHEET

ANT: TSD
TACK: ROCK UNLOADING SCRUBBER
EST DATE: DECEMBER 13, 1989

PERMIT # A053-151296
LIMITS: 40.41 lbs. PARTICULATE/HOUR;
20% VISIBLE EMISSION(OPACITY)

	RUN NO. 1	RUN NO. 2	RUN NO. 3	AVERAGE
TACK DIAMETER (FT)	3.000	3.000	3.000	3.000
OZZLE DIAMETER (FT)	0.020	0.020	0.020	0.020
AMPLING TIME (MIN)	60.000	60.000	60.000	60.000
TACK TEMP (R)	540.000	540.000	540.000	540.000
TACK MOISTURE (%)	3.370	3.405	3.384	3.387
OLUME SAMPLED (ACF)	36.780	36.998	36.762	36.847
OLUME SAMPLED (SCF)	36.324	35.939	36.170	36.144
TACK VELOCITY (F/S)	32.026	31.487	31.577	31.696
OLUMETRIC FLOWRATE (ACFM)	13582.580	13354.080	13392.178	13442.946
OLUMETRIC FLOWRATE (SCFM)	12869.586	12648.506	12687.349	12735.147
PARTICULATE (MG. COLL.)	191.000	205.700	92.500	163.067
(MG. COLL.)	0.000	0.000	0.000	0.000
PARTICULATE (LBS/HR)	8.953	9.578	4.293	7.608
(LBS/HR)	0.000	0.000	0.000	0.000
STACK GAS MOL. WEIGHT	28.629	28.625	28.628	28.627
ISOKINETIC VARIATION %	104.991	105.691	106.045	105.576
PRODUCTION RATE (TPH,P2O5)	200.000	200.000	200.000	200.000
PARTICULATE (LB/HR/TON)	0.045	0.048	0.021	0.038
(LB/HR/TON)	0.000	0.000	0.000	0.000

SUMMARY SHEET

NT: TSD ROCK UNLOADING
ACK: ROCK UNLOADING SCRUBBER
EST DATE: APRIL 18, 1989

PERMIT # A053-151296
LIMITS: 40.41 lbs. PARTICULATE/HOUR;
20% VISIBLE EMISSION(OPACITY)

	RUN NO. 1	RUN NO. 2	RUN NO. 3	AVERAGE
STACK DIAMETER (FT)	3.000	3.000	3.000	3.000
NOZZLE DIAMETER (FT)	0.025	0.025	0.025	0.025
SAMPLING TIME (MIN)	60.000	60.000	60.000	60.000
STACK TEMP (R)	557.000	554.000	554.000	555.000
STACK MOISTURE (%)	4.545	4.179	4.443	4.389
VOLUME SAMPLED (ACF)	46.780	51.149	48.257	48.729
VOLUME SAMPLED (SCF)	45.203	49.358	46.295	46.952
STACK VELOCITY (F/S)	27.564	29.586	28.003	28.384
VOLUMETRIC FLOWRATE (ACFM)	11690.201	12547.944	11876.582	12038.243
VOLUMETRIC FLOWRATE (SCFM)	10643.272	11530.176	10883.183	11018.878
PARTICULATE (MG. COLL.)	619.700	267.700	338.700	408.700
(MG. COLL.)	0.000	0.000	0.000	0.000
PARTICULATE (LBS/HR)	19.304	8.274	10.534	12.704
(LBS/HR)	0.000	0.000	0.000	0.000
STACK GAS MOL. WEIGHT	28.500	28.540	28.511	28.517
ISOKINETIC VARIATION %	103.327	104.145	103.490	103.654
PRODUCTION RATE (TPH,P205)	200.000	200.000	200.000	200.000
PARTICULATE (LB/HR/TON)	0.097	0.041	0.053	0.064
(LB/HR/TON)	0.000	0.000	0.000	0.000

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

ANNUAL OPERATION REPORT FORM FOR AIR EMISSIONS SOURCES

For each permitted emission point, please submit a separate report for calendar year 19__ prior to March 1st of the following year.

I GENERAL INFORMATION

1. Source Name: Farmland Industries, Inc.
2. Permit Number: A053-75878
3. Source Address: P. O. Box 960
   Bartow, Florida 33830
4. Description of Source: PAD I - 124 Ton Ball Mill and 1 Baghouse

II ACTUAL OPERATING HOURS: 16.11 hrs/day 7 days/wk 35.035 wks/yr

III RAW MATERIAL INPUT PROCESS WEIGHT: (List separately all materials put into process and specify applicable units if other than tons/yr)

Raw Material	Input Process Weight
Phosphate Rock (Ground)	238,549 tons/
	tons/
	tons/
	tons/
	tons/

IV PRODUCT OUTPUT (Specify applicable units)

238,549 Tons of Ground (50% - 200 Mesh) Phosphate Rock

DER Form 17-1.202(6)
Effective November 30, 1982

Florida Department of Environmental Regulation
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ANNUAL OPERATION REPORT FORM FOR AIR EMISSIONS SOURCES

For each permitted emission point, please submit a separate report for calendar year 19__ prior to March 1st of the following year.

I GENERAL INFORMATION

1. Source Name: Farmland Industries, Inc.
2. Permit Number: A053-79214
3. Source Address: P. O. Box 960
   Bartow, Florida 33830
4. Description of Source: PAD II - 120 Ton Ball Mill w/Baghouse

II ACTUAL OPERATING HOURS: 19.09 hrs/day 7 days/wk 40.567 wks/yr

III RAW MATERIAL INPUT PROCESS WEIGHT: (List separately all materials put into process and specify applicable units if other than tons/yr)

Raw Material	Input Process Weight	
Phosphate Rock (Ground)	1,058,393	tons/
		tons/
		tons/
		tons/
		tons/

IV PRODUCT OUTPUT (Specify applicable units)

1,058,393 Tons of Ground (50% - 200 Mesh) Phosphate Rock

DER Form 17-1.202(6)
Effective November 30, 1982

Florida Department of Environmental Regulation

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

ANNUAL OPERATION REPORT FORM FOR AIR EMISSIONS SOURCES

For each permitted emission point, please submit a separate report for calendar year 19
prior to March 1st of the following year.

I GENERAL INFORMATION

1. Source Name: Farmland Industries, Inc.
2. Permit Number: A053-151296
3. Source Address: P. O. Box 960
   Bartow, Florida 33830
4. Description of Source: Phosphate Rock Unloading and Storage Scrubbe

II ACTUAL OPERATING HOURS: 16.00 hrs/day 7 days/wk 52 wks/yr

III RAW MATERIAL INPUT PROCESS WEIGHT: (List separately all materials put into proces and specify applicable units if other than tons/yr)

Raw Material	Input Process Weight	
Phosphate Rock	2,203,883	tons
		tons
		tons
		tons
		tons

IV PRODUCT OUTPUT (Specify applicable units)

2,203,883 Tons Phosphate Rock

DER Form 17-1.202(6)
Effective November 30, 1982

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

DER Form
Form Title
Effective Date
DER Application No.

ANNUAL OPERATION REPORT FORM FOR AIR EMISSIONS SOURCES

For each permitted emission point, please submit a separate report for calendar year prior to March 1st of the following year.

I GENERAL INFORMATION

1. Source Name: Farmland Industries, Inc.
2. Permit Number: A053-157062
3. Source Address: P. O. Box 960
   Bartow, Florida 33830
4. Description of Source: Phosphoric Acid Department No. 1 - 120 Ton Ball M
   Baghouse

II ACTUAL OPERATING HOURS: 19.21 hrs/day 7 days/wk 41.499 wks/yr

III RAW MATERIAL INPUT PROCESS WEIGHT: (List separately all materials put into proce and specify applicable units if other than tons/yr)

Raw Material	Input Process Weight	
Phosphate Rock (Ground)	1,260,532	tons
		tons
		tons
		tons
		tons

IV PRODUCT OUTPUT (Specify applicable units)

1,260,372 Tons of Ground (50% - 200 Mesh) Phosphate Rock.

DER Form 17-1.202(6)
Effective November 30, 1982

Northwest District 160 Governmental Center Pensacola, Florida 32501-5794 904-436-8300 | Northeast District 3426 Bills Rd Jacksonville, Florida 32207 904-798-4200 | Central District 3319 Maguire Blvd, Suite 232 Orlando, Florida 32803-3767 305-894-7555 | Southwest District 4520 Oak Fair Blvd Tampa, Florida 33610-7347 813-623-5561 | South District 2269 Bay St Fort Myers, Florida 33901-2896 813-332-2667 | Southeast District 1900 S. Congress Ave West Palm Beach, Fl 305-964-944

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

DER Form #
Form Title
Effective Date
DER Application No.
(Filled in by DER)

ANNUAL OPERATION REPORT FORM FOR AIR EMISSIONS SOURCES

For each permitted emission point, please submit a separate report for calendar year 19 9[illegible] prior to March 1st of the following year.

I GENERAL INFORMATION

1. Source Name: Farmland Industries, Inc.
2. Permit Number: A053-157064
3. Source Address: P. O. Box 960
   Bartow, Florida 33830
4. Description of Source: PAD II - 120 Ton Ball Mill W/Baghouse

II ACTUAL OPERATING HOURS: 20.73 hrs/day 7 days/wk 42.953 wks/yr

III RAW MATERIAL INPUT PROCESS WEIGHT: (List separately all materials put into process and specify applicable units if other than tons/yr)

Raw Material	Input Process Weight
Phosphate Rock (Ground)	1,081,647 tons/yr
	tons/yr
	tons/yr
	tons/yr
	tons/yr

IV PRODUCT OUTPUT (Specify applicable units)

1,081,647 Tons of Ground (50% - 200 Mesh) Phosphate Rock

DER Form 17-1.202(6)
Effective November 30, 1982

REPORT IN SUPPORT OF
AN APPLICATION FOR A PSD
CONSTRUCTION PERMIT REVIEW

PREPARED FOR:

FARMLAND HYDRO, L.P.
GREEN BAY COMPLEX
POLK COUNTY, FLORIDA

MARCH 1992

PREPARED BY:

KOOGLER & ASSOCIATES
4014 N.W. 13TH STREET
GAINESVILLE, FLORIDA 32609
(904) 377-5822

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1.0 SYNOPSIS OF APPLICATION

1.1 APPLICANT

Farmland Hydro, L.P.

Green Bay Complex

P.O. Box 960

Bartow, FL 33830

1.2 FACILITY LOCATION

Farmland Hydro, L.P. (Farmland), Green Bay Complex, is a phosphate chemical fertilizer manufacturing facility located approximately six miles Southwest of Bartow, Florida, on County Road 640 in Polk County. The UTM coordinates of the Farmland Hydro L.P., Green Bay Complex are Zone 17, 409.5 km East and 3079.5 km North.

1.3 PROJECT DESCRIPTION

Farmland Hydro, L.P. proposes to increase the granular monoammonium phosphate (MAP) and diammonium phosphate (DAP) production rates of the existing North plant from 70 to 120 tons per hour MAP, and from 50 to 100 tons per hour DAP. This will result in an increase in the MAP/DAP production rate of the North plant from the current maximum rate of 36.4 tph P_2O_5 to 62.4 tph P_2O_5. The proposed project will include the MAP/DAP North plant process equipment enhancements to achieve the production rate increases.

The proposed project will result in a significant net increase (in accordance with Table 500-2 of Chapter 17-2, Florida

Administrative Code, [FAC]) in the emission rate of fluorides and a less than significant increase in the emission rate of particulate matter.

Farmland Hydro L.P. is submitting this report in support of an application to the Florida Department of Environmental Regulation for increasing the fertilizer production rate of the existing MAP/DAP North plant. The report includes a description of the existing chemical complex and the GTSP/MAP/DAP North plant, a review of Best Available Control Technology, an ambient air quality analysis and an evaluation of the impact of the proposed modification on soils, vegetation and visibility.

2.0 FACILITY DESCRIPTION

The Farmland Hydro, L.P., Green Bay Complex, is a phosphate fertilizer manufacturing facility located on County Road 640 in Polk County, Florida (See Figures 2-1 and 2-2). The UTM coordinates of the facility are Zone 17, 409.5 km East and 3079.5 km North.

2.1 EXISTING FACILITY

The existing fertilizer complex processes wet phosphate rock into several different fertilizer products. This is accomplished by reacting the phosphate rock with sulfuric acid to produce phosphoric acid and then converting the phosphoric acid into fertilizer products. The chemical complex includes sulfuric acid plants, phosphoric acid plants, a fluosilicic acid production facility, a super-phosphoric acid plant, plants to produce monoammonium phosphate (MAP), diammonium phosphate (DAP), granular triple super phosphate (GTSP), and storage, handling, grinding and shipping facilities for phosphate rock, ammonia, sulfur, and fertilizer products. Figure 2-3, Plot Plan, shows the location of the existing plants.

2.2 EXISTING GTSP/MAP/DAP PLANT

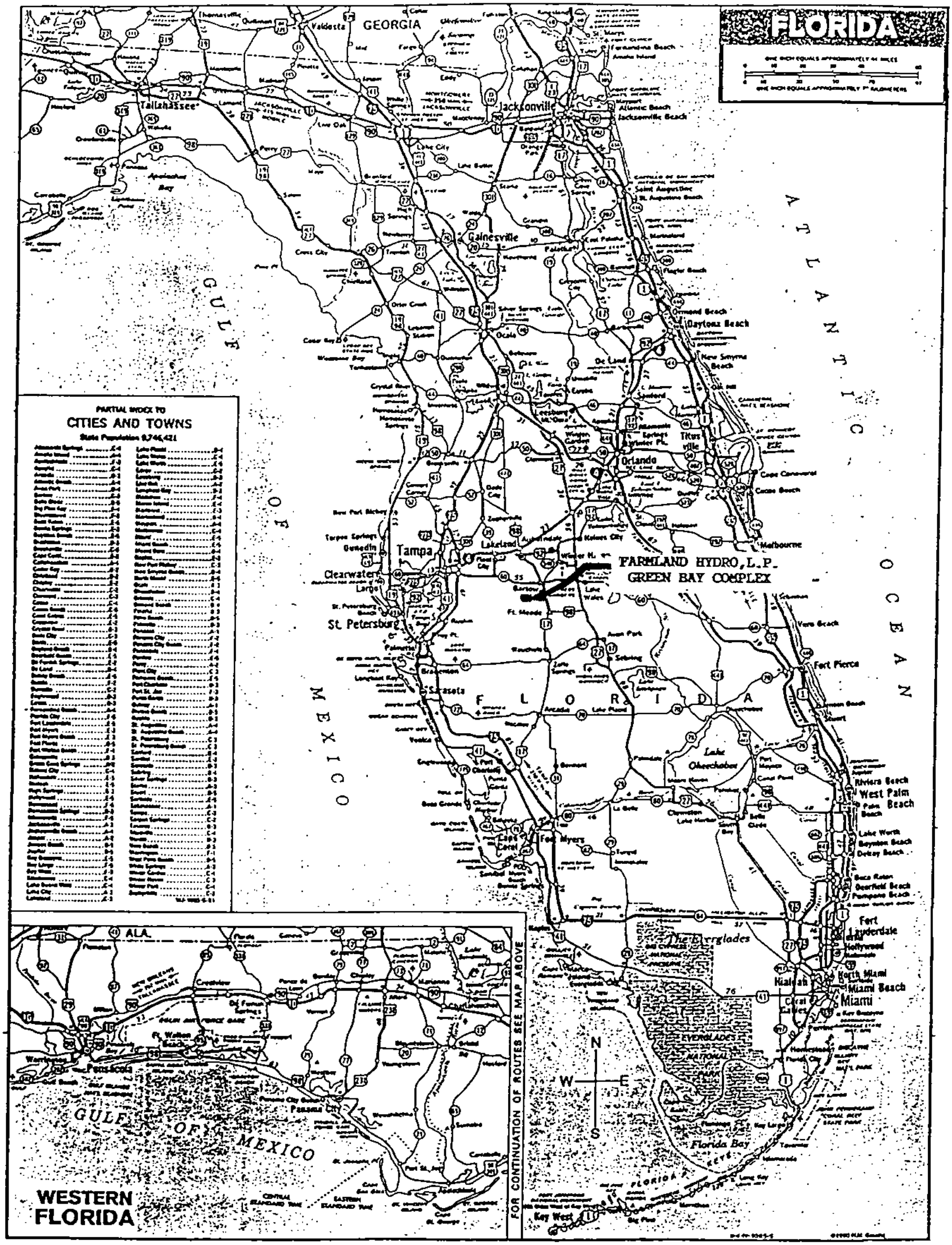
Farmland Hydro currently operates a granular fertilizer plant with two essentially equal independent granulation trains; a North train where the proposed modification is to take place and a South train. The South train produces exclusively DAP while the North train is capable of producing either GTSP, MAP, or DAP. The currently permitted production rates of the North

GTSP/MAP/DAP plant are 70 tons per hour of MAP, 50 tons per hour of DAP and 33.2 tons per hour of GTSP. Only one product can be produced at a time, and it should be noted that in recent years no GTSP has been produced because of a predominant market demand for DAP/MAP. During 1990 and 1991 the GTSP/MAP/DAP North plant has produced mostly MAP because of favorable production rates of MAP.

As the proposed modification will occur exclusively in the GTSP/MAP/DAP North plant, a brief description of the air emission control systems associated with the GTSP/MAP/DAP North plant is provided below.

The emissions from the GTSP/MAP/DAP North plant include particulate matter, ammonia, fluorides, and negligible quantities of natural gas combustion products from the dryer. The North plant dryer is fired on natural gas but is permitted to fire diesel fuel as a stand-by fuel source for up to 400 hours per year. The existing scrubber system includes of a Reactor/ Blungers (granulator) scrubber which uses a nominal 28 percent P_2O_5 strength acid as a scrubbing liquor for ammonia control and pond water for fluoride control. The scrubber consists of a conventional venturi scrubber which initially scrub these gasses of ammonia (see flow diagram Figure 3-1), followed by a large body cyclonic separator. The gases exiting the separator pass through a condensing section which uses pond water. The gas is then forced to the main plant stack through a cross-flow scrubber by the R/B fan .

Two dust scrubbers which include the Dryer scrubber and the Screens/Mills/Cooler scrubber operate on the same scrubbing principal. The gasses first pass through a dry cyclonic separator and then to the primary scrubbers. Each scrubber sprays 28 percent strength P_2O_5 acid in a vertical contact section followed by a wet cyclonic separator. The separators are followed by pond water polishing prior to the secondary scrubber. The gas is then forced through a cross-flow scrubber (secondary scrubber) to the main plant stack.



<u>FIGURE 2-1</u>
AREA LOCATION MAP

FARMLAND HYDRO, L.P.
POLK COUNTY, FLORIDA

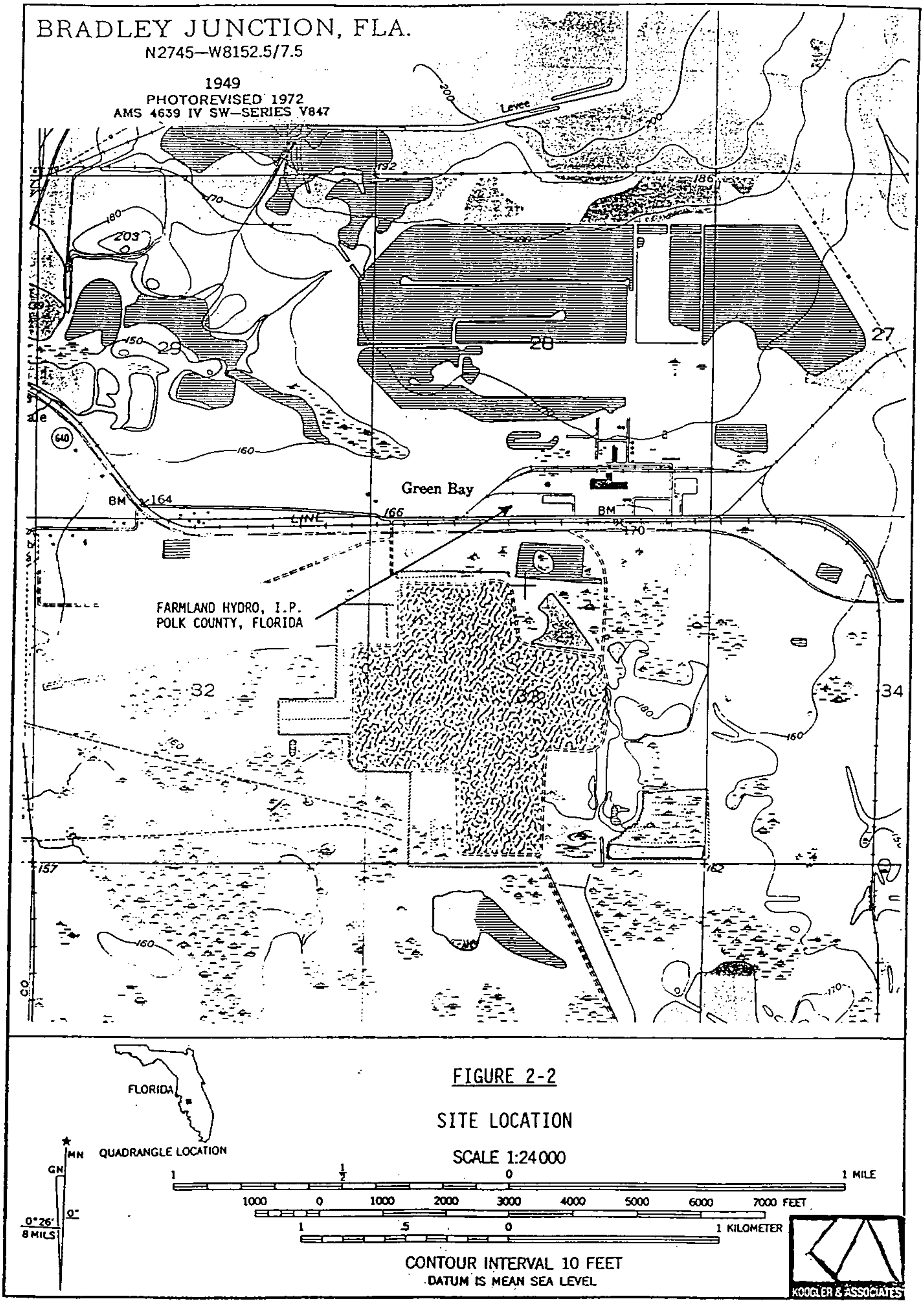


FIGURE 2-2

SITE LOCATION

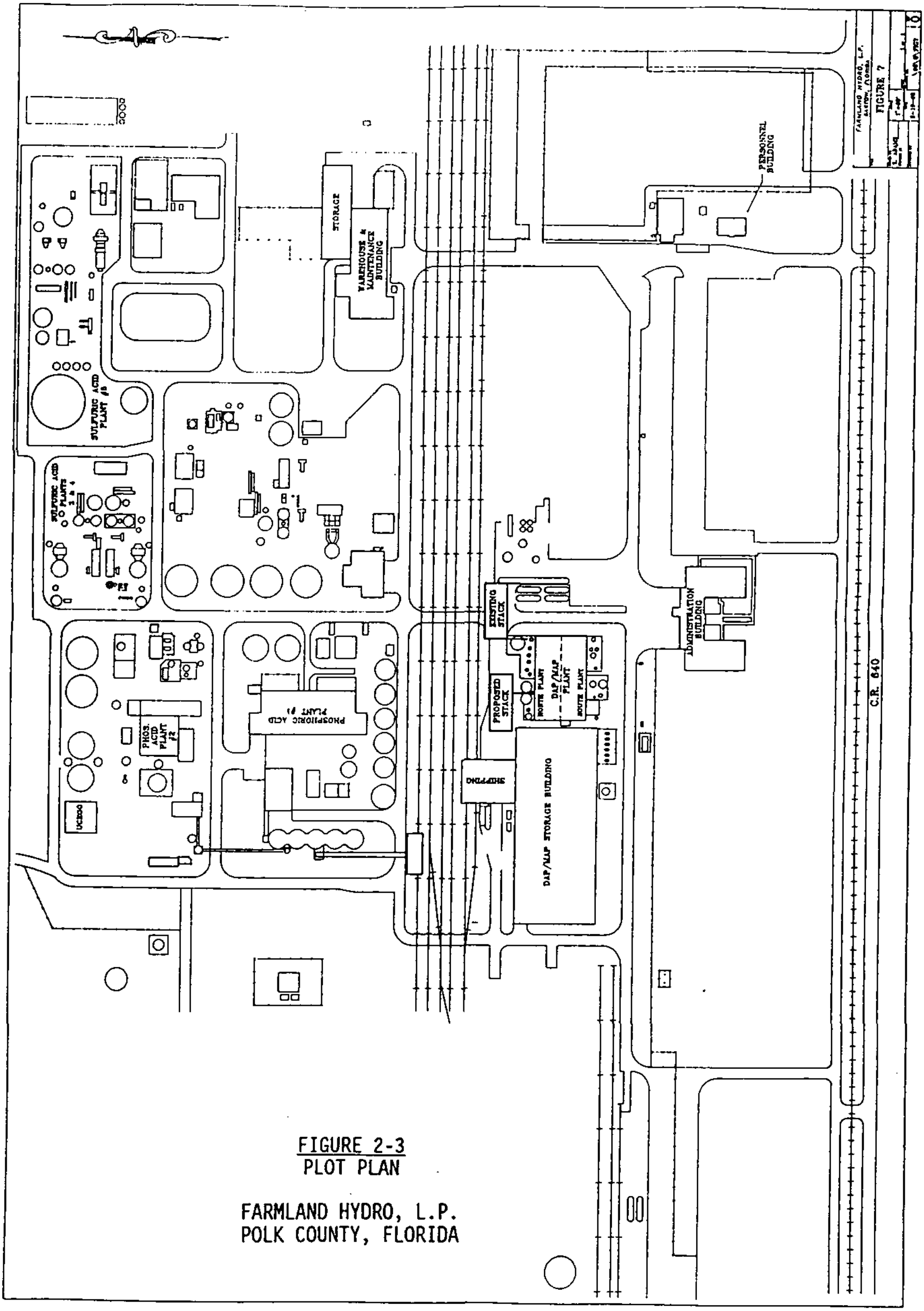


FIGURE 2-3
PLOT PLAN

FARMLAND HYDRO, L.P.
POLK COUNTY, FLORIDA

3.0 PROPOSED PROJECT

Farmland Hydro, L.P. proposes to increase the granular MAP and DAP production rate of the existing North plant from 70 to 120 tons per hour MAP, and from 50 to 100 tons per hour DAP. The GTSP production capability will be removed. This will result in an increase in the MAP/DAP production rate of the North plant from the current maximum rate of 36.4 tph P_2O_5 to 62.4 tph P_2O_5. The proposed project will include the North plant process equipment enhancements to achieve the production rate increases.

An increase in the production rate will require an increase in P_2O_5 feed to the North plant. The existing phosphoric acid plants which currently produce excess acid will supply the additional P_2O_5 required. Farmland Hydro, L.P. currently sells the excess phosphoric acid not used in fertilizer production.

The proposed project will not require a modification of any other plant in the Green Bay Complex other than the MAP/DAP North plant.

3.1 PROJECT DESCRIPTION

As a part of Farmland Hydro, L.P.'s present fertilizer complex, there are two existing granular fertilizer plants contained in a single building. While the two plants share certain common raw material feed storage, product storage facilities, and have a common control room, each plant operates as a separate and independent production facility.

The existing South plant produces exclusively granular DAP fertilizer while the North plant is capable of producing GTSP, MAP, or DAP depending on market requirements. The proposed modification will affect only the North plant.

3.1.1 PROCESS DESCRIPTION

The proposed project will modify the North plant to produce either MAP or DAP at a higher capacity and will eliminate the capability to produce GTSP. The general scope of the project includes the following:

- Replace existing ammoniator/blungers with a single rotary drum ammoniator/granulator.
- Increase the solids recycle capacity to allow for a higher production rate.
- Modify the air pollution control equipment by completely replacing the Reactor/Granular scrubber system with the most modern technology and modify the other air pollution control systems in the plant to improve their performance.

As the GTSP process inherently releases a much greater portion of the incoming fluoride in the raw materials than the MAP or DAP processes, the potential fluoride emissions will be significantly reduced.

In the basic ammoniated phosphate process, anhydrous ammonia is reacted with phosphoric acid. The level of ammoniation determines whether the product is MAP (less ammoniation) or DAP (more ammoniation). The slurry produced by the ammoniation is then sprayed onto a bed of recycled solids in the granulator and additional ammonia (if required) is added to complete the acid neutralization and produce the final product grade (see Figure 3-2.3).

The resulting slurry/solids mixture contains excess water which is removed by drying in a fossil fuel fired, direct contact rotary dryer. The dried solids are then screened to remove the on-size product which is transported to storage. The oversize fraction of the solids is crushed, mixed with the undersize fraction and returned to the granulator for addition of more slurry (see Figures 3-2.4).

The product size material is withdrawn from the screening system and passed through an existing fluid-bed cooler. To improve the cooling capacity of this unit, it is proposed, as part of this overall project, to add a new air conditioning coil utilizing the incoming ammonia as a refrigerant to cool and dehumidify the air entering the cooler. This cooled air will be pulled across the product and will be warmed to about 150-160° F while cooling the product to the required storage temperature. This air will then be passed through a new pollution abatement system prior to discharge to the atmosphere (see Figure 3-2.5).

As the process requires about four tons of recycled solids for each ton of slurry, the solids handling capacity (screens, mills, elevators, and conveyors) will be increased as part of this project. In order to eliminate fumes and dust inside the plant, the venting system (referred to as the screen and mills system) will be modified and improved. The fumes and dust from various equipment items will be removed from the process plant and passed through a pollution control system prior to discharge to the atmosphere.

In the reaction section of the plant, low strength phosphoric acid (about 28 percent P_2O_5) is first used in the pollution control equipment to absorb particulate and ammonia from the exiting gas, and is then mixed with high strength (about 52 percent P_2O_5) acid. The blended acid strength is maintained at about 37 percent P_2O_5 for making DAP and about 45 percent P_2O_5 for making MAP.

In making DAP, the blended acid is partially neutralized with ammonia in a reactor vessel. This reaction is exothermic and a significant amount of water vapor is released from the reactor vessel. Since the DAP production rate will increase, the proposed project will require that the reactor vessel be enlarged in order to allow proper absorption of the ammonia and proper separation of the water vapor and the slurry.

The resulting slurry is then sprayed onto the recycled solids in the granulator and additional ammonia is sparged into the bed in order to complete the neutralization reaction. Not as much ammonia is added to the granulator as is added to the reactor vessel, hence there is not as much heat released in the granulator. The granulator is constantly air swept to remove any excess ammonia fumes, water vapor produced by the heat of reaction and dust.

For MAP grades, the entire neutralization reaction is completed in a contained mixing pipe referred to as a "pipe reactor". The hot slurry is sprayed onto the recycled solids bed in the granulator but no additional ammonia is required to complete the reaction. Most of the water in the acid is vaporized when the slurry is sprayed onto the solids. A small portion of the ammonia in the slurry is also released into the air stream. As with DAP production, the granulator is swept constantly to remove ammonia fumes, water vapor and dust (see Figure 3-2.3).

3.1.2 AIR EMISSION SOURCES

Air emissions will result from four major sources in the North plant. These are:

A. Dryer Air Stream - This air stream is contacted directly with the fertilizer in the rotary dryer and contains fertilizer particulate matter, ammonia vapor, water vapor, trace quantities of fluoride vapor and the combustion products of natural gas.

B. Screen and Mills Air Stream - This air stream is a collection of all air evacuation from all solids handling equipment (except the granulator and the product cooler). It contains fertilizer particulate matter, possible traces of ammonia vapor and possible traces of fluoride vapor.

C. Product Cooler Air Stream - This air stream is exhausted from the product cooler and contains fertilizer particulate matter, possible traces of ammonia vapor and traces of fluoride vapor.

D. Reactor/Granulator Air Stream - This air stream is exhausted from the DAP reactor vessel and the granulator.

It will contain significant quantities of ammonia vapor and water vapor, small quantities of fertilizer particulate matter and small quantities of fluoride vapor.

The present plant uses three scrubbing systems to clean the gases. These are the screen and mills scrubber which is the primary contaminant removal device for the screens and mills gas stream and the cooler gas stream, the dryer scrubber for the dryer gas stream, and a smaller reactor/blunger scrubber as the reactor and blunger air stream cleaning device. All three systems discharge through a common stack. When GTSP grades are manufactured, there is a separate smaller scrubbing system to clean the gases from the GTSP reactors only. This system will be removed as part of the proposed modifications. The following modifications are proposed for the entire emission control system.

A. Dryer Air Stream - The present dryer air handling equipment is large enough for the expanded plant rate. The present system consists of a cyclone to remove the majority of the particulate matter, an acid scrubber (vertical spray section followed by a cyclonic separator) to remove both the ammonia vapor and the remaining particulate matter, a water spray section prior to the fan, and a final water scrubber to remove any fluoride compounds evolved in the acid scrubber. Both of the water scrubbers utilize plant pond water as the liquid scrubbing medium.

As part of the overall plant modifications, the acid liquid scrubbing media for the dryer scrubber, the screen and mills scrubber and the new cooler scrubber will be changed. At present, 28 percent P_2O_5 acid is used. After the proposed modifications, the liquid scrubbing media will be an acid of about 10 percent P_2O_5 strength. As the lower strength acid has a significantly lower vapor pressure of fluoride containing compounds, the fluoride emissions from this scrubber will be significantly reduced from present. Additional controls will be added to the existing scrubber to improve operations. The lower strength acid will have no effect on the particulate removal ability of the scrubber as all process parameters (flow rates, temperatures, etc.) will remain as at present (see Figure 3-2.2).

B. Screen and Mills Air Stream - The present screen and mills scrubber handles both the cooler air stream and screen and mills air stream. The total gas flow into the scrubber is approximately 35,000 SCFM. The screen and mills and cooler air streams have separate cyclones to remove the majority of the particulate matter. The combined gases are then scrubbed in the acid scrubber (vertical downspray section followed by a cyclonic separator) to remove the remaining ammonia and particulate matter, there is a water polishing downcomer prior to the fan. After the fan, final scrubbing occurs in the crossflow water scrubber to remove fluoride generated in the acid scrubber. Plant pond water is used as the liquid scrubbing medium in both of the water scrubbers (see Figure 3-1).

The screen and mills air flow will be reduce to approximately 28,000 SCFM by removing the existing fan and installing a new smaller fan. This reduction is possible as the cooler air stream will be separately handled in a new scrubbing system.

While the existing screens and mills scrubbing system will not be modified, improvements will be made in the controls and the scrubbing liquid (as mentioned in the Dryer Air Stream discussion) will be reduced from about 28 percent P_2O_5 acid to about 10 percent P_2O_5 acid. The fluoride evolution will be reduced as a result of using lower strength acid and the particulate removal capacity will be maintained as at present or improved (see Figure 3-2.2).

C. Cooler Air Stream - As mentioned in the Screen and Mills section, the present cooler air passes through the screen and mills scrubber along with the cooler air. The proposed modifications will install a completely new cooler air system. The existing cooler cyclone will be used, and the air flow will be maintained at the cyclone design rating. A new venturi scrubber followed by a cyclonic separator will be used to remove the remaining particulate matter from the air stream. This new scrubber will use 10 percent P_2O_5 acid in the venturi to absorb the particulate and ammonia vapor in the air stream. The scrubbed air will exit the cyclonic separator and pass through a fan which will discharge to the existing main plant stack for discharge to atmosphere (see Figure 3-2.5).

D. Reactor/Granulator Air Stream - The existing Reactor/ Blunger scrubber system will be dismantled and replaced with a completely new system to control emissions from the reactor and granulator. This system will utilize the latest technology to remove the largest possible amounts of contaminants. The combined air stream will first be contacted with weak (about 28 percent P_2O_5) acid maintained by a sophisticated control system at an NH_3 to H_3PO_4 mole ratio of 1.4 to 1.5. At this mole ratio, the majority of the fluoride compounds are complexed and little or no fluoride is evolved. Additionally, approximately 70 percent of the ammonia vapor in the gas stream is reacted in this scrubber. Most of the heat of reaction is liberated in this scrubber where the fluoride evolution is known to be extremely low.

A cyclonic separator separates the scrubbing liquor from the air stream. The air stream is then contacted with weak (about 28 percent P_2O_5) acid at an NH_3 to H_3PO_4 mole ratio of about 0.6. As most of the heat of reaction from the ammonia vapor and the scrubbing liquor has been released in the first stage scrubber, the evolution of fluoride is significantly lower in this scrubber than in normal single stage scrubbers. This scrubber is a venturi scrubber designed to absorb ammonia vapor and particulate matter from the gas stream. Following the venturi section is a cyclonic scrubber to separate the liquid and the air.

Since there is still a possibility of fluoride vapor in the gas stream, this scrubber is followed by a BFL ammonia vaporizer/scrubber. This unit passes the gases through the tubes of a shell and tube heat exchanger with liquid ammonia in the shell side. The ammonia is maintained at a pressure such that the boiling point is about 35 ^{o}F. As the ammonia boils, some of the water vapor in the gas stream passing through the tubes is condensed. This freshly condensed water vapor has a great affinity for any fluoride compounds in the air stream and absorbs them. Approximately 0.46 gallons of water is condensed per ton of product which translates to about 50 gallons per hour. This condensate is separated from the air stream after the heat exchanger by a demisting chamber, drained to a tank and recirculated to the top of the heat exchanger to maximize the gas/liquid contact surface for fluoride absorption. The tubes of the heat exchanger act as long throat venturis to accelerate the gas liquid mixture to a velocity such that the heat exchanger is acting as a venturi scrubber.

When MAP grade fertilizer is produced, no ammonia is vaporized so fresh pond water is mixed with the incoming gases prior to the heat exchanger. The heat exchanger tubes provide sufficient mixing to yield excellent contact and fluoride absorption. The pond water also condenses a portion of the water vapor in the air stream which further promotes fluoride vapor absorption (see Figure 3-2.1).

The scrubbing liquids are primarily consumed in the manufacturing process. The weak acid used in the dryer, screen and mills, and cooler scrubbers is formed by mixing controlled amounts of plant wash water and 28 percent acid. This weak acid is then directed to either the DAP reactor to form part of the DAP slurry or the MAP pipe reactor feed tank to be reacted in the pipe reactor. The low mole and high mole scrubbing liquors are piped to the same vessel and are consumed in the manufacturing process (Figure 3-2.6 shows reclaim water and weak phosphoric acid raw material feeds. Figures 3-2.1, 3-2.2, 3-2.3, and 3-2.5 show scrubbing liquor flows).

Plant pond water is used in the crossflow scrubber on a single pass basis for final stage scrubbing of the dryer and the screen and mills gases and returned directly to the plant recirculation pond. The BFL vaporizer/scrubber condensate (during DAP production) or pond water (during MAP production) is also returned to the plant recirculation pond.

The existing dryer scrubber gases, the modified screen and mills scrubber gases, and the new cooler scrubber gases will all discharge to atmosphere through the existing main plant stack. A new separate Reactor/Granulator stack will be installed as part of the proposed modifications (see Figures 3-2.1 and 3-2.2).

3.1.3 AIR EMISSIONS

The proposed project will result in an overall net increase in the emissions of particulate matter and fluorides. However, the installation of state-of-the art control equipment will result in an overall net decrease in the emissions of ammonia. As shown in the calculations (see Appendix), the overall net increase in particulate matter will be about 14 tons per year (tpy). The net increase in fluoride emissions will be about 7 tpy. The net decrease in the emissions of ammonia will be about 86 tpy. While the net emissions increase of particulate matter from the proposed project will be below the significant rate (defined in Chapter 17-2 of the Florida Administrative Code) of 15 tpy, the net emissions increase of fluorides will exceed the significant rate of 3 tpy. The air emission control systems for the primary sources in the North plant are discussed below.

The proposed plant will have two stacks. The main stack will handle the discharge of the cooler scrubbing system, the dryer scrubbing system, and the screen and mill (S/M) scrubbing system. The reactor/granulator (R/G) stack will handle the discharge to atmosphere of the R/G scrubbing system.

While the plant can produce two different fertilizer grades (MAP and DAP), not all of the air streams change between grades. The cooler air stream and the S/M air stream, both in flow characteristics and emissions, remain the same with the two products. Only the dryer and the reactor/granulator air streams change with products.

A. COOLER AIR STREAM

The cooler air stream will first be passed through a dry cyclone to remove the majority of the plus 5 micron particles. This gas stream will then pass through a venturi scrubber followed by a cyclonic separator. The scrubbing liquor used will be recirculated 10 percent phosphoric acid. The gas exiting the scrubber will pass through the fan to the main stack.

The maximum emissions from the cooler scrubber are expected to be:

	DAP Emissions		
Pollutant	lbs/hr	ton/yr	lbs/ton P_2O_5
Particulate	1.98	8.67	NA
Ammonia Gas	3.29	14.41	NA
Fluoride Gas	0.94	4.12	0.020

	MAP Emissions		
Pollutant	lbs/hr	ton/yr	lbs/ton P_2O_5
Particulate	5.52	24.18	NA
Ammonia Gas	4.46	19.53	NA
Fluoride Gas	1.21	5.30	0.030

B. S/M AIR STREAM

The gas flow to the S/M Scrubbing System will be the process equipment exhaust gas. It will first pass through a dry cyclone to remove the majority of the plus 5 micron particulate matter. The gas will then enter the S/M Scrubber. This spray cyclonic scrubber will utilize recirculated 10 percent phosphoric acid as the scrubbing medium. The acid will be sprayed into the incoming duct and intimately mixed with the gas stream. The cyclonic separator/scrubber following the spray duct will improve contact between the liquid and the gas and also separate the liquid from the gas stream. After exiting the separator, the gas will be scrubbed with once-through pond water to saturate the gas stream and to control fluoride emissions.

The gas from the pond water polishing duct will then be passed through the S/M fan, combined with the gases exiting the dryer fan, and passed through a crossflow scrubber utilizing once through pond water to remove fluoride vapors. The gas exiting the crossflow scrubber will be discharged to the atmosphere through the main stack.

The maximum material transport between the S/M scrubber pond water polishing duct and the crossflow scrubber will be:

	Emissions		
Pollutant	lbs/hr	ton/yr	lbs/ton P_2O_5
Particulate	6.60	28.91	NA
Ammonia Gas	1.50	6.57	NA
Fluoride Gas	0.20	0.88	0.003

The emissions from the crossflow scrubber to the main stack will be summarized under the crossflow scrubber section (Section E).

C. DRYER SCRUBBER (DAP PRODUCTION)

The dryer scrubbing system will be nearly identical to the S/M scrubbing system. The gas exiting the dryer will first pass through a dry cyclone to separate the larger than five micron particulate fraction and then be contacted in a spray duct with recirculated 10 percent strength phosphoric acid. The pond water polishing system for the dryer will be different in that it will use a much higher liquid to gas ratio. A separator chamber will be used after the spray duct prior to the dryer fan to ensure separation of the pond water from the gas stream.

After the dryer fan, the gas will combine with the S/M gas prior to passing through the crossflow scrubber. Exiting the crossflow scrubber, the combined gas stream will be discharged through the main stack.

The maximum transport between the dryer scrubber pond water polishing step and the crossflow scrubber will be:

	DAP Emissions		
Pollutant	lbs/hr	ton/yr	lbs/ton P_2O_5
Particulate	4.90	21.46	NA
Ammonia Gas	1.80	7.88	NA
Fluoride Gas	0.48	2.10	0.010

The gas exiting the crossflow scrubber will be discussed in the crossflow scrubber section (Section E).

D. DRYER SCRUBBER (MAP PRODUCTION)

The description of the scrubbing system for MAP operation is identical to that for DAP. The gas quantity will be nearly identical for the two grades, but the quantity of particulate will be greater for MAP due to the manufacturing process.

The maximum transport between the dryer pond water polishing step and the crossflow scrubber will be:

MAP Emissions			
Pollutant	lbs/hr	ton/yr	lbs/ton P_2O_5
Particulate	7.32	32.06	NA
Ammonia Gas	2.67	11.69	NA
Fluoride Gas	0.48	2.10	0.007

The gas exiting the crossflow scrubber is addressed in the following section (Section E).

E. CROSSFLOW SCRUBBER

The crossflow scrubber will use once-through pond water sprayed counter current to the air in order to maximize the absorption of fluoride from the combined S/M and dryer scrubbing system. This type of scrubber will also have minor impact on reducing the amount of ammonia gas and particulate matter in the air stream. The emissions from the crossflow scrubber are expected to be:

CROSSFLOW SCRUBBER DAP PRODUCTION

Pollutant	Input lbs/hr	Output lbs/hr	Output ton/yr	Output lb/ton
Particulate	11.50	8.64	37.84	NA
Ammonia Gas	3.30	1.88	8.23	NA
Fluoride Gas	0.68	0.66	2.89	0.014

CROSSFLOW SCRUBBER MAP PRODUCTION

Pollutant	Input lbs/hr	Output lbs/hr	Output ton/yr	Output lb/ton
Particulate	13.92	10.36	45.38	NA
Ammonia Gas	4.17	2.55	11.17	NA
Fluoride Gas	0.68	0.66	2.89	0.011

F. REACTOR/GRANULATOR SCRUBBER SYSTEM (DAP PRODUCTION)

The gas exiting the reactor will be scrubbed in a spray duct with a high mole ratio (NH_3 to H_3PO_4) recirculated scrubber liquor at the liquid to gas ratio of 12 gpm per 1000 cfm. In a separate duct, additional scrubbing liquor of the same composition at the same liquid/gas ratio will contact the granulator gas. These two streams will then be combined and introduced to a high efficiency cyclonic separator to separate the scrubbing liquor from the gas stream.

This scrubbing liquor will be maintained at a mole ratio of about 1.45 to 1.5 by process controls. At this mole ratio, ammonia gas will be absorbed with little or no fluoride evolution.

After exiting the cyclonic separator, the combined reactor and granulator gas stream will be scrubbed in a venturi scrubber with a recirculated low mole scrubbing liquor. This venturi scrubber will maintain a 12 inch water column pressure drop with an adjustable throat. This adjustment will be necessary since the gas volume varies with plant rate. The low mole scrubbing liquor will operate at a lower temperature since most of the ammonia gas will be removed in the high mole scrubbing stage. At this lower temperature, the evolution of fluoride will be much lower than single stage, single mole scrubber systems.

The low mole scrubber liquor will be produced by adding fresh low strength (about 28 percent P_2O_5) phosphoric acid to the high mole scrubber liquor. The low mole liquor will be partially used as make up to the high mole scrubber and any excess will be bypassed directly to the process.

The gas will then exit the low mole scrubber venturi and pass into a high efficiency cyclonic separator to separate the low mole scrubbing liquor from the gas stream. The overall particulate scrubbing efficiency of this two stage scrubber will be in excess of 99.5 percent while the overall ammonia scrubbing efficiency will be about 96 percent. The ammonia efficiency will be dependent upon the plant rate and the actual mole ratio in the low mole scrubber.

When the gas exits the low mole cyclonic separator, it will pass through the tubes of a shell and tube heat exchanger. The heat exchanger size will be such that the gas velocity entering the tubes will be about 7,000 feet per minute. Ammonia liquid will be maintained at the boiling point in the shell side of the heat exchanger and the hot, saturated gas will vaporize the ammonia liquid. As ammonia is vaporized, some of the water vapor in the gas stream will be condensed. The heat balance indicates that about 0.46 gallons of water will be condensed for each ton of fertilizer product produced, or approximately 50 gallons per hour.

This condensed water will be separated from the gas stream in a specially designed chevron-style vessel. The water will drain into a tank, be mixed with a cold (about 50 ^{o} F) water stream from an air conditioning coil, and then recirculated at a rate of about 5 gpm per 1000 cfm to the inlet of the heat exchanger. The water will mix with the gas stream prior to entering the heat exchanger tubes.

The excess water (that produced by the condensation and the air conditioning stream) will overflow the tank and will be returned to the recirculation pond on the plant site. The normal fluoride level in this recirculated water will be less than 500 ppm. Even at the elevated temperature (about 150 °F), the vapor pressure with this low of a concentration will be quite low and the heat exchanger will act as scrubber.

The gas exiting the separator will go to the fan and then to a separate R/G stack. The maximum emissions from this entire R/G scrubbing system will be:

DAP Emissions

Pollutant	lbs/hr	ton/yr	lbs/ton P_2O_5
Particulate	5.52	24.18	NA
Ammonia Gas	41.56	182.03	NA
Fluoride Gas	1.16	5.08	0.025

G. REACTOR/GRANULATOR SCRUBBING SYSTEM (MAP PRODUCTION)

During MAP production, the reactor will not be utilized and will be shut off by using a damper in the duct. The amount of air withdrawn from the granulator will be increased slightly to handle a higher heat load in the granulator. Other than this increase in gas flow, the high and low mole scrubbers will operate exactly as during DAP production. The sprays in the reactor duct will be shut off as there will be no air flow from the reactor, but all other parts of the system will operate identically. The low mole venturi will be adjusted to maintain 12 inches of water column pressure drop.

As MAP will not utilize vaporized ammonia, once-through pond water will be used at the inlet of the ammonia heat exchanger. The gas flow through the tubes will be at a velocity of about 5,000 feet per minute and will mix the pond water and gas intimately for good contact and absorption. Pond water will used at rate of 10 gpm per 1000 cfm. The pond water will be separated and drained to the plant pond.

Since less ammonia gas will escape the process when producing MAP, the heat load in the double mole scrubbing system will be less and the amount of fluoride volatilized to the gas stream will be less. The maximum emissions from the R/G scrubbing system for MAP production will be:

	MAP Emissions		
Pollutant	lbs/hr	ton/yr	lbs/ton P_2O_5
Particulate	6.62	29.00	NA
Ammonia Gas	30.93	139.85	NA
Fluoride Gas	1.87	8.19	0.030

H. TOTAL EMISSIONS

The total overall emissions expected during DAP and MAP production are tabulated below:

	DAP Production (46.0 tph P_2O_5)				
	Main Stack	R/G Stack	Total		
Pollutant	lbs/hr	lbs/hr	lbs/hr	ton/yr	lb/ton P_2O_5
Particulate	10.62	5.52	16.14	70.69	NA
Ammonia Gas	5.17	41.56	46.73	204.68	NA
Fluoride Gas	1.60	1.16	2.76	12.09	0.060

	MAP Production (62.4 tph P_2O_5)				
	Main Stack	R/G Stack	Total		
Pollutant	lbs/hr	lbs/hr	lbs/hr	ton/yr	lb/ton P_2O_5
Particulate	15.88	6.62	22.51	98.59	NA
Ammonia Gas	7.01	30.93	37.94	166.18	NA
Fluoride Gas	1.87	1.87	3.26	14.28	0.060

3.2 RULE REVIEW

The following are the state and federal air regulatory requirements that apply to new or modified sources subject to a Prevention of Significant Deterioration (PSD) review.

In accordance with EPA and State of Florida PSD review requirements, all major new or modified sources of air pollutants regulated under the Clean Air Act (CAA) are subject to preconstruction review. Florida's State Implementation Plan (SIP), approved by the EPA, authorizes the Florida Department of Environmental Regulation (FDER) to manage the air pollution program in Florida.

The PSD review determines whether or not significant air quality deterioration will result from a new or modified facility. Federal PSD regulations are contained in 40 CFR 52.21, Prevention of Significant Deterioration of Air Quality. The State of Florida has adopted PSD regulations which are essentially identical to the federal regulations and are contained in Chapter 17-2 of the Florida Administration Code (FAC). All new major facilities and major modifications to existing facilities are subject to control technology review, source impact analysis, air quality analysis and additional impact analyses for each pollutant subject to a PSD review. A facility must also comply with the Good Engineering Practice (GEP) stack height rule.

A major facility is defined in the PSD rules as anyone of the 28 specific source categories (see Table 3-5) which has the potential to emit 100 tons per year (tpy) or more, or any other stationary facility which has the potential to emit 250 tpy or more, of any pollutant regulated under the CAA. A major modification is defined in the PSD rules as a change at an existing major facility which increases the actual emissions by greater than significant amounts (see Table 3-6).

3.2.1 AMBIENT AIR QUALITY STANDARDS

The EPA and the state of Florida have developed/adopted ambient air quality standards, AAQS (see Table 3-7). Primary AAQS protect the public health while the secondary AAQS protect the public welfare from adverse effects of air pollution. Areas of the country have been designated as attainment or nonattainment for specific pollutants. Areas not meeting the AAQS for a given pollutant are designated as nonattainment areas for that pollutant. Any new source or expansion of existing sources in or near these nonattainment areas are usually subject to more stringent air permitting requirements. Projects proposed in attainment areas are subject to air permit requirements which would ensure continued attainment status.

3.2.2 CONTROL TECHNOLOGY EVALUATION

The PSD control technology review requires that all applicable federal and state emission limiting standards be met and that Best Available Control Technology (BACT) be applied to the source. The BACT requirements are applicable to all regulated pollutants subject to a PSD review.

BACT is defined in Chapter 17-2, FAC as an emission limitation, including a visible emission standard, based on the maximum degree of reduction of each pollutant emitted which the Department, on a case-by-case basis, taking into account energy, environmental, and economic impacts, and other costs, determines is achievable through application of production processes and available methods, systems, and techniques (including fuel cleaning or treatment or innovative fuel combustion techniques) for control of such pollutant. If the Department determines that technological or economic limitations on the application of measurement methodology to a particular part of a source or facility would make the imposition of an emission standard infeasible, a design, equipment, work practice, operational standard or combination thereof, may be prescribed instead, to satisfy the requirement for the application of BACT. Such standard shall, to the degree possible, set forth the emissions reductions achievable by implementation of such design, equipment, work practice or operation. Each BACT determination shall include applicable test methods or shall provide for determining compliance with the standard(s) by means which achieve equivalent results.

The reason for evaluating the BACT is to minimize as much as possible the consumption of PSD increments and to allow future growth without significantly degrading air quality. The BACT review also assures that the most current control systems are incorporated in the design of a proposed facility. The BACT, as a minimum, has to comply with the applicable New Source Performance Standard for the source. The BACT analysis requires the evaluation of the available air pollution control methods including a cost-benefit analysis of the alternatives. The cost-benefit analysis includes consideration of materials, energy, and economic penalties associated with the control systems, as well as environmental benefits derived from the alternatives.

EPA recently determined that the bottom-up approach (starting at NSPS and working up to BACT) was not providing the level of BACT originally intended. As a result, in December 1987, EPA strongly suggested changes in the implementation of the PSD program including the "top-down" approach to BACT. The top-down approach requires an application to start with the most stringent control alternative, often Lowest Achievable Emission Rate (LAER), and justify its rejection or acceptance as BACT. Rejection of control alternatives may be based on technical or economical infeasibility, physical differences, locational differences, and environmental or energy impact differences when comparing a proposed project with a project previously subject to that BACT.

3.2.3 AIR QUALITY MONITORING

An application for a PSD permit requires an analysis of ambient air quality in the area affected by the proposed facility or major modification. For a new major facility, the affected pollutants are those that the facility would potentially emit in significant amounts. For a major modification, the pollutants are those for which the net emissions increase exceeds the significant emission rate.

Ambient air monitoring for a period of up to one year, but no less than four months, may be required for any pollutant for which ambient air quality standards have been established (other than nonmethane hydrocarbons). For any air pollutant for which no ambient air quality standards have been established, monitoring data may be required by the Department. Existing ambient air data for a location in the vicinity of the proposed project is acceptable if the data meet FDER quality assurance requirements. If not, additional data would need to be gathered. There are guidelines available for designing a PSD air monitoring network in EPA's "Ambient Monitoring Guidelines for Prevention of Significant Deterioration."

FDER may exempt a proposed major stationary facility or major modification from the monitoring requirements with respect to a particular pollutant if the emissions increase of the pollutant from the facility or modification would cause air quality impacts less than the de minimis levels (see Table 3-6) or if no ambient air quality standards have been established.

3.2.4 AMBIENT IMPACT ANALYSIS

An impact analysis is required for a proposed major source subject to PSD for each pollutant for which the increase in emissions exceeds the significant emission rate. Specific atmospheric dispersion models are required in performing the impact analysis. The analysis should demonstrate the project's compliance with AAQS and allowable PSD increments. The impact analysis for criteria pollutants may be limited to only the new or modified source if the net increase in impacts due to the new or modified source is below significant impact levels.

Typically, a five-year record of meteorological data is used for the evaluation of the highest, second-high short-term concentrations for comparison to AAQS or PSD increments. The term "highest, second-high" refers to the highest of the second-highest concentrations at all receptors. The second-high concentration is considered because short-term AAQS specify that the standard shall not be exceeded at any location more than once a year. If less than five years of meteorological data are used in the modeling analysis, the highest concentration at each receptor is normally used.

3.2.5 ADDITIONAL IMPACT ANALYSIS

The PSD rules also require analyses of the impairment to visibility and the impact on soils and vegetation that would occur as a result of the project. A visibility impairment analysis must be conducted for PSD Class I areas. Impacts due to commercial, residential, industrial, and other growth associated with the source must be addressed.

3.2.6 GOOD ENGINEERING PRACTICE STACK HEIGHT

In accordance with Chapter 17-2, FAC, the degree of emission limitation required for control of any pollutant is not to be affected by a stack height that exceeds Good Engineering Practice (GEP), or any other dispersion technique. GEP stack height is defined as the highest of:

1. 65 meters (m), or

2. A height established by applying the formula:

   $Hg = H + 1.5 L$

   where:

   Hg - GEP stack height,

   H - Height of the structure or nearby structure, and

   L - Lesser dimension, height or projected width of nearby structure(s), or

3. A height demonstrated by a model or field study.

The GEP stack height regulations require that the stack height used in modeling for determining compliance with AAQS and PSD increments not exceed the GEP stack height. The actual stack height may be higher or lower.

3.3 RULE APPLICABILITY

The MAP/DAP production increase at Farmland Hydro, L.P. is classified as a major modification to a major facility subject to both state and federal regulations as set forth in Chapter 17-2, FAC. The facility is located in an area classified as attainment for each of the regulated air pollutants and the Farmland Hydro, L.P. complex is beyond 100 km from the nearest Class I area. The proposed modification to the existing MAP/DAP North plant will result in significant increases in fluoride emissions as defined by Rule 17-2.500(2)(e)2, FAC, but less than a significant increase in particulate matter emissions and the emissions of other pollutants. The project will therefore be subject to PSD preconstruction review requirements in accordance with FAC Rule 17-2.500 for fluorides. This will include a determination of Best Available Control Technology, an air quality review, Good Engineering Practice stack height analysis and an evaluation of impacts on soils, vegetation and visibility.

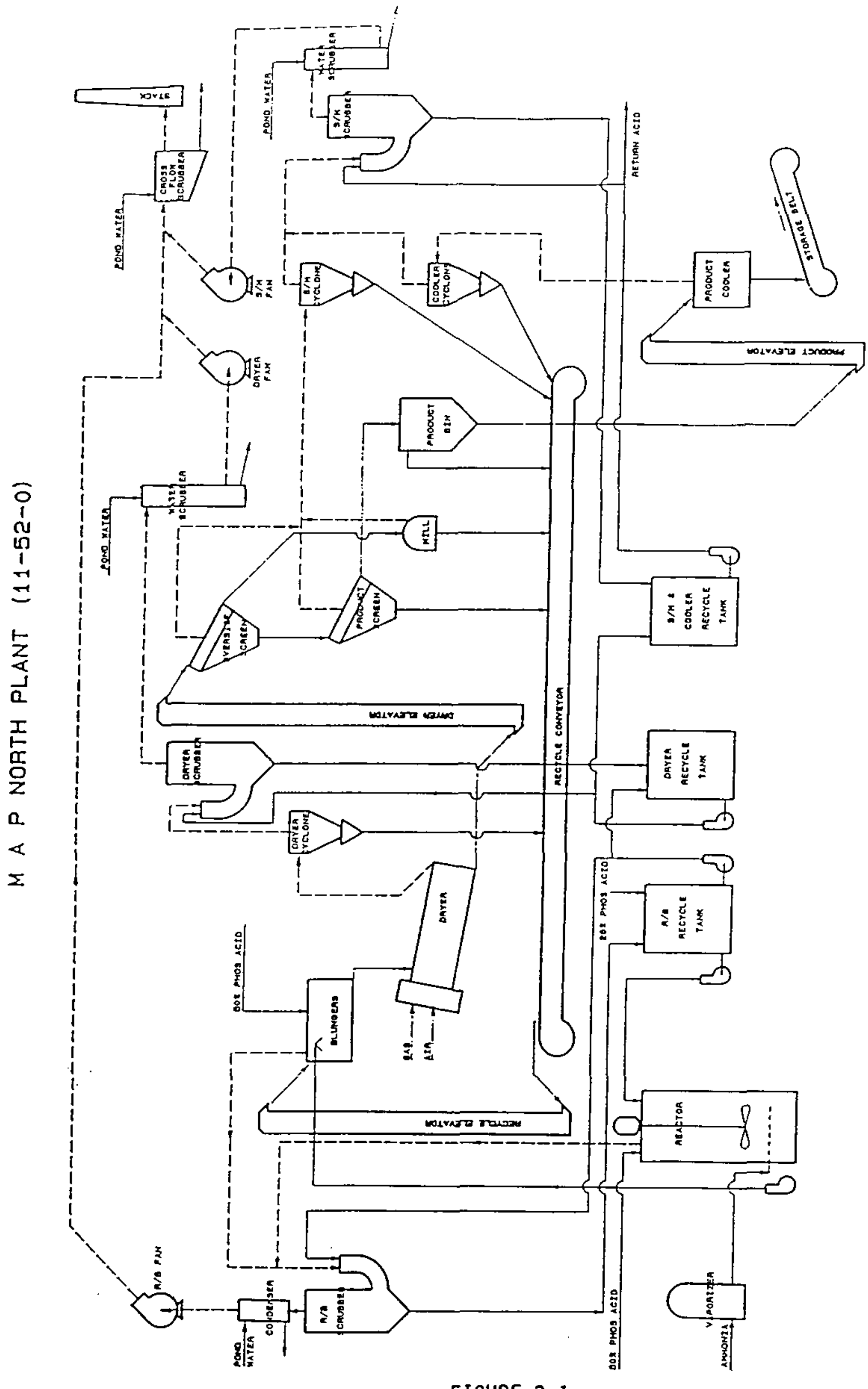
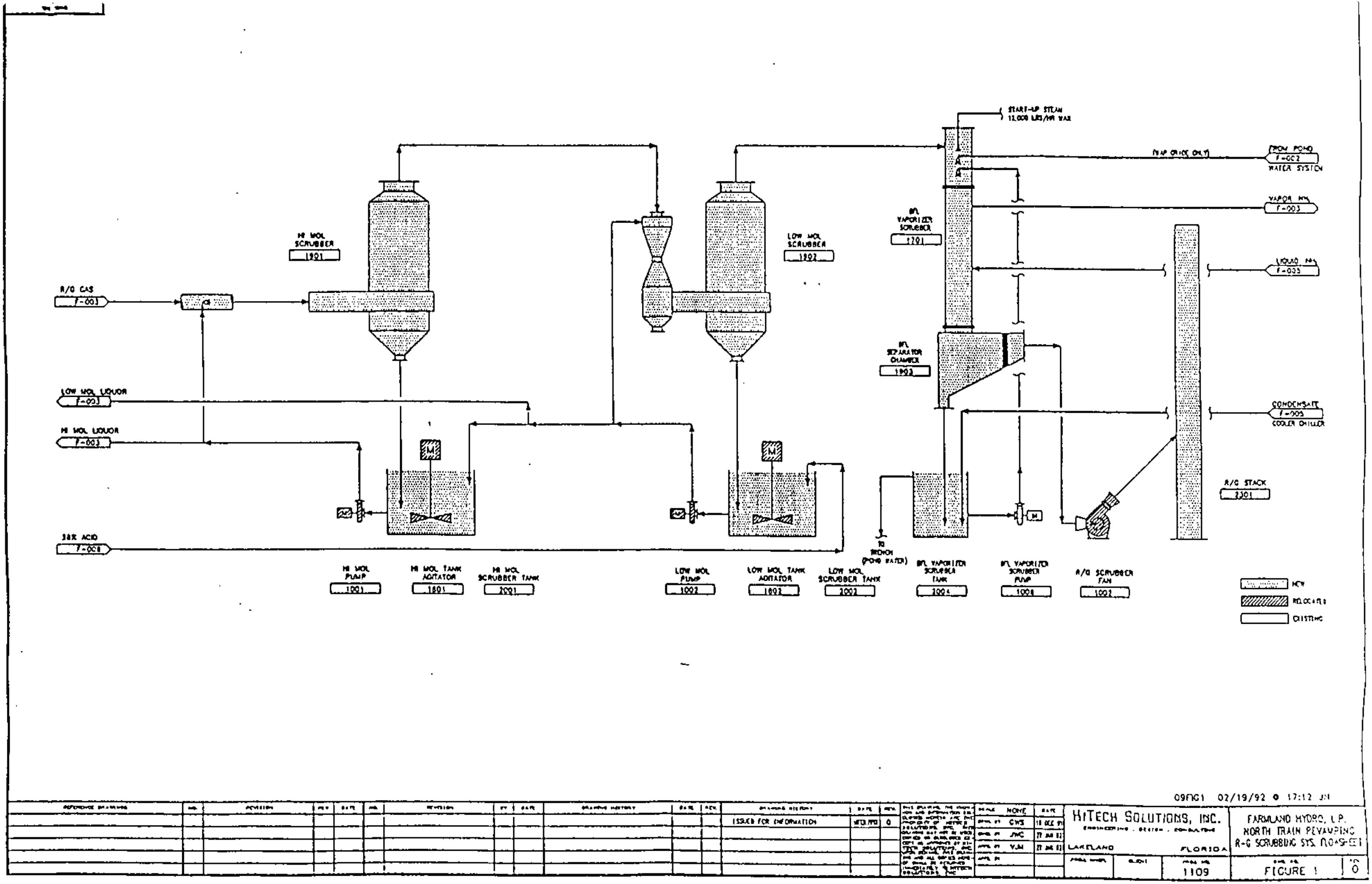


FIGURE 3-1
MAP/DAP PLANT - NORTH
PROCESS FLOW DIAGRAM - EXISTING LAYOUT

FARMLAND HYDRO, L.P.
POLK COUNTY, FLORIDA



<u>FIGURE 3-2.1</u>
MAP/DAP PLANT - NORTH
PROCESS FLOW DIAGRAM
R-G SCRUBBING SYSTEM

FARMLAND HYDRO, L.P.
POLK COUNTY, FLORIDA

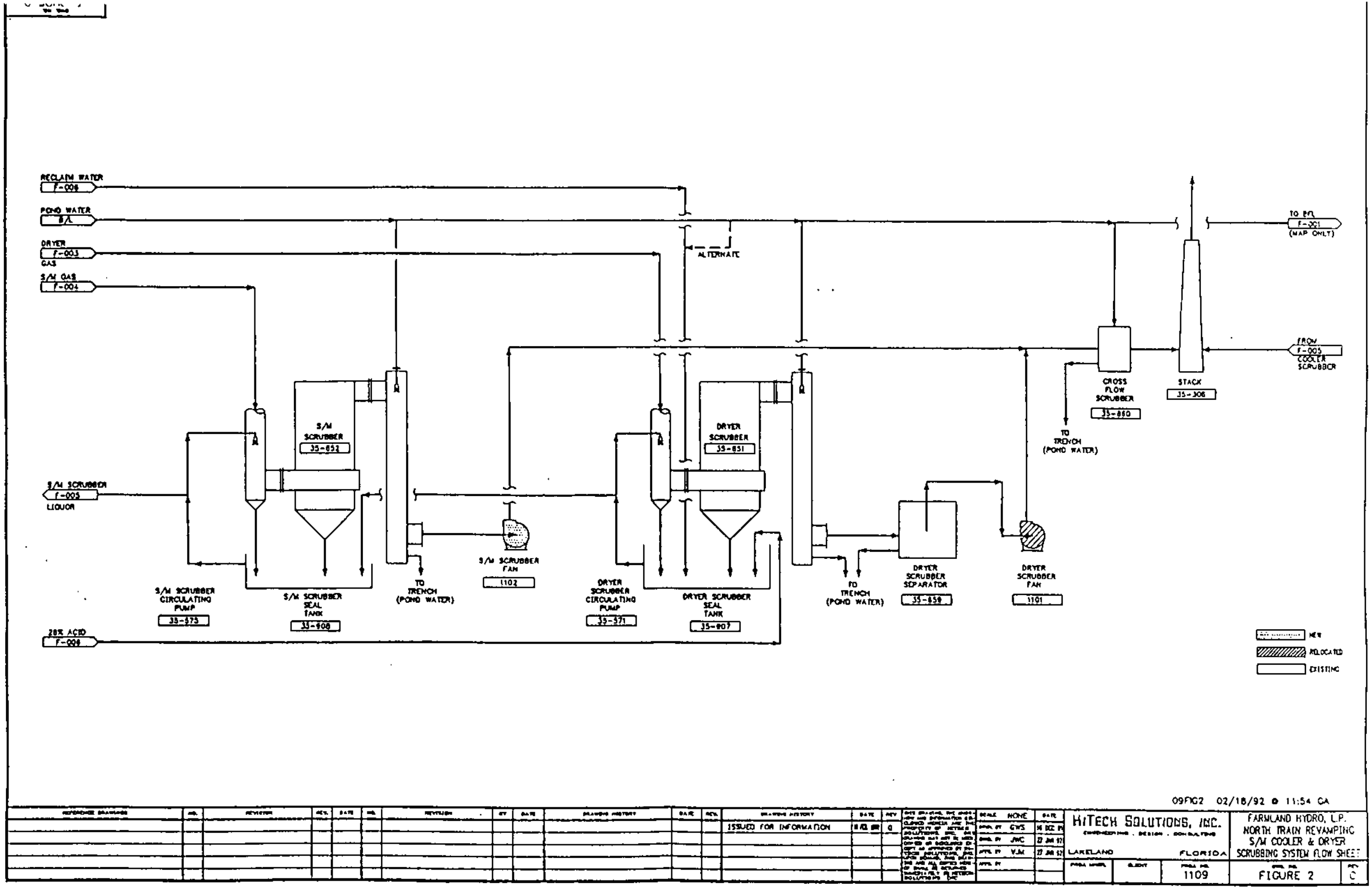


FIGURE 3-2.2
MAP/DAP PLANT - NORTH
PROCESS FLOW DIAGRAM - PROPOSED LAYOUT
S/M COOLER AND DRYER SCRUBBING SYSTEM

FARMLAND HYDRO, L.P.
POLK COUNTY, FLORIDA

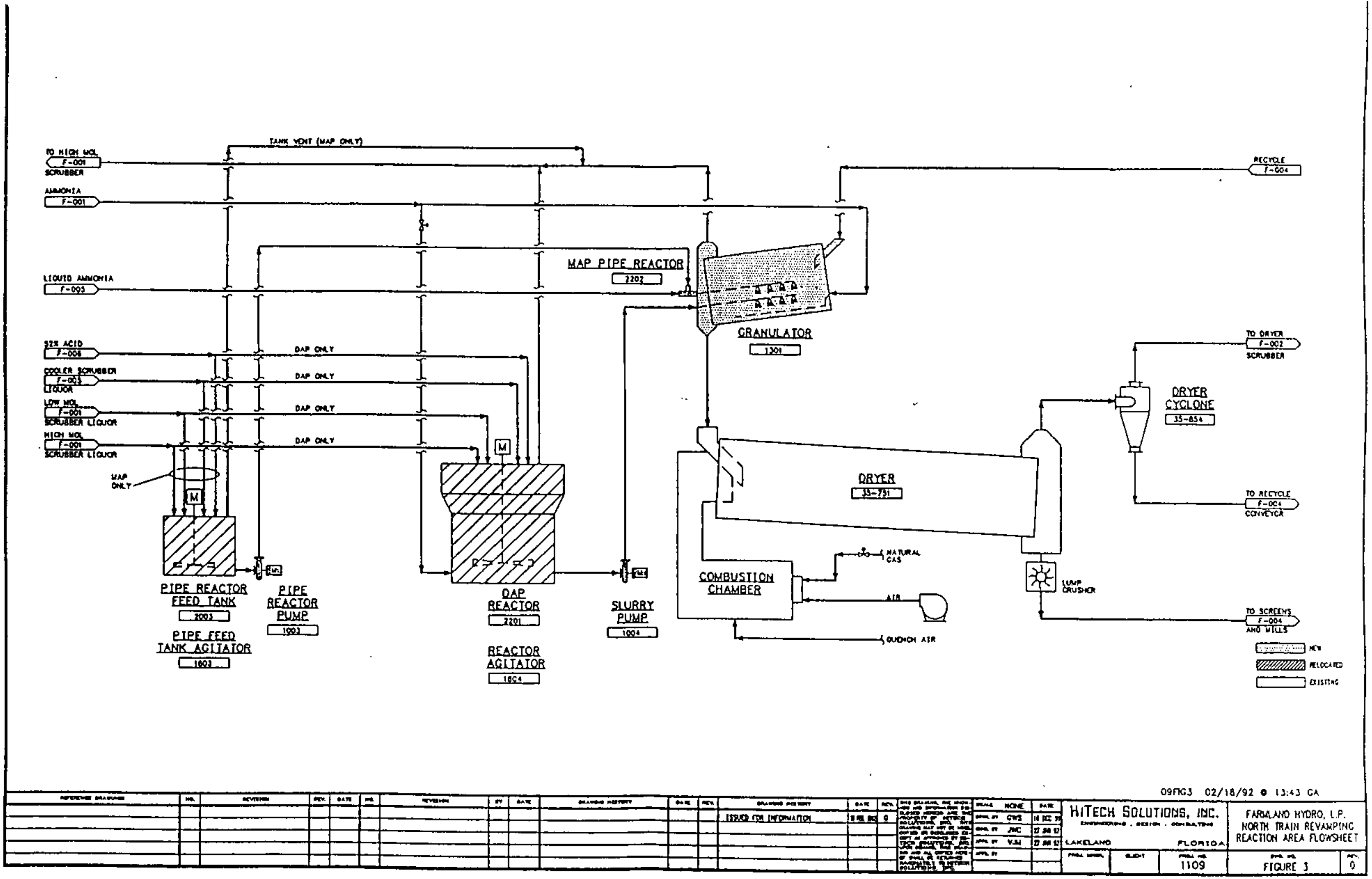


FIGURE 3-2.3
MAP/DAP PLANT - NORTH
PROCESS FLOW DIAGRAM - PROPOSED LAYOUT
REACTOR AND DRYER SYSTEM

FARMLAND HYDRO, L.P.
POLK COUNTY, FLORIDA

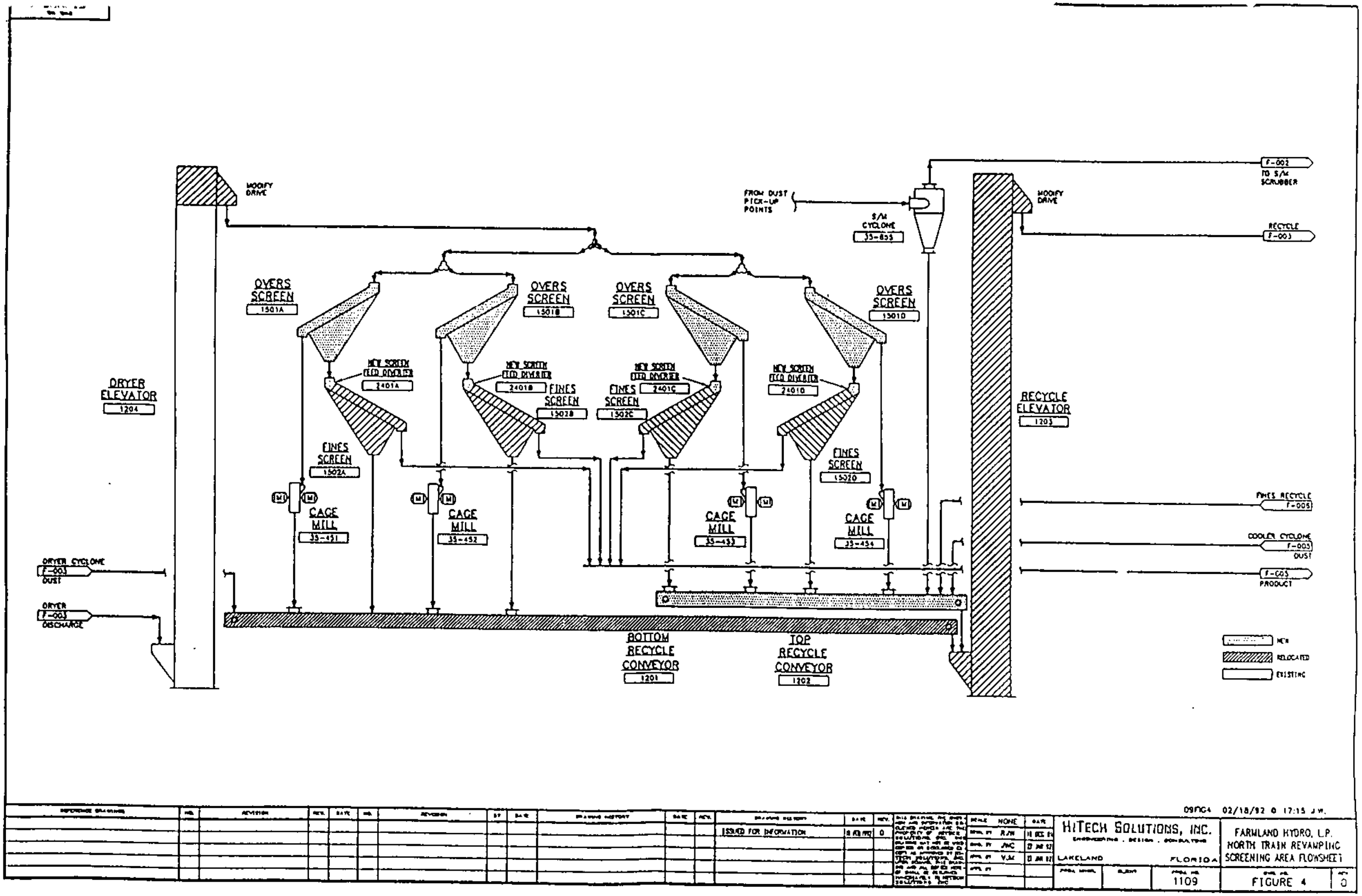


FIGURE 3-2.4
MAP/DAP PLANT - NORTH
PROCESS FLOW DIAGRAM - PROPOSED LAYOUT
SCREENING SYSTEM

FARMLAND HYDRO, L.P.
POLK COUNTY, FLORIDA

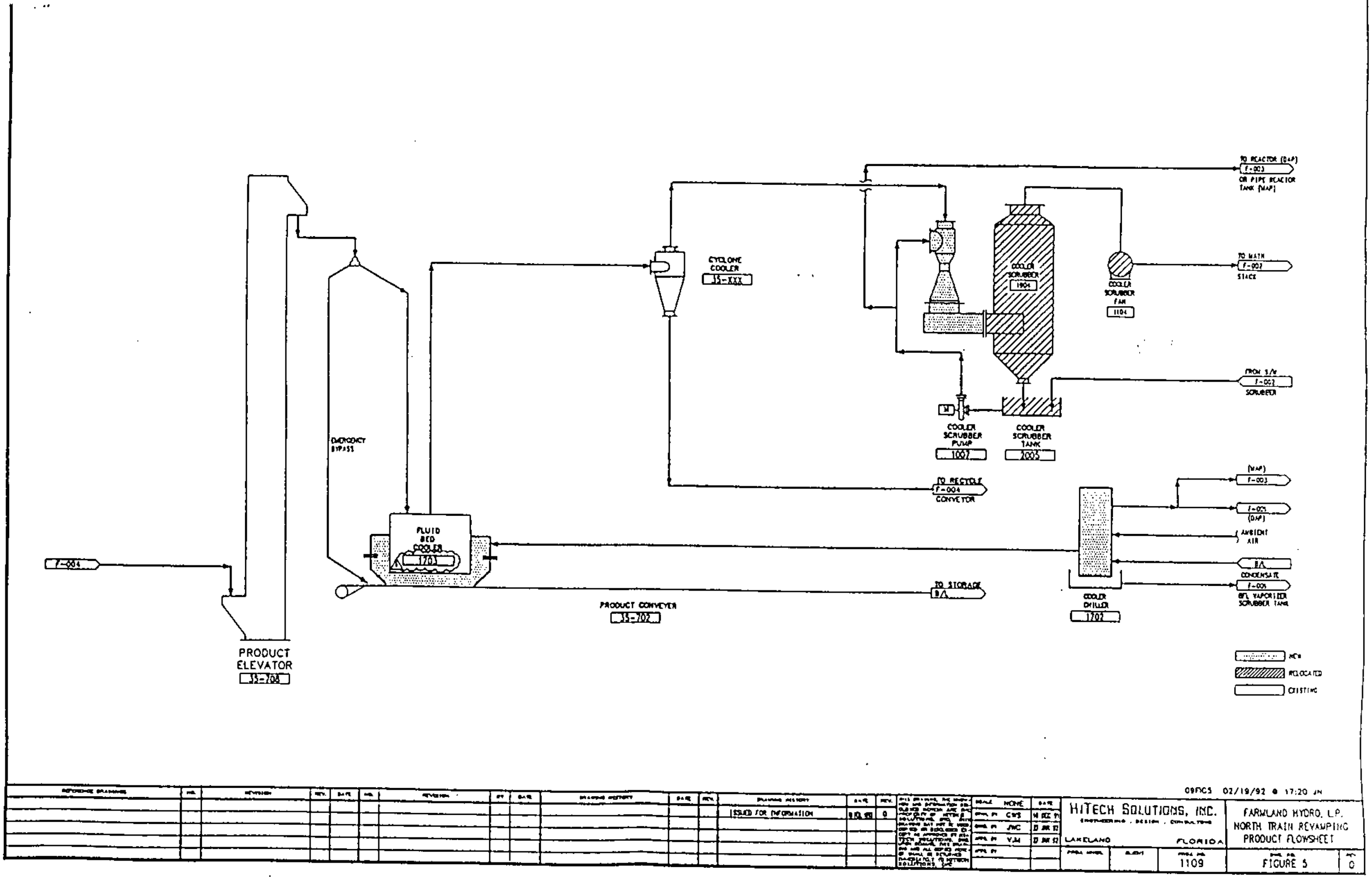


FIGURE 3-2.5
MAP/DAP PLANT
PROCESS FLOW DIAGRAM - PROPOSED LAYOUT
PRODUCT COOLER SCRUBBING SYSTEM

FARMLAND HYDRO, L.P.
POLK COUNTY, FLORIDA

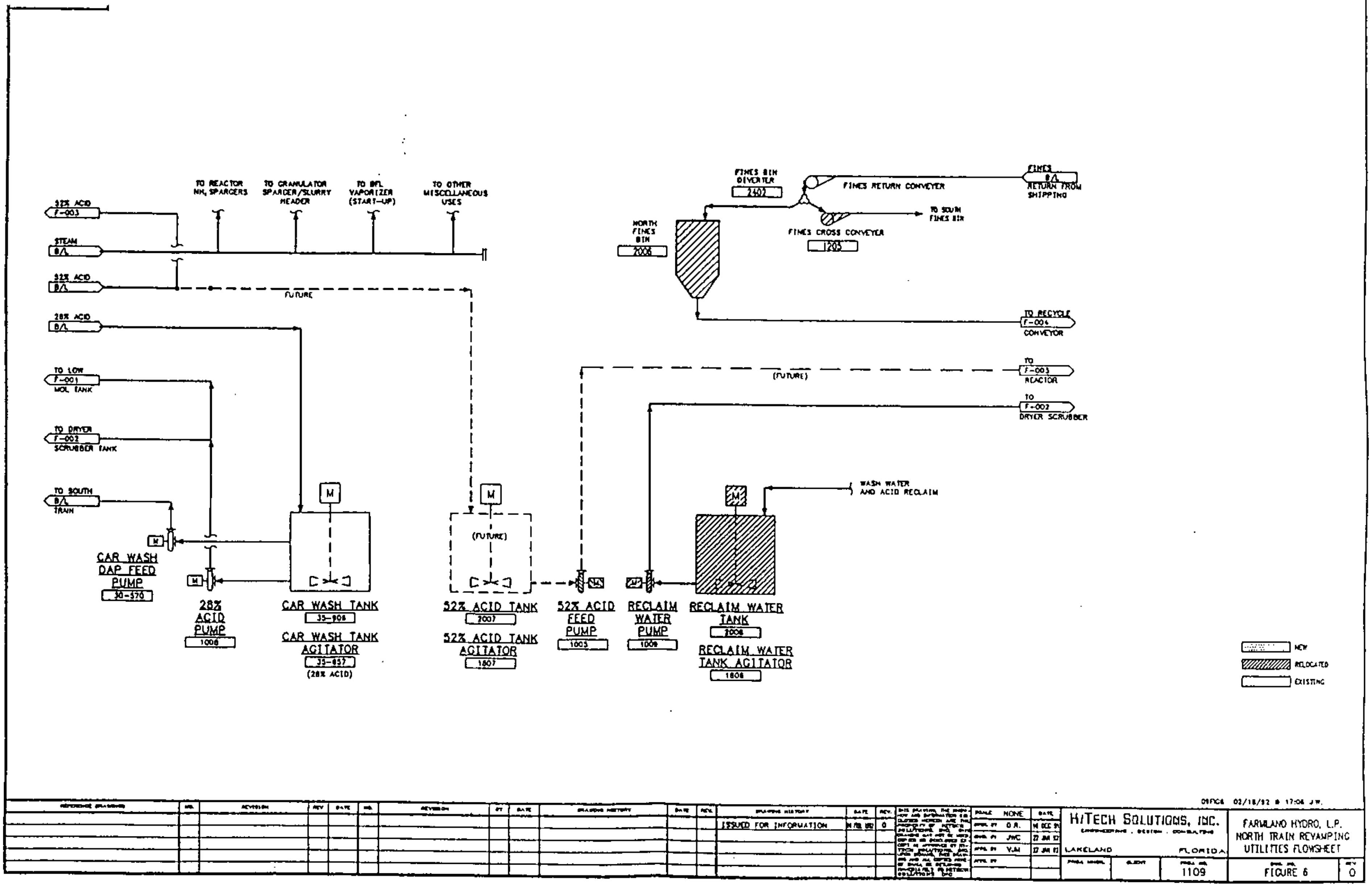


FIGURE 3-2.6
MAP/DAP PLANT - NORTH
PROCESS FLOW DIAGRAM - PROPOSED LAYOUT
UTILITIES FLOW SHEET

FARMLAND HYDRO, L.P.
POLK COUNTY, FLORIDA

TABLE 3-1

GTSP/MAP/DAP NORTH PLANT
MEASURED EMISSION DATA SUMMARY

FARMLAND HYDRO, L.P.
POLK COUNTY, FLORIDA

	TEST DATE	EMISSIONS		
		Part. Matter	Fluorides	
Product	month/year	lb/hr	lb/hr	lb/ton P_2O_5
MAP	4/90	12.21	3.412	0.110
MAP	12/90	13.25	3.695	0.109
MAP	9/91	5.75*	1.366*	0.040*
DAP**	7/89	18.19	1.035	0.056
DAP**	5/90	4.70	0.825	0.045

* The 1991 MAP test data for particulate matter and fluorides indicates low emission rates because of operational difficulty experienced in achieving adequate air flow through the product dryer and cooler. The lower air flow rate resulted in lower particulate matter entrainment as well as inadequate drying and cooling of the product.

** These are the only recent test data available on DAP, which was produced less than 10% of the time.

TABLE 3-2

CONTEMPORANEOUS PM EMISSION CHANGES

FARMLAND HYDRO, L.P.
POLK COUNTY, FLORIDA

Source	Permit No.	Exp. Date [1]	Permitted Emissions lb/hr	Permitted Emissions tpy	Actual Emissions [2] lb/hr	Actual Emissions [2] tpy
Rock Unloading	A053-151296	11/30/93	35.5	155.5	11.2	32.8
PAD 1 Ball Mill	A053-157062	1/17/94	26.2	114.8	2.9	8.1
PAD 2 Ball Mill	A053-157064	1/17/94	27.2	119.1	2.9	8.4
TOTAL				389.4		49.3

1 Permits surrendered to FDER on 6/17/91 when dry rock processing was discontinued.

2 Emissions averaged over 1989 and 1990. See calculations provided in the Appendix

TABLE 3-3

PROPOSED CHANGES IN PRODUCTION AND EMISSION RATES(1)

FARMLAND HYDRO, L.P.
POLK COUNTY, FLORIDA

	NORTH PLANT		
	GTSP	MAP	DAP
PERMIT ALLOWABLE CONDITIONS			
Rate (tph product)	33.2	70	50
F (lb/ton P_2O_5)	0.53	0.12	0.06
(lb/hr)	8.18	3.4	2.4
(tpy)	35.8	14.9	10.5
PM (lb/hr)	26.9	26.9	26.9
(tpy)	117.8	117.8	117.8
Operating Factor	1.0	1.0	1.0
ACTUAL CONDITIONS (1990 - 1991 AVERAGE)			
Rate (tph product)	--	63.2	45.0
F (lb/ton P_2O_5)	--	0.07	0.051
(lb/hr)	--	2.83	0.93
(tpy)	--	9.4	0.19
PM (lb/hr)	--	10.4	11.45
(tpy)	--	35.1	2.27
NH_3 (lb/hr)	--	--	77.4
(tpy)	--	--	291.4
Operating Factor	--	0.83	0.06

TABLE 3-3 (continued)

	NORTH PLANT		
	GTSP	MAP	DAP
PROPOSED CONDITIONS			
Rate (tph product)	NA	120	100
F (lb/ton P_2O_5)	NA	0.06	0.06
(lb/hr)	NA	3.74	2.76
(tpy)	NA	16.4	12.1
PM (lb/hr)	NA	22.5	16.4
(tpy)	NA	98.6	71.8
NH_3 (lb/hr)	NA	37.9	46.7
(tpy)	NA	166.2	204.7
Operating Factor	NA	1.0	1.0

1. See Appendix for calculations of emission rates.

TABLE 3-3 (continued)

Operation	Pollutant	Presently Permitted Emissions lb/hr	Presently Permitted Emissions ton/yr	Proposed Permit Emissions lb/hr	Proposed Permit Emissions ton/yr	Net Change ton/yr
MAP	Particulate Matter	26.9	117.8	22.5	98.6	- 19.2
	Fluorides	3.4	14.9	3.7	16.4	+ 1.5
	Ammonia	--	--	37.9	166.2	--
DAP	Particulate Matter	26.9	117.8	16.1	70.7	- 47.1
	Fluorides	2.4	10.5	2.8	12.1	+ 1.6
	Ammonia	--	--	46.7	204.7	--
Natural Gas Combustion Products	Particulate Matter	0.25	1.10	0.25	1.10	0.0
	Sulfur Dioxide	0.03	0.13	0.03	0.13	0.0
	Nitrogen Oxides	7.00	30.70	7.00	30.70	0.0
	Carbon Monoxide	1.75	7.70	1.75	7.70	0.0
	NMHC *	0.14	0.61	0.14	0.61	0.0

* Non Methane Hydrocarbons

TABLE 3-4

NET EMISSION INCREASES(1)

FARMLAND HYDRO, L.P.
POLK COUNTY, FLORIDA

Pollutant	North Plant Emissions tpy
FLUORIDES (MAP-Worst Case)	
Present (actual)	- 9.4
Proposed	+ 16.4
Total Increase	+ 7.0
Significant Increase (2)	3.0
PM/PM_{10} (MAP-Worst Case)	
Contemporaneous (3)	- 49.3
Present (actual)	- 35.1
Proposed	+ 98.6
Total Increase	+ 14.2
Significant Increase (2)	15.0
Ammonia (DAP-Worst Case)	
Present (actual) (4)	- 291.4
Proposed (5)	+ 204.7
Total Increase	- 86.7
Significant Increase (6)	NA

(1) See Appendix for emission calculations.
(2) Presented in Table 500.2, Chapter 17-2, FAC.
(3) Contemporaneous emission decreases due to shutdown sources.
(4) Based on past performance data.
(5) Ammonia emissions based on HiTech data.
(6) Not applicable to Ammonia, Chapter 17-2, FAC.

TABLE 3-5

MAJOR FACILITY CATEGORIES

FARMLAND HYDRO, L.P.
POLK COUNTY, FLORIDA

Fossil fuel fired steam electric plants of more than 250 MMBTU/hr heat input
Coal cleaning plants (with thermal dryers)
Kraft pulp mills
Portland cement plants
Primary zinc smelters
Iron and steel mill plants
Primary aluminum ore reduction plants
Primary copper smelters
Municipal incinerators capable of charging more than 250 tons of refuse per day
Hydrofluoric acid plants
Sulfuric acid plants
Nitric acid plants
Petroleum refineries
Lime plants
Phosphate rock processing plants
Coke oven batteries
Sulfur recovery plants
Carbon black plants (furnace process)
Primary lead smelters
Fuel conversion plants
Sintering plants
Secondary metal production plants
Chemical process plants
Fossil fuel boilers (or combinations thereof) totaling more than 250 million BTU/hr heat input
Petroleum storage and transfer units with total storage capacity exceeding 300,000 barrels
Taconite ore processing plants
Glass fiber processing plants
Charcoal production plants

TABLE 3-6

REGULATED AIR POLLUTANTS - SIGNIFICANT EMISSION RATES

FARMLAND HYDRO, L.P.
POLK COUNTY, FLORIDA

	Significant Emission Rate (tons/yr)	De Minimis Ambient Impacts Pollutant (ug/m3)	
CO	100	575	(8-hour)
NO_x	40	14	(NO_2, Annual)
SO_2	40	13	(24-hour)
Ozone	40 (VOC)	---	
PM (TSP)	25	10	(24-hour)
PM_{10}	15	10	(24-hour)
TRS (including H_2S)	10	0.2	(1-h our)
H_2SO_4 mist	7	---	
Fluorides	3	0.25	(24-hour)
Vinyl Chloride	1	15	(24-hour)
	(pounds/yr)		
Lead	1200	0.1	(Quarterly avg)
Mercury	200	0.25	(24-hour)
Asbestos	14	---	
Beryllium	0.8	0.001	(24-hour)

TABLE 3-7

AMBIENT AIR QUALITY STANDARDS

FARMLAND HYDRO, L.P.
POLK COUNTY, FLORIDA

		FDER (State)		USEPA (National) Primary		USEPA (National) Secondary	
Pollutant		ug/m3	PPM	ug/m3	PPM	ug/m3	PPM
SO_2,	3-hour	1,300	0.5	-	-	1300	0.5
	24-hour	260	0.1	365	0.14	-	-
	Annual	60	0.02	80	0.03	-	-
PM_{10},	24-hour	150	-	150	-	150	-
	Annual	50	-	50	-	50	-
CO,	1-hour	40,000	35	40,000	35	-	-
	8-hour	10,000	9	10,000	9	-	-
Ozone,	1-hour	235	0.12	235	0.12	235	0.12
NO_2,	Annual	100	0.05	100	-	100	-
Lead,	Quarterly	1.5	-	1.5	-	1.5	-

TABLE 3-8

PSD INCREMENTS

FARMLAND HYDRO, L.P.
POLK COUNTY, FLORIDA

Pollutant	Allowable PSD Increments (State/National)		
	Class I ug/m3	Class II ug/m3	Class III ug/ m3
TSP, Annual	5	19	37
24-hour	10	37	75
SO_2, Annual	2	20	40
24-hour	5	91	182
3-hour	25	512	700
NO_2, Annual	2.5	25	50

4.0 BEST AVAILABLE CONTROL TECHNOLOGY

Best Available Control Technology (BACT) is required to control air pollutants emitted from newly constructed major sources or from a modification to a major emitting facility if the modification results in significant increase in the emission rate of regulated pollutants (see Table 3-6 for significant emission levels).

The North plant will emit particulate matter, ammonia, and fluorides. The emission rate increases proposed by Farmland Hydro, L.P. have been summarized in Table 3-4. A small amount of natural gas combustion products are also emitted from the dryer system. Fluorides are present in the tail gas exhausted from all MAP/DAP plants. The fluoride emission increase from the proposed project will represent a significant increase while particulate matter emissions will be less than significant. A BACT analysis is therefore required for only fluorides.

4.1 EMISSION STANDARDS FOR MAP/DAP PLANTS

Federal New Source Performance Standards (NSPS) have been promulgated for DAP plants. These standards became effective on October 22, 1974 and are codified in 40 CFR 60, Subpart V and require fluoride emissions to be limited to no more than 0.060 pound per ton of P_2O_5. Although no separate NSPS exist for MAP plants, it is recognized that the fluoride emission standard that applies to the DAP plant is also reasonable for the MAP plant. The NSPS under Subpart V do not include emission standards for particulate matter or ammonia from MAP/DAP plants.

EPA revised/amended the New Source Performance Standards for DAP plants in 1989. At that time, no change to the emission standard was deemed necessary or justified. There has been no change in EPA philosophy related to DAP plants since the 1989 review.

A review of BACT/LAER determinations published in the EPA Clearinghouse indicates that no new control alternatives have been applied to MAP/DAP plants as of 1991 that would result in a consistent reduction in fluoride emission below 0.06 pound per ton of P_2O_5.

The general visible emission limiting standard in Chapter 17-2.610, FAC, requires that the visible emissions from the plant not exceed 20 percent opacity.

4.2 CONTROL TECHNOLOGY

At all MAP/DAP plants, wet scrubbing equipment is conventionally applied for removal of ammonia, fluorides and particulate dusts from effluent gas streams. These scrubbers are designed for a variety of functions which include ammonia recovery, particulate collection, and fluoride removal. These functions require a complex arrangement of the scrubbing equipment often tailored for a specific facility.

Wet scrubbers are chosen over other types of pollution control devices because of the flexibility offered in controlling emissions of ammonia, fluorides, and particulates in gas streams high in moisture content. All the gas streams in the MAP/DAP plant originate in wet reactors, dryers, or other pieces of process equipment laden with a significant amount of moisture. The high concentration of water vapor in the gas streams pose problems in the use of fabric collectors and, to a lesser extent, in the use of mechanical or electrostatic collectors.

Typically the scrubbing media are weak acids (from within the process) and pond water (for tail gas scrubbing). The availability of process water as a scrubbing medium and the process water recirculation system as a settling basin for collected solids are ideal features for wet scrubbers.

Although the focus of the control technology review is fluorides, the fertilizer manufacturing process collectively optimizes the collection of particulate matter, ammonia recovery and fluoride control. The combination of requirements for particulate collection, gas absorption for NH_3 recovery, and fluoride emission control requires the application of a wide variety and combination of scrubber types for MAP/DAP plants. The most often used are two-stage wet cyclonic, venturi/cyclone and cross-flow packed scrubbers.

The two pollutants generally addressed under control technology applicability in granular fertilizer plants are particulate matter and fluoride. Ammonia is presently controlled more for material recovery and odor control. There is also a limit placed on the opacity of emissions from granular fertilizer plant stacks of 20 percent. In discussing Best Available Control Technology, it is necessary to address each pollutant separately as the overall control system optimizes the control of all three pollutants. It should be noted, however, that only fluoride emissions from the North plant require a BACT analysis.

An ammoniated fertilizer plant will generally have five separate process gas streams which must be controlled prior to discharging to atmosphere:

A. REACTOR GAS STREAM. Most ammoniated fertilizer plants use a vessel in which most of the ammonia reacts with the phosphoric acid. The gas stream from this reactor contains large amounts of water vapor, large amounts of ammonia, and small amounts of fluoride vapor.

B. GRANULATOR GAS STREAM. The final ammoniation of the phosphoric acid occurs in the granulator. The unit is vented and the air stream contains large amounts of particulate matter, large amounts of ammonia, and small amounts of fluoride vapor.

C. DRYER AIR STREAM. The dryer is a direct contact dryer which uses hot gases to remove excess moisture from the product. The air stream contains particulate matter, a trace of ammonia, a trace amount of fluoride vapor, and combustion products from the natural gas used to fire the dryer.

D. PROCESS EQUIPMENT VENTILATION. The various solids handling equipment is kept under a slight negative pressure by venting all equipment. Some small amount of dust becomes airborne in these streams. Because the solid material is hot, there is also very small amounts of ammonia vapor released into the air stream. Little or no fluoride vapor is evolved by the solids.

E. PRODUCT COOLER AIR STREAM. The final product is cooled by a solid-to-air heat exchanger prior to transfer to storage. This air stream contains some particulate matter and a very small amount of ammonia. Little or no fluoride vapor is evolved in the cooler.

In general, there is not a separate system for each of the above air streams. In nearly all plants, the reactor and the granulator air streams are combined as these air streams contain over 99 percent of the total ammonia evolved into the gas streams. In some plants, the process equipment venting and the low temperature air streams will be combined while the dryer air stream is nearly always left separate for process reasons.

In the Farmland Hydro North train, it is proposed to combine the reactor and the granulator air streams and have separate air streams for the dryer, the process equipment, and the product cooler.

4.2.1 PARTICULATE MATTER

The particulate matter generated in a fertilizer plant is all fine fertilizer dust. In an ammoniated fertilizer plant, the dust will be either MAP or DAP fertilizer depending on which grade of fertilizer the plant is producing. The particulate size analyses which have been performed on the dust indicate that the size distribution is essentially 100 percent plus one micron in size and approximately 80 percent plus five microns in size.

The Best Available Control Technology uses a standard dry cyclone to separate essentially all of the plus 5 micron material from the air stream prior to the stream entering the wet scrubbing system. Modern high efficiency cyclones using a pressure drop of approximately 3 to 4 inches of water column are completely satisfactory for this operation. The basic cyclone design has remained relatively constant for over 20 years. Only minor improvements have been made in materials of construction to improve operating life and decrease the tendency of the cyclone to plug.

The granulator air stream will not have a cyclone as most of the particulate matter in the air stream is less than five microns and the gas stream is extremely humid. Cyclones will not operate satisfactorily in this service. All other air streams that contain particulate matter (Dryer, Cooler, Process Equipment Evacuation) will have cyclones.

Once the large size particulate matter has been removed, the gases will enter into the scrubbing systems. Because of the particulate size, a venturi scrubber with a pressure drop of 12 inches water column has proven to be extremely efficient in particulate removal while also providing ability, in a single unit, to remove the ammonia gases. Minimum measured particulate removal efficiencies at 12 inches water column pressure drop have been 99.5 percent with normal operating efficiencies of 99.9 percent. The minimum efficiencies tend to occur only during extreme process upsets which have an expected occurrence rate of once or twice per year for periods of less than one hour.

The use of baghouses has been tried for some process air streams (dryer and product cooler). In general, a baghouse has proven to be less reliable for removal of the hydroscopic fertilizer particles than wet venturi scrubbers. For the product cooler air stream, the baghouse approach has proven satisfactory only in extremely dry climates (Idaho) where the normal atmospheric relative humidity is less than fifty percent. In wet climates like Florida (where the normal atmospheric relative humidity is fifty to ninety percent), the baghouses tend to plug. This plugging leads to failure of the bag fabric and excessive emissions from the area where the bag fabric failed.

4.2.2 AMMONIA

While ammonia emissions are not regulated at present, they are important to the plant operation. The emissions of ammonia have a direct economic impact on the plant and the emission of significant amounts of ammonia can impact the opacity of the stack and cause local odor problems.

The low pressure drop venturis used for particulate scrubbing are also excellent for the removal of ammonia vapor. For the low content ammonia streams (dryer, process equipment evacuation, cooler), the ammonia vapor in the exit gas stream will be equal to the vapor pressure of ammonia vapor over the scrubbing liquor stream.

For the high content ammonia vapor stream (reactor plus granulator), new technology has been developed which uses two stage scrubbing with low strength phosphoric acid. Each stage of scrubbing uses a different NH_3 to H_3PO_4 molar ratio scrubbing liquor. This type of scrubbing has proven to reduce ammonia emissions significantly from the plant as a whole. The ammonia vapor going to the stack in this two stage scrubber will be equal to the ammonia vapor pressure over the cooler, low strength phosphoric acid.

4.2.3 FLUORIDES

Ammoniated fertilizer plants are somewhat unique in that the use of phosphoric acid as a scrubbing liquor to absorb ammonia vapor and fertilizer particulate creates a fluoride vapor pressure. If scrubbing with phosphoric acid was not performed, the fluoride vapor emissions would be lower than if phosphoric acid scrubbing is used.

The amount of fluoride vapor evolved is a function of the temperature of the phosphoric acid, the concentration of the phosphoric acid, and the ammonia to phosphoric acid mole ratio in the phosphoric acid scrubbing liquor. As the temperature and acid concentration increase, the fluoride vapor evolution increases. As the NH_3/H_3PO_4 mole ratio increases, the amount of fluoride vapor evolved decreases. If the mole ratio exceeds 1.0, much of the fluoride in the phosphoric acid is chemically complexed so that the vapor pressure is extremely low.

The new two-stage (called "double mole") Reactor/Granulator scrubbing system takes advantage of these phenomena to capture a majority (about 70 weight percent) of the ammonia vapor in the first stage with a high mole ratio scrubbing liquor. The temperature of the high mole scrubbing liquor will be quite high but the fluoride evolution will be quite low as the fluoride vapor pressure is low. In the second stage scrubber, a lower mole ratio liquor is used (less than 1.0). The amount of ammonia to react, however, is significantly less than a standard single stage scrubber and the temperature of the scrubbing liquor is raised to only about 160 ^{o} F. (compared to a standard single stage scrubber of over 200 ^{o} F.). The amount of fluoride evolved is therefore much lower.

In the Farmland Hydro, L.P. North plant, the other gas streams will be scrubbed with low strength phosphoric acid. Standard practice calls for using about 28 percent P_2O_5 acid. When this liquor is contacted with air in a venturi scrubber, fluoride is evolved into the air stream to meet the vapor pressure curves. These streams therefore generally contain significant amounts of fluoride vapor. At least one plant is using less than 10 percent P_2O_5 acid which is the proposed strength for the Farmland Hydro, L.P. modified North plant. With this strength of phosphoric acid, the fluoride evolved is much lower.

The Farmland Hydro, L.P. proposed North plant modifications are using Best Available Control Technology to minimize the evolution of fluoride vapor from the acid scrubbers into the air stream. Now it is important to examine the Best Available Control Technology for removal of even that reduced amount of fluoride vapor from the air stream.

The best technique for fluoride scrubbing would be the combination of all air streams into a single common scrubber. This scrubber would be a packed scrubber using once-through fresh water (no fluoride in the incoming water, with water discharge to a treatment plant). For the modified North plant, this would result in the continuous use of about 3000 gallons per minute of fresh water. The discharge water would contain about 5 ppm of fluoride. While this is a small amount, it still exceeds allowable water discharge standards so fluoride removal technology would have to be applied. This technology has a total cost of approximately $10 dollars per 1000 gallons and produces a small amount of solids which must be contained and disposed of on the plant site.

The fresh water required also exceeds the allowable pumping limits imposed by water rationing and by State of Florida water regulatory authorities. While this technology would remove virtually all of the fluoride vapor in the air stream, it would be at the expense of a limited natural resource (fresh water) and would create a significant cost impact on the plant. In essence, the problem would be converted from a vapor emission to a solids problem at a significant cost.

All fertilizer manufacturing complexes have opted to reuse and recirculate as much water as possible to minimize the impact of fresh water requirements. This water will stabilize at about 5000 ppm of fluoride and is used throughout the plant for scrubbing and cooling. Using this water in a tail gas scrubber will produce a fluoride emission of about 0.06 pounds of fluoride per ton of P_2O_5 brought into the plant. We have opted to examine this and other technology for the proposed modification.

One other approach for fluoride removal has been the use of large quantities of pond water to condense much of the water vapor in the air stream and produce a low water temperature exiting the scrubber. This technique is in use in a 1982 vintage fertilizer plant and is partially utilized at Farmland Hydro, L.P. at present on the reactor plus granulator stream. In examining this approach, it was determined that approximately 10,000 gallons per minute additional pond water would be required. This amount of additional water exceeds the available water by a large amount. The estimate to install a completely new pond water supply and return system to meet these water requirement needs was estimated at over three million dollars.

The majority of the fluoride in the air streams (about 50 to 60 percent of the total) is contained in the single reactor/granulator air stream. This air stream also contains significant amounts of water vapor (dew point about 182 $^{\circ}$ F). Since ammonia comes into the plant as liquid and is used in the process as a vapor, energy must be expended to vaporize the ammonia. HiTech Solutions, Inc. has the license of a patented process using waste heat from the reactor to vaporize the ammonia and has installed several of these systems at other plants. If this heat exchanger follows the acid scrubbers, then water vapor in the air stream will be condensed as the ammonia is vaporized.

In examining the heat balance and fluoride evolution, it was discovered that the water condensed would be pure and if all of the fluoride in the gas stream were to be in the water stream, the water stream would contain about 500 ppm of fluoride. In examining the vapor pressure curves for low strength fluoride solutions, it was discovered that this water stream would allow a gaseous fluoride emission of the same or slightly lower than using standard plant pond water.

The gas is passed through the heat exchanger tubes at a velocity of about 7000 feet per minute which will allow a contact time in the heat exchanger between the water and the gas approximately equivalent to a venturi scrubber. It was therefore decided to use this approach for reactor/granulator gas scrubbing. All available pond water to the North plant is therefore available to the other gas streams so that they may be properly contacted for fluoride removal from these streams.

The use of fresh water, in place of pond water, would reduce the fluoride from the tail gas scrubber. If a smaller quantity of fresh water is used in a single tail gas scrubber and a large volume recirculated, the fluoride content of the recirculated water will be lower. The dew point of the combined gas streams will be about 145 ^{o} F and the recirculated water will achieve approximately the dew point temperature of the gas stream because of the overall heat balance. This would cause a higher concentration of fluorides in the final gas stream due to liquid gas equilibrium.

In examining this technology, it was discovered that about 500 to 1000 gallons per minute of fresh water would be required to achieve significant fluoride emissions reduction over using once through pond water. However, the use of fresh water raises several environmental and chemical process related issues which need to be addressed.

The Farmland Hydro, L.P. complex is located in a sensitive water management area. Farmland Hydro has adopted a strict water reduction and conservation program under the direction of the Southwest Florida Water Management District. The use of fresh water for tail gas scrubbing would result in a significant increase in the amount of fresh water consumed by the complex contradicting the facility's commitment to seek ways to reduce current fresh water requirements. The additional scrubber water discharge will result in an increase in the water entering the pond system and within a short period of time exceed the pond's surge capacity requirements. The increased fresh water usage will also adversely affect the delicate water balance of the complex, eventually forcing a plant shut down. A dedicated fresh water recirculation system could be constructed with a dedicated pond and distribution system at considerable expense. Over time the fluoride levels in this dedicated pond would rise to unacceptable levels forcing the use of make-up fresh water. This situation raises the same issues discussed above.

In consideration of the above adverse impacts, the use of fresh water over pond water for a small increase in fluoride removal is not justified.

4.3 BACT CONCLUSION

The proposed combination of wet scrubbers and scrubbing media provides the Best Available Control Technology, given the water limitations imposed on the plant as a whole and the necessity of achieving fluoride emissions of 0.06 lb/ton of P_2O_5.

5.0 AIR QUALITY REVIEW

The air quality review required of a PSD construction permit application potentially requires both air quality modeling and air quality monitoring. The air quality monitoring may be required when the impact of air pollutant emission increases and decreases associated with a proposed project exceeds the de minimis impact levels defined by Rule 17-2.500(3)(e)1, FAC or in cases where an applicant wishes to define existing ambient air quality by monitoring rather than by air quality modeling. Monitoring is required for air pollutants for which air quality standards have been established and may be required for pollutants for which no air quality standards exist (Rule 17-2.500(5)(f)1, FAC.

The air quality modeling is required to provide assurance that the emissions from the proposed project, together with the emissions of all other air pollutants in the project area, will not cause or contribute to a violation of any ambient air quality standard or guideline. Fluorides are the only pollutant subject to the review.

The de minimis impact level (see Table 3-6) for fluorides associated with the proposed project is 0.25 micrograms per cubic meter, 24-hour average. The air quality review for the proposed project, which evaluated fluoride emission increases associated with this modification, demonstrated that the ambient air impact of fluoride emission increases will be greater than the 24-hour de minimis impact level. The impacts will however, be below the FDER No Threat Level (NTL) guidelines for fluoride of 25 micrograms per cubic meter, 8-hour average; and 6 micrograms per cubic meter, 24-hour average.

Although the modeling demonstrates that the net impact of fluoride emission increases addressed in this application exceed the de minimis impact levels defined by Rule 17-1.500(3)(e)1, FAC (presented in Table 3-6), no air quality monitoring should be required as there are no ambient air quality standards for fluorides, there is no generally accepted monitoring method for fluorides and fluorides are not a health related air pollutant (see Section 7.0).

As part of this review, air quality modeling has been conducted for ammonia to demonstrate that the FDER NTL guidelines are not exceeded and to demonstrate that the ambient odor threshold of 2 ppm (1416 ug/m^3) is not exceeded. Ammonia is not a regulated air pollutant and no ambient air quality standards nor PSD increments have been established.

5.1 AIR QUALITY MODELING

The modeling of fluoride and ammonia emissions was conducted in accordance with EPA modeling guidelines with the Industrial Source Complex - Short Term (ISC-ST) air quality model, Version 90346. The meteorological data used with the model were for Tampa, Florida 1982-1986. The model was run using the Regulatory Default option and with building wake effects on plume downwash taken into consideration. Model receptors were located by a polar coordinate grid centered at the North plant. Receptors were located at ten degree intervals around the plant at radial distances ranging from 175 meters (the property line nearest the plant) to 500 meters. Because of the effect of plume downwash, maximum fluoride and ammonium impacts were predicted at receptors 175-200 meters from the plant.

The sources used in the modeling were limited to those associated with the existing and proposed North plant. No attempt was made to model fluoride emissions from other quantifiable sources at Farmland Hydro or other Polk County sources as significant unquantifiable sources could not be addressed. The overall impact of fluoride emissions is addressed in Section 7.0. More detailed modeling for ammonia was not attempted as ammonia is not a regulated pollutant. The source data used for modeling are summarized in Table 5-1.

For fluorides, two scenarios were analyzed; a comparison of maximum proposed fluoride emissions with emissions based on the existing GTSP production capability and a comparison of maximum proposed emissions with emissions from existing MAP production capability. The source data (Table 5-1) show a net decrease in fluoride emissions when compared with emissions from the existing GTSP production mode and a slight increase when compared with emissions from the existing MAP production mode.

The scenario modeled for ammonia represents the change in emissions between existing and proposed DAP plant operations; a net decrease in ammonia emissions.

5.2 AIR QUALITY MODELING RESULTS

The results of the ambient air quality impact analysis for fluorides and ammonia are presented below.

5.2.1 FLUORIDES

As previously described, the emission rate increase for fluorides used for air quality modeling purposes is the proposed maximum allowable emission rate associated with the increased North plant production rates. Existing conditions represent maximum emissions permitted for GTSP plant operations (Option 1) and for MAP plant operations (Option 2). For Option 1, there is a net improvement in annual average air quality and increases (highest, second-high) of 5.1 ug/m^3 and 2.4 ug/m^3 for 8-hour and 24-hour periods, respectively. For Option 2, the annual impact increase by 0.2 ug/m^3, the 8-hour impact increased by 6.7 ug/m^3 and the 24-hour impact increased by 3.4 ug/m^3. As a point of comparison, the FDER NTLs for fluorides are 25 ug/m^3 for the 8-hour period and 6 ug/m^3 for the 24-hour period.

5.2.2 AMMONIA

Maximum allowable ammonia emission from the North MAP/DAP plant will decrease from 77.4 pounds per hour to 46.7 pounds per hour as a result of the proposed project. Even with this net decrease, there will be increases in 1-hour, 8-hour and 24-hour impacts under worst-case conditions as a result of plume downwash. The maximum (highest, second-high) increases in ammonia impacts are predicted to be 365 ug/m^3, 1-hour average; 120 ug/m^3, 8-hour average; and 59 ug/m^3, 24-hour average. These impacts compare with the ammonia odor threshold of 1416 ug/m^3 and NTLs of 180 ug/m^3, 8-hour average, and 43 ug/m^3, 24-hour average. The maximum property line impact of ammonia for the 24-hour period is 30 ug/m^3; or well below the 24-hour NTL of 43 ug/m^3.

TABLE 5-1

AIR QUALITY MODELING PARAMETERS

FARMLAND HYDRO, L.P.
POLK COUNTY, FLORIDA

FLUORIDE MODELING INPUTS

OPTION 1

Based on present allowable GTSP emission rate compared with proposed MAP allowable emission rate.

Source	E (g/sec)	Ht. (meter)	Dia. (meter)	Vel. (m/s)	Temp. (^{o} K)	Location X - Y (meter)	
11 Main GTSP (exist.)	-1.03	39.3	2.29	12.2	311.0	0	0
21 Main MAP (prop.)	0.203	39.3	2.29	13.11	315.2	0	0
22 R/G MAP (prop.)	0.269	39.3	1.68	10.63	354.1	-30	0

OPTION 2

Based on present allowable MAP emission rate compared with proposed MAP allowable emission rate.

Source	E (g/sec)	Ht. (meter)	Dia. (meter)	Vel. (m/s)	Temp. (^{o} K)	Location X - Y (meter)	
11 Main MAP (exist.)	-0.43	39.3	2.29	12.2	311.0	0	0
21 Main MAP (prop.)	0.203	39.3	2.29	13.11	315.2	0	0
22 R/G MAP (prop.)	0.269	39.3	1.68	10.63	354.1	-30	0

TABLE 5-1 (continued)

AMMONIA MODELING INPUTS

Based on past emission data from DAP compared with proposed DAP allowable emission rate.

Source	E (g/sec)	Ht. (meter)	Dia. (meter)	Vel. (m/s)	Temp. (^{o} K)	Location X - Y (meter)
11 Main DAP (exist.)	-9.75	39.3	2.29	12.2	311.0	0 0
21 Main DAP (prop.)	0.650	39.3	2.29	13.11	315.2	0 0
22 R/G DAP (prop.)	5.240	39.3	1.68	10.63	354.1	-30 0

TABLE 5-2

SUMMARY OF FLUORIDE IMPACT ANALYSIS

FARMLAND HYDRO, L.P.
POLK COUNTY, FLORIDA

OPTION 1

Based on present allowable GTSP emission rate compared with proposed MAP allowable emission rate.

METEOROLOGICAL	FLUORIDE IMPACT (ug/m^3) *		
DATA	ANNUAL	8-HOUR	24-HOUR
1982	0	4.86 (175m, 340°)	1.36 (175m, 310°)
1983	0	4.93 (175m, 200°)	2.44 (175m, 200°)
1984	0	4.54 (175m, 200°)	1.57 (200m, 190°)
1985	0	4.63 (175m, 320°)	1.64 (175m, 240°)
1986	0	5.12 (175m, 320°)	1.71 (175m, 320°)
De minimis Impact 17-2.500 (3)(e)1,FAC	NA	NA	0.25
FDER NTLs (Guidelines)	NA	25.0	6.0

* Highest second-high impact.

TABLE 5-2 (continued)

OPTION 2

Based on present allowable MAP emission rate compared with proposed MAP allowable emission rate.

METEOROLOGICAL	FLUORIDE IMPACT (ug/m^3) *		
DATA	ANNUAL	8-HOUR	24-HOUR
1982	0.22 (175m, 250°)	5.62 (175m, 310°)	2.02 (175m, 230°)
1983	0.18 (175m, 250°)	5.33 (175m, 230°)	3.41 (175m, 200°)
1984	0.16 (175m, 250°)	5.64 (175m, 230°)	2.44 (175m, 160°)
1985	0.15 (175m, 260°)	6.66 (200m, 230°)	2.45 (200m, 230°)
1986	0.15 (175m, 250°)	5.65 (175m, 200°)	2.72 (175m, 230°)
De minimis Impact 17-2.500 (3)(e)1,FAC	NA	NA	0.25
FDER NTLs (Guidelines)	NA	25.0	6.0

* Highest second-high impact.

TABLE 5-3

SUMMARY OF AMMONIA IMPACT ANALYSIS

FARMLAND HYDRO, L.P.
POLK COUNTY, FLORIDA

Based on past emission data from DAP compared with proposed DAP allowable emission rate.

MET.	AMMONIA IMPACT (ug/m^3) *		
DATA	1-HOUR	8-HOUR	24-HOUR
1982	365.1 (175m, 310^o)	99.1 (175m, 340^o)	33.7 (175m, 310^o)
1983	365.5 (175m, 330^o)	100.0 (175m, 240^o)	59.1# (175m, 200^o)
1984	353.1 (175m, 190^o)	89.6 (175m, 190^o)	39.7 (175m, 230^o)
1985	363.9 (175m, 320^o)	120.0 (200m, 230^o)	33.9 (175m, 240^o)
1986	364.6 (175m, 330^o)	100.2 (175m, 320^o)	42.0 (175m, 230^o)
FDER NTLs (Guidelines)	**	180.0	43.2

* Highest second-high impact.

\# It should be noted that this impact of 59.1 ug/m^3 occurs on plant property. The highest second-high impact off-plant property is 30.6 ug/m^3 at 175m, 180^o which is below the FDER NTL of 43.2 ug/m^3.

** Odor threshold for ammonia is about 1400 ug/m^3.

6.0 GOOD ENGINEERING PRACTICE STACK HEIGHT

The criteria for good engineering practice stack height in Rule 17-2.270 states that the height of a stack should not exceed the greater of 65 meters (213 feet) or the height of nearby structures plus the lesser of 1.5 times the height or cross-wind width of the nearby structure. This stack height policy is designed to prevent the achievement of ambient air quality goals solely through the use of excessive stack heights and air dispersion.

The North plant stacks are less than 213 feet in height above-grade. Both the existing and the proposed stacks dedicated to the North plant will be 129 feet in height. This will satisfy the good engineering practice (GEP) stack height criteria.

It should be noted that building effects were considered in the modeling using the worst-case building dimensions of the plant building.

7.0 IMPACTS ON SOILS, VEGETATION AND VISIBILITY

The impact of fluoride emissions on soils, vegetation and visibility are addressed below.

7.1 IMPACT ON SOILS AND VEGETATION

The U.S. Environmental Protection Agency (EPA) has promulgated ambient air quality standards for particulate matter, sulfur dioxide, nitrogen oxides, carbon monoxide, ozone and lead. These standards include primary air quality standards developed for the protection of human health and secondary air quality standards developed for the protection of welfare related issues. The fact that EPA has not developed ambient air quality standards for fluorides is due to EPA's position that fluoride levels in the ambient air are "not of sufficiently national character to require a National Ambient Air Quality Standard.".

On August 6, 1975, EPA promulgated standards of performance for five categories of new sources in the phosphate fertilizer industry. The performance standards included emission limiting standards for fluorides. As a result of these standards, fluorides became a "designated pollutant"; that is, a pollutant for which there is no National Ambient Air Quality Standard but one for which New Source Performance Standards have been established.

As required by 40 CFR 60, Subpart B, EPA next published a guideline document to assist states in developing emission standards for fluorides. The document included, among other things, a discussion of the effect of the fluorides on human health and welfare. In the preamble to Subpart B of 40 CFR 60 and hence in the guideline document, a distinction is drawn between "designated pollutants" which may cause or contribute to the endangerment of public health (health-related pollutants) and those for which adverse effects on public health have not been demonstrated (welfare-related pollutants).

In determining whether a "designated pollutant" is health-related or welfare-related, EPA considers such factors as:

- known and suspected effects on public health and welfare,
- potential ambient concentrations of the pollutant,
- the generation of any secondary pollutants for which the "designated pollutant" may be a precursor,
- any synergistic effects with other pollutants, and
- potential for accumulation in soil, water and/or food chains.

After considering all available information, EPA determined that fluoride emissions from phosphate fertilizer plants had no demonstrated effects on public health. As a result, fluoride emissions from phosphate fertilizer plants were classified by EPA as a welfare-related pollutant.

The primary welfare-related effects of fluorides are to vegetation and secondarily, to livestock that forage on this vegetation. With the fluoride emission control presently installed and operating on phosphate fertilizer plants in Florida, fluoride effects on vegetation are very seldom noticed. The major effort regarding welfare-related fluoride effects in

Florida is directed toward limiting the concentration of fluoride in vegetation used for livestock forage.

Fluorides can appear in forage material or on the leaves of this material; the latter being primarily particles deposited on the leaf surface.

Fluorides in vegetation can result from:

- absorption from the atmosphere,
- absorption from the soil,
- absorption from rain water either through the leaf or through the root system,
- absorption from surface water, and/or
- absorption from particles deposited on the leaf.

Fluoride on vegetation can result from:

- deposition of particles from the atmosphere, and/or
- splash of surface particles caused by rainfall.

For all of these factors there are several rate determining factors; including the rate and frequency of rainfall, relative humidity, soil moisture, light, nutrient supply, age and development stage of the vegetation, ambient temperature, chemical form of the fluoride, and the species of vegetation.

In general, fluorides can enter a plant in solution through the root or leaf, or it can be sorbed from particles through the leaf. In the plant, fluorides remain in a soluble form, which is the most nutritionally available form. Particulate fluorides deposited on the surface of the leaf can, in part, be washed from the leaf. The fraction remaining after washing, however, is not necessarily internal to the plant. Thus, there are three forms that fluorides can take:

- free inorganic fluorides within a plant,
- particles of fluorides loosely adhering to on the plant surface, and
- fluorides bound to the plant surface.

Fluoride in the first form is readily available nutritionally while fluorides in the other two forms are generally less reactive than free inorganic fluorides. Based on a study at the University of Tennessee during the period 1948 to 1975, the primary source of naturally occurring fluorides in plants was found to be the soil on which the plant was grown. This study is applicable to the central Florida area since the area investigated in Tennessee was one with a high phosphate content in the soil. As in Florida, the fluorides in the soil were associated with the phosphate content.

Fluorides in the atmosphere can be sorbed through the leaf into plants. The relationship between atmospheric fluoride concentration and plant fluoride concentration is debatable, however. Studies at the University of Tennessee have shown that the concentration of plant fluorides was higher in the direction of prevailing winds near an aluminum smelter than in other directions. Another study showed that with plants grown under the same conditions, those supplied with water-scrubbed air had a lower fluoride content than those supplied with air containing airborne fluorides. McCune and Pack suggest that it has not been possible to establish a relationship between airborne fluorides and plant fluorides and Suttie states, "even if ambient fluoride concentrations were known, variations in the chemical form of the fluoride concentrations were known variations in the chemical form of the fluoride emission, growth rate of plants, rainfall, etc., would make it difficult to extrapolate these values to forage concentrations....". The contribution of fluorides in the soil to plant fluoride levels is partly responsible for this. For example, the fluoride content of grass grown on the same pasture and not influenced by airborne fluorides varied significantly from season to season and from year to year due to the factors discussed herein plus the variability introduced by sampling methods.

Although it is recognized that airborne fluorides are sorbed by plants, no established relationship exists between the concentration in air, exposure time, and the concentration in plants. This is primarily because of the many factors that affect the fluoride uptake of a plant. In addition to the atmosphere concentration of fluoride, the duration and frequency of exposure, the age or stage development of the plant, the species and variety of a plant, most climatic and edaphic factors, exposure to light, and water supply all affect the resulting fluoride content of a plant.

The concentration of fluorides in the ambient air in western Polk County and eastern Hillsborough County and the effects of these fluorides have been monitored since the mid-1960's by several agencies. From 1964 through 1983, the Florida Department of Environmental Regulation (and the agencies that preceded FDER) monitored airborne fluorides and/or the effects of these fluorides at as many as 65 monitoring sites in Polk and eastern Hillsborough Counties. From 1982 to 1986 the Hillsborough County Environmental Protection Commission (HCEPC) monitored airborne fluorides and the effects of the fluorides at five sites in eastern Hillsborough County adjacent to the phosphate processing area in Polk County.

The sampling programs of these agencies have included measurements of airborne fluorides by bubbler samplers, continuous monitors and limed paper, and measurements of fluoride levels in pasture grass and citrus leaves. The bubbler samplers and the continuous fluoride monitors provided actual measurements of the concentration of fluorides in the ambient air while the limed paper provided monthly average fluoride exposure information. The concentration of fluorides in pasture grass has been of interest because of the potential effects of fluorides on cattle foraging on the grass. The fluoride concentration citrus leaves was examined to evaluate potential effects of airborne fluorides on citrus.

The sampling that has been most widespread geographically and that has continued over the longest period of time is the sampling for fluorides in grass. The FDER (and predecessor agencies) monitored fluoride levels in grass from 1964 through 1983. The results of this monitoring are available through the Southwest District office of FDER in Tampa or through the FDER archives in Tallahassee. An FDER report was prepared in 1976 summarizing agency data collected during the period 1964 through 1974.

The fluoride levels in grass measured by the HCEPC were reported, in part, in a 1983 agency report. The data collected by HCEPC from 1984 to 1986 have not been reported.

In the years that Farmland Hydro has been operating, fluoride levels in pasture grass have generally been below the FDER guideline of 45 parts per million (annual average concentration in unwashed pasture grass). In only three of the years (1977, 1978 and 1981) did the fluoride levels in pasture grass from some sites in Southwest Polk County exceed the 45 part per million guideline. Since 1981, the fluoride levels in pasture grass dropped to the 40 part per million range for three years and during the period 1985-1987, the fluoride levels in pasture grass have been in the range of 25 parts per million, annual average.

The Farmland Hydro property and the surrounding areas are comprised of mining lands (phosphate), flatwoods, marshes, and sloughs. The soils of the area are primarily sandy and are typically low in both clay and silt content. These characteristics and the semi-tropic climatic factors of high temperature and rainfall are the natural factors which determine the terrestrial communities of the region.

The land in the vicinity of Farmland Hydro supports various plant communities. The vegetation can be divided into upland and wetland categories. In each category, the following major formations have been identified:

Upland	Wetland
Pine flatwoods	Cypress swamp
Oak Scrub	Shrub swamp
Sandhill	Marsh

Much of the natural vegetation on the site and the surrounding areas has been altered due to mining and industrial use; primarily the phosphate fertilizer industry. As a result of mining and industrial activity, there is very little undisturbed land in existence in the vicinity of the Farmland Hydro facility.

In most areas, the soils encountered are coarse and contain increasing amounts of silt and clays until they contact the phosphate rock deposits. Soils in areas of low relief are influenced by flatwood vegetation, high water tables and organic or mineral pan of varying thickness. Mucks are found in the lower physiographic areas where large amounts of plant debris have accumulated.

The soils and vegetation of the area will be exposed to Farmland's air pollutant levels when they lie downwind of the Farmland Hydro facility. The areas other than those downwind of the facility will be exposed to existing concentrations of air pollutants from other major emitting facilities in the immediate area.

The air quality modeling that has been conducted as a requirement of this PSD application demonstrates that the levels of fluoride expected at the Farmland Hydro site, as a result of the this proposed project will be below the FDER NTLs. As a result, it is reasonable to conclude that there will be no significant change in the ambient effects of fluorides on the soils and vegetation of the area. The impacts of ammonia emissions are expected to be below the FDER NTL and below the odor threshold of 1,416 ug/m^3. Therefore, no adverse effects are anticipated as a result of ammonia emissions from the North plant.

7.2 GROWTH RELATED IMPACTS

The proposed modification will require no increase in personnel to operate the North plant. The increase in fertilizer production may however, cause a slight increase in truck traffic but will have a negligible impact on traffic in the area as compared with traffic levels that presently exist. Therefore, no additional growth impacts are expected as a result of the proposed project.

7.3 VISIBILITY IMPACTS

The proposed project will result in an increase in fluoride emissions which are not expected to have adverse impacts on visibility.

8.0 CONCLUSION

It can be concluded from the information in this report that the proposed increase in the MAP and DAP production rate of the North plant as described in this report will not cause or contribute to a violation of any air quality standard, PSD increment, or any other provision of Chapter 17-2, FAC.

APPENDIX

CONTEMPORANEOUS PARTICULATE MATTER EMISSION CALCULATIONS

The following sources ceased operations when the conversion to the wet rock process was made in June of 1991.

1. Rock Unloading System, A053-151296

1989, PM/PM_{10} = (12.7 + 7.6) lb/hr / 2 x 5,824 hr/yr x Ton/2,000 lb
= 29.6 Ton/yr

1990, PM/PM_{10} = (8.84 + 15.8)lb/hr / 2 x 5,824 hr/yr x ton/2,000 lb
= 35.9 Ton/yr

Avg. PM/PM_{10} lb/hr = (12.7 + 7.6 + 8.84 + 15.8)lb/hr / 4
= 11.2 lb/hr

Avg. PM/PM_{10} TPY = (29.6 + 35.9)ton/yr / 2
= 32.8 ton/yr

2. Phosphoric Acid Plant (PAD) 1 Ball Mill, A053-157062

1989, PM/PM_{10} = 17,000 cfm x 0.02 gr/cf x 60 min/hr x lb/7,000 gr
= 2.9 lb/hr
x 5,608 hr/yr x ton/2,000 lb
= 8.1 ton/yr

1990, PM/PM_{10} = 17,000 cfm x 0.02 gr/cf x 60 min/hr x lb/7,000 gr
= 2.9 lb/hr
x 5,580 hr/yr x ton/2,000 lb
= 8.1 ton/yr

Avg. PM/PM_{10} lb/hr = (2.9 + 2.9)lb/hr / 2
= 2.9 lb/hr

Avg. PM/PM_{10} TPY = (8.1 + 8.1)ton/yr / 2
= 8.1 ton/yr

3. Phosphoric Acid Plant (PAD) 2 Ball Mill, A053-157064

1989, PM/PM_{10} = 17,000 cfm x 0.02 gr/cf x 60 min/hr x lb/7,000 gr
= 2.9 lb/hr
x 5,421 hr/yr x ton/2,000 lb
= 7.9 ton/yr

1990, PM/PM_{10} = 17,000 cfm x 0.02 gr/cf x 60 min/hr x lb/7,000 gr
= 2.9 lb/hr
x 6,233 hr/yr x ton/2,000 lb
= 9.0 ton/yr

Avg. PM/PM_{10} lb/hr = (2.9 + 2.9)lb/hr / 2
= 2.9 lb/hr

Avg. PM/PM_{10} TPY = (7.9 + 9.0)ton/yr / 2
= 8.5 ton/yr

TOTAL PARTICULATE MATTER DECREASES:

Total PM/PM_{10} = 32.8 tpy + 8.1 tpy + 8.5 tpy
= 49.4 tpy

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

ANNUAL OPERATION REPORT FORM FOR AIR EMISSIONS SOURCES

For each permitted emission point, please submit a separate report for calendar year 19
prior to March 1st of the following year.

I GENERAL INFORMATION

1. Source Name: Farmland Industries, Inc.
2. Permit Number: A053-151296
3. Source Address: P. O. Box 960
   Bartow, Florida 33830
4. Description of Source: Phosphate Rock Unloading and Storage Scrubber

II ACTUAL OPERATING HOURS: 16.00 hrs/day 7 days/wk 52 wks/yr

III RAW MATERIAL INPUT PROCESS WEIGHT: (List separately all materials put into proces
and specify applicable units if other than tons/yr)

Raw Material	Input Process Weight	
Phosphate Rock	2,338,404	tons
		tons
		tons
		tons
		tons

IV PRODUCT OUTPUT (Specify applicable units)

2,338,262 Tons Phosphate Rock

DER Form 17-1.202(6)
Effective November 30, 1982

NET EMISSION CHANGES

ACTUAL EMISSIONS:

Current actual emissions of the MAP/DAP/GTSP North plant based on 1990 and 1991 stack test data and actual operating hours.

Particulate Matter:

1990, PM/PM_{10} = (12.23 + 13.25) lb/hr / 2 x 7,671 hr/yr x ton/2,000 lb
= 48.9 ton/yr

1991, PM/PM_{10} = 5.75 lb/hr x 7,384 hr/yr x ton/2,000 lb
= 21.2 ton/yr

Avg. PM/PM_{10} lb/hr = (12.23 + 13.25 + 5.75) lb/hr / 3
= 10.4 lb/hr

Avg. PM/PM_{10} TPY = (48.9 + 21.2)ton/yr / 2
= 35.1 ton/yr

Fluorides:

1990, F = (3.42 + 3.70) lb/hr / 2 x 7,671 hr/yr x ton/2,000 lb
= 13.7 ton/yr

1991, F = 1.37 lb/hr x 7,384 hr/yr x ton/2,000 lb
= 5.1 ton/yr

Avg. F lb/hr = (3.42 + 3.70 + 1.37) lb/hr / 3
= 2.8 lb/hr

Avg. F TPY = (13.7 + 5.1)ton/yr / 2
= 9.4 ton/yr

Ammonia:

The only available data on ammonia emissions is from past performance stack sampling conducted on the South DAP plant which show emissions up to 1.362 lb/ton for the Dryer Scrubber and 0.848 lb/ton for the Reactor/Granulator.

1990, NH_3 = (1.362 + 0.848) lb/ton x 35 ton/hr
= 77.4 lb/hr
x 7,671 hr/yr x ton/2,000 lb
= 296.9 ton/yr

1991, NH_3 = 77.4 lb/hr x 7,384 hr/yr x ton/2,000 lb
= 285.8 ton/yr

Avg. NH_3 lb/hr = (77.4 + 77.4) lb/hr / 2
= 77.4 lb/hr

Avg. NH_3 TPY = (296.9 + 285.8)ton/yr / 2
= 291.4 ton/yr

PROPOSED EMISSIONS:

Proposed emissions are based on MAP/DAP process calculations.

Particulate Matter:

DAP Main Stack

PM/PM_{10} = 10.62 lb/hr x 8,760 hr/yr x ton/2,000 lb
= 46.5 ton/yr

DAP Reactor/Granulator (R/G) Stack

PM/PM_{10} = 5.52 lb/hr x 8,760 hr/yr x ton/2,000 lb
= 24.2 ton/yr

Total DAP

PM/PM_{10} = 16.14 lb/hr
x 8,760 hr/yr
= 70.7 ton/yr

MAP Main Stack

PM/PM_{10} = 15.88 lb/hr x 8,760 hr/yr x ton/2,000 lb
= 69.6 ton/yr

MAP R/G Stack

PM/PM_{10} = 6.62 lb/hr x 8,760 hr/yr x ton/2,000 lb
= 29.0 ton/yr

Total MAP

PM/PM_{10} = 22.5 lb/hr
x 8,760 hr/yr
= 98.6 ton/yr

Max. PM/PM_{10} = 22.5 lb/hr
= 98.6 ton/yr

Fluorides:

DAP Main Stack

F = 1.60 lb/hr x 8,760 hr/yr x ton/2,000 lb
= 7.0 ton/yr

DAP R/G Stack

F = 1.16 lb/hr x 8,760 hr/yr x ton/2,000 lb
= 5.1 ton/yr

Total DAP

F = 2.76 lb/hr
x 8,760 hr/yr
= 12.1 ton/yr

MAP Main Stack

F = 1.87 lb/hr x 8,760 hr/yr x ton/2,000 lb
= 8.2 ton/yr

MAP R/G Stack

F = 1.87 lb/hr x 8,760 hr/yr x ton/2,000 lb
= 8.2 ton/yr

Total MAP

F = 3.74 lb/hr
x 8,760 hr/yr
= 16.4 ton/yr

Max. F = 3.74 lb/hr
= 16.4 ton/yr

Ammonia:

DAP Main Stack

NH_3 = 5.17 lb/hr x 8,760 hr/yr x ton/2,000 lb
= 22.6 ton/yr

DAP R/G Stack

NH_3 = 41.56 lb/hr x 8,760 hr/yr x ton/2,000 lb
= 180.0 ton/yr

Total DAP

NH_3 = 46.73 lb/hr
x 8,760 hr/yr
= 204.7 ton/yr

MAP Main Stack

NH_3 = 7.01 lb/hr x 8,760 hr/yr x ton/2,000 lb
= 30.7 ton/yr

MAP R/G Stack

NH_3 = 30.93 lb/hr x 8,760 hr/yr x ton/2,000 lb
= 135.5 ton/yr

Total MAP

NH_3 = 37.94 lb/hr
x 8,760 hr/yr
= 166.2 ton/yr

Max. NH_3 = 46.73 lb/hr
= 204.7 ton/yr

NET ANNUAL EMISSIONS INCREASE:

Particulate Matter:

$$\begin{aligned}\text{Net PM/PM}_{10}\text{ increase} &= \text{Proposed} - (\text{Actual} + \text{Contemporaneous Decreases}) \\ &= 98.6\text{ tpy} - (35.1\text{ tpy} + 49.4\text{ tpy}) \\ &= 14.1\text{ tpy}\end{aligned}$$

Fluorides:

$$\begin{aligned}\text{Net F increase} &= \text{Proposed} - \text{Actual} \\ &= 16.4\text{ tpy} - 9.4\text{ tpy} \\ &= 7.0\text{ tpy}\end{aligned}$$

Ammonia:

$$\begin{aligned}\text{Net NH3 increase} &= \text{Proposed} - \text{Actual} \\ &= 204.7\text{ tpy} - 291.4\text{ tpy} \\ &= -\ 86.7\text{ tpy}\end{aligned}$$

EMISSIONS FROM NATURAL GAS COMBUSTION

Natural gas usage rate will remain the same at 50 MM BTU per hour heat input. There will be no change in the dryer heat input requirements because the product manufactured by the proposed granulator will be lower in moisture content than that manufactured by the existing blunger system. Since there will be no change in the natural gas usage, no emission changes will occur as a result of the proposed project. The emissions expected from the combustion of natural gas in the dryer are presented below. It should be noted that diesel fuel may be used as a back-up fuel for less than 400 total hours in a given year.

The emission calculations below are based on AP-42 factors.

PM/PM_{10} = 5.0 lb/mcf x 0.05 mcf/hr
= 0.25 lb/hr
x 8,760 hr/yr x ton/2,000 lb
= 1.1 tpy

SO_2 = 0.6 lb/mcf x 0.05 mcf/hr
= 0.03 lb/hr
x 8,760 hr/yr x ton/2,000 lb
= 0.13 tpy

NO_x = 140.0 lb/mcf x 0.05 mcf/hr
= 7.0 lb/hr
x 8,760 hr/yr x ton/2,000 lb
= 30.7 tpy

CO = 35.0 lb/mcf x 0.05 mcf/hr
= 1.75 lb/hr
x 8,760 hr/yr x ton/2,000 lb
= 7.7 tpy

VOC* = 2.8 lb/mcf x 0.05 mcf/hr
= 0.14 lb/hr
x 8,760 hr/yr x ton/2,000 lb
= 0.61 tpy

* Non methane hydrocarbon.