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STATE OF FLORIDA
DEPARTMENT OF ENVIRONMENTAL REGULATION

APPLICATION TO OPERATE/CONSTRUCT AIR POLLUTION SOURCES

This Applic. Approved 7-3-80 115TPH SLF

SOURCE TYPE: DAP Fertilizer Plant [x] New[1] [ ] Existing[1]

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

COMPANY NAME: W. R. Grace & Co., Bartow Works COUNTY: Polk

Identify the specific emission point source(s) addressed in this application (i.e. Lime Kiln No. 4 with Venturi Scrubber; Peeking Unit No. 2, Gas Fired) Proposed DAP Fertilizer Plant No. 3 stack

SOURCE LOCATION: Street N. of S. R. 60 City W of Bartow

UTM: East 409,290 North 3,086,960 change

Latitude 27 ° 54 ' 13 "N Longitude 81 ° 55 ' 17 "W

APPLICANT NAME AND TITLE: A. F. Vondrasek, General Manager

APPLICANT ADDRESS: P. O. Box 471, Bartow, Fl 33830

SECTION I: STATEMENTS BY APPLICANT AND ENGINEER

A. APPLICANT

I am the undersigned owner or authorized representative* of W. R. Grace & Co., Bartow Works

I certify that the statements made in this application for a construction 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: A F Vondrasek

A. F. Vondrasek, General Manager
Name and Title (Please Type)

Date: 4-16-80 Telephone No. (813) 533-2171

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 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.

(Affix Seal)

Signed: D. M. Weatherly

D. M. Weatherly
Name (Please Type)

The D. M. Weatherly Co.
Company Name (Please Type)

1800 Peachtree Rd., N.W. Atlanta, Ga
Mailing Address (Please Type)

Florida Registration No. 5513 Date: 8-3-80 Telephone No. (404) 355-5323

[1]See Section 17-2.02(15) and (22), Florida Administrative Code, (F.A.C.)

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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.

Three venturi scrubbers & cyclonic mist eliminators in parallel, using phosphoric acid to remove particulates and ammonia, followed by two vertical packed counter flow scrubbers: one for dryer gases and one for the remaining fumes. Emissions will comply with DER Rules & Regulations for Particulates and Fluorides.

B. Schedule of project covered in this application (Construction Permit Application Only) Dec 1981

Start of Construction January 1981 Completion of Construction July 1982

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.)

Steel tanks & scrubbers	900,000	$1,500.000)
Ductwork, piping, pumps, blower	700,000	1,100,000) 2,300,000
Electrical & Instrumentation	400,000	600,000) Total $4,000,000
Engineering & Starting	200,000	800,000)

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

SHUT DOWN ON START UP NEW PLT

None; however this plant will replace 300-X and 300-Y plants averaging a discharge of 67 tons of particulates and 28 tons of fluorides per year. (see permits Nos. AO53-25191 and AO53-13210). The old plants will be phased out within 6 months after the new plant is in normal operations.

E. Is this application associated with or part of a Development of Regional Impact (DRI) pursuant to Chapter 380, Florida Statutes, and Chapter 22F-2, Florida Administrative Code? ____ Yes X No

F. Normal equipment operating time: hrs/day 16-24 ; days/wk 7 ; wks/yr 50 ; if power plant, hrs/yr 7,000 ; if seasonal, describe: _____

G. 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? _____
   b. If yes, has "Lowest Achievable Emission Rate" been applied? _____
   c. If yes, list non-attainment pollutants. _____
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) requirements apply to this source? If yes, see Sections VI and VII. No
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

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

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

A. Raw Materials and Chemicals Used in your Process, if applicable: for the proposed DAP plant

Description	Contaminants		Utilization Rate - lbs/hr	Relate to Flow Diagram
	Type	% Wt		
Phos. Acid (100% P_2O_5)	Fluorides	1.8-3.8%	112,000 (dry basis)	sketch No. 1
Ammonia, 100%	-	N.A.	54,000	"
Sulfuric Acid 100%	-	N.A.	3,500	"
Inert filler	-	-	as required	

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

1. Total Process Input Rate (lbs/hr): 112,000 of 100% P_2O_5, (56 TPH)
2. Product Weight (lbs/hr): 230,000 of diammonium phosphate (115 TPH)

C. Airborne Contaminants Emitted:

Name of Contaminant	Emission[1]		Allowed Emission[2] Rate per Ch. 17-2, F.A.C.	Allowable[3] Emission lbs/hr	Inlet Loading(4) ~~Potential Emission~~		Relate to Flow Diagram
	Maximum lbs/hr	Actual T/yr			lbs/hr	T/yr	
Particulates	28 BACT	98	45 lbs/hr. @650tph	45	≤1000	≤3500	)sketch
Fluorides	3.36	12	0.06 lbs./ton P_2O_5	3.36	70	245	)No. 2:
*SO_2	35	< 70	BACT	39	100	< 175	)stack
NO_x	8	28	BACT				
CO	2	7	BACT				

*Only during cold weather spells when natural gas is restricted for brief periods.

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

Name and Type (Model & Serial No.)	Contaminant	Efficiency	Range of Particles[5] Size Collected (in microns)	Basis for Efficiency (Sec. V, It[5]
Same "D. M. Weatherly" design as the D.A.P. plant at USSAG at Bartow, Florida	DAP PARTI-culates & Fluorides	> 96%	Not Applicable	Designer's guarantee confirmed by performance test results.
		> 95%	N.A.	
	SO_2	> 65%		
	NO_x	N.A.		
	CO	N.A.		

[1] See Section V, Item 2.

[2] Reference applicable emission standards and units (e.g., Section 17-2.05(6) Table II, E. (1), F.A.C. – 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) (it will be physically impossible to operate this plant without the "pollution control equipment functioning. Bypassing it is not possible.

[5] If Applicable

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E. Fuels

Type (Be Specific)	Consumption* avg/hr	Consumption* max./hr	Maximum Heat Input (MMBTU/hr)
Natural gas	37 MMCF	44 MMCF	30
or			
#5 Fuel Oil (occasionally)	1400 2000 lbs.	1700 2700 lbs.	30
	Intermittent		

*Units Natural Gas, MMCF/hr; Fuel Oils, barrels/hr; Coal, lbs/hr

Fuel Analysis:

Percent Sulfur: 2.3 < 2.4 Percent Ash: 0.04

Density: 7.7 lbs/gal Typical Percent Nitrogen: N.A.

Heat Capacity: 18,500 BTU/lb 142,000 BTU/gal

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

F. If applicable, indicate the percent of fuel used for space heating. Annual Average N.A. Maximum _____

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

None. Process "Pond" Water used in scrubbers is combined with contaminated waters from other plants of the chemical complex and recirculated thru cooling ponds. DAP plants have a negative water balance.

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

Stack Height: 132.5 ft. Stack Diameter: 7'0" ft.

Gas Flow Rate: 160,000 200,000 ACFM Gas Exit Temperature: 110-120° °F.

Water Vapor Content: saturated 10 % Velocity: approx. 70 FPS

SECTION IV: INCINERATOR INFORMATION

NOT APPLICABLE

Type of Waste	Type O (Plastics)	Type I (Rubbish)	Type II (Refuse)	Type III (Garbage)	Type IV (Pathological)	Type V (Liq & Gas By-prod.)	Type VI (Solid By-prod.)
Lbs/hr Incinerated							

Description of Waste _____

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

Approximate Number of Hours of Operation per day _____ days/week _____

Manufacturer _____

Date Constructed _____ Model No. _____

NOT APPLICABLE

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

Stack Height: _____ ft. Stack Diameter _____ Stack Temp. _____

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

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

Type of pollution control device: [ ] Cyclone [ ] Wet Scrubber [ ] Afterburner [ ] Other (specify) _____

Brief description of operating characteristics of control devices: _____

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

SECTION V: SUPPLEMENTAL REQUIREMENTS

Please provide the following supplements where required for this application.

1. Total process input rate and product weight – show derivation. See III a & b, based on exist.plants'usage
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, 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 8½" 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 8½" 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 8½" 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. An application fee of $20, unless exempted by Section 17-4.05(3), F.A.C. 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

A. Are standards of performance for new stationary sources pursuant to 40 C.F.R. Part 60 applicable to the source?
[X] Yes [ ] No

Contaminant	Rate or Concentration
Fluorides	0.06 lbs./ton 100% P_2O_5 input
Particulates	0.5 lbs./ton 100% P_2O_5 input
SO_2	0.7 lbs./ton 100% P_2O_5 input

B. Has EPA declared the best available control technology for this class of sources (If yes, attach copy) [ ] Yes [X] No

Contaminant	Rate or Concentration

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

Contaminant	Rate or Concentration
Fluorides	0.06 lbs./ton P_2O_5 input
DAP Particulates	0.5 lbs./ton P_2O_5 input
SO_2	$\leq$ 0.7 lbs./ton P_2O_5 input

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

1. Control Device/System: venturi-cyclonic scrubber demisters followed by counter flow packed towers.
2. Operating Principles: Acceleration, absorption, condonsation, deceleration, inertial impact.
3. Efficiency:* (to meet standards)
4. Capital Costs: $2,500,000
5. Useful Life: 11 yrs. (Packing: 3 yrs.)
6. Operating Costs: Approx. 10-15% of capital cost
7. Energy: 2,000 KWH*
8. Maintenance Cost:
9. Emissions: 3.7 #F/hr.; $\leq$ 16 #Particulates/hr.; NH_2=2-10 lbs./hr.; SO_2: negligible, $<$25#/hr., (neutralized by NH_3 & scrubbed)

Contaminant	Rate or Concentration
Fluorides: inlets not known; outlets vary from 1.5 to 3.7 lbs./hr.*	
Particulates: inlets not known; outlets vary from 6 to 16 lbs./hr.*	
*Note: outlets from our existing fertilizer plant at 45-60 TPH of D.A.P.	

*Explain method of determining D 3 above.

10. Stack Parameters: Existing DAP plant. (see p. 4, H for the proposed stack data.)

a. Height:	99	ft.	b. Diameter:	7.5'	ft.
c. Flow Rate:	126,000	ACFM	d. Temperature:	120°-140°	°F
e. Velocity:	47	FPS			

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

1.

a. Control Device: Venturi scrubbers & demisters followed by vertical counter flow packed towers, which are more efficient than cross-flow or co-current packed scrubbers.

b. Operating Principles: Condensation, absorption, acceleration in the venturi, decelleration and inertial impact.

c. Efficiency*: to meet standards

d. Capital Cost: $5-6/TPY

e. Useful Life: approx. 11 yrs.

f. Operating Cost:) Approx. 10-15% of

g. Energy*: dependent on plant size

h. Maintenance Cost:) capital cost

i. Availability of construction materials and process chemicals: good

j. Applicability to manufacturing processes: good: venturis are self cleaning.

k. Ability to construct with control device, install in available space, and operate within proposed levels: This technology has been proven in Florida.

2. All the existing scrubbing systems use the same principle (E. T. A.)and technology. Venturi scrubbers & packed scrubbers.

a. Control Device:

b. Operating Principles: same as above

c. Efficiency*: to meet EPA & DER standards

d. Capital Cost: as above

e. Useful Life: approx. 11 yrs.

f. Operating Cost: "

g. Energy**: as above

h. Maintenance Costs: "

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:

*Explain method of determining efficiency. calculated inlet loading less stack emissions ÷ by inlet.

**Energy to be reported in units of electrical power – KWH design rate. these data are not available from out competitors.

3.

a. Control Device: same as above

b. Operating Principles:

c. Efficiency*:

d. Capital Cost:

e. Life:

f. Operating Cost:

g. Energy:

h. Maintenance Cost:

*Explain method of determining efficiency above.

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 same as above

b. Operating Principles:

c. Efficiency*:

d. Capital Cost:

e. Life:

f. Operating Cost:

g. Energy:

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:

F. Describe the control technology selected:

1. Control Device: 3 venturi scrubbers & cyclonic demisters followed by 2 counter flow packed scrubbers & demisters.

2. Efficiency*: F≥95%; particul≥96%

3. Capital Cost: $4,000,000

4. Life: 11 yrs.

5. Operating Cost: 230,000

6. Energy: 2000 KWH/hr.

7. Maintenance Cost: 180,000

8. Manufacturer: "Weatherly" design (or equivalent) made in any local shop.

9. Other locations where employed on similar processes:

a. The "Weatherly" wet scrubbing system has been operated successfully at

(1) Company: USS Agri-Chemicals Division (USSAG) of U. S. Steel Corp.

(2) Mailing Address: Hwy. 60 W. Bartow, P. O. Box 150

(3) City: Bartow (4) State: Florida 33830

(5) Environmental Manager: James Carroll

(6) Telephone No.: (813) 533-0471

*Explain method of determining efficiency above. inlet loading less stack emissions ÷ by inlet.

(7) Emissions*:

Contaminant	Rate or Concentration	
	Design	Field Test
Fluorides	0.06#/ton P_2O_5	< 0.043#/T(.143mg/sc
Particulates (D. A. P.)	33.7 lbs./hr.	< 10#/hr. (>.01gr/scf)

(8) Process Rate*: approx. 90 TPH and 70 TPH respectively.

b.

(1) Company: Our own existing DAP plant equipped with a similar scrubbing system has been operating in compliance thru' 1979.

(2) Mailing Address: P. O. Box 471

(3) City: Bartow (4) State: Florida 33830

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

(5) Environmental Manager: M. J. Altenburger

(6) Telephone No.: 813/533-2171

(7) Emissions*:

Contaminant	Rate or Concentration
Particulates: 14.2 lbs./hr. average, = 40 T/yr. (1977)	16.8 lbs./hr. max. at 300 TPH recycle rate
Fluorides: 11.2T/yr.	

(8) Process Rate*: 300 TPH recycle rate thru' the dryer; 45-60 TPH DAP product rate.

10. Reason for selection and description of systems:

Stack emissions from the D.A.P. fertilizer plant scrubbing system designed by "D. M. WEATHERLY" Engineering Company represent the lowest emissions known to the phosphate industry engineers at this time.

The three venturi scrubbers & demisters installed in parallel remove most of the ammonia fumes and particulate matter, and the two counter current packed towers represent the most efficient scrubber for the removal of fluorides.

D. M. Weatherly has designed the scrubbing system for USSAG plant in Bartow, Florida, and his design was accepted as B.A.C.T. by D.E.R. at the guaranteed emission level 33.7 lbs./hr. Particultes and 0.06 #F/ton of 100% P_2O_5 input. The plant test data indicate that the Weatherly scrubbing system reduced the stack emissions well below the design criteria.

We therefore believe that the proposed scrubbing system similar to the Weatherly design, will meet the B.A.C.T. as per D.E.R.'s recent determination of the following parameters:

Particulates	0.5 #/T P_2O_5 input
Fluorides	0.06 #/T P_2O_5 input
SO_2	0.7 #/T P_2O_5 input

*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 Not Required

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.

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 on 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.

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

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.

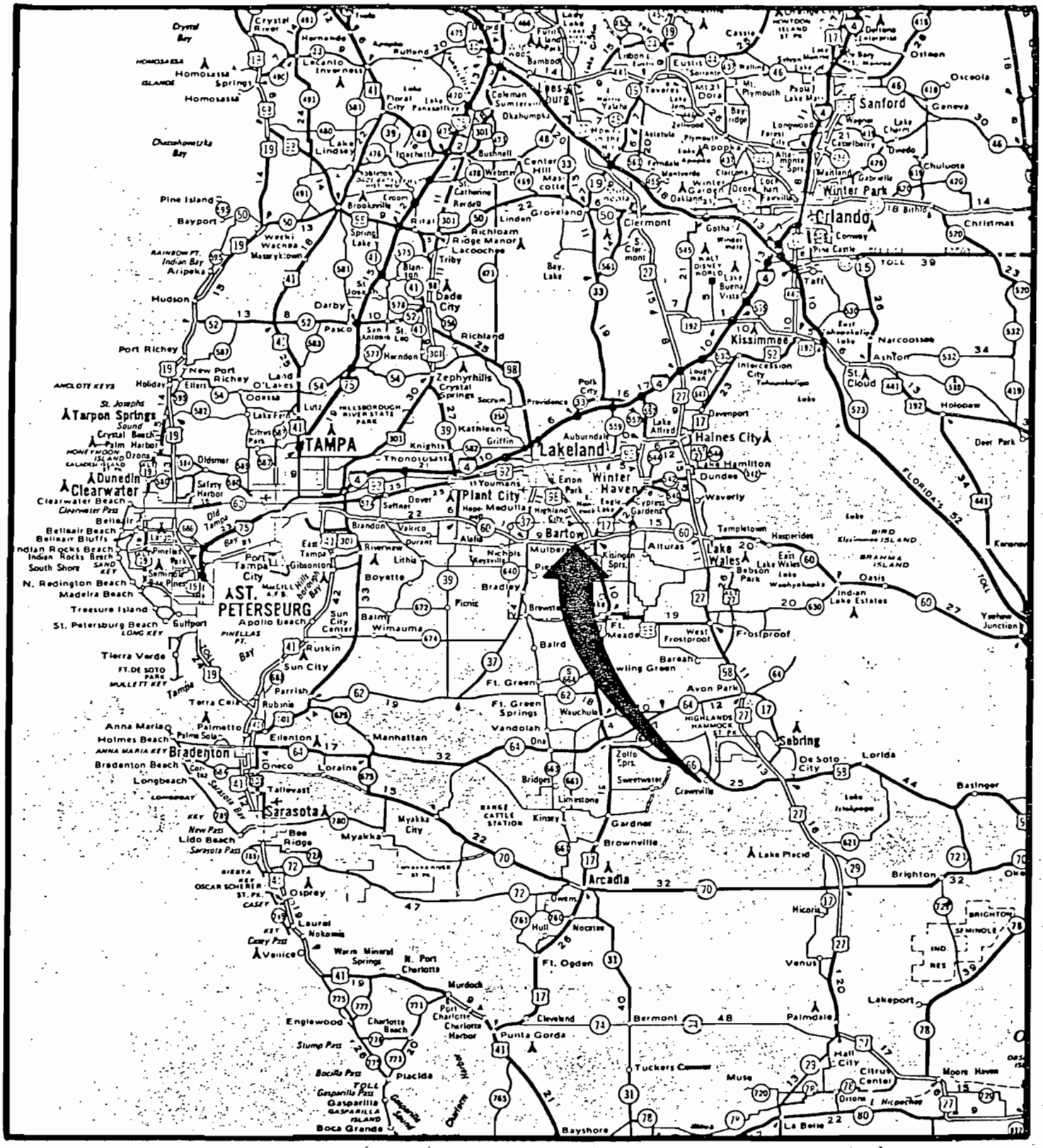


Figure 1. Location of the W. R. Grace Phosphate Fertilizer Complex.

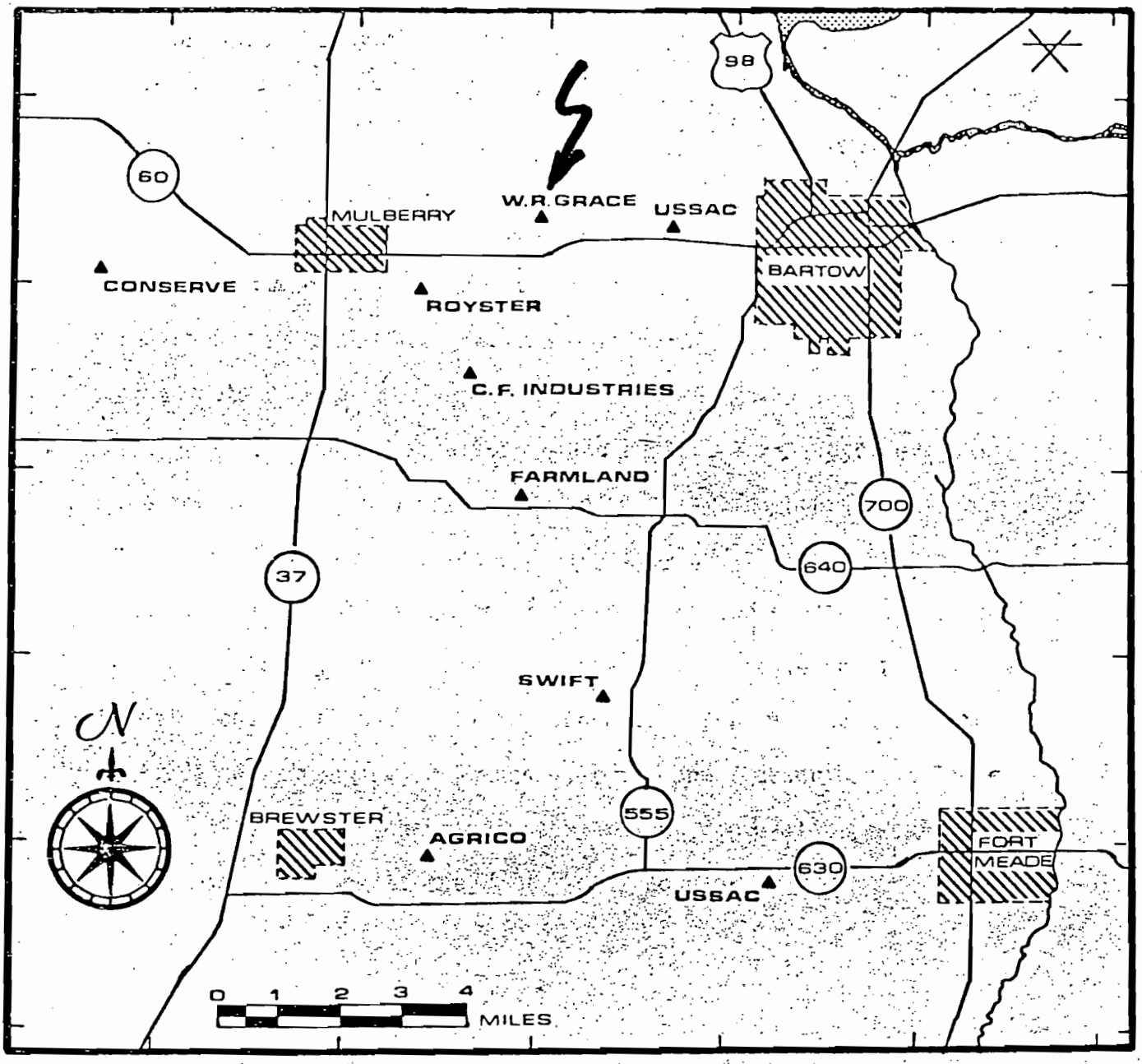
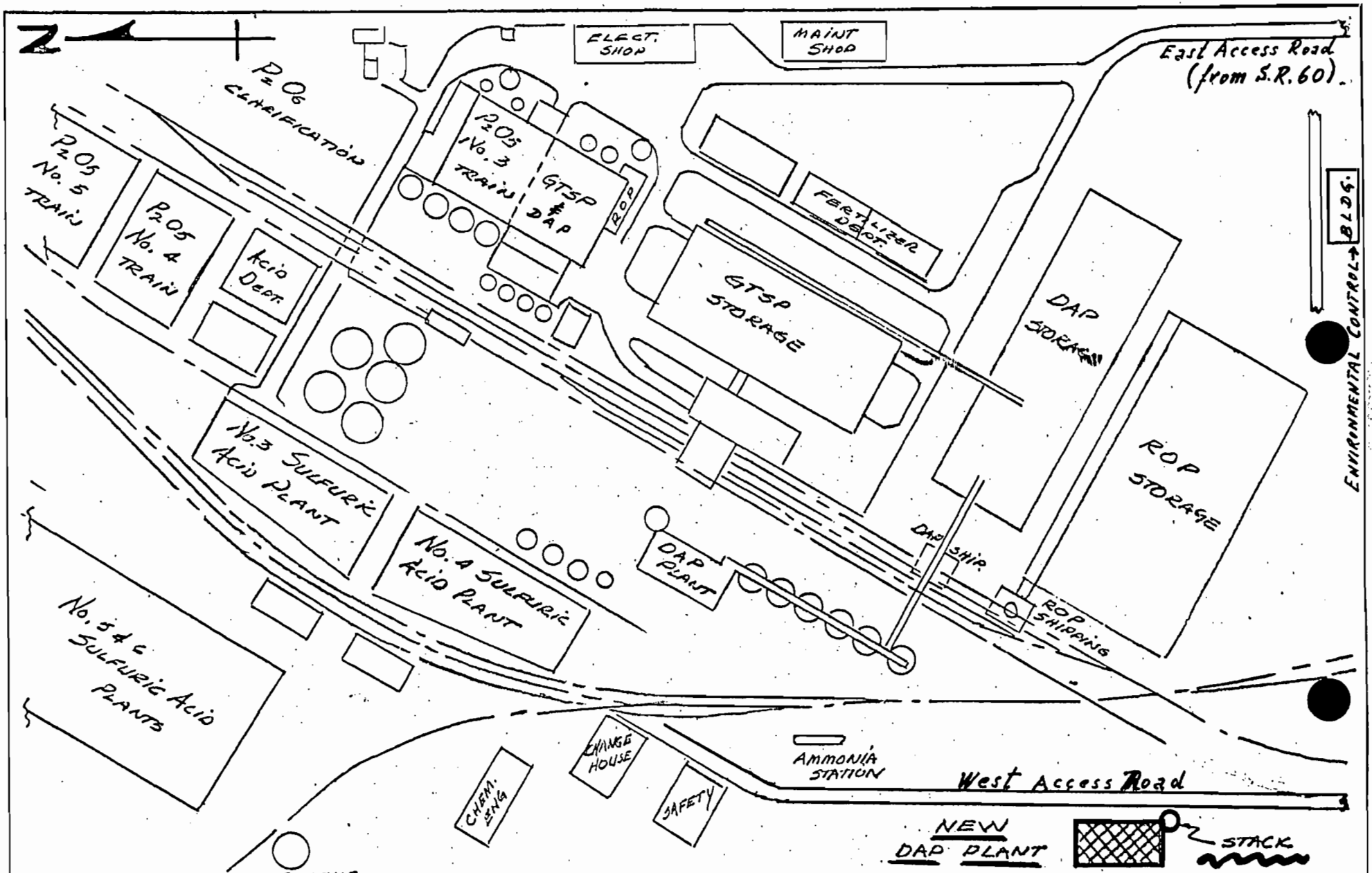


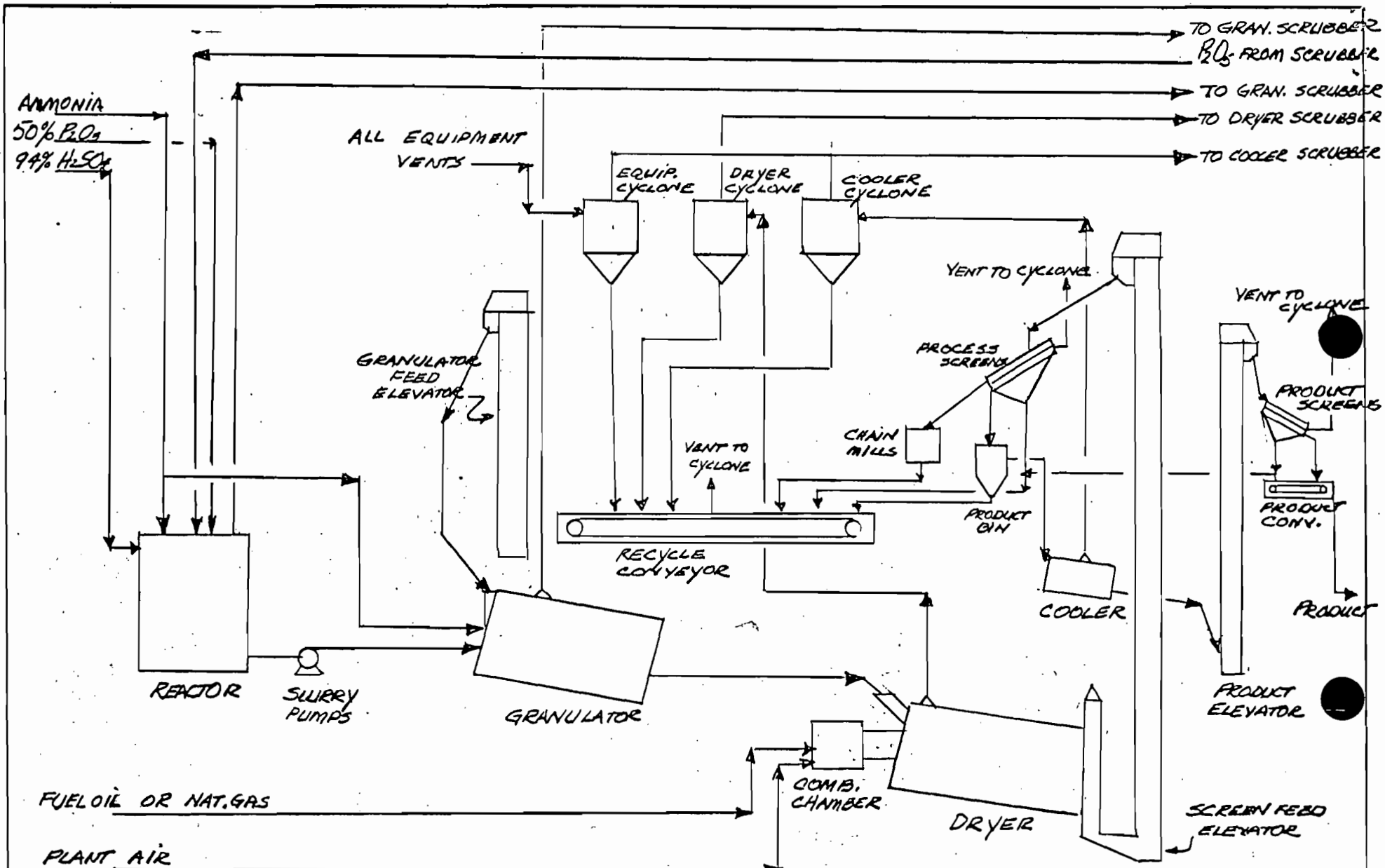
Figure 2. Study Area



W. R. GRACE & CO.
AGRICULTURAL CHEMICALS
BARTOW, FLORIDA

PLOT PLAN – CHEMICAL COMPLEX
DAP PLANT EXPANSION

DRAWN:	12/3/79	D'W'G. NO. sk-107

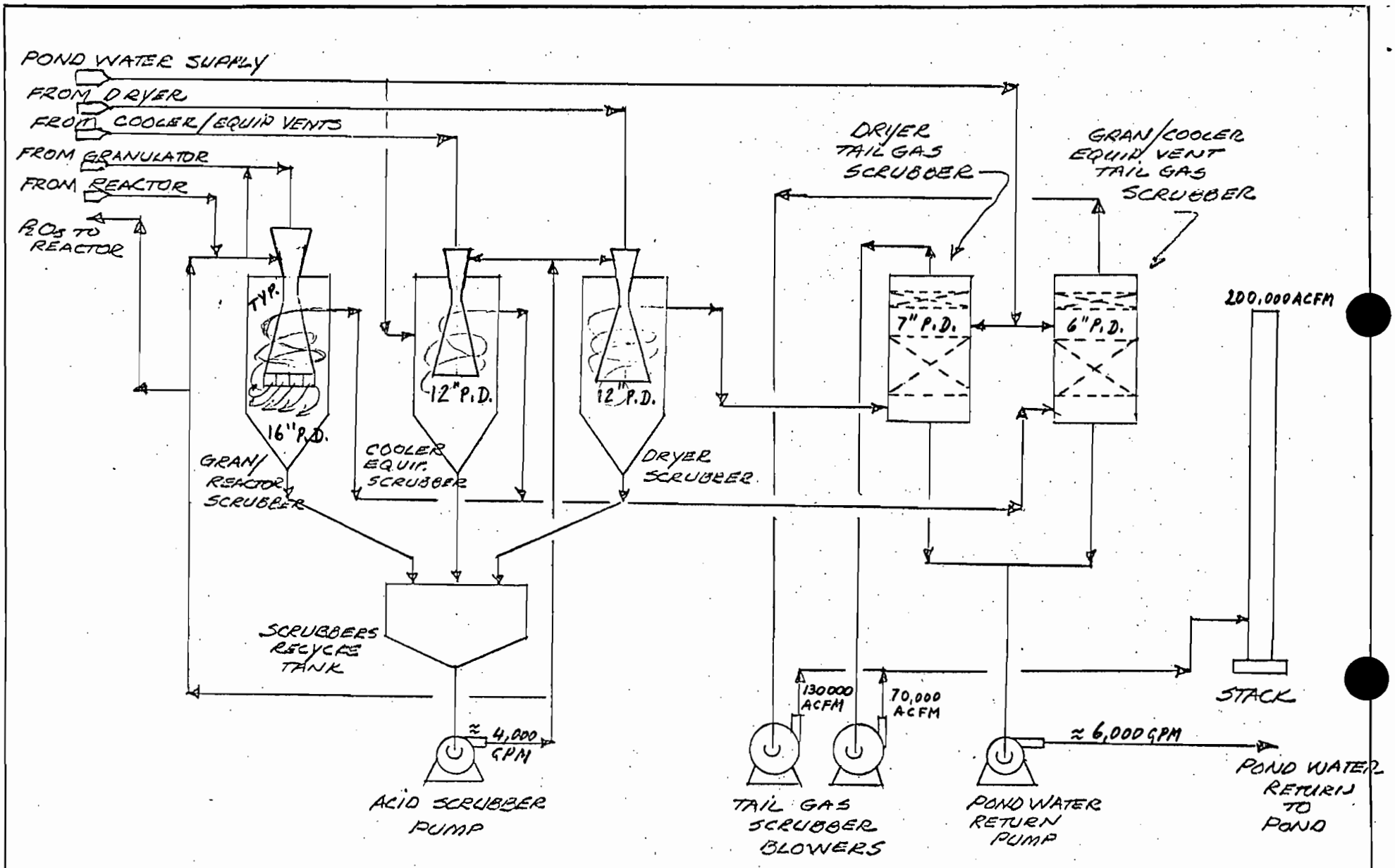


W. R. GRACE & CO.
AGRICULTURAL CHEMICALS
BARTOW, FLORIDA

DAP GRANULATION PLANT
PROCESS FLOW DIAGRAM - PROCESS

DRAWN: H. CORTES	12/79	D'W'G. NO. 1

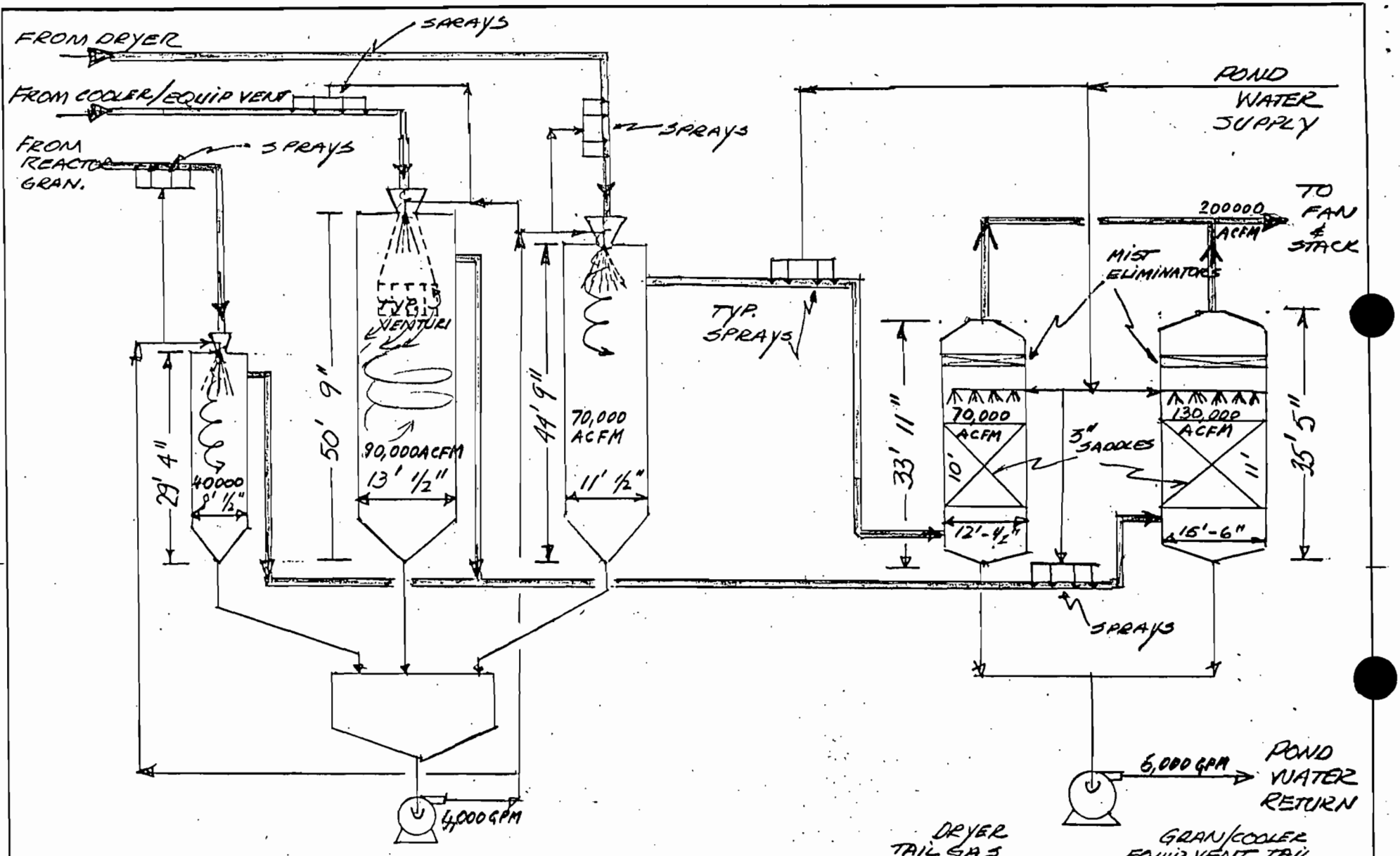
Sect. V, 6



W. R. GRACE & CO.
AGRICULTURAL CHEMICALS
BARTOW, FLORIDA

DAP GRANULATION PLANT
PROCESS FLOW DIAGRAM
SCRUBBER SYSTEM

DRAWN: H. CORTES	REV. 1	D'W'G. NO. 2



SCALE: 1" = 20'

W. R. GRACE & CO.
AGRICULTURAL CHEMICALS
BARTOW, FLORIDA

DAP GRANULATION PLANT
PROCESS FLOW DIAGRAM
SCRUBBER SYSTEM

DRAWN: J CORTES	12/79	D'W'G. NO. 3