

AP42 Section: 8.5

Title: Comments to sections on Phospahte Fertilizers

Note: This material is related to a section in *AP42, Compilation of Air Pollutant Emission Factors, Volume I Stationary Point and Area Sources*. AP42 is located on the EPA web site at www.epa.gov/ttn/chief/ap42/

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P.O. Box 48 Aurora, North Carolina 27806

June 1, 1992

Phosphate Operations
(919) 322-4111

Mr. Ron Myers
Emission Inventory Branch (MD-14)
U.S. Environmental Protection Agency
Research Triangle Park, North Carolina 27711

Re: **Texasgulf Inc.**
Aurora Phosphate Operations
AP-42 Update Information
PES Contract Number 68DO0124

Dear Mr. Myers:

As requested in your letters dated March 9 and 27, 1992, please find Attachments 1 through 3 and Enclosures 1 through 14 with the information on Texasgulf Inc.'s Phosphoric Acid, Triple Superphosphate, Ammonium Phosphate, and Sulfuric Acid production facilities:

If there are any questions concerning this information, please feel free to call me at 919/322-8262.

Sincerely,

B. A. Peacock
Senior Environmental Engineer

pc: WAS/00-17-000 (w/o enclosures)
11-01-001-00 (w/ enclosures except stack test reports)

Attachment 1

Part 1: Phosphoric Acid Production

Texasgulf has four (4) wet phosphoric acid production plants that produce 30% acid from either calcined or uncalcined phosphate rock.

1) Process Description

The AP-42 process description for the production of phosphoric acid (5.11) has been reviewed with the following comments:

A) Section 5.11.1.1, Paragraph 1, Sentence 1

the phosphate rock is not ground and contains 26 to 30 percent P₂O₅.

B) Section 5.11.1.1. Paragraph 4, Sentence 2 and 3

25 percent versus 32 percent acid solution is produced and is concentrated to 54 percent acid with 16 vacuum evaporators versus 2 or 3.

2) Manufacturing Capacities and Average Production Levels

	Permitted Production Rate, TPD	1991 Average ⁽¹⁾ Production Rate, TPD
Plant No. 1	1250	862
Plant No. 2	1250	874
Plant No. 3	1250	926
Plant No. 4	1250	940

⁽¹⁾ Texasgulf has a daily production limitation; average production rates should not be used for capacity factor calculations.

3) Test Data

The air permit for the phosphoric acid plant does not require annual compliance testing. Enclosed is a copy of the latest stack sampling results for fluorides, SO₂ and Total Reduced Sulfur (TRS). The fluoride test (Enclosure 1) is a comprehensive test involving eleven (11) sources. The SO₂ test (Enclosure 2) was conducted on each of the four (4) cross-flow scrubber stacks. The TRS tests (Enclosures 3 and 4) were conducted on the fume scrubber stacks, vacuum pump stacks, bird filter stacks and cross-flow stacks.

4) Industry Trends

Long term plans are to expand the capacity of phosphoric acid production.

Part 2: Triple Superphosphate Production

Texasgulf has one (1) granular fertilizer plant, GTSP #2, which produces granular triple superphosphate (GTSP).

1) Process Description

The AP-42 process description for the production of triple superphosphate (6.10.2) has been reviewed with the following comments:

A) Section 6.10.2.1, Paragraph 2, Sentence 5

slurry is introduced through the distributor pipes set lengthwise in the drum over, not under, the bed.

B) Table 6.10.2-1 Controlled Emission Factors

The actual control efficiencies of the cyclones and wet scrubbers on the GTSP #2 plant are unknown. Texsagulf has not performed testing on the pollutant inlet loading rates so overall efficiencies cannot be calculated.

2) Manufacturing Capacities and 1991 Average Production Levels

<u>Plant</u>	<u>Permitted Production Rate, TPD</u>	<u>1991 Average Production Rate TPD</u>
GTSP #2	1400	906

3) Test Data

The air permit for GTSP #2 does not require annual compliance testing and, therefore, no fluoride or particulate test data is available. The GTSP #2 fertilizer plant emits the following NC Air Toxic Pollutants from burning #6 fuel oil in the dryer: arsenic, beryllium, cadmium, chromuim VI, formaldehyde, manganese, mercury and nickel. Texasgulf has not conducted stack sampling to determine the emission rate of beryllium, formaldehyde, chromium VI or mercury. The remaining pollutants, arsenic, cadmium and manganese, are contained in the phosphate rock in sufficient quantities to warrent stack sampling to determine their concentration in the particulate matter. Listed below are the results (ppm) from analyzing the particulate matter collected during stack sampling while producing GTSP.

	<u>As</u>	<u>Cd</u>	<u>Mn</u>	<u>Ni</u>
Test 1	18	112	145	14,000
Test 2	16	67	74	6,980
Test 3	17	44	84	10,000
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Average	17 ppm	74 ppm	101 ppm	10,327 ppm

Texasgulf has not attempted to determine the per cent metal concentration contributed from combusting #6 fuel oil or from the phosphate rock. Additionally, Texasgulf analyzed for the total amount of each metal and did not determine the various compounds of each metal that might be contained in the particulate matter.

4) Industry Trends

The world markets are demanding more DAP and less MAP and GTSP fertilizers. Texasgulf has no plans to expand the capacity of GTSP production.

Part 3: Ammonium Phosphate Production

Texasgulf has three (3) granular fertilizer plants, DAP #1, DAP #2 and GTSP #2, that produce ammonium phosphates. DAP #1 and #2 are permitted to produce diammonium phosphate (DAP) and monoammonium phosphate (MAP). The GTSP #2 plant is permitted to produce MAP. Of the three plants, only DAP #2 is a NSPS facility.

1) Process Description

The AP-42 process description for the production of ammonium phosphates (6.10.3) has been reviewed with the following comments:

A) Section 6.10.3.1, Paragraph 2, Sentence 3

the secondary scrubbers use fresh water versus gypsum pond water.

B) Section 6.10.3.1, Paragraph 3, Sentence 1

the rotary drum ammoniator/granulator does not have a scraper or cutter mounted inside; the drum is rubber lined with flex points which tends to have little or no slurry build-up.

C) Section 6.10.3.1 Paragraph 4, Sentence 1

the ammonium phosphate granules are screened first then cooled; this reduces the amount of cooling required since the off size material is sent back to be reprocessed and not cooled; additionally, less coating oil is used since the oil is applied in the cooler to only the on size material.

D) Figure 6.2.3-1 Process Flow Diagram

Flow diagrams for the DAP #2 and GTSP #2 plants are attached (Attachments 2 and 3). The DAP #1 plant has cyclones on the dryer/cooler followed by a cyclonic/venturi wet scrubber, and a cyclonic/venturi wet scrubber on the reactor/granulator.

E) Table 6.10.3-1 Average Controlled Emission Factors

The actual control efficiencies of the cyclones and wet scrubbers on each of the plants are unknown. Texasgulf has not performed testing on the pollutant inlet loading rates so overall efficiencies cannot be calculated. Refer to Section 3 below for Test Data.

2) Manufacturing Capacities and 1991 Average Production Levels

<u>Plant</u>	<u>Permitted Production Rate, TPD</u>	<u>1991 Average Production Rate, TPD</u>
Dap #1		
DAP	1000	867
MAP	1000	0
DAP #2		
DAP	2200	1740
MAP	2200	0
GTSP #2		
MAP	2160	1183

3) Test Data

The air permits for DAP #1 and GTSP #2 do not require annual compliance testing. Enclosed is a copy of the latest stack test for each. The air permit for DAP #2 does require annual compliance testing; the tests for the last three years are enclosed.

<u>Plant</u>	<u>lbs fluoride/ ton P2O5 input</u>	<u>lbs particulate/ ton P2O5 input</u>	
DAP #1	0.234	2.513	(Enclosure 5)
DAP #2			
1989	0.009	Not required	(Enclosure 6)
1990	0.025	Not required	(Enclosure 7)
1991	0.024	0.546	(Enclosures 8 & 9)
GTSP #2			
MAP	0.002	Not required	(Enclosure 10)

The three (3) fertilizer plants emit the following NC Air Toxic Pollutants from burning #6 fuel oil in the dryers: arsenic, beryllium, cadmium, chromuim VI, formaldehyde, manganese, mercury and nickel. Texasgulf has not done stack sampling to determine the emission rate of beryllium, formaldehyde, chromium VI or mercury. The remaining pollutants, arsenic, cadmium and manganese, are contained in the phosphate rock in sufficient quantities to warrent stack sampling to determine their concentration in the particulate matter. Listed below are the results (ppm) from analyzing the particulate matter collected during stack sampling while producing DAP/MAP.

	<u>As</u>	<u>Cd</u>	<u>Mn</u>	<u>Ni</u>
Test 1	1.8	64.0	40.0	623.0
Test 2	0.3	32.0	41.0	359.0
	----	----	----	----
Average	1.1 ppm	48.0 ppm	40.5 ppm	491.0 ppm

Texasgulf has not attempted to determine the per cent metal concentration contributed from combusting #6 fuel oil or from the phosphate rock. Additionally, Texasgulf analyzed for the total amount of each metal and did not determine the various compounds of each metal that might be contained in the particulate matter.

During DAP production, DAP #1 and DAP #2 emit ammonia, also a NC Air Toxic Pollutant. The air permits for those two plants currently do not require compliance testing for ammonia. However, Texasgulf has performed in-house stack testing during DAP production with the following results (gas fraction only; does not include ammonia in the particulate matter):

<u>Plant</u>	<u>lbs NH3/ ton P2O5</u>	<u>NH3 lbs/hr</u>	
DAP #1			
Test #1	14.2	263.3	(Enclosure 11)
Test #2	<u>6.4</u>	<u>118.7</u>	(Enclosure 12)
Average	10.3	191.0	

Note: P2O5 input rate = 18.5 TPH for tests above (not on Enclosures 6 and 7)

DAP #2			
Test #1	0.020	0.85	(Enclosure 13)
Test #2	<u>0.030</u>	<u>1.23</u>	(Enclosure 14)
Average	0.025	1.04	

Texasgulf has not conducted any recent, meaningful stack sampling for ammonia emissions during MAP production.

4) Industry Trends

The world markets are demanding more DAP and less MAP and GTSP fertilizers. Texasgulf has plans to expand its DAP capacity.

Part 4: Sulfuric Acid Production

Texasgulf has four (4) elemental sulfur burning, double absorption sulfuric acid plants.

1) Process Description

The AP-42 process description for the production of sulfuric acid (5.17) has been reviewed with the following comments:

A) Section 5.17.2, Paragraph 1, Sentence 6

the 4 lbs SO₂/ton 100% acid is a maximum 3 hour average, not a 2 hour average.

B) Section 5.17.2, Paragraph 4, Sentence 1 and 2

in the dual absorption process, all gases go to the absorber, not just the SO₃ gas. The gas mixture includes nitrogen and oxygen as well as SO₂ and SO₃. The gas that contains the uncontrolled SO₂ gas that is forwarded to the final stages in the converter, also contains the nitrogen and oxygen gases.

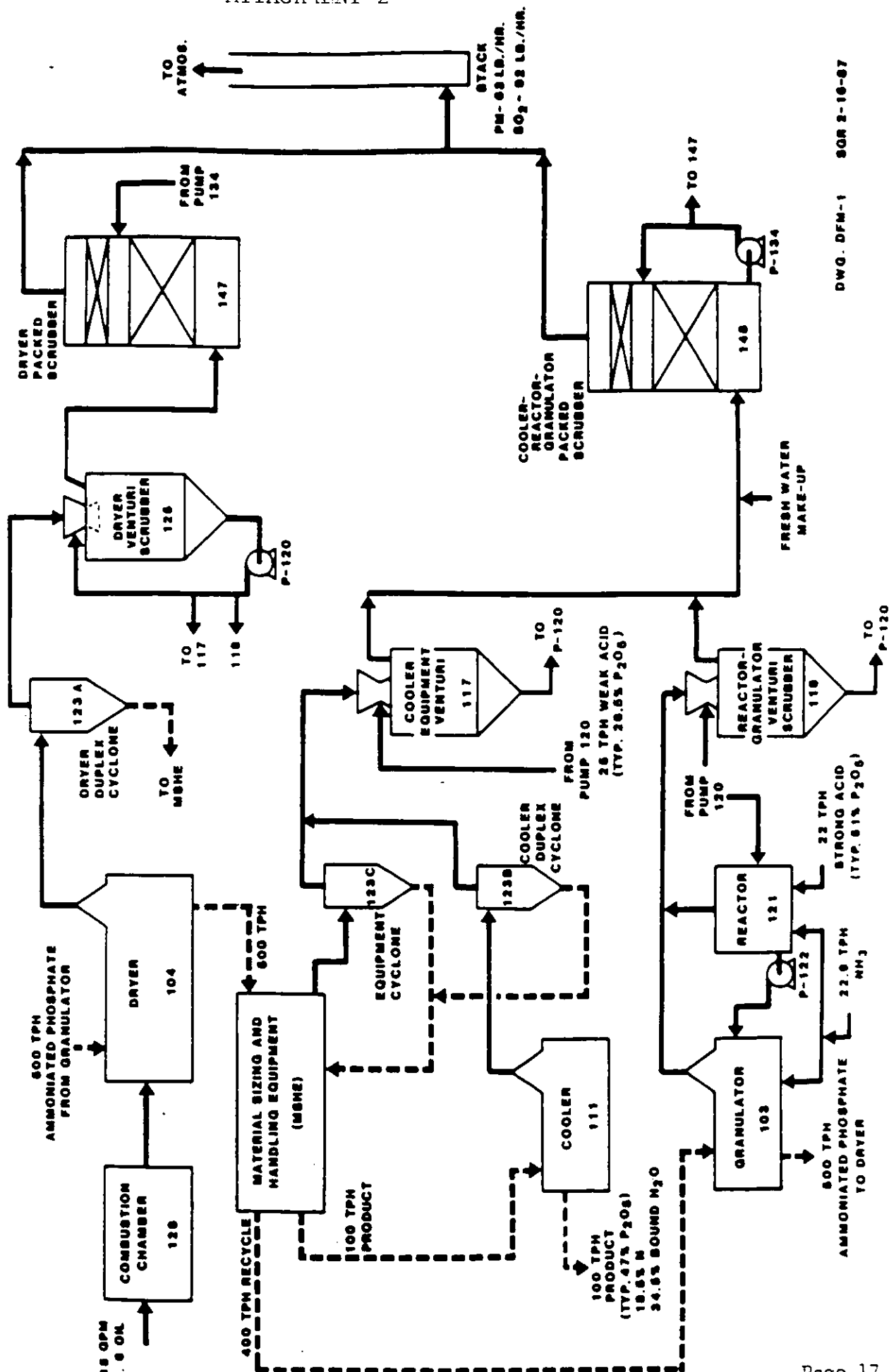
C) The following describes the mist eliminators on the four (4) plants:

Plants 3/4	Drying	- Vertical Tubular
Plants 3/4	IPA	- Vertical Tubular
Plants 3/4	FAT	- Vertical Tubular + Horizontal Panel
Plants 5	Drying	- Vertical Tubular
Plants 5	IPA	- Vertical Tubular
Plants 5	FAT	- Vertical Tubular
Plants 6	FAT	- Vertical Tubular + Horizontal Panel
Plants 6	Drying	- Vertical Tubular + Horizontal Panel
Plants 6	IPA	- Vertical Tubular

2) Manufacturing Capacities and Average Production Levels

	<u>Permitted Production Rate, TPD</u>	<u>1991 Average Production Rate, TPD</u>
Plant No. 3	1850	1676
Plant No. 4	1850	1698
Plant No. 5	3250	3113
Plant No. 6	3600	3395

AP No.2 Process Flow Diagram



3) Test Data

The following are the results from the stack tests performed in 1991 (PES has already obtained copies of the stack tests):

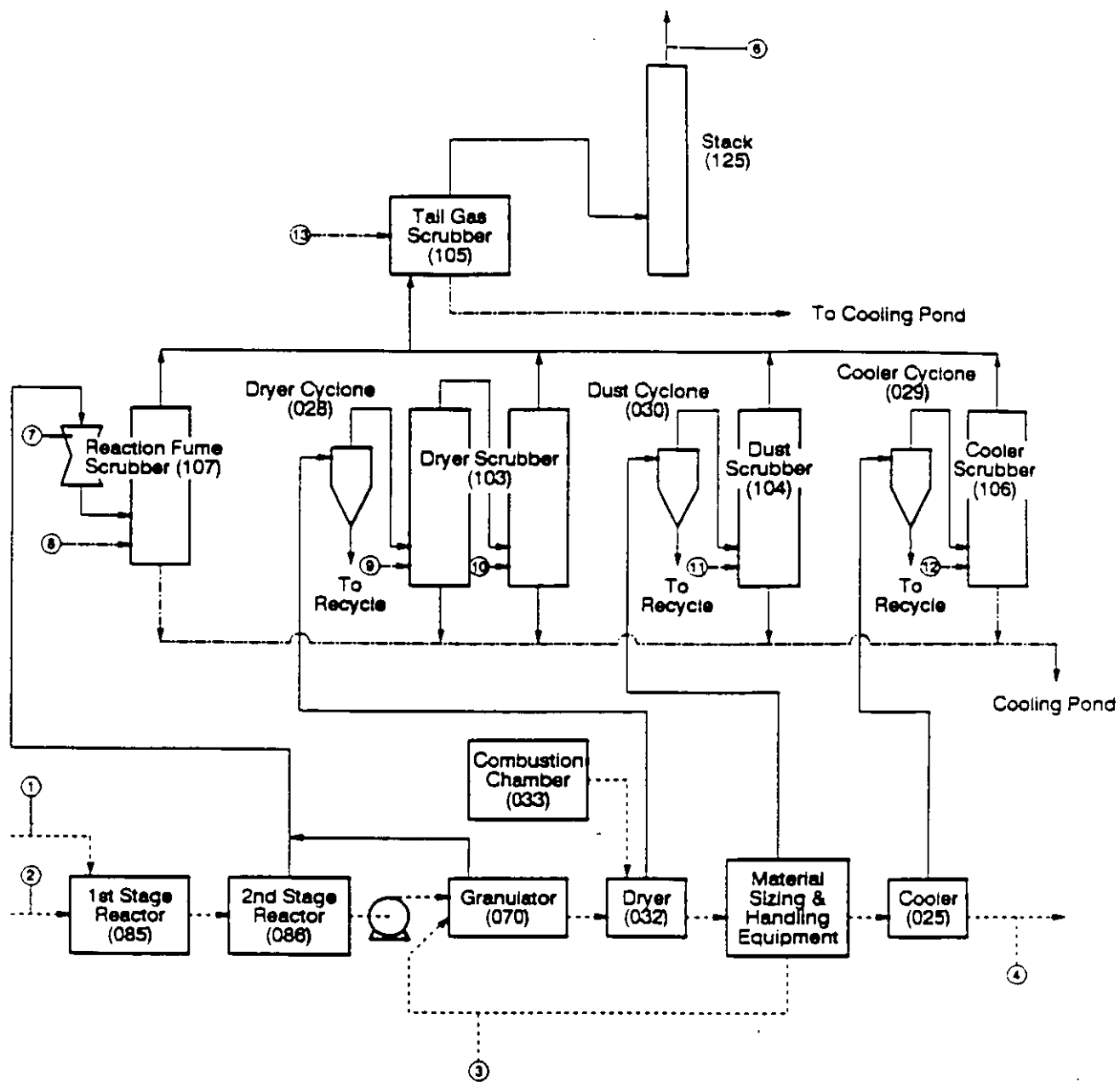
	1991 lbs SO ₂ /ton <u>100% acid</u>	1991 lbs mist/ton <u>100% acid</u>
Plant No. 3	3.65	0.030
Plant No. 4	3.22	0.044
Plant No. 5	3.84	0.043
Plant No. 6	3.72	0.021

All four plants are operated with a 99.7% conversion efficiency to comply with the NSPS of 4 lbs SO₂/ton product (100% acid).

4) Industry Trends

Long term plans are to expand the capacity of sulfuric acid production.

ATTACHMENT 3



- 1 Phosphate Rock (31% P_2O_5)
- 2 Phosphoric Acid (42% P_2O_5)
- 3 Recycle 1,000,000 lbs/hr or 500 tons/hr
- 4 Product GTSP 116,600 lbs/hr or 58.3 tons/hr (46% P_2O_5) or 1400 tons/day
- 5 No.6 Fuel Oil, 55 x 10⁶ Btu/hr
- 6 137,000 ACFM @ 89°F, Particulates 64.9 lbs/hr, SO_2 126.5 lbs/hr,
NOx 44 lbs/hr, CO 1.4 lbs/hr, Fluorides 4.6 lbs/hr
- 7 Cooling Pond Water 800 gpm (minimum)
- 8 Cooling Pond Water 150 gpm (minimum)
- 9 Cooling Pond Water 550 gpm (minimum)
- 10 Cooling Pond Water 350 gpm (minimum)
- 11 Cooling Pond Water 150 gpm (minimum)
- 12 Cooling Pond Water 150 gpm (minimum)
- 13 Cooling Pond Water 1000 gpm (minimum)

GTSP No. 2 Process Flow Diagram - Area 511

Figure 2-2. Schematic Diagram of GTSP #2 Plant