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RADIAN CORPORATION

July 2, 1980

AMMONIUM NITRATE
AP-42 Section 6.8
Reference Number
3

TO: Ammonium Nitrate File

FROM: C. D. Anderson

SUBJECT: Summary of industry responses

Contained is an updated version of Pat Brown's (GCA Corporation) summary of 114 letters and telephone conversations with ammonium nitrate manufacturers.

Note: This is a reference cited in *AP 42, 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/

The file name refers to the reference number, the AP42 chapter and section. The file name "ref02_c01s02.pdf" would mean the reference is from AP42 chapter 1 section 2. The reference may be from a previous version of the section and no longer cited. The primary source should always be checked.

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ID number	Company name	Type of product	Production	Neutralizer		
				Description	Type of control	Emissions
1	Agway, Inc. (CFI Orlean, N. Y.	Solids	64,000 ton/year			
2	Air Products & Chemicals Pensacola, Florida	High density prills	200,000 ton/year			
3	Allied Chemical Co. Geismar, La.	AN liquid only		Atmospheric neutralizer pH 5.4	Packed scrubber condenser then acid scrubber	Meets 20% opacity regulation
4	Allied Chemical Co. Omaha, Nebr.	Uran-32 (AN solution)	64,000 ton/year AN (all used in Uran-32)	In-house design pH 4-5	Scrubber	5%
5	American Cyanamid Hannibal, Mo.	High density prills Low density prills	135,600 ton/year	pH unknown run at a vacuum	None - unit vents directly to concentrator	
6	Apache Powder Co. Benson, Ariz.	Low density prills Graining	Max 300 ton/day 112,000 ton/yr solids Max 54 ton/day	Atmospheric - pH not known	None	
7	CF Industries Donaldsonville, La.	Liquid AN	2600 ton/day	UDHE design (1977) 18 psig pH=2	First to a "separator", then condensed	

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ID number	Company name	Concentrator			Solids formation		
		Type	Control method	Emissions	Type	Type of control	Emissions
1	Agway, Inc. (CFI Olean, N.Y.						
2	Air Products & Chemicals Pensacola, Fla.	(Company requires written request)			Prill tower	CFCA core & venturi scrubber	
3	Allied Chemical Co. Geismar, La.	None			None		
4	Allied Chemical Co. Omaha, Nebr.	Falling film evaporator	Use neutralizer scrubber	5%	None		
5	American Cyanamid Hannibal, Mo.	Falling film evaporator	Controlled by prill tower Brinks	Variance issued compliance by 12/1/77	Prill tower	Brinks with CFA cone	Variance issued compliance by 12/1/77
6	Apache Power Co. Benson, Ariz.	Falling film evaporator (separate evap. for graining)	None		Low density prill graining	None	
7	CF Industries Donaldsonville, La.	None			None		

ID number	Company name	Predrying	Drying	Cooling	Coating	Bagging
1	Agway, Inc. (CFI Olean, N.Y.					
2	Air Products & Chemicals Pensacola, Fla.	None	None	Smog tower on discharge stream		
3	Allied Chemical Co. Geismar, La.	None	None	None	None	No solids
4	Allied Chemical Co.	None	None	None	None	No solids
5	American Cyanamid Hannibal, Mo.		dryer and cooler controlled by a wet scrubber		No controls	bulk only - baghouse on warehouse area
6	Apache Powder Co. Benson, Ariz.	Precooler	No controls	Fluidized bed	All coated no controls	Small amount - no controls
7	CF Industries Donaldsonville, La.	None	None	None	None	No solids

ID number	Company name	Type of product	Production	Neutralizer		
				Description	Type of control	Emissions
8	CF Industries Freemont, Nebr.	AN solutions	1,000 lb/hr	Atmospheric pH 4.0 - 4.5	York Demister (114's)	
9	CF Industries Terre Haute, Ind.	High density prills/solutions	600 ton/day	8-11" pressure pH 3.5 - 5.5	2/3 steam condenser(1) 1/3 steam Brinks H.V. demister No. 2	Never tested
10	CF Industries Tunis, N.C.	High density prills	400,000 ton/year	2-stage Neutr. 1st-pH 2.5 - 3.5 2nd-pH 5.5 - 6.0	Packed wet scrubber W. York Demister(4)	
11	CF Industries Harrison, Tenn.	High density prills	550 ton/day	On the ammonia side	H.V. Brinks Mistelim, then to Koch scrubber	
12	N-ReN Pryor, Okla.	High density granules,	77,000 ton/year 400 ton/day	(2)	Sly impinjet scrubber on 2nd stage(3)	200 ppm NH_3 and 600-700 ppm AN Never tested
13	Coastal States Gas Corp. (Wycon Chemical) Cheyenne, Wyo.	High density prills	80,500 ton/year	Atmospheric (1 or 2 psig) pH - 5.5	Total condenser	
14	Columbia Nitrogen Corp. Augusta, Ga.	Low density prills	234,000 ton/yr		Wet scrubber - in-house design	

(1) (NH_3 vaporizer). Ref. Telecon. C. Sherwood. (Nonconfid)

(2) The 114 response lists only one stage, at atmospheric pressure, and pH = 4.5 to 5.2. Ref: p. 1 of the 114 response (Nonconfid) No

(3) Exhaust from each scrubber stage preheats the HNO_3 feed, before treatment by the Brinks HV or Sly impinjet. Ref: Final Trip Report (S. Capone), p. 7 (Nonconfid)

(4) There is a vein-type demister of 'unknown origin' within the 1st stage neutralizer. The 1st stage vents to the packed scrubber (W. York demister at outlet). The 2nd stage vents to the first stage. Ref:114 Response p. 2,3,6,7 (Nonconfid).

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ID number	Company name	Concentrator			Solids formation		
		Type	Control method	Emissions	Type	Type of control	Emissions
8	CF Industries Freemont, Nebr.	Kettle Type	None		None	None	None
9	CF Industries Terre Haute, Ind.	Falling film evaporator	Steam exhaust to prill tower Brinks		Prill tower	H.E. Brinks demister with	0.54 to 0.60 lb/ton from fans. 0.09 to 0.15 lb/ton from Brinks (December 1976)
10	CF Industries Tunis, N.C.	2-Stage design	Barometric condensor on 2nd stage		Prill tower	No controls	Never tested
11	CF Industries Harrison, Tenn.	Falling film evaporator	To prill tower scrubber (Koch modified)		Prill tower	In-house designed wet scrubber low energy valve turn scrubber (modified Koch)	In compliance 30-60 lb/hr 20-30% opacity
12	N-ReN Pryor, Okla.	Wittlock air swept falling film evaporator	Combined with granulator exhaust		Pan granulator	Variable throat venturi scrubber 20 in. W.C. pressure drop	Never tested
13	Coastal States Gas Corp. (Wycon Chemical) Cheyenne, Wyo.	Falling film evaporator	None		Prill tower	Knock-out chambers	700 lb/day meets process weight regulation 24.4 lb/hr
14	Columbia Nitrogen Corp. Augusta, Ga.				Prill tower	H.E. Brinks W/Shroud	

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ID number	Company name	Predrying	Drying	Cooling	Coating	Bagging
8	CF Industries Freemont, Nebr.	None	None	None	None	None - no solids
9	CF Industries Terre Haute, Ind.	None	None	Brinks demister No. 2 (2-3" P) Dec. 1976 0.005 to 0.007 lb/ton	0.1% coating no control	No controls
10	CF Industries Tunis, N.C.	None	None	No controls Fluid Bed Cooler	No coating	No controls
11	CF Industries Harrison, Tenn.	None	None	Rotary drum cooler Buell Scrubbers	No coating MgO additive before prill	No controls
12	N-ReN Pryor, Okla.	Rotary drum precooler controlled by Buffalo Forge Scrubber		Rotary drum cooler controlled by wet cyclones Buell scrubber	2% added prior to granulation 0.4% added to final product baghouse on coating tank	1 Baghouse on warehouse and 1 on conveyor
13	Coastal States Gas Corp. (Wycon Chemical) Cheyenne, Wyo.			Cooler controlled by cyclone separator		All bulk
14	Columbia Nitrogen Corp. Augusta, Ga.		Low density wet scrubber	Cooler controlled by Dulon scrubber	baghouse	baghouse

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ID number	Company name	Type of product	Production	Neutralizer		
				Type	Control method	Emissions
15	Cominco American Co. Beatrice, Nebr.	High density granules	Capacity: 700 ton/day Production: 500 ton/day	Atmospheric pH = 5.4	50% condensed* 50% vented	Meets 20% opacity 0.72 lb/ton in 1974
16	E.I. DuPont de Nemours & Co. Seneca, Ill.	(Company requires written request				
17	Nipak Kerens, Tex.	Light density prills solutions (10% of production)	50,000 ton/year			
18	Farmland Industries Dodge City, Kans.	AN liquid	500 ton/day UAN 221.5 ton/day AN		Condenser followed by a scrubber	No problem meeting 20% standard
19	Farmland Industries Lawrence, Kans.	High density prills/liquid 2 plants	1400-1600 ton/day	Atmospheric	No.2: steam to Brinks demister on prill towers. No.1: Condensor and venturi scrubber Ref: 114 Response, Attachment #5 p. 2 (Nonconfid)	
20	Gardiner Big River Inc. Helena, Ark. (Sold to Allied)	AN liquid only	105,000 ton/year	Vacuum neutralizer pH5	scrubber	

*For NH_3 preheat. Ref: Fig. 3-1 of Draft Stack Test Report - York Research Corp.)

ID number	Company name	Concentrator			Solids formation		
		Description	Type of control	Emissions	Type	Type of control	Emissions
15 -	Cominco American Co. Beatrice, Nebr.	Air swept falling film evaporators	Controlled by granulator scrubber	Meets 20% opacity	2 Rotary drum granulators	4 Dovle impinger scrubbers (2 each granulator)	Meets 20% opacity occasional 35% 1974: 0.77 to 1.83 lb/ton, not EPA approved testing; meets regulation
16	E.I. DuPont de Nemours & Co. Seneca, Ill.						
17	Nipak Kerens, Tex.				Prill tower	No controls	No visible emissions
18	Farmland Industries Dodge City, Kans.	None			None		
19	Farmland Industries Lawrence, Kans.	Whittock falling film evaporators	No.2: overheads to prill tower (Brinks) No.1:*		2 Prill tower	Both have CFCA cone and Brinks demister	
20	Gardiner Big River Inc. Helena, Ark. (Sold to Allied)	Falling film (dilute to 83% after concentration)	Condensor	Sample on 3/18/77; particulates = 0.18 lb/ton	None		

*No. 1: Overheads from the 95% evaporator are controlled by condensation
Overheads from the 99% evaporator go to Brinks (prill tower Brinks)
Ref: 114 Response, Attachment #5 p. 3 (Nonconfid)

ID number	Company name	Predrying	Drying	Cooling	Coating	Bagging
15	Cominco American Co. Beatrice, Nebr.	None	None	2 Rotary drum coolers controlled by Doyle impingement scrubbers	1 Rotary drum coater controlled by baghouse	Controlled by baghouse
16	E.I. DuPont de Nemours & Co. Seneca, Ill.			Doyle scrubbers		
17	Nipak Kerens, Tex.			wet cyclone on dryers and coolers	Koalin added and controlled by baghouse	
18	Farmland Industries Dodge City, Kans.	None	None	None	None	None - No solids
19	Farmland Industries Lawrence, Kans.			No. 1 line has a rotary drum cooler controlled by wet cyclone and Buell scrubber No. 2 line has a fluid bed cooler* with cyclone	0.1% coating added Semco dust collectors - both plants (fabric filters)	No control
20	Gardiner Big River Inc. Helena, Ark. (Sold to Allied)	None	None	None	None	None - No solids

*114 Response (Attachment #6 p. 5) lists a wet scrubber in use on the exhaust from the fluid bed cooler (Nonconfid)

ID number	Company name	Type of product	Production	Neutralizer		
				Description	Type of control	Emissions
21	W.R. Grace & Co. Wilmington, N.C.	AN prills LD prills	115.8 ton/hr			
22	Gulf Oil Chemical Co. Pittsburgh, Kansas	Light density prills small amount solutions	1,000 ton/day[a] 360,000 ton/yr	3 Neutralizers	1 Scrubber on each unit	17-27; 19-24; 10-17 lb/hr
23	Hawkeye Chemical Co. Clinton, Iowa (Skelly Oil)	Light density prills, High density prills, solution	136,000 ton/yr 425 ton/day solution 2-0 ton/day prills	Mississippi Chemical design	Wire mesh and high density pad mist eliminator	No visible emission
24	Hercules, Inc. Bessamer, Ala	AN grains for explosives	1,000 lb/batch	None		
25	Hercules, Inc. Carthage, Mo.	All grains for explosives	850-990 ton/day 26,000 ton/yr of explosives	No neutralizer receives 83% AN solution by railcar		
26	Hercules, Inc. Donora, Pa.	Light density prills	400 ton/day		Total condensation	
27	Hercules, Inc. Louisiana, Mo.	Light density prills solution	850-990 ton/day	ph = 10.2	H.V. Brinks (mist eliminator to cyclone) Note 1.	0.22 gr/scf

[a]1,000 ton/day expansion planned in January 1979.

Note 1: See item 1, Confidential Addendum. Contact Eric Noble, 919-541-5213.

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ID number	Company name	Concentrator			Solids formation		
		Type	Control mechod	Emissions	Type	Type of control	Emissions
21	W.R. Grace & Co. Wilmington, N.C.				Prill Tower	No controls	
22	Gulf Oil Chemical Co. Pittsburg, Kansas	Falling film evaporator	No control		2 light density prill towers	No controls setting chamber	5-10 percent opacity average 25-26 lb/hr/tower
23	Hawkeye Chemical Co. Clinton, Iowa (Skelly Oil)	Two evaporators 1. located by prill tower 2. located at solution plant	1. York mist eliminator 2. wet impact scrubber	No visible emissions tested 7/17 to 7/18/75	Prill tower	Shroud to vertical wire mesh scrubber to horizontal wire mesh mist eliminator	Light density 0.06 to 0.93 lb/ton (1/76-3/76) High density: 0.13 to 1.80 lb/ton (8/76, 7 tests)
24	Hercules, Inc. Bessemer, Ala.	Evaporator falling film	No controls		Kettle graining	Uncontrolled no stacks.	
25	Hercules, Inc. Carthage, Mo.	None			Kettle graining	York demister pads	2.7 lb/hr by calculation
26	Hercules, Inc. Donora, Pa	Whittlock falling film evaporator	No controls		Prill twoer	2 (50,000 cfm each) Wet impingement scrubbers control all airflow	In 1972: 0.21 lb/ton
27	Hercules Inc. Louisiana, Mo.	Steam heated evaporator at top tower	[b]Note 2	0.25 gr/scf	Prill tower	No controls	Meets local regulations 72 lb/hr; 1.97 lb/ton 0.37, 0.16, 0.23 gr/scf

[b]Note 2 - See item 1, Confidential Addendum. Contact Eric Noble, 919-541-5213.

ID number	Company name	Predryer	Dryer	Cooling	Coating	Bagging
21	W.R. Grace & Co. Wilmington, N.C.	Cyclones	Cyclones	Cyclones		
22	Gulf Oil Chemical Co. Pittsburg, Kansas	3 Rotary drum predryers feed 1 rotary drum dryer and all four units controlled by a scrubber			Coater controlled by a dry cyclone followed by a wet scrubber	All bulk no controls
23	Hawkeye Chemical Co. Clinton, Iowa (Skelly Oil)	Predryer controlled by American Air Filter Co. type W Rotoclone (wet dynamic precipitator) followed by a cyclone	Dryer controlled by Rotoclone followed by cyclone	Cooler controlled by Rotoclone followed by cyclone	Rotary controlled by no controls	Bulk only - covered uncontrolled
24	Hercules, Inc. Bessemer, Ala	None	None	None	No coating	Solids are produced
25	Hercules, Inc. Carthage, Mo.	None	None	None	None	Solids are produced
26	Hercules, Inc. Donora, Pa.	Predryer controlled by two-tray wet scrubber. In 1978: 0.05 lb/ton	Dryer controlled by two-tray wet scrubber. In 1978: 0.12 lb/ton	Cooler controlled by two-tray wet scrubber. In 1978: 0.10 lb/ton	Controlled by baghouse	Only 1-2% of product uncontrolled.
27	Hercules, Inc. Louisiana, Mo. 2 units	[c]Note 3 BECO wet Scrubber AAF wet Scrubber	[c]Note 3 Same	[c]Note 3 Same	no control	

[c]Note 3 - See item 3, Confidential Addendum. Contact Eric Noble, 919-541-5213.

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ID number	Company name	Type of product	Production	Neutralizer		
				Description	Type of control	Emissions
28	Illinois Nitrogen Co. Marseilles, Ill.	High density prills (15-20% prilled)	220 ton/day - high density prills	Atmospheric - slight pressure drop	Condense all overheads	
29	Kaiser Agri-Chem Bainbridge, Ga.	AN solutions only				
30	Kaiser Agri-Chem North Bend, Ohio	Liquid AN	93,000 ton/year			
31	Kaiser Agri-Chem Savannah, Ga.	Light density prills	252,500 ton/year		Pease-Anthony scrubber	
32	Mississippi Chemical Corp. Yazoo City, Mo.	High density prills	Installed capacity 2,300 ton/day	4 Neutralizers MCC design	Process controls - no add-on equipment	0.32 to 1.68 lb/ton
33	Monsanto Co. El Dorado, Ark.	High density prills	1,500 ton/day	2 Neutralizers pH 4-5	Brinks H.V. and vented to prill tower Brinks H.E.[2]	
34	Monsanto Co. Luling, La.	High density prills Light density prills	365,000 ton/year high density prills, 120,000 ton/year light density prills	2 Neutralizers 5 psig & basic	90% condensation[1]	

[1] There is a mist eliminator in the neutralizer vessel. 70% of the exhaust steam goes to "overhead water condensors", 20% goes to the acid preheater, 10% is vented. Ref: 114 response, pp. 12-13.

[2] After HV, part of the "chemical steam" is used to preheat the HNO_3 and NH_3 feed. Ref. 114 response, General Section p. 4 and Section I, p. 2.

ID number	Company name	Concentrator			Solids formation		
		Type	Control method	Emissions	Type	Type of control	Emissions
28	Illinois Nitrogen Co. Marseilles, Ill.	2 Falling film evaporators	First by condensation second to prill tower Brinks unit		Prills	CFCA cone Brinks	
29	Kaiser Agri-Chem Bainbridge, Ga.				None		
30	Kaiser Agri-Chem North Bend, Ohio				None		
31	Kaiser Agri-Chem Savannah Ga.		Demister		Prills	No controls	
32	Mississippi Chemical Corp. Yazoo City, Mo.	3 Whitlock falling film evaporators	Separate BECO scrubbers on two of three only	0.04 to 0.06 lb/ton	2 Prill towers	Separate BECO scrubbers on each	0.53 to 1.51 lb/ton
33	Monsanto Co. El Dorado, Ark.	Whitlock falling film (90 - 95%) Swanson barometric condenser (95-99.5%)	Brinks H_1V. demister[1]		2 Prill towers high density	Each controlled by CFCA cone and Brinks N.E.	
34	Monsanto Co. Luling, La.	[2]Thermal circulation vacuum evaporators [1]Swenson falling film vacuum evap. - for HD prilling only Remelv concentrate (auxiliary) has York mist eliminators	Total condensation Vacuum condenser		2 Prill towers	A CFCA cone in each tower exhausting to	Tower 1: 0.097 lb/ton Tower 2: 1.04 lb/ton

[1]Low concentrator - HV mist eliminator, high concentrator - vacuum and condensation control. Ref: 114 Response, General Section, p. 6.

ID number	Company name	Predryer	Dryer	Cooling	Coating	Bagging
28	Illinois Nitrogen Co. Marseilles, Ill.	None	None	Rotary drum cooler controlled by type W No. 30 AAF Rotoclone	Yes - kaolin baghouse	Yes - same baghouse as coating operation
29	Kaiser Agri-Chem Bainbridge, Ga.	None	None	None	None	None
30	Kaiser Agri-Chem North Bend, Ohio	None	None	None	None	None
31	Kaiser Agri-Chem Savannah, Ga.	None	None	None	-	-
32	Mississippi Chemical Corp. Yazoo City, Mo.	None	Each of 3 cooling trains has 2 rotary drum coolers in series. All controlled by Buell scrubbers. Emissions 0.21 to 0.59 lb/ton.		Rotary drum diatomaceous earth coating controlled by Buell scrubbers	No control on bagging operation
33	Monsanto Co. El Dorado, Ark.	None	None	2 Rotary drum coolers each has Pease-Anthony scrubber	No coating additive used	No bagging
34	Monsanto Co. Luling, La.	Rotary drum controlled by Pease-Anthony scrubber	Rotary drum controlled by Pease-Anthony scrubber	Rotary drum controlled by Pease-Anthony scrubber	Rotary drum coater and coating line controlled by baghouses (W.W. Sly)	Bulk shipping only

ID number	Company name	Type of product	Production	Neutralizer		
				Description	Type of control	Emissions
35	Nitram, Inc. Tampa, Fla.	Low density prills (95-99% of production)	150,000 ton/year	Atmospheric pH = 2	Condense all overheads	
36	N-ReN Carlsbad, N. Mex.	Low density prills	200 TPD		Part used to preheat NH_3, remainder through sly impinjet	
37	Phillips Pacific Co. Kennewick, Wash.	AN solution	55,000 ton/year	Atmospheric pH = 6	Controlled by a scrubber followed by a condenser	
38	Phillips Petroleum Beatrice, Nebr.	AN solution	70,500 ton/year			
39	Phillips Petroleum Etter, Tex	Low density prills	185,000 ton/year	Basic	One-half of overheads condensed and remainder vented	
40	Reichold Chemical, Inc. St. Helen, Oreg.	UAN solution	25,000 ton/year AN	Weatherly neutralizer basic	Packed bed scrubber followed by a Brinks unit	
41	St. Paul Ammonia St. Paul, Minn. (N-ReN)	Low density and high density prills AN solutions	650 ton/day high density 200 ton/day low density 50 ton/day solution		Sly scrubber remover NH_3, first, then part of exhaust combined with prill tower and part used for NH_3 preheat.	5.8 lb/hr of emissions not vented to Brinks

ID number	Company name	Concentrator			Solids formation		
		Type	Control method	Emissions	Type	Type of control	Emissions
35	Nitram, Inc. Tampa, Fla.	3 Steam heated vacuum evaporators	All overheads run through ammonia stripper		Prill tower	None - process modifications particulates caught in head house	10-20% opacity meet 26.4 lb/hr limit
36	N-ReN Carlsbad, N. Mex.				Prill tower	No controls	
37	Phillips Pacific Co. Kennewick, Wash.	None			None		
38	Phillips Petroleum Beatrice, Nebr.				None		
39	Phillips Petroleum Etter, Tex.	Primary and secondary vacuum evaporators	Barometric condenser		Prill tower	None	0.98 ~~[illegible]~~ lb/ton
40	Reichold Chemical, Inc. St. Helen, Oreg.	None			None		
41	St. Paul Ammonia St. Paul, Minn. (N-ReN)	Small evaporator large evaporator	Send to prill tower Brinks scrubber	2.6 lb/hr → sent to scrubber 34.1 lb/hr → sent to scrubber 3.3 lb/hr - vented	Prill tower	CFCA cone and Brinks scrubber Press drop 7" in w.g.	Total: 21.7 lb/hr (neut+evap+prill+scrubber); uncontrolled fraction from prill: 10.8 lb/hr; exit from scrubber = 1.8 lb/hr

ID number	Company name	Predrying	Drying	Cooling	Coating	Bagging
35	Nitram, Inc. Tampa, Fla.	"Cyclone type" scrubber controls emissions from all 3 rotary drums			Diatomaceous earth coating controlled by baghouse	Baghouse controls bagging operation
36	N-ReN Carlsbad, N. Mex.	3 Fluidized beds: predryer, dryer, cooler exhausted to a wet scrubber			Baghouse control Kaolin clay with Petro Ag coating = 1% H_2O = 0.2%	Baghouse control
37	Phillips Pacific Co. Kennewick, Wash.	None	None	None	None	No solids
38	Phillips Petroleum Beatrice, Nebr.	None	None	None	None	No solids
39	Phillips Petroleum Etter, Tex. or Conmaster		Rotoclones on 2 dryers. Pease-Anthony scrubber on 3 dryers		Cyclone separator on coater and baghouse on coating transfer	No bagging
40	Reichold Chemical, Inc. St. Helen, Oreg.	None	None	None	None	No solids
41	St. Paul Ammonia St. Paul, Minn. (N-ReN)	None	None	Cooler controlled by AAF Rotoclone Type W, Type R Res. Time - 20-45 min. AN in - 225°F AN out - 110°F	0.2% coating on high density prills and controlled by baghouse	Bagging operation controlled by baghouse

ID number	Company name	Type of product	Production	Neutralizer		
				Description	Type of control	Emissions
42	J. R. Simplot Co. Pocatello, Idaho	Solids	18,000 as pure AN	Atmospheric slightly basic	No controls vented to atmospheric	
43	Standard Oil of California Fort Madison, Iowa	S granules	300 ton/day		Uncontrolled	No visible
44	Standard Oil of Kentucky (old) Kennewick, Wash. (Chevron)	S granules	300 ton/day		No controls	
45	Standard Oil of Kentucky (new) Kennewick, Wash. (Chevron)	S granules	400 ton/day	Mississippi Chemical neutralizer		
46	Standard Oil of Ohio Lima, Ohio (Vistron)	Solids	93,500 ton/year	(Company requires request in writing)		
47	Swift Chemical Beaumont, Tex.	S Granules	400 ton/day			
48	TVA Muscle Shoals, Ala.	Solids	4,000 ton/day			

ID number	Company name	Concentrator			Solids formation		
		Type	Control method	Emissions	Type	Type of control	Emissions
42	J. R. Simplot Co. Pocatello, Idaho	None			None		No visible
43	Standard Oil of California Fort Madian, Iowa	Evaporator	Emissions vented to cooler scrubber		Spherodizer	Scrubber	No visible
44	Standard Oil of Kentucky (old) Kennewick, Wash. (Chevron)	Evaporator	None		Spherodizer	Wet scrubber Joy impingement ΔP = 10-14 in.	
45	Standard Oil of Kentucky (new) Kennewick, Wash. (Chevron)	Evaporator	None		Spherodizer	Wet scrubber Joy Impingement	
46	Standard Oil of Ohio Lima, Ohio (Vistron)						
47	Swift Chemical Beaumont, Tex.	2-Stage vacuum evaporator	Condenser (vapor trap)		Spherodizer	Wet scrubber	2-6.9 lb/hr
48	TVA Muscle Shoals, Ala.						

ID number	Company name	Predrying	Drying	Cooling	Coating	Bagging
42	J. R. Simplot Co. Pocatello, Idaho	None	None	None	None	No solids
43	Standard Oil of California Fort Madison, Iowa	None	None	Rotoclone scrubber no visible	Drum coater	No controls - bulk only
44	Standard Oil of Kentucky (old) Kennewick, Wash. (Chevron)			Rotoclone W + Cyclone	Celatom coating Baghouse	Baghouse controls bagging operation
45	Standard Oil of Kentucky (new) Kennewick, Wash. (Chevron)			none	Celatom coating used % not given in 114 Baghouse	Baghouse controls bagging operation
46	Standard Oil of Ohio Lima, Ohio (Vistron)					
47	Swift Chemical Beaumont, Tex.			dry cyclone ~~Clay coating used~~	clay coating no control	Bulk with some bagging - no control
48	TVA Muscle Shoals, Ala.					

ID number	Company name	Type of product	Production	Neutralizer		
				Description	Type of control	Emissions
49	Terra Chemicals International Port Neal, Iowa	Solids, High density prills	415 ton/day of which 130 ton/day prilled	Run at pH=6.0	Demister pads	No visible
50	Atlas Powder Co. Joplin, Mo.	Solids High density prills Grained AN by batch on request	65 ton/day Stengel AN 14,000 ton/year high density prills	Stengel reactor pH=5, 2.5 psig	Packed bed followed by BECO scrubber Variable throat venturi scrubber	
51	Atlas Powder Co. Tamaque, Pa.	Solids	65 ton/day	Stengel reactor	Packed bed followed by BECO scrubber	
52	Collier Carbon and Chemical Brea, Calif. (Union Oil)	Low density prills Solids	60,000 ton/year			
53	U. S. Steel Corporation (U.S.S. Agrichem) Cherokee, Ala.	Solids, High density prills	100,000 ton/year	MCC neutralizer	Total condensation for NH_3 preheat	
54	U. S. Steel Corporation Crystal City, Mo.	Low density prills (new granulator under construction) Solids, Low density prills, granular	100,000 ton/year	MCC neutralizer	¼ condensation as NH_3 preheat 3/4 vented uncontrolled	
55	U. S. Steel Corporation Geneva, Utah	Solids, Low density prills	102,258 tons in 1977	Basic - excess NH_3	None	

ID number	Company name	Concentrator			Solids formation		
		Type	Control method	Emissions	Type	Type of control	Emissions
49	Terra Chemicals International Port Neal, Iowa	Falling film evaporator	Demister pads	No visible, in compliance	Prill tower (130 ton/day) 4 fans	Prohibit simultaneous operation of fans Nos. 2 and 4	25% opacity - in compliance
50	Atlas Powder Co. Joplin, Mo.	Whitlock falling film (prills)	York "mesh" pad		1 Prill tower Sandvik belt Graining	CFCA shroud with Brinks demister, Rotoclone scrubber, Hooded and exhausted uncontrolled	0.57 lb/ton
51	Atlas Powder Co. Tamaque, Pa.						
52	Collier Carbon and Chemical Brea, Calif. (Union Oil)				Prill tower	None	0.42 lb/ton
53	U. S. Steel Corporation (U.S.S. Agrichem) Cherokee, Ala.	Whitlock falling film 1 stage	Indusco ejector scrubber low ΔP	No data	Prill tower	No controls	
54	U. S. Steel Corporation Crystal City, Mo.				Prill tower (new granulation plant under construction)	No controls	10-20% opacity
55	U. S. Steel Corporation Geneva, Utah	Vacuum evaporator	None		Prill tower	None	

ID number	Company name	Predrying	Drying	Cooling	Coating	Bagging
49	Terra Chemicals International Port Neal, Iowa	None	None	Cooler controlled by Rotoclone scrubber	Clay coating controlled by baghouse	All bulk - no controls solid loading in covered area kaolin unloading open
50	Atlas Powder Co. Joplin, Mo.	Rotoclone on rotary drum (prills)	Rotoclone on rotary drum (prills)	Rotoclone on rotary drum (prills)	Rotary drum controlled by baghouse (prills)	Bagging operation controlled by same baghouse as coating operation (prills)
51	Atlas Powder Co. Tamaque, Pa.					
52	Collier Carbon and Chemical Brea, Calif. (Union Oil)	Sly-scrubber	Sly-scrubber	Sly-scrubber		Some scrubbers
53	U. S. Steel Corporation (U.S.S. Agrichem) Cherokee, Ala.	None	None	AAF Scrubber on Rotary Drum Rotoclone w	Clay coating controlled by W W Sly Baghouse	
54	U. S. Steel Corporation Crystal City, Mo.	Wet cyclones	Wet cyclones	Wet cyclones	Baghouse	None
55	U. S. Steel Corporation Geneva, Utah	Rotary drums - each dryer and cooler has a wet cyclone			0.4% talc & petro-AG fines 0.04% baghouse (also for screening) 99% design efficiency	Bulk shipping only

ID number	Company name	Type of product	Production	Neutralizer		
				Description	Type of control	Emissions
56	Valley Nitrogen Co. El Centro, Calif.	Solids			None	
57	Valley Nitrogen Co. Helm, Calif.	Solids				
58	Agrico Chemical Verdegris, Okla.	Solids				

ID number	Company name	Concentrator			Solids formation		
		Type	Control method	Emissions	Type	Type of control	Emissions
56	Valley Nitrogen Co. El Centro, Calif.	Evaporator					
57	Valley Nitrogen Co. Helm, Calif.						
58	Agrico Chemical Verdegris, Okla.						

ID number	Company name	Predrying	Drying	Cooling	Coating	Bagging
56	Valley Nitrogen Co. El Centro, Calif.					
57	Valley Nitrogen Co. Helm, Calif.					
58	Agrico Chemical Verdegris, Okla.					

BACKGROUND FOR TABLE 4.1

EXISTING AN EMISSION CONTROLS

Process	No. replies for this process	None	Partial or total Condenser		TYPE OF EMISSION CONTROL: Mist Eliminator		Wet scrubber		Other	
Concentrator	48	6 8 13 22 24 26 32c 39 44 45 55 11 Total 23%	10b	Barometric condenser on second stage	23a	(evaporator # 1) York	23b	(evaporator #2)	4	To neutralizer scrubber
			28a 23b 34a,b,c		27	"Note 2"[a]	32a,b	Beco scrubbers	5	Controlled by prill tower Brinks
			47a,b	(2-stage evaporator)	31	"Demister"	53	Indusco, low ΔP scrubber	9	Controlled by prill tower Brinks
			19a	First stage condensed	49	"Demister pads"	4 Total 8% (11% of control)		10a	Unknown
			39a,b	Barometric condenser for 1 and 2 evaporators	50	York			11	To prill tower Kock scrubber
			11 Total 23% (30% of control)		5 Total 10% (14% of control)				12	Combined with pan granulator exhaust - to variable Venturi, 20" w.g.
									15	Combined with drum granulator exhaust - to Doyle impingement scrubbers
									19b	Stage to prill tower Brinks
									19c	To prill tower Brinks

[a]See Item 2, Confidential Addendum. Contact Eric Noble, 919-541-5213.

Process	No. replies for this process	None	Partial or total Consenser	TYPE OF EMISSION CONTROL: Mist Eliminator	Wet scrubber	Other
						28b To prill tower Brinks 33a To prill tower Brinks 35a,b,c Overheads through ammonia stripper 41a,b To prill tower Brinks 42 Emissions vented to cooler scrubber (Rotoclone) granulator plant
						17 Total 35% (46% of control)

Breakdown of "Other"

		Fraction of all evaporators controlled this way
Combined with prill tower exhaust to Brink's unit:	8	17%
To neutralizer scrubber:	1	
Combined with prill tower or granulator exhaust to scrubber:	3 (2 pan granulator)	
To ammonia stripper:	3	
Unknown:	1	
To cooler scrubber:	1	

Total treated with prill tower or granulator: 8+3 = 11, or 23%

Process	No. replies for this process	Type of emission controls: None	Type of emission controls: Baghouse	Type of emission controls: Other
Bagging	25	6 - LD, Granules 9 - HD 10 - HD 11 - HD 26 - HD 32 - HD 6 Total	12 - 2 baghouses on (gran) warehouse, one on conveyor 15 - (gran) 28 - Same baghouse as (HD) coating operation 35 - LD 41 - HD, LD 44 - Gran. 45 - Gran. 50 - Same baghouse as coating operation (LD) 9 Total	52 - Scrubber (LD)

Process	No. Replies for this process	Type of emission control: None	Type of emission control: Baghouse	Type of emission control: Other	
Coating	24	5	12	22	Dry cyclone on coater, followed by a wetscrubber
		6	15	32	Diatomaceous earth coating controlled by Buell scrubbers
		9	17	36	Cyclone
		23	19a,b	39	Cyclone seperator on coater and baghouse on coating transfer
		4 Total	26	43	Unknown
		17%	27	5 Total	
			28	21%	
			34		
			35		
			41		
			49		
			50		
			53		
			55		
			15 Total		
			62%		

Process	No. replies for this process	Type of emission control			
		None	Mist eliminator	Wet scrubber	Other
Prill tower		6 - LD and grains 10 - HD 17 - LD 21 - "Prills" 22 - LD	5 - (HDP, LDP,) CFCA 9 - (HD) - CFCA 14 - LD prills 19a and b - HD prills shroud 23 - HD and LD - 1 to wire mesh vertical "scrubber" to horizontal wire mesh mist eliminator	11 - Koch scrubber (HD) 6" P 26 - LD prills - Total airflow control with impingement scrubbers, 3" ΔP	13 - Knock-out chamber; HD prills

Process	No. replies for this process	Type of emission control			
		None	Mist eliminator	Wet scrubber	Other
Gran.		24 - Kettle graining	25 - Kettle graining - York demister pads	12 - Variable venturi, 20" ΔP, on a pan granulator 15 - Doyle impingement scrubbers on 2 rotary drum granulators (2 each)	