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FEDERAL LEGISLATION AND DISCHARGE LIMITS (AIR-WATER) FOR FERTILIZER MANUFACTURING PLANTS IN THE UNITED STATES[1]

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Introduction

The United States Environmental Protection Agency (EPA) is charged with the multiple functions of monitoring, regulation, enforcement, and research needed to implement Congressional environmental mandates. In this context, it is useful to recall President Nixon's words upon the occasion of the formation of the National Industrial Pollution Control Council, "It would be unrealistic, of course, to think that private enterprise could meet this problem alone. The problem of the environment is one area where private enterprise can do the job only if government plays its proper role."

The purposes of this paper are to (1) outline the philosophy and major features of the legislative framework under which EPA must "play the government's proper role," and (2) to interpret this legislation as it impacts directly on the allowable pollutant discharges from the fertilizer manufacturing industry in the United States.

I. FEDERAL ENVIRONMENTAL LEGISLATION

Two pieces of legislation constitute the Congressional mandate for environmental control under which the EPA operates. Only the major features of these acts, which bear on industrial sources in general and more specifically on fertilizer operations, will be highlighted.

A. Federal Water Pollution Control Act Amendments (FWPCAA) of 1972 (PL 92-500)

1. General Provisions

The law proclaims two broad goals for the United States:

(1) To achieve wherever possible by July 1, 1983, water that is not only clean enough for swimming and other recreational uses, but for the protection and propagation of fish, shell-fish and wildlife,

(2) and by 1985, to have no discharges of pollutants into the Nation's waters.

These are goals. They reflect deep national concern about the condition of the Nation's waters and a strong commitment to end water pollution.

The new law encompasses features of earlier Federal and state statutes, but includes many firsts. While the states retain the primary responsibility to prevent, reduce and eliminate water pollution, they must now do so within the framework of a new national program. If the states do not or cannot fulfill their obligations under the law, the Federal government, through the EPA, is empowered and directed to take action. For the first time, "technology capability" becomes the basis for effluent limitation. Federal pollution controls now apply to all U.S. waters; previously, only interstate waters were covered by Federal legislation. Also for the first time, the law authorizes the Federal government to seek immediate court injunctions against polluters when water pollution presents "an imminent and substantial endangerment" to public health, or when it endangers someone's livelihood.

Although not totally new features, the Act provides for greatly increased financial and area-wide planning assistance to municipalities for sewage treatment plant construction; support for small businesses to assist them in controlling pollution; and a broad-based research program including grant and contracting authority to both non-profit groups (universities, governmental bodies, institutes) and profit-making organizations (consultants, corporations) to develop and demonstrate control technology.

2. Specific Provisions of FWPCAA for Industrial Discharges

• Industries discharging pollutants into the Nation's waters must use the "best practicable" water pollution control technology by July 1, 1977, and the "best available" technology by July 1, 1983.

• EPA will issue guidelines for "best practicable" and "best available" technologies for various industries by October, 1973. The guidelines can be adjusted by several factors, including the cost of pollution control, the age of the industrial facility, the process used and the environmental impact (other than on water quality) of the controls. EPA will also identify pollution control measures for completely eliminating industrial discharges.

• By May, 1974, new sources of industrial pollution must use the "best available demonstrated control technology." This will be defined by EPA in the form of "standards of performance" for various industries no later than May, 1974. Where practicable, EPA may require no discharge at all of pollutants from new industrial facilities.

• Discharges of toxic pollutants will be controlled by effluent standards to be issued by EPA no later than January, 1974. EPA is required to provide an ample margin of safety in setting effluent standards for toxic pollutants. EPA is also empowered to prohibit discharges of toxic pollutants, in any amount, if deemed necessary.

• The Act prohibits the discharge into the Nation's waters of any radiological, chemical or biological warfare materials, or high-level radioactive waste.

• Any industry that discharges its wastes into a municipal treatment plant must pre-treat its effluent so that the industrial pollutants do not interfere with the operation of the plant or pass through the plant without adequate treatment. This requirement takes effect no later than May, 1974, for new industrial sources of pollution, and no later than July, 1976, for existing industrial facilities.

• The law also authorizes loans to help small businesses meet water-pollution control requirements. The loan program is designed for firms that would be likely to suffer "substantial economic injury" unless they receive financial assistance to comply with the law.

3. Water Quality Implications

Although industrial effluent limitations are generally to be based upon technology capability rather than water quality considerations, FWPCAA continues, expands, and coordinates the water quality standards programs of earlier statutes. (Water quality standards define the uses of specific bodies of water--

such as public water supply, propagation of fish and wildlife, recreation, and agricultural and industrial water supply.) These standards must protect human health and welfare and enhance water quality. Water quality provisions of the Act include:

- Water quality standards previously established by states and approved by EPA for interstate waters remain in effect.

- States must adopt standards for intrastate waters and have them approved by EPA.

- If a state finds that the use of "best practicable" or "best available" controls are not adequate to meet water quality standards, more stringent controls must be imposed. To this end, the states must establish the total maximum daily load of pollutants, including heat, that will not impair propagation of fish and wildlife. EPA will identify by October, 1973, pollutants for which maximum daily loads might be set.

4. Permits and Licenses

The FWPCAA creates a new permit system to regulate all (public and private) point source discharges--the National Pollutant Discharge Elimination System (NPDES). A point source is defined as any discernible, confined, conduit (pipes, ditches, channels, sewers, tunnels) or vessels from which pollutants are or may be discharged. Key provisions of the NPDES include:

- No discharge from any point source will be allowed without a permit from EPA or a Federally approved state program.

- Emergency powers are given EPA to obtain court injunctions to stop any discharge posing imminent threat to public health and welfare.

- Permit conditions can include a compliance schedule to meet increasingly more restrictive effluent limitations.

- Self monitoring of permitted discharge is required and EPA is empowered to enter a polluter's premises and inspect monitoring equipment and data files.

- Severe penalties (both fines and imprisonment) are provided for permit violations.

- Public access to EPA-gathered effluent data (excluding trade secrets) is guaranteed and citizen suites are authorized against polluters and EPA alike for failure to abide by the Act.

B. Clean Air Amendments of 1970 (PL 91-604)

1. General Observations

In contrast to water pollution's "control technology" basis, air pollution control is premised directly on protection of "human health and welfare." Primary responsibility to prevent and control air pollution at the source remains vested in the states, but the Air Amendments provide for a minimally acceptable, uniform national air quality and mechanisms for direct Federal action through EPA to insure that quality is achieved and maintained.

Another contrast with water pollution control is the application of these national standards to specific geographical areas for the purposes of determining individual source emission limitations. The use of air quality modeling is envisioned as the primary technique to determine the allowable emissions from all sources within an area in order to insure that the national standard for any given pollutant is not exceeded. Thus identical industrial plants in different areas of the country could be assigned very different emission limitations depending upon source density, meteorology, and topography interactions.

2. What the Air Amendments Say

- Air Quality Control Regions

EPA, assisted by the states, is to designate air quality control regions. These are the basic geographic units in which the control process takes place. Regional boundaries are based on considerations of climate, meteorology, topography, urbanization, and other factors affecting air quality conditions in each area. A region can cover only part of one state or it can include portions of several states which share a common air pollution problem. The nation has been divided into about 250 regions.

- Criteria Documents

EPA is required to develop air quality criteria for the major pollutants: particulate matter, sulfur oxides, hydrocarbons, carbon monoxide, and so on. These criteria, which are issued in "criteria documents," give the levels at which these pollutants--by themselves and in combination with other pollutants--are known to have adverse effects on public health or welfare.

Simultaneously, EPA must provide information on control techniques for each of these pollutants, describing the methods available to reduce emissions. Such information must include the latest technology, the costs of emission control, and the economic feasibility of alternative control methods.

• National Ambient Air Quality Standards (Ambient means outdoor air, i.e. atmosphere)

A national ambient air quality standard is the maximum level that will be permitted for a given pollutant. There are two kinds of such standards, primary and secondary. Primary standards are to be sufficiently stringent to protect the public health; secondary standards must protect the public welfare.

EPA must set these standards after it issues both a criteria and control-technology document on the pollutant in question. Both the primary and secondary standards will apply to all control regions.

• Implementation Plans

Within nine months after EPA issues primary and secondary national ambient air quality standards for a pollutant, each state must formulate a plan to meet, maintain, and enforce those standards in each air quality control region within its jurisdiction. Each state plan must be approved by EPA and provide for the attainment of primary standards within three years after approval; secondary standards must be attained within a "reasonable time." If a state fails to submit a satisfactory plan, EPA has the authority to write its own plan for the state, which the state must then carry out.

• Standards of Performance

The Amendments require EPA to set "standards of performance" for new and "modified" stationary sources of pollution. These standards are distinct from the ambient air quality standards. They constitute direct emission limitations for all major pollutants from specified types of sources, such as nitric acid plants.

All standards of performance are applicable nationally, but only to sources in a category specified by EPA. They apply principally to new pollution sources. They can also apply to existing sources whenever "modification" (physical change or change in the method of operation) results in increased emissions of old pollutants or in emissions of new pollutants.

For all existing, unmodified sources in the specified category, the states are required to set performance standards under procedures to be established by EPA. EPA will also prescribe procedures under which the states may choose to enforce the federal standards for new and modified sources.

o Hazardous Air Pollutants

Some pollutants are more toxic than others. For those which are not covered by an ambient standard and which EPA believes "may cause, or contribute to, an increase in mortality or...in serious irreversible, or incapacitating reversible, illness," EPA

must set emission standards that incorporate "an ample margin of safety to protect the public health." Such pollutants include, for example, asbestos, beryllium, and mercury.

• Monitoring and Public Information Rights

EPA may require states and individual sources to monitor pollutant emissions, to keep records, and to submit periodic reports. All such records and reports are to be considered public information, with one exception: EPA may keep confidential any trade secrets or other information whose public availability the manufacturer has shown to be of potential harm to his business. However, emission data are specifically exempted from such protection.

• Federal Enforcement

Once standards and implementation plans are in effect, EPA is required to oversee state enforcement. Where widespread violations indicate that the state is failing to enforce a plan, EPA may step in and enforce it. Or EPA may enforce portions of a plan by issuing orders of compliance or bringing civil actions in federal courts for violations. EPA is also empowered to sue for immediate restraint of any pollutant source which is imminently endangering the health of persons--if state or local authorities have failed to do so.

• Citizen Suits

Any citizen may bring suit against any person or corporation alleged to be violating an emission standard or other limitation applicable under the Amendments. Citizens may also sue the Administrator of EPA for failure to perform an action required of him by the Amendments.

II. LEGISLATIVE CRITERIA FOR CONTROL OF INDUSTRIAL DISCHARGES

A. Aqueous Effluents

1. General Observations

Subject to the overriding provision of FWPCAA regarding toxic pollutants, the quantitative aqueous effluent limitations and required compliance schedule for any industry are fully specified by definition of "best practicable" and "best available" control technologies and "new source performance standards." However, before any numerical values could be established, the Congressional intent of these terms had to be interpreted. Two points are immediately clear and warrant re-emphasis:

(1) All categories of effluent limitations are to be considered minimum, uniform, national levels of compliance under

FWPCAA. Permitted discharges for individual plants may always be more restrictive based upon "toxic" considerations, local "water quality" needs, or "public health and welfare" considerations--but never less estrictive.

(2) Although the numerical effluent limitations set by EPA must be based upon one or more actual treatment processes for any given level and industrial category, once they have been established, it is left totally to the industry involved as to which technology to employ for compliance.

2. FWPCAA Criteria for Defining "Best Practicable" Control Technology (July 1, 1977)

"Best practicable" technology will represent the average of the best existing performance by well operated plants within each industrial category or subcategory. In industrial categories where existing treatment measures are considered inadequate, EPA will set more stringent standards if the technology can be made available through good engineering practice at a reasonable cost.

"Best practicable" technology emphasizes treatment at the end of the manufacturing process. However, industries are not required to undertake any such treatment as long as their effluent discharges meet the required limit by the July 1, 1977, deadline. In some plants, controlling leaks in pipes, purchasing higher quality raw materials, substituting chemical additives or making changes in process operations may be sufficient to meet the effluent limitation, without need for construction of an individual industrial treatment plant.

Before "best practicable" limits can be finalized, EPA must weigh the costs versus benefits to be achieved within each industrial category (subcategory).

3. FWPCAA Criteria for Defining "Best Available" Control Technology (July 1, 1983)

"Best available" technology will be based upon the very best control and treatment measures that have been or are capable of being economically achieved by July 1, 1983. In general terms, the application of the best available technology should support two major objectives:

(1) Achievement of the greatest amount of uniformity among categories of industries.

(2) Reduction in pollutants so that reasonable progress is being made to achieve the 1985 goal of "no pollutant discharge."

In prescribing "best available" limitations, EPA must consider a far broader range of technological options than for "best practicable." In addition to end-of-process treatment measures, EPA will assess in-plant controls and equipment modifications that may be easily adapted from other industries.

The ultimate range of options for "best available" technology, however, will depend upon the extent of industrial and academic research conducted between now and the 1977 "best practicable" deadline. For this reason, the first pass "best available" technology limitations will include developmental processes whose reliability and costs are not as well established as the "best practicable" limits. Provisions are, therefore, provided for periodic revision of "best available" limits. Although a general economic impact assessment of the proposed "best available" limitations for each industrial category (subcategory) is still required of EPA, a detailed cost-benefit analysis is not.

4. Criteria for "New Source Performance Standards"

"New source" limitations will be proposed such that new plants within any given industrial category (subcategory) will be designed from the ground up to minimize pollutant discharges. For purposes of FWPCAA, a "new source" is any plant whose construction begins after EPA proposes standards for its industrial category (subcategory). Substantial modification of any existing source, however, may make it a "new source" under the Act.

B. Vapor Emissions

Subject to the conditions specified for "hazardous air pollutants," plant emissions under the Air Amendments are to be regulated by two distinct mechanisms: (1) "existing sources" through application of air quality models and allocation formulas in concert with State Implementation Plans applied within the Air Quality Control Region of the plant(s) in question such that the National Ambient Air Quality Standards are not exceeded; and (2) "new or modified sources" according to Standards of Performance limitations established by EPA. Individual plant emission limitations calculated or established under (1) could be called state standards of performance; those under (2) Federal. Federal standards are minimal, uniform, national values. Specific plant restrictions can always be more restrictive but not less. Federal "new or modified source" standards under the Air Amdendments must be based on "adequately demonstrated," economically feasible technology.

Obviously for existing plants of any industry no generalized emission limitations can be stated. Indeed, two identical plants in the same state (but two different Air Quality Control Regions) could be allowed vastly different emission levels as dictated by the State Implementation Plan. New or modified sources will have uniform Federal limitations; however, ever identical new plants could have different emission limits if required by the state.

III. ALLOWABLE DISCHARGES FOR THE FERTILIZER INDUSTRY

A. Aqueous Effluents

1. Definition of the Fertilizer Manufacturing Point Source Category for Purposes of FWPCAA

Those processing operations adopted by EPA as constituting the Fertilizer Manufacturing Point Source Category and their corresponding Standard Industrial Classification (SIC) codes (prescribed by the U.S. Bureau of the Budget) are presented in Table 1.

2. Fertilizer Industry Subcategorization

In response to FWPCAA requirements to assess such factors as plant age and size, process differences, cost, and effluent treatability in determining effluent limitations, the need for valid criteria to subcategorize had to be established. Based upon two detailed EPA studies, conducted before passage of the FWPCAA, of the current state of fertilizer manufacturing effluent control, ten potential factors for subcategorization were proposed and a list of exemplary (well operated) plants for detailed analysis was compiled covering all the operations listed in Table 1. The ten criteria were:

1. Natural industrial division.

2. Waste load characteristics.

3. Treatability of waste streams either by interprocess reuse or control technology.

4. Problems with separation of individual process effluents within a complex.

5. Plant age.

6. Plant size.

7. Effect of raw material variations.

8. Land availability for containment/waste utilization.

9. Interaction with air pollution control equipment.

10. Meteorology (rainfall-evaporation differential).

As the first result of the detailed exemplary plant study (questionnaires, on-site surveys, waste stream sampling/analysis, interviews with design and operating personnel), which constituted a portion of the data base for the effluent limitations, only the first three or four factors above were

Table 1. Definition of the Fertilizer Manufacturing Point Source Category and SIC Codes.

Chemicals and Processes	SIC Codes
Sulfuric Acid - Sulfur burning only	2819, 2871
Phosphoric Acid - wet process only (Including adjacent rock grinding)	2819, 2817
Phosphoric Acid Concentration and Clarification	2819, 2817 2871
Normal Superphosphate	2871
Triple Superphosphate (Run-of-Pile and Granular)	2871
Ammonium Phosphates	2871
Nitric Acid	2819, 2871
Urea	2818
Ammonium Nitrate	2819, 2871
Ammonium Sulfate (Synthetic, Steel Mill and Fibers By-Product)	2818, 2871 2872, 3312
Mixed and Blend Fertilizers (Types A, B, C, and D N-P-K Plants)	2871, 2872

found valid for subcategorization of the industry. Application of these factors produced the seven subcategories presented in Table 2. Effluent limitations for the first five subcategories have been promulgated, and drafted (under EPA review) for the last two.

3. Fertilizer Manufacturing Point Source Effluent Limitations

Since no fertilizer product or by-product constituent has been identified by EPA as a toxic pollutant under FWPCAA, definition of "best practicable" and "best available" control technologies and "new source performance standards" will constitute the effluent limitations and compliance schedule for the industry.

Based upon the results of the detailed exemplary plant survey, including extensive effluent analyses, combined with an independent economic evaluation of pertinent control technologies, effluent limitations for "best practicable" control technology currently achievable were established for each subcategory of Table 2. These "best practicable" limits are presented in Table 3. Pollutant discharges, where allowed, were related to production rate. Although "no discharge of process waste water pollutants" was specified for the Phosphate Subcategory, it was recognized that a discharge under certain meteorological conditions cannot be avoided. Conditions under which a discharge in the Phosphate Subcategory is allowed for "Best Practicable Control Technology Currently Available" are:

(1) A process waste water impoundment which is designed, constructed and operated so as to contain the precipitation from the 10-year, 24-hour rainfall event as established by the National Climatic Center, National Oceanic and Atmospheric Administration, for the area in which such impoundment is located may discharge that volume of process waste water which is equivalent to the volume of precipitation that falls within the impoundment in excess of that attributable to the 10-year, 24-hour rainfall event, when such event occurs.

(2) During any calendar month there may be discharged from a process waste water impoundment either a volume of process waste water equal to the difference between the precipitation for that month that falls within the impoundment and the evaporation within the impoundment for that month, or, if greater, a volume of process waste water equal to the difference between the mean precipitation for that month that falls within the impoundment and the mean evaporation for that month as established by the National Climatic Center, National Oceanic and Atmospheric Administration, for the area in which such impoundment is located (or as otherwise determined if no monthly data have been established by the National Climatic Center).

Table 2. Fertilizer Manufacturing Point Source Category Effluent Limitation Subcategories

A. Phosphate Subcategory

1. Phosphate Rock Grinding
2. Wet Process Phosphoric Acid
3. Wet Process Phosphoric Acid Concentration and Clarification
4. Normal Superphosphate
5. Triple Superphosphate (Run-of-Pile and Granular)
6. Ammonium Phosphates (Mono- and Di-Ammonium)
7. Sulfuric Acid (Sulfur Burning)

B. Ammonia Subcategory

C. Urea Subcategory

D. Ammonium Nitrate Subcategory

E. Nitric Acid Subcategory

*F. Ammonium Sulfate Subcategory

1. Synthetic Process
2. Steel Mill By-Product Process

*G. Mixed and Blend Fertilizers (Types A, B, C, and D N-P K Plants)

* Note: Subcategory status and effluent limitations in draft form are currently under EPA review.

Table 3. Fertilizer Manufacturing Effluent Limitations For "Best Practicable" Control Technology Currently Available (July 1, 1977)

Subcategory	Effluent Limitation Parameters* → (Kilograms/1000 Kilograms of Product) Ammonia (as N)	Organic Nitrogen (as N)	Nitrate (as N)	pH (Range)
Ammonia	0.0625	-	-	6.0-9.0
Urea	0.0375 (non-prill) 0.05 (prill)	0.175 (non-prill) 0.5 (prill)	-	6.0-9.0
Ammonium Nitrate	0.0375 (solution) 0.1 (non-solution)	-	0.05 (solution) 0.11 (non-solution)	6.0-9.0
Phosphate	Subject to provisions of Chapter III, Section 3, no discharge of process waste water pollutants.			
Nitric Acid	No discharge of process waste water pollutants.			
Ammonium Sulfate**	No discharge of process waste water pollutants.			
Mixed-Blend Fertilizers**	No discharge of process waste water pollutants.			

*Values listed are the maximum allowed average of daily averages for 30 consecutive operating days, i.e. the 30-day maximum averages. Maximum allowed single day (average) values are equal to twice the 30-day averages except Urea organic nitrogen for which the factor is 2½.

**These subcategory effluent limitations are draft values only, currently under EPA review.

Augmentation of the basic exemplary plant study with an in-depth engineering evaluation of the research and development literature (process engineering and design firms, consultants, universities, government) to include assessment of technologies adaptable from other industries produced the "new source performance standards" and "best available" control technology economically achievable limits presented in Tables 4 and 5, respectively. As in the case of "best practicable" limits, it was recognized that under certain meteorological conditions, some discharge from the Phosphate Subcategory cannot be avoided. The promulgated condition under which such a discharge for the Phosphate Subcategory will be allowed under "New Source Performance Standards" and "Best Available Control Technology Economically Achievable" is identical to the first condition specified for "Best Practicable Control Technology Currently Available" except that the reference rainfall is the 25-year, 24-hour event as established by the National Climatic Center, National Oceanic and Atmospheric Administration. It has been proposed to modify this limit by incorporating the second "best practicable" condition to handle monthly rainfall-evaporation excesses from impoundments sized using the 25-year, 24-hour single rainfall event criteria. This proposed modification is currently under EPA review. Any aqueous discharges allowed for the Phosphate Subcategory under the monthly rainfall-evaporation excess differential condition (?) for either "best practicable," "new source," or "best available" technologies must meet the specifications presented in Table 6.

4. Application of the Effluent Limitations

Effluent limitation parameters presented in section 3 apply only to process waste water pollutant discharge. Process waste water is defined as any water that, during the manufacturing process, comes into direct contact with any raw material, intermediate, product, by-product, or gas or liquid that has accumulated such constituents. Standards for such non-process waste water discharges as non-contact cooling water, boiler blowdown, and raw water treatment blowdown will be promulgated separately by EPA at a later date. These limits will be applied in addition to the effluent limitations for process waste water.

Because the process waste water effluent limitations are related to production rate for any given subcategory, total allowed effluent values for multi-product plants can be readily calculated using a building block approach.

5. Pretreatment Standards

Pretreatment standards for discharge of fertilizer plant effluents to municipal systems were established in principle. However, fertilizer wastes are generally considered incompatible with municipal treatment plants and joint treatment is not recommended. Specific pretreatment limits will, therefore, not be presented or addressed in any detail herein.

Table 4. Fertilizer Manufacturing Effluent Limitations
"Standards of Performance for New Sources"

Subcategory	Effluent Limitation Parameters* → (Kilograms/1000 Kilograms of Product)			
	Ammonia (as N)	Organic Nitrogen (as N)	Nitrate (as N)	pH (Range)
Ammonia	0.055	-	-	6.0-9.0
Urea	0.0325 (non-prill) 0.0325 (prill)	0.12 (non-prill) 0.35 (prill)	-	6.0-9.0
Ammonium Nitrate	0.025 (solution) 0.05 (non-solution)	-	0.0125 (solution) 0.025 (non-solution)	6.0-9.0
Phosphate	Subject to provisions of Chapter III, Section 3, no discharge of process waste water pollutants.			
Nitric Acid	No discharge of process waste water pollutants.			
Ammonium Sulfate**	No discharge of process waste water pollutants.			
Mixed-Blend Fertilizers**	No discharge of process waste water pollutants.			

*Values listed are the maximum allowed average of daily averages for 30 consecutive operating days, i.e. the 30-day maximum averages. Maximum allowed single day (average) values are equal to twice the 30-day averages.

**These subcategory effluent limitations are draft values only, currently under EPA review.

Table 5. Fertilizer Manufacturing Effluent Limitations For "Best Available" Control Technology Economically Achievable (July 1, 1973)

Subcategory	Effluent Limitation Parameters* → (Kilograms/1000 Kilograms of Product)			
	Ammonia (as N)	Organic Nitrogen (as N)	Nitrate (as N)	pH (Range)
Ammonia	0.025	-	-	6.0-9.0
Urea	0.015 (non-prill) 0.015 (prill)	0.025 (non-prill) 0.0375 (prill)	-	6.0-9.0
Ammonium Nitrate	0.0075 (any)	-	0.0125 (any)	6.0-9.0
Phosphate	Subject to provisions of Chapter III, Section 3, no discharge of process waste water pollutants.			
Nitric Acid	No discharge of process waste water pollutants.			
Ammonium Sulfate**	No discharge of process waste water pollutants.			
Mixed-Blend Fertilizers**	No discharge of process waste water pollutants.			

*Values listed are the maximum allowed average of daily averages for 30 consecutive operating days, i.e. the 30-day average. Maximum allowed single day (average) values are equal to twice the 30-day averages.
**These subcategory effluent limitations are draft values only, currently under EPA review.

Table 6. Phosphate Subcategory Effluent Limitations For Allowed Discharges Under Monthly Rainfall-Evaporation Excess Conditions

Effluent Characteristic	Effluent Limitations (Metric Units - mg/l)	
	Maximum for any 1 day	Average of daily values for 30 consecutive days shall not exceed-
Total Phosphorus (as P)	70	35
Fluoride	30	15
TSS	50	25
pH	Within the range of 8.0 to 9.5*	

*pH range specified is to insure that heavy metal discharge, particularly Ra-226, is adequately controlled.

B. Vapor Emissions

1. General Observation

Since no fertilizer product or by-product constituent has as yet been identified by EPA as a hazardous pollutant, vapor emission limitations for the industry are governed solely by application of the National Ambient Air Quality Standards for existing plants and the New of Modified Source Performance Standards.

2. National Ambient Air Quality Standards and Fertilizer Plant Emissions

Uniform National Ambient Air Quality Standards have been established to date for six general classes of pollutants at two levels--"primary," to protect human health and "secondary," to protect public welfare. These Standards are presented in Table 7.

As the numerical basis for all State Implementation Plan emission allocations, the Ambient Standards will impact directly on allowed emissions from existing fertilizer plants in three categories: Particulate Matter, Sulfur Oxides, and Nitrogen Oxides. These Standards cannot be converted into specific plant emission limits unless the air quality model (source interaction) parameters are known and specified for the Air Quality Control Region containing the plant. Development and verification of EPA air quality models, calculation procedures, air pollutant health effects data, and air emission control technology development and demonstration are the responsibilities of the EPA's National Environmental Research Center, Research Triangle Park, North Carolina 27711.

3. Standards of Performance for New or Modified Fertilizer Plants

Table 8 presents "standards of performance" for new or modified fertilizer plants--both those already adopted and some in draft form only (under EPA review). The data in Table 8 show that only a few of the fertilizer production processes are currently covered by new source performance standards.

The minimum, uniform Federal (EPA) standards given in Table 8 provide a design basis for air pollution control equipment and processes for all new or modified plants engaged in these operations in the United States.

Table 7. National Ambient Air Quality Standards

Pollutant	Primary ($\mu g/m^3$)	Secondary ($\mu g/m^3$)
PARTICULATE MATTER		
Annual geometric mean	75	60
Maximum 24-hour concentration*	260	150
SULFUR OXIDES		
Annual arithmetic mean	80 (.03 ppm)	60 (.02 ppm)
Maximum 24-hour concentration*	365 (.14 ppm)	260 (.1 ppm)
Maximum 3-hour concentration*		1,300 (.5 ppm)
CARBON MONOXIDE		
Maximum 8-hour concentration*	10,000 (9 ppm)	
Maximum 1-hour concentration*	40,000 (35 ppm)	same as primary
PHOTOCHEMICAL OXIDANTS		
Maximum 1-hour concentration*	160 (.08 ppm)	same as primary
HYDROCARBONS		
Maximum 3-hour (6-9 am) concentration*	160 (.24 ppm)	same as primary
NITROGEN OXIDES		
Annual arithmetic mean	100 (.05 ppm)	same as primary

*Not to be exceeded more than once a year.

Equivalent measurements in parts per million (ppm) are given for the gaseous pollutants.

Table 8. New or Modified Source Standards of Performance--Fertilizer Production and Processing Plants

Processes and Effluent Parameters	Emission Limits*
Nitric Acid	
Total Nitrogen Oxides	1.5 kg (as NO_2)/mton of product (as 100% acid)
Visible Emission	10% Opacity
Sulfuric Acid	
Sulfur Dioxide	2.0 kg (as SO_2)/mton of product (as 100% acid)
Visible Emission	10% Opacity
Acid Mist	0.075 kg/mton of product (as 100% acid)
Wet Process Phosphoric Acid**	
Fluorine	10.0 gm total (as F)/mton of P_2O_5 feed
Diammonium Phosphate**	
Fluorine	30.0 gm total (as F)/mton of P_2O_5 feed
Visible Emission	20% Opacity
Triple Superphosphate** (ROP and Granular Manufacture)	
Fluorine	100 gm total (as F)/mton of P_2O_5 feed
Visible Emission	20% Opacity
Triple Superphosphate** (Granular Storage)	
Fluorine	0.25 gm total (as F)/hour/mton of P_2O_5 feed

*All discharge quantities are maximum averages for the test procedure and time specified (usually for one hour minimum).
**Limits given for these operations are draft only, currently under EPA review.

IV. SOURCES OF TECHNICAL INFORMATION WITHIN EPA

A. Supporting Technology for Discharge Limits

The previous chapters describe the legislation and derived discharge limitations for the American fertilizer industry. Although an in-depth analysis of the associated control technology is beyond the scope of this paper, it would be a serious omission not to reference the key supporting technology and economics documents and the responsible EPA activity. It would also be remiss to omit a brief description of the role of EPA in control technology research and development.

In the case of aqueous effluents, three documents provide the basic technology and economics basis for the fertilizer effluent limitations:

(1) "Inorganic Fertilizer and Phosphate Mining Industries--Water Pollution and Control," 12020 FPD 09/71, EPA Office of Research and Monitoring Water Pollution Control Research Series Report. (Available for $1.75 from the U.S. Government Printing Office, Washington, D.C. 20402.)

(2) "Development Document for Proposed Effluent Limitations Guidelines and New Source Performance Standards for the Basic Fertilizer Chemicals Segment of the Fertilizer Manufacturing Point Source Category," EPA 440/1-73/011, November 1973. (Available upon request from U.S. EPA, Effluent Guidelines Division, Washington, D.C. 20460.)

(3) "Economic Impact of Costs of Proposed Effluent Limitation Guidelines for the Fertilizer Industry," EPA 230/1-73/010, October 1973. (Available upon request from U.S. EPA, Office of Planning and Evaluation, Washington, D.C. 20460.)

Additional data on the guidelines and the technology involved may be found in the appropriate issue of the Federal Register (see Reference List). Copies of the Registers may be obtained either upon request to the U.S. EPA Office of Legislative Affairs, Washington, D.C. 20460 or for $0.75 each to the Office of Federal Register, National Archives and Records Service, GSA, Washington, D.C. 20408.

For vapor emission control technology background the reader is referred to the "Background Document for New Source Performance Standards," APTD 0711 (available upon request from the Air Pollution Technical Information Center, Research Triangle Park, North Carolina 27711). Applicable Federal Registers are also given in the Reference List.

B. EPA Control Technology Research and Development

Both the FWPCAA and Air Amendments charge the Administrator of EPA to conduct the necessary R&D to insure that the technology

and economics bases for the effluent and emission limitations adopted are both sound and in concert with Congressional intent. In addition, the FWPCAA clearly indicates that it is not the Congressional desire to control aqueous effluents by creating additional air or solid discharges or by dilution and dispersion. As a result, multimedia pollutant discharge control is required. The outgrowth of this mandate is emphasis on the development of closed-loop water (reuse-recycle) treatment systems with product or by-product recovery and integration of the air and water control processes to minimize or eliminate a positive water balance. In addition, new or modified production processes that eliminate or minimize discharges and by-product utilization schemes have become valid areas of EPA R&D interest.

To conduct the control technology research, development, and demonstration mandated by Congress, the EPA has been given broad grant and contract authority. These awards of public monies can be made by EPA to profit-making organizations and individuals, including the polluting industries themselves, as well as to non-profit R&D institutions and universities. Grant and contract programs are planned and executed by EPA's Office of Research and Development (ORD) using ORD laboratories throughout the United States. Air control technology R&D (including that related to fertilizer production) is conducted by the Control Systems Laboratory, National Environmental Research Center, Research Triangle Park, North Carolina 27711. R&D for the control of aqueous discharges from fertilizer plants is the responsibility of the Industrial Pollution Branch, Southeast Environmental Research Laboratory, Athens, Georgia 30601. Additional information concerning the grant (contract) program in general or specific R&D projects sponsored by EPA-ORD related to fertilizer production (or other industrial operations) can be obtained by contacting these activities directly.

Reference List

(1) U.S. Environmental Protection Agency. The Federal Water Pollution Control Act Amendments of 1972 Highlights. Washington, D.C. January 1973.

(2) Izaak Walton League of America and the U.S. Environmental Protection Agency. A Citizen's Guide to Clean Water. Washington, D.C. June 1973.

(3) The Conservation Foundation and the U.S. Environmental Protection Agency. A Citizens Guide to Clean Air. Washington, D.C. January 1972.

(4) U.S. Environmental Protection Agency Federal Register. Effluent Guidelines and Standards, General Provisions. Volume 39, Number 24, Part II. Washington, D.C. February 4, 1974.

(5) U.S. Environmental Protection Agency Federal Register. Fertilizer Manufacturing Point Source Category, Effluent Guidelines and Standards and Proposed Limitations. Volume 39, Number 68, Part III. Washington, D.C. April 8, 1974.

(6) U.S. Environmental Protection Agency Federal Register. Fertilizer Manufacturing Point Source Category, Proposed Effluent Limitations and Guidelines. Volume 39, Number 128, Part IV. Washington, D.C. July 2, 1974.

(7) U.S. Environmental Protection Agency Federal Register. State Plans for Implementation of National Ambient Air Quality Standards, Notice of Proposed Rule Making. Volume 37, Number 115, Part II. Washington, D.C. June 14, 1972.

(8) U.S. Environmental Protection Agency Federal Register. Standards of Performance for New Stationary Sources. Volume 36, Number 247, Part II. Washington, D.C. December 23, 1971.

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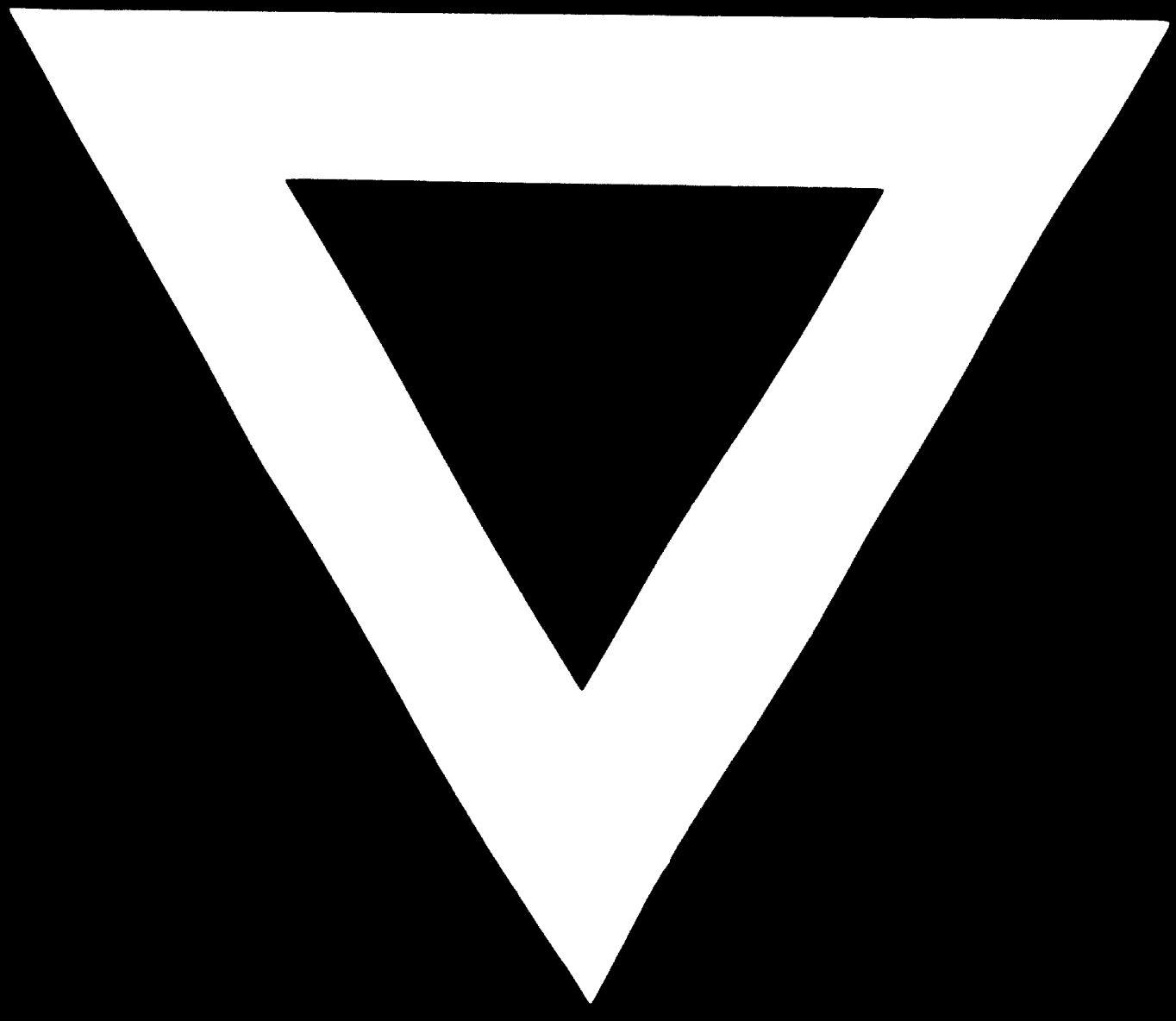

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