

STATE OF FLORIDA

DEPARTMENT OF ENVIRONMENTAL REGULATION

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



BOB MARTINEZ
GOVERNOR

DALE TWACHTMANN
SECRETARY

August 14, 1987

CERTIFIED MAIL-RETURN RECEIPT REQUESTED

Mr. Rudy J. Cabina, Vice President
Gardinier, Inc.
PO Box 3269
Tampa, FL 33601

Dear Mr. Cabina:

Attached is one copy of the Intent to Issue an Exemption, from air permitting, for Gardinier's proposed construction of a replacement phosphogypsum storage area, located East of Old U.S. Highway 41 and West of Riverview Drive, Hillsborough County, Tampa, Florida, phosphate fertilizer chemical complex.

In the alternative, if it is determined by any administrative hearing that the phosphogypsum storage area is unable to qualify for this exemption, then this notice shall also constitute a Notice of Intent to Issue a permit to construct a replacement phosphogypsum storage area.

Please submit, in writing, any comments which you wish to have considered concerning the Department's proposed action to Bill Thomas of the Bureau of Air Quality Management.

Sincerely,

C. H. Fancy, P.E.
Deputy Chief
Bureau of Air Quality
Management

CHF/bm

cc: B. Thomas, SW Dist.
J. Campbell, HCEPC
R. Nettles, P.E., Gardinier, Inc.

State of Florida
Department of Environmental Regulation
Notice of Proposed Agency Action
on Permit Application

Gardinier, Inc. has requested permission to construct and operate a replacement phosphogypsum storage area. Gardinier is exchanging one operating phosphogypsum storage area for another. The present operating phosphogypsum storage area will be closed, sealed and grassed as required by Condition No. 39 in Part IV of the Hillsborough County DRI Development Order No. 76.

The Department of Environmental Regulation gives notice of its intent to issue an exemption from air permitting to Gardinier, Inc.'s proposed construction of a phosphogypsum storage area replacement located south of Tampa near the intersection of U.S. Highway 41 and Riverview Drive in Hillsborough County.

In the alternative, if it is determined by any administrative hearing on this matter that the phosphogypsum storage area replacement is unable to qualify for this exemption, then this notice shall also constitute a notice of intent to issue a permit to construct an air pollution source, the phosphogypsum storage area replacement.

Persons whose substantial interests are affected by the Department's proposed permitting decision may petition for an administrative proceeding (hearing) in accordance with Section 120.57, Florida Statutes. The petition must conform to the requirements of Chapters 17-103 and 28-5, Florida Administrative Code, and must be filed (received) in the Office of General Counsel of the Department at 2600 Blair Stone Road, Twin Towers Office Building, Tallahassee, Florida 32399-2400, within fourteen (14) days of publication of this notice. Failure to file a request for hearing within this time period shall constitute a waiver of any right such person may have to request an administrative determination (hearing) under Section 120.57, Florida Statutes.

If a petition is filed, the administrative hearing process is designed to formulate agency action. Accordingly, the Department's final action may be different from the position taken by it in this preliminary statement. Therefore, persons who may not object to the proposed agency action may wish to intervene in the proceeding. A petition for intervention must be filed pursuant to Model Rule 28-5.207 at least five (5) days before the final hearing and be filed with the hearing officer if one has been assigned at the Division of Administrative Hearings, Department of Administration, 2009 Apalachee Parkway, Tallahassee, Florida 32399-2400. If no hearing officer has been assigned, the petition is to be filed with the Department's Office of General Counsel, 2600 Blair Stone Road, Tallahassee,

Florida 32399-2400. Failure to petition to intervene within the allowed time frame constitutes a waiver of any right such person has to request a hearing under Section 120.57, Florida Statutes.

The application is available for public inspection during normal business hours, 8:00 a.m. to 5:00 p.m., Monday through Friday, except legal holidays, at:

Hillsborough County Environmental
Protection Commission
1900 9th Avenue
Tampa, Florida 33605

Dept. of Environmental Regulation
Bureau of Air Quality Management
2600 Blair Stone Road
Tallahassee, Florida 32399-2400

Department of Environmental Regulation
Southwest District
4520 Live Oak Fair Blvd.
Tampa, Florida 33610-7347

Any person may send written comments on the proposed action to Mr. Bill Thomas at the Department's Tallahassee address. All comments mailed within 14 days of the publication of this notice will be considered in the Department's final determination.

RULES OF THE ADMINISTRATIVE COMMISSION
MODEL RULES OF PROCEDURE
CHAPTER 28-5
DECISIONS DETERMINING SUBSTANTIAL INTERESTS

28-5.15 Requests for Formal and Informal Proceedings

- (1) Requests for proceedings shall be made by petition to the agency involved. Each petition shall be printed, typewritten or otherwise duplicated in legible form on white paper of standard legal size. Unless printed, the impression shall be on one side of the paper only and lines shall be double spaced and indented.
- (2) All petitions filed under these rules should contain:
 - (a) The name and address of each agency affected and each agency's file or identification number, if known;
 - (b) The name and address of the petitioner or petitioners;
 - (c) All disputed issues of material fact. If there are none, the petition must so indicate;
 - (d) A concise statement of the ultimate facts alleged, and the rules, regulations and constitutional provisions which entitle the petitioner to relief;
 - (e) A statement summarizing any informal action taken to resolve the issues, and the results of that action;
 - (f) A demand for the relief to which the petitioner deems himself entitled; and
 - (g) Such other information which the petitioner contends is material.

BEFORE THE STATE OF FLORIDA
DEPARTMENT OF ENVIRONMENTAL REGULATION

In the Matter of
Application for Permit by:

Gardinier, Inc.
P. O. Box 3269
Tampa, Florida 33601

DER File No. AC 29-131183

INTENT TO ISSUE EXEMPTION

The Department of Environmental Regulation hereby gives notice of its Intent to Issue an Exemption to air permitting, pursuant to Florida Administrative Code Rule 17-4.04(11), for the proposed project as detailed in the application specified above (copy attached). The Department is issuing this Intent to Issue for the reasons in the attached evaluation.


Gardinier, Inc. applied March 2, 1987 to the Department of Environmental Regulation for a permit to construct a replacement phosphogypsum storage area at their Tampa phosphate fertilizer chemical complex. The information submitted in their letter received June 8, 1987, completed the application so that it could be processed by the Department. Information submitted by the company shows the construction of the phosphogypsum storage area will have an insignificant impact on the environment and will comply with all applicable federal, state, and county air pollution regulations.

Persons whose substantial interests are affected by the above proposed agency action have a right, pursuant to Section 120.57, F.S., to petition for an administrative determination (hearing) on the proposed action. The Petition must conform to the requirements of Chapters 17-103 and 28-5, FAC, and must be filed (received) with the Division of Administrative Hearings, The Oakland Building, 2009 Apalachee Parkway, Tallahassee, Florida 32399-2400, within fourteen (14) days of publication of this notice. Failure to file a petition within the fourteen (14)

days constitutes a waiver of any right such person has to an administrative determination (hearing) pursuant to Section 120.57, F.S.

If a petition is filed, the administrative hearing process is designed to formulate agency action. Accordingly, the Department's final action may be different from the proposed agency action. Persons whose substantial interests will be affected by any decision of the Department has the right to intervene in the proceeding. A petition for intervention must be filed pursuant to Model Rule 28-5.207, FAC, at least five (5) days before the final hearing and be filed with the Hearing Officer at the Division of Administrative Hearings, Department of Administration, 2009 Apalachee Parkway, Tallahassee, Florida 32399-2400. Failure to Petition to intervene within the allowed time frame constitutes a waiver of any right such person has to request a hearing under Section 120.57, F.S.

STATE OF FLORIDA DEPARTMENT
OF ENVIRONMENTAL REGULATION



C. H. Fancy, P.E.
Deputy Chief
Bureau of Air Quality Management

Copies furnished to:

B. Thomas, SW District
J. Campbell, HCEPC
R. Nettles, P.E., Gardinier, Inc.

CERTIFICATE OF SERVICE

The undersigned duly designated deputy clerk hereby certifies that this NOTICE OF INTENT TO ISSUE and all copies were mailed before the close of business on August 14, 1987.

FILING AND ACKNOWLEDGEMENT
FILED, on this date, pursuant to
§120.52(9), Florida Statutes, with
the designated Department Clerk,
receipt of which is hereby
acknowledged.

Maitha J. Wise 8-14-87
Clerk Date

BEFORE THE STATE OF FLORIDA
DEPARTMENT OF ENVIRONMENTAL REGULATION

In the Matter of
Application for Permit by:

Gardinier, Inc.
P. O. Box 3269
Tampa, Florida 33601

DER File No. AC 29-131183

INTENT TO ISSUE PERMIT

The Department of Environmental Regulation hereby gives notice of its intent to issue a permit (copy attached) for the proposed project as detailed in the application specified above. The Department is issuing this Intent to Issue for the reasons stated in the attached Technical Evaluation and Preliminary Determination.

Gardinier, Inc. applied March 2, 1987 to the Department of Environmental Regulation for a permit to construct a replacement phosphogypsum storage area at their Tampa phosphate fertilizer chemical complex. The information submitted in their letter received June 8, 1987, completed the application so that it could be processed by the Department. Information submitted by the company shows the construction and operation of the phosphogypsum storage area will comply with all applicable federal, state, and county air pollution regulations.

The Department has permitting jurisdiction under Chapter 403, Florida Statutes and Florida Administrative Code Rules 17-2 and 17-4.

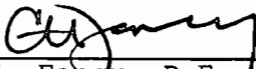
Pursuant to Section 403.815, F.S. and DER Rule 17-103.150, FAC, you (the applicant) are required to publish at your own expense the enclosed Notice of Proposed Agency Action on permit application. The notice must be published one time only in a section of a major local newspaper of general circulation in the county in which the

project is located and within thirty (30) days from receipt of this intent. Proof of publication must be provided to the Department within seven days of publication of the notice. Failure to publish the notice and provide proof of publication within the allotted time may result in the denial of the permit.

The Department will issue the permit with the attached conditions unless petition for an administrative proceeding (hearing) is filed pursuant to the provisions of Section 120.57, Florida Statutes. A person whose substantial interests are affected by the Department's proposed permitting decision may petition for an administrative proceeding (hearing) in accordance with Section 120.57, Florida Statutes. Petitions must comply with the requirement of Florida Administrative Code Rules 17-103.155 and 28-5.201 (copies enclosed) and be filed with (received by) the Office of General Counsel of the Department at 2600 Blair Stone Road, Tallahassee, Florida 32399-2400. Petitions filed by the permit applicant must be filed within fourteen (14) days of receipt of this intent. Petitions filed by other persons must be filed within fourteen (14) days of publication of the public notice or within fourteen (14) days of receipt of this intent, whichever first occurs. Failure to file a petition within this time period shall constitute a waiver of any right such person may have to request an administrative determination (hearing) under Section 120.57, Florida Statutes, concerning the subject permit application. Petitions which are not filed in accordance with the above provisions will be dismissed.

Executed in Tallahassee, Florida.

STATE OF FLORIDA DEPARTMENT
OF ENVIRONMENTAL REGULATION



C. H. Fancy, P.E.
Deputy Chief
Bureau of Air Quality Management

Copies furnished to:

B. Thomas, SW District
J. Campbell, HCEPC
R. Nettles, P.E., Gardinier, Inc.

CERTIFICATE OF SERVICE

The undersigned duly designated deputy clerk hereby certifies that this NOTICE OF INTENT TO ISSUE and all copies were mailed before the close of business on August 14, 1987

FILING AND ACKNOWLEDGEMENT
FILED, on this date, pursuant to
§120.52(9), Florida Statutes, with
the designated Department Clerk,
receipt of which is hereby
acknowledged.

Martha J. Wise 8-14-87
Clerk Date

Notice of Issuance of Exemption
Pursuant to Florida Administrative Code Rule 17-4.04(11)

Gardinier, Inc.
Tampa, Florida
Hillsborough County

Phosphogypsum Storage Area
File No. AC 29-131183

Florida Department of Environmental Regulation
Central Air Permitting
Bureau of Air Quality Management

August 14, 1987

I. Applicant

Gardinier, Inc.
Tampa Chemical Plant
Post Office Box 3269
Tampa, Florida 33601

II. Location

The proposed phosphogypsum storage area replacement is located south of Tampa near the intersection of U.S. Highway 41 and Riverview Drive; (Figure 1) Latitude: 27°, 53', 10" N; Longitude: 82°, 22', 30" W; UTM coordinates: Zone 17, 3085.17 km N, 364.65 km E.

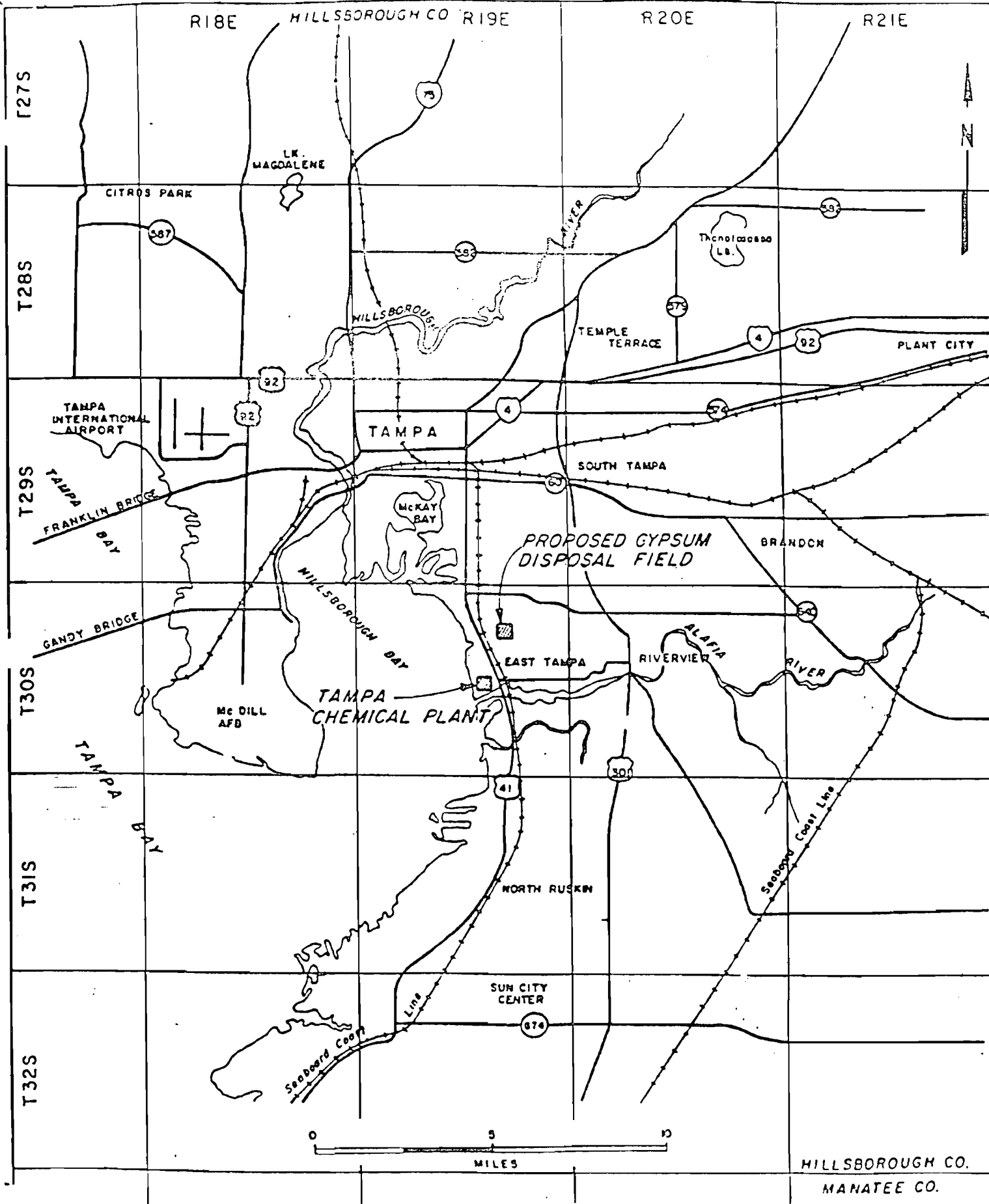
III. Project Description

The applicant proposes to construct and operate a replacement phosphogypsum storage area (SIC No. 2874). This area will store phosphogypsum produced by the operation of their East Tampa Phosphate Chemical Plant.

Gardinier, Inc. and the majority of all other U.S. wet process phosphoric acid producers, use the dihydrate process to produce phosphoric acid. This process uses concentrated sulfuric acid (H_2SO_4) to dissolve fluorapatite ($Ca_{10}(PO_4)_6F_2$) contained in finely ground marketable phosphate rock. As this exothermic reaction proceeds, phosphoric acid (H_3PO_4) is produced along with by-product fluosilicic acid (H_2SiF_6) and waste gypsum ($CaSO_4 \cdot 2H_2O$). Gypsum is removed from the reaction mixture by filtration and discharged to storage areas as a slurry. Vacuum evaporators are used at the processing plant to separate phosphoric acid from fluosilicic acid and to concentrate the phosphoric acid.

Gardinier, Inc. is currently operating a phosphogypsum storage area located directly north of their existing phosphoric acid plant. This storage area is close to exhausting its designed storage capacity. Once this occurs, Gardinier will need additional storage area in order to continue their operations at the East Tampa Phosphate Chemical Plant.

The new phosphogypsum storage area is planned to become operational in 1990 and to be in operation for the next 40 years (until 2030). The proposed phosphogypsum storage area site covers 600 acres (Figure 2), of which the pile or "stack" of phosphogypsum will cover approximately 330 acres and is designed to reach a maximum height of 200 feet. To go beyond a height of 100 feet, Gardinier will have to get approval from Hillsborough County as per DRI Development Order No. 76.



0326 (4/

HILLSBOROUGH CO.
MANATEE CO.

FIG. I
GENERAL LOCATION MAP

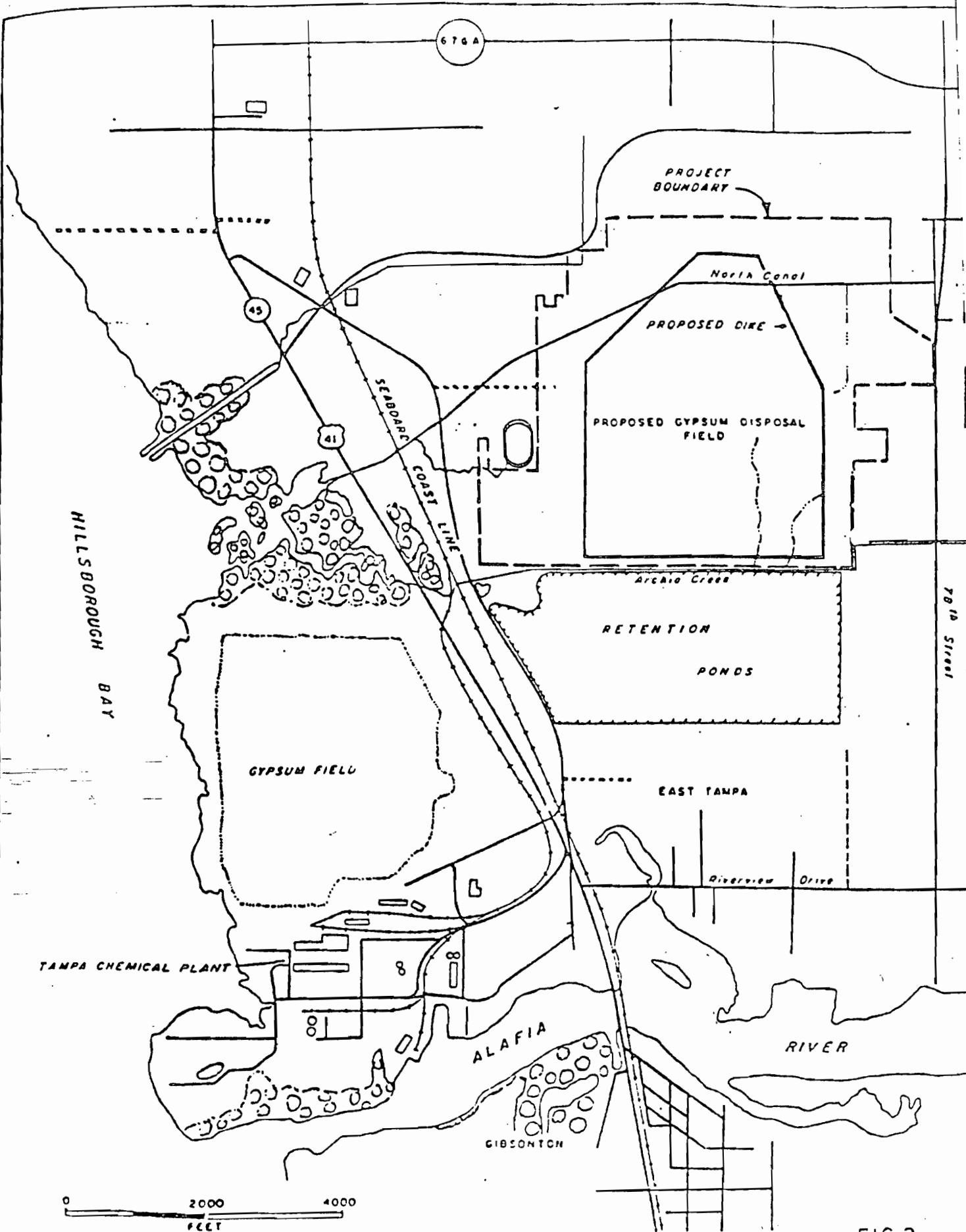


FIG. 2

VICINITY MAP

For the initial growth of the phosphogypsum storage field, a starter dike of approximately 10 feet high will be required. This dike crest will be 16 feet above mean sea level (MSL) and will be constructed of compacted on-site silty soil. It will have an outside slope of 3H:1V and will be vegetated to control stormwater runoff and wind erosion.

The phosphogypsum will be distributed inside the dike by peripheral deposition (see sketch 1, Details "A" & "B"). As deposition progresses, the dike will be raised in stages or lifts of 3 to 5 feet vertical intervals. Each stage or lift will be constructed of phosphogypsum from the storage field. It is estimated that dike lifts of 3 to 5 feet will be made on an annual basis.

The phosphogypsum will be hydraulically transported through pipelines to the storage area as a 30 percent solids slurry at a rate of approximately 6000 gallons per minute. These pipelines will originate at the phosphoric acid plant and run under U.S. Highway 41 at a point due east of the southern end of the existing phosphogypsum storage area. After passing under the highway, the slurry lines will then run above ground on Gardinier's property on the east side of U.S. Highway 41 to the southwest corner of the new proposed phosphogypsum storage area. To cross Archie Creek, a structural steel pipe bridge will hold four phosphogypsum slurry pipelines. Each pipeline will be encased within a steel pipe casing. These steel casings are designed to contain any accidental spill and prevent potential contamination of Archie Creek. The returning transport water is taken to the recirculating ponds located south of the new proposed phosphogypsum storage area.

Design of the new proposed phosphogypsum storage field incorporates state of the art technology, including an internal field drainage to prevent acid water from seeping to the side-slopes, vegetation on the side slopes, recirculation of transport water and a maintenance program to insure that unconfined particulate matter emissions from the new phosphogypsum storage site will be minimized.

IV. Rule Applicability

Gardinier's Tampa Plant is a "Major Facility" as defined by Rule 17-2.100, FAC. Their plant is located in an area designated nonattainment for particulate matter and ozone (Rule 17-2.410, FAC). The proposed new phosphogypsum storage area is a modification of the Tampa facility. Except for a minor increase in emissions during the construction and start-up of the new phosphogypsum stack, the project will not result in a net contemporaneous emissions increase of any pollutants. Therefore, the project is not subject to New Source Review pursuant to Rule 17-2.500, FAC, Prevention of Significant Deterioration

regulations or Rule 17-2.510, FAC, Nonattainment Area regulations. This modification will not cause the issuance of air contaminants in sufficient quantity, with respect to its character, quality or content, and the circumstances surrounding its location, use and operation, as to contribute significantly to the pollution problems within the State, so that the regulation thereof is not reasonably justified, and which does not in fact cause the issuance of contaminants in violation of law or of the rules and regulations (Rule 17-4.04(11), FAC).

Gardinier is exchanging one operating phosphogypsum storage area for another. The present operating phosphogypsum storage area will be closed, sealed and grassed as required by Condition No. 39 found in Part IV, of Hillsborough County DRI Development Order No. 76.

Gardinier will comply with the regulations of the Hillsborough County Environmental Protection Commission and the resolution of the Hillsborough Board of County Commissioners-DRI Development Order No. 76/Rezoning Order No. 83-6.

V. Technical Evaluation

A. Engineering

Technically, the name "phosphogypsum" is used to designate the waste byproduct of phosphoric acid production, while "gypsum" refers to the natural mineral. These words are used interchangeably in the fertilizer industry.

The Department has reviewed the available information on phosphogypsum and the contaminants (fluoride and radionuclide) associated with it. This review included existing reports by the United States Environmental Protection Agency (USEPA), Charles E. Roessler, Ph.D (certified health physicist and member of the Governor's Task Force on Phosphate-Related Radiation), P. J. Walsh, Ph.D (Health and Safety Research Division, Oak Ridge National Laboratory), Alexander May and John W. Sweeny (U.S. Bureau of Mines, Tuscaloosa Research Center), plus the transcript of testimony and proceedings of the Hillsborough County DRI Development Order No. 76.

The USEPA's Final Guideline Document, (EPA-450/2-77-005, March 1977): Control of Fluoride Emissions from Existing Phosphate Fertilizer Plants, provides a description of the phosphate fertilizer industry, the five manufacturing categories for which fluoride emission guidelines are established, and the nature and source of fluoride emissions. According to this guideline document, airborne fluoride emissions from phosphate facilities do not contribute to the endangerment of public health. Fluoride emissions from such a facility may, however, have an adverse effect on livestock and vegetation.

The Hillsborough County Environmental Protection Commission has a fluoride monitoring station located across Highway 41 from the Gardinier Plant. This monitoring station indicates ambient air fluoride concentrations, at that location, to be 3 to 4 parts per billion (PPB).

Since the area near the existing Gardinier facility is not currently experiencing any fluoride pollution problems, no new problem is expected to develop as a result of emissions from the new replacement phosphogypsum field. Gardinier is exchanging one operating phosphogypsum field for another. There should be no significant net increase in emissions when the field site is changed from the old field to the new field. After the new phosphogypsum field is placed in service, the old phosphogypsum field pond will be dried up and sealed with clay, then covered with top soil and grassed.

The airborne radiation and the radiation-related risks associated with the present phosphogypsum field have been reviewed by Dr. Charles Roessler, Dr. P. J. Walsh, Wally Johnson (radiation expert with the Florida Department of Health and Rehabilitative Services), and Mike Terpilak (an independent radiation-related risk assessment consultant for Hillsborough County). All of these experts agree that the potential health risk caused by radiation from the phosphogypsum field would be very small. Dr. Charles Roessler's in-depth study of radon flux emissions from the phosphogypsum storage area was based on an assumed emission rate of 26 pCi/m²/sec from the storage area. The latest sampling of Gardinier's existing phosphogypsum storage area reported by the USEPA shows the actual mean radon flux emissions from the dry storage area are 19.4 pCi/m²/sec. This is 25% less than what was assumed by Dr. Roessler for his study. In Dr. Roessler's opinion, the total combined exposure to the public from the existing phosphogypsum storage area and the proposed phosphogypsum storage area will be negligible.

Based on this review, the Department has reasonable assurance that radionuclide and fluoride emissions from the phosphogypsum storage area do not pose any danger to the public safety or welfare.

Gardinier has designed the site maintenance program for the new phosphogypsum field to insure that unconfined particulate matter emissions from the new phosphogypsum storage site will be minimized.

It is planned that the top of the new phosphogypsum field will be maintained by using the peripheral deposition method. Peripheral deposition is a technique by which phosphogypsum can be selectively placed around the outside perimeter of the phosphogypsum field. Implementation of the peripheral deposition

system will begin once the bottom of the field is covered with phosphogypsum to protect the underdrains. All sides will be furnished with a supply of phosphogypsum slurry through the use of two pumping systems with bypass valves near the south end of the field. A shut off valve will also be located near the south end of the field so that the discharge point can be moved without switching pumping systems (See detail B of Sketch 1).

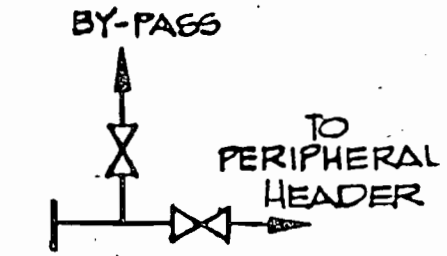
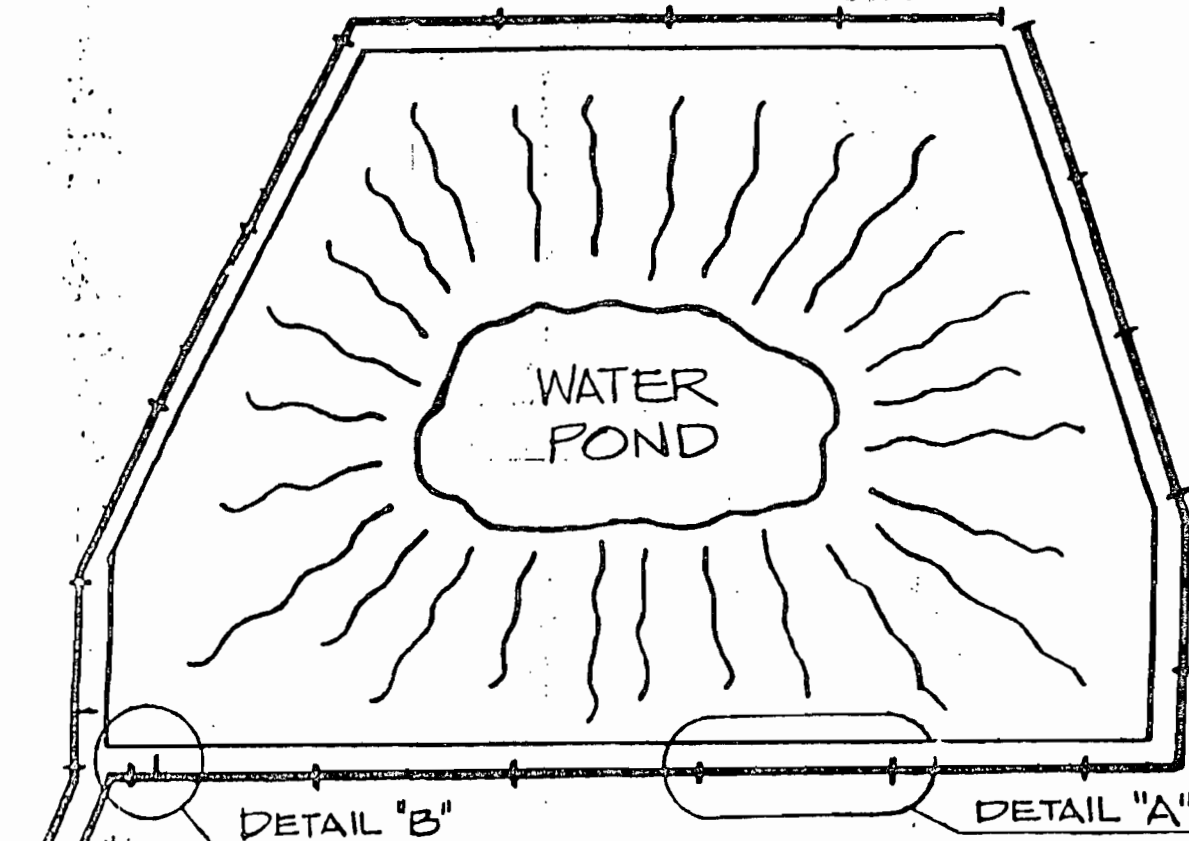
The peripheral deposition discharge sections will be 200 ft. long with 8 four inch diameter discharge nozzles (See Detail A of Sketch 1). After the "beach" has been established, a 200 ft. discharge section will be operated for about 16 hours in one location and then moved to the next location. The discharge point will be shifted to the bypass section at the south end of the line or to the opposite side of the field while the 200 ft. discharge sections are relocated. The slurry will not be allowed to atomize or spray at any point, i.e., leaking pipe joints, holes in slurry pipe, poorly designed distribution nozzles and etc.

To raise the phosphogypsum deposition field, a portion of the header pipe and spigots would be removed from the piping system. A phosphogypsum dike would then be constructed of material from the field, and the piping system raised to the top of the dike. The piping system can then be reconnected and put back into operation. This operation will involve a minimum of time and a minimal construction effort. It is envisioned that raises can be accomplished with dozers, draglines, and/or backhoe, as is common with raises on the existing phosphogypsum field.

The use of the peripheral deposition method will provide a means for keeping the top of the phosphogypsum field in a "moist" condition. This technique of continually wetting the top of the phosphogypsum field with fresh slurry will result in minimizing unconfined particulate emissions to the extent that is technically feasible.

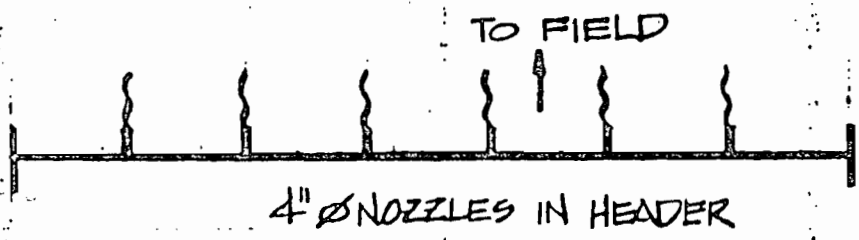
The side slopes of the phosphogypsum field will be grassed at approximately each increase in height of 7 ft. This would correspond to a slope distance of about 21 ft. The side slopes will be grassed using soil which would be stockpiled from the clearing of the site. Approximately 12 to 18 inches of soil capable of supporting vegetation will be placed over the top of the phosphogypsum field slopes.

The top 6 inches of soil placed on the field will be topsoil. The topsoil from the stripping operation will be stockpiled around the field to be used for this top 6 inch of cover. The underlying soil can be borrowed from offsite if required.



DETAIL "B"
N.T.S.

PLAN
N.T.S.



DETAIL "A"
N.T.S.

GARDINIER INC.		
EAST TAMPA, FLORIDA		
SKETCH 1		
SECT: PB.	SCALE: N.T.S.	DATE: 7/84
DR. L.W.P.		DRAWING NO.
TR.		SK-1712
CH.		

Table I is a typical quantitative analysis of the phosphogypsum field material and slurry.

Table II is a typical qualitative analysis of the phosphogypsum field material and slurry.

B. Air Quality Analysis

In support of the application, the applicant has completed a study of the projected ambient air quality due to emissions from the proposed phosphogypsum pile. Two pollutants regulated by the Department were evaluated, particulate matter (PM) and fluorides. Emissions of particulate matter result mostly from wind erosion. Fluoride emissions are released from the pond located in the center (top) of the phosphogypsum pile.

The construction of the new phosphogypsum pile replaces the old pile located approximately 2.5 kilometers away (center to center distance). Both piles are within the Gardinier (Tampa) facility boundary. Since the new pile is a replacement, and the effective areal extent of emissions are approximately the same (estimated to be slightly greater at the old pile), no net emission increase for either particulates or fluorides is expected.

The Gardinier facility is located within the Tampa particulate nonattainment area. Since the new phosphogypsum pile is simply a displacement of the old pile, no interference with reasonable further progress toward attaining the particulate ambient air quality standard is anticipated.

The fact that the pile is being displaced approximately 2.5 km means that some areas previously unaffected, or only slightly affected, may now be affected. At the same time, other areas previously affected by the old pile will no longer be as affected. To evaluate the effect of the new pile on the area immediately surrounding it, the applicant has completed an air quality impact analysis. There are no ambient air quality standards for fluorides so that only particulate matter was evaluated in terms of ambient concentration levels. The results of the analysis indicate that ambient ground-level concentrations, due solely to the wind erosion from the pile and roadways, are quite small. On an annual average basis, the maximum concentration due to the pile is less than $1 \mu\text{g}/\text{m}^3$. On a 24-hour average basis, the maximum concentration is predicted to be less than $15 \mu\text{g}/\text{m}^3$.

Given the results of the air quality analysis and the fact that the new phosphogypsum pile is a replacement of an old pile, the Department has reasonable assurance that the construction of the new pile, as documented in the application, will not

Best Available Copy

QUANTITATIVE

Table I

Listed below are the analysis of "typical" gypsum and gypsum slurry;

<u>CHEMICAL ANALYSIS</u>	<u>TYPICAL GYPSUM (as-is)</u>	<u>GYPSUM SLURRY (as-is)</u>
Free H2O	10 - 35 %	Approx. 70 %
Phosphorus as P2O5	1.0 - 1.5 %	1.0 - 1.5 %
Fluorine as F	0.15 - 0.42 %	0.15 - 0.42 %
Silica as SiO2	1.8 - 2.2 %	0.5 - 0.7 %
Iron as Fe2O3	0.02 - 0.09 %	0.01 - 0.03 %
Aluminum as Al2O3	0.05 - 0.15 %	0.02 - 0.05 %
Magnesium as MgO	0.01 - 0.03 %	< 0.01 %
Sodium as Na2O	0.09 - 0.17 %	0.03 - 0.05 %
Potassium as K2O	< 0.01 %	< 0.01 %
Calcium as CaO	22 - 30 %	5 - 7 %
Sulfate as SO4	35 - 48 %	10 - 15 %
Calc. as CaSO4 2H2O	68 - 90 %	20 - 30 %
Carbonate (CO3)	0.10 - 0.15 %	0.03 - 0.05 %
Uranium as U3O8	3 - 40 ppm	1 - 12 ppm
Thorium	< 1 ppm	< 1 ppm
Radium 226	< 30 pc/gm	< 9 pc/gm
Manganese	< 0.002 %	< 0.001 %
Nickel	< 0.0002 %	< 0.0001 %
Strontium	< 0.0006 %	< 0.0002 %
Titanium	< 0.20 %	< 0.06 %
Vanadium	< 0.0007 %	< 0.0002 %
Yttrium	< 0.0002 %	< 0.0001 %
Silver	< 0.0002 %	< 0.0001 %
Zirconium	< 0.01 %	< 0.01 %
Zinc	< 0.001 %	< 0.001 %
Lead	< 0.0002 %	< 0.0001 %
Cobalt	< 0.0002 %	< 0.0001 %
Arsenic	< 0.0002 %	< 0.0001 %
Boron	< 0.0006 %	< 0.0002 %
Tantallum	< 0.0002 %	< 0.0001 %

PHYSICAL CHARACTERISTICS

Bulk density - wet	86 - 94 lbs/cu.ft.	N/A
Bulk density - dry	73 - 77 lbs/cu.ft.	N/A
Screen +100 Tyler	Approx. 20 %	N/A
Screen +200 Tyler	Approx. 50 %	N/A
Screen +300 Tyler	Approx. 20 %	N/A
Screen -300 Tyler	Approx. 10 %	N/A
Slurry Viscosity (30 %)	N/A	4.8 cp
Slurry Specific Gravity (30%)	N/A	1.17 g/ml

QUALITATIVE

Table II

Listed below are the analysis of "typical" gypsum and gypsum slurry;

<u>CHEMICAL ANALYSIS</u>	<u>TYPICAL GYPSUM (Free H2O-Free)</u>	<u>TYPICAL GYPSUM SLURRY</u>
CaSO4 2H2O	90 - 95 %	28 - 32 %
SiO2	1 - 3 %	< 1 %
Trace Elements	1 - 2 %	< 1 %
P2O5 as Rock (CI)	< 1 %	< 1 %
Pond Water	N/A	68 - 72 %

interfere with the reasonable further progress of this area to meet the particulate ambient air quality standards.

For fluorides, the Department is satisfied that no increase in total emissions will occur. Further, the estimated emissions of fluorides from the pond is a small fraction of the total fluoride emissions from the entire Gardinier facility. Control of fluorides from this pond, if it were possible, would not represent a significant reduction in emissions facility-wide. The Department has reasonable assurance sure that fluoride emissions from the pond will not cause or significantly contribute to, heretofore unfound, fluoride pollution problems in the area.

C. Modeling Methodology

The EPA-approved Industrial Source Complex Short-Term and Long-Term, ISCST and ISCLT, atmospheric dispersion models were used in the air quality analysis. The ISCST model processes sequential hourly meteorological data to calculate short-term (one-hour to 24-hour) average concentrations of a pollutant. The ISCLT model uses a joint frequency distribution of wind speed and direction for discreet stability categories to calculate annual average concentrations. Both models incorporate procedures to account for plume rise, transport by the mean wind, lateral and vertical dispersion, and deposition of large particles. Ambient ground-level concentrations can be calculated at user-defined receptor locations.

One year of National Weather Service data from Tampa, Florida, for 1970, was used in the analysis.

Particulate emissions from the phosphogypsum pile are virtually all due to wind erosion. Since an emission factor for wind erosion from this type of source has not been developed, an estimate was obtained by using an erosion factor developed for exposed agricultural fields. This factor is dependent upon particle sizes, soil erodibility, surface roughness, climate, sheltering of the field, and the vegetative cover. The value determined for the phosphogypsum pile, considering the site-specific characteristics for the above factors, is 2 tons/acre year.

The entire area encompassing the phosphogypsum pile is not all susceptible to wind erosion emission of particulates. Most of the area will be either grassed or under water. The applicant estimates that, in the worst case, only 14.7 acres of the 326 total will generate particulate emissions due to wind erosion. This worst-case situation will occur during the beginning stages of the pile construction along the outer perimeter of the pile area.

In the modeling analysis completed by the applicant, 17 equal square areas were positioned along the perimeter of the pile from which wind erosion would occur. Although the actual area to be modeled is 14.7 acres, the 17 (200m x 200m) areas add up to 168 acres. The reason for this overestimation of area is to account for the entire perimeter of the pile area within the constraints of the model and with reasonable model inputs. To have modeled the actual perimeter as 14.7 acres would have required nearly 200 equal area sources. The emission rate used was adjusted to spread the emissions coming from 14.7 acres to 168 acres. This results in a slight underestimation of the ambient impacts by allowing for initial dispersion; however, the Department's analysis shows that the conclusions are not altered by this assumption.

The applicant also included in its modeling the depletion of ambient particulates by accounting for deposition. Three particle size categories were used: (1) less than 10 um, (2) 10 to 20 um, and (3) 20 to 30 um. Particles greater than 30 um were assumed to not be emitted since they settle out very quickly.

The results of the modeling analysis should be considered a rough estimate of the future concentrations levels. Although the analysis completed represents the state-of-the-art for regulatory modeling, the models are not validated for the complicated emission patterns like those of the phosphogypsum pile. In addition, the emission factor for wind erosion used for this analysis is a best guess estimate of the actual factor.

VI. Conclusion

The Department hereby gives notice to Gardinier, Inc. of its determination of eligibility for an exemption from permitting for Gardinier's proposed phosphogypsum storage area and in support of its determination states:

1. The Department currently has no emission limiting standards or ambient air quality standards governing radon or fluoride emissions from phosphogypsum storage areas. The Department's rules governing particulate emissions from a source such as this are contained in Rule 17-2.610(3), FAC, which requires only that a source take "reasonable precautions to prevent such emissions." The rule goes on to provide a non-inclusive list of reasonable precautions, one which is "landscaping or planting of vegetation." Florida Department of Health and Rehabilitative Services (HRS) has regulations governing radiation emitting materials.

Although not without jurisdiction to regulate radon as a pollutant, it is the Department's position that HRS is the State agency with primary authority, pursuant to Section 404.051, F.S., to license and regulate radioactive materials which may cause a

hazard to human health. It is the Department's intention to establish an interagency agreement with HRS which will determine the roles of responsibilities of both agencies regarding regulation of radiation.

2. The Department finds that Gardinier's proposed new phosphogypsum storage area will not cause the issuance of air contaminants in sufficient quantity, with respect to its character, quality or content, and the circumstances surrounding its location, use and operation, so as to contribute significantly to the pollution problems within the State, so that the regulation thereof is not reasonably justified, and which does not in fact cause the issuance of fluoride or particulate matter in violation of law or of the Department's rules and regulations.
3. It is, therefore, concluded that Gardinier's proposal to construct a replacement phosphogypsum storage area is eligible for an exemption pursuant to Florida Administrative Code Rule 17-4.04(11). As the phosphogypsum storage area is not an "article, machine, equipment, contrivance, or their exhaust system", the storage area does not fall within the exception to the exemption rule for radioactive materials.

Technical Evaluation
and
Preliminary Determination

Gardinier, Inc.
Tampa, Florida
Hillsborough County

Phosphogypsum Storage Area
File No. AC 29-131183

Florida Department of Environmental Regulation
Central Air Permitting
Bureau of Air Quality Management

August 14, 1987

I. Applicant

Gardinier, Inc.
Tampa Chemical Plant
Post Office Box 3269
Tampa, Florida 33601

II. Location

The proposed phosphogypsum storage area replacement is located south of Tampa at the intersection of U.S. Highway 41 and Riverview Drive; (Figure 1) Latitude: 27°, 53', 10" N; Longitude: 82°, 22', 30" W; UTM coordinates: Zone 17, 3085.17 km N, 364.65 km E.

III. Project Description

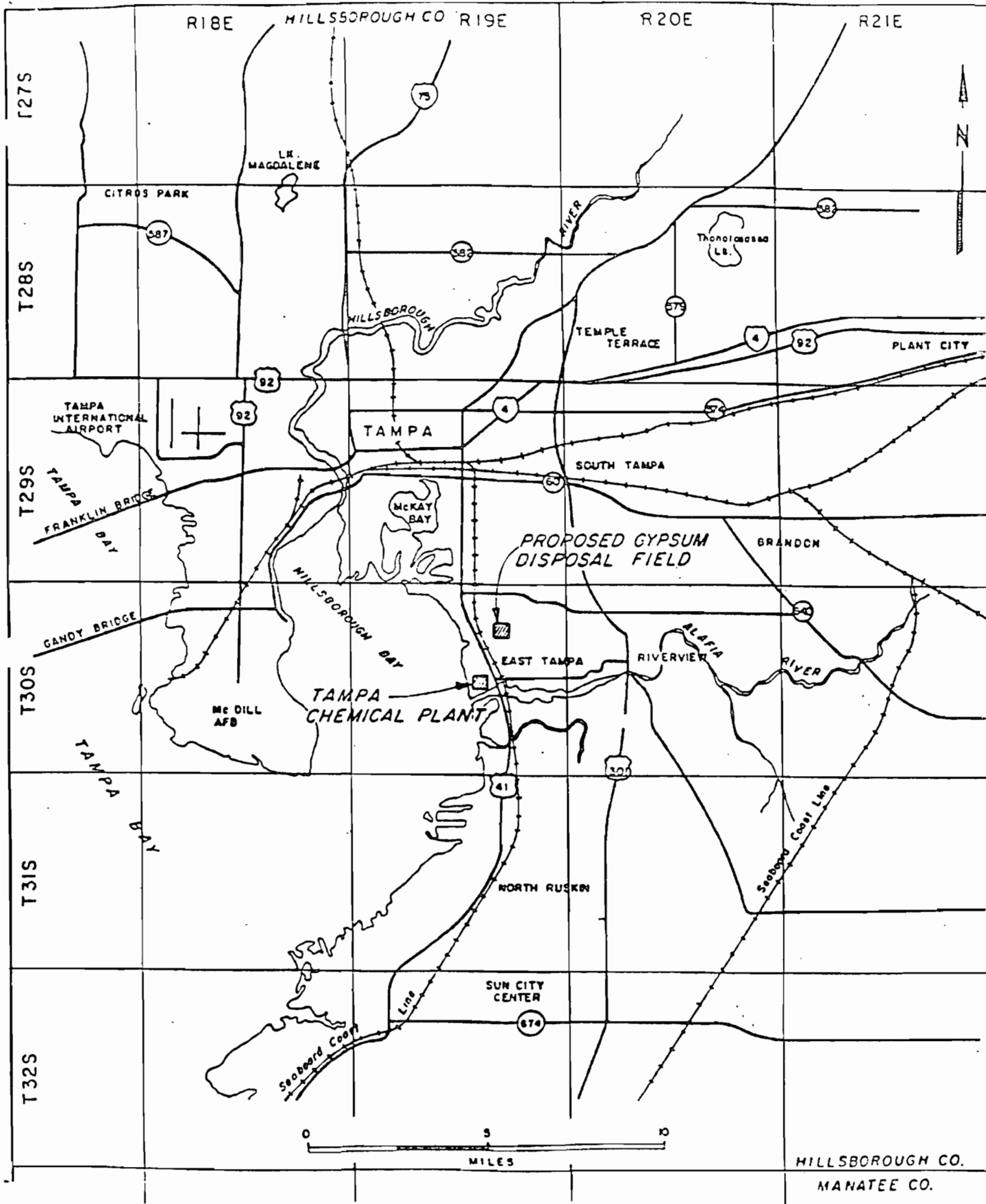
The applicant proposes to construct and operate a replacement phosphogypsum storage area (SIC No. 2874). This area will be used to store phosphogypsum produced by the operation of their East Tampa Phosphate Chemical Plant.

Gardinier, Inc. and the majority of all other U.S. wet process phosphoric acid producers, use the dihydrate process to produce phosphoric acid. This process uses concentrated sulfuric acid (H_2SO_4) to dissolve fluorapatite ($Ca_{10}(PO_4)_6F_2$) contained in finely ground marketable phosphate rock. As this exothermic reaction proceeds, phosphoric acid (H_3PO_4) is produced along with by-product fluosilicic acid (H_2SiF_6) and waste gypsum ($CaSO_4 \cdot 2H_2O$). Gypsum is removed from the reaction mixture by filtration and discharged to storage areas as a slurry. Vacuum evaporators are used at the processing plant to separate and recover fluosilicic acid and to concentrate the phosphoric acid.

Gardinier, Inc. is currently operating a phosphogypsum storage area located directly north of their existing phosphoric acid plant. This storage area is close to exhausting its designed storage capacity. Once this occurs, Gardinier will need additional storage area in order to continue their operations at the East Tampa Phosphate Chemical Plant.

The new phosphogypsum storage area is planned to become operational in 1990 and to be in operation for the next 40 years (until 2030). The proposed phosphogypsum storage area site covers 600 acres (Figure 2), of which the pile or "stack" of phosphogypsum will cover approximately 330 acres and is designed to reach a maximum height of 200 feet. To go beyond a height of 100 feet, Gardinier will have to get approval from Hillsborough County as per DRI Development Order No. 76.

For the initial growth of the phosphogypsum storage field a starter dike of approximately 10 feet high will be required.



HILLSBOROUGH CO.
MANATEE CO.

FIG. I
GENERAL LOCATION MAP

00326 (4/

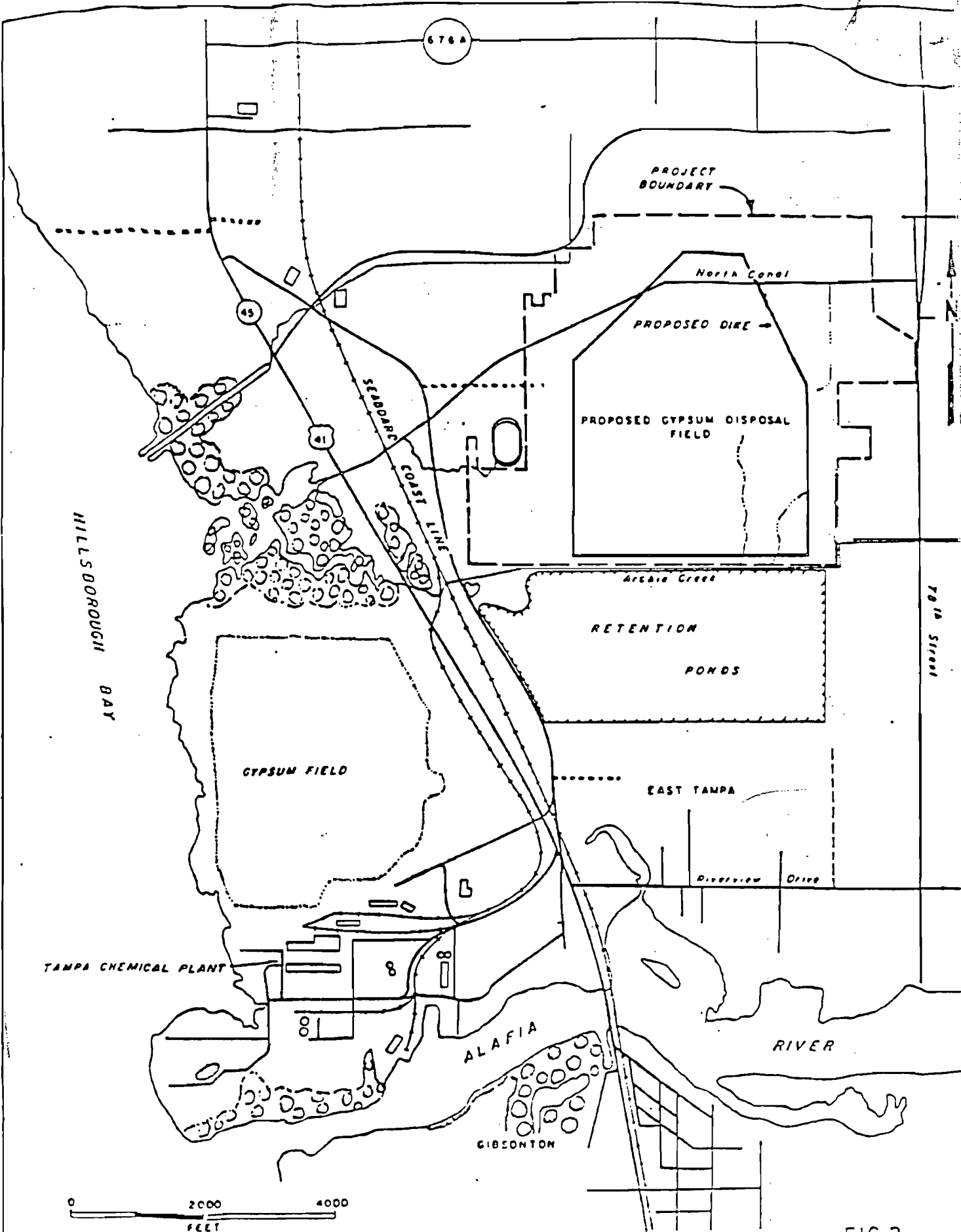


FIG. 2
VICINITY MAP

This dike crest will be 16 feet above mean sea level (MSL) and will be constructed of compacted on-site silty soil. It will have an outside slope of 3H:1V and will be vegetated to control stormwater runoff and wind erosion.

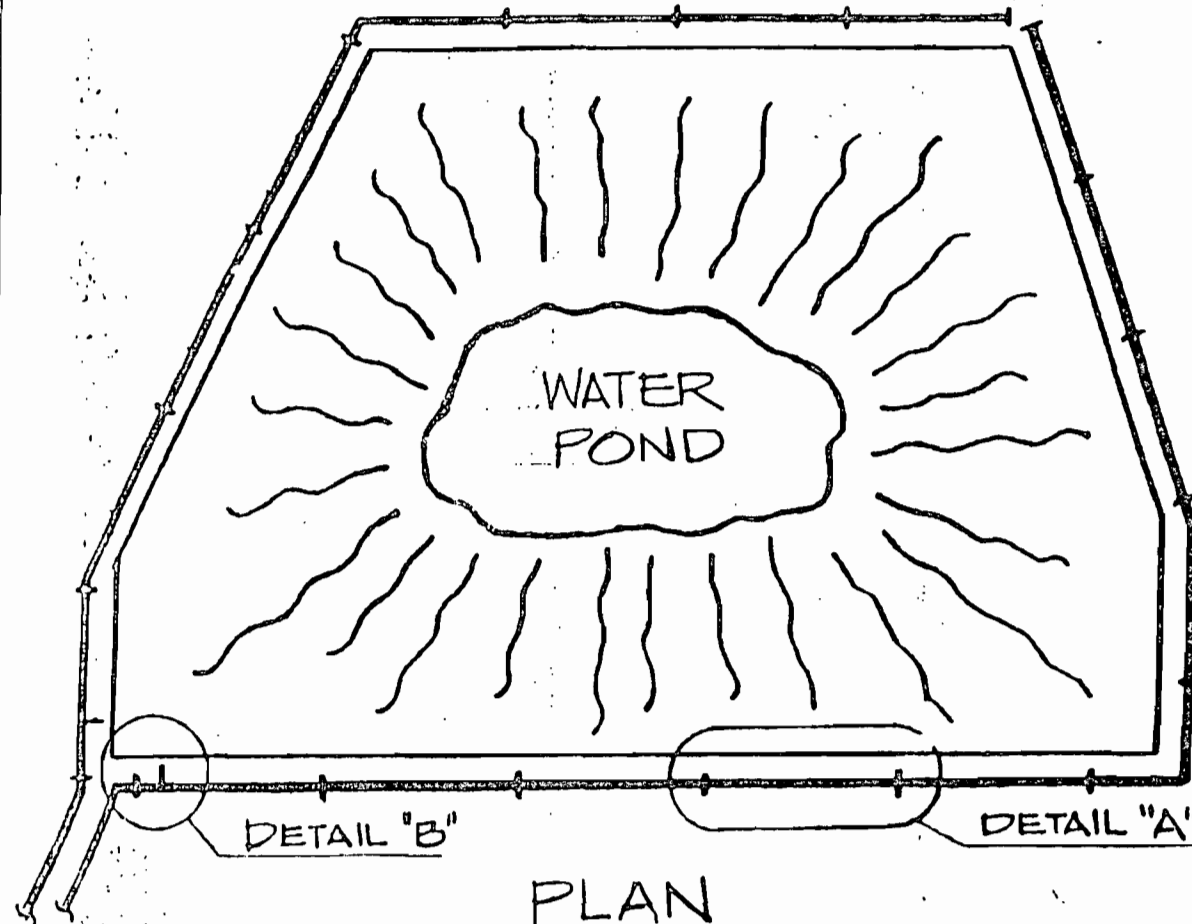
The phosphogypsum will be distributed inside the dike by peripheral deposition (see sketch 1, Details "A" & "B"). As deposition progresses, the dike will be raised in stages or lifts of 3 to 5 feet vertical intervals. Each stage or lift will be constructed of phosphogypsum from the storage field. It is estimated that dike lifts of 3 to 5 feet will be made on an annual basis.

The phosphogypsum will be hydraulically transported through pipelines to the storage area as a 30 percent solids slurry at a rate of approximately 6000 gallons per minute. These pipelines will originate at the phosphoric acid plant and run under U.S. Highway 41 at a point due east of the southern end of the existing phosphogypsum storage area. After passing under the highway, the slurry lines will then run above ground on Gardinier's property on the east side of U.S. Highway 41 to the southwest corner of the new proposed phosphogypsum storage area. To cross Archie Creek, a structural steel pipe bridge will hold four phosphogypsum slurry pipelines. Each pipeline will be encased within a steel pipe casing. These steel casings are designed to contain any accidental spill to prevent potential contamination of Archie Creek. The returning transport water is taken to the recirculating ponds located south of the new proposed phosphogypsum storage area.

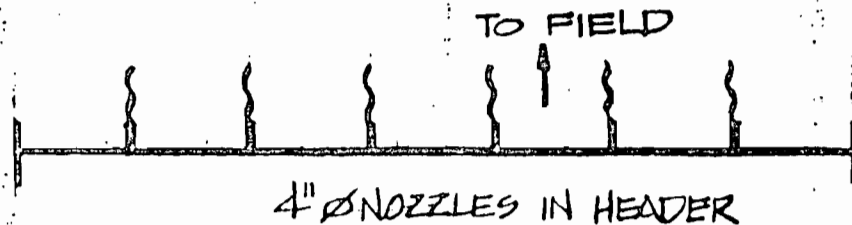
Design of the new proposed phosphogypsum storage field incorporates state of the art technology, including an internal field drainage to prevent acid water from seeping to the side-slopes, vegetation on the side slopes, recirculation of transport water and a maintenance program to insure that unconfined particulate matter emissions from the new phosphogypsum storage site will be minimized.

IV. Rule Applicability

Gardinier's Tampa Plant is a "Major Facility" as defined by Rule 17-2.100, FAC. Their plant is located in an area designated nonattainment for particulate matter and ozone (Rule 17-2.410, FAC). The proposed new phosphogypsum storage area is a modification of the Tampa facility and a source of unconfined emissions of particulate matter subject to Rule 17-2.610(3), FAC. This modification will not result in a significant net air emissions increase provided reasonable precautions to minimize unconfined particulate matter emissions are taken as defined by Rule 17-2.610(3)(c), FAC.

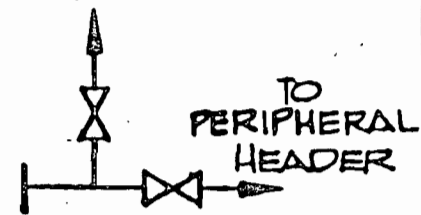


PLAN
N.T.S.



DETAIL "A"
N.T.S.

BY-PASS



DETAIL "B"
N.T.S.

GARDINIER INC.		
EAST TAMPA, FLORIDA		
SKETCH 1		
SECT: PB.	SCALE: N.T.S.	DATE: 7/88
DR. LWP		DRAWING NO
TR.		SK-1718
CH.		

Gardinier is exchanging one operating phosphogypsum storage area for another. The present operating phosphogypsum storage area will be closed, sealed and grassed as required by Condition No. 39 found in Part IV, of Hillsborough County DRI Development Order No. 76.

Gardinier must comply with the regulations of the Hillsborough County Environmental Protection Commission and the resolution of the Hillsborough Board of County Commissioners-DRI Development Order No. 76/Rezoning Order No. 83-6.

V. Technical Evaluation

A. Engineering

Technically, the name "phosphogypsum" is used to designate the waste byproduct of phosphoric acid production, while "gypsum" refers to the natural mineral. These words are used interchangeably in the fertilizer industry.

The Department has reviewed the available information on phosphogypsum and the contaminants (fluoride and radionuclide) associated with it. This review included existing reports by the United States Environmental Protection Agency (USEPA), Charles E. Roessler, Ph.D (certified health physicist and member of the Governor's Task Force on Phosphate-Related Radiation), P. J. Walsh, Ph.D (Health and Safety Research Division, Oak Ridge National Laboratory), Alexander May and John W. Sweeny (U.S. Bureau of Mines, Tuscaloosa Research Center), plus the transcript of testimony and proceedings of the Hillsborough County DRI Development Order No. 76.

The USEPA's Final Guideline Document: (EPA-450/2-77-005, March 1977), Control of Fluoride Emissions from Existing Phosphate Fertilizer Plants, provides a description of the phosphate fertilizer industry, the five manufacturing categories for which fluoride emission guidelines are established, and the nature and source of fluoride emissions. According to this guideline document, airborne fluoride emissions from phosphate facilities do not contribute to the endangerment of public health. Fluoride emissions from such a facility may, however, have an adverse effect on livestock and vegetation.

The Hillsborough County Environmental Protection Commission has a fluoride monitoring station located across Highway 41 from the Gardinier Plant. This monitoring station indicates ambient air fluoride concentrations, at that location, to be 3 to 4 parts per billion (PPB).

Since the area near the Gardinier facility is not currently experiencing any fluoride pollution problems, no new problem is expected to develop as a result of emissions from the new

Gardinier is exchanging one operating phosphogypsum storage area for another. The present operating phosphogypsum storage area will be closed, sealed and grassed as required by Condition No. 39 found in Part IV, of Hillsborough County DRI Development Order No. 76.

Gardinier must comply with the regulations of the Hillsborough County Environmental Protection Commission and the resolution of the Hillsborough Board of County Commissioners-DRI Development Order No. 76/Rezoning Order No. 83-6.

V. Technical Evaluation

A. Engineering

Technically, the name "phosphogypsum" is used to designate the waste byproduct of phosphoric acid production, while "gypsum" refers to the natural mineral. These words are used interchangeably in the fertilizer industry.

The Department has reviewed the available information on phosphogypsum and the contaminants (fluoride and radionuclide) associated with it. This review included existing reports by the United States Environmental Protection Agency (USEPA), Charles E. Roessler, Ph.D (certified health physicist and member of the Governor's Task Force on Phosphate-Related Radiation), P. J. Walsh, Ph.D (Health and Safety Research Division, Oak Ridge National Laboratory), Alexander May and John W. Sweeny (U.S. Bureau of Mines, Tuscaloosa Research Center), plus the transcript of testimony and proceedings of the Hillsborough County DRI Development Order No. 76.

The USEPA's Final Guideline Document: (EPA-450/2-77-005, March 1977), Control of Fluoride Emissions from Existing Phosphate Fertilizer Plants, provides a description of the phosphate fertilizer industry, the five manufacturing categories for which fluoride emission guidelines are established, and the nature and source of fluoride emissions. According to this guideline document, airborne fluoride emissions from phosphate facilities do not contribute to the endangerment of public health. Fluoride emissions from such a facility may, however, have an adverse effect on livestock and vegetation.

The Hillsborough County Environmental Protection Commission has a fluoride monitoring station located across Highway 41 from the Gardinier Plant. This monitoring station indicates ambient air fluoride concentrations, at that location, to be 3 to 4 parts per billion (PPB).

Since the area near the Gardinier facility is not currently experiencing any fluoride pollution problems, no new problem is expected to develop as a result of emissions from the new

phosphogypsum field. Gardinier is exchanging one operating phosphogypsum field for another. There should be no significant net increase in emissions when the field site is changed from the old field to the new field. After the new phosphogypsum field is placed in service, the old phosphogypsum field pond will be dried up and sealed with clay, then covered with top soil and grassed.

The airborne radiation and the radiation-related risks associated with the present phosphogypsum field have been reviewed by Dr. Charles Roessler, Dr. P. J. Walsh, Wally Johnson (radiation expert in the Florida Department of Health and Rehabilitative Services), and Mike Terpilak (an independent radiation-related risk assessment consultant for Hillsborough County). All of these experts agree that the potential health risk caused by radiation from the phosphogypsum field would be very small. Dr. Charles Roessler's indepth study of radon flux emissions from the phosphogypsum storage area was based on an assumed emission of 26 pCi/m²/sec. from the storage area. The latest sampling of Gardinier's phosphogypsum storage area reported by the USEPA shows the actual mean radon flux emissions from the dry storage area are 19.4 pCi/m²/sec. This is 25% less than what was assumed by Dr. Roessler for his study. In Dr. Roessler's opinion, the total combined exposure to the public from the existing phosphogypsum storage area and the proposed phosphogypsum storage area will be negligible.

Based on this review, the Department has reasonable assurance that radionuclide and fluoride emissions from the phosphogypsum storage area do not pose any immediate danger to the public safety or welfare. To insure that radiation and fluoride levels do not become excessive, Gardinier will continue their monitoring program of the ambient air quality until the Department determines this source will not create a hazard.

Gardinier has designed the site maintenance program for the new phosphogypsum field to insure that unconfined particulate matter emissions from the new phosphogypsum storage site will be minimized.

It is planned that the top of the new phosphogypsum field will be maintained by using the peripheral deposition method. Peripheral deposition is a technique by which phosphogypsum can be selectively placed around the outside perimeter of the phosphogypsum field. Implementation of the peripheral deposition system will begin once the bottom of the field is covered with phosphogypsum to protect the underdrains. All sides will be furnished with a supply of phosphogypsum slurry through the use of two pumping systems with bypass valves near the south end of the field. A shut off valve will also be located near the south end of the field so that the discharge point can be moved without switching pumping systems (See detail B of Sketch 1).

The peripheral deposition discharge sections will be 200 ft. long with 8 four inch diameter discharge nozzles (See Detail A of Sketch 1). After the "beach" has been established, a 200 ft. discharge section will be operated for about 16 hours in one location and then moved to the next location. The discharge point will be shifted to the bypass section at the south end of the line or to the opposite side of the field while the 200 ft. discharge sections are relocated. The slurry will not be allowed to atomize or spray at any point, i.e., leaking pipe joints, holes in slurry pipe, poorly designed distribution nozzles and etc.

To raise the phosphogypsum deposition field, a portion of the header pipe and spigots would be removed from the piping system. A phosphogypsum dike would then be constructed of material from the field, and the piping system raised to the top of the dike. The piping system can then be reconnected and put back into operation. This operation will involve a minimum of time and a minimal construction effort. It is envisioned that raises can be accomplished with dozers, draglines, and/or backhoe, as is common with raises on the existing phosphogypsum field.

The use of the peripheral deposition method will provide a means for keeping the top of the phosphogypsum field in a "moist" condition. This technique of continually wetting the top of the phosphogypsum field with fresh slurry will result in minimizing unconfined particulate emissions to the extent that is technically feasible.

Additionally, when weather conditions become dry and the access roads appear to dust, then the watering program will be initiated to minimize unconfined particulate emissions. This watering program will be accomplished with water trucks and/or an irrigation system. No visible particulate matter emissions shall be observed and/or permitted to exist without initiating the watering program immediately.

The side slopes of the phosphogypsum field will be grassed at approximately each increase in height of 7 ft. This would correspond to a slope distance of about 21 ft. The side slopes will be grassed using soil which would be stockpiled from the clearing of the site. Approximately 12 to 18 inches of soil capable of supporting vegetation will be placed over the top of the phosphogypsum field slopes.

The top 6 inches of soil placed on the field will be topsoil. The topsoil from the stripping operation will be stockpiled around the field to be used for this top 6 inch of cover. The underlying soil can be borrowed from offsite if required.

Table I is a typical quantitative analysis of the phosphogypsum field material and slurry.

Table II is a typical qualitative analysis of the phosphogypsum field material and slurry.

The emissions associated with the new field are non-point in nature. The following measures will be applied to minimize and monitor emissions.

1. Transporting and deposition of the phosphogypsum will be as a wet slurry. Hence, the initial process of adding to the field will not result in unconfined phosphogypsum particulate matter emissions.
2. As a result of the vegetation program that will be part of the project, only a strip about 21 ft. wide on the outer slope, around the top of the phosphogypsum field (stack), should be exposed at any time.
3. The chemical plant recovers fluosilicic acid, which reduces the potential for fluoride emissions from the phosphogypsum pond.
4. An air quality monitoring program has been implemented in the area of the new field. The program is monitoring TSP, ambient radon, ambient fluoride, fluoride in grasses, radium 226, and sulfate in particulate matter. This program will continue until the Department approves its discontinuance.

B. Air Quality Analysis

In support of the permit application, the applicant has completed a study of the projected ambient air quality due to emissions from the proposed phosphogypsum pile. Two pollutants regulated by the Department were evaluated, particulate matter (PM) and fluorides. Emissions of particulate matter result mostly from wind erosion. Fluoride emissions are released from the pond located in the center (top) of the phosphogypsum pile.

The construction of the new phosphogypsum pile replaces the old pile located approximately 2.5 kilometers away (center to center distance). Both piles are within the Gardinier (Tampa) facility boundary. Since the new pile is a replacement, and the effective areal extent of emissions are approximately the same (estimated to be slightly greater at the old pile), no net emission increase for either particulates or fluorides is expected.

The Gardinier facility is located within the Tampa particulate nonattainment area. Since the new phosphogypsum pile is simply a displacement of the old pile, no interference with

Best Available Copy

QUANTITATIVE

Table I

Listed below are the analysis of "typical" gypsum and gypsum slurry;

<u>CHEMICAL ANALYSIS</u>	<u>TYPICAL GYPSUM (as-is)</u>	<u>GYPSUM SLURRY (as-is)</u>
Free H ₂ O	10 - 35 %	Approx. 70 %
Phosphorus as P ₂ O ₅	1.0 - 1.5 %	1.0 - 1.5 %
Fluorine as F	0.15 - 0.42 %	0.15 - 0.42 %
Silica as SiO ₂	1.8 - 2.2 %	0.5 - 0.7 %
Iron as Fe ₂ O ₃	0.02 - 0.09 %	0.01 - 0.03 %
Aluminum as Al ₂ O ₃	0.05 - 0.15 %	0.02 - 0.05 %
Magnesium as MgO	0.01 - 0.03 %	< 0.01 %
Sodium as Na ₂ O	0.09 - 0.17 %	0.03 - 0.05 %
Potassium as K ₂ O	< 0.01 %	< 0.01 %
Calcium as CaO	22 - 30 %	5 - 7 %
Sulfate as SO ₄	35 - 48 %	10 - 15 %
Calc. as CaSO ₄ 2H ₂ O	68 - 90 %	20 - 30 %
Carbonate (CO ₃)	0.10 - 0.15 %	0.03 - 0.05 %
Uranium as U ₃ O ₈	3 - 40 ppm	1 - 12 ppm
Thorium	< 1 ppm	< 1 ppm
Radium 226	< 30 pc/gm	< 9 pc/gm
Manganese	< 0.002 %	< 0.001 %
Nickel	< 0.0002 %	< 0.0001 %
Strontium	< 0.0006 %	< 0.0002 %
Titanium	< 0.20 %	< 0.06 %
Vanadium	< 0.0007 %	< 0.0002 %
Yttrium	< 0.0002 %	< 0.0001 %
Silver	< 0.0002 %	< 0.0001 %
Zirconium	< 0.01 %	< 0.01 %
Zinc	< 0.001 %	< 0.001 %
Lead	< 0.0002 %	< 0.0001 %
Cobalt	< 0.0002 %	< 0.0001 %
Arsenic	< 0.0002 %	< 0.0001 %
Boron	< 0.0006 %	< 0.0002 %
Tantalum	< 0.0002 %	< 0.0001 %

PHYSICAL CHARACTERISTICS

Bulk density - wet	86 - 94 lbs/cu.ft.	N/A
Bulk density - dry	73 - 77 lbs/cu.ft.	N/A
Screen +100 Tyler	Approx. 20 %	N/A
Screen +200 Tyler	Approx. 50 %	N/A
Screen +300 Tyler	Approx. 20 %	N/A
Screen -300 Tyler	Approx. 10 %	N/A
Slurry Viscosity (30 %)	N/A	4.8 cp
Slurry Specific Gravity (30%)	N/A	1.17 g/ml

QUALIITATIVE

Table II

Listed below are the analysis of "typical" gypsum and gypsum slurry;

<u>CHEMICAL ANALYSIS</u>	<u>TYPICAL GYPSUM (Free H2O-Free)</u>	<u>TYPICAL GYPSUM SLURRY</u>
CaSO4 2H2O	90 - 95 %	28 - 32 %
SiO2	1 - 3 %	< 1 %
Trace Elements	1 - 2 %	< 1 %
P2O5 as Rock (CI)	< 1 %	< 1 %
Pond Water	N/A	68 - 72 %

reasonable further progress toward attaining the particulate ambient air quality standard is anticipated.

The fact that the pile is being displaced approximately 2.5 km means that some areas previously unaffected, or only slightly affected, may now be affected. At the same time, other areas previously affected by the old pile will no longer be as affected. To evaluate the effect of the new pile on the area immediately surrounding it, the applicant has completed an air quality impact analysis. There are no ambient air quality standards for fluorides so that only particulate matter was evaluated in terms of ambient concentration levels. The results of the analysis indicate that ambient ground-level concentrations, due solely to the wind erosion from the pile and roadways, are quite small. On an annual average basis, the maximum concentration due to the pile is less than 1 ug/m^3 . On a 24-hour average basis, the maximum concentration is predicted to be less than 15 ug/m^3 .

Given the results of the air quality analysis and the fact that the new phosphogypsum pile is a replacement of an old pile, the Department has reasonable assurance that the construction of the new pile, as documented in the application, will not interfere with the reasonable further progress of this area to meet the particulate ambient air quality standards.

For fluorides, the Department is satisfied that no increase in total emissions will occur. Further, the estimated emissions of fluorides from the pond is a small fraction of the total fluoride emissions from the entire Gardinier facility. Control of fluorides from this pond, if it were possible, would not represent a significant reduction in emissions facility-wide. The Department is reasonably sure that fluoride emissions from the pond will not cause or significantly contribute to, heretofore unfound, fluoride pollution problems in the area.

Radionuclide emission reports have also been reviewed by the Department. These emissions emanate from the phosphogypsum being piled and from the natural soil base. Dust blown from the pile will also contribute to additional emissions off the site area. Based on an administrative research by the Department and review of information provided by the applicant, the Department is reasonably assured that radiation emissions from the pile will not cause any significant health problems to the population surrounding the site.

C. Modeling Methodology

The EPA-approved Industrial Source Complex Short-Term and Long-Term, ISCST and ISCLT, atmospheric dispersion models were used in the air quality analysis. The ISCST model processes sequential hourly meteorological data to calculate short-term

(one-hour to 24-hour) average concentrations of a pollutant. The ISCLT model uses a joint frequency distribution of wind speed and direction for discrete stability categories to calculate annual average concentrations. Both models incorporate procedures to account for plume rise, transport by the mean wind, lateral and vertical dispersion, and deposition of large particles. Ambient ground-level concentrations can be calculated at user-defined receptor locations.

One year of National Weather Service data from Tampa, Florida, for 1970, was used in the analysis.

Particulate emissions from the phosphogypsum pile are virtually all due to wind erosion. Since an emission factor for wind erosion from this type of source has not been developed, an estimate was obtained by using an erosion factor developed for exposed agricultural fields. This factor is dependent upon particle sizes, soil erodibility, surface roughness, climate, sheltering of the field, and the vegetative cover. The value determined for the phosphogypsum pile, considering the site-specific characteristics for the above factors, is 2 tons/acre year.

The entire area encompassing the phosphogypsum pile is not all susceptible to wind erosion emission of particulates. Most of the area will be either grassed or under water. The applicant estimates that, in the worst case, only 14.7 acres of the 326 total will generate particulate emissions due to wind erosion. This worst-case situation will occur during the beginning stages of the pile construction along the outer perimeter of the pile area.

In the modeling analysis completed by the applicant, 17 equal square areas were positioned along the perimeter of the pile from which wind erosion would occur. Although the actual area to be modeled is 14.7 acres, the 17 (200m x 200m) areas add up to 168 acres. The reason for this overestimation of area is to account for the entire perimeter of the pile area within the constraints of the model and with reasonable model inputs. To have modeled the actual perimeter as 14.7 acres would have required nearly 200 equal area sources. The emission rate used was adjusted to spread the emissions coming from 14.7 acres to 168 acres. This results in a slight underestimation of the ambient impacts by allowing for initial dispersion; however, the Department's analysis shows that the conclusions are not altered by this assumption.

The applicant also included in its modeling the depletion of ambient particulates by accounting for deposition. Three particle size categories were used: (1) less than 10 um, (2) 10 to 20 um, and (3) 20 to 30 um. Particles greater than 30 um were assumed to not be emitted since they settle out very quickly.

The results of the modeling analysis should be considered a rough estimate of the future concentrations levels. Although the analysis completed represents the state-of-the-art for regulatory modeling, the models are not validated for the complicated emission patterns like those of the phosphogypsum pile. In addition, the emission factor for wind erosion used for this analysis is a best guess estimate of the actual factor.

VI. Conclusion

Based on the information submitted by Gardinier, Inc. and with the restrictions placed on them by the Hillsborough County Board of Commissioners Development Order No. 76, the Department has concluded that construction and operation of the proposed replacement phosphogypsum storage area will not result in the interference of reasonable further progress of this area to meet the particulate standard. The Department proposes to issue an air permit to authorize construction of the new replacement phosphogypsum storage area in accordance with Chapter 17-2, FAC. It is the applicant's responsibility to obtain all other permits that may be required for this source prior to commencing construction.

The General and Specific Conditions listed in the proposed permit (attached) will assure compliance of the source with the air pollution control regulations.

STATE OF FLORIDA
DEPARTMENT OF ENVIRONMENTAL REGULATION

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



BOB MARTINEZ
GOVERNOR
DALE TWACHTMANN
SECRETARY

PERMITTEE:
Gardinier, Inc.
P. O. Box 3269
Tampa, Florida 33601-0111

Permit Number: AC 29-131183
Expiration Date: June 30, 1992
County: Hillsborough
Latitude/Longitude: 27° 50' 10" N
82° 22' 30" W
Project: Phosphogypsum Storage
Area

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

To construct and operate a replacement phosphogypsum storage area. This facility will be for the purpose of storing phosphogypsum, produced by the East Tampa Phosphate Chemical Plant.

The UTM coordinates of the site are Zone 17, 364.65 km E and 3085.17 km N.

Gardinier, Inc. is currently operating a phosphogypsum storage area, located directly north of their existing phosphoric acid plant. This storage area is close to using all of its designed storage capacity. Once this occurs, Gardinier will need to switch over to the new phosphogypsum storage area to continue operation of their phosphate chemical plant.

Construction shall be in accordance with the application for a permit to construct the phosphogypsum storage area that was signed by Mr. Rudy J. Cabina, Vice President, on February 2, 1987, and Hillsborough County Board of Commission Development Order (DRI) Development Order No. 76/Rezoning Order No. 83-6 (Exhibit I).

Attachments:

1. Application for permit signed February 29, 1987.
2. Exhibit I, Hillsborough County DRI Petition No. 76.
3. DER letter dated March 25, 1987.
4. Gardinier, Inc. letter dated April 9, 1987.

PERMITTEE:
Gardinier, Inc.

Permit Number: AC 29-131183
Expiration Date: June 30, 1992

GENERAL CONDITIONS:

1. The terms, conditions, requirements, limitations, and restrictions set forth herein are "Permit Conditions" and as such are binding upon the permittee and enforceable pursuant to the authority of Sections 403.161, 403.727, or 403.859 through 403.861, Florida Statutes. The permittee is hereby placed on notice that the Department will review this permit periodically and may initiate enforcement action for any violation of the "Permit Conditions" by the permittee, its agents, employees, servants or representatives.
2. This permit is valid only for the specific processes and operations applied for and indicated in the approved drawings or exhibits. Any unauthorized deviation from the approved drawings, exhibits, specifications, or conditions of this permit may constitute grounds for revocation and enforcement action by the Department.
3. As provided in Subsections 403.087(6) and 403.722(5), Florida Statutes, the issuance of this permit does not convey any vested rights or any exclusive privileges. Nor does it authorize any injury to public or private property or any invasion of personal rights, nor any infringement of federal, state or local laws or regulations. This permit does not constitute a waiver of or approval of any other Department permit that may be required for other aspects of the total project which are not addressed in the permit.
4. This permit conveys no title to land or water, does not constitute state recognition or acknowledgement of title, and does not constitute authority for the use of submerged lands unless herein provided and the necessary title or leasehold interests have been obtained from the state. Only the Trustees of the Internal Improvement Trust Fund may express state opinion as to title.
5. This permit does not relieve the permittee from liability for harm or injury to human health or welfare, animal, plant or aquatic life or property and penalties therefore caused by the construction or operation of this permitted source, nor does it allow the permittee to cause pollution in contravention of Florida Statutes and Department rules, unless specifically authorized by an order from the Department.

PERMITTEE:
Gardinier, Inc.

Permit Number: AC 29-131183
Expiration Date: June 30, 1992

GENERAL CONDITIONS:

6. The permittee shall at all times properly operate and maintain the facility and systems of treatment and control (and related appurtenances) that are installed or used by the permittee to achieve compliance with the conditions of this permit, as required by Department rules. This provision includes the operation of backup or auxiliary facilities or similar systems when necessary to achieve compliance with the conditions of the permit and when required by Department rules.

7. The permittee, by accepting this permit, specifically agrees to allow authorized Department personnel, upon presentation of credentials or other documents as may be required by law, access to the premises, at reasonable times, where the permitted activity is located or conducted for the purpose of:

- a. Having access to and copying any records that must be kept under the conditions of the permit;
- b. Inspecting the facility, equipment, practices, or operations regulated or required under this permit; and
- c. Sampling or monitoring any substances or parameters at any location reasonably necessary to assure compliance with this permit or Department rules.

Reasonable time may depend on the nature of the concern being investigated.

8. If, for any reason, the permittee does not comply with or will be unable to comply with any condition or limitation specified in this permit, the permittee shall immediately notify and provide the Department with the following information:

- a. a description of and cause of non-compliance; and
- b. the period of noncompliance, including exact dates and times; or, if not corrected, the anticipated time the noncompliance is expected to continue, and steps being taken to reduce, eliminate, and prevent recurrence of the noncompliance.

PERMITTEE:
Gardinier, Inc.

Permit Number: AC 29-131183
Expiration Date: June 30, 1992

GENERAL CONDITIONS:

The permittee shall be responsible for any and all damages which may result and may be subject to enforcement action by the Department for penalties or revocation of this permit.

9. In accepting this permit, the permittee understands and agrees that all records, notes, monitoring data and other information relating to the construction or operation of this permitted source, which are submitted to the Department, may be used by the Department as evidence in any enforcement case arising under the Florida Statutes or Department rules, except where such use is proscribed by Sections 403.73 and 403.111, Florida Statutes.

10. The permittee agrees to comply with changes in Department rules and Florida Statutes after a reasonable time for compliance, provided however, the permittee does not waive any other rights granted by Florida Statutes or Department rules.

11. This permit is transferable only upon Department approval in accordance with Florida Administrative Code Rules 17-4.12 and 17-30.30, as applicable. The permittee shall be liable for any non-compliance of the permitted activity until the transfer is approved by the Department.

12. This permit is required to be kept at the work site of the permitted activity during the entire period of construction or operation.

13. This permit also constitutes:

- () Determination of Best Available Control Technology (BACT)
- () Determination of Prevention of Significant Deterioration (PSD)
- () Compliance with New Source Performance Standards.

14. The permittee shall comply with the following monitoring and record keeping requirements:

- a. Upon request, the permittee shall furnish all records and plans required under Department rules. The retention period for all records will be extended automatically, unless otherwise stipulated by the Department, during the course of any unresolved enforcement action.

PERMITTEE:
Gardinier, Inc.

Permit Number: AC 29-131183
Expiration Date: June 30, 1992

GENERAL CONDITIONS:

- b. The permittee shall retain at the facility or other location designated by this permit records of all monitoring information (including all calibration and maintenance records and all original strip chart recordings for continuous monitoring instrumentation), copies of all reports required by this permit, and records of all data used to complete the application for this permit. The time period of retention shall be at least three years from the date of the sample, measurement, report or application unless otherwise specified by Department rule.
- c. Records of monitoring information shall include:
- the date, exact place, and time of sampling or measurements;
 - the person responsible for performing the sampling or measurements;
 - the date(s) analyses were performed;
 - the person responsible for performing the analyses;
 - the analytical techniques or methods used; and
 - the results of such analyses.

15. When requested by the Department, the permittee shall within a reasonable time furnish any information required by law which is needed to determine compliance with the permit. If the permittee becomes aware that relevant facts were not submitted or were incorrect in the permit application or in any report to the Department, such facts or information shall be submitted or corrected promptly.

SPECIFIC CONDITIONS:

1. External slopes of the phosphogypsum pile shall not exceed 3 feet horizontal to 1 foot vertical (3H:1V).
2. New Gypsum Field Maintenance Program, Appendix E-2 of the application shall be implemented.
3. The external slope vegetation program will normally be maintained to about 7 vertical feet from the top of the phosphogypsum pile. This vertical exposure shall not exceed 10 feet.

PERMITTEE:
Gardinier, Inc.

Permit Number: AC 29-131183
Expiration Date: June 30, 1992

SPECIFIC CONDITIONS:

4. Unpaved travel ways and working areas shall be kept damp or moderately wet to minimize unconfined particulate matter emissions.
5. The slurry handling system shall not be allowed to atomize or spray at any point.
6. The air quality monitoring program will continue as outlined in Appendix D of this application and Gardinier's Ambient Air Monitoring Plan of November 25, 1986 (GAA-QA-AAMP/86), until the Department approves its discontinuance in writing.
7. Gardinier, Inc. shall comply with the Hillsborough County Development Order (DRI) Petition No. 76/Rezoning Petition No. 83-6.
8. Gardinier, Inc. shall comply with all applicable new regulations concerning discharge of air emissions from their phosphogypsum storage, as adopted by the USEPA and/or the State of Florida, within a reasonable time after adoption as per Rule 17-4.08, FAC.

Issued this _____ day of _____, 19____

STATE OF FLORIDA DEPARTMENT OF
ENVIRONMENTAL REGULATION

Dale Twachtmann, Secretary

ATTACHMENT 1
(Available Upon Request)

ATTACHMENT 2
(Available Upon Request)

ATTACHMENT 3
(Available Upon Request)

ATTACHMENT 4
(Available Upon Request)