GARDINIER INC.

Post Office Box 3269 ○ Tampa, Florida 33601 ○ Telephone 813-677-9111 ○ TWX 810-876-0648 ○ Telex-52666 ○ Cable-Gardinphos

RUDY J. CABINA
VICE PRESIDENT

DER
MAR 2 1987
BAQM

February 27, 1987

Mr. Clair H. Fancy
Florida Department of
Environmental Regulation
Twin Towers Office Building
2600 Blair Stone Road
Tallahassee, Florida 32301

Subject: Proposed Gardinier Phosphogypsum Storage Area
Air Pollution Source Permit Application

Dear Mr. Fancy:

Attached for filing is an application for a Department Air Pollution Source Construction Permit in connection with the proposed construction and operation of Gardinier's replacement phosphogypsum storage area at our East Tampa Plant.

The filing of this application is a result of the settlement of administrative litigation. By filing this application, Gardinier does not admit in any way that a Department air pollution source permit is required for the construction of the facility and does not waive any rights that it may have to dispute the Department's jurisdiction or authority at any time.

Furthermore, the company has attempted to cooperate with the Department by providing a great deal of technical information in response to requests made by Department staff at preapplication conferences. Our submittal of this information should in no way be construed as an admission on the company's part that the subject matter addressed in the information is material or relevant to the factors that may be considered by the Department in acting upon the permit application.

Responses to the questions raised during the preapplication meeting on February 12, 1987 can be found in Appendix E.

We have also attached our check in the amount of $100.00 in payment of the required fee for processing the permit application.

Should you have any questions, please give me a call.

Sincerely,

Rudy J. Cabina

Rudy J. Cabina
Vice President

RJC:rw
Enclosures
cc: Dr. Richard Garrity, DER
Mr. Roger Stewart, HCEPC
Ms. Julia Costas, Esq.
Mr. Robert L. Rhodes, Jr., Esq.

INDEX

AC 29-131183

STATE OF FLORIDA

DEPARTMENT OF ENVIRONMENTAL REGULATION

TWIN TOWERS OFFICE BUILDING
2600 BLAIR STONE ROAD
TALLAHASSEE, FLORIDA 32301

DER

MAR 2 1987

BAOM

BOB GRAHAM
GOVERNOR

VICTORIA J. TSCHINKEL
SECRETARY

APPLICATION TO OPERATE/CONSTRUCT AIR POLLUTION SOURCES

SOURCE TYPE: Replacement Phosphogypsum Pile [X] New[1] [ ] Existing[1]

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

COMPANY NAME: Gardinier, Inc. COUNTY: Hillsborough

Identify the specific emission point source(s) addressed in this application (i.e. Lime Kiln No. 4 with Venturi Scrubber; Peaking Unit No. 2, Gas Fired) Phosphogypsum Pile

SOURCE LOCATION: Street East of Old U.S. Highway 41 and West of Riverview Drive City Gibsonton

UTM: East ______ North ______

Latitude 27 ° 53 ' 10 "N Longitude 82 ° 22 ' 30 "W

APPLICANT NAME AND TITLE: Rudy J. Cabina, Vice President

APPLICANT ADDRESS: Post Office Box 3269, Tampa, Florida 33601

SECTION I: STATEMENTS BY APPLICANT AND ENGINEER

A. APPLICANT

I am the undersigned owner or authorized representative* of Gardinier, Inc.

I certify that the statements made in this application for a construction permit are true, correct and complete to the best of my knowledge and belief. Further, I agree to maintain and operate the pollution control source and pollution control facilities in such a manner as to comply with the provision of Chapter 403, Florida Statutes, and all the rules and regulations of the department and revisions thereof. I also understand that a permit, if granted by the department, will be non-transferable and I will promptly notify the department upon sale or legal transfer of the permitted establishment.

*Attach letter of authorization

Signed: Rudy J. Cabina

Rudy J. Cabina, Vice President
Name and Title (Please Type)

Date: 2/27/87 Telephone No. 813-677-9111

B. PROFESSIONAL ENGINEER REGISTERED IN FLORIDA (where required by Chapter 471, F.S.)

This is to certify that the engineering features of this pollution control project have been designed/examined by me and found to be in conformity with modern engineering principles applicable to the treatment and disposal of pollutants characterized in the permit application. There is reasonable assurance, in my professional judgment, that

[1] See Florida Administrative Code Rule 17-2.100(57) and (104)

the pollution control facilities, when properly maintained and operated, will discharge an effluent that complies with all applicable statutes of the State of Florida and the rules and regulations of the department. It is also agreed that the undersigned will furnish, if authorized by the owner, the applicant a set of instructions for the proper maintenance and operation of the pollution control facilities and, if applicable, pollution sources.

Signed ______________________

Richard J. Nettles
Name (Please Type)

Gardinier, Inc.
Company Name (Please Type)

Post Office Box 3269, Tampa, Florida 33601
Mailing Address (Please Type)

Florida Registration No. 0029483 Date: 2/27/87 Telephone No. 813-677-9111

SECTION II: GENERAL PROJECT INFORMATION

A. Describe the nature and extent of the project. Refer to pollution control equipment, and expected improvements in source performance as a result of installation. State whether the project will result in full compliance. Attach additional sheet if necessary.

Refer to attached Appendix A

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

Start of Construction June 1987 Completion of Construction December 1989

C. Costs of pollution control system(s): (Note: Show breakdown of estimated costs only for individual components/units of the project serving pollution control purposes. Information on actual costs shall be furnished with the application for operation permit.)

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

DER Construction Permit IC29-53996 Issued 12/5/84 Expires 2/1/88

Hillsborough County Development Order 80-713 Issued 9/30/84

E. Requested permitted equipment operating time: hrs/day 24 ; days/wk 7 ; wks/yr 52 ;

if power plant, hrs/yr N/A ; if seasonal, describe: N/A

F. If this is a new source or major modification, answer the following questions. (Yes or No) Not applicable. Please refer to Appendix B.

1. Is this source in a non-attainment area for a particular pollutant? ______

   a. If yes, has "offset" been applied? ______

   b. If yes, has "Lowest Achievable Emission Rate" been applied? ______

   c. If yes, list non-attainment pollutants. ______

2. Does best available control technology (BACT) apply to this source? If yes, see Section VI. ______

3. Does the State "Prevention of Significant Deterioriation" (PSD) requirement apply to this source? If yes, see Sections VI and VII. ______

4. Do "Standards of Performance for New Stationary Sources" (NSPS) apply to this source? ______

5. Do "National Emission Standards for Hazardous Air Pollutants" (NESHAP) apply to this source? ______

H. Do "Reasonably Available Control Technology" (RACT) requirements apply to this source? ______

   a. If yes, for what pollutants? N/A

   b. If yes, in addition to the information required in this form, any information requested in Rule 17-2.650 must be submitted.

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

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

A. Raw Materials and Chemicals Used in your Process, if applicable:

Description	Contaminants		Utilization Rate - lbs/hr	Relate to Flow Diagram
	Type	% Wt		
Phosphate Rock	Fluoride	3.5	700,000	
Sulfuric Acid	-	-	547,293	
Water	-	-	634,307	

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

1. Total Process Input Rate (lbs/hr): 1,881,600
2. Product Weight (lbs/hr): 1,000,000 (phosphogypsum)

C. Airborne Contaminants Emitted: (Information in this table must be submitted for each emission point, use additional sheets as necessary)

Name of Contaminant	Emission[1]		Allowed[2] Emission Rate per Rule 17-2	Allowable[3] Emission lbs/hr	Potential[4] Emission		Relate to Flow Diagram
	Maximum lbs/hr	Actual T/yr			lbs/yr	T/yr	
Particulate			Reasonable Precautions	N/A			
Fluoride	Unquantifiable		N/A	N/A			
	(Refer to Appendix C)						

[1]See Section V, Item 2.

[2]Reference applicable emission standards and units (e.g. Rule 17-2.600(5)(b)2. Table II, E. (1) - 0.1 pounds per million BTU heat input)

[3]Calculated from operating rate and applicable standard.

[4]Emission, if source operated without control (See Section V, Item 3).

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

Name and Type (Model & Serial No.)	Contaminant	Efficiency	Range of Particles Size Collected (in microns) (If applicable)	Basis for Efficiency (Section V Item 5)
Refer to Appendix D				

E. Fuels N/A

Type (Be Specific)	Consumption*		Maximum Heat Input (MMBTU/hr)
	avg/hr	max./hr	

*Units: Natural Gas--MMCF/hr; Fuel Oils--gallons/hr; Coal, wood, refuse, other--lbs/hr.

Fuel Analysis:

Percent Sulfur: ____________________ Percent Ash: ____________________

Density: ____________________ lbs/gal Typical Percent Nitrogen: ____________________

Heat Capacity: ____________________ BTU/lb ____________________ BTU/gal

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

____

F. If applicable, indicate the percent of fuel used for space heating. N/A

Annual Average ____________________ Maximum ____________________

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

____

____

____

____

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

Stack Height: ____________ ft. Stack Diameter: ____________ ft.

Gas Flow Rate: ________ ACFM ________ DSCFM Gas Exit Temperature: ________ °F.

Water Vapor Content: ____________ % Velocity: ____________ FPS

SECTION IV: INCINERATOR INFORMATION

N/A

Type of Waste	Type O (Plastics)	Type I (Rubbish)	Type II (Refuse)	Type III (Garbage)	Type IV (Patholog-ical)	Type V (Liq.& Gas By-prod.)	Type VI (Solid By-prod.)
Actual lb/hr Inciner-ated							
Uncon-trolled (lbs/hr)							

Description of Waste ____________

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

Approximate Number of Hours of Operation per day ______ day/wk ______ wks/yr. ______

Manufacturer ____________ ______

Date Constructed ____________ Model No. ____________

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

Stack Height: ________ ft. Stack Diamter: ____________ Stack Temp. ________

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

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

Type of pollution control device: [ ] Cyclone [ ] Wet Scrubber [ ] Afterburner

[ ] Other (specify) ____________

Brief description of operating characteristics of control devices:

N/A

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

N/A

NOTE: Items 2, 3, 4, 6, 7, 8, and 10 in Section V must be included where applicable.

SECTION V: SUPPLEMENTAL REQUIREMENTS

Please provide the following supplements where required for this application.

1. Total process input rate and product weight -- show derivation [Rule 17-2.100(127)]

2. To a construction application, attach basis of emission estimate (e.g., design calculations, design drawings, pertinent manufacturer's test data, etc.) and attach proposed methods (e.g., FR Part 60 Methods 1, 2, 3, 4, 5) to show proof of compliance with applicable standards. To an operation application, attach test results or methods used to show proof of compliance. Information provided when applying for an operation permit from a construction permit shall be indicative of the time at which the test was made.

3. Attach basis of potential discharge (e.g., emission factor, that is, AP42 test).

4. With construction permit application, include design details for all air pollution control systems (e.g., for baghouse include cloth to air ratio; for scrubber include cross-section sketch, design pressure drop, etc.)

5. With construction permit application, attach derivation of control device(s) efficiency. Include test or design data. Items 2, 3 and 5 should be consistent: actual emissions = potential (1-efficiency).

6. An 8 1/2" x 11" flow diagram which will, without revealing trade secrets, identify the individual operations and/or processes. Indicate where raw materials enter, where solid and liquid waste exit, where gaseous emissions and/or airborne particles are evolved and where finished products are obtained.

7. An 8 1/2" x 11" plot plan showing the location of the establishment, and points of airborne emissions, in relation to the surrounding area, residences and other permanent structures and roadways (Example: Copy of relevant portion of USGS topographic map).

8. An 8 1/2" x 11" plot plan of facility showing the location of manufacturing processes and outlets for airborne emissions. Relate all flows to the flow diagram.

9. The appropriate application fee in accordance with Rule 17-4.05. The check should be made payable to the Department of Environmental Regulation.

10. With an application for operation permit, attach a Certificate of Completion of Construction indicating that the source was constructed as shown in the construction permit.

SECTION VI: BEST AVAILABLE CONTROL TECHNOLOGY

N/A

A. Are standards of performance for new stationary sources pursuant to 40 C.F.R. Part 60 applicable to the source?

[ ] Yes [X] No

Contaminant	Rate or Concentration

B. Has EPA declared the best available control technology for this class of sources (If yes, attach copy)

[ ] Yes [X] No

Contaminant	Rate or Concentration

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

Contaminant	Rate or Concentration
N/A	

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

1. Control Device/System:
2. Operating Principles:
3. Efficiency:*
4. Capital Costs:

*Explain method of determining

5. Useful Life:

6. Operating Costs:

7. Energy:

8. Maintenance Cost:

9. Emissions:

Contaminant	Rate or Concentration

10. Stack Parameters

a. Height: ft.

b. Diameter: ft.

c. Flow Rate: ACFM

d. Temperature: °F.

e. Velocity: FPS

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

1.

a. Control Device:

b. Operating Principles:

c. Efficiency:[1]

d. Capital Cost:

e. Useful Life:

f. Operating Cost:

g. Energy [2]

h. Maintenance Cost:

i. Availability of construction materials and process chemicals:

j. Applicability to manufacturing processes:

k. Ability to construct with control device, install in available space, and operate within proposed levels:

2.

a. Control Device:

b. Operating Principles:

c. Efficiency:[1]

d. Capital Cost:

e. Useful Life:

f. Operating Cost:

g. Energy:[2]

h. Maintenance Cost:

i. Availability of construction materials and process chemicals:

[1]Explain method of determining efficiency.
[2]Energy to be reported in units of electrical power - KWH design rate.

j. Applicability to manufacturing processes:

k. Ability to construct with control device, install in available space, and operate within proposed levels:

3.

a. Control Device:

b. Operating Principles:

c. Efficiency:[1]

d. Capital Cost:

e. Useful Life:

f. Operating Cost:

g. Energy:[2]

h. Maintenance Cost:

i. Availability of construction materials and process chemicals:

j. Applicability to manufacturing processes:

k. Ability to construct with control device, install in available space, and operate within proposed levels:

4.

a. Control Device:

b. Operating Principles:

c. Efficiency:[1]

d. Capital Costs:

e. Useful Life:

f. Operating Cost:

g. Energy:[2]

h. Maintenance Cost:

i. Availability of construction materials and process chemicals:

j. Applicability to manufacturing processes:

k. Ability to construct with control device, install in available space, and operate within proposed levels:

F. Describe the control technology selected:

1. Control Device:

2. Efficiency:[1]

3. Capital Cost:

4. Useful Life:

5. Operating Cost:

6. Energy:[2]

7. Maintenance Cost:

8. Manufacturer:

9. Other locations where employed on similar processes:

a. (1) Company:

(2) Mailing Address:

(3) City:

(4) State:

[1]Explain method of determining efficiency.
[2]Energy to be reported in units of electrical power - KWH design rate.

(5) Environmental Manager:

(6) Telephone No.:

(7) Emissions:[1]

Contaminant	Rate or Concentration

(8) Process Rate:[1]

b. (1) Company:

(2) Mailing Address:

(3) City: (4) State:

(5) Environmental Manager:

(6) Telephone No.:

(7) Emissions:[1]

Contaminant	Rate or Concentration

(8) Process Rate:[1]

10. Reason for selection and description of systems:

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

SECTION VII - PREVENTION OF SIGNIFICANT DETERIORATION

A. Company Monitored Data N/A

1. __________ no. sites __________ TSP __________ ( ) SO^{2}* __________ Wind spd/di:

Period of Monitoring _____ / _____ / _____ to _____ / _____ / _____
month day year month day year

Other data recorded ____________________

Attach all data or statistical summaries to this application.

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

2. Instrumentation, Field and Laboratory

a. Was instrumentation EPA referenced or its equivalent? [ ] Yes [ ] No

b. Was instrumentation calibrated in accordance with Department procedures?

[ ] Yes [ ] No [ ] Unknown

B. Meteorological Data Used for Air Quality Modeling

1. _____ Year(s) of data from ____/____/____ to ____/____/____
month day year month day year

2. Surface data obtained from (location)________________________

3. Upper air (mixing height) data obtained from (location)________________

4. Stability wind rose (STAR) data obtained from (location)________________

C. Computer Models Used

1. ______________________ Modified? If yes, attach description.

2. ______________________ Modified? If yes, attach description.

3. ______________________ Modified? If yes, attach description.

4. ______________________ Modified? If yes, attach description.

Attach copies of all final model runs showing input data, receptor locations, and principle output tables.

D. Applicants Maximum Allowable Emission Data

Pollutant	Emission Rate	
TSP	______________	grams/sec
SO^2	______________	grams/sec

E. Emission Data Used in Modeling

Attach list of emission sources. Emission data required is source name, description of point source (on NEDS point number), UTM coordinates, stack data, allowable emissions, and normal operating time.

F. Attach all other information supportive to the PSD review.

G. Discuss the social and economic impact of the selected technology versus other applicable technologies (i.e., jobs, payroll, production, taxes, energy, etc.). Include assessment of the environmental impact of the sources.

H. Attach scientific, engineering, and technical material, reports, publications, journals, and other competent relevant information describing the theory and application of the requested best available control technology.

APPENDIX A

General Project Information

Gardinier, Inc., will construct and operate a replacement phosphogypsum field. This facility would be for the purpose of storing phosphogypsum, produced by the operations of the East Tampa Phosphate Chemical Plant (Figure 1).

Gardinier, Inc., and the vast majority of other U.S. wet process phosphoric acid producers, use the dihydrate process. 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 disposal areas as a slurry. Vacuum evaporators are used to separate phosphoric acid from fluosilicic acid and to concentrate the phosphoric acid.

Gardinier, Inc. is currently operating a phosphogypsum disposal field, located directly north of their existing phosphoric acid plant. This disposal field is close to exhausting its designed storage capacity. Once this occurs, Gardinier, Inc., will require additional storage space in order to continue their operations under present conditions.

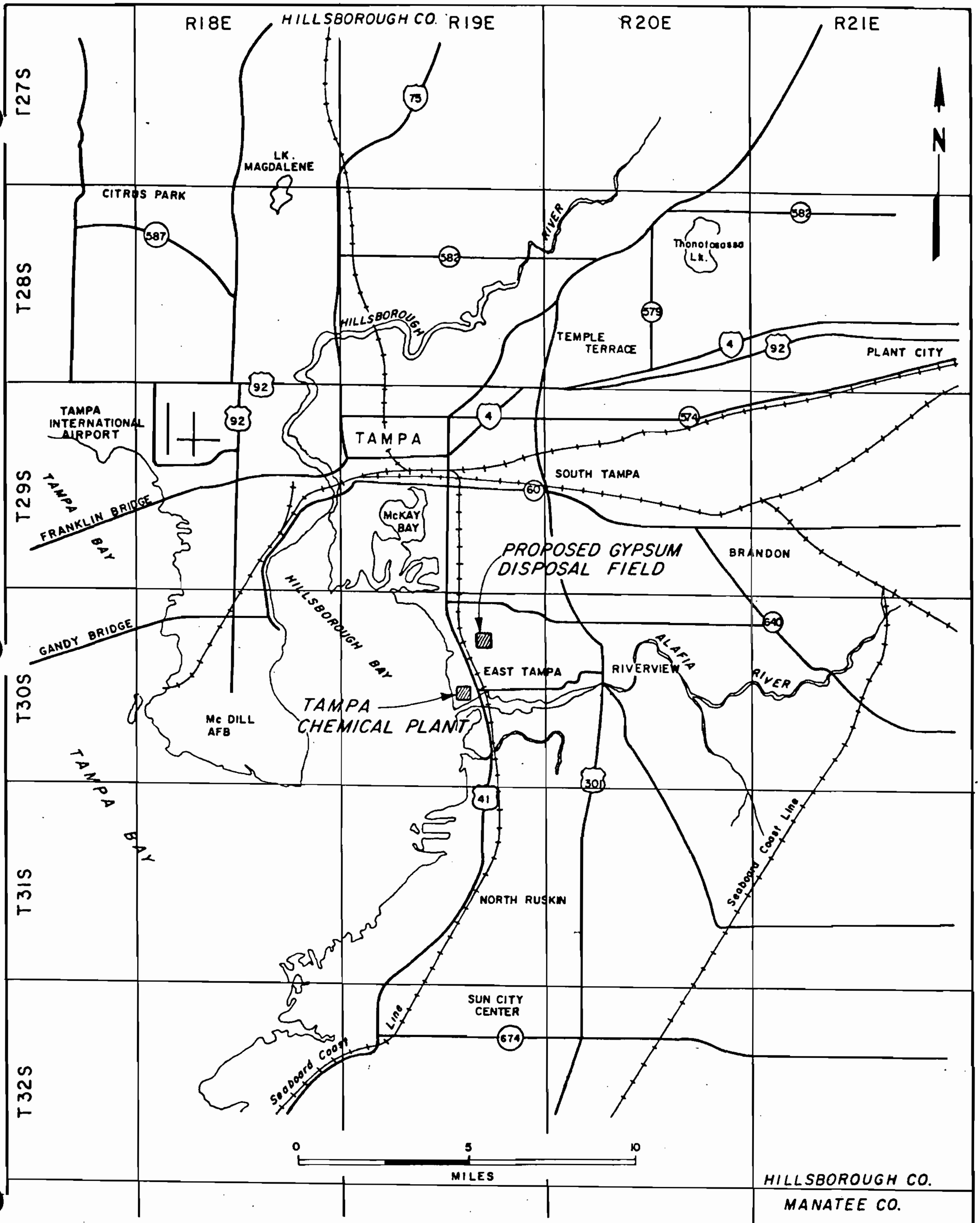

FIG. I
GENERAL LOCATION MAP

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The new phosphogypsum disposal field is expected to come on-line in 1990 and be operational for 40 years, until 2030. The phosphogypsum disposal field site covers 600 acres (Figure 2), of which the phosphogypsum itself will cover approximately 330 acres, and will reach a maximum height of 200 feet. To go beyond a height of 100 feet, Gardinier will be required to get approval from Hillsborough County.

For the initial growth of the phosphogypsum disposal field a starter dike approximately 10 feet high will be required. This dike crest will be at 16 feet above mean sea level (MSL) and will be constructed of compacted on-site silty soils. It will have an outside slope of 3H:1V and will be vegetated to control runoff. The phosphogypsum inside will be deposited by peripheral deposition. The phosphogypsum disposal field will be raised by lifts of 5 to 10 feet.

The phosphogypsum will be hydraulically transported through pipelines to the disposal area as a 30 percent solids slurry, at a rate of approximately 6000 gallons per minute. These pipelines will originate from the plant and will run under U.S. Highway 41 at a point due east of the southern end of the existing phosphogypsum disposal field. Once passing under the highways, the lines would then run on Gardinier, Inc.'s property on the east side of the old U.S. 41 to the southwest corner of the new phosphogypsum disposal field (Figure 2). To cross Archie Creek, a structural steel pipebridge will hold the four phosphogypsum slurry pipes encased within a steel liner pipe. These 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 proposed new phosphogypsum disposal field.

Site planning was directed towartds reducing to a minimum all possible environmental impacts and reducing the impact of the phosphogypsum disposal field on the possible land uses of the adjacent property owners.

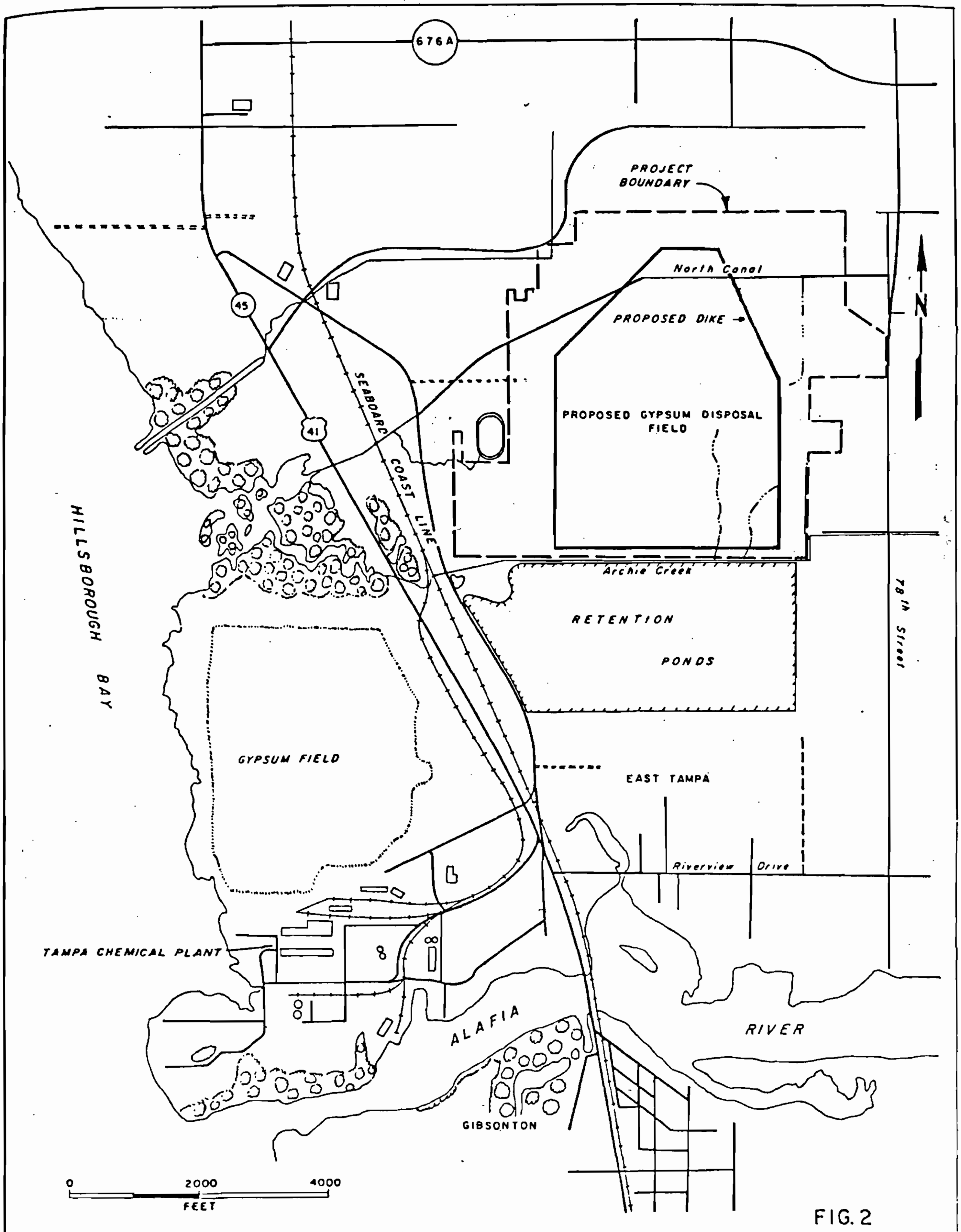

FIG. 2

VICINITY MAP

The design of the phosphogypsum disposal field incorporates state-of-the-art technology, including a liner, a slurry wall, recirculation of transport water, vegetation of the side slopes and controls to preserve the surrounding surface and ground water quality.

Appendix B

The definition of the word modifications as provided under 17-2.100(117) is "any physical change in, or change in the method of operation of, or addition to a stationary facility which increase the actual emissions of any air pollutant regulated under this Chapter, including any not previously emitted, from any source within such facility." The regulations do not provide a definition for major modification as referenced in the application, however, we assume that this refers to a modification of a major facility as the term is used in 17-2.500(2)(d)4 and 17-2.510(2)(d)4. These regulatory provisions limit the applicability or regulatory requirements to modifications resulting in net emission increases. Gardinier is a major facility as defined by 17-2.100(110). The proposed new phosphogypsum field is a modification of the operation of an existing major facility, but the modification will not result in a significant air emission increase.

Gardinier is basically exchanging one phosphogypsum field for another. The existing field will be closed and grassed. Condition No. 39, found in Part IV, Conditions and Limitations, of the Hillsborough County Board of County Commissioners' Development Order for the construction of the new field requires closure of the existing phosphogypsum field within six (6) months of switch-over and de-bugging of the new phosphogypsum disposal field which was permitted by the Department under DER Permit No. IC29-53996A. As requested by Dr. Richard Garrity, Southwest District Manager, Gardinier will apply for a construction permit to close the existing field nine (9) months prior to the actual closure date. A discussion of the emissions comparing the existing phosphogypsum field and the proposed new phosphogypsum field is found in Appendix C.

The proposed field is in a designated non-attainment area for particulate. However, based on the emission analysis of Appendix C, the proposed field will not result in a significant net particulate emission increase and is precluded from the New Source Review (NSR) rules and the provisions of 17-2.510(4). Particulate emissions are governed by the non-attainment rules and the Prevention of Significant Deterioration (PSD) requirements and Best Available Control Technology (BACT) evaluation does not apply.

There will be no significant new increase in emissions of fluoride from the Gardinier facility. Chapter 17-2.500(2)(e)2, FAC, defines a significant net emission increase as three (3) tons per year or more for fluoride. As field-to-field (pile-to-pile) emissions will be approximately the same (refer to the fluoride discussion in Appendix C) there will be no increase in fluoride emissions. The fact that the new field will bot significantly increase fluoride emissions prelcudes this application from NSR by Chapter 17-2.500(2)(d)4, BACT evaluation by 17-2.500(2)(f)(2) and PSD review by Chapter 17-2.500(2)(a)4.a(ii).

APPENDIX C

EMISSION ESTIMATES AND AMBIENT IMPACT ANALYSIS FOR PARTICULATE MATTER

APPENDIX C

EMISSION ESTIMATES AND AMBIENT IMPACT ANALYSIS FOR PARTICULATE MATTER

C.1 FLUORIDE EMISSIONS

C.1.1 Emission Estimates

Fluoride emissions from phosphogypsum fields in large part are influenced by the temperature of the water on their surface. As Gardinier is not increasing plant capacity or process rate, the heat load on the recycle system will not increase. The typical surface area of the pond on the phosphogypsum field and of the recycle system will remain approximately as it has existed in the past. The pond found on the field has an approximate area of 27 acres. As the pond on the new field will be approximately the same size, there will be no change in emissions from old field to new field. Similarities between the two fields are further illustrated in Figures C-1 and C-2.

It must be kept in mind that these are fugitive emissions and their quantification is extremely speculative. Many variables including water temperature and concentrations of calcium, fluorides, silica, aluminum, and iron influence the emission of fluorides. The use of any particular emission factor is hampered by the fact that the variables mentioned above are all varying at the same time.

Attempts to determine fluoride emission factors by various researchers in the past have yielded emission factors ranging from 0.1 lb/acre·day to 10 lb/acre·day. Cross and Ross (1969) found emissions at approximately 0.2 lb/acre·day. Crane et al. (1970) found emissions between 0.5 to 2.5 lb/acre·day depending upon temperature. Work by Tatera (1970) found emissions of about 10 lb/acre·day. Uniform use of any of these factors is speculative and the emissions from the fields should be considered unquantifiable.

From the above discussion, it becomes apparent that the best approach to evaluating fluoride emissions from the phosphogypsum field is that there will be no net significant increase in emissions from the old field to the new field. The old field will not have any ponded liquid on its surface and will be closed and grassed. Emissions from the new field are cancelled by the cessation of emissions from the old field.

C.1.2 References

Crane, G.B., Goodwin, G.R. and Rook, J.H., 1970, Atmospheric emissions from wet process phosphoric acid manufacturing. U.S. Public Health Service, NAPCA Publication No. AP-57.

Cross, F.L. and Ross, R.W., 1969, New developments in fluoride emissions from phosphate processing plants. Journal of the Air Pollution Control Association, Vol. 19, p. 15-17.

Tatera, B.S., 1970, Parameters which influence fluoride emissions from gypsum ponds. Ph.D. Thesis, University of Florida, Gainesville, Florida, Dissertation Abstract No. 3992-B.

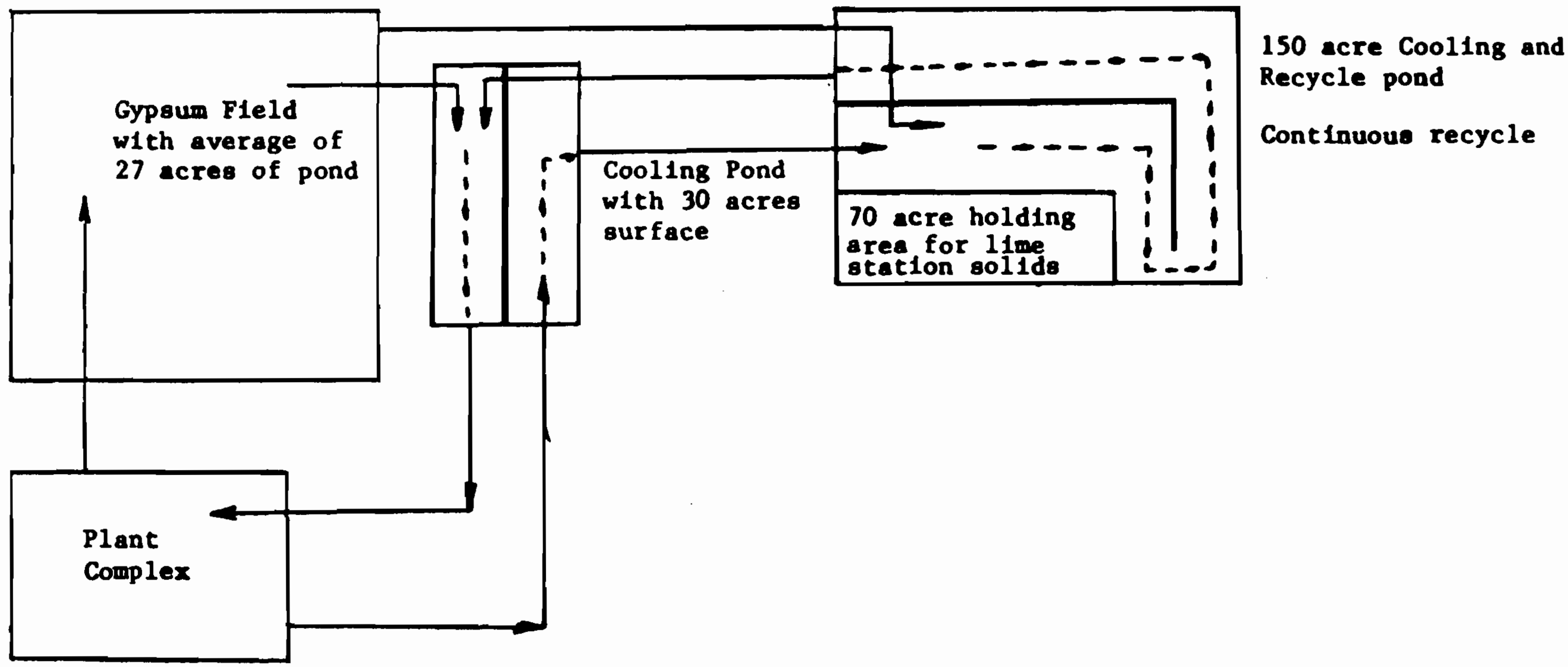

Figure C-1. Existing Pond and Phosphogypsum System

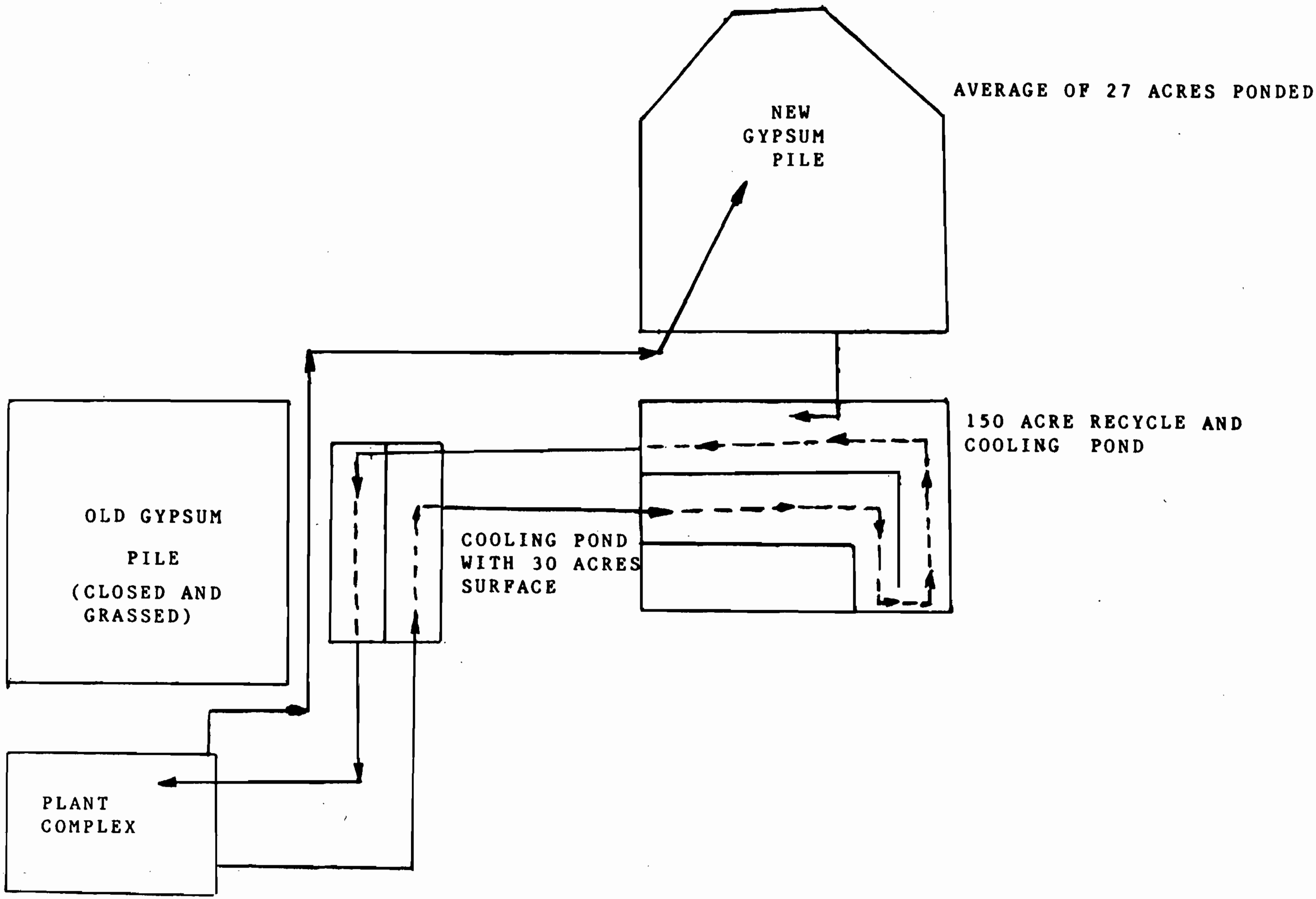

Figure C-2. New Pond and Phosphogypsum System

C.2 MODELING EVALUATION OF PHOSPHOGYPSUM FIELD PARTICULATE EMISSIONS

C.2.1 Introduction

Although phosphogypsum fields are not typically considered significant sources of fugitive dust emissions, minor amounts of phosphogypsum particles may become airborne due to phosphogypsum disposal. This section describes a method for assessing the effects of fugitive dust emissions and presents the results of such an assessment for Gardinier's proposed new phosphogypsum field in Hillsborough County, Florida.

C.2.2 Evaluation Method

The elements of any quantitative air quality analysis consist of a calculation formula or code and appropriate input data. To assess the effects of fugitive gypsum particle emissions from Gardinier's phosphogypsum field, a computerized calculation approach was used with input data specifying emission source characteristics, meteorological conditions, and receptor locations (points at which ambient concentrations are calculated).

C.2.2.1 Computer Code

In selecting a calculation code, the objective was to choose models for computation of both short-term and long-term effects. The models selected were the U.S. Environmental Protection Agency's Industrial Source Complex Short-Term and Long-Term models, ISCST and ISCLT (U.S. Environmental Protection Agency, 1979c). The UNAMAP5 versions of these models were used.

ISCST and ISCLT are capable of calculating fugitive dust emission effects. They can take into account the particle size distribution of emissions from each source, and can treat fugitive dust sources as area sources rather than as point (or stack) sources. Another feature of the ISCST and ISCLT models that was used in this analysis is the feature that allows varying emission rate as a function of wind speed (discussed later).

C.2.2.2 Emission Source Characteristics

Phosphogypsum arrives at the disposal field as a wet slurry, and hence the initial process of adding to the field does not result in fugitive dust emissions. Only after drying begins is there a potential for fugitive dust generation. Although portions of the exposed outer slope of the phosphogypsum field and the roadway on top of the field will occasionally be disturbed by movement of various types of mechanical equipment, wind erosion is the basic force that might cause fugitive emissions over a large area of the field on a frequent enough basis to affect air quality conditions. Therefore, wind erosion was the only potential fugitive dust producer considered in the modeling analysis. Wind erosion is assumed to affect only the outer surface of the field and the roadway on top of the field since the interior of the field will be covered by a pond or in a wetted condition.

The greatest source of uncertainty in a modeling analysis of this type is the assessment of emission rates. Emission factors for fugitive dust sources are often of very questionable reliability even when applied to the type of sources for which they were originally developed. The problem is compounded in this case because a search of standard emission factor publications revealed no factors specific to phosphogypsum fields (U.S. Environmental Protection Agency, 1974, 1977, 1978a, 1978b, 1979a, 1979b, 1985). An emission estimation method that gives some guidance is one developed for wind erosion of exposed agricultural fields (U.S. Environmental Protection Agency, 1974) adapted from a U.S. Department of Agriculture publication (Craig and Turelle, 1964).

Suspension of particles from open land depends on wind speed. Below a certain threshold speed, emissions will not occur. Above the suspension threshold, emissions are likely to vary depending on wind speed, particle size distribution, and the presence of barriers which deflect the wind. At least one study has shown that emission rates will vary over time even at the same wind speed because the particles small enough to be easily suspended at a particular wind speed are quickly removed, and thus the availability of suspendable particles decreases unless there is a process to create more particles in the proper size range (Axetell and Cowherd, 1981). Other factors which affect emission variability include surface roughness, degree of crusting, and surface layer moisture content. For example, high moisture content and surface crusting in phosphogypsum fields probably serve to reduce fugitive dust emissions. Thus, any specific emission rate selected for modeling purposes must be considered as only a rough estimate.

Particulate matter concentration is dependent on the size distribution of emitted particles. This introduces another point of uncertainty because particle size distributions for fugitive sources are seldom known precisely. Particles of most concern, of course, are those which remain suspended long enough to be transported beyond the property boundaries of the emission source. Suspended particles are often defined as those particles with an equivalent aerodynamic diameter of 30 μm or less. Using a particle size distribution for samples from Gardinier's existing gypsum field, the mass fraction of particles in three particle diameter size ranges was estimated. The three ranges selected were 10 μm or less (corresponding to EPA's current definition of inhalable particles), 10-20 μm, and 20-30 μm.

Another input variable that can be considered in the ISCLT and ISCST models is the particle reflection factor. A particle hitting the ground (or other surface) will either remain at the point of impact or bounce back into the atmosphere. To calculate concentration, the degree of reflection for each particle size range evaluated must be specified. Particle reflection factors used in the Gardinier analysis were taken from the ISCST/ISCLT user's manual (U.S. Environmental Protection Agency, 1979c), factors which were developed from Dumbauld et al. (1976).

The new Gardinier phosphogypsum field will occupy a horizontal area of about 326 acres and will ultimately reach a height of 100 to 200 feet. Based on a surface slope of 3 horizontal to 1 vertical and a height of 200 feet, the outer surface of the field will eventually reach an area greater than 100 acres. To estimate fugitive gypsum emission rates due to wind erosion, however, the area of exposed gypsum should be used. As a result of the vegetation program planned for the project, only about 7 feet (vertical dimension) of gypsum should be exposed at any given time. A strip 7 feet high around the entire outer surface of the pile will expose an area of about 8.1 acres initially, diminishing in size as the field tapers to its ultimate height. In addition, there will be a 20-foot wide roadway on top of the field that will have an initial area of about 6.6 acres. The estimated maximum exposed area will therefore be 8.1 + 6.6 acres, or 14.7 acres. Emission rates for modeling purposes were calculated using this maximum exposed area. If average annual emissions were calculated for the life of the field, this average would be less than the maximum based on 14.7 acres of exposed area because the wind erosion factor used for estimating emissions is proportional to area. Areas less than 14.7 acres will produce lower emission rates.

Total particulate matter emissions are estimated to be approximately 2 tons per year per acre using the wind erosion equation (U.S. Environmental Protection Agency, 1974). Emission derivation calculations are shown in Attachment C-1 to Appendix C. For a total area of 14.7 acres, the resultant particulate matter emissions are 29.4 tons per year.

Several points should be considered for better understanding of this number. First, as noted above, average emissions over the life of the field would be less than 29.4 tons per year using this calculation method. Second, as stated in the publication containing this estimation procedure (U.S. Environmental Protection Agency, 1974), the procedure should not be used in determining emission rates for enforcement purposes. It merely provides an approximation, in this case an approximate emission rate for assessing ambient impacts. Third, the wind erosion equation is most applicable to a flat area where emissions from the entire area can be assumed uniform. For an elevated storage area like a phosphogypsum field, emission rates are likely to vary across the field depending on whether a specific part of the field is on the windward or leeward side at any given time. Assuming that the emission rate of 2 tons per year per acre applies to the entire exposed area probably introduces an overprediction effect. Fourth, the wind erosion equation can not adequately account for the crusting on phosphogypsum field surfaces that acts to suppress fugitive dust emissions. Taken together, these points suggest that actual emissions are likely to be less than the emission rate used for modeling purposes. Lower emissions would of course produce lower modeled concentrations than those reported here.

For annual average modeling purposes using the ISCLT model, the phosphogypsum field was divided into 17 equal area squares 200 meters on a side overlying the outer portion of the field where fugitive emissions could originate. Emissions from each of the square areas was assumed equal to the total emission rate of 29.4 tons per year divided by 17, or 1.73 tons per year (ton/yr).

The emission rate required by the ISCLT model for area sources is in units of grams per second per square meter ($g/s{\cdot}m^2$). One way of obtaining a rate in these units would be to divide 1.73 ton/yr by the area of each square (200 m x 200 m) and by the number of seconds in a year. This approach, however, ignores the fact that fugitive dust emissions due to wind erosion do not generally occur below some threshold wind speed level. Although the threshold speed no doubt varies depending on particle size and the condition of the ground surface (moisture content and degree of crusting, for example), a speed greater than 12 miles per hour (or about 10 knots) has been suggested for general use (U.S. Environmental Protection Agency, 1974, 1978b, 1985).

Based on the Tampa meteorological data used for modeling (discussed in Section C.2.2.3), wind speeds in excess of 10 knots occur approximately 17 percent of the time (16.94 percent). The emission rate used for modeling purposes for each square area was therefore 1.73 ton/yr divided by the area of each square and by 16.94 percent of the number of seconds in a year. This emission rate was coupled with the

ISCLT feature that allows specification of emission rate as a function of wind speed. The emission rate calculated as just described was used for wind speeds greater than 10 knots, and an emission rate of zero was used for wind speeds 10 knots and less.

At the request of the Florida Department of Environmental Regulation (DER) to estimate 24-hour concentrations as well as annual average concentrations, the wind erosion emission factor was also used to produce emission rates for short-term modeling. This is a questionable approach because, as stated in the publication describing the wind erosion equation (U.S. Environmental Protection Agency, 1974), the wind erosion estimation procedure is not intended for use in predicting emissions for short time periods. For lack of a better method, however, the wind erosion emission factor was applied for estimation of 24-hour concentrations. Specific emission rates were again based on the frequency of wind speeds greater than 10 knots as described for annual average modeling. As allowed by the ISCST model, emissions for wind speeds less than or equal to 10 knots were set to zero.

Using an entire year of hourly meteorological data, 24-hour concentrations were initially calculated by representing the phosphogypsum field as composed of two large square areas - one for the southern part of the field and one for the northern part. For the worst-case days identified from this initial calculation, additional modeling was carried out using the same 17 equal area squares considered with the ISCLT model. The days considered were those producing the highest concentration at each receptor, plus any other days represented in a list of the 25 highest concentrations regardless of receptor location. A total of 21 days was selected following this procedure.

Another variable that must be specified for modeling calculations is the effective height of emissions release. Previous air quality assessments of the proposed phosphogypsum field focused on impacts over a period of several years. For these assessments an emission height of 20 meters was used, representing approximately the height of the field when the exposed area is at the average value for the life of the field.

For purposes of preparing a permit application, an emission height of 10 meters was considered in addition to a height of 20 meters. The 10-meter height is intended to represent an early stage of development when wind erosion might begin, whereas the 20-meter height again represents more of a long-term average condition. If modeling calculations were made at heights exceeding 20 meters, resulting concentrations would be lower than those reported here.

Table C-1 summarizes emission source characteristics including the particle characteristics used for modeling. Additional emissions input data appear in the computer printouts provided in Attachment C-2 to Appendix C.

C.2.2.3 Meteorological Data

Meteorological input data required for the ISCLT model primarily consist of an annual average joint frequency distribution of wind speed, wind direction, and atmospheric stability class. For the Gardinier analysis, an available data set was used derived from observations at the Tampa International Airport for the year 1970. This data set was obtained from DER.

Application of the ISCST model requires use of hourly meteorological data. The hourly data used were again based on Tampa International Airport observations for the year 1970 and were again obtained from DER.

As discussed previously, dust particles do not generally become suspended due to wind erosion when the wind speed is below a threshold level (taken to be 11 knots as explained in Section C.2.2.2). Therefore, although all meteorological values in the annual average and hourly 1970 Tampa data sets were input to the models, the models were set to produce an emission rate of zero at wind speeds less than 11 knots. Consequently, ambient concentrations greater than zero would be predicted only with wind speeds greater than 10 knots.

To illustrate wind occurrences at the Tampa Airport in 1970, wind roses are presented in Figures C-3 and C-4. Figure C-3 shows the percent frequency of wind direction occurrence with all wind speeds considered. Mean wind speeds by direction are also shown in this figure. Figure C-4 shows the percent frequency of wind direction occurrence for those conditions when wind speeds exceed 10 knots. In both distributions, winds from the east are the most common occurrence.

C.2.2.4 Receptor Points

Several off-site locations (receptor points) were chosen for calculation of ambient particulate matter concentrations. Receptor point locations evaluated in the modeling analysis are shown in Figure C-5.

One group of receptor points was chosen to represent nearby off-site residences and the nearby elementary school, as follows:

1 - Housing near southwest quadrant of field
2 - Housing near southwest quadrant of field
3 - Housing near northwest quadrant of field
4 - Housing near northwest quadrant of field
5 - Housing near northwest quadrant of field
6 - Housing near northwest quadrant of field
7 - Housing near southeast quadrant of field
8 - Housing near southeast quadrant of field
9 - Housing near southeast quadrant of field
10 - Housing near southeast quadrant of field
11 - Housing near southeast quadrant of field
12 - Housing near southeast quadrant of field
13 - Progress Village housing near northeast quadrant of field
14 - Progress Village Elementary School near northeast quadrant of field
15 - Progress Village housing near northeast quadrant of field

The remaining 11 receptors were placed at the Gardinier site property boundary to help identify highest concentrations whether at an inhabited location or not. (For low emission height area sources maximum off-site ambient concentrations will be predicted at the closest off-site locations, that is, at the property boundary.) These receptors combined with the other 15 provide for a determination of highest concentrations with a spacing between receptors of 500 meters or less. For the types and sizes of area sources considered, this receptor grid resolution is sufficiently detailed to determine maximum concentrations - especially for annual average concentrations which are more reliably predicted than short-term concentrations when dealing with fugitive dust sources of this type.

C.2.3 Results

Ambient particulate matter concentration results from both the ISCST and ISCLT models are summarized in Table C-2. The highest predicted annual average concentrations at any receptor from either the ISCST or ISCLT models (both of which can calculate annual concentrations) is 0.9 $\mu g/m^3$ for an emission height of 10 meters and 0.6 $\mu g/m^3$ for an emission height of 20 meters. These concentrations are insignificant based on the DER definition of significant impact being an annual average concentration greater than 1 $\mu g/m^3$ (DER Regulation 17-2.100(170)).

Given the uncertainties of applying the wind erosion equation to an estimation of emissions for short time periods, predicted 24-hour concentrations should be viewed as only a rough indicator of short-term impacts. The highest predicted 24-hour concentration from the ISCST model at an emission height of either 10 or 20 meters is 14 $\mu g/m^3$. This value is less than 10 percent of the Florida 24-hour ambient air quality standard of 150 $\mu g/m^3$. Emissions from the phosphogypsum field are therefore likely to have only a minor impact on short-term concentrations.

All of the predicted long-term and short-term concentrations shown in Table C-2 are highest concentrations based on an array of receptors located near the phosphogypsum field. Predicted concentrations attributable to fugitive emission sources of this type would be even less at greater distances.

C.2.4 References

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TABLE C-1

PHOSPHOGYPSUM FIELD PARTICULATE MATTER
EMISSION SOURCE CHARACTERISTICS
USED FOR MODELING PURPOSES

1. <u>General Characteristics</u>

Emission rate ---------------------------- 2 ton/acre·year

Total area of exposed phosphogypsum ------ 14.7 acres

Emission height -------------------------- 10 meters and 20 meters

2. <u>Particle Characteristics</u>

	Particle Diameter Size Range (μm)		
	Less than 10	10 - 20	20 - 30
Mass Mean Diameter (μm)	6.30	15.54	25.33
Mass Fraction	0.04	0.29	0.67
Particle Density (g/cm^3)	2.35	2.35	2.35
Settling Velocity (m/s)	0.0028	0.017	0.045
Reflection Coefficient (0 = Total retention, 1 = Total reflection)	0.88	0.70	0.60

TABLE C-2

SUMMARY OF PARTICULATE MATTER MODELING RESULTS FOR GARDINIER'S PROPOSED PHOSPHOGYPSUM FIELD

	Maximum Particulate Matter Concentrations (μg/m³)					
	Emission Height=10 meters			Emission Height=20 meters		
Receptor Number[a]	ISCLT Annual Average[b]	ISCST Annual Average[c]	ISCST 24-Hour Average[d]	ISCLT Annual Average[b]	ISCST Annual Average[c]	ISCST 24-Hour Average[d]
1	0.6	0.6	12	0.5	0.5	9
2	0.7	0.6	12	0.5	0.5	8
3	0.7	0.8	8	0.5	0.6	5
4	0.4	0.5	6	0.3	0.4	5
5	0.7	0.9	9	0.5	0.6	6
6	0.5	0.7	6	0.4	0.5	5
7	0.2	0.2	5	0.1	0.1	4
8	0.2	0.2	8	0.2	0.2	7
9	0.3	0.3	9	0.2	0.2	7
10	0.4	0.3	8	0.3	0.3	6
11	0.4	0.3	8	0.3	0.3	6
12	0.3	0.3	6	0.3	0.2	5
13	0.1	0.1	3	0.1	0.1	3
14	0.1	0.1	3	0.1	0.1	2
15	0.1	0.1	3	0.1	0.1	2
16	0.5	0.6	9	0.3	0.4	6
17	0.6	0.1	6	0.3	0.1	4
18	0.2	0.2	5	0.2	0.2	3
19	0.2	0.2	6	0.2	0.2	4
20	0.6	0.4	10	0.4	0.3	6
21	0.6	0.5	10	0.4	0.4	7
22	0.7	0.5	12	0.5	0.4	7
23	0.3	0.3	12	0.3	0.2	9
24	0.5	0.4	14	0.4	0.3	9
25	0.2	0.2	7	0.1	0.1	5
26	0.1	0.1	4	0.1	0.1	3

[a] Refer to Figure C-5 for location of receptor points.
[b] Based on representation of proposed field as 17 area sources.
[c] Based on representation of proposed field as 2 area sources.
[d] Based on representation of proposed field as 2 area sources initially and as 17 area sources for worst-case days.

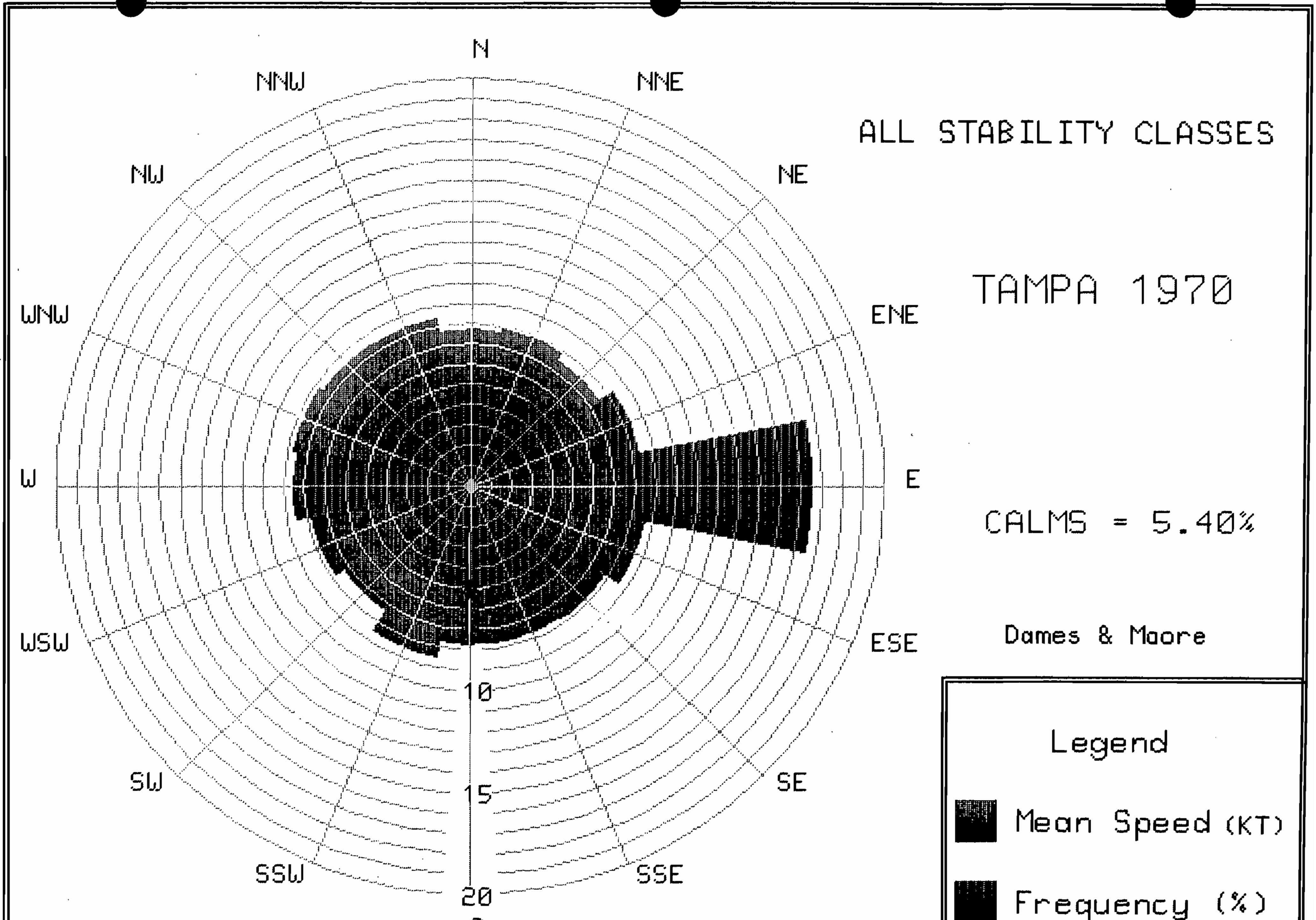
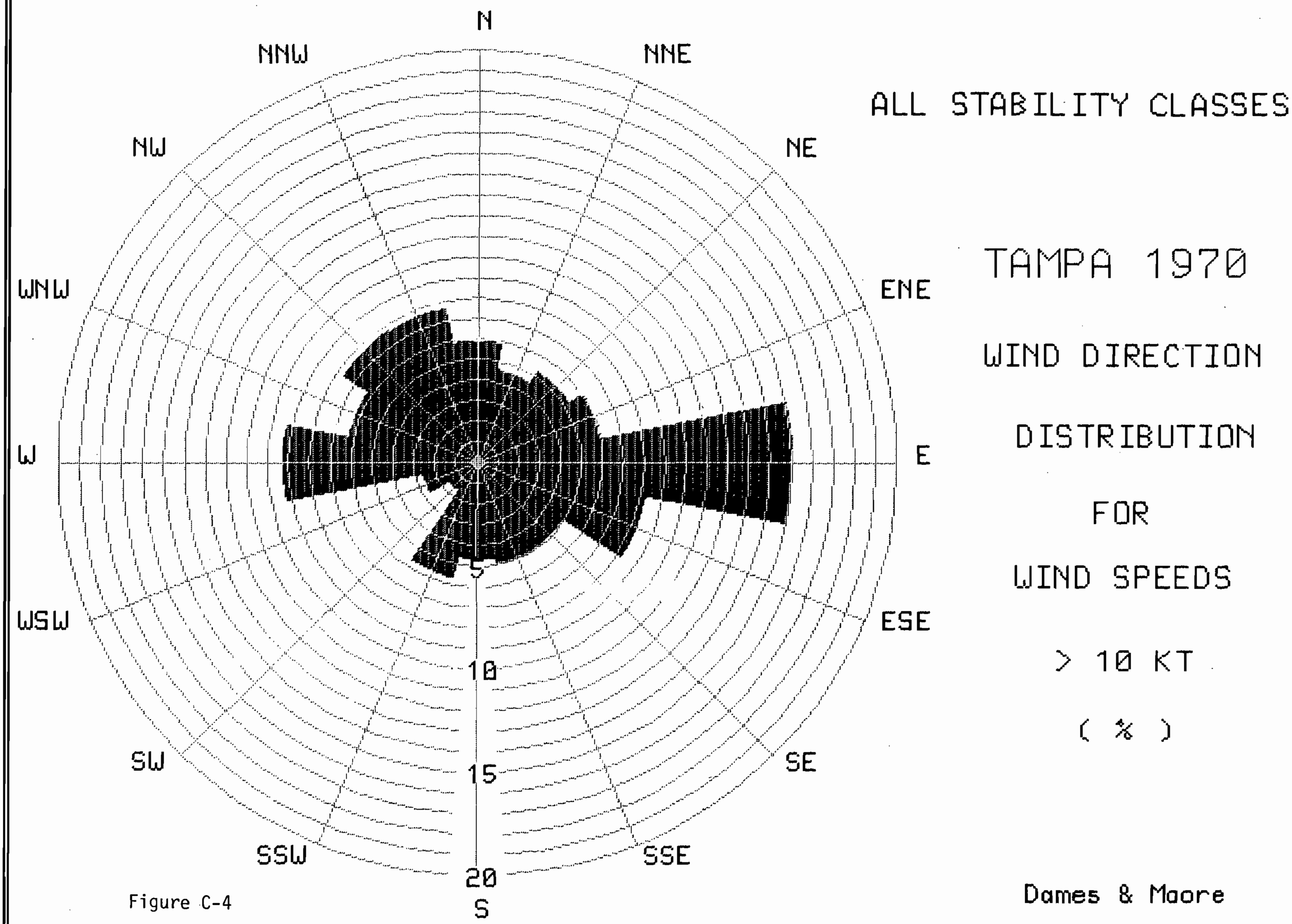


Figure C-3

WIND FREQUENCY DISTRIBUTION



N
NNE
NE
ENE
E
ESE
SE
SSE
S
SSW
SW
WSW
W
WNW
NW
NNW
5
10
15
20
ALL STABILITY CLASSES
TAMPA 1970
WIND DIRECTION
DISTRIBUTION
FOR
WIND SPEEDS
> 10 KT
(%)
Dames & Moore

Figure C-4

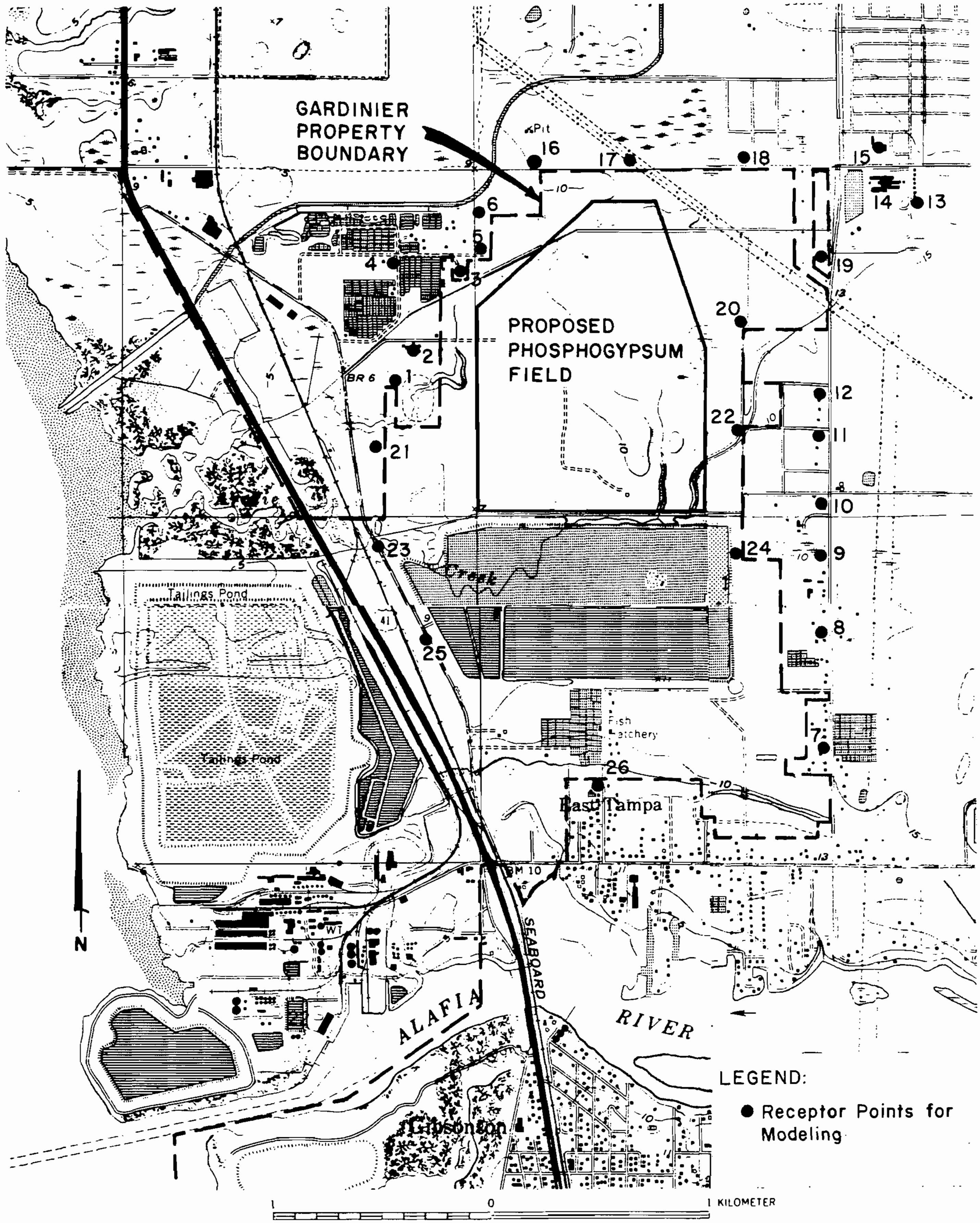


Figure C-5. Receptor Point Locations

C.3 NET CHANGE IN PARTICULATE MATTER EMISSIONS

As discussed in Appendix B, the proposed phosphogypsum field will be a replacement for an existing field and not a new type of emission source. This section discusses the similarities between the old and new fields. It also presents the conclusions that (1) the net change in particulate matter emissions will, if anything, be a decrease in emissions, and (2) the effect of emissions from the new field on the Hillsborough County particulate matter nonattainment area will be essentially the same as the effect of the old field.

C.3.1 Particulate Matter Emission Characteristics

Before comparing the fugitive particulate matter emission characteristics of the old and new phosphogypsum fields, it is important to recall that any emissions from the old field will cease when the new field begins full-time operation. The old field will be closed and grassed and will no longer be a potential source of fugitive particulate emissions. Any emissions from the new field after it becomes operational will therefore be instead of and not in addition to existing phosphogypsum field emissions.

Section C.2 of Appendix C describes the potential for fugitive emissions of particulate matter from the new field due to wind erosion. The factor used to estimate wind erosion emissions from the new field is based on the area of the field that is exposed (that is, not grassed and not covered by water or wetted as within the interior of the field). The maximum exposed area of the new field is estimated to be 14.7 acres (8.1 acres on the external slope plus 6.6 acres of unpaved roadway on the top of the field). By comparison, the exposed area of the existing field for the remainder of its operating lifetime is estimated to be approximately 16 acres (11.7 acres on the external slope plus 4.3 acres of unpaved roadway). Assuming that the wind erosion emission factor is equally applicable to the old and new fields, fugitive particulate matter emissions from the new field would be estimated as slightly less than those from the old field. Therefore, the net change in wind erosion emissions is expected to be, if anything, a decrease.

The assumption of equal applicability of the wind erosion emission factor is supported by the following:

- The same type of material (phosphogypsum) will be stored.
- The particle size distribution, water content, and other characteristics of the stored phosphogypsum will be the same so far as is known.
- The same vegetation cover program now being successfully applied to succeeding levels of the existing field will be applied to the new field.
- The climatic conditions applicable to the existing field should be equally applicable to the new field, including similar wind flow patterns and similar precipitation, humidity, and evaporation conditions.

Also mentioned in Section C.2 is the expected insignificance of fugitive emissions due to vehicle/equipment movements on the new gypsum field. Since even fewer vehicle movements are expected on the new field than on the old field, the net change in fugitive emissions from this source should again, if anything, be in the direction of a decrease in emissions.

C.3.2 Effect on Hillsborough County Nonattainment Area

The location of the Hillsborough County particulate matter nonattainment area and the locations of the old and new phosphogypsum fields are shown in Figure C-6. The two fields are in relatively close proximity and are similarly located with respect to the boundaries of the nonattainment area. Fugitive emissions from the new field - expected to be no greater than and possibly less than emissions from the existing field as discussed above - should have no more adverse effect on the nonattainment area than the existing field. Moreover, based on the annual average concentration modeling results in Section

C.2, the new field taken by itself without regard to compensating emission reductions from the old field is expected to have an insignificant impact on the nonattainment area.

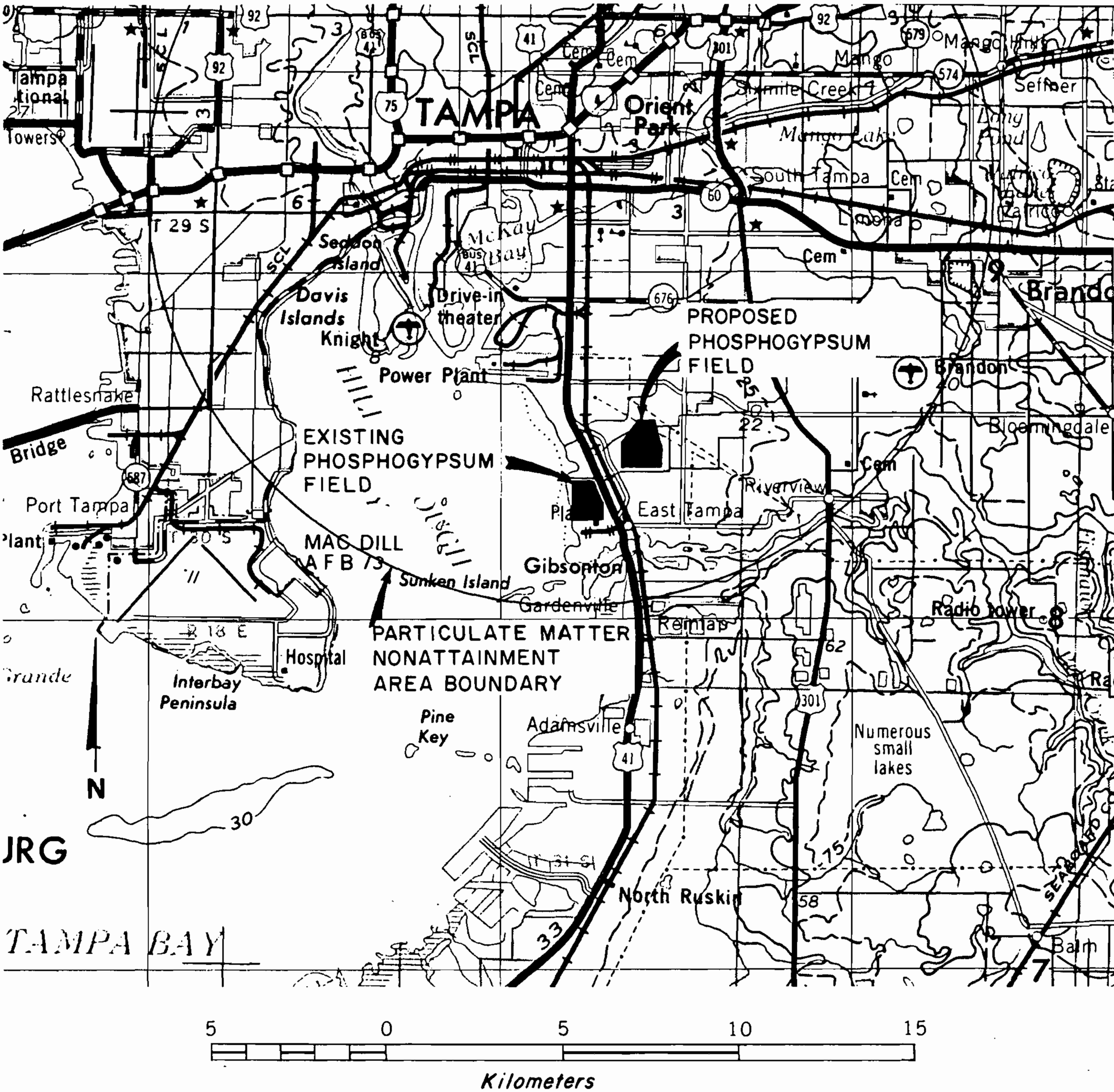


Figure C-6. Location of Gardinier Phosphogypsum Fields and Hillsborough County Particulate Matter Nonattainment Area

ATTACHMENT C-1

CALCULATION OF PARTICULATE MATTER EMISSION RATE FOR WIND EROSION FROM PHOSPHOGYPSUM FIELD

Wind erosion equation (from U.S. Environmental Protection Agency, 1974; see reference list at end of Section C.2):

$E = A \cdot I \cdot K \cdot C \cdot L \cdot V$, where

E = suspended particulate fraction of wind erosion losses from tilled fields, ton/acre·year.

A = portion of total wind erosion losses that would be measured as suspended particulate; reference for wind erosion equation recommends a value of 0.025.

I = soil erodibility in ton/acre·year for a flat, very large, bare field in a climate highly conducive to wind erosion (high wind speeds, high temperature, little precipitation); various rates are given depending on soil type; phosphogypsum assumed to be similar to a silty clay, clay, or sandy loam, all of which have a stated soil erodibility of 86 ton/acre·year.

K = surface roughness factor due to ridges, furrows, and large clods; ranges from 0.5 to 1.0; taken to be 0.5 for phosphogypsum field to account for crusting of phosphogypsum field surface and for field being sloped rather than flat.

C = climatic factor; ranges from 2 to 5 for Tampa area (depending on season of year), based on figures in reference; value of 2 selected for calculation purposes to allow for crusting of phosphogypsum field surface; can also calculate from a formula considering average wind speed and Thornthwaite PE index which also gives a value of approximately 2.

L = unsheltered field width factor; depends on product of I·K and unsheltered field distances; maximum value is 1.0; for distances of 2,000 to 3,000 ft and I·K=43, varies from 0.8 to 0.9; value of 0.9 used for calculation purposes.

V = vegetative cover factor; maximum value of 1.0 used for calculation purposes (that is, no vegetative cover).

Therefore,

$$
\begin{aligned}
E &= (0.025)(86)(0.5)(2)(0.9)(1.0) \\
&= 1.94 \text{ ton/acre·year} \\
&= 2 \text{ ton/acre·year (approximate)}
\end{aligned}
$$

ATTACHMENT C-2

COMPUTER PRINTOUTS FROM PARTICULATE MATTER MODELING ANALYSIS

1. ISCLT Results: Emission Height = 10 meters
2. ISCLT Results: Emission Height = 20 meters
3. ISCST Results: Emission Height = 10 meters; 2 Area Sources; Entire Year of Meteorological Data
4. ISCST Results: Emission Height = 10 meters; 17 Area Sources; Worst-Case Days
5. ISCST Results: Emission Height = 20 meters; 2 Area Sources; Entire Year of Meteorological Data
6. ISCST Results: Emission Height = 20 meters; 17 Area Sources; Worst-Case Days

1. ISCLT Results: Emission Height = 10 meters

ISCLT (VERSION 82341)
AN AIR QUALITY DISPERSION MODEL IN
SECTION 2. NON-GUIDELINE MODELS.
IN UNAMAP (VERSION 5) DEC 82.
SOURCE: FILE 19 ON UNAMAP MAGNETIC TAPE FROM NTIS.

- ISCLT INPUT DATA -

NUMBER OF SOURCES = 17
NUMBER OF X AXIS GRID SYSTEM POINTS = 0
NUMBER OF Y AXIS GRID SYSTEM POINTS = 0
NUMBER OF SPECIAL POINTS = 26
NUMBER OF SEASONS = 1
NUMBER OF WIND SPEED CLASSES = 6
NUMBER OF STABILITY CLASSES = 6
NUMBER OF WIND DIRECTION CLASSES = 16
FILE NUMBER OF DATA FILE USED FOR REPORTS = 1
THE PROGRAM IS RUN IN RURAL MODE
CONCENTRATION (DEPOSITION) UNITS CONVERSION FACTOR =0.10000000E+07
ACCELERATION OF GRAVITY (METERS/SEC**2) = 9.800
HEIGHT OF MEASUREMENT OF WIND SPEED (METERS) = 10.000
ENTRAINMENT PARAMETER FOR UNSTABLE CONDITIONS = 0.600
ENTRAINMENT PARAMETER FOR STABLE CONDITIONS = 0.600
CORRECTION ANGLE FOR GRID SYSTEM VERSUS DIRECTION DATA NORTH (DEGREES) = 0.000
DECAY COEFFICIENT =0.00000000E+00
PROGRAM OPTION SWITCHES = 1, 1, 1, 0, 0, 3, 2, 2, 3, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0,
ALL SOURCES ARE USED TO FORM SOURCE COMBINATION 1
DISTANCE X SPECIAL DISCRETE POINTS (METERS)= 415.00, 475.00, 620.00, 355.00, 790.00, 780.00,
2300.00, 2300.00, 2300.00, 2300.00, 2300.00, 2300.00, 2740.00, 2560.00, 2560.00, 1000.00,
1500.00, 2000.00, 2350.00, 2000.00, 350.00, 2000.00, 350.00, 2000.00, 500.00, 1250.00,
DISTANCE Y SPECIAL DISCRETE POINTS (METERS)= 2230.00, 2415.00, 2690.00, 2780.00, 2840.00, 3050.00,
610.00, 1100.00, 1460.00, 1680.00, 1990.00, 2205.00, 3035.00, 3145.00, 3330.00, 3150.00,
3150.00, 3150.00, 2750.00, 2400.00, 2000.00, 2000.00, 1500.00, 1500.00, 1000.00, 450.00,

- AMBIENT AIR TEMPERATURE (DEGREES KELVIN) -

	STABILITY CATEGORY 1	STABILITY CATEGORY 2	STABILITY CATEGORY 3	STABILITY CATEGORY 4	STABILITY CATEGORY 5	STABILITY CATEGORY 6
SEASON 1	295.0000	295.0000	295.0000	295.0000	295.0000	295.0000

- MIXING LAYER HEIGHT (METERS) -

SEASON 1

	WIND SPEED CATEGORY 1	WIND SPEED CATEGORY 2	WIND SPEED CATEGORY 3	WIND SPEED CATEGORY 4	WIND SPEED CATEGORY 5	WIND SPEED CATEGORY 6
STABILITY CATEGORY 1	0.600000E+03	0.600000E+03	0.600000E+03	0.600000E+03	0.600000E+03	0.600000E+03
STABILITY CATEGORY 2	0.600000E+03	0.600000E+03	0.600000E+03	0.600000E+03	0.600000E+03	0.600000E+03
STABILITY CATEGORY 3	0.600000E+03	0.600000E+03	0.600000E+03	0.600000E+03	0.600000E+03	0.600000E+03
STABILITY CATEGORY 4	0.600000E+03	0.600000E+03	0.600000E+03	0.600000E+03	0.600000E+03	0.600000E+03
STABILITY CATEGORY 5	0.100000E+05	0.100000E+05	0.100000E+05	0.100000E+05	0.100000E+05	0.100000E+05
STABILITY CATEGORY 6	0.100000E+05	0.100000E+05	0.100000E+05	0.100000E+05	0.100000E+05	0.100000E+05

- ISCLT INPUT DATA (CONT.

- FREQUENCY OF OCCURRENCE OF WIND SPEED, DIRECTION AND STABILITY -

SEASON 1

STABILITY CATEGORY 1

DIRECTION (DEGREES)	WIND SPEED CATEGORY 1 (0.7500MPS)	WIND SPEED CATEGORY 2 (2.5000MPS)	WIND SPEED CATEGORY 3 (4.3000MPS)	WIND SPEED CATEGORY 4 (6.8000MPS)	WIND SPEED CATEGORY 5 (9.5000MPS)	WIND SPEED CATEGORY 6 (12.5000MPS)
0.000	0.00003400	0.00011400	0.00000000	0.00000000	0.00000000	0.00000000
22.500	0.00027500	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000
45.000	0.00003400	0.00011400	0.00000000	0.00000000	0.00000000	0.00000000
67.500	0.00003400	0.00011400	0.00000000	0.00000000	0.00000000	0.00000000
90.000	0.00006700	0.00022800	0.00000000	0.00000000	0.00000000	0.00000000
112.500	0.00003400	0.00011400	0.00000000	0.00000000	0.00000000	0.00000000
135.000	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000
157.500	0.00014800	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000
180.000	0.00010100	0.00034200	0.00000000	0.00000000	0.00000000	0.00000000
202.500	0.00003400	0.00011400	0.00000000	0.00000000	0.00000000	0.00000000
225.000	0.00003400	0.00011400	0.00000000	0.00000000	0.00000000	0.00000000
247.500	0.00003400	0.00011400	0.00000000	0.00000000	0.00000000	0.00000000
270.000	0.00003400	0.00011400	0.00000000	0.00000000	0.00000000	0.00000000
292.500	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000
315.000	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000
337.500	0.00003400	0.00011400	0.00000000	0.00000000	0.00000000	0.00000000

SEASON 1

STABILITY CATEGORY 2

DIRECTION (DEGREES)	WIND SPEED CATEGORY 1 (0.7500MPS)	WIND SPEED CATEGORY 2 (2.5000MPS)	WIND SPEED CATEGORY 3 (4.3000MPS)	WIND SPEED CATEGORY 4 (6.8000MPS)	WIND SPEED CATEGORY 5 (9.5000MPS)	WIND SPEED CATEGORY 6 (12.5000MPS)
0.000	0.00051999	0.00136999	0.00069499	0.00000000	0.00000000	0.00000000
22.500	0.00017300	0.00045699	0.00091299	0.00000000	0.00000000	0.00000000
45.000	0.00059899	0.00091299	0.00069499	0.00000000	0.00000000	0.00000000
67.500	0.00075999	0.00125598	0.00125598	0.00000000	0.00000000	0.00000000
90.000	0.00041799	0.00159799	0.00136998	0.00000000	0.00000000	0.00000000
112.500	0.00016600	0.00159799	0.00229297	0.00000000	0.00000000	0.00000000
135.000	0.00053199	0.00148398	0.00273997	0.00000000	0.00000000	0.00000000
157.500	0.00022100	0.00091299	0.00148398	0.00000000	0.00000000	0.00000000
180.000	0.00017700	0.00171198	0.00216897	0.00000000	0.00000000	0.00000000
202.500	0.00024400	0.00114199	0.00309196	0.00000000	0.00000000	0.00000000
225.000	0.00034700	0.00091299	0.00229297	0.00000000	0.00000000	0.00000000
247.500	0.00010600	0.00102699	0.00331096	0.00000000	0.00000000	0.00000000
270.000	0.00095699	0.00194098	0.00650692	0.00000000	0.00000000	0.00000000
292.500	0.00019700	0.00068499	0.00045699	0.00000000	0.00000000	0.00000000
315.000	0.00008300	0.00079899	0.00022800	0.00000000	0.00000000	0.00000000
337.500	0.00009500	0.00091299	0.00057099	0.00000000	0.00000000	0.00000000

- ISCLT INPUT DATA (CONT.

- FREQUENCY OF OCCURRENCE OF WIND SPEED, DIRECTION AND STABILITY -

SEASON 1

STABILITY CATEGORY 3

DIRECTION (DEGREES)	WIND SPEED CATEGORY 1 (0.7500MPS)	WIND SPEED CATEGORY 2 (2.5000MPS)	WIND SPEED CATEGORY 3 (4.3000MPS)	WIND SPEED CATEGORY 4 (6.8000MPS)	WIND SPEED CATEGORY 5 (9.5000MPS)	WIND SPEED CATEGORY 6 (12.5000MPS)
0.000	0.00002700	0.00079899	0.00422395	0.00068499	0.00000000	0.00000000
22.500	0.00014900	0.00091299	0.00365296	0.00045699	0.00000000	0.00000000
45.000	0.00015300	0.00102699	0.00331096	0.00057099	0.00000000	0.00000000
67.500	0.00011200	0.00331096	0.00662092	0.00068499	0.00000000	0.00000000
90.000	0.00041399	0.00525094	0.01472582	0.00194098	0.00000000	0.00000000
112.500	0.00031400	0.00228297	0.00821890	0.00239697	0.00000000	0.00000000
135.000	0.00009300	0.00273997	0.00799090	0.00102699	0.00000000	0.00000000
157.500	0.00006200	0.00182598	0.00799090	0.00091299	0.00000000	0.00000000
180.000	0.00016500	0.00136998	0.00650692	0.00148398	0.00000000	0.00000000
202.500	0.00004300	0.00125598	0.00787690	0.00159798	0.00000000	0.00000000
225.000	0.00015700	0.00114199	0.00547893	0.00022800	0.00000000	0.00000000
247.500	0.00019900	0.00239697	0.00730591	0.00125598	0.00000000	0.00000000
270.000	0.00008900	0.00262597	0.01780778	0.00422395	0.00000000	0.00000000
292.500	0.00013000	0.00034200	0.00205497	0.00114199	0.00000000	0.00000000
315.000	0.00004300	0.00125598	0.00251097	0.00022800	0.00000000	0.00000000
337.500	0.00013400	0.00045699	0.00285396	0.00045699	0.00000000	0.00000000

SEASON 1

STABILITY CATEGORY 4

DIRECTION (DEGREES)	WIND SPEED CATEGORY 1 (0.7500MPS)	WIND SPEED CATEGORY 2 (2.5000MPS)	WIND SPEED CATEGORY 3 (4.3000MPS)	WIND SPEED CATEGORY 4 (6.8000MPS)	WIND SPEED CATEGORY 5 (9.5000MPS)	WIND SPEED CATEGORY 6 (12.5000MPS)
0.000	0.00022000	0.00228297	0.00878989	0.00913189	0.00011400	0.00000000
22.500	0.00028900	0.00114199	0.00924689	0.00719191	0.00011400	0.00000000
45.000	0.00011100	0.00251097	0.01141586	0.00833290	0.00000000	0.00000000
67.500	0.00012100	0.00273997	0.01175786	0.00947488	0.00000000	0.00000000
90.000	0.00079799	0.00730591	0.03162061	0.02305872	0.00045699	0.00000000
112.500	0.00068799	0.00479494	0.01404083	0.01152986	0.00000000	0.00000000
135.000	0.00007500	0.00171198	0.01164386	0.00730591	0.00000000	0.00000000
157.500	0.00022000	0.00228297	0.01130086	0.00719191	0.00022800	0.00000000
180.000	0.00033400	0.00216897	0.01152986	0.00593593	0.00045699	0.00000000
202.500	0.00010600	0.00239697	0.00981688	0.00776290	0.00022800	0.00000000
225.000	0.00033900	0.00228297	0.00570793	0.00239697	0.00000000	0.00000000
247.500	0.00031400	0.00171198	0.00445195	0.00296796	0.00022800	0.00000000
270.000	0.00047299	0.00262597	0.01666679	0.01130086	0.00011400	0.00000000
292.500	0.00008500	0.00194098	0.00741991	0.00741991	0.00182598	0.00011400
315.000	0.00020000	0.00182598	0.01015988	0.01095887	0.00171198	0.00011400
337.500	0.00030900	0.00159798	0.00662092	0.01084487	0.00136998	0.00022800

- ISCLT INPUT DATA (CONT.)

- FREQUENCY OF OCCURRENCE OF WIND SPEED, DIRECTION AND STABILITY -

SEASON 1

STABILITY CATEGORY 5

DIRECTION (DEGREES)	WIND SPEED CATEGORY 1 (0.7500MPS)	WIND SPEED CATEGORY 2 (2.5000MPS)	WIND SPEED CATEGORY 3 (4.3000MPS)	WIND SPEED CATEGORY 4 (6.8000MPS)	WIND SPEED CATEGORY 5 (9.5000MPS)	WIND SPEED CATEGORY 6 (12.5000MPS)
0.000	0.00000000	0.00467994	0.00627892	0.00000000	0.00000000	0.00000000
22.500	0.00000000	0.00273997	0.00559393	0.00000000	0.00000000	0.00000000
45.000	0.00000000	0.00467994	0.00650692	0.00000000	0.00000000	0.00000000
67.500	0.00000000	0.01198585	0.00867589	0.00000000	0.00000000	0.00000000
90.000	0.00000000	0.01940576	0.01723679	0.00000000	0.00000000	0.00000000
112.500	0.00000000	0.01232885	0.00833290	0.00000000	0.00000000	0.00000000
135.000	0.00000000	0.00616392	0.00502294	0.00000000	0.00000000	0.00000000
157.500	0.00000000	0.00650692	0.00308196	0.00000000	0.00000000	0.00000000
180.000	0.00000000	0.00639292	0.00262597	0.00000000	0.00000000	0.00000000
202.500	0.00000000	0.00342496	0.00079899	0.00000000	0.00000000	0.00000000
225.000	0.00000000	0.00376695	0.00125598	0.00000000	0.00000000	0.00000000
247.500	0.00000000	0.00194098	0.00125598	0.00000000	0.00000000	0.00000000
270.000	0.00000000	0.00353896	0.00376695	0.00000000	0.00000000	0.00000000
292.500	0.00000000	0.00376695	0.00216897	0.00000000	0.00000000	0.00000000
315.000	0.00000000	0.00536493	0.00479494	0.00000000	0.00000000	0.00000000
337.500	0.00000000	0.00433795	0.00399495	0.00000000	0.00000000	0.00000000

SEASON 1

STABILITY CATEGORY 6

DIRECTION (DEGREES)	WIND SPEED CATEGORY 1 (0.7500MPS)	WIND SPEED CATEGORY 2 (2.5000MPS)	WIND SPEED CATEGORY 3 (4.3000MPS)	WIND SPEED CATEGORY 4 (6.8000MPS)	WIND SPEED CATEGORY 5 (9.5000MPS)	WIND SPEED CATEGORY 6 (12.5000MPS)
0.000	0.00498894	0.01015988	0.00000000	0.00000000	0.00000000	0.00000000
22.500	0.00389395	0.00513694	0.00000000	0.00000000	0.00000000	0.00000000
45.000	0.00524894	0.01004588	0.00000000	0.00000000	0.00000000	0.00000000
67.500	0.01127686	0.01974876	0.00000000	0.00000000	0.00000000	0.00000000
90.000	0.01755378	0.03299059	0.00000000	0.00000000	0.00000000	0.00000000
112.500	0.00783990	0.01415483	0.00000000	0.00000000	0.00000000	0.00000000
135.000	0.00292996	0.00639292	0.00000000	0.00000000	0.00000000	0.00000000
157.500	0.00394195	0.00741991	0.00000000	0.00000000	0.00000000	0.00000000
180.000	0.00373695	0.00456594	0.00000000	0.00000000	0.00000000	0.00000000
202.500	0.00164998	0.00228297	0.00000000	0.00000000	0.00000000	0.00000000
225.000	0.00126398	0.00194098	0.00000000	0.00000000	0.00000000	0.00000000
247.500	0.00204297	0.00159798	0.00000000	0.00000000	0.00000000	0.00000000
270.000	0.00302796	0.00410995	0.00000000	0.00000000	0.00000000	0.00000000
292.500	0.00317796	0.00570793	0.00000000	0.00000000	0.00000000	0.00000000
315.000	0.00432695	0.00776290	0.00000000	0.00000000	0.00000000	0.00000000
337.500	0.00472094	0.00707791	0.00000000	0.00000000	0.00000000	0.00000000

- ISCLT INPUT DATA (CONT.

- VERTICAL POTENTIAL TEMPERATURE GRADIENT (DEGREES KELVIN/METER) -

	WIND SPEED CATEGORY 1	WIND SPEED CATEGORY 2	WIND SPEED CATEGORY 3	WIND SPEED CATEGORY 4	WIND SPEED CATEGORY 5	WIND SPEED CATEGORY 6
STABILITY CATEGORY 1	0.000000E+00	0.000000E+00	0.000000E+00	0.000000E+00	0.000000E+00	0.000000E+00
STABILITY CATEGORY 2	0.000000E+00	0.000000E+00	0.000000E+00	0.000000E+00	0.000000E+00	0.000000E+00
STABILITY CATEGORY 3	0.000000E+00	0.000000E+00	0.000000E+00	0.000000E+00	0.000000E+00	0.000000E+00
STABILITY CATEGORY 4	0.000000E+00	0.000000E+00	0.000000E+00	0.000000E+00	0.000000E+00	0.000000E+00
STABILITY CATEGORY 5	0.200000E-01	0.200000E-01	0.200000E-01	0.200000E-01	0.200000E-01	0.200000E-01
STABILITY CATEGORY 6	0.350000E-01	0.350000E-01	0.350000E-01	0.350000E-01	0.350000E-01	0.350000E-01

- WIND PROFILE POWER LAW EXPONENTS -

	WIND SPEED CATEGORY 1	WIND SPEED CATEGORY 2	WIND SPEED CATEGORY 3	WIND SPEED CATEGORY 4	WIND SPEED CATEGORY 5	WIND SPEED CATEGORY 6
STABILITY CATEGORY 1	0.100000E+00	0.100000E+00	0.100000E+00	0.100000E+00	0.100000E+00	0.100000E+00
STABILITY CATEGORY 2	0.150000E+00	0.150000E+00	0.150000E+00	0.150000E+00	0.150000E+00	0.150000E+00
STABILITY CATEGORY 3	0.200000E+00	0.200000E+00	0.200000E+00	0.200000E+00	0.200000E+00	0.200000E+00
STABILITY CATEGORY 4	0.250000E+00	0.250000E+00	0.250000E+00	0.250000E+00	0.250000E+00	0.250000E+00
STABILITY CATEGORY 5	0.300000E+00	0.300000E+00	0.300000E+00	0.300000E+00	0.300000E+00	0.300000E+00
STABILITY CATEGORY 6	0.300000E+00	0.300000E+00	0.300000E+00	0.300000E+00	0.300000E+00	0.300000E+00

- SOURCE INPUT DATA -

```
C T SOURCE SOURCE      X           Y        EMISSION  BASE /
A A NUMBER  TYPE  COORDINATE  COORDINATE   HEIGHT   ELEV- /              - SOURCE DETAILS DEPENDING ON TYPE -
R P                  (M)         (M)         (M)     ATION /
D E                                                   (M)  /
----------------------------------------------------------------------------------------------------------------------------
X       1  AREA      750.00     1650.00    10.00     0.00 WIDTH OF AREA (M)=  200.00
                                                                                 - PARTICULATE CATEGORIES -
                                                                                   1      2      3
                                                          FALL VELOCITY (MPS)     0.0028 0.0170 0.0450
                                                          MASS FRACTION           0.0400 0.2900 0.6700
                                                          REFLECTION COEFFICIENT  0.8800 0.7000 0.6000
                                                                 - SOURCE STRENGTHS ( GRAMS PER SEC  PER SQUARE METER        ) -
                                                              SPEED CATEGORY   SEASON 1      SEASON
                                                                      1        0.00000E+00
                                                                      2        0.00000E+00
                                                                      3        0.00000E+00
                                                                      4        7.34400E-06
                                                                      5        7.34400E-06
                                                                      6        7.34400E-06
X       2  AREA     1000.00     1650.00    10.00     0.00 WIDTH OF AREA (M)=  200.00
                                                                                 - PARTICULATE CATEGORIES -
                                                                                   1      2      3
                                                          FALL VELOCITY (MPS)     0.0028 0.0170 0.0450
                                                          MASS FRACTION           0.0400 0.2900 0.6700
                                                          REFLECTION COEFFICIENT  0.8800 0.7000 0.6000
                                                                 - SOURCE STRENGTHS ( GRAMS PER SEC  PER SQUARE METER        ) -
                                                              SPEED CATEGORY   SEASON 1      SEASON
                                                                      1        0.00000E+00
                                                                      2        0.00000E+00
                                                                      3        0.00000E+00
                                                                      4        7.34400E-06
                                                                      5        7.34400E-06
                                                                      6        7.34400E-06
X       3  AREA     1200.00     1650.00    10.00     0.00 WIDTH OF AREA (M)=  200.00
                                                                                 - PARTICULATE CATEGORIES -
                                                                                   1      2      3
                                                          FALL VELOCITY (MPS)     0.0028 0.0170 0.0450
                                                          MASS FRACTION           0.0400 0.2900 0.6700
                                                          REFLECTION COEFFICIENT  0.8800 0.7000 0.6000
                                                                 - SOURCE STRENGTHS ( GRAMS PER SEC  PER SQUARE METER        ) -
                                                              SPEED CATEGORY   SEASON 1      SEASON
                                                                      1        0.00000E+00
                                                                      2        0.00000E+00
                                                                      3        0.00000E+00
                                                                      4        7.34400E-06
                                                                      5        7.34400E-06
                                                                      6        7.34400E-06
```

- SOURCE INPUT DATA (CONT.) -

C A R D	T A P E	SOURCE NUMBER	SOURCE TYPE	X COORDINATE (M)	Y COORDINATE (M)	EMISSION HEIGHT (M)	BASE ELEV-ATION (M)	- SOURCE DETAILS DEPENDING ON TYPE -
X		4	AREA	1400.00	1650.00	10.00	0.00	WIDTH OF AREA (M)= 200.00

- PARTICULATE CATEGORIES -

	1	2	3
FALL VELOCITY (MPS)	0.0028	0.0170	0.0450
MASS FRACTION	0.0400	0.2900	0.6700
REFLECTION COEFFICIENT	0.8800	0.7000	0.6000

- SOURCE STRENGTHS (GRAMS PER SEC PER SQUARE METER) -

SPEED CATEGORY	SEASON 1	SEASON
1	0.00000E+00	
2	0.00000E+00	
3	0.00000E+00	
4	7.34400E-06	
5	7.34400E-06	
6	7.34400E-06	

C A R D	T A P E	SOURCE NUMBER	SOURCE TYPE	X COORDINATE (M)	Y COORDINATE (M)	EMISSION HEIGHT (M)	BASE ELEV-ATION (M)	- SOURCE DETAILS DEPENDING ON TYPE -
X		5	AREA	1600.00	1650.00	10.00	0.00	WIDTH OF AREA (M)= 200.00

- PARTICULATE CATEGORIES -

	1	2	3
FALL VELOCITY (MPS)	0.0028	0.0170	0.0450
MASS FRACTION	0.0400	0.2900	0.6700
REFLECTION COEFFICIENT	0.8800	0.7000	0.6000

- SOURCE STRENGTHS (GRAMS PER SEC PER SQUARE METER) -

SPEED CATEGORY	SEASON 1	SEASON
1	0.00000E+00	
2	0.00000E+00	
3	0.00000E+00	
4	7.34400E-06	
5	7.34400E-06	
6	7.34400E-06	

C A R D	T A P E	SOURCE NUMBER	SOURCE TYPE	X COORDINATE (M)	Y COORDINATE (M)	EMISSION HEIGHT (M)	BASE ELEV-ATION (M)	- SOURCE DETAILS DEPENDING ON TYPE -
X		6	AREA	1600.00	1850.00	10.00	0.00	WIDTH OF AREA (M)= 200.00

- PARTICULATE CATEGORIES -

	1	2	3
FALL VELOCITY (MPS)	0.0028	0.0170	0.0450
MASS FRACTION	0.0400	0.2900	0.6700
REFLECTION COEFFICIENT	0.8800	0.7000	0.6000

- SOURCE STRENGTHS (GRAMS PER SEC PER SQUARE METER) -

SPEED CATEGORY	SEASON 1	SEASON
1	0.00000E+00	
2	0.00000E+00	
3	0.00000E+00	
4	7.34400E-06	
5	7.34400E-06	
6	7.34400E-06	

- SOURCE INPUT DATA (CONT.) -

```
C T SOURCE SOURCE      X            Y       EMISSION  BASE /
A A NUMBER  TYPE  COORDINATE  COORDINATE  HEIGHT  ELEV- /             - SOURCE DETAILS DEPENDING ON TYPE -
R P                  (M)          (M)        (M)    ATION /
D E                                                  (M)  /
---------------------------------------------------------------------------------------------------------------------
X         7  AREA     1600.00     2050.00   10.00     0.00 WIDTH OF AREA (M)=  200.00
                                                                              - PARTICULATE CATEGORIES -
                                                                                  1      2      3
                                                           FALL VELOCITY (MPS)    0.0028 0.0170 0.0450
                                                           MASS FRACTION          0.0400 0.2900 0.6700
                                                           REFLECTION COEFFICIENT 0.8800 0.7000 0.6000
                                                                - SOURCE STRENGTHS ( GRAMS PER SEC  PER SQUARE METER        ) -
                                                               SPEED CATEGORY   SEASON 1      SEASON
                                                                     1         0.00000E+00
                                                                     2         0.00000E+00
                                                                     3         0.00000E+00
                                                                     4         7.34400E-06
                                                                     5         7.34400E-06
                                                                     6         7.34400E-06
X         8  AREA     1600.00     2250.00   10.00     0.00 WIDTH OF AREA (M)=  200.00
                                                                              - PARTICULATE CATEGORIES -
                                                                                  1      2      3
                                                           FALL VELOCITY (MPS)    0.0028 0.0170 0.0450
                                                           MASS FRACTION          0.0400 0.2900 0.6700
                                                           REFLECTION COEFFICIENT 0.8800 0.7000 0.6000
                                                                - SOURCE STRENGTHS ( GRAMS PER SEC  PER SQUARE METER        ) -
                                                               SPEED CATEGORY   SEASON 1      SEASON
                                                                     1         0.00000E+00
                                                                     2         0.00000E+00
                                                                     3         0.00000E+00
                                                                     4         7.34400E-06
                                                                     5         7.34400E-06
                                                                     6         7.34400E-06
X         9  AREA     1550.00     2450.00   10.00     0.00 WIDTH OF AREA (M)=  200.00
                                                                              - PARTICULATE CATEGORIES -
                                                                                  1      2      3
                                                           FALL VELOCITY (MPS)    0.0028 0.0170 0.0450
                                                           MASS FRACTION          0.0400 0.2900 0.6700
                                                           REFLECTION COEFFICIENT 0.8800 0.7000 0.6000
                                                                - SOURCE STRENGTHS ( GRAMS PER SEC  PER SQUARE METER        ) -
                                                               SPEED CATEGORY   SEASON 1      SEASON
                                                                     1         0.00000E+00
                                                                     2         0.00000E+00
                                                                     3         0.00000E+00
                                                                     4         7.34400E-06
                                                                     5         7.34400E-06
                                                                     6         7.34400E-06
```

- SOURCE INPUT DATA (CONT.) -

```
C T SOURCE SOURCE      X            Y        EMISSION  BASE /
A A NUMBER  TYPE  COORDINATE   COORDINATE    HEIGHT   ELEV- /              - SOURCE DETAILS DEPENDING ON TYPE -
R P                  (M)          (M)          (M)    ATION /
D E                                                    (M)  /
---------------------------------------------------------------------------------------------------------------------
X       10  AREA     1500.00      2650.00    10.00     0.00 WIDTH OF AREA (M)=  200.00
                                                                                  - PARTICULATE CATEGORIES -
                                                                                    1      2      3
                                                            FALL VELOCITY (MPS)    0.0028 0.0170 0.0450
                                                            MASS FRACTION          0.0400 0.2900 0.6700
                                                            REFLECTION COEFFICIENT 0.8800 0.7000 0.6000
                                                                  - SOURCE STRENGTHS ( GRAMS PER SEC  PER SQUARE METER        ) -
                                                               SPEED CATEGORY   SEASON 1     SEASON
                                                                    1          0.00000E+00
                                                                    2          0.00000E+00
                                                                    3          0.00000E+00
                                                                    4          7.34400E-06
                                                                    5          7.34400E-06
                                                                    6          7.34400E-06
X       11  AREA     1400.00      2850.00    10.00     0.00 WIDTH OF AREA (M)=  200.00
                                                                                  - PARTICULATE CATEGORIES -
                                                                                    1      2      3
                                                            FALL VELOCITY (MPS)    0.0028 0.0170 0.0450
                                                            MASS FRACTION          0.0400 0.2900 0.6700
                                                            REFLECTION COEFFICIENT 0.8800 0.7000 0.6000
                                                                  - SOURCE STRENGTHS ( GRAMS PER SEC  PER SQUARE METER        ) -
                                                               SPEED CATEGORY   SEASON 1     SEASON
                                                                    1          0.00000E+00
                                                                    2          0.00000E+00
                                                                    3          0.00000E+00
                                                                    4          7.34400E-06
                                                                    5          7.34400E-06
                                                                    6          7.34400E-06
X       12  AREA     1200.00      2850.00    10.00     0.00 WIDTH OF AREA (M)=  200.00
                                                                                  - PARTICULATE CATEGORIES -
                                                                                    1      2      3
                                                            FALL VELOCITY (MPS)    0.0028 0.0170 0.0450
                                                            MASS FRACTION          0.0400 0.2900 0.6700
                                                            REFLECTION COEFFICIENT 0.8800 0.7000 0.6000
                                                                  - SOURCE STRENGTHS ( GRAMS PER SEC  PER SQUARE METER        ) -
                                                               SPEED CATEGORY   SEASON 1     SEASON
                                                                    1          0.00000E+00
                                                                    2          0.00000E+00
                                                                    3          0.00000E+00
                                                                    4          7.34400E-06
                                                                    5          7.34400E-06
                                                                    6          7.34400E-06
```

- SOURCE INPUT DATA (CONT.) -

```
C T SOURCE SOURCE      X           Y       EMISSION  BASE /
A A NUMBER  TYPE  COORDINATE  COORDINATE   HEIGHT   ELEV- /           - SOURCE DETAILS DEPENDING ON TYPE -
R P                   (M)         (M)        (M)    ATION /
D E                                                  (M)  /
-----------------------------------------------------------------------------------------------------------------------------------
X       13  AREA     1000.00     2650.00   10.00     0.00 WIDTH OF AREA (M)=  200.00
                                                                                  - PARTICULATE CATEGORIES -
                                                                                     1      2      3
                                                          FALL VELOCITY (MPS)     0.0028 0.0170 0.0450
                                                          MASS FRACTION           0.0400 0.2700 0.6700
                                                          REFLECTION COEFFICIENT 0.8800 0.7000 0.6000
                                                               - SOURCE STRENGTHS ( GRAMS PER SEC  PER SQUARE METER        ) -
                                                             SPEED CATEGORY   SEASON 1      SEASON
                                                                   1         0.00000E+00
                                                                   2         0.00000E+00
                                                                   3         0.00000E+00
                                                                   4         7.34400E-06
                                                                   5         7.34400E-06
                                                                   6         7.34400E-06
X       14  AREA      800.00     2450.00   10.00     0.00 WIDTH OF AREA (M)=  200.00
                                                                                  - PARTICULATE CATEGORIES -
                                                                                     1      2      3
                                                          FALL VELOCITY (MPS)     0.0028 0.0170 0.0450
                                                          MASS FRACTION           0.0400 0.2700 0.6700
                                                          REFLECTION COEFFICIENT 0.8800 0.7000 0.6000
                                                               - SOURCE STRENGTHS ( GRAMS PER SEC  PER SQUARE METER        ) -
                                                             SPEED CATEGORY   SEASON 1      SEASON
                                                                   1         0.00000E+00
                                                                   2         0.00000E+00
                                                                   3         0.00000E+00
                                                                   4         7.34400E-06
                                                                   5         7.34400E-06
                                                                   6         7.34400E-06
X       15  AREA      750.00     2250.00   10.00     0.00 WIDTH OF AREA (M)=  200.00
                                                                                  - PARTICULATE CATEGORIES -
                                                                                     1      2      3
                                                          FALL VELOCITY (MPS)     0.0028 0.0170 0.0450
                                                          MASS FRACTION           0.0400 0.2700 0.6700
                                                          REFLECTION COEFFICIENT 0.8800 0.7000 0.6000
                                                               - SOURCE STRENGTHS ( GRAMS PER SEC  PER SQUARE METER        ) -
                                                             SPEED CATEGORY   SEASON 1      SEASON
                                                                   1         0.00000E+00
                                                                   2         0.00000E+00
                                                                   3         0.00000E+00
                                                                   4         7.34400E-06
                                                                   5         7.34400E-06
                                                                   6         7.34400E-06
```

- SOURCE INPUT DATA (CONT.) -

CARD	TAPE	SOURCE NUMBER	SOURCE TYPE	X COORDINATE (M)	Y COORDINATE (M)	EMISSION HEIGHT (M)	BASE ELEVATION (M)	- SOURCE DETAILS DEPENDING ON TYPE -
X		16	AREA	750.00	2050.00	10.00	0.00	WIDTH OF AREA (M)= 200.00

- PARTICULATE CATEGORIES -

	1	2	3
FALL VELOCITY (MPS)	0.0028	0.0170	0.0450
MASS FRACTION	0.0400	0.2900	0.6700
REFLECTION COEFFICIENT	0.8800	0.7000	0.6000

- SOURCE STRENGTHS (GRAMS PER SEC PER SQUARE METER) -

SPEED CATEGORY	SEASON 1	SEASON
1	0.00000E+00	
2	0.00000E+00	
3	0.00000E+00	
4	7.34400E-06	
5	7.34400E-06	
6	7.34400E-06	

CARD	TAPE	SOURCE NUMBER	SOURCE TYPE	X COORDINATE (M)	Y COORDINATE (M)	EMISSION HEIGHT (M)	BASE ELEVATION (M)	- SOURCE DETAILS DEPENDING ON TYPE -
X		17	AREA	750.00	1850.00	10.00	0.00	WIDTH OF AREA (M)= 200.00

- PARTICULATE CATEGORIES -

	1	2	3
FALL VELOCITY (MPS)	0.0028	0.0170	0.0450
MASS FRACTION	0.0400	0.2900	0.6700
REFLECTION COEFFICIENT	0.8800	0.7000	0.6000

- SOURCE STRENGTHS (GRAMS PER SEC PER SQUARE METER) -

SPEED CATEGORY	SEASON 1	SEASON
1	0.00000E+00	
2	0.00000E+00	
3	0.00000E+00	
4	7.34400E-06	
5	7.34400E-06	
6	7.34400E-06	

** ANNUAL GROUND LEVEL CONCENTRATION (MICROGRAMS PER CUBIC METER) FROM ALL SOURCES COMBINED **

- DISCRETE RECEPTORS -

X DISTANCE (METERS)	Y DISTANCE (METERS)	CONCENTRATION	X DISTANCE (METERS)	Y DISTANCE (METERS)	CONCENTRATION	X DISTANCE (METERS)	Y DISTANCE (METERS)	CONCENTRATION
415.0	2230.0	0.634983	475.0	2415.0	0.661688	620.0	2690.0	0.676428
355.0	2780.0	0.413797	790.0	2840.0	0.715608	780.0	3050.0	0.478299
2300.0	610.0	0.158699	2300.0	1100.0	0.226506	2300.0	1460.0	0.301550
2300.0	1680.0	0.351804	2300.0	1990.0	0.355762	2300.0	2205.0	0.323209
2740.0	3035.0	0.095854	2560.0	3145.0	0.098007	2560.0	3330.0	0.080192
1000.0	3150.0	0.488669	1500.0	3150.0	0.550264	2000.0	3150.0	0.206550
2350.0	2750.0	0.204727	2000.0	2400.0	0.572193	350.0	2000.0	0.585329
2000.0	2000.0	0.654738	350.0	1500.0	0.338354	2000.0	1500.0	0.502190
500.0	1000.0	0.178461	1250.0	450.0	0.139046			

2. ISCLT Results: Emission Height = 20 meters

ISCLT (VERSION 82341)
AN AIR QUALITY DISPERSION MODEL IN
SECTION 2. NON-GUIDELINE MODELS.
IN UNAMAP (VERSION 5) DEC 82.
SOURCE: FILE 19 ON UNAMAP MAGNETIC TAPE FROM NTIS.

- ISCLT INPUT DATA -

```
NUMBER OF SOURCES =  17
NUMBER OF X AXIS GRID SYSTEM POINTS =     0
NUMBER OF Y AXIS GRID SYSTEM POINTS =     0
NUMBER OF SPECIAL POINTS =   26
NUMBER OF SEASONS =   1
NUMBER OF WIND SPEED CLASSES =   6
NUMBER OF STABILITY CLASSES =   6
NUMBER OF WIND DIRECTION CLASSES =  16
FILE NUMBER OF DATA FILE USED FOR REPORTS =   1
THE PROGRAM IS RUN IN RURAL MODE
CONCENTRATION (DEPOSITION) UNITS CONVERSION FACTOR =0.10000000E+07
ACCELERATION OF GRAVITY (METERS/SEC**2) =  9.800
HEIGHT OF MEASUREMENT OF WIND SPEED (METERS) =  10.000
ENTRAINMENT PARAMETER FOR UNSTABLE CONDITIONS = 0.600
ENTRAINMENT PARAMETER FOR STABLE CONDITIONS = 0.600
CORRECTION ANGLE FOR GRID SYSTEM VERSUS DIRECTION DATA NORTH (DEGREES) =   0.000
DECAY COEFFICIENT =0.00000000E+00
PROGRAM OPTION SWITCHES = 1, 1, 1, 0, 0, 3, 2, 2, 3, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0,
ALL SOURCES ARE USED TO FORM SOURCE COMBINATION  1
DISTANCE X SPECIAL DISCRETE POINTS (METERS )=     415.00,     475.00,     620.00,     355.00,     790.00,     780.00,
    2300.00,    2300.00,    2300.00,    2300.00,    2300.00,    2300.00,    2740.00,    2560.00,    2560.00,    1000.00,
    1500.00,    2000.00,    2350.00,    2000.00,     350.00,    2000.00,     350.00,    2000.00,     500.00,    1250.00,
DISTANCE Y SPECIAL DISCRETE POINTS (METERS )=    2230.00,    2415.00,    2690.00,    2780.00,    2840.00,    3050.00,
     610.00,    1100.00,    1460.00,    1680.00,    1990.00,    2205.00,    3035.00,    3145.00,    3330.00,    3150.00,
    3150.00,    3150.00,    2750.00,    2400.00,    2000.00,    2000.00,    1500.00,    1500.00,    1000.00,     450.00,
```

- AMBIENT AIR TEMPERATURE (DEGREES KELVIN) -

	STABILITY CATEGORY 1	STABILITY CATEGORY 2	STABILITY CATEGORY 3	STABILITY CATEGORY 4	STABILITY CATEGORY 5	STABILITY CATEGORY 6
SEASON 1	295.0000	295.0000	295.0000	295.0000	295.0000	295.0000

- MIXING LAYER HEIGHT (METERS) -

SEASON 1

	WIND SPEED CATEGORY 1	WIND SPEED CATEGORY 2	WIND SPEED CATEGORY 3	WIND SPEED CATEGORY 4	WIND SPEED CATEGORY 5	WIND SPEED CATEGORY 6
STABILITY CATEGORY 1	0.600000E+03	0.600000E+03	0.600000E+03	0.600000E+03	0.600000E+03	0.600000E+03
STABILITY CATEGORY 2	0.600000E+03	0.600000E+03	0.600000E+03	0.600000E+03	0.600000E+03	0.600000E+03
STABILITY CATEGORY 3	0.600000E+03	0.600000E+03	0.600000E+03	0.600000E+03	0.600000E+03	0.600000E+03
STABILITY CATEGORY 4	0.600000E+03	0.600000E+03	0.600000E+03	0.600000E+03	0.600000E+03	0.600000E+03
STABILITY CATEGORY 5	0.100000E+05	0.100000E+05	0.100000E+05	0.100000E+05	0.100000E+05	0.100000E+05
STABILITY CATEGORY 6	0.100000E+05	0.100000E+05	0.100000E+05	0.100000E+05	0.100000E+05	0.100000E+05

- ISCLT INPUT DATA (CONT.) -

- FREQUENCY OF OCCURRENCE OF WIND SPEED, DIRECTION AND STABILITY -

SEASON 1

STABILITY CATEGORY 1

DIRECTION (DEGREES)	WIND SPEED CATEGORY 1 (0.7500MPS)	WIND SPEED CATEGORY 2 (2.5000MPS)	WIND SPEED CATEGORY 3 (4.3000MPS)	WIND SPEED CATEGORY 4 (6.8000MPS)	WIND SPEED CATEGORY 5 (9.5000MPS)	WIND SPEED CATEGORY 6 (12.5000MPS)
0.000	0.00003400	0.00011400	0.00000000	0.00000000	0.00000000	0.00000000
22.500	0.00029500	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000
45.000	0.00003400	0.00011400	0.00000000	0.00000000	0.00000000	0.00000000
67.500	0.00003400	0.00011400	0.00000000	0.00000000	0.00000000	0.00000000
90.000	0.00006700	0.00022800	0.00000000	0.00000000	0.00000000	0.00000000
112.500	0.00003400	0.00011400	0.00000000	0.00000000	0.00000000	0.00000000
135.000	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000
157.500	0.00014800	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000
180.000	0.00010100	0.00034200	0.00000000	0.00000000	0.00000000	0.00000000
202.500	0.00003400	0.00011400	0.00000000	0.00000000	0.00000000	0.00000000
225.000	0.00003400	0.00011400	0.00000000	0.00000000	0.00000000	0.00000000
247.500	0.00003400	0.00011400	0.00000000	0.00000000	0.00000000	0.00000000
270.000	0.00003400	0.00011400	0.00000000	0.00000000	0.00000000	0.00000000
292.500	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000
315.000	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000
337.500	0.00003400	0.00011400	0.00000000	0.00000000	0.00000000	0.00000000

SEASON 1

STABILITY CATEGORY 2

DIRECTION (DEGREES)	WIND SPEED CATEGORY 1 (0.7500MPS)	WIND SPEED CATEGORY 2 (2.5000MPS)	WIND SPEED CATEGORY 3 (4.3000MPS)	WIND SPEED CATEGORY 4 (6.8000MPS)	WIND SPEED CATEGORY 5 (9.5000MPS)	WIND SPEED CATEGORY 6 (12.5000MPS)
0.000	0.00051999	0.00136998	0.00068499	0.00000000	0.00000000	0.00000000
22.500	0.00017300	0.00045699	0.00091299	0.00000000	0.00000000	0.00000000
45.000	0.00059899	0.00091299	0.00068499	0.00000000	0.00000000	0.00000000
67.500	0.00075999	0.00125598	0.00125598	0.00000000	0.00000000	0.00000000
90.000	0.00041799	0.00159798	0.00136998	0.00000000	0.00000000	0.00000000
112.500	0.00016600	0.00159798	0.00228297	0.00000000	0.00000000	0.00000000
135.000	0.00053199	0.00148398	0.00273997	0.00000000	0.00000000	0.00000000
157.500	0.00022100	0.00091299	0.00148398	0.00000000	0.00000000	0.00000000
180.000	0.00017700	0.00171198	0.00216897	0.00000000	0.00000000	0.00000000
202.500	0.00024400	0.00114199	0.00308196	0.00000000	0.00000000	0.00000000
225.000	0.00034700	0.00091299	0.00228297	0.00000000	0.00000000	0.00000000
247.500	0.00010600	0.00102699	0.00331096	0.00000000	0.00000000	0.00000000
270.000	0.00095699	0.00194098	0.00650692	0.00000000	0.00000000	0.00000000
292.500	0.00019700	0.00068499	0.00045699	0.00000000	0.00000000	0.00000000
315.000	0.00008300	0.00079899	0.00022800	0.00000000	0.00000000	0.00000000
337.500	0.00009500	0.00091299	0.00057099	0.00000000	0.00000000	0.00000000

- ISCLT INPUT DATA (CONT.) -

- FREQUENCY OF OCCURRENCE OF WIND SPEED, DIRECTION AND STABILITY -

SEASON 1

STABILITY CATEGORY 3

DIRECTION (DEGREES)	WIND SPEED CATEGORY 1 (0.7500MPS)	WIND SPEED CATEGORY 2 (2.5000MPS)	WIND SPEED CATEGORY 3 (4.3000MPS)	WIND SPEED CATEGORY 4 (6.8000MPS)	WIND SPEED CATEGORY 5 (9.5000MPS)	WIND SPEED CATEGORY 6 (12.5000MPS)
0.000	0.00002700	0.00079899	0.00422395	0.00068499	0.00000000	0.00000000
22.500	0.00014900	0.00091299	0.00365296	0.00045699	0.00000000	0.00000000
45.000	0.00015300	0.00102699	0.00331096	0.00057099	0.00000000	0.00000000
67.500	0.00011200	0.00331096	0.00662092	0.00068499	0.00000000	0.00000000
90.000	0.00041399	0.00525094	0.01472582	0.00194098	0.00000000	0.00000000
112.500	0.00031400	0.00228297	0.00821890	0.00239697	0.00000000	0.00000000
135.000	0.00009300	0.00273997	0.00799090	0.00102699	0.00000000	0.00000000
157.500	0.00006200	0.00182598	0.00799090	0.00091299	0.00000000	0.00000000
180.000	0.00016500	0.00136998	0.00650692	0.00148398	0.00000000	0.00000000
202.500	0.00004300	0.00125598	0.00787690	0.00159798	0.00000000	0.00000000
225.000	0.00015700	0.00114199	0.00547893	0.00022800	0.00000000	0.00000000
247.500	0.00019900	0.00239697	0.00730591	0.00125598	0.00000000	0.00000000
270.000	0.00008900	0.00262597	0.01780778	0.00422395	0.00000000	0.00000000
292.500	0.00013000	0.00034200	0.00205497	0.00114199	0.00000000	0.00000000
315.000	0.00004300	0.00125598	0.00251097	0.00022800	0.00000000	0.00000000
337.500	0.00013400	0.00045699	0.00285396	0.00045699	0.00000000	0.00000000

SEASON 1

STABILITY CATEGORY 4

DIRECTION (DEGREES)	WIND SPEED CATEGORY 1 (0.7500MPS)	WIND SPEED CATEGORY 2 (2.5000MPS)	WIND SPEED CATEGORY 3 (4.3000MPS)	WIND SPEED CATEGORY 4 (6.8000MPS)	WIND SPEED CATEGORY 5 (9.5000MPS)	WIND SPEED CATEGORY 6 (12.5000MPS)
0.000	0.00022000	0.00228297	0.00879989	0.00913189	0.00011400	0.00000000
22.500	0.00028900	0.00114199	0.00924689	0.00719191	0.00011400	0.00000000
45.000	0.00011100	0.00251097	0.01141586	0.00833290	0.00000000	0.00000000
67.500	0.00012100	0.00273997	0.01175786	0.00947488	0.00000000	0.00000000
90.000	0.00079799	0.00730591	0.03162061	0.02305872	0.00045699	0.00000000
112.500	0.00068799	0.00479494	0.01404083	0.01152986	0.00000000	0.00000000
135.000	0.00007500	0.00171198	0.01164386	0.00730591	0.00000000	0.00000000
157.500	0.00022000	0.00228297	0.01130086	0.00719191	0.00022800	0.00000000
180.000	0.00033400	0.00216897	0.01152986	0.00593593	0.00045699	0.00000000
202.500	0.00010600	0.00239697	0.00981688	0.00776290	0.00022800	0.00000000
225.000	0.00033900	0.00228297	0.00570793	0.00239697	0.00000000	0.00000000
247.500	0.00031400	0.00171198	0.00445195	0.00296796	0.00022800	0.00000000
270.000	0.00047299	0.00262597	0.01666679	0.01130086	0.00011400	0.00000000
292.500	0.00008500	0.00194098	0.00741991	0.00741991	0.00182598	0.00011400
315.000	0.00020000	0.00182599	0.01015989	0.01095887	0.00171198	0.00011400
337.500	0.00030900	0.00159798	0.00662092	0.01084487	0.00136998	0.00022800

- ISCLT INPUT DATA (CONT.) -

- FREQUENCY OF OCCURRENCE OF WIND SPEED, DIRECTION AND STABILITY -

SEASON 1

STABILITY CATEGORY 5

DIRECTION (DEGREES)	WIND SPEED CATEGORY 1 (0.7500MPS)	WIND SPEED CATEGORY 2 (2.5000MPS)	WIND SPEED CATEGORY 3 (4.3000MPS)	WIND SPEED CATEGORY 4 (6.8000MPS)	WIND SPEED CATEGORY 5 (9.5000MPS)	WIND SPEED CATEGORY 6 (12.5000MPS)
0.000	0.00000000	0.00467994	0.00627892	0.00000000	0.00000000	0.00000000
22.500	0.00000000	0.00273997	0.00559393	0.00000000	0.00000000	0.00000000
45.000	0.00000000	0.00467994	0.00650692	0.00000000	0.00000000	0.00000000
67.500	0.00000000	0.01198585	0.00867589	0.00000000	0.00000000	0.00000000
90.000	0.00000000	0.01940576	0.01723679	0.00000000	0.00000000	0.00000000
112.500	0.00000000	0.01232885	0.00833290	0.00000000	0.00000000	0.00000000
135.000	0.00000000	0.00616392	0.00502294	0.00000000	0.00000000	0.00000000
157.500	0.00000000	0.00650692	0.00308196	0.00000000	0.00000000	0.00000000
180.000	0.00000000	0.00639292	0.00262597	0.00000000	0.00000000	0.00000000
202.500	0.00000000	0.00342496	0.00079899	0.00000000	0.00000000	0.00000000
225.000	0.00000000	0.00376695	0.00125598	0.00000000	0.00000000	0.00000000
247.500	0.00000000	0.00194098	0.00125598	0.00000000	0.00000000	0.00000000
270.000	0.00000000	0.00353896	0.00376695	0.00000000	0.00000000	0.00000000
292.500	0.00000000	0.00376695	0.00216897	0.00000000	0.00000000	0.00000000
315.000	0.00000000	0.00536493	0.00479494	0.00000000	0.00000000	0.00000000
337.500	0.00000000	0.00433795	0.00399495	0.00000000	0.00000000	0.00000000

SEASON 1

STABILITY CATEGORY 6

DIRECTION (DEGREES)	WIND SPEED CATEGORY 1 (0.7500MPS)	WIND SPEED CATEGORY 2 (2.5000MPS)	WIND SPEED CATEGORY 3 (4.3000MPS)	WIND SPEED CATEGORY 4 (6.8000MPS)	WIND SPEED CATEGORY 5 (9.5000MPS)	WIND SPEED CATEGORY 6 (12.5000MPS)
0.000	0.00498894	0.01015989	0.00000000	0.00000000	0.00000000	0.00000000
22.500	0.00389395	0.00513694	0.00000000	0.00000000	0.00000000	0.00000000
45.000	0.00524894	0.01004588	0.00000000	0.00000000	0.00000000	0.00000000
67.500	0.01127686	0.01974876	0.00000000	0.00000000	0.00000000	0.00000000
90.000	0.01755378	0.03299059	0.00000000	0.00000000	0.00000000	0.00000000
112.500	0.00783990	0.01415483	0.00000000	0.00000000	0.00000000	0.00000000
135.000	0.00292996	0.00639292	0.00000000	0.00000000	0.00000000	0.00000000
157.500	0.00394195	0.00741991	0.00000000	0.00000000	0.00000000	0.00000000
180.000	0.00373695	0.00456594	0.00000000	0.00000000	0.00000000	0.00000000
202.500	0.00164998	0.00228297	0.00000000	0.00000000	0.00000000	0.00000000
225.000	0.00126399	0.00194099	0.00000000	0.00000000	0.00000000	0.00000000
247.500	0.00204297	0.00159799	0.00000000	0.00000000	0.00000000	0.00000000
270.000	0.00302796	0.00410995	0.00000000	0.00000000	0.00000000	0.00000000
292.500	0.00317796	0.00570793	0.00000000	0.00000000	0.00000000	0.00000000
315.000	0.00432695	0.00776290	0.00000000	0.00000000	0.00000000	0.00000000
337.500	0.00472094	0.00707791	0.00000000	0.00000000	0.00000000	0.00000000

- ISCLT INPUT DATA (CONT.)

- VERTICAL POTENTIAL TEMPERATURE GRADIENT (DEGREES KELVIN/METER) -

	WIND SPEED CATEGORY 1	WIND SPEED CATEGORY 2	WIND SPEED CATEGORY 3	WIND SPEED CATEGORY 4	WIND SPEED CATEGORY 5	WIND SPEED CATEGORY 6
STABILITY CATEGORY 1	0.000000E+00	0.000000E+00	0.000000E+00	0.000000E+00	0.000000E+00	0.000000E+00
STABILITY CATEGORY 2	0.000000E+00	0.000000E+00	0.000000E+00	0.000000E+00	0.000000E+00	0.000000E+00
STABILITY CATEGORY 3	0.000000E+00	0.000000E+00	0.000000E+00	0.000000E+00	0.000000E+00	0.000000E+00
STABILITY CATEGORY 4	0.000000E+00	0.000000E+00	0.000000E+00	0.000000E+00	0.000000E+00	0.000000E+00
STABILITY CATEGORY 5	0.200000E-01	0.200000E-01	0.200000E-01	0.200000E-01	0.200000E-01	0.200000E-01
STABILITY CATEGORY 6	0.350000E-01	0.350000E-01	0.350000E-01	0.350000E-01	0.350000E-01	0.350000E-01

- WIND PROFILE POWER LAW EXPONENTS -

	WIND SPEED CATEGORY 1	WIND SPEED CATEGORY 2	WIND SPEED CATEGORY 3	WIND SPEED CATEGORY 4	WIND SPEED CATEGORY 5	WIND SPEED CATEGORY 6
STABILITY CATEGORY 1	0.100000E+00	0.100000E+00	0.100000E+00	0.100000E+00	0.100000E+00	0.100000E+00
STABILITY CATEGORY 2	0.150000E+00	0.150000E+00	0.150000E+00	0.150000E+00	0.150000E+00	0.150000E+00
STABILITY CATEGORY 3	0.200000E+00	0.200000E+00	0.200000E+00	0.200000E+00	0.200000E+00	0.200000E+00
STABILITY CATEGORY 4	0.250000E+00	0.250000E+00	0.250000E+00	0.250000E+00	0.250000E+00	0.250000E+00
STABILITY CATEGORY 5	0.300000E+00	0.300000E+00	0.300000E+00	0.300000E+00	0.300000E+00	0.300000E+00
STABILITY CATEGORY 6	0.300000E+00	0.300000E+00	0.300000E+00	0.300000E+00	0.300000E+00	0.300000E+00

- SOURCE INPUT DATA -

```
C T SOURCE SOURCE      X            Y       EMISSION  BASE /
A A NUMBER  TYPE  COORDINATE  COORDINATE  HEIGHT  ELEV- /             - SOURCE DETAILS DEPENDING ON TYPE -
R P                  (M)         (M)        (M)   ATION /
D E                                                (M)  /
-------------------------------------------------------------------------------------------------------------------------------
X        1  AREA      750.00     1650.00  20.00     0.00 WIDTH OF AREA (M)=  200.00
                                                                         - PARTICULATE CATEGORIES -
                                                                             1       2       3
                                                     FALL VELOCITY (MPS)    0.0028 0.0170 0.0450
                                                     MASS FRACTION          0.0400 0.2900 0.6700
                                                     REFLECTION COEFFICIENT 0.8800 0.7000 0.6000
                                                           - SOURCE STRENGTHS ( GRAMS PER SEC  PER SQUARE METER        ) -
                                                         SPEED CATEGORY   SEASON 1      SEASON
                                                                1       0.00000E+00
                                                                2       0.00000E+00
                                                                3       0.00000E+00
                                                                4       7.34400E-06
                                                                5       7.34400E-06
                                                                6       7.34400E-06
X        2  AREA     1000.00     1650.00  20.00     0.00 WIDTH OF AREA (M)=  200.00
                                                                         - PARTICULATE CATEGORIES -
                                                                             1       2       3
                                                     FALL VELOCITY (MPS)    0.0028 0.0170 0.0450
                                                     MASS FRACTION          0.0400 0.2900 0.6700
                                                     REFLECTION COEFFICIENT 0.8800 0.7000 0.6000
                                                           - SOURCE STRENGTHS ( GRAMS PER SEC  PER SQUARE METER        ) -
                                                         SPEED CATEGORY   SEASON 1      SEASON
                                                                1       0.00000E+00
                                                                2       0.00000E+00
                                                                3       0.00000E+00
                                                                4       7.34400E-06
                                                                5       7.34400E-06
                                                                6       7.34400E-06
X        3  AREA     1200.00     1650.00  20.00     0.00 WIDTH OF AREA (M)=  200.00
                                                                         - PARTICULATE CATEGORIES -
                                                                             1       2       3
                                                     FALL VELOCITY (MPS)    0.0028 0.0170 0.0450
                                                     MASS FRACTION          0.0400 0.2900 0.6700
                                                     REFLECTION COEFFICIENT 0.8800 0.7000 0.6000
                                                           - SOURCE STRENGTHS ( GRAMS PER SEC  PER SQUARE METER        ) -
                                                         SPEED CATEGORY   SEASON 1      SEASON
                                                                1       0.00000E+00
                                                                2       0.00000E+00
                                                                3       0.00000E+00
                                                                4       7.34400E-06
                                                                5       7.34400E-06
                                                                6       7.34400E-06
```

- SOURCE INPUT DAT.. (CONT.) -

```
C T SOURCE SOURCE      X           Y       EMISSION  BASE /
A A NUMBER  TYPE  COORDINATE  COORDINATE   HEIGHT   ELEV- /                    - SOURCE DETAILS DEPENDING ON TYPE -
R P                   (M)         (M)        (M)    ATION /
D E                                                   (M) /
-------------------------------------------------------------------------------------------------------------------------------
X        4  AREA      1400.00     1650.00   20.00     0.00 WIDTH OF AREA (M)=  200.00
                                                                                  - PARTICULATE CATEGORIES -
                                                                                     1       2       3
                                                           FALL VELOCITY (MPS)    0.0028  0.0170  0.0450
                                                           MASS FRACTION          0.0400  0.2900  0.6700
                                                           REFLECTION COEFFICIENT 0.8800  0.7000  0.6000
                                                                 - SOURCE STRENGTHS ( GRAMS PER SEC  PER SQUARE METER          ) -
                                                               SPEED CATEGORY   SEASON 1      SEASON
                                                                     1         0.00000E+00
                                                                     2         0.00000E+00
                                                                     3         0.00000E+00
                                                                     4         7.34400E-06
                                                                     5         7.34400E-06
                                                                     6         7.34400E-06
X        5  AREA      1600.00     1650.00   20.00     0.00 WIDTH OF AREA (M)=  200.00
                                                                                  - PARTICULATE CATEGORIES -
                                                                                     1       2       3
                                                           FALL VELOCITY (MPS)    0.0028  0.0170  0.0450
                                                           MASS FRACTION          0.0400  0.2900  0.6700
                                                           REFLECTION COEFFICIENT 0.8800  0.7000  0.6000
                                                                 - SOURCE STRENGTHS ( GRAMS PER SEC  PER SQUARE METER          ) -
                                                               SPEED CATEGORY   SEASON 1      SEASON
                                                                     1         0.00000E+00
                                                                     2         0.00000E+00
                                                                     3         0.00000E+00
                                                                     4         7.34400E-06
                                                                     5         7.34400E-06
                                                                     6         7.34400E-06
X        6  AREA      1600.00     1850.00   20.00     0.00 WIDTH OF AREA (M)=  200.00
                                                                                  - PARTICULATE CATEGORIES -
                                                                                     1       2       3
                                                           FALL VELOCITY (MPS)    0.0028  0.0170  0.0450
                                                           MASS FRACTION          0.0400  0.2900  0.6700
                                                           REFLECTION COEFFICIENT 0.8800  0.7000  0.6000
                                                                 - SOURCE STRENGTHS ( GRAMS PER SEC  PER SQUARE METER          ) -
                                                               SPEED CATEGORY   SEASON 1      SEASON
                                                                     1         0.00000E+00
                                                                     2         0.00000E+00
                                                                     3         0.00000E+00
                                                                     4         7.34400E-06
                                                                     5         7.34400E-06
                                                                     6         7.34400E-06
```

```
                                        - SOURCE INPUT DATA (CONT.) -

C T SOURCE SOURCE      X          Y       EMISSION  BASE /
A A NUMBER  TYPE  COORDINATE COORDINATE  HEIGHT   ELEV- /                - SOURCE DETAILS DEPENDING ON TYPE -
R P                   (M)        (M)        (M)   ATION /
D E                                                 (M) /
------------------------------------------------------------------------------------------------------------------------------------
X       7  AREA     1600.00    2050.00   20.00    0.00 WIDTH OF AREA (M)=  200.00
                                                                          - PARTICULATE CATEGORIES -
                                                                              1        2        3
                                                       FALL VELOCITY (MPS)    0.0028 0.0170 0.0450
                                                       MASS FRACTION          0.0400 0.2900 0.6700
                                                       REFLECTION COEFFICIENT 0.8800 0.7000 0.6000
                                                             - SOURCE STRENGTHS ( GRAMS PER SEC   PER SQUARE METER         ) -
                                                          SPEED CATEGORY    SEASON 1      SEASON
                                                                 1         0.00000E+00
                                                                 2         0.00000E+00
                                                                 3         0.00000E+00
                                                                 4         7.34400E-06
                                                                 5         7.34400E-06
                                                                 6         7.34400E-06
X       8  AREA     1600.00    2250.00   20.00    0.00 WIDTH OF AREA (M)=  200.00
                                                                          - PARTICULATE CATEGORIES -
                                                                              1        2        3
                                                       FALL VELOCITY (MPS)    0.0028 0.0170 0.0450
                                                       MASS FRACTION          0.0400 0.2900 0.6700
                                                       REFLECTION COEFFICIENT 0.8800 0.7000 0.6000
                                                             - SOURCE STRENGTHS ( GRAMS PER SEC   PER SQUARE METER         ) -
                                                          SPEED CATEGORY    SEASON 1      SEASON
                                                                 1         0.00000E+00
                                                                 2         0.00000E+00
                                                                 3         0.00000E+00
                                                                 4         7.34400E-06
                                                                 5         7.34400E-06
                                                                 6         7.34400E-06
X       9  AREA     1550.00    2450.00   20.00    0.00 WIDTH OF AREA (M)=  200.00
                                                                          - PARTICULATE CATEGORIES -
                                                                              1        2        3
                                                       FALL VELOCITY (MPS)    0.0028 0.0170 0.0450
                                                       MASS FRACTION          0.0400 0.2900 0.6700
                                                       REFLECTION COEFFICIENT 0.8800 0.7000 0.6000
                                                             - SOURCE STRENGTHS ( GRAMS PER SEC   PER SQUARE METER         ) -
                                                          SPEED CATEGORY    SEASON 1      SEASON
                                                                 1         0.00000E+00
                                                                 2         0.00000E+00
                                                                 3         0.00000E+00
                                                                 4         7.34400E-06
                                                                 5         7.34400E-06
                                                                 6         7.34400E-06
```

- SOURCE INPUT DATA (CONT.) -

```
C T SOURCE SOURCE      X            Y       EMISSION  BASE /
A A NUMBER  TYPE  COORDINATE   COORDINATE   HEIGHT   ELEV- /          - SOURCE DETAILS DEPENDING ON TYPE -
R P                   (M)          (M)        (M)    ATION /
D E                                                   (M)  /
---------------------------------------------------------------------------------------------------------------------
X       10  AREA     1500.00      2650.00   20.00     0.00 WIDTH OF AREA (M)=  200.00
                                                                              - PARTICULATE CATEGORIES -
                                                                                 1      2      3
                                                           FALL VELOCITY (MPS)    0.0028 0.0170 0.0450
                                                           MASS FRACTION          0.0400 0.2900 0.6700
                                                           REFLECTION COEFFICIENT 0.8800 0.7000 0.6000
                                                                 - SOURCE STRENGTHS ( GRAMS PER SEC  PER SQUARE METER        ) -
                                                               SPEED CATEGORY   SEASON 1      SEASON
                                                                     1         0.00000E+00
                                                                     2         0.00000E+00
                                                                     3         0.00000E+00
                                                                     4         7.34400E-06
                                                                     5         7.34400E-06
                                                                     6         7.34400E-06
X       11  AREA     1400.00      2850.00   20.00     0.00 WIDTH OF AREA (M)=  200.00
                                                                              - PARTICULATE CATEGORIES -
                                                                                 1      2      3
                                                           FALL VELOCITY (MPS)    0.0028 0.0170 0.0450
                                                           MASS FRACTION          0.0400 0.2900 0.6700
                                                           REFLECTION COEFFICIENT 0.8800 0.7000 0.6000
                                                                 - SOURCE STRENGTHS ( GRAMS PER SEC  PER SQUARE METER        ) -
                                                               SPEED CATEGORY   SEASON 1      SEASON
                                                                     1         0.00000E+00
                                                                     2         0.00000E+00
                                                                     3         0.00000E+00
                                                                     4         7.34400E-06
                                                                     5         7.34400E-06
                                                                     6         7.34400E-06
X       12  AREA     1200.00      2850.00   20.00     0.00 WIDTH OF AREA (M)=  200.00
                                                                              - PARTICULATE CATEGORIES -
                                                                                 1      2      3
                                                           FALL VELOCITY (MPS)    0.0028 0.0170 0.0450
                                                           MASS FRACTION          0.0400 0.2900 0.6700
                                                           REFLECTION COEFFICIENT 0.8800 0.7000 0.6000
                                                                 - SOURCE STRENGTHS ( GRAMS PER SEC  PER SQUARE METER        ) -
                                                               SPEED CATEGORY   SEASON 1      SEASON
                                                                     1         0.00000E+00
                                                                     2         0.00000E+00
                                                                     3         0.00000E+00
                                                                     4         7.34400E-06
                                                                     5         7.34400E-06
                                                                     6         7.34400E-06
```

- SOURCE INPUT DATA (CONT.) -

```
C T SOURCE SOURCE      X           Y       EMISSION  BASE /
A A NUMBER  TYPE  COORDINATE  COORDINATE  HEIGHT   ELEV- /                 - SOURCE DETAILS DEPENDING ON TYPE -
R P                  (M)         (M)        (M)    ATION /
D E                                                 (M)  /
------------------------------------------------------------------------------------------------------------------------
X       13   AREA     1000.00     2650.00  20.00     0.00 WIDTH OF AREA (M)=  200.00
                                                                                - PARTICULATE CATEGORIES -
                                                                                  1      2      3
                                                          FALL VELOCITY (MPS)    0.0028 0.0170 0.0450
                                                          MASS FRACTION          0.0400 0.2900 0.6700
                                                          REFLECTION COEFFICIENT 0.8800 0.7000 0.6000
                                                               - SOURCE STRENGTHS ( GRAMS PER SEC  PER SQUARE METER        ) -
                                                              SPEED CATEGORY   SEASON 1      SEASON
                                                                    1         0.00000E+00
                                                                    2         0.00000E+00
                                                                    3         0.00000E+00
                                                                    4         7.34400E-06
                                                                    5         7.34400E-06
                                                                    6         7.34400E-06
X       14   AREA      800.00     2450.00  20.00     0.00 WIDTH OF AREA (M)=  200.00
                                                                                - PARTICULATE CATEGORIES -
                                                                                  1      2      3
                                                          FALL VELOCITY (MPS)    0.0028 0.0170 0.0450
                                                          MASS FRACTION          0.0400 0.2900 0.6700
                                                          REFLECTION COEFFICIENT 0.8800 0.7000 0.6000
                                                               - SOURCE STRENGTHS ( GRAMS PER SEC  PER SQUARE METER        ) -
                                                              SPEED CATEGORY   SEASON 1      SEASON
                                                                    1         0.00000E+00
                                                                    2         0.00000E+00
                                                                    3         0.00000E+00
                                                                    4         7.34400E-06
                                                                    5         7.34400E-06
                                                                    6         7.34400E-06
X       15   AREA      750.00     2250.00  20.00     0.00 WIDTH OF AREA (M)=  200.00
                                                                                - PARTICULATE CATEGORIES -
                                                                                  1      2      3
                                                          FALL VELOCITY (MPS)    0.0028 0.0170 0.0450
                                                          MASS FRACTION          0.0400 0.2900 0.6700
                                                          REFLECTION COEFFICIENT 0.8800 0.7000 0.6000
                                                               - SOURCE STRENGTHS ( GRAMS PER SEC  PER SQUARE METER        ) -
                                                              SPEED CATEGORY   SEASON 1      SEASON
                                                                    1         0.00000E+00
                                                                    2         0.00000E+00
                                                                    3         0.00000E+00
                                                                    4         7.34400E-06
                                                                    5         7.34400E-06
                                                                    6         7.34400E-06
```

- SOURCE INPUT DA[illegible] (CONT.) -

C A R D	T A P E	SOURCE NUMBER	SOURCE TYPE	X COORDINATE (M)	Y COORDINATE (M)	EMISSION HEIGHT (M)	BASE ELEV- ATION (M)	- SOURCE DETAILS DEPENDING ON TYPE -
X		16	AREA	750.00	2050.00	20.00	0.00	WIDTH OF AREA (M)= 200.00
X		17	AREA	750.00	1850.00	20.00	0.00	WIDTH OF AREA (M)= 200.00

Source 16:

- PARTICULATE CATEGORIES -

	1	2	3
FALL VELOCITY (MPS)	0.0028	0.0170	0.0450
MASS FRACTION	0.0400	0.2900	0.6700
REFLECTION COEFFICIENT	0.8800	0.7000	0.6000

- SOURCE STRENGTHS (GRAMS PER SEC PER SQUARE METER) -

SPEED CATEGORY	SEASON 1	SEASON
1	0.00000E+00	
2	0.00000E+00	
3	0.00000E+00	
4	7.34400E-06	
5	7.34400E-06	
6	7.34400E-06	

Source 17:

- PARTICULATE CATEGORIES -

	1	2	3
FALL VELOCITY (MPS)	0.0028	0.0170	0.0450
MASS FRACTION	0.0400	0.2900	0.6700
REFLECTION COEFFICIENT	0.8800	0.7000	0.6000

- SOURCE STRENGTHS (GRAMS PER SEC PER SQUARE METER) -

SPEED CATEGORY	SEASON 1	SEASON
1	0.00000E+00	
2	0.00000E+00	
3	0.00000E+00	
4	7.34400E-06	
5	7.34400E-06	
6	7.34400E-06	

** UAL GROUND LEVEL CONCENTRATION (MICROGRAMS PER CUBIC ER) FROM ALL SOURCES COMBINED

- DISCRETE RECEPTORS -

X DISTANCE (METERS)	Y DISTANCE (METERS)	CONCENTRATION	X DISTANCE (METERS)	Y DISTANCE (METERS)	CONCENTRATION	X DISTANCE (METERS)	Y DISTANCE (METERS)	CONCENTRATION
415.0	2230.0	0.467008	475.0	2415.0	0.478406	620.0	2690.0	0.478916
355.0	2780.0	0.322236	790.0	2840.0	0.496260	780.0	3050.0	0.354880
2300.0	610.0	0.130758	2300.0	1100.0	0.182797	2300.0	1460.0	0.238170
2300.0	1680.0	0.274852	2300.0	1990.0	0.275871	2300.0	2205.0	0.250217
2740.0	3035.0	0.078614	2560.0	3145.0	0.079872	2560.0	3330.0	0.065693
1000.0	3150.0	0.348675	1500.0	3150.0	0.329604	2000.0	3150.0	0.159498
2350.0	2750.0	0.161778	2000.0	2400.0	0.395713	350.0	2000.0	0.439630
2000.0	2000.0	0.450741	350.0	1500.0	0.262228	2000.0	1500.0	0.370566
500.0	1000.0	0.143526	1250.0	450.0	0.114114			

3. ISCST Results: Emission Height = 10 meters; 2 Area Sources; Entire Year of Meteorological Data

ISCST (VERSION 82340)
AN AIR QUALITY DISPERSION MODEL IN
SECTION 2. NON-GUIDELINE MODELS.
IN UNAMAP (VERSION 5) DEC 82.
SOURCE: FILE 18 ON UNAMAP MAGNETIC TAPE FROM S.

*** GARDINIER PHOSPHOGYPSUM FIELD - CONCENTRATION - 1970 MET ***

CALCULATE (CONCENTRATION=1, DEPOSITION=2)	ISW(1) =	1
RECEPTOR GRID SYSTEM (RECTANGULAR=1 OR 3, POLAR=2 OR 4)	ISW(2) =	1
DISCRETE RECEPTOR SYSTEM (RECTANGULAR=1, POLAR=2)	ISW(3) =	1
TERRAIN ELEVATIONS ARE READ (YES=1, NO=0)	ISW(4) =	0
CALCULATIONS ARE WRITTEN TO TAPE (YES=1, NO=0)	ISW(5) =	0
LIST ALL INPUT DATA (NO=0, YES=1, MET DATA ALSO=2)	ISW(6) =	1
COMPUTE AVERAGE CONCENTRATION (OR TOTAL DEPOSITION) WITH THE FOLLOWING TIME PERIODS:		
HOURLY (YES=1, NO=0)	ISW(7) =	0
2-HOUR (YES=1, NO=0)	ISW(8) =	0
3-HOUR (YES=1, NO=0)	ISW(9) =	0
4-HOUR (YES=1, NO=0)	ISW(10) =	0
6-HOUR (YES=1, NO=0)	ISW(11) =	0
8-HOUR (YES=1, NO=0)	ISW(12) =	0
12-HOUR (YES=1, NO=0)	ISW(13) =	0
24-HOUR (YES=1, NO=0)	ISW(14) =	1
PRINT 'N'-DAY TABLE(S) (YES=1, NO=0)	ISW(15) =	1
PRINT THE FOLLOWING TYPES OF TABLES WHOSE TIME PERIODS ARE SPECIFIED BY ISW(7) THROUGH ISW(14):		
DAILY TABLES (YES=1, NO=0)	ISW(16) =	0
HIGHEST & SECOND HIGHEST TABLES (YES=1, NO=0)	ISW(17) =	1
MAXIMUM 50 TABLES (YES=1, NO=0)	ISW(18) =	1
METEOROLOGICAL DATA INPUT METHOD (PRE-PROCESSED=1, CARD=2)	ISW(19) =	1
RURAL-URBAN OPTION (RURAL=0, URBAN MODE 1=1, URBAN MODE 2=2)	ISW(20) =	0
WIND PROFILE EXPONENT VALUES (DEFAULTS=1, USER ENTERS=2, 3)	ISW(21) =	1
VERTICAL POT. TEMP. GRADIENT VALUES (DEFAULTS=1, USER ENTERS=2, 3)	ISW(22) =	1
SCALE EMISSION RATES FOR ALL SOURCES (NO=0, YES>0)	ISW(23) =	4
PROGRAM CALCULATES FINAL PLUME RISE ONLY (YES=1, NO=2)	ISW(24) =	1
PROGRAM ADJUSTS ALL STACK HEIGHTS FOR DOWNWASH (YES=2, NO=1)	ISW(25) =	1
NUMBER OF INPUT SOURCES	NSOURC =	2
NUMBER OF SOURCE GROUPS (=0, ALL SOURCES)	NGROUP =	0
TIME PERIOD INTERVAL TO BE PRINTED (=0, ALL INTERVALS)	IPERD =	0
NUMBER OF X (RANGE) GRID VALUES	NXPNTS =	0
NUMBER OF Y (THETA) GRID VALUES	NYPNTS =	0
NUMBER OF DISCRETE RECEPTORS	NXWYPT =	26
SOURCE EMISSION RATE UNITS CONVERSION FACTOR	TK =	.10000E+07
ENTRAINMENT COEFFICIENT FOR UNSTABLE ATMOSPHERE	BETA1 =	0.600
ENTRAINMENT COEFFICIENT FOR STABLE ATMOSPHERE	BETA2 =	0.600
HEIGHT ABOVE GROUND AT WHICH WIND SPEED WAS MEASURED	ZR =	10.00 METERS
LOGICAL UNIT NUMBER OF METEOROLOGICAL DATA	IMET =	9
DECAY COEFFICIENT FOR PHYSICAL OR CHEMICAL DEPLETION	DECAY =	0.000000E+00
SURFACE STATION NO.	ISS =	12842
YEAR OF SURFACE DATA	ISY =	70
UPPER AIR STATION NO.	IUS =	12842
YEAR OF UPPER AIR DATA	IUY =	70
ALLOCATED DATA STORAGE	LIMIT =	43500 WORDS
REQUIRED DATA STORAGE FOR THIS PROBLEM RUN	MIMIT =	891 WORDS

*** X,Y COORDINATES OF DISCRETE RECEPTORS ***
(METERS)

```
(    415.0,   2230.0),  (    475.0,   2415.0),  (    620.0,   2690.0),  (    355.0,   2780.0),  (    790.0,   2840.0),
(    780.0,   3050.0),  (   2300.0,    610.0),  (   2300.0,   1100.0),  (   2300.0,   1460.0),  (   2300.0,   1680.0),
(   2300.0,   1990.0),  (   2300.0,   2205.0),  (   2740.0,   3035.0),  (   2560.0,   3145.0),  (   2560.0,   3330.0),
(   1000.0,   3150.0),  (   1500.0,   3150.0),  (   2000.0,   3150.0),  (   2350.0,   2750.0),  (   2000.0,   2400.0),
(    350.0,   2000.0),  (   2000.0,   2000.0),  (    350.0,   1500.0),  (   2000.0,   1500.0),  (    500.0,   1000.0),
(   1250.0,    450.0),  (
```

*** GARDINIER PHOSPHOGYPSUM FIELD - CONCENTRATION - 1970 MET ***

*** SOURCE DATA ***

SOURCE NUMBER	TYPE	WAKE	NUMBER PART. CATS.	EMISSION RATE TYPE=0,1 (GRAMS/SEC) TYPE=2 (GRAMS/SEC) *PER METER**2	X (METERS)	Y (METERS)	BASE ELEV. (METERS)	HEIGHT (METERS)	TEMP. TYPE=0 (DEG. K); VERT. DIM TYPE=1 (METERS)	EXIT VEL. TYPE=0 (M/SEC); HORZ. DIM TYPE=1,2 (METERS)	DIAMETER TYPE=0 (METERS)	BLDG. HEIGHT TYPE=0 (METERS)	BLDG. LENGTH TYPE=0 (METERS)	BLDG. WIDTH TYPE=0 (METERS)
1	2	0	3	0.32000E-05	750.0	1600.0	0.0	10.00	0.00	1000.00	0.00	0.00	0.00	0.00
2	2	0	3	0.50000E-05	1000.0	2500.0	0.0	10.00	0.00	600.00	0.00	0.00	0.00	0.00

*** GARDINIER PHOSPHOGYPSUM FIELD - CONCENTRATION - 1970 MET ***

* 365-DAY AVERAGE CONCENTRATION (MICROGRAMS/CUBIC METER) *

* FROM ALL SOURCES *
* FOR THE DISCRETE RECEPTOR POINTS *

- X -	- Y -	CON.	- X -	- Y -	CON.	- X -	- Y -	CON.
415.0	2230.0	0.60628	475.0	2415.0	0.64439	620.0	2690.0	0.75516
355.0	2780.0	0.52567	790.0	2840.0	0.87846	780.0	3050.0	0.68215
2300.0	610.0	0.17759	2300.0	1100.0	0.23866	2300.0	1460.0	0.27976
2300.0	1680.0	0.33078	2300.0	1990.0	0.32843	2300.0	2205.0	0.29822
2740.0	3035.0	0.11120	2560.0	3145.0	0.10235	2560.0	3330.0	0.07217
1000.0	3150.0	0.64426	1500.0	3150.0	0.13475	2000.0	3150.0	0.20907
2350.0	2750.0	0.19976	2000.0	2400.0	0.44965	350.0	2000.0	0.53219
2000.0	2000.0	0.47956	350.0	1500.0	0.30359	2000.0	1500.0	0.41225
500.0	1000.0	0.17838	1250.0	450.0	0.12078			

*** GARDINIER PHOSPHOGYPSUM FIELD M CONCENTRATION - 1970 MET ***

* HIGHEST 24-HOUR AVERAGE CONCENTRATION (MICROGRAMS/CUBIC METER) *
* FROM ALL SOURCES *
* FOR THE DISCRETE RECEPTOR POINTS *

- X -	- Y -	CON.	(DAY, PER.)	- X -	- Y -	CON.	(DAY, PER.)
415.0	2230.0	12.06031	(290, 1)	475.0	2415.0	8.73133	(290, 1)
620.0	2690.0	7.47174	(280, 1)	355.0	2780.0	5.95879	(270, 1)
790.0	2840.0	8.83885	(292, 1)	780.0	3050.0	6.39738	(32, 1)
2300.0	610.0	4.63632	(7, 1)	2300.0	1100.0	6.25904	(73, 1)
2300.0	1460.0	6.82174	(73, 1)	2300.0	1680.0	7.05603	(72, 1)
2300.0	1990.0	7.48000	(73, 1)	2300.0	2205.0	5.86283	(48, 1)
2740.0	3035.0	3.24660	(178, 1)	2560.0	3145.0	2.80134	(177, 1)
2560.0	3330.0	2.11951	(177, 1)	1000.0	3150.0	9.08930	(33, 1)
1500.0	3150.0	3.12249	(109, 1)	2000.0	3150.0	3.28516	(222, 1)
2350.0	2750.0	5.50839	(178, 1)	2000.0	2400.0	6.19612	(73, 1)
350.0	2000.0	8.88241	(272, 1)	2000.0	2000.0	9.55322	(73, 1)
350.0	1500.0	8.04613	(38, 1)	2000.0	1500.0	7.81639	(7, 1)
500.0	1000.0	4.78138	(38, 1)	1250.0	450.0	3.82335	(328, 1)

*** GARDINIER PHOSPHOGYPSUM FIELD - [illegible] CONCENTRATION - 1970 MET ***

* SECOND HIGHEST 24-HOUR AVERAGE CONCENTRATION (MICROGRAMS/CUBIC METER) *
* FROM ALL SOURCES *
* FOR THE DISCRETE RECEPTOR POINTS *

- X -	- Y -	CON.	(DAY, PER.)	- X -	- Y -	CON.	(DAY, PER.)
415.0	2230.0	8.33476	(272, 1)	475.0	2415.0	8.23754	(14, 1)
620.0	2690.0	7.34462	(290, 1)	355.0	2780.0	5.85050	(280, 1)
770.0	2840.0	8.63574	(290, 1)	780.0	3050.0	6.15823	(292, 1)
2300.0	610.0	2.89085	(73, 1)	2300.0	1100.0	6.04482	(7, 1)
2300.0	1460.0	5.68722	(7, 1)	2300.0	1680.0	6.93358	(73, 1)
2300.0	1990.0	5.96780	(34, 1)	2300.0	2205.0	5.08125	(73, 1)
2740.0	3035.0	2.49056	(177, 1)	2560.0	3145.0	2.49780	(178, 1)
2560.0	3330.0	1.99437	(298, 1)	1000.0	3150.0	6.81669	(6, 1)
1500.0	3150.0	3.02765	(350, 1)	2000.0	3150.0	3.16162	(178, 1)
2350.0	2750.0	3.70656	(67, 1)	2000.0	2400.0	5.97246	(48, 1)
350.0	2000.0	8.53171	(290, 1)	2000.0	2000.0	8.93659	(72, 1)
350.0	1500.0	6.94345	(272, 1)	2000.0	1500.0	7.72125	(73, 1)
500.0	1000.0	3.58116	(37, 1)	1250.0	450.0	2.64803	(4, 1)

*** GARDINIER PHOSPHOGYPSUM FIELD - / CONCENTRATION - 1970 MET ***

* 50 MAXIMUM 24-HOUR AVERAGE CONCENTRATION (MICROGRAMS/CUBIC METER) *

* FROM ALL SOURCES *

RANK	CON.	PER.	DAY	X OR RANGE (METERS)	Y(METERS) OR DIRECTION (DEGREES)	RANK	CON.	PER.	DAY	X OR RANGE (METERS)	Y(METERS) OR DIRECTION (DEGREES)
1	12.06031	1	290	415.0	2230.0	26	6.82174	1	73	2300.0	1460.0
2	9.55322	1	73	2000.0	2000.0	27	6.81669	1	6	1000.0	3150.0
3	9.08930	1	33	1000.0	3150.0	28	6.79051	1	14	790.0	2840.0
4	8.93659	1	72	2000.0	2000.0	29	6.70741	1	270	790.0	2840.0
5	8.88241	1	272	350.0	2000.0	30	6.64290	1	151	620.0	2690.0
6	8.83985	1	292	790.0	2840.0	31	6.63099	1	273	350.0	2000.0
7	8.73133	1	290	475.0	2415.0	32	6.56462	1	138	620.0	2690.0
8	8.63574	1	290	790.0	2840.0	33	6.39738	1	32	780.0	3050.0
9	8.53171	1	290	350.0	2000.0	34	6.35817	1	280	790.0	2840.0
10	8.41475	1	34	2000.0	2000.0	35	6.33454	1	34	2300.0	1680.0
11	8.33476	1	272	415.0	2230.0	36	6.29743	1	203	1000.0	3150.0
12	8.24386	1	38	350.0	2000.0	37	6.26949	1	38	415.0	2230.0
13	8.23754	1	14	475.0	2415.0	38	6.25904	1	73	2300.0	1100.0
14	8.04613	1	38	350.0	1500.0	39	6.23172	1	14	415.0	2230.0
15	7.81639	1	7	2000.0	1500.0	40	6.19612	1	73	2000.0	2400.0
16	7.72125	1	73	2000.0	1500.0	41	6.15823	1	292	780.0	3050.0
17	7.61333	1	68	2000.0	2000.0	42	6.14083	1	292	620.0	2690.0
18	7.48000	1	73	2300.0	1990.0	43	6.13547	1	290	350.0	1500.0
19	7.47174	1	280	620.0	2690.0	44	6.04482	1	7	2300.0	1100.0
20	7.34462	1	290	620.0	2690.0	45	6.02433	1	272	475.0	2415.0
21	7.24004	1	81	2000.0	2000.0	46	5.98714	1	68	2300.0	1680.0
22	7.05603	1	72	2300.0	1680.0	47	5.98404	1	32	1000.0	3150.0
23	7.01598	1	270	620.0	2690.0	48	5.97246	1	48	2000.0	2400.0
24	6.94345	1	272	350.0	1500.0	49	5.96780	1	34	2300.0	1990.0
25	6.93358	1	73	2300.0	1680.0	50	5.95879	1	270	355.0	2780.0

4. ISCST Results: Emission Height = 10 meters; 17 Area Sources;
Worst-Case Days

ISCST (VERSION 82340)
AN AIR QUALITY DISPERSION MODEL IN
SECTION 2. NON-GUIDELINE MODELS.
IN UNAMAP (VERSION 5) DEC 82.
SOURCE: FILE 18 ON UNAMAP MAGNETIC TAPE FROM NTIS.

CALCULATE (CONCENTRATION=1, DEPOSITION=2)	ISW(1) =	1
RECEPTOR GRID SYSTEM (RECTANGULAR=1 OR 3, POLAR=2 OR 4)	ISW(2) =	1
DISCRETE RECEPTOR SYSTEM (RECTANGULAR=1, POLAR=2)	ISW(3) =	1
TERRAIN ELEVATIONS ARE READ (YES=1, NO=0)	ISW(4) =	0
CALCULATIONS ARE WRITTEN TO TAPE (YES=1, NO=0)	ISW(5) =	0
LIST ALL INPUT DATA (NO=0, YES=1, MET DATA ALSO=2)	ISW(6) =	1
COMPUTE AVERAGE CONCENTRATION (OR TOTAL DEPOSITION) WITH THE FOLLOWING TIME PERIODS:		
HOURLY (YES=1, NO=0)	ISW(7) =	0
2-HOUR (YES=1, NO=0)	ISW(8) =	0
3-HOUR (YES=1, NO=0)	ISW(9) =	0
4-HOUR (YES=1, NO=0)	ISW(10) =	0
6-HOUR (YES=1, NO=0)	ISW(11) =	0
8-HOUR (YES=1, NO=0)	ISW(12) =	0
12-HOUR (YES=1, NO=0)	ISW(13) =	0
24-HOUR (YES=1, NO=0)	ISW(14) =	1
PRINT 'N'-DAY TABLE(S) (YES=1, NO=0)	ISW(15) =	1
PRINT THE FOLLOWING TYPES OF TABLES WHOSE TIME PERIODS ARE SPECIFIED BY ISW(7) THROUGH ISW(14):		
DAILY TABLES (YES=1, NO=0)	ISW(16) =	0
HIGHEST & SECOND HIGHEST TABLES (YES=1, NO=0)	ISW(17) =	1
MAXIMUM 50 TABLES (YES=1, NO=0)	ISW(18) =	1
METEOROLOGICAL DATA INPUT METHOD (PRE-PROCESSED=1, CARD=2)	ISW(19) =	1
RURAL-URBAN OPTION (RURAL=0, URBAN MODE 1=1, URBAN MODE 2=2)	ISW(20) =	0
WIND PROFILE EXPONENT VALUES (DEFAULTS=1, USER ENTERS=2, 3)	ISW(21) =	1
VERTICAL POT. TEMP. GRADIENT VALUES (DEFAULTS=1, USER ENTERS=2, 3)	ISW(22) =	1
SCALE EMISSION RATES FOR ALL SOURCES (NO=0, YES>0)	ISW(23) =	4
PROGRAM CALCULATES FINAL PLUME RISE ONLY (YES=1, NO=2)	ISW(24) =	1
PROGRAM ADJUSTS ALL STACK HEIGHTS FOR DOWNWASH (YES=2, NO=1)	ISW(25) =	1
NUMBER OF INPUT SOURCES	NSOURC =	17
NUMBER OF SOURCE GROUPS (=0, ALL SOURCES)	NGROUP =	0
TIME PERIOD INTERVAL TO BE PRINTED (=0, ALL INTERVALS)	IPERD =	0
NUMBER OF X (RANGE) GRID VALUES	NXPNTS =	0
NUMBER OF Y (THETA) GRID VALUES	NYPNTS =	0
NUMBER OF DISCRETE RECEPTORS	NXWYPT =	26
SOURCE EMISSION RATE UNITS CONVERSION FACTOR	TK =	.10000E+07
ENTRAINMENT COEFFICIENT FOR UNSTABLE ATMOSPHERE	BETA1 =	0.600
ENTRAINMENT COEFFICIENT FOR STABLE ATMOSPHERE	BETA2 =	0.600
HEIGHT ABOVE GROUND AT WHICH WIND SPEED WAS MEASURED	ZR =	10.00 METERS
LOGICAL UNIT NUMBER OF METEOROLOGICAL DATA	IMET =	9
DECAY COEFFICIENT FOR PHYSICAL OR CHEMICAL DEPLETION	DECAY =	0.000000E+00
SURFACE STATION NO.	ISS =	12842
YEAR OF SURFACE DATA	ISY =	70
UPPER AIR STATION NO.	IUS =	12842
YEAR OF UPPER AIR DATA	IUY =	70
ALLOCATED DATA STORAGE	LIMIT =	43500 WORDS
REQUIRED DATA STORAGE FOR THIS PROBLEM RUN	MIMIT =	4116 WORDS

*** GARDINIER PHOSPHOGYPSUM FIELD - CONCENTRATION - 1970 MET ***

*** METEOROLOGICAL DAYS TO BE PROCESSED ***
(IF=1)

```
0 0 0 0 0 0 1 0 0 0   0 0 0 1 0 0 0 0 0 0   0 0 0 0 0 0 0 0 0 0   0 1 1 1 0 0 0 1 0 0   0 0 0 0 0 0 0 1 0 0
0 0 0 0 0 0 0 0 0 0   0 0 0 0 0 0 0 1 0 0   0 1 1 0 0 0 0 0 0 0   1 0 0 0 0 0 0 0 0 0   0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 1 0   0 0 0 0 0 0 0 0 0 0   0 0 0 0 0 0 0 0 0 0   0 0 0 0 0 0 0 0 0 0   0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0   0 0 0 0 0 0 0 0 0 0   0 0 0 0 0 0 1 1 0 0   0 0 0 0 0 0 0 0 0 0   0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0   0 0 0 0 0 0 0 0 0 0   0 1 0 0 0 0 0 0 0 0   0 0 0 0 0 0 0 0 0 0   0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0   0 0 0 0 0 0 0 0 0 1   0 1 0 0 0 0 0 0 0 1   0 0 0 0 0 0 0 0 0 1   0 1 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0   0 0 0 0 0 0 0 0 0 0   0 0 0 0 0 0 0 1 0 0   0 0 0 0 0 0 0 0 0 0   0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0   0 0 0 0 0 0
```

*** UPPER BOUND OF FIRST THROUGH FIFTH WIND SPEED CATEGORIES ***
(METERS/SEC)

1.54, 3.09, 5.14, 8.23, 10.80,

*** WIND PROFILE EXPONENTS ***

STABILITY CATEGORY	WIND SPEED CATEGORY 1	2	3	4	5	6
A	.10000E+00	.10000E+00	.10000E+00	.10000E+00	.10000E+00	.10000E+00
B	.15000E+00	.15000E+00	.15000E+00	.15000E+00	.15000E+00	.15000E+00
C	.20000E+00	.20000E+00	.20000E+00	.20000E+00	.20000E+00	.20000E+00
D	.25000E+00	.25000E+00	.25000E+00	.25000E+00	.25000E+00	.25000E+00
E	.30000E+00	.30000E+00	.30000E+00	.30000E+00	.30000E+00	.30000E+00
F	.30000E+00	.30000E+00	.30000E+00	.30000E+00	.30000E+00	.30000E+00

*** VERTICAL POTENTIAL TEMPERATURE GRADIENTS ***
(DEGREES KELVIN PER METER)

STABILITY CATEGORY	WIND SPEED CATEGORY 1	2	3	4	5	6
A	.00000E+00	.00000E+00	.00000E+00	.00000E+00	.00000E+00	.00000E+00
B	.00000E+00	.00000E+00	.00000E+00	.00000E+00	.00000E+00	.00000E+00
C	.00000E+00	.00000E+00	.00000E+00	.00000E+00	.00000E+00	.00000E+00
D	.00000E+00	.00000E+00	.00000E+00	.00000E+00	.00000E+00	.00000E+00
E	.20000E-01	.20000E-01	.20000E-01	.20000E-01	.20000E-01	.20000E-01
F	.35000E-01	.35000E-01	.35000E-01	.35000E-01	.35000E-01	.35000E-01

*** X,Y COORDINATES OF DISCRETE RECEPTORS ***
(METERS)

(415.0, 2230.0),	(475.0, 2415.0),	(620.0, 2690.0),	(355.0, 2780.0),	(790.0, 2840.0),
(780.0, 3050.0),	(2300.0, 610.0),	(2300.0, 1100.0),	(2300.0, 1460.0),	(2300.0, 1680.0),
(2300.0, 1990.0),	(2300.0, 2205.0),	(2740.0, 3035.0),	(2560.0, 3145.0),	(2560.0, 3330.0),
(1000.0, 3150.0),	(1500.0, 3150.0),	(2000.0, 3150.0),	(2350.0, 2750.0),	(2000.0, 2400.0),
(350.0, 2000.0),	(2000.0, 2000.0),	(350.0, 1500.0),	(2000.0, 1500.0),	(500.0, 1000.0),
(1250.0, 450.0),	(			

*** SOURCE DATA ***

SOURCE NUMBER	TYPE	WAKE	NUMBER PART. CATS.	EMISSION RATE TYPE=0,1 (GRAMS/SEC) TYPE=2 (GRAMS/SEC) *PER METER**2	X (METERS)	Y (METERS)	BASE ELEV. (METERS)	HEIGHT (METERS)	TEMP. TYPE=0 (DEG. K); VERT. DIM TYPE=1 (METERS)	EXIT VEL. TYPE=0 (M/SEC); HORZ. DIM TYPE=1,2 (METERS)	DIAMETER TYPE=0 (METERS)	BLDG. HEIGHT TYPE=0 (METERS)	BLDG. LENGTH TYPE=0 (METERS)	BLDG. WIDTH TYPE=0 (METERS)
1	2	0	3	0.73000E-05	750.0	1650.0	0.0	10.00	0.00	200.00	0.00	0.00	0.00	0.00
2	2	0	3	0.73000E-05	1000.0	1650.0	0.0	10.00	0.00	200.00	0.00	0.00	0.00	0.00
3	2	0	3	0.73000E-05	1200.0	1650.0	0.0	10.00	0.00	200.00	0.00	0.00	0.00	0.00
4	2	0	3	0.73000E-05	1400.0	1650.0	0.0	10.00	0.00	200.00	0.00	0.00	0.00	0.00
5	2	0	3	0.73000E-05	1600.0	1650.0	0.0	10.00	0.00	200.00	0.00	0.00	0.00	0.00
6	2	0	3	0.73000E-05	1600.0	1850.0	0.0	10.00	0.00	200.00	0.00	0.00	0.00	0.00
7	2	0	3	0.73000E-05	1600.0	2050.0	0.0	10.00	0.00	200.00	0.00	0.00	0.00	0.00
8	2	0	3	0.73000E-05	1600.0	2250.0	0.0	10.00	0.00	200.00	0.00	0.00	0.00	0.00
9	2	0	3	0.73000E-05	1550.0	2450.0	0.0	10.00	0.00	200.00	0.00	0.00	0.00	0.00
10	2	0	3	0.73000E-05	1500.0	2650.0	0.0	10.00	0.00	200.00	0.00	0.00	0.00	0.00
11	2	0	3	0.73000E-05	1400.0	2850.0	0.0	10.00	0.00	200.00	0.00	0.00	0.00	0.00
12	2	0	3	0.73000E-05	1200.0	2850.0	0.0	10.00	0.00	200.00	0.00	0.00	0.00	0.00
13	2	0	3	0.73000E-05	1000.0	2650.0	0.0	10.00	0.00	200.00	0.00	0.00	0.00	0.00
14	2	0	3	0.73000E-05	800.0	2450.0	0.0	10.00	0.00	200.00	0.00	0.00	0.00	0.00
15	2	0	3	0.73000E-05	750.0	2250.0	0.0	10.00	0.00	200.00	0.00	0.00	0.00	0.00
16	2	0	3	0.73000E-05	750.0	2050.0	0.0	10.00	0.00	200.00	0.00	0.00	0.00	0.00
17	2	0	3	0.73000E-05	750.0	1850.0	0.0	10.00	0.00	200.00	0.00	0.00	0.00	0.00

*** GARDINIER PHOSPHOGYPSUM FIELD - [illegible] CONCENTRATION - 1970 MET ***

*** SOURCE PARTICULATE DATA ***

*** SOURCE NUMBER = 1 ***

MASS FRACTION =
0.04000, 0.29000, 0.67000,

SETTLING VELOCITY(METERS/SEC) =
0.0028, 0.0170, 0.0450,

SURFACE REFLECTION COEFFICIENT =
0.88000, 0.70000, 0.60000,

*** SOURCE NUMBER = 2 ***

MASS FRACTION =
0.04000, 0.29000, 0.67000,

SETTLING VELOCITY(METERS/SEC) =
0.0028, 0.0170, 0.0450,

SURFACE REFLECTION COEFFICIENT =
0.88000, 0.70000, 0.60000,

*** SOURCE NUMBER = 3 ***

MASS FRACTION =
0.04000, 0.29000, 0.67000,

SETTLING VELOCITY(METERS/SEC) =
0.0028, 0.0170, 0.0450,

SURFACE REFLECTION COEFFICIENT =
0.88000, 0.70000, 0.60000,

*** SOURCE PARTICULATE DATA ***

*** SOURCE NUMBER = 4 ***

MASS FRACTION =
0. 04000, 0. 29000, 0. 67000,

SETTLING VELOCITY(METERS/SEC) =
0. 0028, 0. 0170, 0. 0450,

SURFACE REFLECTION COEFFICIENT =
0. 88000, 0. 70000, 0. 60000,

*** SOURCE NUMBER = 5 ***

MASS FRACTION =
0. 04000, 0. 29000, 0. 67000,

SETTLING VELOCITY(METERS/SEC) =
0. 0028, 0. 0170, 0. 0450,

SURFACE REFLECTION COEFFICIENT =
0. 88000, 0. 70000, 0. 60000,

*** SOURCE NUMBER = 6 ***

MASS FRACTION =
0. 04000, 0. 29000, 0. 67000,

SETTLING VELOCITY(METERS/SEC) =
0. 0028, 0. 0170, 0. 0450,

SURFACE REFLECTION COEFFICIENT =
0. 88000, 0. 70000, 0. 60000,

*** SOURCE PARTICULATE DATA ***

*** SOURCE NUMBER = 7 ***

MASS FRACTION =
0.04000, 0.29000, 0.67000,

SETTLING VELOCITY(METERS/SEC) =
0.0028, 0.0170, 0.0450,

SURFACE REFLECTION COEFFICIENT =
0.89000, 0.70000, 0.60000,

*** SOURCE NUMBER = 8 ***

MASS FRACTION =
0.04000, 0.29000, 0.67000,

SETTLING VELOCITY(METERS/SEC) =
0.0028, 0.0170, 0.0450,

SURFACE REFLECTION COEFFICIENT =
0.89000, 0.70000, 0.60000,

*** SOURCE NUMBER = 9 ***

MASS FRACTION =
0.04000, 0.29000, 0.67000,

SETTLING VELOCITY(METERS/SEC) =
0.0028, 0.0170, 0.0450,

SURFACE REFLECTION COEFFICIENT =
0.89000, 0.70000, 0.60000,

*** SOURCE PARTICULATE DATA ***

*** SOURCE NUMBER = 10 ***

MASS FRACTION =
0. 04000, 0. 29000, 0. 67000,

SETTLING VELOCITY(METERS/SEC) =
0. 0029, 0. 0170, 0. 0450,

SURFACE REFLECTION COEFFICIENT =
0. 80000, 0. 70000, 0. 60000,

*** SOURCE NUMBER = 11 ***

MASS FRACTION =
0. 04000, 0. 29000, 0. 67000,

SETTLING VELOCITY(METERS/SEC) =
0. 0029, 0. 0170, 0. 0450,

SURFACE REFLECTION COEFFICIENT =
0. 80000, 0. 70000, 0. 60000,

*** SOURCE NUMBER = 12 ***

MASS FRACTION =
0. 04000, 0. 29000, 0. 67000,

SETTLING VELOCITY(METERS/SEC) =
0. 0029, 0. 0170, 0. 0450,

SURFACE REFLECTION COEFFICIENT =
0. 80000, 0. 70000, 0. 60000,

*** SOURCE PARTICULATE DATA ***

*** SOURCE NUMBER = 13 ***

MASS FRACTION =
0. 04000, 0. 29000, 0. 67000,

SETTLING VELOCITY(METERS/SEC) =
0. 0028, 0. 0170, 0. 0450,

SURFACE REFLECTION COEFFICIENT =
0. 88000, 0. 70000, 0. 60000,

*** SOURCE NUMBER = 14 ***

MASS FRACTION =
0. 04000, 0. 29000, 0. 67000,

SETTLING VELOCITY(METERS/SEC) =
0. 0028, 0. 0170, 0. 0450,

SURFACE REFLECTION COEFFICIENT =
0. 88000, 0. 70000, 0. 60000,

*** SOURCE NUMBER = 15 ***

MASS FRACTION =
0. 04000, 0. 29000, 0. 67000,

SETTLING VELOCITY(METERS/SEC) =
0. 0028, 0. 0170, 0. 0450,

SURFACE REFLECTION COEFFICIENT =
0. 88000, 0. 70000, 0. 60000,

*** SOURCE PARTICULATE DATA ***

*** SOURCE NUMBER = 16 ***

MASS FRACTION =
0.04000, 0.29000, 0.67000,

SETTLING VELOCITY(METERS/SEC) =
0.0028, 0.0170, 0.0450,

SURFACE REFLECTION COEFFICIENT =
0.88000, 0.70000, 0.60000,

*** SOURCE NUMBER = 17 ***

MASS FRACTION =
0.04000, 0.29000, 0.67000,

SETTLING VELOCITY(METERS/SEC) =
0.0028, 0.0170, 0.0450,

SURFACE REFLECTION COEFFICIENT =
0.88000, 0.70000, 0.60000,

*** GARDINIER PHOSPHOGYPSUM FIELD - PM CONCENTRATION - 1970 MET ***

* SOURCE EMISSION RATE SCALARS WHICH VARY WITH STABILITY AND WIND SPEED *

* FOR ALL SOURCES *

STABILITY CATEGORY	WIND SPEED CATEGORY 1	2	3	4	5	6
A	.00000E+00	.00000E+00	.00000E+00	.10000E+01	.10000E+01	.10000E+01
B	.00000E+00	.00000E+00	.00000E+00	.10000E+01	.10000E+01	.10000E+01
C	.00000E+00	.00000E+00	.00000E+00	.10000E+01	.10000E+01	.10000E+01
D	.00000E+00	.00000E+00	.00000E+00	.10000E+01	.10000E+01	.10000E+01
E	.00000E+00	.00000E+00	.00000E+00	.10000E+01	.10000E+01	.10000E+01
F	.00000E+00	.00000E+00	.00000E+00	.10000E+01	.10000E+01	.10000E+01

*** GARDINIER PHOSPHOGYPSUM FIELD - PM CONCENTRATION - 1970 MET ***

* SOURCE-RECEPTOR COMBINATIONS LESS THAN 100 METERS OR THREE BUILDING HEIGHTS IN DISTANCE. NO AVERAGE CONCENTRATION IS CALCULATED *

SOURCE NUMBER	- - RECEPTOR LOCATION - - X OR RANGE (METERS)	Y (METERS) OR DIRECTION (DEGREES)	DISTANCE BETWEEN (METERS)
11	1500.0	3150.0	87.16

*** GARDINIER PHOSPHOGYPSUM FIELD - CONCENTRATION - 1970 MET ***

* HIGHEST 24-HOUR AVERAGE CONCENTRATION (MICROGRAMS/CUBIC METER) *
* FROM ALL SOURCES *
* FOR THE DISCRETE RECEPTOR POINTS *

- X -	- Y -	CON.	(DAY, PER.)	- X -	- Y -	CON.	(DAY, PER.)
415.0	2230.0	10.93196	(290, 1)	475.0	2415.0	11.77675	(290, 1)
620.0	2690.0	8.09313	(33, 1)	355.0	2780.0	5.48867	(292, 1)
790.0	2840.0	8.04671	(280, 1)	780.0	3050.0	5.92585	(292, 1)
2300.0	610.0	5.02867	(7, 1)	2300.0	1100.0	8.32717	(73, 1)
2300.0	1460.0	9.46903	(73, 1)	2300.0	1680.0	8.12654	(73, 1)
2300.0	1990.0	7.62190	(178, 1)	2300.0	2205.0	6.01129	(73, 1)
2740.0	3035.0	3.00162	(178, 1)	2560.0	3145.0	2.82523	(178, 1)
2560.0	3330.0	2.79001	(177, 1)	1000.0	3150.0	6.42331	(292, 1)
1500.0	3150.0	6.17714	(33, 1)	2000.0	3150.0	4.51154	(109, 1)
2350.0	2750.0	4.55589	(178, 1)	2000.0	2400.0	9.51630	(73, 1)
350.0	2000.0	9.50274	(290, 1)	2000.0	2000.0	11.78345	(73, 1)
350.0	1500.0	12.21610	(290, 1)	2000.0	1500.0	14.18402	(73, 1)
500.0	1000.0	6.84570	(38, 1)	1250.0	450.0	4.20814	(328, 1)

*** GARDINIER PHOSPHOGYPSUM FIELD - 1 CONCENTRATION - 1970 MET ***

* SECOND HIGHEST 24-HOUR AVERAGE CONCENTRATION (MICROGRAMS/CUBIC METER) *
* FROM ALL SOURCES *
* FOR THE DISCRETE RECEPTOR POINTS *

- X -	- Y -	CON.	(DAY, PER.)	- X -	- Y -	CON.	(DAY, PER.)
415.0	2230.0	9.07630	(272, 1)	475.0	2415.0	8.38116	(14, 1)
620.0	2690.0	7.46029	(290, 1)	355.0	2780.0	5.27865	(280, 1)
790.0	2840.0	7.78669	(33, 1)	780.0	3050.0	5.64734	(270, 1)
2300.0	610.0	3.26482	(73, 1)	2300.0	1100.0	6.58919	(7, 1)
2300.0	1460.0	6.70490	(68, 1)	2300.0	1680.0	6.24211	(68, 1)
2300.0	1990.0	6.93190	(73, 1)	2300.0	2205.0	5.67707	(48, 1)
2740.0	3035.0	2.24060	(177, 1)	2560.0	3145.0	2.73730	(177, 1)
2560.0	3330.0	1.59645	(222, 1)	1000.0	3150.0	5.30412	(33, 1)
1500.0	3150.0	5.65213	(109, 1)	2000.0	3150.0	4.19220	(177, 1)
2350.0	2750.0	3.31036	(177, 1)	2000.0	2400.0	9.14511	(72, 1)
350.0	2000.0	9.46490	(38, 1)	2000.0	2000.0	10.37694	(7, 1)
350.0	1500.0	9.91921	(272, 1)	2000.0	1500.0	9.74292	(7, 1)
500.0	1000.0	4.37375	(272, 1)	1250.0	450.0	0.32652	(73, 1)

*** GARDINIER PHOSPHOGYPSUM FIELD M CONCENTRATION - 1970 MET ***

* 50 MAXIMUM 24-HOUR AVERAGE CONCENTRATION (MICROGRAMS/CUBIC METER) *

* FROM ALL SOURCES *

RANK	CON.	PER.	DAY	X OR RANGE (METERS)	Y(METERS) OR DIRECTION (DEGREES)	RANK	CON.	PER.	DAY	X OR RANGE (METERS)	Y(METERS) OR DIRECTION (DEGREES)
1	14.18402	1	73	2000.0	1500.0	26	8.32717	1	73	2300.0	1100.0
2	12.21610	1	290	350.0	1500.0	27	8.19769	1	280	350.0	2000.0
3	11.78345	1	73	2000.0	2000.0	28	8.19653	1	68	2000.0	2000.0
4	11.77675	1	290	475.0	2415.0	29	8.12654	1	73	2300.0	1680.0
5	10.93196	1	290	415.0	2230.0	30	8.11636	1	292	415.0	2230.0
6	10.37694	1	7	2000.0	2000.0	31	8.09313	1	33	620.0	2690.0
7	9.91721	1	272	350.0	1500.0	32	8.04671	1	280	790.0	2840.0
8	9.74292	1	7	2000.0	1500.0	33	8.01497	1	81	2000.0	1500.0
9	9.71078	1	68	2000.0	1500.0	34	8.00379	1	81	2000.0	2000.0
10	9.51630	1	73	2000.0	2400.0	35	8.00280	1	81	2000.0	2400.0
11	9.50274	1	290	350.0	2000.0	36	7.90508	1	14	415.0	2230.0
12	9.46703	1	73	2300.0	1460.0	37	7.81696	1	68	2000.0	2400.0
13	9.46490	1	38	350.0	2000.0	38	7.78669	1	33	790.0	2840.0
14	9.42291	1	34	2000.0	1500.0	39	7.62190	1	178	2300.0	1790.0
15	9.30553	1	38	350.0	1500.0	40	7.54152	1	272	475.0	2415.0
16	9.28846	1	34	2000.0	2000.0	41	7.51531	1	292	475.0	2415.0
17	9.18096	1	72	2000.0	2000.0	42	7.50393	1	14	790.0	2840.0
18	9.14511	1	72	2000.0	2400.0	43	7.46328	1	270	350.0	2000.0
19	9.07630	1	272	415.0	2230.0	44	7.46029	1	290	620.0	2690.0
20	8.97053	1	72	2000.0	1500.0	45	7.25798	1	292	790.0	2840.0
21	8.85679	1	272	350.0	2000.0	46	7.15744	1	38	415.0	2230.0
22	8.74169	1	34	2000.0	2400.0	47	7.11237	1	14	350.0	2000.0
23	8.71540	1	48	2000.0	1500.0	48	6.96485	1	280	415.0	2230.0
24	8.61310	1	178	2000.0	2000.0	49	6.93399	1	280	475.0	2415.0
25	8.38116	1	14	475.0	2415.0	50	6.93190	1	73	2300.0	1790.0

5. ISCST Results: Emission Height = 20 meters; 2 Area Sources;
Entire Year of Meteorological Data

ISCST (VERSION 82340)
AN AIR QUALITY DISPERSION MODEL IN
SECTION 2. NON-GUIDELINE MODELS.
IN UNAMAP (VERSION 5) DEC 82.
SOURCE: FILE 18 ON UNAMAP MAGNETIC TAPE FROM NTIS.

*** GARDINIER PHOSPHOGYPSUM FIELD [illegible]M CONCENTRATION - 1970 MET ***

CALCULATE (CONCENTRATION=1, DEPOSITION=2)	ISW(1) = 1
RECEPTOR GRID SYSTEM (RECTANGULAR=1 OR 3, POLAR=2 OR 4)	ISW(2) = 1
DISCRETE RECEPTOR SYSTEM (RECTANGULAR=1, POLAR=2)	ISW(3) = 1
TERRAIN ELEVATIONS ARE READ (YES=1, NO=0)	ISW(4) = 0
CALCULATIONS ARE WRITTEN TO TAPE (YES=1, NO=0)	ISW(5) = 0
LIST ALL INPUT DATA (NO=0, YES=1, MET DATA ALSO=2)	ISW(6) = 1
COMPUTE AVERAGE CONCENTRATION (OR TOTAL DEPOSITION)	
WITH THE FOLLOWING TIME PERIODS:	
HOURLY (YES=1, NO=0)	ISW(7) = 0
2-HOUR (YES=1, NO=0)	ISW(8) = 0
3-HOUR (YES=1, NO=0)	ISW(9) = 0
4-HOUR (YES=1, NO=0)	ISW(10) = 0
6-HOUR (YES=1, NO=0)	ISW(11) = 0
8-HOUR (YES=1, NO=0)	ISW(12) = 0
12-HOUR (YES=1, NO=0)	ISW(13) = 0
24-HOUR (YES=1, NO=0)	ISW(14) = 1
PRINT 'N'-DAY TABLE(S) (YES=1, NO=0)	ISW(15) = 1
PRINT THE FOLLOWING TYPES OF TABLES WHOSE TIME PERIODS ARE	
SPECIFIED BY ISW(7) THROUGH ISW(14):	
DAILY TABLES (YES=1, NO=0)	ISW(16) = 0
HIGHEST & SECOND HIGHEST TABLES (YES=1, NO=0)	ISW(17) = 1
MAXIMUM 50 TABLES (YES=1, NO=0)	ISW(18) = 1
METEOROLOGICAL DATA INPUT METHOD (PRE-PROCESSED=1, CARD=2)	ISW(19) = 1
RURAL-URBAN OPTION (RURAL=0, URBAN MODE 1=1, URBAN MODE 2=2)	ISW(20) = 0
WIND PROFILE EXPONENT VALUES (DEFAULTS=1, USER ENTERS=2, 3)	ISW(21) = 1
VERTICAL POT. TEMP. GRADIENT VALUES (DEFAULTS=1, USER ENTERS=2, 3)	ISW(22) = 1
SCALE EMISSION RATES FOR ALL SOURCES (NO=0, YES>0)	ISW(23) = 4
PROGRAM CALCULATES FINAL PLUME RISE ONLY (YES=1, NO=2)	ISW(24) = 1
PROGRAM ADJUSTS ALL STACK HEIGHTS FOR DOWNWASH (YES=2, NO=1)	ISW(25) = 1
NUMBER OF INPUT SOURCES	NSOURC = 2
NUMBER OF SOURCE GROUPS (=0, ALL SOURCES)	NGROUP = 0
TIME PERIOD INTERVAL TO BE PRINTED (=0, ALL INTERVALS)	IPERD = 0
NUMBER OF X (RANGE) GRID VALUES	NXPNTS = 0
NUMBER OF Y (THETA) GRID VALUES	NYPNTS = 0
NUMBER OF DISCRETE RECEPTORS	NXWYPT = 26
SOURCE EMISSION RATE UNITS CONVERSION FACTOR	TK =.10000E+07
ENTRAINMENT COEFFICIENT FOR UNSTABLE ATMOSPHERE	BETA1 =0.600
ENTRAINMENT COEFFICIENT FOR STABLE ATMOSPHERE	BETA2 =0.600
HEIGHT ABOVE GROUND AT WHICH WIND SPEED WAS MEASURED	ZR = 10.00 METERS
LOGICAL UNIT NUMBER OF METEOROLOGICAL DATA	IMET = 9
DECAY COEFFICIENT FOR PHYSICAL OR CHEMICAL DEPLETION	DECAY =0.000000E+00
SURFACE STATION NO.	ISS = 12842
YEAR OF SURFACE DATA	ISY = 70
UPPER AIR STATION NO.	IUS = 12842
YEAR OF UPPER AIR DATA	IUY = 70
ALLOCATED DATA STORAGE	LIMIT = 43500 WORDS
REQUIRED DATA STORAGE FOR THIS PROBLEM RUN	MIMIT = 891 WORDS

*** GARDINIER PHOSPHOGYPSUM FIELD - [illegible]M CONCENTRATION - 1970 MET ***

*** METEOROLOGICAL DAYS TO BE PROCESSED ***
(IF=1)

```
1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1
1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1
1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1
1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1
1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1
1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1
1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1
1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1
```

*** UPPER BOUND OF FIRST THROUGH FIFTH WIND SPEED CATEGORIES ***
(METERS/SEC)

1.54, 3.09, 5.14, 8.23, 10.80,

*** WIND PROFILE EXPONENTS ***

STABILITY CATEGORY	WIND SPEED CATEGORY 1	2	3	4	5	6
A	.10000E+00	.10000E+00	.10000E+00	.10000E+00	.10000E+00	.10000E+00
B	.15000E+00	.15000E+00	.15000E+00	.15000E+00	.15000E+00	.15000E+00
C	.20000E+00	.20000E+00	.20000E+00	.20000E+00	.20000E+00	.20000E+00
D	.25000E+00	.25000E+00	.25000E+00	.25000E+00	.25000E+00	.25000E+00
E	.30000E+00	.30000E+00	.30000E+00	.30000E+00	.30000E+00	.30000E+00
F	.30000E+00	.30000E+00	.30000E+00	.30000E+00	.30000E+00	.30000E+00

*** VERTICAL POTENTIAL TEMPERATURE GRADIENTS ***
(DEGREES KELVIN PER METER)

STABILITY CATEGORY	WIND SPEED CATEGORY 1	2	3	4	5	6
A	.00000E+00	.00000E+00	.00000E+00	.00000E+00	.00000E+00	.00000E+00
B	.00000E+00	.00000E+00	.00000E+00	.00000E+00	.00000E+00	.00000E+00
C	.00000E+00	.00000E+00	.00000E+00	.00000E+00	.00000E+00	.00000E+00
D	.00000E+00	.00000E+00	.00000E+00	.00000E+00	.00000E+00	.00000E+00
E	.20000E-01	.20000E-01	.20000E-01	.20000E-01	.20000E-01	.20000E-01
F	.35000E-01	.35000E-01	.35000E-01	.35000E-01	.35000E-01	.35000E-01

*** X,Y COORDINATES OF DISCRETE RECEPTORS ***
(METERS)

(415.0, 2230.0),	(475.0, 2415.0),	(620.0, 2690.0),	(355.0, 2780.0),	(790.0, 2840.0),
(780.0, 3050.0),	(2300.0, 610.0),	(2300.0, 1100.0),	(2300.0, 1460.0),	(2300.0, 1680.0),
(2300.0, 1970.0),	(2300.0, 2205.0),	(2740.0, 3035.0),	(2560.0, 3145.0),	(2560.0, 3330.0),
(1000.0, 3150.0),	(1500.0, 3150.0),	(2000.0, 3150.0),	(2350.0, 2750.0),	(2000.0, 2400.0),
(350.0, 2000.0),	(2000.0, 2000.0),	(350.0, 1500.0),	(2000.0, 1500.0),	(500.0, 1000.0),
(1250.0, 450.0),	(			

*** GARDINIER PHOSPHOGYPSUM FIELD - [illegible] CONCENTRATION - 1970 MET ***

*** SOURCE DATA ***

SOURCE NUMBER	TYPE	WAKE	NUMBER PART. CATS.	EMISSION RATE TYPE=0,1 (GRAMS/SEC) TYPE=2 (GRAMS/SEC) *PER METER**2	X (METERS)	Y (METERS)	BASE ELEV. (METERS)	HEIGHT (METERS)	TEMP. TYPE=0 (DEG. K); VERT. DIM TYPE=1 (METERS)	EXIT VEL. TYPE=0 (M/SEC); HORZ. DIM TYPE=1,2 (METERS)	DIAMETER TYPE=0 (METERS)	BLDG. HEIGHT TYPE=0 (METERS)	BLDG. LENGTH TYPE=0 (METERS)	BLDG. WIDTH TYPE=0 (METERS)
1	2	0	3	0.32000E-05	750.0	1600.0	0.0	20.00	0.00	1000.00	0.00	0.00	0.00	0.00
2	2	0	3	0.50000E-05	1000.0	2500.0	0.0	20.00	0.00	600.00	0.00	0.00	0.00	0.00

*** SOURCE PARTICULATE DATA ***

*** SOURCE NUMBER = 1 ***

MASS FRACTION =
0.04000, 0.29000, 0.67000,

SETTLING VELOCITY(METERS/SEC) =
0.0028, 0.0170, 0.0450,

SURFACE REFLECTION COEFFICIENT =
0.88000, 0.70000, 0.60000,

*** SOURCE NUMBER = 2 ***

MASS FRACTION =
0.04000, 0.29000, 0.67000,

SETTLING VELOCITY(METERS/SEC) =
0.0028, 0.0170, 0.0450,

SURFACE REFLECTION COEFFICIENT =
0.88000, 0.70000, 0.60000,

*** GARDINIER PHOSPHOGYPSUM FIELD - PM CONCENTRATION - 1970 MET ***

* SOURCE EMISSION RATE SCALARS WHICH VARY WITH STABILITY AND WIND SPEED *

* FOR ALL SOURCES *

STABILITY CATEGORY	WIND SPEED CATEGORY 1	2	3	4	5	6
A	.00000E+00	.00000E+00	.00000E+00	.10000E+01	.10000E+01	.10000E+01
B	.00000E+00	.00000E+00	.00000E+00	.10000E+01	.10000E+01	.10000E+01
C	.00000E+00	.00000E+00	.00000E+00	.10000E+01	.10000E+01	.10000E+01
D	.00000E+00	.00000E+00	.00000E+00	.10000E+01	.10000E+01	.10000E+01
E	.00000E+00	.00000E+00	.00000E+00	.10000E+01	.10000E+01	.10000E+01
F	.00000E+00	.00000E+00	.00000E+00	.10000E+01	.10000E+01	.10000E+01

*** GARDINIER PHOSPHOGYPSUM FIELD - PM CONCENTRATION - 1970 MET ***

* SOURCE-RECEPTOR COMBINATIONS LESS THAN 100 METERS OR THREE BUILDING HEIGHTS IN DISTANCE. NO AVERAGE CONCENTRATION IS CALCULATED *

SOURCE NUMBER	- - RECEPTOR LOCATION - - X OR RANGE (METERS)	Y (METERS) OR DIRECTION (DEGREES)	DISTANCE BETWEEN (METERS)
2	1500.0	3150.0	64.60

*** GARDINIER PHOSPHOGYPSUM FIELD [M] CONCENTRATION - 1970 MET ***

* 365-DAY AVERAGE CONCENTRATION (MICROGRAMS/CUBIC METER) *

* FROM ALL SOURCES *
* FOR THE DISCRETE RECEPTOR POINTS *

- X -	- Y -	CON.	- X -	- Y -	CON.	- X -	- Y -	CON.
415.0	2230.0	0.46328	475.0	2415.0	0.48962	620.0	2690.0	0.56144
355.0	2780.0	0.40748	790.0	2840.0	0.61800	780.0	3050.0	0.49121
2300.0	610.0	0.14519	2300.0	1100.0	0.19227	2300.0	1460.0	0.22303
2300.0	1680.0	0.26220	2300.0	1990.0	0.25918	2300.0	2205.0	0.23505
2740.0	3035.0	0.09057	2560.0	3145.0	0.08277	2560.0	3330.0	0.05869
1000.0	3150.0	0.44302	1500.0	3150.0	0.10608	2000.0	3150.0	0.16241
2350.0	2750.0	0.15853	2000.0	2400.0	0.34123	350.0	2000.0	0.41013
2000.0	2000.0	0.36651	350.0	1500.0	0.23812	2000.0	1500.0	0.32134
500.0	1000.0	0.14263	1250.0	450.0	0.09823			

*** GARDINIER PHOSPHOGYPSUM FIE[...] PM CONCENTRATION - 1970 MET ***

* HIGHEST 24-HOUR AVERAGE CONCENTRATION (MICROGRAMS/CUBIC METER) *
* FROM ALL SOURCES *
* FOR THE DISCRETE RECEPTOR POINTS *

- X -	- Y -	CON.	(DAY, PER.)	- X -	- Y -	CON.	(DAY, PER.)
415.0	2230.0	9.15401	(290, 1)	475.0	2415.0	6.58476	(290, 1)
620.0	2690.0	5.46206	(280, 1)	355.0	2780.0	4.59336	(270, 1)
790.0	2840.0	6.17021	(292, 1)	780.0	3050.0	4.65110	(32, 1)
2300.0	610.0	3.78525	(7, 1)	2300.0	1100.0	5.01322	(73, 1)
2300.0	1460.0	5.40956	(73, 1)	2300.0	1680.0	5.55604	(72, 1)
2300.0	1990.0	5.85029	(73, 1)	2300.0	2205.0	4.55215	(48, 1)
2740.0	3035.0	2.63423	(178, 1)	2560.0	3145.0	2.24832	(177, 1)
2560.0	3330.0	1.70867	(177, 1)	1000.0	3150.0	6.37551	(33, 1)
1500.0	3150.0	2.45635	(109, 1)	2000.0	3150.0	2.51888	(222, 1)
2350.0	2750.0	4.37141	(178, 1)	2000.0	2400.0	4.61241	(73, 1)
350.0	2000.0	6.85298	(272, 1)	2000.0	2000.0	7.21719	(73, 1)
350.0	1500.0	6.34150	(38, 1)	2000.0	1500.0	6.09896	(7, 1)
500.0	1000.0	3.80461	(38, 1)	1250.0	450.0	3.10340	(328, 1)

*** GARDINIER PHOSPHOGYPSUM FIELD [illegible] CONCENTRATION - 1970 MET ***

* SECOND HIGHEST 24-HOUR AVERAGE CONCENTRATION (MICROGRAMS/CUBIC METER) *
* FROM ALL SOURCES *
* FOR THE DISCRETE RECEPTOR POINTS *

- X -	- Y -	CON.	(DAY, PER.)	- X -	- Y -	CON.	(DAY, PER.)
415.0	2230.0	6.34989	(272, 1)	475.0	2415.0	6.20009	(14, 1)
620.0	2690.0	5.30997	(290, 1)	355.0	2780.0	4.48491	(280, 1)
790.0	2840.0	5.70228	(290, 1)	780.0	3050.0	4.34922	(292, 1)
2300.0	610.0	2.35437	(319, 1)	2300.0	1100.0	4.87240	(7, 1)
2300.0	1460.0	4.52983	(7, 1)	2300.0	1680.0	5.45916	(73, 1)
2300.0	1990.0	4.65472	(34, 1)	2300.0	2205.0	3.96031	(73, 1)
2740.0	3035.0	2.01631	(177, 1)	2560.0	3145.0	2.00103	(178, 1)
2560.0	3330.0	1.59474	(298, 1)	1000.0	3150.0	4.74812	(6, 1)
1500.0	3150.0	2.36287	(350, 1)	2000.0	3150.0	2.41379	(177, 1)
2350.0	2750.0	2.88450	(67, 1)	2000.0	2400.0	4.44191	(48, 1)
350.0	2000.0	6.55470	(290, 1)	2000.0	2000.0	6.73253	(72, 1)
350.0	1500.0	5.44950	(272, 1)	2000.0	1500.0	5.97987	(73, 1)
500.0	1000.0	2.86100	(37, 1)	1250.0	450.0	2.15914	(4, 1)

*** GARDINIER PHOSPHOGYPSUM FIELD - [illegible]M CONCENTRATION - 1970 MET ***

* 50 MAXIMUM 24-HOUR AVERAGE CONCENTRATION (MICROGRAMS/CUBIC METER) *

* FROM ALL SOURCES *

RANK	CON.	PER.	DAY	X OR RANGE (METERS)	Y(METERS) OR DIRECTION (DEGREES)	RANK	CON.	PER.	DAY	X OR RANGE (METERS)	Y(METERS) OR DIRECTION (DEGREES)
1	9.15401	1	290	415.0	2230.0	26	5.17096	1	270	620.0	2690.0
2	7.21719	1	73	2000.0	2000.0	27	5.10299	1	273	350.0	2000.0
3	6.85298	1	272	350.0	2000.0	28	5.01322	1	73	2300.0	1100.0
4	6.73253	1	72	2000.0	2000.0	29	4.97802	1	34	2300.0	1680.0
5	6.58476	1	290	475.0	2415.0	30	4.93306	1	138	620.0	2690.0
6	6.55470	1	290	350.0	2000.0	31	4.90384	1	151	620.0	2690.0
7	6.38766	1	38	350.0	2000.0	32	4.87240	1	7	2300.0	1100.0
8	6.37551	1	33	1000.0	3150.0	33	4.81304	1	38	415.0	2230.0
9	6.34989	1	272	415.0	2230.0	34	4.77682	1	290	350.0	1500.0
10	6.34150	1	38	350.0	1500.0	35	4.74812	1	6	1000.0	3150.0
11	6.33104	1	34	2000.0	2000.0	36	4.73099	1	14	415.0	2230.0
12	6.20009	1	14	475.0	2415.0	37	4.70800	1	68	2300.0	1680.0
13	6.17021	1	292	790.0	2840.0	38	4.65472	1	34	2300.0	1990.0
14	6.09896	1	7	2000.0	1500.0	39	4.65110	1	32	780.0	3050.0
15	5.97987	1	73	2000.0	1500.0	40	4.62469	1	270	790.0	2840.0
16	5.85029	1	73	2300.0	1990.0	41	4.62142	1	48	2300.0	1990.0
17	5.73461	1	68	2000.0	2000.0	42	4.61241	1	73	2000.0	2400.0
18	5.70228	1	290	790.0	2840.0	43	4.59336	1	270	355.0	2780.0
19	5.55604	1	72	2300.0	1680.0	44	4.58635	1	81	2300.0	1680.0
20	5.47378	1	81	2000.0	2000.0	45	4.57476	1	292	620.0	2690.0
21	5.46206	1	280	620.0	2690.0	46	4.56326	1	272	475.0	2415.0
22	5.45916	1	73	2300.0	1680.0	47	4.56012	1	14	790.0	2840.0
23	5.44950	1	272	350.0	1500.0	48	4.55215	1	48	2300.0	2205.0
24	5.40956	1	73	2300.0	1460.0	49	4.52983	1	7	2300.0	1460.0
25	5.30997	1	290	620.0	2690.0	50	4.48905	1	41	2000.0	2000.0

6. ISCST Results: Emission Height = 20 meters; 17 Area Sources; Worst-Case Days

ISCST (VERSION 82340)
AN AIR QUALITY DISPERSION MODEL IN
SECTION 2. NON-GUIDELINE MODELS.
IN UNAMAP (VERSION 5) DEC 82.
SOURCE: FILE 18 ON UNAMAP MAGNETIC TAPE FROM .S.

*** GARDINIER PHOSPHOGYPSUM FIELD – ... CONCENTRATION - 1970 MET ***

CALCULATE (CONCENTRATION=1, DEPOSITION=2)	ISW(1) =	1
RECEPTOR GRID SYSTEM (RECTANGULAR=1 OR 3, POLAR=2 OR 4)	ISW(2) =	1
DISCRETE RECEPTOR SYSTEM (RECTANGULAR=1, POLAR=2)	ISW(3) =	1
TERRAIN ELEVATIONS ARE READ (YES=1, NO=0)	ISW(4) =	0
CALCULATIONS ARE WRITTEN TO TAPE (YES=1, NO=0)	ISW(5) =	0
LIST ALL INPUT DATA (NO=0, YES=1, MET DATA ALSO=2)	ISW(6) =	1
COMPUTE AVERAGE CONCENTRATION (OR TOTAL DEPOSITION) WITH THE FOLLOWING TIME PERIODS:		
HOURLY (YES=1, NO=0)	ISW(7) =	0
2-HOUR (YES=1, NO=0)	ISW(8) =	0
3-HOUR (YES=1, NO=0)	ISW(9) =	0
4-HOUR (YES=1, NO=0)	ISW(10) =	0
6-HOUR (YES=1, NO=0)	ISW(11) =	0
8-HOUR (YES=1, NO=0)	ISW(12) =	0
12-HOUR (YES=1, NO=0)	ISW(13) =	0
24-HOUR (YES=1, NO=0)	ISW(14) =	1
PRINT 'N'-DAY TABLE(S) (YES=1, NO=0)	ISW(15) =	1
PRINT THE FOLLOWING TYPES OF TABLES WHOSE TIME PERIODS ARE SPECIFIED BY ISW(7) THROUGH ISW(14):		
DAILY TABLES (YES=1, NO=0)	ISW(16) =	0
HIGHEST & SECOND HIGHEST TABLES (YES=1, NO=0)	ISW(17) =	1
MAXIMUM 50 TABLES (YES=1, NO=0)	ISW(18) =	1
METEOROLOGICAL DATA INPUT METHOD (PRE-PROCESSED=1, CARD=2)	ISW(19) =	1
RURAL-URBAN OPTION (RURAL=0, URBAN MODE 1=1, URBAN MODE 2=2)	ISW(20) =	0
WIND PROFILE EXPONENT VALUES (DEFAULTS=1, USER ENTERS=2, 3)	ISW(21) =	1
VERTICAL POT. TEMP. GRADIENT VALUES (DEFAULTS=1, USER ENTERS=2, 3)	ISW(22) =	1
SCALE EMISSION RATES FOR ALL SOURCES (NO=0, YES>0)	ISW(23) =	4
PROGRAM CALCULATES FINAL PLUME RISE ONLY (YES=1, NO=2)	ISW(24) =	1
PROGRAM ADJUSTS ALL STACK HEIGHTS FOR DOWNWASH (YES=2, NO=1)	ISW(25) =	1
NUMBER OF INPUT SOURCES	NSOURC =	17
NUMBER OF SOURCE GROUPS (=0, ALL SOURCES)	NGROUP =	0
TIME PERIOD INTERVAL TO BE PRINTED (=0, ALL INTERVALS)	IPERD =	0
NUMBER OF X (RANGE) GRID VALUES	NXPNTS =	0
NUMBER OF Y (THETA) GRID VALUES	NYPNTS =	0
NUMBER OF DISCRETE RECEPTORS	NXWYPT =	26
SOURCE EMISSION RATE UNITS CONVERSION FACTOR	TK =	.10000E+07
ENTRAINMENT COEFFICIENT FOR UNSTABLE ATMOSPHERE	BETA1 =	0.600
ENTRAINMENT COEFFICIENT FOR STABLE ATMOSPHERE	BETA2 =	0.600
HEIGHT ABOVE GROUND AT WHICH WIND SPEED WAS MEASURED	ZR =	10.00 METERS
LOGICAL UNIT NUMBER OF METEOROLOGICAL DATA	IMET =	9
DECAY COEFFICIENT FOR PHYSICAL OR CHEMICAL DEPLETION	DECAY =	0.000000E+00
SURFACE STATION NO.	ISS =	12842
YEAR OF SURFACE DATA	ISY =	70
UPPER AIR STATION NO.	IUS =	12842
YEAR OF UPPER AIR DATA	IUY =	70
ALLOCATED DATA STORAGE	LIMIT =	43500 WORDS
REQUIRED DATA STORAGE FOR THIS PROBLEM RUN	MIMIT =	4116 WORDS

*** GARDINIER PHOSPHOGYPSUM FIELD [illegible]PM CONCENTRATION - 1970 MET ***

*** METEOROLOGICAL DAYS TO BE PROCESSED ***
(IF=1)

```
0 0 0 0 0 0 1 0 0 0   0 0 0 1 0 0 0 0 0 0   0 0 0 0 0 0 0 0 0 0   0 1 1 1 0 0 0 1 0 0   0 0 0 0 0 0 0 1 0 0
0 0 0 0 0 0 0 0 0 0   0 0 0 0 0 0 0 1 0 0   0 1 1 0 0 0 0 0 0 0   1 0 0 0 0 0 0 0 0 0   0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 1 0   0 0 0 0 0 0 0 0 0 0   0 0 0 0 0 0 0 0 0 0   0 0 0 0 0 0 0 0 0 0   0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0   0 0 0 0 0 0 0 0 0 0   0 0 0 0 0 0 1 1 0 0   0 0 0 0 0 0 0 0 0 0   0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0   0 0 0 0 0 0 0 0 0 0   0 1 0 0 0 0 0 0 0 0   0 0 0 0 0 0 0 0 0 0   0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0   0 0 0 0 0 0 0 0 0 1   0 1 0 0 0 0 0 0 0 1   0 0 0 0 0 0 0 0 0 1   0 1 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0   0 0 0 0 0 0 0 0 0 0   0 0 0 0 0 0 0 1 0 0   0 0 0 0 0 0 0 0 0 0   0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0   0 0 0 0 0 0
```

*** UPPER BOUND OF FIRST THROUGH FIFTH WIND SPEED CATEGORIES ***
(METERS/SEC)

1.54, 3.09, 5.14, 8.23, 10.80,

*** WIND PROFILE EXPONENTS ***

STABILITY CATEGORY	WIND SPEED CATEGORY 1	2	3	4	5	6
A	.10000E+00	.10000E+00	.10000E+00	.10000E+00	.10000E+00	.10000E+00
B	.15000E+00	.15000E+00	.15000E+00	.15000E+00	.15000E+00	.15000E+00
C	.20000E+00	.20000E+00	.20000E+00	.20000E+00	.20000E+00	.20000E+00
D	.25000E+00	.25000E+00	.25000E+00	.25000E+00	.25000E+00	.25000E+00
E	.30000E+00	.30000E+00	.30000E+00	.30000E+00	.30000E+00	.30000E+00
F	.30000E+00	.30000E+00	.30000E+00	.30000E+00	.30000E+00	.30000E+00

*** VERTICAL POTENTIAL TEMPERATURE GRADIENTS ***
(DEGREES KELVIN PER METER)

STABILITY CATEGORY	WIND SPEED CATEGORY 1	2	3	4	5	6
A	.00000E+00	.00000E+00	.00000E+00	.00000E+00	.00000E+00	.00000E+00
B	.00000E+00	.00000E+00	.00000E+00	.00000E+00	.00000E+00	.00000E+00
C	.00000E+00	.00000E+00	.00000E+00	.00000E+00	.00000E+00	.00000E+00
D	.00000E+00	.00000E+00	.00000E+00	.00000E+00	.00000E+00	.00000E+00
E	.20000E-01	.20000E-01	.20000E-01	.20000E-01	.20000E-01	.20000E-01
F	.35000E-01	.35000E-01	.35000E-01	.35000E-01	.35000E-01	.35000E-01

*** X,Y COORDINATES OF DISCRETE RECEPTORS ***
(METERS)

(415.0,	2230.0),	(475.0,	2415.0),	(620.0,	2690.0),	(355.0,	2780.0),	(790.0,	2840.0),
(780.0,	3050.0),	(2300.0,	610.0),	(2300.0,	1100.0),	(2300.0,	1460.0),	(2300.0,	1680.0),
(2300.0,	1990.0),	(2300.0,	2205.0),	(2740.0,	3035.0),	(2560.0,	3145.0),	(2560.0,	3330.0),
(1000.0,	3150.0),	(1500.0,	3150.0),	(2000.0,	3150.0),	(2350.0,	2750.0),	(2000.0,	2400.0),
(350.0,	2000.0),	(2000.0,	2000.0),	(350.0,	1500.0),	(2000.0,	1500.0),	(500.0,	1000.0),
(1250.0,	450.0),	(							

*** GARDINIER PHOSPHOGYPSUM FIELD [illegible]M CONCENTRATION - 1970 MET ***

*** SOURCE DATA ***

SOURCE NUMBER	TYPE	WAKE	NUMBER PART. CATS.	EMISSION RATE TYPE=0,1 (GRAMS/SEC) TYPE=2 (GRAMS/SEC) *PER METER**2	X (METERS)	Y (METERS)	BASE ELEV. (METERS)	HEIGHT (METERS)	TEMP. TYPE=0 (DEG.K); VERT.DIM TYPE=1 (METERS)	EXIT VEL. TYPE=0 (M/SEC); HORZ.DIM TYPE=1,2 (METERS)	DIAMETER TYPE=0 (METERS)	BLDG. HEIGHT TYPE=0 (METERS)	BLDG. LENGTH TYPE=0 (METERS)	BLDG. WIDTH TYPE=0 (METERS)
1	2	0	3	0.73000E-05	750.0	1650.0	0.0	20.00	0.00	200.00	0.00	0.00	0.00	0.00
2	2	0	3	0.73000E-05	1000.0	1650.0	0.0	20.00	0.00	200.00	0.00	0.00	0.00	0.00
3	2	0	3	0.73000E-05	1200.0	1650.0	0.0	20.00	0.00	200.00	0.00	0.00	0.00	0.00
4	2	0	3	0.73000E-05	1400.0	1650.0	0.0	20.00	0.00	200.00	0.00	0.00	0.00	0.00
5	2	0	3	0.73000E-05	1600.0	1650.0	0.0	20.00	0.00	200.00	0.00	0.00	0.00	0.00
6	2	0	3	0.73000E-05	1600.0	1850.0	0.0	20.00	0.00	200.00	0.00	0.00	0.00	0.00
7	2	0	3	0.73000E-05	1600.0	2050.0	0.0	20.00	0.00	200.00	0.00	0.00	0.00	0.00
8	2	0	3	0.73000E-05	1600.0	2250.0	0.0	20.00	0.00	200.00	0.00	0.00	0.00	0.00
9	2	0	3	0.73000E-05	1550.0	2450.0	0.0	20.00	0.00	200.00	0.00	0.00	0.00	0.00
10	2	0	3	0.73000E-05	1500.0	2650.0	0.0	20.00	0.00	200.00	0.00	0.00	0.00	0.00
11	2	0	3	0.73000E-05	1400.0	2850.0	0.0	20.00	0.00	200.00	0.00	0.00	0.00	0.00
12	2	0	3	0.73000E-05	1200.0	2850.0	0.0	20.00	0.00	200.00	0.00	0.00	0.00	0.00
13	2	0	3	0.73000E-05	1000.0	2650.0	0.0	20.00	0.00	200.00	0.00	0.00	0.00	0.00
14	2	0	3	0.73000E-05	800.0	2450.0	0.0	20.00	0.00	200.00	0.00	0.00	0.00	0.00
15	2	0	3	0.73000E-05	750.0	2250.0	0.0	20.00	0.00	200.00	0.00	0.00	0.00	0.00
16	2	0	3	0.73000E-05	750.0	2050.0	0.0	20.00	0.00	200.00	0.00	0.00	0.00	0.00
17	2	0	3	0.73000E-05	750.0	1850.0	0.0	20.00	0.00	200.00	0.00	0.00	0.00	0.00

*** SOURCE PARTICULATE DATA ***

*** SOURCE NUMBER = 1 ***

MASS FRACTION =
0.04000, 0.29000, 0.67000,

SETTLING VELOCITY(METERS/SEC) =
0.0028, 0.0170, 0.0450,

SURFACE REFLECTION COEFFICIENT =
0.89000, 0.70000, 0.60000,

*** SOURCE NUMBER = 2 ***

MASS FRACTION =
0.04000, 0.29000, 0.67000,

SETTLING VELOCITY(METERS/SEC) =
0.0028, 0.0170, 0.0450,

SURFACE REFLECTION COEFFICIENT =
0.89000, 0.70000, 0.60000,

*** SOURCE NUMBER = 3 ***

MASS FRACTION =
0.04000, 0.29000, 0.67000,

SETTLING VELOCITY(METERS/SEC) =
0.0028, 0.0170, 0.0450,

SURFACE REFLECTION COEFFICIENT =
0.89000, 0.70000, 0.60000,

*** SOURCE PARTICULATE DATA ***

*** SOURCE NUMBER = 4 ***

MASS FRACTION =
0. 04000, 0. 29000, 0. 67000,

SETTLING VELOCITY(METERS/SEC) =
0. 0029, 0. 0170, 0. 0450,

SURFACE REFLECTION COEFFICIENT =
0. 88000, 0. 70000, 0. 60000,

*** SOURCE NUMBER = 5 ***

MASS FRACTION =
0. 04000, 0. 29000, 0. 67000,

SETTLING VELOCITY(METERS/SEC) =
0. 0029, 0. 0170, 0. 0450,

SURFACE REFLECTION COEFFICIENT =
0. 88000, 0. 70000, 0. 60000,

*** SOURCE NUMBER = 6 ***

MASS FRACTION =
0. 04000, 0. 29000, 0. 67000,

SETTLING VELOCITY(METERS/SEC) =
0. 0029, 0. 0170, 0. 0450,

SURFACE REFLECTION COEFFICIENT =
0. 88000, 0. 70000, 0. 60000,

*** SOURCE PARTICULATE DATA ***

*** SOURCE NUMBER = 7 ***

MASS FRACTION =
0. 04000, 0. 29000, 0. 67000,

SETTLING VELOCITY(METERS/SEC) =
0. 0028, 0. 0170, 0. 0450,

SURFACE REFLECTION COEFFICIENT =
0. 88000, 0. 70000, 0. 60000,

*** SOURCE NUMBER = 8 ***

MASS FRACTION =
0. 04000, 0. 29000, 0. 67000,

SETTLING VELOCITY(METERS/SEC) =
0. 0028, 0. 0170, 0. 0450,

SURFACE REFLECTION COEFFICIENT =
0. 88000, 0. 70000, 0. 60000,

*** SOURCE NUMBER = 9 ***

MASS FRACTION =
0. 04000, 0. 29000, 0. 67000,

SETTLING VELOCITY(METERS/SEC) =
0. 0028, 0. 0170, 0. 0450,

SURFACE REFLECTION COEFFICIENT =
0. 88000, 0. 70000, 0. 60000,

*** GARDINIER PHOSPHOGYPSUM FIELD [illegible]M CONCENTRATION - 1970 MET ***

*** SOURCE PARTICULATE DATA ***

*** SOURCE NUMBER = 10 ***

MASS FRACTION =
0.04000, 0.29000, 0.67000,

SETTLING VELOCITY(METERS/SEC) =
0.0028, 0.0170, 0.0450,

SURFACE REFLECTION COEFFICIENT =
0.88000, 0.70000, 0.60000,

*** SOURCE NUMBER = 11 ***

MASS FRACTION =
0.04000, 0.29000, 0.67000,

SETTLING VELOCITY(METERS/SEC) =
0.0028, 0.0170, 0.0450,

SURFACE REFLECTION COEFFICIENT =
0.88000, 0.70000, 0.60000,

*** SOURCE NUMBER = 12 ***

MASS FRACTION =
0.04000, 0.29000, 0.67000,

SETTLING VELOCITY(METERS/SEC) =
0.0028, 0.0170, 0.0450,

SURFACE REFLECTION COEFFICIENT =
0.88000, 0.70000, 0.60000,

*** SOURCE PARTICULATE DATA ***

*** SOURCE NUMBER = 13 ***

MASS FRACTION =
0.04000, 0.29000, 0.67000,

SETTLING VELOCITY(METERS/SEC) =
0.0028, 0.0170, 0.0450,

SURFACE REFLECTION COEFFICIENT =
0.89000, 0.70000, 0.60000,

*** SOURCE NUMBER = 14 ***

MASS FRACTION =
0.04000, 0.29000, 0.67000,

SETTLING VELOCITY(METERS/SEC) =
0.0028, 0.0170, 0.0450,

SURFACE REFLECTION COEFFICIENT =
0.89000, 0.70000, 0.60000,

*** SOURCE NUMBER = 15 ***

MASS FRACTION =
0.04000, 0.29000, 0.67000,

SETTLING VELOCITY(METERS/SEC) =
0.0028, 0.0170, 0.0450,

SURFACE REFLECTION COEFFICIENT =
0.89000, 0.70000, 0.60000,

*** SOURCE PARTICULATE DATA ***

*** SOURCE NUMBER = 16 ***

MASS FRACTION =
0. 04000, 0. 29000, 0. 67000,

SETTLING VELOCITY(METERS/SEC) =
0. 0029, 0. 0170, 0. 0450,

SURFACE REFLECTION COEFFICIENT =
0. 80000, 0. 70000, 0. 60000,

*** SOURCE NUMBER = 17 ***

MASS FRACTION =
0. 04000, 0. 29000, 0. 67000,

SETTLING VELOCITY(METERS/SEC) =
0. 0029, 0. 0170, 0. 0450,

SURFACE REFLECTION COEFFICIENT =
0. 80000, 0. 70000, 0. 60000,

*** GARDINIER PHOSPHOGYPSUM FIELD - PM CONCENTRATION - 1970 MET ***

* SOURCE EMISSION RATE SCALARS WHICH VARY WITH STABILITY AND WIND SPEED *

* FOR ALL SOURCES *

STABILITY CATEGORY	WIND SPEED CATEGORY 1	2	3	4	5	6
A	.00000E+00	.00000E+00	.00000E+00	.10000E+01	.10000E+01	.10000E+01
B	.00000E+00	.00000E+00	.00000E+00	.10000E+01	.10000E+01	.10000E+01
C	.00000E+00	.00000E+00	.00000E+00	.10000E+01	.10000E+01	.10000E+01
D	.00000E+00	.00000E+00	.00000E+00	.10000E+01	.10000E+01	.10000E+01
E	.00000E+00	.00000E+00	.00000E+00	.10000E+01	.10000E+01	.10000E+01
F	.00000E+00	.00000E+00	.00000E+00	.10000E+01	.10000E+01	.10000E+01

*** GARDINIER PHOSPHOGYPSUM FIELD - PM CONCENTRATION - 1970 MET ***

* SOURCE-RECEPTOR COMBINATIONS LESS THAN 100 METERS OR THREE BUILDING HEIGHTS IN DISTANCE. NO AVERAGE CONCENTRATION IS CALCULATED *

SOURCE NUMBER	- - RECEPTOR LOCATION - - X OR RANGE (METERS)	Y (METERS) OR DIRECTION (DEGREES)	DISTANCE BETWEEN (METERS)
11	1500.0	3150.0	87.16

*** GARDINIER PHOSPHOGYPSUM FIELD -[?]M CONCENTRATION - 1970 MET ***

* HIGHEST 24-HOUR AVERAGE CONCENTRATION (MICROGRAMS/CUBIC METER) *
* FROM ALL SOURCES *
* FOR THE DISCRETE RECEPTOR POINTS *

- X -	- Y -	CON.	(DAY,PER.)	- X -	- Y -	CON.	(DAY,PER.)
415.0	2230.0	7.25294	(290, 1)	475.0	2415.0	7.84752	(290, 1)
620.0	2690.0	5.36173	(33, 1)	355.0	2780.0	3.98808	(292, 1)
770.0	2840.0	4.70510	(280, 1)	780.0	3050.0	4.03895	(292, 1)
2300.0	610.0	4.06111	(7, 1)	2300.0	1100.0	6.54310	(73, 1)
2300.0	1460.0	7.10647	(73, 1)	2300.0	1680.0	6.05471	(73, 1)
2300.0	1990.0	5.72456	(178, 1)	2300.0	2205.0	4.45863	(73, 1)
2740.0	3035.0	2.41685	(178, 1)	2560.0	3145.0	2.23805	(178, 1)
2560.0	3330.0	2.22925	(177, 1)	1000.0	3150.0	3.82508	(292, 1)
1500.0	3150.0	3.97716	(33, 1)	2000.0	3150.0	3.42016	(109, 1)
2350.0	2750.0	3.51880	(178, 1)	2000.0	2400.0	5.96365	(73, 1)
350.0	2000.0	6.91504	(38, 1)	2000.0	2000.0	7.16742	(73, 1)
350.0	1500.0	8.82897	(290, 1)	2000.0	1500.0	9.21253	(73, 1)
500.0	1000.0	5.38953	(38, 1)	1250.0	450.0	3.38107	(328, 1)

*** GARDINIER PHOSPHOGYPSUM FIELD M CONCENTRATION - 1970 MET ***

* SECOND HIGHEST 24-HOUR AVERAGE CONCENTRATION (MICROGRAMS/CUBIC METER) *
* FROM ALL SOURCES *
* FOR THE DISCRETE RECEPTOR POINTS *

- X -	- Y -	CON.	(DAY, PER.)	- X -	- Y -	CON.	(DAY, PER.)
415.0	2230.0	6.26114	(272, 1)	475.0	2415.0	5.31989	(14, 1)
620.0	2690.0	5.13253	(290, 1)	355.0	2780.0	3.89686	(280, 1)
790.0	2840.0	4.63751	(14, 1)	780.0	3050.0	3.82447	(270, 1)
2300.0	610.0	2.63267	(73, 1)	2300.0	1100.0	5.16445	(7, 1)
2300.0	1460.0	4.99267	(68, 1)	2300.0	1680.0	4.63271	(68, 1)
2300.0	1990.0	5.13268	(73, 1)	2300.0	2205.0	4.11457	(48, 1)
2740.0	3035.0	1.80646	(177, 1)	2560.0	3145.0	2.18230	(177, 1)
2560.0	3330.0	1.28419	(222, 1)	1000.0	3150.0	3.53803	(33, 1)
1500.0	3150.0	3.75267	(109, 1)	2000.0	3150.0	2.97096	(177, 1)
2350.0	2750.0	2.54770	(177, 1)	2000.0	2400.0	5.85651	(72, 1)
350.0	2000.0	6.55698	(290, 1)	2000.0	2000.0	6.90252	(7, 1)
350.0	1500.0	7.23679	(272, 1)	2000.0	1500.0	6.44923	(7, 1)
500.0	1000.0	3.45366	(272, 1)	1250.0	450.0	0.26253	(73, 1)

*** GARDINIER PHOSPHOGYPSUM FIELD - CONCENTRATION - 1970 MET ***

* 50 MAXIMUM 24-HOUR AVERAGE CONCENTRATION (MICROGRAMS/CUBIC METER) *

* FROM ALL SOURCES *

RANK	CON.	PER.	DAY	X OR RANGE (METERS)	Y(METERS) OR DIRECTION (DEGREES)
1	9.21253	1	73	2000.0	1500.0
2	8.82897	1	290	350.0	1500.0
3	7.84752	1	290	475.0	2415.0
4	7.25294	1	290	415.0	2230.0
5	7.23679	1	272	350.0	1500.0
6	7.16742	1	73	2000.0	2000.0
7	7.10647	1	73	2300.0	1460.0
8	6.91504	1	38	350.0	2000.0
9	6.90252	1	7	2000.0	2000.0
10	6.81216	1	38	350.0	1500.0
11	6.55698	1	290	350.0	2000.0
12	6.54310	1	73	2300.0	1100.0
13	6.44923	1	7	2000.0	1500.0
14	6.30720	1	272	350.0	2000.0
15	6.26114	1	272	415.0	2230.0
16	6.19709	1	68	2000.0	1500.0
17	6.05471	1	73	2300.0	1680.0
18	5.96650	1	34	2000.0	1500.0
19	5.96365	1	73	2000.0	2400.0
20	5.85651	1	72	2000.0	2400.0
21	5.82206	1	48	2000.0	1500.0
22	5.72456	1	178	2300.0	1990.0
23	5.69405	1	72	2000.0	1500.0
24	5.68613	1	280	350.0	2000.0
25	5.56615	1	178	2000.0	2000.0
26	5.52676	1	34	2000.0	2400.0
27	5.52456	1	292	415.0	2230.0
28	5.51861	1	34	2000.0	2000.0
29	5.38953	1	38	500.0	1000.0
30	5.36173	1	33	620.0	2690.0
31	5.32335	1	72	2000.0	2000.0
32	5.31989	1	14	475.0	2415.0
33	5.24309	1	270	350.0	2000.0
34	5.21315	1	81	2000.0	2400.0
35	5.18291	1	14	415.0	2230.0
36	5.16445	1	7	2300.0	1100.0
37	5.13577	1	272	475.0	2415.0
38	5.13268	1	73	2300.0	1990.0
39	5.13253	1	290	620.0	2690.0
40	5.12625	1	81	2000.0	1500.0
41	5.07637	1	38	415.0	2230.0
42	4.99267	1	68	2300.0	1460.0
43	4.96635	1	68	2000.0	2400.0
44	4.93895	1	34	2300.0	1990.0
45	4.93649	1	72	2300.0	1990.0
46	4.86339	1	14	350.0	2000.0
47	4.82712	1	68	2000.0	2000.0
48	4.82465	1	81	2000.0	2000.0
49	4.81649	1	34	2300.0	1460.0
50	4.80979	1	292	475.0	2415.0

APPENDIX D

The emissions associated with the new field are non-point source in nature. Although the air emissions are considered to be insignificant, the following mitigation measures will be applied to reduce and monitor emissions.

1. Disposal of the phosphogypsum will be as a wet slurry and hence the initial process of adding to the field does not result in fugitive gyspum dust emissions.
2. As a result of a vegetation program planned for the project, only about 7 vertical feet of gypsum should be exposed at any time.
3. The chemical plant recovers fluosilicic acid, which reduces the potential for fluoride evolution 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 and fluoride, fluoride in grasses, and Radium 226 and sulfate in particulate matter.

APPENDIX D

The emissions associated with the new field are non-point source in nature. Although the air emissions are considered to be insignificant, the following mitigation measures will be applied to reduce and monitor emissions.

1. Disposal of the phosphogypsum will be as a wet slurry and hence the initial process of adding to the field does not result in fugitive gypsum dust emissions.
2. As a result of a vegetation program planned for the project, only about 5 to 10 vertical feet of gypsum should be exposed at any given time.
3. The chemical plant recovers fluosilicic acid, which reduces the potential for fluoride evolution 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 and fluoride, fluoride in grasses, and Radium 226 and sulfate in particulate matter.

INDEX - APPENDIX E

(Responses to Pre-Application Meeting)

1. Gypsum Characterization

2. New Gypsum Field Maintenance Program

3. Modeling Clarification

4. Gypsum Particle Size Data

Appendix E-1

QUANTITATIVE

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

CHEMICAL ANALYSIS	TYPICAL GYPSUM (as-is)	GYPSUM SLURRY (as-is)
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

QUALIITATIVE

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

CHEMICAL ANALYSIS	TYPICAL GYPSUM (Free H2O-Free)	TYPICAL GYPSUM SLURRY
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 %

Appendix E-2

February 24, 1987

NEW GYPSUM FIELD MAINTENANCE PROGRAM

Gardinier has designed the maintenance program for the new gypsum field to insure that there will be no fugitive dust emissions from the new gypsum disposal site.

It is planned that the top of the new gypsum field will be maintained by using the peripheral deposition method. Peripheral deposition is a technique by which gypsum can be selectively placed around the outside perimeter of the gypsum field. Implementation of the peripheral deposition system will begin once the bottom of the field is covered with gypsum to protect the underdrains. All sides will be furnished with a supply of gypsum 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 - 4 inch diameter discharge nozzles (See Detail A of Sketch 1). After the "beach" has been established, a 200 ft. discharge section would be operated for about 16 hours in one location and then moved to the next location. The discharge point would be shifted to the bypass section of the south end of the line or to the opposite side of the field while the 200 ft. discharge sections are relocated.

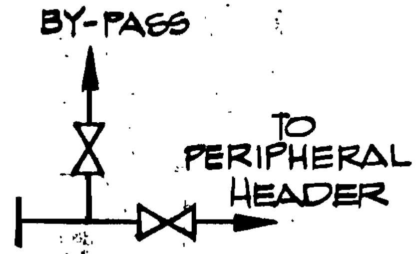
To raise the field, a portion of the header pipe and spigots could be closed from the piping system, a gypsum dike would then be constructed of material from the field, and the piping system raised to the top of the dike. The piping system would then be reconnected and put back into operation. This operation would involve a minimum of time and a minimul construction effort. It is envisioned that raises can be accomplished with doziers and some gradall assistance, as is common with raises on the existing gypsum field.

The use of the peripheral deposition system will provide a means for keeping the top of the field in a "moist" condition. This technique of continually wetting the top of the field with fresh slurry should result in virtually eliminating any dust problems.

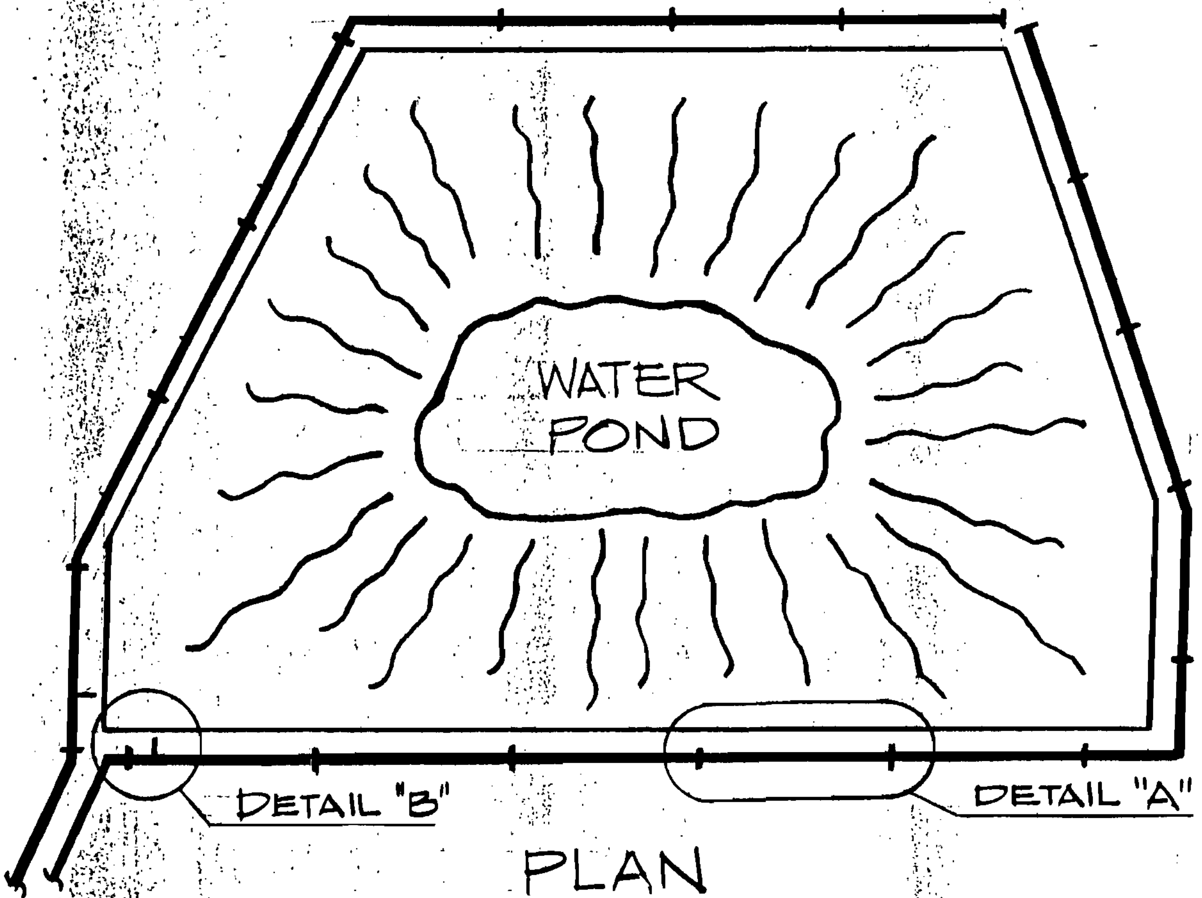
Additionally, it is anticipated that if weather conditions become dry and the access and maintenance roads become dusty then a watering program would be initiated to substantially reduce any dust emittions. Watering would probably be done by using water trucks or if necessary by the installation of an irrigation system.

The side slopes of the gypsum field would be grassed at approximately each increase in height of 7 ft. This would correspond to a slope distance of about 22 ft. The side slopes would 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 would be placed over the top of the gypsum.

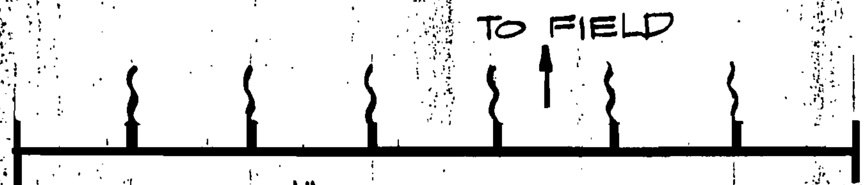
The top 6 inches of soil placed on the field would be topsoil. The topsoil from the stripping operation would be stockpiled around the field to be used for this top 6 inch of cover. The underlying soil could be borrowed from offsite if required.



DETAIL "B"
N.T.S.



PLAN
N.T.S.



DETAIL "A"
N.T.S.

GARDINIER INC. EAST TAMPA, FLORIDA		
SKETCH 1		
SECT: P.E.	SCALE: N.T.S.	DATE: 2-24-87
DR. L.W.P. TR. CH.		DRAWING NO. SK-1718

Appendix E-3

GARDINIER PHOSPHOGYPSUM FIELD
AIR EMISSIONS PERMIT APPLICATION:

ADDENDUM ON AMBIENT PARTICULATE
MATTER CONCENTRATION ASSESSMENT

GARDINIER PHOSPHOGYPSUM FIELD
AIR EMISSIONS PERMIT APPLICATION:

ADDENDUM ON AMBIENT PARTICULATE
MATTER CONCENTRATION ASSESSMENT

In the preapplication meeting on Gardinier's proposed new phosphogypsum field, the Florida Department of Environmental Regulation (DER) requested additional information on five aspects of the ambient particulate matter concentration assessment. This addendum provides the information requested.

The five items of interest to DER are as follows:

1. The method of calculating the acreages of exposed areas form which particulate matter emissions could occur due to wind erosion.
2. The need for a higher emission rate to calculate maximum 24-hour concentrations.
3. The basis for establishing particle size distributions.
4. Confirmation that emission rates used for model input are equivalent to total emissions calculated from the wind erosion emission factor.
5. Confirmation that maximum predicted concentrations occur at the receptors used in developing results for the preapplication meeting and not at greater distances.

Responses to these five items are provided in the remainder of this addendum.

1. EXPOSED AREA ACREAGE CALCULATIONS

The size of the exposed phosphogypsum field area used to calculate wind erosion emissions is 14.7 acres. This value is the sum of an outer slope exposed area of 8.1 acres and a field roadway area of 6.6 acres. These acreages were calculated as follows.

Outer Slope Exposed Acreage

As a result of the vegetation program planned for the project, only about 7 feet (vertical dimension) of phosphogypsum should be exposed at any given time on the outer surface of the field. Based on a surface slope of 3 horizontal to 1 vertical, the width of the exposed outer surface strip is equal to:

$$(7^2 + 21^2)^{0.5}\text{ft} = 22.14 \text{ ft}$$

Using a value of 15,900 ft to represent the perimeter of the field at its base, the total area of the exposed outer strip is equal to:

$$\frac{22.14 \text{ ft} \times 15{,}900 \text{ ft}}{43{,}560 \text{ ft}^2\cdot\text{acre}^{-1}} = 8.1 \text{ acres}$$

This acreage would decrease as the field increases in height assuming a constant exposed vertical dimension of 7 ft and a constant slope of 3 to 1.

Roadway Acreage

The roadway on top of the field will be approximately 20 ft wide. Using a roadway length of 14,400 ft, the area of the roadway as used to calculate emissions is equal to:

$$\frac{20 \text{ ft} \times 14{,}400 \text{ ft}}{43{,}560 \text{ ft}^2\cdot\text{acre}^{-1}} = 6.6 \text{ acres}$$

2. EMISSION RATE FOR MODELING 24-HOUR CONCENTRATIONS

As described in the information developed for the preapplication meeting, the most appropriate emission factor that could be found for the proposed phosphogypsum field is the wind erosion equation. This method of estimating emissions provides a total annual emission rate. The annual emission rate obtained by this method was used to derive emissions for modeling of both annual average and 24-hour concentrations using the following rules:

(1) Emissions occur only a wind speeds greater than 10 kts ($5.14\ m \cdot s^{-1}$).

(2) The same emission rate occurs for all wind speeds greater than 10 kts.

Application of these rules produces an instantaneous emission rate for modeling purposes that is consistent with the total annual emission rate considered to be the most reliable emission quantity for this type of emission source.

DER is interested in knowing if the instantaneous emission rate calculated in this fashion from an annual emission value can give a reasonable depiction of maximum 24-hour concentrations. We believe it can for the reasons discussed below.

If the annual emission rate calculated from the wind erosion equation is considered accurate, then there are primarily only two reasons that the emission rates used to predict 24-hour concentrations would be inappropriate. These two reasons entail a departure from the two rules of emission rate derivation listed above. First, it is possible to consider that wind erosion emissions occur at wind speeds less than or equal to 10 kts. Second, it is possible to consider that emission rates are not constant at all wind speeds greater than 10 kts.

The idea of a threshold wind speed below which wind erosion emissions do not occur is conceptually reasonable and has been confirmed by observation. Available literature support for a threshold above 10 kts is referenced in the information submitted for the preapplication meeting. The literature cited includes the latest edition of the U.S. Environmental Protection Agency's emission factors compilation (AP-42). DER did not specifically question the threshold concept or the threshold wind speed selected. Therefore, we assume that the method of incorporating this concept in the modeling analysis is acceptable and is not cause for a further consideration of the emission rate used to predict 24-hour concentrations.

This leaves the possibility that emission rates are not constant with wind speed (at and above the threshold speed). The three simplest situations that can be envisioned related to this possibility are the following. One, emission rates are always greater at higher wind speeds than at lower speeds. Two, emission rates are always greater at lower wind speeds than at higher speeds. Three, emission rates are always low at lower wind speeds, greatest at some intermediate speed, and then low again at the highest wind speeds.

Of these three, the first is intuitively the most plausible. If it were the case that emissions are greater at higher speeds and if we continue to consider that the annual emission rate calculated for the phosphogypsum field is accurate, then the constant instantaneous emission rate used in the modeling analysis overestimates emissions for the lower speeds (above the threshold) and underestimates for the higher speeds. The effect of these variances, however, would not necessarily be an underestimate of maximum 24-hour concentrations. Since no plume rise calculation is involved in the modeling analysis, predicted concentrations are directly proportional to emission rate and inversely proportional to wind speed on a linear basis. The overestimate of concentrations resulting from overestimating emission rates at lower speeds could very well exceed the underestimate of concentrations resulting from underestimating emission rates at higher speeds.

To this discussion, the actual occurrences of wind speeds at the site of the proposed phosphogypsum field should be introduced. Based on 1970 Tampa meteorological data, wind speeds in the range of 11 to

16 kts occur 16.2 percent of the time, and wind speeds of 17 kts or greater occur less than 1 percent of the time (0.7). Or, based on the threshold wind speed concept, wind erosion emissions occur 96 percent of the time wind speeds of 11 to 16 kts and only 4 percent of the time at higher wind speeds.

Another perspective on wind speed conditions, one which also includes some effect of wind direction, can be gained from the modeling analysis of 24-hour concentrations reported in the preapplication meeting information. For example, on the day producing the highest 24-hour concentration, for an emission height of 10 m, wind speeds above the threshold level associated with wind flow toward the highest concentration receptor were generally between 12 and 15 kts -- that is, in the lower wind speed category.

Based on actual wind speed occurrence, therefore, any overestimate of emission rates for the lowest wind speed category (above the threshold) would most likely produce an overestimate of predicted concentrations due to emissions from Gardinier's proposed field.

A less simple departure from the rule of constant emission rate at all wind speeds is the possibility that on some days the emission rate is higher for the same wind speed than it is on other days. We do not, however, have any information that would provide a realistic estimate of the likely range in emission rate differences for the same wind speed. For the sake of argument, though, consider the possibility that emission rates during worst-case meteorological episodes are twice as high as those used for modeling. In this case, the maximum predicted 24-hour concentration at any location would still be less than 30 $\mu g/m^3$, and the maximum predicted concentrations at most off-site locations would be less than 20 $\mu g/m^3$. Bear in mind also that these numbers do not necessarily represent increases in concentration above existing levels. The proposed field is a replacement for the existing field. Hence, any contribution to existing ambient particulate matter concentrations from the existing field would no longer exist once the new field begins operation.

A final item can be added to this discussion. Maximum predicted 24-hour concentrations have been predicted for days when there are several hours of winds above the threshold speed from the same or similar directions. For such days, however, there may be no mechanism for prolonged generation of suspendable particles on the phosphogypsum field. In other words, after the suspended particles originally present are removed during the first hours of a persistent wind direction day, such small particles may no longer be available to create emissions during later hours. The modeling analysis results presented to DER were based on an assumption of suspendable particles being continuously available.

3. PARTICLE SIZE DATA

In February 1984, Gardinier had samples collected from the side of the existing phosphogypsum field and from the roadway on the field. These samples were then analyzed to determine particle size distribution. Samples were collected under the supervision of Thornton Laboratories (Tampa, Florida) and sent to Particle Data Laboratories (Elmhurst, Illinois) for analysis by the Elzone method. Attached at the end of this section are the chain of custody records signed by Thornton Laboratories, and relevant particle size analysis results from Particle Data Laboratories (expressed as volume (mass) distributions).

As discussed in information prepared for the preapplication meeting, the particles of most concern for assessment of ambient concentrations are those that remain suspended long enough to be transported beyond the property boundaries of the emission source. Suspended particles are often defined as those with a diameter of 30 μm or less. For modeling purposes, three particle size ranges of suspended particles were considered: less than 10 μm (<10), 10-20 μm, and 20-30 μm.

From the particle size sampling results, the percentage of total particles on a volume or mass basis falling within these three ranges was determined. Separate determinations were made for the side sample and for the roadway sample. The three size range percentages for each type of sample were then normalized to show what fraction of all particles less than 30 μm in diameter are in each of the three size ranges. For example, 25.18 percent of all particles in the side sample were measured to be less than 30 μm in size; and 1.42 percent were measured to be less than 10 μm. The fraction of <10 μm particles in the suspended particle group is therefore 1.42/25.18, or 0.06.

The separate fractional distributions of suspended particles in the side and roadway samples were then combined to produce a single particle size distribution for modeling purposes. This combination was achieved by weighting the separate distributions in proportion to the estimated areas of exposed outer slope and roadway that will exist in the new phosphogypsum field - namely, 8.1 acres of exposed outer slope and 6.6 acres of roadway. It was assumed that 8.1/14.7 (or 55 percent) of emissions would come from the side of the field, and 6.6/14.7 (or 45 percent) from the roadway, and that these percentages apply to each of the three suspended particle size ranges.

As an example of this approach, consider those particles in the <10 μm range. The fraction of these particles in the total suspended particle group is 0.06 in the side sample and 0.02 in the roadway sample. Weighting these fractions in proportion to the side and roadway acreages, the combined particle size fraction of <10 μm particles is [(0.06 x 0.55) + (0.02 x 0.45)], or 0.04. Results of similar calculations for all three size ranges are shown in Table 3-1.

As a check on the importance of particle size distribution to predicted ambient concentrations, modeling calculations were made with different distributions. This sensitivity test was done with the ISCLT model for the case of annual average concentrations at an emission height of 10 m. Calculations were made for the combinations of mass fraction and reflection coefficient shown in Table 3-2.

The maximum annual concentrations obtained from these sensitivity test cases range from 0.7 to 0.9 $\mu g/m^3$. All predicted concentrations are considered insignificant using the 1.0 $\mu g/m^3$ definition of "significant impact" in DER's 17-2 regulations. These results demonstrate that assumptions on particle size distributions (and reflection coefficients as well) are not critical to the conclusion that predicted ambient particulate matter concentrations due to the proposed phosphogypsum field are minor.

TABLE 3-1

PARTICLE SIZE DISTRIBUTION DEVELOPED FROM SAMPLE ANALYSIS

	Volume (Mass) Distribution in Side Sample		Volume (Mass) Distribution in Roadway Sample		
Size Range (μm)	Percent of Total Sample	Normalized Mass Fraction[a]	Percent of Total Sample	Normalized Mass Fraction[a]	Combined Weighted Mass Fraction[b]
<10	1.42	0.06	0.43	0.02	0.04
10 to <20	9.32	0.37	3.49	0.19	0.29
20 to <30	14.44	0.57	14.38	0.79	0.67
	25.18	1.00	18.30	1.00	1.00

[a]Mass of particles in size range as a fraction of total mass of particles <30 μm in size.

[b]Weighted in proportion to 8.1 acres of exposed outer slope and 6.6 acres of roadway on the proposed new phosphogypsum field.

TABLE 3-2

PARTICLE SIZE DISTRIBUTION
SENSITIVITY TEST CASES

	Particle Size Range		
	<10	10 - 20	20 - 30
Case 1:[a]			
Mass Fraction	0.04	0.29	0.67
Reflection Coefficient	0.88	0.70	0.60
Case 2:			
Mass Fraction	0.04	0.29	0.67
Reflection Coefficient	1.00	1.00	1.00
Case 3:			
Mass Fraction	1.00	0.00	0.00
Reflection Coefficient	0.88	0.70	0.60
Case 4:			
Mass Fraction	1.00	0.00	0.00
Reflection Coefficient	1.00	1.00	1.00
Case 5:			
Mass Fraction	0.00	1.00	0.00
Reflection Coefficient	0.88	0.70	0.60
Case 6:			
Mass Fraction	0.00	0.00	1.00
Reflection Coefficient	0.88	0.70	0.60

[a]This is the base case reported in the draft permit application.

PARTICLE SIZE ANALYSIS BY ELZONE METHOD--PARTICLE DATA LABORATORIES, LTD.
115 HAHN STREET - ELMHURST, IL. 60126 - TELEPHONE: (312)832-5658

CLIENT: GARDINIER INC. 27 FEB 84 :DATE
SAMPLE: GYPSUM PILE (GYPSUM SIDE) 7743 : JOB NUMBER

*TOTAL IN TABULATION= TOTAL COUNT OR VOLUME IN ANALYSIS
TABULATION

DATA ID 7743 DATE NO DATE
SIZE-NORMALIZED VOLUME DISTRIBUTION
TOTAL = 2.94113E 8

CHNL	SIZE	VOLUME	% >	CHNL	SIZE	VOLUME	% >	CHNL	SIZE	VOLUME	% >
6	2.79	16	100.00	47	18.57	3222776	90.35	88	123.46	3949440	10.62
7	2.92	355	100.00	48	19.44	3415274	89.26	89	129.30	3380845	9.27
8	3.06	5502	100.00	49	20.36	3677259	88.10	90	135.42	2844733	8.12
9	3.21	18780	100.00	50	21.33	3953221	86.85	91	141.82	2497026	7.16
10	3.36	27129	99.99	51	22.34	4288939	85.50	92	148.53	2149387	6.31
11	3.52	29714	99.98	52	23.39	4644995	84.04	93	155.55	1856193	5.58
12	3.68	34570	99.97	53	24.50	5081672	82.46	94	162.91	1587660	4.95
13	3.86	40831	99.96	54	25.66	5421268	80.74	95	170.61	1415590	4.41
14	4.04	46143	99.95	55	26.87	5794944	78.89	96	178.68	1253393	3.93
15	4.23	54048	99.93	56	28.14	6172099	76.92	97	187.13	1122905	3.50
16	4.43	61424	99.91	57	29.47	6575765	74.82	98	195.98	1024026	3.12
17	4.64	70711	99.89	58	30.87	6948513	72.59	99	205.25	941306	2.77
18	4.86	79012	99.87	59	32.33	7413462	70.23	100	214.96	873349	2.45
19	5.09	88303	99.84	60	33.85	7815666	67.71	101	225.13	808827	2.15
20	5.33	102906	99.81	61	35.46	7890998	65.05	102	235.77	742082	1.88
21	5.58	117642	99.78	62	37.13	7896088	62.36	103	246.92	686160	1.62
22	5.85	130225	99.74	63	38.89	8000000	59.68	104	258.60	622057	1.39
23	6.12	149045	99.69	64	40.73	7967421	56.96	105	270.83	551806	1.18
24	6.41	170228	99.64	65	42.65	7812301	54.25	106	283.64	499357	.99
25	6.72	196299	99.58	66	44.67	7539543	51.59	107	297.06	457480	.82
26	7.04	227859	99.52	67	46.78	7031367	49.03	108	311.11	409636	.67
27	7.37	261508	99.44	68	49.00	6427201	46.64	109	325.82	360524	.53
28	7.72	316490	99.35	69	51.31	5929924	44.46	110	341.23	309122	.41
29	8.08	385404	99.24	70	53.74	5562375	42.44	111	357.37	257970	.30
30	8.46	446170	99.11	71	56.28	5034256	40.55	112	374.27	201417	.21
31	8.86	511359	98.96	72	58.94	4787306	38.84	113	391.97	144888	.14
32	9.28	598450	98.79	73	61.73	4599539	37.21	114	410.51	107119	.09
33	9.72	718411	98.58	74	64.65	4219249	35.64	115	429.92	78241	.06
34	10.18	852530	98.34	75	67.71	4024736	34.21	116	450.25	49775	.03
35	10.66	946597	98.05	76	70.91	4202570	32.84	117	471.55	26628	.01
36	11.17	1088460	97.73	77	74.26	4517105	31.41	118	493.85	11452	.01
37	11.70	1252261	97.36	78	77.78	4981287	29.88	119	517.21	3187	.00
38	12.25	1444137	96.93	79	81.45	5444216	28.18	120	541.67	679	.00
39	12.83	1617306	96.44	80	85.31	5731755	26.33	121	567.28	267	.00
40	13.44	1748888	95.89	81	89.34	6255373	24.38	122	594.11	186	.00
41	14.07	1884849	95.29	82	93.57	6453490	22.26	123	622.21	113	.00
42	14.74	2091251	94.65	83	97.99	6358526	20.06	124	651.64	246	.00
43	15.43	2299054	93.94	84	102.63	6112856	17.90	125	682.46	36	.00
44	16.16	2503024	93.16	85	107.48	5744221	15.82	126	714.73	12	.00
45	16.93	2746428	92.31	86	112.56	5113515	13.87				
46	17.73	3009948	91.38	87	117.89	4451867	12.13				

4. CONFIRMATION OF EMISSION RATE USED FOR MODELING

Modeling with ISCLT Model

For ISCLT modeling purposes, particulate matter emissions from Gardinier's proposed phosphogypsum field are represented as originating from 17 square areas located around the periphery of the field. Each square area was specified as having a width of 200 m, giving an area of 40,000 m^2. The emission rate from each area was specified (in units required by the model) as 7.344×10^{-6} $g \cdot s^{-1}$. If emissions were assumed continuous, this instantaneous emission rate would equate to the following annual emission rate:

$$= 7.344 \times 10^{-6}\ g \cdot s \cdot m^{-2}) \times (8{,}760\ h \cdot yr^{-1} \times 3{,}600\ s \cdot h^{-1}) \times$$

$$(40{,}000\ m^2) \times (1/453.6\ lb \cdot g^{-1}) \times (1/2{,}000\ ton \cdot lb^{-1}) \times 17\ \text{areas}$$

$$= 173.6\ ton \cdot yr^{-1}$$

Obviously, this figure exceeds the emission rate of 29.4 $ton \cdot yr^{-1}$ estimated from the wind erosion equation. However, as discussed in the information supplied for the preapplication meeting, emissions from wind erosion are not continuous but rather occur only at higher wind speeds. Using a feature of the ISCLT model, the emission rate of 7.344×10^{-6} $g \cdot s^{-1} \cdot m^{-2}$ was specified as applicable only to the three highest wind speed categories. For the three lowest wind speed categories, an emission rate of zero was specified. This specification can be coupled with the frequency of occurrence of wind speed classes in the meteorological input data set to produce an annual emission rate equivalent to that seen by the model. The frequency of occurrence of the three highest wind speed classes (for the 1970 Tampa meteorological data set) is 16.94 percent as can be verified by summing up the individual frequencies shown in the computer printout of input data provided to DER. Applying this percentage to the continuous source emission rate of 173.6 $ton \cdot yr^{-1}$ calculated above results in an actual emission rate as seen by the model of $0.1694 \times 173.6 = 29.4$ $ton \cdot yr^{-1}$.

Modeling With ISCST Model

Emission rates for use in hourly concentration calculations with the ISCST model were derived from the wind erosion equation annual emission rate of 29.4 $ton.yr^{-1}$. This was done by assuming an equa emission contribution during each hour that the wind speed equalled or exceeded the threshold wind speed required for wind erosion emissions. This approach can be illustrated for the modeling run which treated the proposed phosphogypsum field as two square areas with widths of 1,000 m (area = 1,000,000 m^2) and 600 m (area = 360,000 m^2), respectively.

As can be seen in the computer printouts supplied to DER, the emission rate specified for the 1,000-m wide area was 3.2×10^{-6} $g \cdot s^{-1} \cdot m^{-2}$, and the emission rate for the 600-m wide area was 5.0×10^{-6} $g \cdot s^{-1} \cdot m^{-2}$. If these were continuous emission rates, the following annual emission rate would result:

$$= [(3.2 \times 10^{-6}\ g \cdot s^{-1} \cdot m^{-2}) \times (1{,}000{,}000\ m^2) +$$
$$(5.0 \times 10^{-6}\ g \cdot s^{-1} \cdot m^{-2}) \times (360{,}000\ m^2)] \times [(8{,}760\ h \cdot yr^{-1}) \times$$
$$(3{,}600\ s \cdot h^{-1}) \times (1/453.6\ lb \cdot g^{-1}) \times (1/2{,}000\ ton \cdot lb^{-1})]$$
$$= 173.8\ ton \cdot yr^{-1}$$

This continuous emissions annual rate, however, was modified using the ISCST feature that specifies emission rate as a function of wind speed. The instantaneous emission rates for the two areas cited above were specified as applying only to wind speeds greater than 5.14 $m \cdot s^{-1}$ (10 kts). The input emission rates were adjusted to zero for lower wind speeds (using the source emission rate scalars shown in the computer printout supplied to DER). The actual annual emission rate seen by the model is therefore the annual rate equivalent to continuous emissions multiplied by the fraction of time that wind speeds exceed 10 kts, which for the 1970 Tampa meteorological data set is $0.1694 \times 173.8 = 29.4\ ton \cdot yr^{-1}$.

A similar discussion could be presented to show that the instantaneous emission rate used for the 17-source ISCST modeling runs also produces an annual emission rate of 29.4 $ton \cdot yr^{-1}$.

5. CONFIRMATION OF MAXIMUM CONCENTRATION LOCATIONS

The ambient concentration assessment in Gardinier's draft permit application focused on receptors at and near the property boundary line. This procedure was considered appropriate for predicting maximum off-site concentrations since the effective emission heights evaluated (10 m and 20 m) are relatively low and since the nearest off-site locations are at least 0.7 km from the center of the proposed phosphogypsum field. In fact, most of the property boundary receptors modeled are more than 1.0 km from the center of the field.

To confirm that higher predicted concentrations do not occur at greater distances, additional modeling was performed for both the 10-m and 20-m emission heights. This additional modeling consisted of annual average and 24-hour average calculations using the same emissions data as previously used. (Additional calculations of 24-hour concentrations were based on the 2-source configuration with a year of meteorological data.) Receptors were specified using a polar coordinate grid centered on the proposed field with radial distances of 1.0, 1.5, 2.0, 2.5, and 3.0 km and a radial spacing of ten degrees.

Results from this additional modeling analysis confirm that maximum predicted concentrations occur at the receptors previously modeled and not at greater distances. This is true for emission heights of both 10 and 20 m.

Appendix E-4

PARTICLE DATA LABORATORIES, LTD.

115 Hahn Street • Elmhurst, Illinois 60126 • (312) 832-5658

February 27, 1984

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

Attn: Mr. G. E. Wilkinson

Subject: Electrozone Analysis of 2 Gypsum Samples.

PDL Project: I-7743

Gentlemen:

Enclosed please find a copy of the computerized data printout of your sample as generated by the Electrozone Analyzer. If you have any questions, please do not hesitate to call us at Particle Data Laboratories.

It has been a pleasure serving your company, and we look forward to serving you again in the near future.

Respectfully submitted,

PARTICLE DATA LABORATORIES, LTD.

H. R. Batchu
Chemical Engineer & Senior Consultant
Particle Measurement Services

Enc.

PARTICLE DATA LABORATORIES, LTD.

115 Hahn Street • Elmhurst, Illinois 60126 • (312) 832-5658

BASIC ELECTROZONE TECHNOLOGY
AND
EXPLANATION OF REPORT

The electric sensing zone analytical technique has developed rapidly over the past twenty years. In this technique, particles suspended in a conductive fluid, flow serially through an orifice under a differential pressure. Electrodes are immersed on each side of the orifice as shown in Figure 1. As each particle passes through the aperture, it replaces its own volume of electolyte within the aperture, momentarily changing the resistance value between the electrodes. This change produces a voltage pulse of short duration having a magnitude proportional to particle volume. The resulting series of pulses is electronically amplified, scaled, and counted. Raw data processing is performed by a PDP-1103 minicomputer in such a manner that a population histogram of 128 or 256 channels of information can be acquired. Acquired data is conditioned by applying calibration, extrapolation, volume (weight) or area conversions. Normalization of size and quantity axes to the types of scales required by the researcher is also possible.

The conductive particle suspension medium is an important consideration in Electrozone^{R} technology. Typically, aqueous isotonic saline (0.9% by Wt) or a 4% by weight sodium pyrophosphate is used as a dispersing and particle suspension medium. For certain analyses which cannot be run in an aqueous media, 4% weight/volume lithium chloride in isopropyl alcohol is effective.

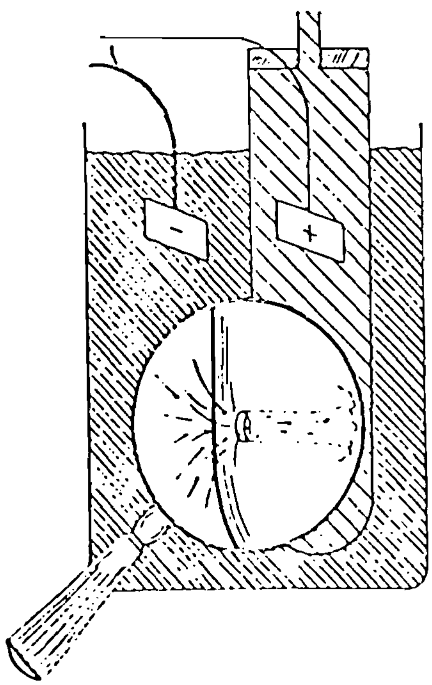


Figure 1 Basic Detection Mechanism

Figure IIA is a cross section of the orifice shown in Figure I. In this configuration, no particle is shown in the orifice. Since a constant current is established in the conductive liquid and through the sapphire orifice, a constant voltage potential is represented as the product of the current (I) and Resistance (R).

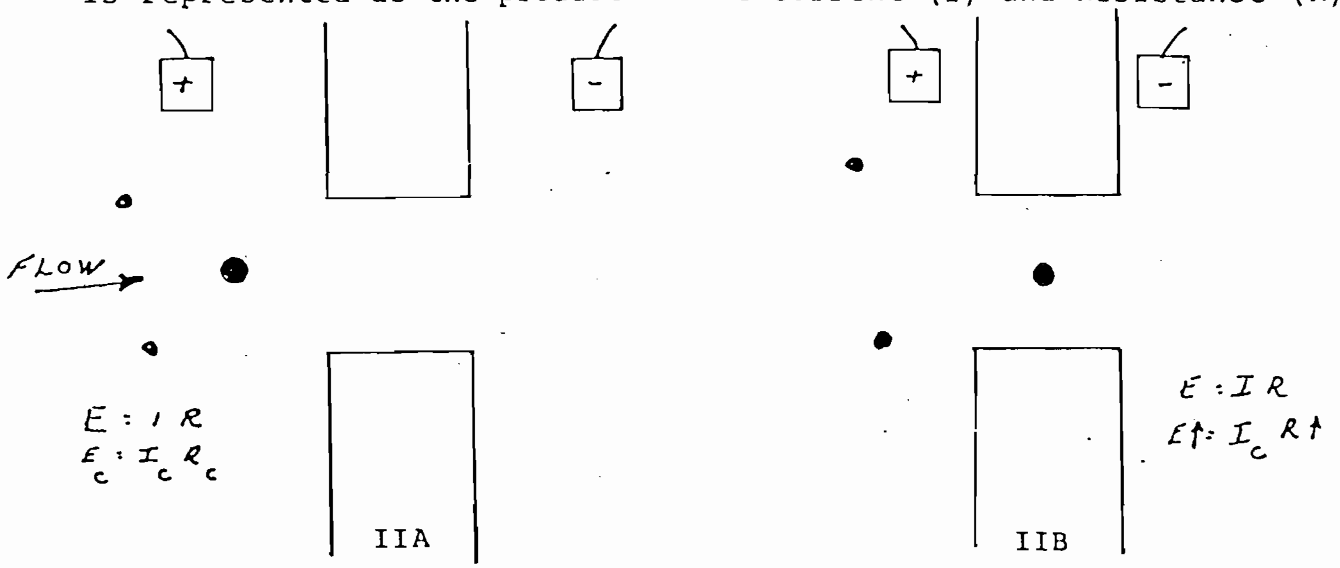


Figure IIB is the same condition except with a particle in the orifice or sensing zone. Since almost all particles act as insulators, the electrical resistance increases in the orifice. Under the conditions of a constant current and increased resistance, the product of these two must rise according to Ohm's Law. Since the particles traverse the orifice in about 20 micro seconds, a voltage pulse is produced. The magnitude of this voltage pulse is proportional to the envelope volume of the particle. That is, a small particle yields a small voltage pulse while a large particle yields a large pulse. The particle may be irregular in shape (spheres are seldom encountered), but since the volume of that particle has been measured, the diameter of a sphere of equal volume can be assigned to that particle. This method of expressing data as the "Diameter of a Sphere of Equal Volume" is used throughout all of "Fine Particle Technology."

Now that we have a way of measuring discrete events very rapidly and accurately, all we have to do is to present a representative population to the detector. The technologist must sample the powder in a meaningful manner and he must disperse the powder so that only individual particles are monitored by the instrument. When all of these conditions have been met, the suspension is analyzed by counting and sizing no fewer than fifty thousand particles of the sample. Since the accuracy and precision of the measurement is effected by the sample size, we elect to count such a high number of particles. When a preset number of particles has been acquired, the computer stops the analysis. At this point pertinent calibration information is added from the keyboard and the frequency (population) statistics are generated. The information is then converted to a volume (mass) basis and these statistics are reported.

There are two classic methods of fine particle size analysis:

1. Frequency Distribution (Microscope Counting)
2. Mass Distribution (Sieves or Andreason sedimentation)

In the first method, the number of particles of a specific size are tabulated by the microscopist. He scans a microscope slide while randomly searching for a particle in the prepared slide. When one is located, it is sized using an eyepiece micrometer and counted as a frequency of occurrence. Soon a frequency distribution is established for the sample of interest. The microscopist can now calculate the relative percent of particles within a given size interval or he can sum the data and report the percentage greater than an indicated size. Table I is a brief example of this procedure. Following the statistical treatment, he can plot the data to locate the geometric median diameter and then derive other statistical parameters.

Table I

Example of Frequency Distribution Data

(µm) Particle Size Interval	d Mid Size	N Frequency of Occurrence	Σ N Cumulative Frequency	Cumulative Frequency ≥Indicated %
1.0 - 1.4	1.2	10	100	100
1.4 - 2.0	1.7	15	90	90
2.0 - 2.8	2.4	50	75	75
2.8 - 4.0	3.2	15	25	25
4.0 - 5.6	4.8	10	10	10

What this data indicates is that 100% of the data measured is greater than or equal to 1.0 microns. Ninety percent is greater than 1.4 microns diameter. This information when plotted on log-probability paper will yield a straight line if the distribution is truly log normal (most samples are). Once the data is plotted many statistical parameters are available to the analyst from standard formulas.

The second method of analysis is performed by a standard sieving technique. In this method, a known weight of dry sample is passed through nested precision sieves and the weight percent retained on each sieve size is calculated. Data is handled as above in Table I except data is expressed on a weight basis.

Since the Elzone technique determines the volume of individual particles, we can convert frequency data directly into mass or into area. It is part of the job of the technologist to determine which data format is appropriate to his application.

The Elzone report is broken down as follows:

Page	Description
1	Frequency and Volume (Mass) Statistics
2	Plot of Differential Frequency Distribution
3	Tabulation of Channel Number, Diameter and Count (Number of particles at that size).
4	Plot of Differential Mass Distribution
5	Tabulation of Channel Number, Diameter and mass (relative units at that size).

Each page will be described below:

Page 1

The top section of this page is devoted to the volume (mass) statistics. The definitions of the terms used are as follows:

Volume Mode - The diameter size in microns of a spherical particle that contains the largest total mass value. It is always the peak of a distribution curve.

Volume Median - That point in the distribution curve that splits the data into two equal areas. One half is larger and one half is smaller than the indicated size on a mass basis.

Geometric Volume Mean - The size of an average particle calculated on a log basis.

Arithmetic Volume Mean - The size of an average particle calculated on an arithmetic scale.

+/-XXX - One sigma interval of standard deviation

(XX.XXX) - Coefficient of variation This is the Standard Deviation divided by the Mean multiplied by 100 to yield percentage.

Skewness - This term denotes symmetry. If the curve is perfectly Gaussian, geometric skewness will be 0.00. If the curve is biased towards the fines, skewness will be negative.

For Plotting on Log Probability Paper -
This data is presented at 0.77 sigma intervals across a normal curve. It expresses the percent of mass at or greater than the indicated size from a cumulative curve.

The bottom of this page is just like the top except that it expresses the statistics on a frequency (count) basis.

Remember that the frequency basis will always be smaller than mass basis because the mass data rises as a function of the diameter cubed. It takes one million one micron diameter particles by count to equal the same mass as a single one hundred micron diameter particle.

Page 2

This page is a plot of the frequency distribution as a function of size. Each plus (+) represents a specific number of particles at a given size. The size scale is a log scale because a Gaussian curve plotted on a arithmetic scale would be skewed towards the larger sizes. Typically, data is plotted on a log scale.

Page 3

This is the "Tabulation" page by frequency (count). The number after "Total =" represents the number of particles counted in a particular analysis. This number is usually modified by some factor so that the graph routine will be represented as a full scale plot. The tabulation informs the client how many particles (count) he could expect to find at any indicated micron size if he had counted the number of particles indicated under "Total In Tabulation".

Page 4

This page is a plot of the mass (volume) distribution mathematically derived from the count (frequency) distribution. It reveals the distribution of mass as a function of particle size. Usually, this data is more relevant as to a particular industrial process.

Page 5

The last page in your report is a tabulation of data in a mass (volume) format. It is exactly like the count tabulation except that it informs us of the relative mass (grams, micrograms, pounds or tons) of material at each micron size if you had a pile of material weighing the same as that figure displayed under "Total =".

BEST AVAILABLE COPY

PARTICLE SIZE ANALYSIS BY ELZONE METHOD--PARTICLE DATA LABORATORIES, LTD.
115 HAHN STREET - ELMHURST, IL. 60126 - TELEPHONE: (312)832-5658

CLIENT: GARDINIER INC. 27 FEB 84 :DATE
SAMPLE: GYPSUM PILE (GYPSUM SIDE) 7743 : JOB NUMBER

OLUME (MASS) DISTRIBUTION FROM DISPLAY AREA: 4
=======================

NDICES

OLUME MODE = 38.89 MEDIAN = 44.67 MICRONS AND LARGER

EOMETRIC VOLUME MEAN = 47.64 +/- 53.57 (112.45%) SKEWNESS = .16

RITHMETIC VOLUME MEAN = 63.16 +/- 52.81 (83.62%) SKEWNESS = .46

OR PLOTTING PROBABILITY ON LOG PAPER:

ERCENTILE: 00.1% OF VOLUME IS AT 391.97 MICRONS AND LARGER
ERCENTILE: 01.0% OF VOLUME IS AT 270.83 MICRONS AND LARGER
ERCENTILE: 06.0% OF VOLUME IS AT 148.53 MICRONS AND LARGER
ERCENTILE: 22.0% OF VOLUME IS AT 93.57 MICRONS AND LARGER
ERCENTILE: 50.0% OF VOLUME IS AT 44.67 MICRONS AND LARGER
ERCENTILE: 78.0% OF VOLUME IS AT 26.87 MICRONS AND LARGER
ERCENTILE: 94.0% OF VOLUME IS AT 14.74 MICRONS AND LARGER
E TILE: 99.0% OF VOLUME IS AT 8.46 MICRONS AND LARGER
ERCENTILE: 99.9% OF VOLUME IS AT 4.43 MICRONS AND LARGER

OUNT (FREQUENCY) DISTRIBUTION FROM DISPLAY AREA: 5
===========================

NDICES

OUNTS MODE = 2.79 MEDIAN = 8.46 MICRONS AND LARGER

GEOMETRIC COUNTS MEAN = 8.55 +/- 9.19 (107.60%) SKEWNESS = .63

ARITHMETIC COUNTS MEAN = 11.34 +/- 10.04 (88.52%) SKEWNESS = .85

FOR PLOTTING PROBABILITY ON LOG PAPER:

ERCENTILE: 00.1% OF COUNTS IS AT 93.57 MICRONS AND LARGER
ERCENTILE: 01.0% OF COUNTS IS AT 46.78 MICRONS AND LARGER
ERCENTILE: 06.0% OF COUNTS IS AT 28.14 MICRONS AND LARGER
ERCENTILE: 22.0% OF COUNTS IS AT 15.43 MICRONS AND LARGER
E TILE: 50.0% OF COUNTS IS AT 8.46 MICRONS AND LARGER
E NTILE: 78.0% OF COUNTS IS AT 4.23 MICRONS AND LARGER
ERCENTILE: 94.0% OF COUNTS IS AT 3.06 MICRONS AND LARGER
ERCENTILE: 99.0% OF COUNTS IS AT 2.79 MICRONS AND LARGER
ERCENTILE: 99.9% OF COUNTS IS AT 2.79 MICRONS AND LARGER

BEST AVAILABLE COPY

PARTICLE SIZE ANALYSIS BY ELZONE METHOD--PARTICLE DATA LABORATORIES, LTD.
115 HAHN STREET - ELMHURST, IL. 60126 - TELEPHONE: (312)832-5658

CLIENT: GARDINIER INC. 27 FEB 84 :DATE
SAMPLE: GYPSUM PILE (GYPSUM SIDE) · 7743 : JOB NUMBER

PARTICLE SIZE VS. COUNTS
ENCLOSING
LOW AT 6 2.79 4000 HIGH AT 92 148.53 5

GRAPH OF DIAMETER SIZES VS. DIFFERENTIAL COUNTS FROM CHANNEL 6 TO 92, AND SKIP: 2

% MAX	SIZE
.0	2.55
96.2	2.92
91.6	3.36
86.9	3.86
81.3	4.43
77.0	5.09
72.3	5.85
72.0	6.72
76.5	7.72
84.4	8.86
87.1	10.18
87.0	11.70
80.1	13.44
69.6	15.43
60.0	17.73
48[illegible]	20.36
40.3	23.39
33.2	26.87
26.2	30.87
19.7	35.46
13.1	40.73
7.7	46.78
4.0	53.74
2.2	61.73
1.3	70.91
1.1	81.45
.9	93.57
.6	107.48
.2	123.46
.1	141.82

(Scale: 0 10 20 30 40 50 60 70 80 90 100)

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PARTICLE SIZE ANALYSIS BY ELZONE METHOD--PARTICLE DATA LABORATORIES, LTD.
115 HAHN STREET - ELMHURST, IL. 60126 - TELEPHONE: (312)832-5658

CLIENT: GARDINIER INC. 27 FEB 84 :DATE
SAMPLE: GYPSUM PILE (GYPSUM SIDE) 7743 : JOB NUMBER

TOTAL IN TABULATION= TOTAL COUNT OR VOLUME IN ANALYSIS
ABULATION

ATA ID 7743 DATE NO DATE
SIZE-NORMALIZED VOLUME DISTRIBUTION
TOTAL = 2.94113E 8

HNL	SIZE	VOLUME	% >	CHNL	SIZE	VOLUME	% >	CHNL	SIZE	VOLUME	% >
6	2.79	16	100.00	47	18.57	3222776	90.35	88	123.46	3949440	10.62
7	2.92	355	100.00	48	19.44	3415274	89.26	89	129.30	3380845	9.27
8	3.06	5502	100.00	49	20.36	3677259	88.10	90	135.42	2844733	8.12
9	3.21	18780	100.00	50	21.33	3953221	86.85	91	141.82	2497026	7.16
10	3.36	27129	99.99	51	22.34	4288939	85.50	92	148.53	2149387	6.31
11	3.52	29714	99.98	52	23.39	4644995	84.04	93	155.55	1856193	5.58
12	3.68	34570	99.97	53	24.50	5081672	82.46	94	162.91	1587660	4.95
13	3.86	40831	99.96	54	25.66	5421268	80.74	95	170.61	1415590	4.41
14	4.04	46143	99.95	55	26.87	5794944	78.89	96	178.68	1253393	3.93
15	4.23	54048	99.93	56	28.14	6172099	76.92	97	187.13	1122905	3.50
16	4.43	61424	99.91	57	29.47	6575765	74.82	98	195.98	1024026	3.12
17	4.64	70711	99.89	58	30.87	6948513	72.59	99	205.25	941306	2.77
18	4.86	79012	99.87	59	32.33	7413462	70.23	100	214.96	873349	2.45
19	5.09	88303	99.84	60	33.85	7815666	67.71	101	225.13	808827	2.15
20	.33	102906	99.81	61	35.46	7890998	65.05	102	235.77	742082	1.88
21	5.58	117642	99.78	62	37.13	7896088	62.36	103	246.92	686160	1.62
22	5.85	130225	99.74	63	38.89	8000000	59.68	104	258.60	622057	1.39
23	6.12	149045	99.69	64	40.73	7967421	56.96	105	270.83	551806	1.18
24	6.41	170228	99.64	65	42.65	7812301	54.25	106	283.64	499357	.99
25	6.72	196299	99.58	66	44.67	7539543	51.59	107	297.06	457480	.82
26	7.04	227859	99.52	67	46.78	7031367	49.03	108	311.11	409636	.67
27	7.37	261508	99.44	68	49.00	6427201	46.64	109	325.82	360524	.53
28	7.72	316490	99.35	69	51.31	5929924	44.46	110	341.23	309122	.41
29	8.08	385404	99.24	70	53.74	5562375	42.44	111	357.37	257970	.30
30	8.46	446170	99.11	71	56.28	5034256	40.55	112	374.27	201417	.21
31	8.86	511359	98.96	72	58.94	4787306	38.84	113	391.97	144888	.14
32	9.28	598450	98.79	73	61.73	4599539	37.21	114	410.51	107119	.09
33	9.72	718411	98.58	74	64.65	4219249	35.64	115	429.92	78241	.06
34	10.18	852530	98.34	75	67.71	4024736	34.21	116	450.25	49775	.03
35	10.66	946597	98.05	76	70.91	4202570	32.84	117	471.55	26628	.01
36	11.17	1088460	97.73	77	74.26	4517105	31.41	118	493.85	11452	.01
37	11.70	1252261	97.36	78	77.78	4981287	29.88	119	517.21	3187	.00
38	12.25	1444137	96.93	79	81.45	5444216	28.18	120	541.67	679	.00
39	12.83	1617306	96.44	80	85.31	5731755	26.33	121	567.28	267	.00
40	13.44	1748868	95.89	81	89.34	6255373	24.38	122	594.11	186	.00
41	14.07	1884849	95.29	82	93.57	6453490	22.26	123	622.21	113	.00
42	14.74	2091251	94.65	83	97.99	6358526	20.06	124	651.64	246	.00
43	15.43	2299054	93.94	84	102.63	6112856	17.90	125	682.46	36	.00
4	6.16	2503024	93.16	85	107.48	5744221	15.82	126	714.73	12	.00
45	16.93	2746428	92.31	86	112.56	5113515	13.87				
46	17.73	3009948	91.38	87	117.89	4451867	12.13				

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PARTICLE SIZE ANALYSIS BY ELZONE METHOD--PARTICLE DATA LABORATORIES, LTD.
115 HAHN STREET - ELMHURST, IL. 60126 - TELEPHONE: (312)832-5658

CLIENT: GARDINIER INC. 27 FEB 84 :DATE
SAMPLE: GYPSUM PILE (GYPSUM SIDE) 7743 : JOB NUMBER

ARTICLE SIZE VS. VOLUME
NCLOSING
OW AT 6 2.79 16 HIGH AT 126 714.73 12

RAPH OF DIAMETER SIZES VS. DIFFERENTIAL VOLUME FROM CHANNEL 6 TO 126, AND SKIP: 2

MAX	SIZE (bar scale 0–100)
.0	2.55
.0	2.92
.3	3.36
.5	3.86
.7	4.43
1.1	5.09
1.6	5.85
2.3	6.72
3.8	7.72
6.1	8.86
10.2	10.18
14.9	11.70
20.8	13.44
27.4	15.43
35.9	17.73
43	20.36
55.4	23.39
69.1	26.87
82.8	30.87
94.1	35.46
95.0	40.73
83.8	46.78
66.3	53.74
54.8	61.73
50.1	70.91
64.9	81.45
76.9	93.57
68.5	107.48
47.1	123.46
29.8	141.82
18.9	162.91
13.4	187.13
10.4	214.96
8.2	246.92
6.0	283.64
4.3	325.82
2.4	374.27
.9	429.92
.1	493.85
[illegible]	567.28
[illegible]	651.64

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PARTICLE SIZE ANALYSIS BY ELZONE METHOD--PARTICLE DATA LABORATORIES, LTD.
115 HAHN STREET - ELMHURST, IL. 60126 - TELEPHONE: (312)832-5658

CLIENT: GARDINIER INC. 27 FEB 84 :DATE
SAMPLE: GYPSUM PILE (GYPSUM SIDE) 7743 : JOB NUMBER

TOTAL IN TABULATION= TOTAL COUNT OR VOLUME IN ANALYSIS
TABULATION

DATA ID 7743 DATE 27 FEB
SIZE-NORMALIZED COUNTS DISTRIBUTION
TOTAL = 162166

CHNL	SIZE	COUNTS	% >	CHNL	SIZE	COUNTS	% >	CHNL	SIZE	COUNTS	% >
6	2.79	4000	100.00	35	10.66	3554	39.69	64	40.73	537	1.99
7	2.92	3941	97.53	36	11.17	3554	37.50	65	42.65	460	1.66
8	3.06	3854	95.10	37	11.70	3563	35.31	66	44.67	387	1.38
9	3.21	3795	92.73	38	12.25	3540	33.11	67	46.78	314	1.14
10	3.36	3750	90.39	39	12.83	3413	30.93	68	49.00	250	.95
11	3.52	3681	88.07	40	13.44	3281	28.82	69	51.31	200	.79
12	3.68	3622	85.80	41	14.07	3081	26.80	70	53.74	164	.67
13	3.86	3559	83.57	42	14.74	2976	24.90	71	56.28	127	.57
14	4.04	3463	81.38	43	15.43	2849	23.07	72	58.94	105	.49
15	4.23	3399	79.24	44	16.16	2699	21.31	73	61.73	91	.42
16	4.43	3331	77.14	45	16.93	2576	19.64	74	64.65	73	.37
17	4.64	3299	75.09	46	17.73	2457	18.06	75	67.71	59	.32
18	4.86	3208	73.06	47	18.57	2294	16.54	76	70.91	55	.29
19	5.09	3154	71.08	48	19.44	2116	15.13	77	74.26	50	.25
20	[illegible].33	3058	69.13	49	20.36	1980	13.82	78	77.78	50	.22
21	5.58	3013	67.25	50	21.33	1857	12.60	79	81.45	46	.19
22	5.85	2962	65.39	51	22.34	1752	11.45	80	85.31	41	.16
23	6.12	2953	63.56	52	23.39	1652	10.37	81	89.54	41	.14
24	6.41	2935	61.74	53	24.50	1575	9.36	82	93.57	36	.11
25	6.72	2949	59.93	54	25.66	1461	8.38	83	97.99	32	.09
26	7.04	2976	58.11	55	26.87	1361	7.48	84	102.63	27	.07
27	7.37	3049	56.28	56	28.14	1261	6.64	85	107.48	23	.05
28	7.72	3135	54.40	57	29.47	1170	5.87	86	112.56	18	.04
29	8.08	3258	52.46	58	30.87	1074	5.15	87	117.89	14	.03
30	8.46	3349	50.46	59	32.33	997	4.48	88	123.46	9	.02
31	8.86	3458	48.39	60	33.85	915	3.87	89	129.30	9	.01
32	9.28	3522	46.26	61	35.46	805	3.30	90	135.42	5	.01
33	9.72	3559	44.09	62	37.13	701	2.81	91	141.82	5	.01
34	10.18	3568	41.89	63	38.89	619	2.38	92	148.53	5	.00

DISPLAY AREA: 4

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PARTICLE SIZE ANALYSIS BY ELZONE METHOD--PARTICLE DATA LABORATORIES, LTD.
115 HAHN STREET - ELMHURST, IL. 60126 - TELEPHONE: (312)832-5658

CLIENT: GARDINIER INC. 27 FEB 84 :DATE
SAMPLE: GYPSUM PILE (ROAD) 7743 : JOB NUMBER

TOTAL IN TABULATION= TOTAL COUNT OR VOLUME IN ANALYSIS
TABULATION

DATA ID 7743 DATE 27 FEB
SIZE-NORMALIZED VOLUME DISTRIBUTION
TOTAL =21992210

CHNL	SIZE	VOLUME	% >	CHNL	SIZE	VOLUME	% >	CHNL	SIZE	VOLUME	% >
3	2.33	3023	100.00	45	14.36	477874	98.64	87	88.57	2477465	14.11
4	2.43	4368	100.00	46	14.99	542094	98.42	88	92.49	2345299	12.99
5	2.54	4865	100.00	47	15.66	648195	98.18	89	96.59	2209575	11.94
6	2.65	5412	99.99	48	16.35	787818	97.88	90	100.86	2106357	10.94
7	2.77	5962	99.99	49	17.07	901799	97.53	91	105.33	1998046	9.97
8	2.89	6512	99.99	50	17.83	1088554	97.12	92	109.99	1878673	9.09
9	3.02	7207	99.99	51	18.62	1224385	96.63	93	114.86	1781058	8.[illegible]5
10	3.15	7887	99.98	52	19.44	1448758	96.08	94	119.95	1633008	7.45
11	3.29	8924	99.98	53	20.30	1691679	95.43	95	125.26	1562497	6.71
12	3.44	9661	99.98	54	21.20	1985199	94.67	96	130.80	1436714	6.01
13	3.59	10953	99.97	55	22.14	2299591	93.77	97	136.59	1383162	5.36
14	3.75	12430	99.97	56	23.12	2679236	92.74	98	142.64	1264810	4.74
15	3.91	13270	99.96	57	24.15	3220904	91.53	99	148.96	1200528	4.17
16	4.09	14859	99.95	58	25.22	3793525	90.08	100	155.55	1111759	3.63
17	[illegible].27	16663	99.95	59	26.33	4299542	88.37	101	162.44	1020326	3.12
18	4.46	18900	99.94	60	27.50	4903364	86.43	102	169.63	945392	2.66
19	4.65	19762	99.93	61	28.72	5614690	84.22	103	177.14	866901	2.24
20	4.86	21500	99.92	62	29.99	6092289	81.70	104	184.98	755754	1.85
21	5.08	23987	99.91	63	31.31	6625819	78.95	105	193.17	641728	1.51
22	5.30	25394	99.90	64	32.70	7212539	75.97	106	201.73	563780	1.22
23	5.54	27433	99.89	65	34.15	7511547	72.72	107	210.66	483309	.97
24	5.78	30579	99.88	66	35.66	7855477	69.33	108	219.98	393221	.75
25	6.04	31651	99.87	67	37.24	7972432	65.80	109	229.72	313118	.57
26	6.30	34578	99.85	68	38.89	8000000	62.20	110	239.90	257401	.43
27	6.58	39500	99.84	69	40.61	7917263	58.60	111	250.52	219635	.31
28	6.87	45011	99.82	70	42.41	7836158	55.03	112	261.61	166368	.21
29	7.18	49738	99.80	71	44.29	7724641	51.50	113	273.19	120525	.14
30	7.50	55288	99.77	72	46.25	7643203	48.02	114	285.28	88387	.09
31	7.83	60226	99.75	73	48.29	7489609	44.58	115	297.92	58067	.05
32	8.18	67353	99.72	74	50.43	7208948	41.21	116	311.11	28968	.02
33	8.54	77007	99.69	75	52.66	6852077	37.96	117	324.88	8771	.01
34	8.92	85330	99.66	76	55.00	6363483	34.87	118	339.26	2031	.00
35	9.31	99550	99.62	77	57.43	5891203	32.01	119	354.28	355	.00
36	9.72	119184	99.57	78	59.97	5198980	29.35	120	369.97	72	.00
37	10.15	125648	99.52	79	62.63	4703435	27.01	121	386.35	182	.00
38	10.60	150176	99.46	80	65.40	4359006	24.89	122	403.45	615	.00
39	11.07	169175	99.40	81	68.30	4038462	22.93	123	421.32	615	.00
40	11.56	216285	99.32	82	71.32	3603615	21.11	124	439.97	182	.00
4[illegible]	[illegible]2.07	252974	99.22	83	74.48	3307609	19.49	125	459.45	97	.00
42	12.61	305006	99.11	84	77.78	3079938	18.00	126	479.79	420	.00
43	13.17	340841	98.97	85	81.22	2865465	16.61	127	501.03	198	.00
44	13.75	403163	98.82	86	84.82	2679211	15.32				

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PARTICLE SIZE ANALYSIS BY ELZONE METHOD--PARTICLE DATA LABORATORIES, LTD.
115 HAHN STREET - ELMHURST, IL. 60126 - TELEPHONE: (312)832-5658

CLIENT: GARDINIER INC. 27 FEB 84 :DATE
SAMPLE: GYPSUM PILE (ROAD) 7743 : JOB NUMBER

PARTICLE SIZE VS. VOLUME
ENCLOSING
LOW AT 3 2.33 3023 HIGH AT 127 501.03 188

GRAPH OF DIAMETER SIZES VS. DIFFERENTIAL VOLUME FROM CHANNEL 3 TO 127, AND SKIP: 2

% MAX	SIZE
.0	2.13
.1	2.43
.1	2.77
.1	3.15
.1	3.59
.2	4.09
.2	4.65
.3	5.30
.4	6.04
.5	6.87
.7	7.83
1.0	8.92
1.5	10.15
2.6	11.56
4.1	13.17
[illegible]	14.99
10.8	17.07
17.3	19.44
27.4	22.14
45.2	25.22
66.9	28.72
86.0	32.70
95.0	37.24
93.4	42.41
89.3	48.29
75.9	55.00
56.1	62.63
43.0	71.32
34.2	81.22
28.0	92.49
23.8	105.33
19.5	119.95
16.5	136.59
13.3	155.55
10.3	177.14
6.7	201.73
3.7	229.72
2.0	261.61
.7	297.92
[illegible]	339.26
[illegible]	386.35
.0	439.97
.0	501.03

Scale: 0 10 20 30 40 50 60 70 80 90 100

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PARTICLE SIZE ANALYSIS BY ELZONE METHOD--PARTICLE DATA LABORATORIES, LTD.
115 HAHN STREET - ELMHURST, IL. 60126 - TELEPHONE: (312)832-5658

CLIENT: GARDINIER INC. 27 FEB 84 :DATE
SAMPLE: GYPSUM PILE (ROAD) 7743 : JOB NUMBER

TOTAL IN TABULATION= TOTAL COUNT OR VOLUME IN ANALYSIS
TABULATION

DATA ID 7743 DATE 27 FEB
SIZE-NORMALIZED COUNTS DISTRIBUTION
TOTAL = 170801

CHNL	SIZE	COUNTS	% >	CHNL	SIZE	COUNTS	% >	CHNL	SIZE	COUNTS	% >
3	2.33	4000	100.00	35	9.31	1546	51.52	67	37.24	1974	7.81
4	2.43	3897	97.66	36	9.72	1561	50.61	68	38.89	1744	6.65
5	2.54	3821	95.38	37	10.15	1576	49.70	69	40.61	1513	5.63
6	2.65	3731	93.14	38	10.60	1615	48.78	70	42.41	1321	4.75
7	2.77	3603	90.95	39	11.07	1694	47.83	71	44.29	1141	3.97
8	2.89	3462	88.85	40	11.56	1741	46.84	72	46.25	987	3.30
9	3.02	3359	86.82	41	12.07	1790	45.82	73	48.29	846	2.73
10	3.15	3231	84.85	42	12.61	1854	44.77	74	50.43	718	2.23
11	3.29	3141	82.96	43	13.17	1910	43.69	75	52.66	603	1.81
12	3.44	3051	81.12	44	13.75	1987	42.57	76	55.00	487	1.46
13	3.59	2977	79.34	45	14.36	2064	41.40	77	57.43	397	1.17
14	3.75	2935	77.59	46	14.99	2136	40.20	78	59.97	308	[illegible]
15	3.91	2833	75.87	47	15.66	2222	38.94	79	62.63	244	.76
16	4.09	2767	74.22	48	16.35	2262	37.64	80	65.40	205	.62
1[illegible]	[illegible].27	2717	72.60	49	17.07	2332	36.32	81	68.30	167	.50
18	4.46	2628	71.00	50	17.83	2413	34.95	82	71.32	128	.40
19	4.65	2513	69.47	51	18.62	2473	33.54	83	74.48	103	.32
20	4.86	2397	67.99	52	19.44	2526	32.09	84	77.78	90	.26
21	5.08	2276	66.59	53	20.30	2590	30.61	85	81.22	64	.21
22	5.30	2179	65.26	54	21.20	2680	29.10	86	84.82	51	.17
23	5.54	2111	63.98	55	22.14	2787	27.53	87	88.57	51	.14
24	5.78	2026	62.75	56	23.12	2852	25.90	88	92.49	38	.11
25	6.04	1949	61.56	57	24.15	2982	24.23	89	96.59	26	.09
26	6.30	1885	60.42	58	25.22	3038	22.48	90	100.86	26	.08
27	6.58	1821	59.32	59	26.33	3013	20.70	91	105.33	26	.06
28	6.87	1782	58.25	60	27.50	3026	18.94	92	109.99	13	.05
29	7.18	1718	57.21	61	28.72	3038	17.17	93	114.86	13	.04
30	7.50	1679	56.20	62	29.99	2897	15.39	94	119.95	13	.03
31	7.83	1615	55.22	63	31.31	2769	13.69	95	125.26	13	.02
32	8.18	1577	54.27	64	32.70	2641	12.07	96	130.80	13	.02
33	8.54	1590	53.35	65	34.15	2423	10.53	97	136.59	13	.01
34	8.92	1538	52.42	66	35.66	2218	9.11				

DISPLAY AREA: 4

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PARTICLE SIZE ANALYSIS BY ELZONE METHOD--PARTICLE DATA LABORATORIES, LTD.
115 HAHN STREET - ELMHURST, IL. 60126 - TELEPHONE: (312)832-5658

CLIENT: GARDINIER INC. 27 FEB 84 :DATE
SAMPLE: GYPSUM PILE (ROAD) 7743 : JOB NUMBER

PARTICLE SIZE VS. COUNTS
ENCLOSING
LOW AT 3 2.33 4000 HIGH AT 97 136.59 13

GRAPH OF DIAMETER SIZES VS. DIFFERENTIAL COUNTS FROM CHANNEL 3 TO 97, AND SKIP: 2

% MAX	SIZE
.0	2.13
95.1	2.43
88.0	2.77
78.9	3.15
72.7	3.59
67.6	4.09
61.4	4.65
53.2	5.30
47.6	6.04
43.5	6.87
39.4	7.83
37.5	8.92
38.5	10.15
42.5	11.56
46.6	13.17
52.[illegible]	14.99
[illegible]	17.07
61.7	19.44
68.0	22.14
74.2	25.22
74.2	28.72
64.5	32.70
48.2	37.24
32.3	42.41
20.7	48.29
11.9	55.00
6.0	62.63
3.1	71.32
1.6	81.22
.9	92.49
.6	105.33
.3	119.95
.3	136.59

Scale: 0 10 20 30 40 50 60 70 80 90 100

BEST AVAILABLE COPY

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OLUME (MASS) DISTRIBUTION FROM DISPLAY AREA: 4
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NDICES

OLUME MODE = 38.89 MEDIAN = 44.29 MICRONS AND LARGER

EOMETRIC VOLUME MEAN = 46.73 +/- 35.96 (76.94%) SKEWNESS = .22

RITHMETIC VOLUME MEAN = 55.60 +/- 38.10 (68.52%) SKEWNESS = .44

OR PLOTTING PROBABILITY ON LOG PAPER:

ERCENTILE: 00.1% OF VOLUME IS AT 273.19 MICRONS AND LARGER
ERCENTILE: 01.0% OF VOLUME IS AT 201.73 MICRONS AND LARGER
ERCENTILE: 06.0% OF VOLUME IS AT 130.80 MICRONS AND LARGER
ERCENTILE: 22.0% OF VOLUME IS AT 68.30 MICRONS AND LARGER
ERCENTILE: 50.0% OF VOLUME IS AT 44.27 MICRONS AND LARGER
ERCENTILE: 78.0% OF VOLUME IS AT 31.31 MICRONS AND LARGER
ERCENTILE: 94.0% OF VOLUME IS AT 21.20 MICRONS AND LARGER
ERCENTILE: 99.0% OF VOLUME IS AT 12.61 MICRONS AND LARGER
ERCENTILE: 99.9% OF VOLUME IS AT 5.30 MICRONS AND LARGER

OUNT (FREQUENCY) DISTRIBUTION FROM DISPLAY AREA: 5
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NDICES

OUNTS MODE = 2.33 MEDIAN = 9.72 MICRONS AND LARGER

EOMETRIC COUNTS MEAN = 9.75 +/- 15.64 (160.36%) SKEWNESS = .47

RITHMETIC COUNTS MEAN = 14.99 +/- 13.78 (91.92%) SKEWNESS = .92

OR PLOTTING PROBABILITY ON LOG PAPER:

ERCENTILE: 00.1% OF COUNTS IS AT 92.49 MICRONS AND LARGER
ERCENTILE: 01.0% OF COUNTS IS AT 57.43 MICRONS AND LARGER
ERCENTILE: 06.0% OF COUNTS IS AT 38.89 MICRONS AND LARGER
ERCENTILE: 22.0% OF COUNTS IS AT 25.22 MICRONS AND LARGER
ERCENTILE: 50.0% OF COUNTS IS AT 9.72 MICRONS AND LARGER
ERCENTILE: 78.0% OF COUNTS IS AT 3.59 MICRONS AND LARGER
ERCENTILE: 94.0% OF COUNTS IS AT 2.54 MICRONS AND LARGER
ERCENTILE: 99.0% OF COUNTS IS AT 2.33 MICRONS AND LARGER
ERCENTILE: 99.9% OF COUNTS IS AT 2.33 MICRONS AND LARGER