



**Air Quality Permitting
Statement of Basis**

October 13, 2004

**Permit to Construct No. P-030414
Reed Barley Storage, LLC, Hazelton
Facility ID No. 053-00008**

Prepared by:

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AIR QUALITY DIVISION**

FINAL PERMIT

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Acronyms, Units, and Chemical Nomenclatures

AAC	acceptable ambient concentration
AFS	AIRS Facility Subsystem
AIRS	Aerometric Information Retrieval System
AQCR	Air Quality Control Region
CFR	Code of Federal Regulations
CO	carbon monoxide
DEQ	Department of Environmental Quality
HAPs	Hazardous Air Pollutants
IDAPA	a numbering designation for all administrative rules in Idaho promulgated in accordance with the Idaho Administrative Procedures Act
lb/hr	pounds per hour
MACT	Maximum Achievable Control Technology
NAAQS	National Ambient Air Quality Standards
NESHAP	National Emission Standards for Hazardous Air Pollutants
NO _x	nitrogen oxides
NSPS	New Source Performance Standards
O&M	Operation and Maintenance
PM	particulate matter
PM ₁₀	particulate matter with an aerodynamic diameter less than or equal to a nominal 10 micrometers
PSD	Prevention of Significant Deterioration
PTC	permit to construct
Rules	Rules for the Control of Air Pollution in Idaho
SIC	Standard Industrial Classification
SIP	State Implementation Plan
TAP	toxic air pollutant
T/yr	tons per year
µg/m ³	micrograms per cubic meter
UTM	Universal Transverse Mercator

1. PURPOSE

The purpose for this memorandum is to satisfy the requirements of IDAPA 58.01.01.200, Rules for the Control of Air Pollution in Idaho, for issuing permits to construct.

2. FACILITY DESCRIPTION

The grain elevator operations at Reed Barley Storage (RBS) will receive, store, and ship malting barley to other facilities for further processing. The facility is limited to processing and handling malting barley, which will be stored in 12 metal silos. Process operations at RBS include the following: barley unloading from hopper trucks and straight trucks, barley handling, barley loading and unloading by railcars, truck loading, and baghouse waste loading into trucks.

Facility operations begin with weighing incoming barley. Trucks will unload the barley to two receiving pits from which the barley is conveyed to the east and west elevators. The railcar will unload barley to a separate single receiving pit from which the barley is conveyed to the east elevator.

From the east and west elevators the grains will be delivered to grain distributor. The distributor will direct the grain to the grain silos.

The following procedure will be used for loading and shipping grain from the facility:

- a. The silo loading gates will be opened to the extent necessary to allow required throughput to recovery conveyors.
- b. The recovery conveyors deliver the grain back to the distributor.
- c. The distributor diverts the grain to either a bulk weighing scale for railcar loading or directly to a truck in the truck-receiving building.

Each of these operations releases particulate matter with an aerodynamic diameter less than or equal to a nominal 10 micrometers (PM₁₀) to the atmosphere. In addition, toxic air pollutants (TAPs)—i.e., phosphine and ammonia—are emitted from the facility during fumigation of barley at RBS.

Fugitive emissions also occur from truck and rail loading, truck and rail unloading, and baghouse waste loading.

It should be noted that the permanent storage capacity of this grain elevator is 2.43 million U.S. bushels. The facility is not subject to the New Source Performance Standards (NSPS), Subpart DD, because the facility's permanent storage capacity is less than 2.5 million U.S. bushels – for more information on the NSPS applicability refer to Section 5.4 of this statement of basis.

3. FACILITY / AREA CLASSIFICATION

This facility is located at 2576 Highway 25, Hazelton, Idaho. Hazelton is located in Jerome County and is within Air Quality Control Region (AQCR) 63 and Universal Transverse Mercator (UTM) Zone 11. Jerome County is designated as unclassifiable for all criteria pollutants (PM₁₀, carbon monoxide [CO], oxides of nitrogen [NO_x], sulfur dioxide [SO₂], lead, and ozone).

The primary Standard Industrial Classification (SIC) code for the facility is 5153, Grain and Field Beans. The Aerometric Information Retrieval System (AIRS) facility classification for this facility is "B" because the uncontrolled potential to emit is below applicable major source thresholds. The AIRS information provided in Appendix B of this statement of basis defines the classification for each regulated air pollutant at RBS.

The facility is not subject to Prevention of Significant Deterioration (PSD) requirements because its potential to emit is less than all applicable PSD major source thresholds. This facility is not a designated facility, as defined in IDAPA 58.01.01.006.27. The facility is not major facility as defined in IDAPA 58.01.01.205. The facility is also not a Tier I source as defined in IDAPA 58.01.01.006.102.

4. APPLICATION SCOPE

On June 3, 2003, DEQ received an application from RBS to obtain a permit to construct (PTC) for the facility. The facility was constructed in 2003 without a previously obtained PTC from DEQ.

4.1 Application Chronology

June 3, 2003	DEQ received application from RBS for permit to construct. The permit number assigned for this project was PTC No. P-030414.
July 1, 2003	DEQ determined the P-030414 application incomplete.
July 30, 2003	DEQ received additional information.
August 27, 2003	DEQ sent a second incompleteness letter to RBS.
September 30, 2003	DEQ received a letter from RBS's consultant, Tetra Tech EM, Inc. in which they requested a 60-day extension to respond to DEQ's second incompleteness letter.
October 10, 2003	DEQ granted a 60-day extension letter to RBS.
December 5, 2003	DEQ received additional information, including air dispersion modeling from RBS.
January 2, 2004	DEQ determined the P-030414 application incomplete for the third time.
February 5, 2004	DEQ received additional information from RBS.
February 19, 2004	DEQ received a letter that was signed by RBS's responsible official in which it certified that the submitted documents are consistent with IDAPA 58.01.01.123 of the Rules.
March 5, 2004	DEQ determined the P-030414 application complete.
March 12, 2004	DEQ provided an opportunity for public comment period on the PTC application, in accordance with IDAPA 58.01.01.209.01.c., from March 12, 2004 to April 13, 2004. There were no comments on the application and no requests for a public comment period on DEQ's proposed action.
March 17, 2004	RBS requested to review a draft of PTC No. P-030414 prior to the final issuance.
March 25, 2004	DEQ sent RBS an information request letter. In this letter DEQ requested RBS send information regarding emissions of phosphine gas from the facility.
April 12, 2004	DEQ received additional information regarding the phosphine and ammonia emissions from RBS.
April 21, 2004	RBS submitted revised phosphine and ammonia emissions to DEQ.

July 23, 2004	DEQ received documentation on the source of the ammonia emissions factor used to calculate the ammonia emissions from the facility.
September 24, 2004	DEQ sent Twin Falls Regional Office a copy of draft PTC No. P-030414 for review.
September 28, 2004	DEQ sent RBS a copy of draft PTC No. P-030414 for review.
October 13, 2004	DEQ received the PTC processing fees of \$1,000.00.
October 15, 2004	RBS submitted a comment on the facility draft PTC No. P-030414.

5. PERMIT ANALYSIS

This section of the statement of basis describes the regulatory requirements for this PTC action.

5.1 Equipment Listing

The grain elevator plant and the baghouse at RBS are new equipment.

Grain elevator

Manufacturer Inter System
 Type:..... Scale Loadout
 Max asphalt capacity: 600 T/hr

Baghouse

Manufacturer: Dustex
 Model No.:..... 3600-11-12
 Number of Bags:..... 132
 Bag Size:..... 6 inches x 12 feet
 Type of filter Media:..... Polyester
 Air-to-Cloth Ratio: 12.0:1
 Compressed Air: 20 cfm @ 85 psig
 Design Pressure Drop: 4-6 inches of water gauge
 PM₁₀ Control Efficiency: 99.7%
 Grain Loading:..... 0.015 grains/dscf, as guaranteed by the manufacturer

5.2 Emissions Inventory

Particulate matter (PM) and PM₁₀ emissions estimates were provided by Tetra Tech EM Inc. (TTEM) and are included in the PTC application materials submitted to DEQ on 12/5/03, 2/5/04, and 4/12/04:

- Toxic air pollutants (TAPs) and hazardous air pollutants (HAPs) emissions estimates were provided on 4/12/04 and on 7/23/04. Appendix A of this statement of basis contains the emissions estimates for PM, PM₁₀, TAPs, and HAPs emissions, as submitted by RBS.
- Section 2.0 of RBS's permit application of December 5, 2003 contains the emissions estimates for the point and fugitive sources at the facility.

Emissions estimates of PM and PM₁₀ from the grain elevator at RBS were obtained from emission factors described in U.S. EPA's Compilation of Air Pollutant Emission Factors, AP-42, Section 9.9.1, Grain Elevators and Processes, 4/03.

Emissions estimates for the TAPS and HAPs were calculated based on emissions factors supplied by Pestcon System, Inc. – Applicators Manual for Fumitoxin Tablets and Pellets. From the 2/5/04 PTC's application, the potential to emit for PM₁₀ from the facility is estimated by TTEM to be 17.75 T/yr. The PTE for any single HAP is estimated to be less than 10 T/yr, the major source threshold of any HAP. The PTE for the two HAPs (i.e., phosphine and ammonia) from the facility were estimated to be 3.43 T/yr, which are well below the major source threshold of 25 T/yr for a combination of two HAPs or more – refer to Appendix A.

All methodologies and assumptions used in the emissions estimates are presented and documented in Section 2.0 of the permit application. The emissions calculations submitted in the application were checked by DEQ for the bases of the emissions factors and references and found to be consistent with current DEQ methodology. Therefore, DEQ used the applicant emissions estimates as a basis for the permitting analyses for this permit.

These emissions calculations provided the basis for PM₁₀ emissions limits from the grain elevator stack. They also provided the basis for the PM₁₀ compliance with the National Ambient Air Quality Standards (NAAQS) and the TAPs increment analyses – see Appendix B of this document for modeling analysis.

Detailed emissions estimates are included in Appendix A of this statement of basis. It should be noted that the point source information contained in Table 5.1 of this document was used to determine the processing fee assessed in accordance with IDAPA 58.01.01.225.

Samples of hourly and annual PM₁₀ calculations for determining the PM₁₀ emissions from truck unloading west station are shown below.

Given

Barley unloading west station = 95,055.21 T/yr (Table 3, PTC application received on 12/5/03)

Hours of operation = 295 hrs/yr

PM₁₀ emission factor = 0.0078 lb/ton (AP-42, Section 9.9.1-1, PM₁₀ emissions factors for grain elevators, grain receiving by hopper truck).

Baghouse control efficiency = 99.7%

Percent emissions from truck unloading west that enter baghouse system = 90% (Table 1, PTC application received on 12/5/03)

Yearly emissions: (95,055.21 T/yr) (0.0078 lb/T) (1-0.997)(0.90)(1 T/2,000 lb) = 1.00E-03 T/yr

Hourly emissions: (1.00E-03 T/yr)(1 yr/295 hrs)(2,000 lbs/1 T) = 6.79E-03 lb/hr

Table 5.1 provides a summary of the emissions inventory of the facility based on potential to emit.

Detailed emissions estimates are included in Appendix A of this statement of basis. It should be noted that the point source information contained in this table was used to determine the processing fee assessed in accordance with IDAPA 58.01.01.225.

Table 5.1 PM, PM₁₀, AND TAP EMISSIONS^a FROM THE GRAIN ELEVATOR OPERATIONS BAGHOUSE STACK

Truck unloading-west	0.03	0.0045	0.007	0.001				
Truck unloading-east	0.03	0.0045	0.007	0.001				
Grain handling-west	0.06	0.0087	0.032	0.005				
Grain handling-east	0.06	0.0088	0.033	0.005				
Rail loading	0.02	0.006	0.002	0.0005				
Truck loading	0.01	0.0002	0.002	0.00006				
Truck loading the baghouse waste	0.01	0.00007	0.005	0.00002				
Total	0.22	0.033	0.088	0.013				
TAPs Emissions from facility ^d					0.58	0.21	0.20	0.07

- a Emissions were determined by using emissions factors from AP-42, Section 9.91, Grain Elevators and Processes and process limits (e.g. throughput and hours of operation)
- b Particulate matter
- c Particulate matter with an aerodynamic diameter less than or equal to a nominal 10 micrometers
- d Emissions estimates are in Appendix A of this statement of basis

5.3 Modeling

Refer to the modeling review memorandum contained in Appendix C of this statement of basis for a discussion of the air dispersion analysis conducted for this project. DEQ has determined that RBS has successfully demonstrated that this project will not cause or significantly contribute to a violation of any National Ambient Air Quality Standards (NAAQS). The results of the ambient impact analyses are summarized in Table 5.2.

Table 5.2 PM₁₀ IMPACT ANALYSES RESULTS

PM ₁₀		Impact from facility-wide emissions ^a		NAAQS ^c	
		Annual	24-hour	(µg/m ³)	(µg/m ³)
	Annual	3.9		26	59.8
	24-hour	55.6		73	85.7

- a Impact from facility-wide emissions
- b Micrograms per cubic meter
- c National Ambient Air Quality Standards

In addition, the modeled toxic air pollutants showed the facility will not exceed any TAP increments. The impact analyses resulting from this PTC are presented in the modeling memorandum in Appendix C of this document. The results of TAP modeling are summarized in Table 5.3

Table 5.3 TAP IMPACT ANALYSES RESULTS

Phosphine	12.7	20	63.5
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- a micrograms per cubic meter
- b acceptable ambient concentration

5.4 Regulatory Review

This section describes the regulatory analysis of the applicable air quality rules with respect to this PTC.

IDAPA 58.01.01.201 Permit to Construct Required

A permit to construct is required for this non-major stationary source because it does not meet the exemption criteria contained in IDAPA 58.01.01.200-223.

IDAPA 58.01.01.203 Permit Requirements for New and Modified Stationary Sources

All PTC applications are required to demonstrate compliance with the terms of IDAPA 58.01.01.203. This section of the Rules requires RBS to demonstrate that the grain elevator operations at the facility will comply with all applicable emissions standards and will not cause or significantly contribute to a violation of any ambient air quality standard.

IDAPA 58.01.01.205 Permit Requirements for New Major Facilities or Major Modifications in Attainment or Unclassifiable Areas

This facility is not a PSD major facility; therefore, PSD permitting requirements do not apply.

IDAPA 58.01.01.209.01.c Opportunity for Public Comment

This PTC is subject to the provisions of IDAPA 58.01.01.209.01.c. An opportunity for public comment period, in accordance with IDAPA 58.01.01.209.01.c, started on March 12, 2004 and ended on April 13, 2004. During this time, there were no comments on the application and no requests for a public comment period on DEQ's proposed action.

IDAPA 58.01.01.210 Demonstration of Preconstruction Compliance with Toxic Standards

The TAPs emissions resulting from fumigation of barley at RBS were estimated by TTEM. Appendix A of this document contains all TAPs emissions estimates from the grain elevator operations. All TAPs emissions from the RBS were demonstrated to meet the requirements specified in IDAPA 58.01.01.210. Refer to the modeling review memorandum in Appendix C of this document.

IDAPA 58.01.01.212 Obligation to Comply

Receipt of this PTC does not relieve RBS from the responsibility to comply with all federal, state, and local rules and regulations.

IDAPA 58.01.01.225 Permit to Construct Processing Fees

This project is subject to the fee provisions of IDAPA 58.01.01.225, and RBS will be assessed a processing fee of \$1,000.00 for a PTC with total PM₁₀, TAPs, and HAPs emissions of 0.29 T/yr.

IDAPA 58.01.01.577 Ambient Air Quality Standards for Specific Air Pollutants

The RBS submitted a modeling analysis demonstrating that emissions rates from the grain elevator operations at the facility will not cause or significantly contribute to a NAAQS violation; therefore, the requirements of IDAPA 58.01.01.203.02 and .577 are satisfied. The facility's modeling analyses were reviewed by DEQ's Stationary Source Program staff, and the modeling review memorandum indicates that the requirements of IDAPA 58.01.01.203.02 and .577 are met. The modeling review memorandum is in Appendix C of this statement of basis.

IDAPA 58.01.01.625 Visible Emissions Limitation

Emissions from all stationary point sources in the state of Idaho are required to comply with the opacity standards of IDAPA 58.01.01.625-626, unless exempted under Section 625.01. The grain elevator baghouse stack at the facility is subject to this standard.

IDAPA 58.01.01.650 Rules for the Control of Fugitive Dust

All stationary sources are required to comply with the fugitive dust prevention requirements of IDAPA 58.01.01.650-651.

40 CFR 60 New Source Performance Standards

The RBS facility is not currently subject to terms and provisions of NSPS, 40 CFR 60, Subpart DD – Standards of Performance for Grain Elevators.

The permanent storage capacity is defined in Subpart DD as “the grain storage capacity which is inside a building, bin, or silo.” To be subject to Subpart DD the permanent storage capacity of any grain elevator must be greater than 2.5 million U.S. bushels. The permanent storage capacity of RBS facility is 2.43 million U.S. bushels. The NSPS, 40 CFR 60, Subpart DD requirements therefore do not apply to RBS.

40 CFR 61 and 63 National Emission Standards for Hazardous Air Pollutants and Maximum Achievable Control Technology

The facility is not currently subject to any National Emission Standard for Hazardous Air Pollutants (NESHAP) or Maximum Achievable Control Technology (MACT) requirements.

5.5 Fee Review

Reed Barley Storage, LLC paid the \$1,000 application fee as required in IDAPA 58.01.01.224 on May 28, 2003.

A permit to construct processing fee of \$1,000.00 is required in accordance with IDAPA 58.01.01.225 because the increase in emissions from this project is less than one ton per year. The processing fee was requested at the time of the issuance of this draft permit. The processing fee was received October 13, 2004.

The Reed Barley Storage, LLC facility is not a major facility as defined in IDAPA 58.01.01.008.10. Therefore, registration fees are not applicable in accordance with IDAPA 58.01.01.387.

6. PERMIT CONDITIONS

Visible Emissions Limit - Permit Condition 2.3

Permit Condition 2.3 is taken directly from IDAPA 58.01.01.625.02. Other than sources listed in IDAPA 58.01.01.625.01, emissions from all stationary point sources in the state of Idaho are subject to the opacity standard, therefore the grain elevator operations baghouse stack must comply with this standard.

Compliance Demonstration

Permit Condition 2.13 requires the permittee to conduct a monthly inspection of visible emissions from the barley processing operations baghouse stack during daylight hours and under normal operating conditions. The inspection shall consist of a see/no see evaluation for the baghouse stack visible emissions. If any visible emissions are present from the baghouse stack, the permittee shall either take appropriate corrective action as expeditiously as practicable, or perform a Method 9 opacity test in accordance with the procedures outlined in IDAPA 58.01.01.625. A minimum of 30 observations shall be recorded when conducting the opacity test. If opacity is greater than 20% for a period or periods aggregating more than three minutes in any 60-minute period, the permittee shall take all necessary corrective action and report the exceedance in accordance with IDAPA 58.01.01.130-136. The permittee shall maintain records of the results of the monthly visible emissions inspection and each opacity test when conducted. The records shall include, at a minimum, the date and results of each inspection and test and a description of the following: the permittee's assessment of the conditions existing at the time visible emissions are present (if observed), any corrective action taken in response to the visible emissions, and the date corrective action was taken. The visible emissions inspection is not required when barley processing is not in operation.

A compilation of the most recent two years of records shall be kept on site and shall be made available to DEQ representatives upon request.

PM₁₀ Emissions Limits - Permit Condition 2.4

Particulate matter with an aerodynamic diameter less than or equal to a nominal 10 micrometers (PM₁₀) emitted from the grain elevator baghouse stack shall not exceed any corresponding pounds per hour (lb/hr) and tons per 12-month consecutive period (T/yr) emissions rate limits listed in Table 2.4.

Compliance Demonstration

Reed Barley Storage estimated and modeled emissions of PM₁₀ from the facility based on throughput of barley of 192,030 tons per any consecutive 12-month period. Compliance with the PM₁₀ emissions limit can be determined by calculations using the annual barley throughput and the emissions factor from AP-42, Section 9.9.1, Grain Elevators and Processes.

It should be noted that the grain elevator at RBS does not operate continuously for 8,760 hours per year. For example, the truck unloading west station operates 295 hours per year. Thus, emissions for each process at RBS are estimated based on the number of hours each system operates. The hours of operations for each system is included in RBS's PTC application received on December 5, 2003, and these are included in Appendix A of this statement of basis.

Samples of hourly and annual PM₁₀ calculations for determining the PM₁₀ emissions from truck unloading west station are included in Section 5.2 of this document.

Additionally, the permittee will demonstrate compliance with the PM₁₀ emissions limits by monitoring, on a daily basis, the pressure drop across the baghouse (see Permit Condition 2.11). Visible emissions will also be monitored in accordance with IDAPA 58.01.01.625.

In order to determine compliance with the hourly and annual PM₁₀ emissions rates, RBS will estimate the PM₁₀ emissions by monitoring the annual barley production.

Throughput Limits - Permit Condition 2.6

The throughput of barley shall not exceed a maximum of 192,030 tons of barley in any consecutive 12-month period.

Compliance Demonstration

Permit Condition 2.11 requires the permittee to monitor and record the barley throughput on a daily and monthly basis. Records of monitoring throughput will remain on site for the most recent two-year period and shall be made available to DEQ representatives upon request.

Baghouse Monitoring Equipment - Permit Condition 2.7

The permittee shall, in accordance with manufacturer specifications, install, calibrate, maintain, and operate equipment to continuously measure the pressure differential across the grain elevator baghouse.

Compliance Demonstration

The permittee must install monitoring equipment in order to measure the pressure drop across the baghouse.

Operation and Maintenance Manual - Permit Condition 2.8

The permit requires that PM₁₀ emissions from the grain elevator operations baghouse stack be controlled by properly functioning baghouse. The PM₁₀ emission limitations and subsequent compliance with the emission standards are based on the use of the baghouse. The permittee is required to prepare an operation and maintenance manual for the baghouse. The pressure drop across the baghouse will be maintained within manufacturer and operation and maintenance manual specifications that indicate proper baghouse operations. The permittee must install monitoring equipment in order to measure the pressure drop across the baghouse. The permittee must monitor and record the pressure drop across the baghouse on a daily basis. The daily monitoring will allow the permittee to track the changes and clean or replace the bags as recommended by the manufacturer. The facility is not required to record the pressure drop across the baghouse when processes associated with the baghouse are not in operation.

Pressure Drop Across the Baghouse – Permit Condition 2.9

The pressure drop across the baghouse shall be maintained within manufacturer and O&M manual specifications. Documentation of both the manufacturer and O&M manual operating pressure drop specifications shall remain on site at all times and shall be made available to DEQ representatives upon request.

Compliance Demonstration

To assure the baghouse is operating according to manufacturer recommended operating specifications, the permittee is required to monitor the pressure drop across the baghouse once per day while the baghouse is operating – refer to Permit Condition 2.10. So long as the pressure drop is within the recommended pressure drop operating range, it can be reasonably assured the baghouse is operating properly, which in turn, reasonably assures compliance with the corresponding emissions rate limits.

7. PUBLIC COMMENT

A draft permit was provided for facility review. Comment were received and the permit was changed as appropriate.

The draft permit was also provided to the Twin Falls Regional Office of the DEQ.

An opportunity for public comment on the PTC application was provided, in accordance with IDAPA 58.01.01.209.01.c, from March 12, 2004 to April 13, 2004. During this time, there were no comments on the application and no requests for a public comment period on DEQ's proposed action.

8. RECOMMENDATION

Based on review of application materials and all applicable state and federal rules and regulations, staff recommend that DEQ issue final PTC No. P-030414 Reed Barley Storage, LLC in Hazelton. An opportunity for public comment on the air quality aspects of the proposed permit to construct was provided in accordance with IDAPA 58.01.01.209.01.c.

HE/sd Permit No. P-030414

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APPENDIX A

Emissions Inventory

From: "Herlocker, Douglas" <Douglas.Herlocker@ttemi.com>
To: "HELSHAFE@DEQ.STATE.ID.US" <HELSHAFE@DEQ.STATE.ID.US>
Date: 7/23/04 4:35:40 PM
Subject: Documentation for Ammonia emissions from Fumitoxin product

Hello Harbi,

I finally received the documentation from Pestcon to support the ammonia emissions I included in the emission estimate for Reed Barley. I have attached the document, which documents the gaseous emission rate of each reaction (in Kg) in relation to a case of Fumitoxin (in Kg). This rate of 0.119 is multiplied by the weight of each pellet (0.6 gm) to get a value of 0.07 gm ammonia released per pellet.

Please let me know if you have any questions.

Thanks,

Doug

~~~~~  
Douglas Herlocker  
Environmental Scientist/Air quality Specialist  
Tetra Tech EMI  
106 N. 6th. St., Suite 202  
Boise, ID 83702  
(208)343-4085  
~~~~~

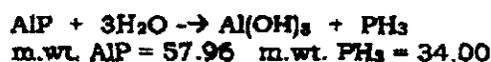
CC: "ereed@reedgrain.com" <ereed@reedgrain.com>

GASEOUS EMISSIONS FROM FUMITOXIN® FUMIGANTS

Fumitoxin® Tablets and Pellets are prepared from the same basic formula which contains 55% aluminum phosphine and 27% ammonium carbamate. The remaining 18% consists of non-volatile inert compounds such as paraffin and aluminum oxide.

Fumitoxin® Tablets are packed in 21.0 kg cases containing 14 resealable, gas-tight flasks of 500 - 3g tablets. Fumitoxin® Pellets are packed in 21.0 kg cases containing 21 resealable, gas-tight flasks of approximately 1660 - 0.6g pellets.

Aluminum phosphide reacts with moisture in the air as follows:



Ammonium carbamate volatilizes as follows:



One molecular or atomic weight of any gas will occupy a volume of 24.45 l at 25°C and 760mm (1 atm) of pressure. Twenty-one kg of Fumitoxin® will liberate the following amounts of gases:

$$\frac{(21.0\text{kg Fumitoxin}\text{®})(0.55)}{57.96} \frac{34.00}{57.96} = 6.8\text{kg PH}_3 \text{ per case}$$

$$\frac{(21.0\text{kg Fumitoxin}\text{®})(0.27)}{78.07} \frac{44.01}{78.07} = 3.2\text{kg CO}_2 \text{ per case}$$

$$\frac{(21.0\text{kg Fumitoxin}\text{®})(0.27)}{78.07} \frac{34.06}{78.07} = 2.5\text{kg NH}_3 \text{ per case}$$

Reed Barley Storage

TAPs Emissions Estimates

The phosphine and ammonia are the two TAPs that are released during the treatment of barley. Reed uses the 0.6 gram pellets for barley treatment. According to Fumitoxin MSDS and applicator's manual, the following information is used to calculate the phosphine and ammonia emissions

Given:

Fumitoxin Pellets = 0.6 gram (gr) each
phosphine released per pellet = 0.2 gr
ammonia released per pellet = 0.07 gr
application rate = 120 pellets per 1,000 bushels
1 bushel = 48 pounds (lbs)
barley throughput = 264 ton/hr
and 192,030 T/yr

Phosphine emissions

$$\text{Hourly: } \frac{0.2 \text{ gr} \mid 120 \text{ Pellets} \mid 1 \text{ bushel} \mid 264 \text{ T} \mid 2,000 \text{ lbs} \mid 1 \text{ lb}}{1 \text{ pellet} \mid 1,000 \text{ bushels} \mid 48 \text{ lbs} \mid \text{hr} \mid 1 \text{ T} \mid 453.6 \text{ gr}} = 0.58 \text{ lbs/hr}$$

$$\text{Annual: } \frac{0.2 \text{ gr} \mid 120 \text{ Pellets} \mid 1 \text{ bushel} \mid 192,030 \text{ T} \mid 1 \text{ lb}}{1 \text{ pellet} \mid 1,000 \text{ bushels} \mid 48 \text{ lbs} \mid \text{yr} \mid 453.6 \text{ gr}} = 0.21 \text{ T/yr}$$

$$\text{PTE: } \frac{0.2 \text{ gr} \mid 120 \text{ Pellets} \mid 1 \text{ bushel} \mid 264 \text{ T} \mid 8,760 \text{ hrs} \mid 1 \text{ lb}}{1 \text{ pellet} \mid 1,000 \text{ bushels} \mid 48 \text{ lbs} \mid \text{hr} \mid \text{Yr} \mid 453.6 \text{ gr}} = 2.54 \text{ T/yr}$$

Ammonia emissions

$$\text{Hourly: } \frac{0.07 \text{ gr} \mid 120 \text{ pellets} \mid 1 \text{ bushel} \mid 264 \text{ T} \mid 2,000 \text{ lbs} \mid 1 \text{ lb}}{1 \text{ pellet} \mid 1,000 \text{ bushels} \mid 48 \text{ lbs} \mid \text{hr} \mid 1 \text{ T} \mid 453.6 \text{ gr}} = 0.20 \text{ lbs/hr}$$

$$\text{Annual: } \frac{0.07 \text{ gr} \mid 120 \text{ pellets} \mid 1 \text{ bushel} \mid 192,030 \text{ T} \mid 1 \text{ lb}}{1 \text{ pellet} \mid 1,000 \text{ bushel} \mid 48 \text{ lbs} \mid \text{yr} \mid 453.6 \text{ gr}} = 0.07 \text{ T/yr}$$

$$\text{PTE: } \frac{0.07 \text{ gr} \mid 120 \text{ Pellets} \mid 1 \text{ bushel} \mid 264 \text{ T} \mid 8,760 \text{ hrs} \mid 1 \text{ lb}}{1 \text{ pellet} \mid 1,000 \text{ bushels} \mid 48 \text{ lbs} \mid \text{hr} \mid \text{yr} \mid 453.6 \text{ gr}} = 0.89 \text{ T/yr}$$

April 8, 2004

Harbi Elshafei
State of Idaho
Department of Environmental Quality
1410 North Hilton
Boise, ID 83706-1255

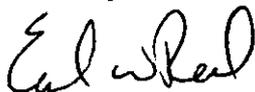
Dear Harbi Elshafei,

SUBJECT: FACILITY ID NO. 053-00008

Reed Barley Storage LLC has engaged Tetra Tech EM Inc., to complete the ISC-Prime modeling projects specifically the TAP emissions review, modeling, and report preparation.

Tetra Tech has assured me that this report will be delivered to your office on Monday April 12, 2004 before the close of business.

Sincerely,



Earl W. Reed

REED BARLEY STORAGE LLC
2576 HWY 25
HAZELTON, ID 83335

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APR 12 2004

Department of Environmental Quality
State Air Program



21865



Tetra Tech EM Inc.

106 North 6th Street, Suite 202 ♦ Boise, ID 83702 ♦ (208) 343-4085 ♦ FAX (208) 343-4756

April 9, 2004

Mr. Harbi Elshafei
Air Quality Permit Engineer
Idaho Department of Environmental Quality
1410 N. Hilton
Boise, ID 83706

RE: Toxic Air Pollutant Emission Estimates for Reed Barley Tier II Air Quality Permit Application

Dear Mr. Elshafei:

Per a letter from the Idaho Department of Environmental Quality (IDEQ) under your signature, dated March 25, 2004, I am providing information you requested to complete a Tier II Air Quality Permit for Reed Barley Storage (Reed). Tetra Tech EMI (TtEMI) was contracted by Reed to prepare and submit a Toxic Air Pollutant (TAP) emissions analysis. TAP emissions are based on the Potential to Emit (PTE) scenario submitted by TtEMI on February 3, 2004, to determine if emissions exceed screening emission levels (EL) as defined by the Idaho Department of Administrative Procedures act, IDAPA 58.01.01.585.

All information in this document is based on our knowledge of the barley handling and storage process at the Reed facility and is offered to assist the IDEQ in issuing an air quality permit. Reed is requesting a hard copy draft of the permit prior to being issued for public comment. If you have any questions, please feel free to contact me at (208) 343-4085 or Mr. Earl Reed at (208) 829-4111.

Sincerely,

Doug Herlocker
Air Quality Specialist

cc: Earl Reed

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APR 12 2004

Department of Environmental Quality
State Air Program



21844

**TOXIC AIR POLLUTANT EMISSION ANALYSIS AND DISPERSION
MODELING IMPACT ANALYSIS FOR
REED BARLEY STORAGE FACILITY LLC**

**SUPPLEMENTAL INFORMATION
FOR
THE MINOR SOURCE PERMIT APPLICATION FOR THE HAZELTON
BARLEY STORAGE FACILITY**

Prepared for:

**IDAHO DEPARTMENT OF ENVIRONMENTAL QUALITY
AIR QUALITY PROGRAM
1410 N. HILTON
BOISE, IDAHO 83706**

Prepared by:



**TETRA TECH EM INC.
106 North 6th Street, Suite 202
Boise, Idaho 83702**

APRIL 9, 2004

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APR 12 2004

Department of Environmental Quality
State Air Program

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1.0 INTRODUCTION

Tetra Tech EM Inc. (TtEMI) was contracted by Reed Barley Storage (Reed) to prepare and submit a Toxic Air Pollutant (TAP) emissions analysis. Per a letter from the Idaho Department of Environmental Quality (IDEQ), dated March 25, 2004, TtEMI is providing information required to complete a Tier II Air Quality Permit for Reed. The IDEQ letter requested TAP emission estimates for the Reed facility prior to obtaining an air quality permit. TAP emissions are based on the Potential to Emit (PTE) scenario submitted to IDEQ by TtEMI on February 3, 2004, to determine if emissions exceed screening emission levels (EL) as defined by the Idaho Department of Administrative Procedures act, IDAPA 58.01.01.585. The PTE scenario described a throughput rate of 264 tons (of barley) per hour (11,000 bushels per hour) and 2,312,640 tons (of barley) per year (tpy). A copy of the certification letter from the responsible official at Reed Barley which supports this document (in accordance with IDAPA 58.01.01.123, Rules for the Control of Air Pollution in Idaho) is attached in Appendix A.

2.0 ANALYSIS OF TOXIC AIR POLLUTANT SCREENING EMISSION LEVELS

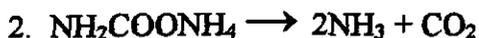
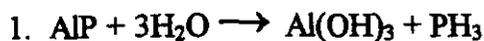
TAP levels that exceed the EL are required to undergo a modeling analysis and are compared to the Acceptable Ambient Concentrations (AAC) described in IDAPA 58.01.01.585. For the Reed TAP analysis, the PTE scenario described above was used.

During a telephone conversation on March 25, 2004 between Mr. Earl Read and Harbi Elshafei, it was discovered that Reed applies and mixes a pesticide pellet with incoming barley. Reed currently uses a fumigation agent sold under the trade name Fumitoxin, manufactured by Pestcon systems, Inc. (Pestcon). The product is manufactured and sold in 0.3 gram (gm) tablets and 0.6 gm pellets and activates once the sealed container has been opened. Reed uses the 0.6 gm pellets for barley application. Please reference the Fumitoxin Material Safety Data Sheet (MSDS) and Applicator's Manual (presented in Appendices B and C, respectively) for chemical information, safety procedures, and application and handling requirements. Reed anticipates they will continue to use and apply Fumitoxin (or equivalent products sold under different trade names) during the 5-year air quality permit term. All handling and application procedures are done in accordance with the Applicator's manual.

In general, the Fumitoxin (or equivalent product) is composed of 55% aluminum phosphide and also contains ammonium carbamate and inert ingredients. Two main reactions occur during the breakdown of the pellets: 1) The active ingredient, aluminum phosphide (AIP) reacts with water (H₂O) to produce



phosphine gas (PH₃), and 2) Ammonium carbamate releases ammonia (NH₃) and carbon dioxide (CO₂). The two reactions are summarized below.



IDAPA 58.01.01.585 presents ELs for TAPs. The TAP ELs of concern for this application are identified as phosphine and ammonia. Information for these TAPs is presented in Table 1.

TABLE 1
TOXIC AIR POLLUTANTS OF CONCERN

CAS Number	Chemical	Emission Screening Level ([EL] lb/hr)	Acceptable Ambient Concentrations ([AAC] mg/m ³)
7664-41-7	Ammonia	1.2	0.9
7803-51-2	Phosphine	0.027	0.02

Notes:

1. AAC is 24-hour average period
- lb/hr pound per hour
mg/m³ milligrams per cubic meter

As described in the Fumitoxin MSDS and Applicator's Manual, and also confirmed in discussions with Pestcon Technical staff, phosphine and ammonia are released in the reaction described above in the amount of 0.2 gm and 0.07 gm per 0.6 gm pellet, respectively. The Fumitoxin product is applied at a rate of 120 pellets per 1,000 bushels of grain (barley). The emission rates of phosphine and ammonia and application rate of Fumitoxin are summarized below.

Weight, application rates, and release amounts:

- Fumitoxin Pellets = 0.6 gm each
- Application rate = 120 pellets per 1,000 bushels
- PH₃ amount released per pellet = 0.2 gm
- NH₃ amount released per pellet = 0.07 gm

According to throughput rates described above, hourly emission rates for phosphine and ammonia are described below.

Emission rate calculation for Phosphine and ammonia according to PTE barley throughput:

- Application rate = 120 pellets per 1,000 bushels
- Hourly throughput rate = 264 tons per hour



$$\text{Equation \#1 - PH}_3: \frac{0.2 \text{ gm PH}_3}{0.6 \text{ gm pellet}} \times \frac{120 \text{ pellets}}{1,000 \text{ bushel}} \times \frac{264 \text{ ton}}{\text{hr}} \times \frac{\text{bushel}}{41.67 \text{ ton}} \times \frac{0.0022 \text{ lb}}{1 \text{ gm}}$$

$$= 0.58 \text{ lb PH}_3/\text{hr}$$

$$\text{Equation \#2 - NH}_3: \frac{0.07 \text{ gm NH}_3}{0.6 \text{ gm pellet}} \times \frac{120 \text{ pellet}}{1,000 \text{ bushel}} \times \frac{264 \text{ ton}}{\text{hr}} \times \frac{\text{bushel}}{41.67 \text{ ton}} \times \frac{0.0022 \text{ lb}}{1 \text{ gm}}$$

$$= 0.20 \text{ lb NH}_3/\text{hr}$$

According to the above calculations, phosphine emissions exceed the EL. However, ammonia emissions do not. Phosphine emissions have undergone a modeling analysis and are presented in the following section.

The basis for PTE emission estimates are based on the following assumptions:

- 100 percent of phosphine emissions are released during a one-hour period
- 100 percent of ammonia emissions are released during a one-hour period
- 100 percent of incoming barley treated with Fumitoxin product

3.0 AIR DISPERSION MODELING ANALYSIS

This section discusses the dispersion modeling analysis completed to evaluate potential phosphine impacts from the Reed facility. The modeling was completed to demonstrate compliance with the AAC for phosphine described in Table 1. The dispersion modeling analysis was completed in accordance with the guidance and protocols outlined in the U.S. Environmental Protection Agency's (EPA) *Guideline on Air Quality Models (Revised)* (EPA 2003) and IDEQ *State of Idaho Air Quality Modeling Guidance* (IDEQ 2002).

3.1 Model Selection and Inputs

The EPA's *Guideline on Air Quality Models* (EPA 2003) recommends that the Industrial Source Complex Short-term Model Version 3 (ISCST3) be used for source-specific analysis of complicated sources in a nearfield analysis. A complicated source is one with more than one emission point, aerodynamic downwash, dry and wet deposition, or volume and area sources. ISCST3 is a steady-state Gaussian plume model that is appropriate for estimating pollutant concentrations at distances to 50 kilometers (km), and for averaging times from one hour to one year.



The ISCST3 model has recently been revised to include enhanced building downwash and plume rise algorithms. This new version of the ISCST3 model is called ISC-PRIME (Plume Rise Model Enhancements). Based on discussions with IDEQ, ISC-PRIME is the preferred model for evaluating all pollutant concentrations from Reed Barley. The latest version of the ISC-PRIME model available on the EPA SCRAM website, dated 11/27/2002, was used in this modeling analysis.

The ISC-PRIME model was run using the regulatory default options, except stack-tip downwash, which was turned off per IDEQ guidance, and one full year of meteorological data collected in 2000 from the Heyburn, Idaho meteorological site, which is approximately 20 miles east of Reed Barley. Regulatory default options include the use of buoyancy-induced dispersion, calms processing routines, upper-bound downwash concentrations for super-squat buildings, default wind speed profile exponents, and vertical potential temperature gradients; and excluded the use of gradual plume rise. The model was run using rural dispersion parameters and incorporated terrain into the calculations.

3.2 Source Input Data

The phosphine emission sources at Reed consist of passive vent escape of phosphine gas from 12 grain silo during the activation of the Fumitoxin pellets. All of the emissions are from silo vents. The configuration and specification of the silo vents are described below.

Specification and configuration of grain silo vents:

- 12 total silos
- Average of 14 vents per silo
- Each vent approximately 18" by 18" square screened opening
- Each vent oriented downward at 45-degree angle (to prevent rain from entering silo)
- Vent height approximately 74 feet above ground level (22.56 meters)
- Passive are escape (i.e. no forced air fan system)

The phosphine emissions from the silo vents were characterized in the model as point sources so that building downwash could be incorporated into the analysis. Total phosphine emissions from Reed are estimated to be approximately 0.58 lb/hr. It is assumed for this modeling analysis that phosphine emissions are uncontrolled and continuous during the grain storage process. Total phosphine emissions were divided equally among the 12 silos for modeling purposes. It was assumed that the emissions from each silo exit a single vent to simplify the analysis and to provide maximum modeled concentrations. The modeling was completed with stack tip downwash turned off, in accordance with IDEQ guidance for pseudo point sources.



Table 2 identifies the emission sources, locations, estimated emissions, and associated release parameters. The silo source parameters were established based on physical parameters of the silos and silo vents, as well as IDEQ guidance.

TABLE 2
REED BARLEY STORAGE FACILITY
PHOSPHINE EMISSION SOURCE INPUT DATA

Source Description	Source ID	UTM Location (mE/mN)	Release Height (m)	Stack Temp (K)	Exit Velocity (m/s)	Stack Diameter (m)	Volume Source Sigma-y (m)	Volume Source Sigma-z (m)	Phosphine Emission Rate (g/s)
Silo 1	Silo 1	733534/4720712	22.6	293.0	0.001	0.52	N/A	N/A	0.006
Silo 2	Silo 2	733561/4720712	22.6	293.0	0.001	0.52	N/A	N/A	0.006
Silo 3	Silo 3	733588/4720712	22.6	293.0	0.001	0.52	N/A	N/A	0.006
Silo 4	Silo 4	733615/4720712	22.6	293.0	0.001	0.52	N/A	N/A	0.006
Silo 5	Silo 5	733669/4720712	22.6	293.0	0.001	0.52	N/A	N/A	0.006
Silo 6	Silo 6	733696/4720712	22.6	293.0	0.001	0.52	N/A	N/A	0.006
Silo 7	Silo 7	733723/4720712	22.6	293.0	0.001	0.52	N/A	N/A	0.006
Silo 8	Silo 8	733750/4720712	22.6	293.0	0.001	0.52	N/A	N/A	0.006
Silo 9	Silo 9	733634/4720720	22.6	293.0	0.001	0.52	N/A	N/A	0.006
Silo 10	Silo 10	733634/4720704	22.6	293.0	0.001	0.52	N/A	N/A	0.006
Silo 11	Silo 11	733651/4720704	22.6	293.0	0.001	0.52	N/A	N/A	0.006
Silo 12	Silo 12	733651/4720720	22.6	293.0	0.001	0.52	N/A	N/A	0.006

Notes:

UTM Universal Transverse Mercator
 ID identification
 K degrees Kelvin
 N/A Not applicable

g gram
 m meter
 s second



3.3 BUILDING DOWNWASH

The modeling analysis included building dimensions at Reed Barley to assess the potential downwash effects on the phosphine emissions from nearby structures. The direction-specific downwash parameters were calculated using facility plot-plan maps, and EPA's Building Profile Input Program (BPIP) for the ISC-PRIME model. Output from BPIP was incorporated into the ISC-PRIME input files. An electronic copy of modeling files are included in Appendix D.

3.4 MODEL RECEPTORS

A grid of model receptors was developed for the modeling analysis to describe the area surrounding Reed Barley. The rectangular grid of receptors was developed from the facility's fenceline outward for 6 km in each direction. Spacing intervals between the receptors are 100 m out to 1 km, and 500-m spacing between 1 and 6 km. In addition, receptors were placed along the facility fenceline, at 25 m receptor spacing intervals. Receptor elevations were determined using U.S. Geological Survey 7.5-minute Digital Elevation Model data. A plot of the model receptor locations is shown in Figure 3-1.

3.5 METEOROLOGICAL DATA

The dispersion modeling was run using meteorological data collected in 2000 from the Heyburn, Idaho meteorological site, approximately 20 miles east of the Reed facility. This one-year dataset was recently provided to Tetra Tech by IDEQ for a nearby modeling analysis. The nearby proximity of the meteorological station to the Reed facility, along with the similar geographic features of the two sites, indicates that the meteorological dataset is representative of the conditions at Reed. The surface data were combined with approved mixing height data from Boise, Idaho.

The Heyburn meteorological data demonstrate a primary wind direction from the west through west-northwest. Secondary wind directions are from the southwest and east-northeast. Figure 3-2 presents a windrose representing the 2000 Heyburn meteorological data.

3.6 MODEL RESULTS

ISCPRIME modeling was completed assuming worst-case 24-hour operating conditions for Phosphine emissions. Table 3 summarizes the ISCPRIME phosphine modeling results. The highest modeled 24-hour phosphine concentration is 0.011 mg/m³, which is less than the 24-hour phosphine ACC limit of 0.02 mg/m³. The highest impacts from the modeling are very localized and occur just north of the rail loading and unloading operations. Impacts diminish quickly with distance from the fenceline. Modeled 24-hour phosphine emissions are shown in Figure 3-3.

**TABLE 3
REED BARLEY STORAGE FACILITY
PHOSPHINE MODEL RESULTS**

Averaging Period	Highest Modeled Concentration (mg/m³)	ACCEPTABLE AMBIENT CONCENTRATION (mg/m³)
24-Hour	0.011	0.02

Notes:

mg/m³ milligrams per cubic meter

**FIGURE 3-1
REED BARLEY STORAGE LLC
MODEL RECEPTOR LOCATIONS**

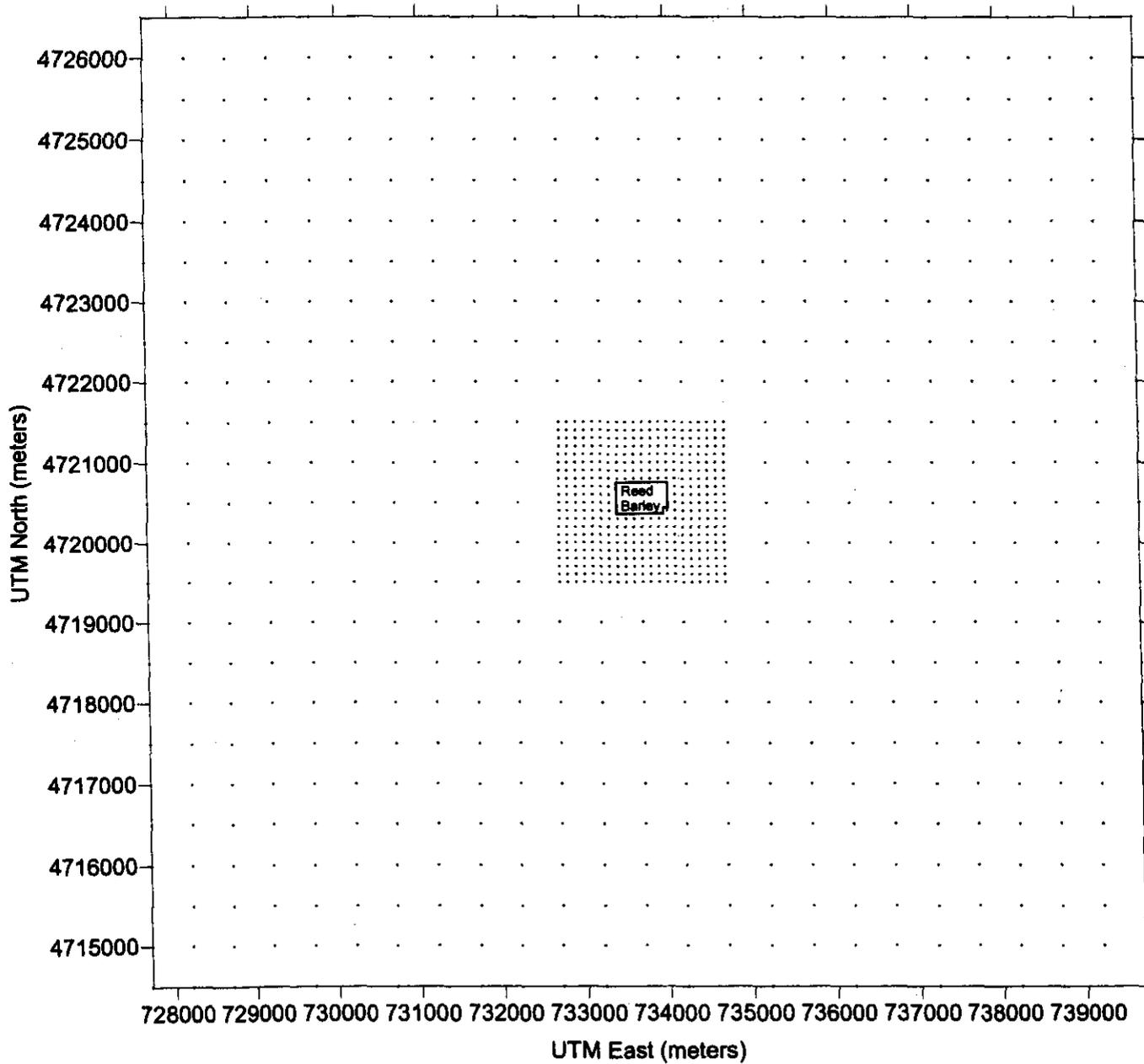
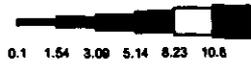
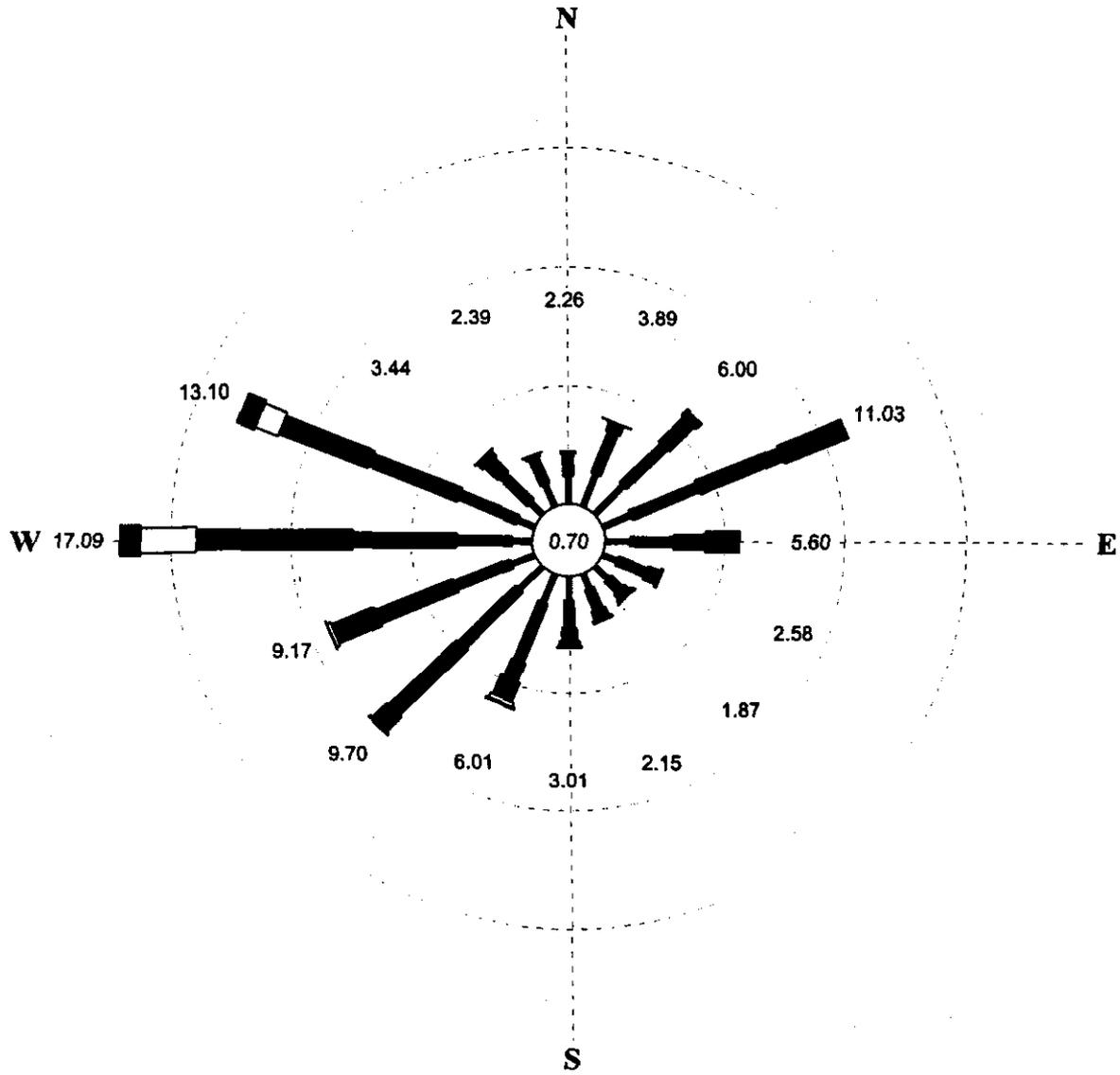


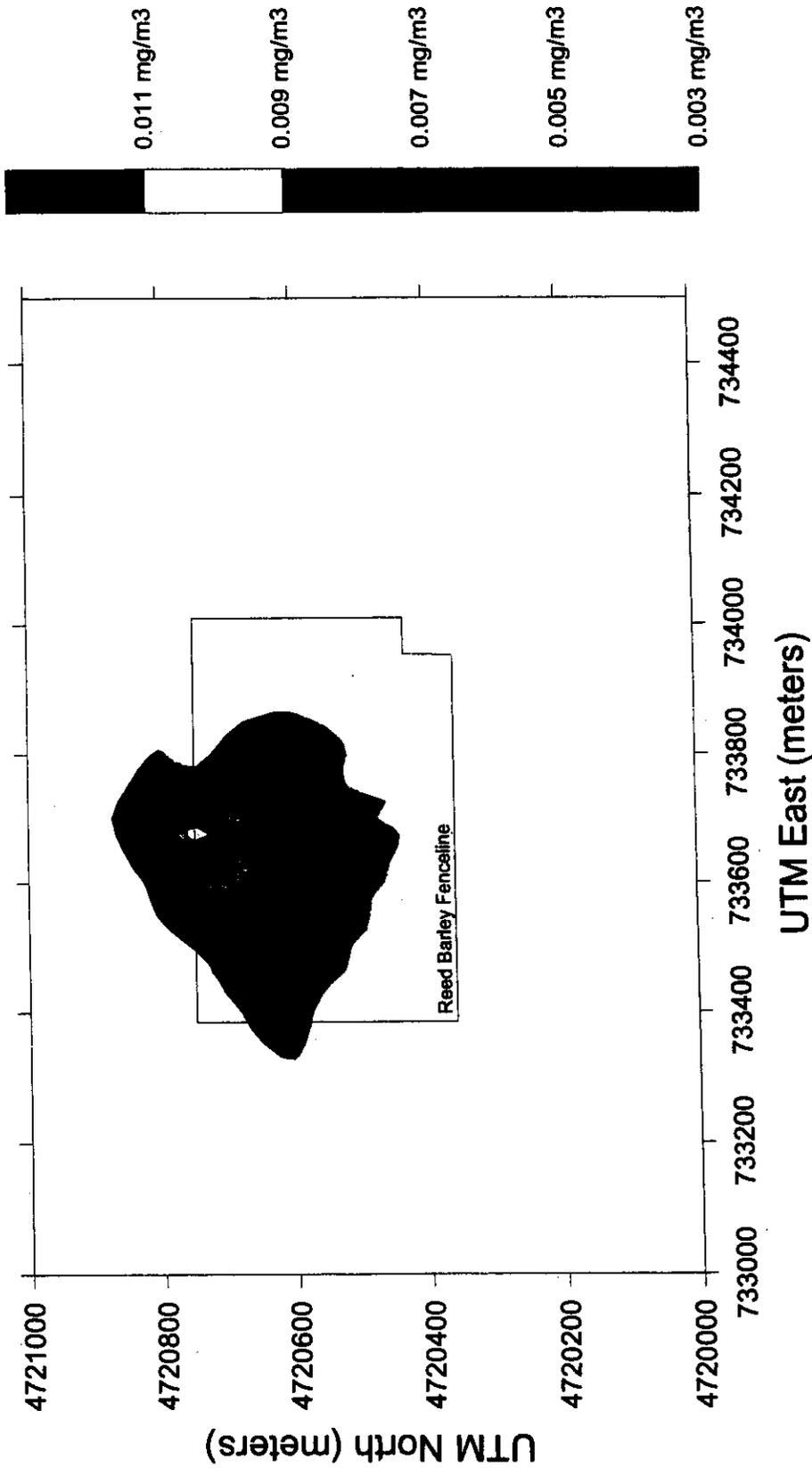
FIGURE 3-2
2000 Heyburn Windrose



Wind Speed (Meters Per Second)

Calms included at center.
 Rings drawn at 5% intervals.
 Wind flow is TO the directions shown.
 48 observations were missing.

**FIGURE 3-3
 REED BARLEY STORAGE LLC
 24-HOUR PHOSPHINE CONCENTRATIONS
 (milligrams per cubic meter)**



4.0 REFERENCES

- Idaho Department of Environmental Quality (IDEQ). 2002. "State of Idaho Air Quality Modeling Guidance." Air Quality Division, Stationary Source Program. ID AQ-011. December.
- U.S. Environmental Protection Agency (EPA). 2003. "Guideline on Air Quality Models (Revised)." 40 Code of Federal Regulations, Part 51, Appendix W. Office of Air Quality Planning and Standards. Research Triangle Park, NC.
- EPA. 1995. "User's Guide for the Industrial Source Complex (ISC3) Dispersion Models." EPA-454/B-95-003a. Office of Air Quality Planning and Standards. Research Triangle Park



APPENDIX A

REED BARLEY CERTIFICATION LETTER

April 8, 2004

Harbi Elshafei
State of Idaho
Department of Environmental Quality
1410 North Hilton
Boise, ID 83706-1255

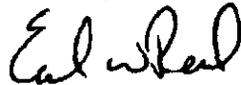
Dear Harbi Elshafei,

SUBJECT: FACILITY ID NO. 053-00008

Reed Barley Storage LLC has engaged Tetra Tech EM Inc., to complete the ISC-Prime modeling projects specifically the TAP emissions review, modeling, and report preparation.

Tetra Tech has assured me that this report will be delivered to your office on Monday April 12, 2004 before the close of business.

Sincerely,

A handwritten signature in black ink, appearing to read "Earl W. Reed". The signature is written in a cursive style with a large initial "E".

Earl W. Reed

REED BARLEY STORAGE LLC
2576 HWY 25
HAZELTON, ID 83335

APPENDIX B

FUMITOXIN MATERIAL SAFETY DATA SHEET



PESTCON SYSTEMS, INC.

MATERIAL SAFETY DATA SHEET: ALUMINUM PHOSPHIDE, FUMITOXIN*

DISTRIBUTOR:

Pestcon Systems, Inc.
1808 Firestone Parkway
Wilson, N.C. 27893
Phone: 252-237-7923
Fax: 252-243-1832

MANUFACTURER:

SINOCHEM International
Chemical Co., Inc.
Beijing, China 100045

**CHEMTREC EMERGENCY NO: 800-424-9300
202-483-7616**

HAZARDOUS INGREDIENTS INFORMATION

PRODUCT NAME:

FUMITOXIN* Tablets, Pellets, Bags
Hydrogen Phosphide (Phosphine, PH₃) Gas

CAS Number:

20859-73-8
7803-51-2

FUMITOXIN* aluminum phosphide reacts with water to produce Phosphine, Hydrogen Phosphide, PH₃:



FUMITOXIN* aluminum phosphide is formulated with 55% aluminum phosphide and also contains ammonium carbamate and inert ingredients. Ammonium carbamate releases ammonia and carbon dioxide as follows:



NH₂COONH₄CAS NO. 1111-78-0

NH₃.....CAS NO. 7664-41-7

CO₂CAS NO. 124-38-9

INHALATION EXPOSURE LIMITS:

COMPONENT	OSHA PEL (ppm)	ACGIH TLV		IDLH (ppm)
		TWA (ppm)	STEL (ppm)	
Hydrogen Phosphide	0.3	0.3	1.0	50
Ammonia	50	25	35	300
Carbon Dioxide	5000	5000	30,000	40,000

PHYSICAL CHARACTERISTICS

Boiling Point:

AIP >1000°C

PH₃ -87.7°C

Specific Gravity of Vapors (Air = 1):

AIP N/A

PH₃ 1.17

Vapor Pressure:

AIP 0mm Hg

PH₃ 40mmHg @ -129.4°C

Solubility in Water:

AIP Insoluble, reacts

PH₃ 26cc in 100 ml water at 17°C

Appearance and Odor:

Fumitoxin Aluminum phosphide has a greenish gray color and the hydrogen phosphide (phosphine, PH₃) gas produced by this chemical has an odor described as similar to garlic, carbide or decaying fish and is colorless.

Specific Gravity:

AIP 2.85

Melting Point:

AIP >1,000°C

PH₃ -133.5°C

FIRE AND EXPLOSION HAZARD DATA

Flash Point:

Aluminum phosphide is not flammable. However, it will react readily with water to produce hydrogen phosphide (phosphine, PH₃) gas which may ignite spontaneously in air at concentrations above its LEL of 1.8% v/v. UEL of hydrogen phosphide is not known.

Extinguishing Media:

Suffocate flames with sand, carbon dioxide or dry extinguishing chemicals.

Special Fire Fighting Procedures:

Do not use water on aluminum phosphide fires.

Respiratory Protection:

Wear NIOSH/MSHA approved SCBA or equivalent respiratory protection.

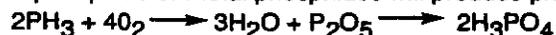
Protective Clothing:

Wear gloves when handling FUMITOXIN tablets and pellets.

Unusual Fire and Explosion Hazards:

Do not confine spent or partially spent aluminum phosphide residues. Any hydrogen phosphide (phosphine) gas released may ignite. Do not pile unreacted tablets, pellets or bags; or allow these products to come in contact with liquid water. Open containers of FUMITOXIN* in open air only and never in a flammable atmosphere.

Fires containing hydrogen phosphide or metal phosphides will produce phosphoric acid.



REACTIVITY DATA

Stability:

Fumitoxin Aluminum phosphide is stable to most chemical reactions, except for hydrolysis. It will react with moist air, liquid water, acids and some other liquids to produce toxic and flammable hydrogen phosphide (phosphine, PH₃) gas.

Incompatibility:

Avoid contact with water and oxidizing agents.

Corrosion:

Hydrogen phosphide gas may react with certain metals and cause corrosion, especially at higher temperatures and relative humidities. Metals such as copper, brass and other copper alloys, and precious metals such as gold and silver are susceptible to corrosion by phosphine. Small electric motors, smoke detectors, brass sprinkler heads, batteries and battery chargers, fork lifts, temperature monitoring systems, switching gears, communication devices, computers, calculators and other electrical equipment may be damaged by this gas. Hydrogen phosphide will also react with certain metallic salts and, therefore, sensitive items such as photographic film, some inorganic pigments, etc., should not be exposed.

Hazardous Polymerization:

Will not occur.

HEALTH HAZARD INFORMATION

Routes of Entry:

Aluminum phosphide and hydrogen phosphide gas from FUMITOXIN are not absorbed dermally. Primary routes of exposure are inhalation and ingestion.

Acute and Chronic Health Hazards:

Fumitoxin is a highly acute toxic substance. Hydrogen phosphide gas LC₅₀ is about 190 ppm for a one-hour inhalation exposure. The acute oral toxicity of the Aluminum phosphide was found to be 11.5mg/kg of body weight.

FUMITOXIN is not known to cause chronic poisoning.

Carcinogenicity:

Fumitoxin is not known to be carcinogenic and is not listed as such by NTP, IARC or OSHA.

Signs and Symptoms of Exposure:

Aluminum phosphide tablets, pellets or bags react with moisture from the air, acids and many other liquids to release hydrogen phosphide (phosphine, PH₃) gas. Mild exposure by inhalation causes malaise (indefinite feeling of sickness), ringing in the ears, fatigue, nausea and pressure in the chest which is relieved by removal to fresh air. Moderate poisoning causes weakness, vomiting, pain just above the stomach, chest pain, diarrhea and dyspnea (difficulty in breathing). Symptoms of severe poisoning may occur within a few hours to several days resulting in pulmonary edema (fluid in lungs) and may lead to dizziness, cyanosis (blue or purple skin color), unconsciousness, and death.

Emergency and First Aid Procedures:

Symptoms of overexposure are headache, dizziness, nausea, difficult breathing, vomiting, and diarrhea. In all cases of overexposure get medical attention immediately. Take victim to a doctor or emergency treatment facility.

If the gas or dust from aluminum phosphide is inhaled:

Get exposed person to fresh air. Keep warm and make sure person can breath freely. If breathing has stopped, give artificial respiration by mouth-to-mouth or other means of resuscitation. Do not give anything by mouth to an unconscious person.

If aluminum phosphide pellets, tablets or powder are swallowed:

Drink or administer one or two glasses of water and induce vomiting by touching back of the throat with finger, or, if available, syrup of ipecac. Do not give anything by mouth if the victim is unconscious or not alert.

If powder or granules of aluminum phosphide get on skin or clothing:

Brush or shake material off clothes in a well ventilated area. Allow clothes to aerate in a ventilated area prior to laundering. Do not leave contaminated clothing in occupied and/or confined areas such as automobiles, vans, motel rooms, etc. Wash contaminated skin thoroughly with soap and water.

If dust from pellets or tablets gets in eyes:

Flush with plenty of water. Get medical attention.

PRECAUTIONS FOR SAFE HANDLING**Spill Cleanup Procedures:**

If possible, dispose of spilled FUMITOXIN by use according to label instructions. Freshly spilled material which has not been contaminated by water or foreign matter may be replaced into original containers. Punctured flasks or containers may be temporarily repaired using aluminum tape. If the age of the spill is unknown or if the Fumitoxin has been contaminated with soil, debris, water, etc., gather up the spillage in small open buckets having a capacity no larger than about 1 gallon. Do not add more than about 1 to 1.5 kg (2 to 3 lbs) to a bucket. If on-site wet deactivation is not feasible, transport the uncovered buckets in open vehicles to a suitable area. Wear gloves when handling Fumitoxin.

Respiratory protection may be required during cleanup of spilled material. If the concentration of hydrogen phosphide is unknown, NIOSH/MSHA approved SCBA or its equivalent must be worn.

Small amounts of spillage, from about 4 to 8 kg (9 to 18 lbs) may be spread out over the ground in an open area to be deactivated by atmospheric moisture. Alternatively, spilled Fumitoxin may be deactivated by the wet method as described in the following.

Wet Deactivation of Spilled FUMITOXIN:

1. Deactivating solution is prepared by adding the approximate amount of low sudsing detergent to water in a drum or other suitable container. A 2% solution or 4 cups of detergent in 30 gallons is suggested. The container should be filled with deactivating solution to within a few inches of the top.

2. The material is added slowly to the deactivating solution and stirred so as to thoroughly wet all of the Fumitoxin. This should be carried out in open air and respiratory protection may be required.
3. No more than about 45 to 50 lbs of Fumitoxin should be added to 15 gallons of water-detergent mixture.
4. Allow the mixture to stand, with occasional stirring, for about 36 hours. The resultant slurry will then be safe for disposal.
5. Dispose of the slurry of deactivated material, with or without preliminary decanting, at a sanitary landfill or other suitable site approved by local authorities. Where permissible, this slurry may be poured into a storm sewer or out onto the ground.

Precautions to be Taken in Handling and Storage:

1. Store in a dry, well ventilated area, away from heat and under lock and key. Keep away from irresponsible people and children. Post as a pesticide storage area. Do not contaminate water, food or feed by storing pesticides in the same area used to store these commodities.
2. Do not store in buildings where humans or domestic animals reside.
3. Fumitoxin tablets and pellets are supplied in relatively gas tight resealable aluminum flasks. Do not expose the product to atmospheric moisture any longer than is necessary. Reseal tightly before returning flasks to storage; mark the flask opened and partially used.
4. Fumitoxin bags that are supplied in tins are non-resealable and must be completely used when opened.

Fumitoxin bags that are supplied in metal drums do not have to be completely used as long as the bag is not removed from the foil pouch or the foil pouch is not opened. Remove the number of pouches required and reseal the metal drum.

5. The shelf life of Fumitoxin is virtually unlimited as long as the containers are kept tightly sealed.

FUMITOXIN IS A RESTRICTED USE PESTICIDE DUE TO THE ACUTE INHALATION TOXICITY OF HIGHLY TOXIC HYDROGEN PHOSPHIDE (PHOSPHINE, PH₃) GAS AND IS FOR RETAIL SALE TO AND USE ONLY BY CERTIFIED APPLICATORS OR PERSONS UNDER THEIR DIRECT SUPERVISION AND ONLY FOR THOSE USES COVERED BY THE CERTIFIED APPLICATOR'S CERTIFICATION. READ AND FOLLOW EPA ACCEPTED LABELING BEFORE USING FUMITOXIN* ALUMINUM PHOSPHIDE PRODUCTS.

FOR ASSISTANCE:

Contact - Pestcon Systems, Inc.
Telephone: 252-237-7923
Fax: 252-243-1832
or ChemTrec: 800-424-9300

SHIPPING DATA

D.O.T. Shipping Name: Aluminum phosphide
Hazard Class or Division: 4.3
Identification Numbers: UN1397
Packing Group: I
Labels required: Dangerous When Wet/Poison

This information is furnished without warranty, expressed or implied, except that it is accurate to the best knowledge of Pestcon Systems, Inc. The data on this sheet relates only to the specific material designated herein. Pestcon Systems, Inc. assumes no legal responsibility for use or reliance upon these data.

Issued By: Pestcon Systems, Inc.

Issue Date: 7/01

APPENDIX C

FUMITOXIN APPLICATOR'S MANUAL

APPLICATOR'S MANUAL
For
Fumitoxin[®]
Tablets and Pellets

THIS PRODUCT MUST BE ACCOMPANIED BY AN APPROVED LABEL AND APPLICATOR'S MANUAL. READ AND UNDERSTAND THE ENTIRE LABELING AND APPLICATOR'S MANUAL. ALL PARTS OF THE LABELING AND APPLICATOR'S MANUAL ARE EQUALLY IMPORTANT FOR SAFE AND EFFECTIVE USE OF THESE PRODUCTS. CONSULT WITH YOUR STATE LEAD PESTICIDE REGULATORY AGENCY TO DETERMINE REGULATORY STATUS, REQUIREMENTS, AND RESTRICTIONS FOR FUMIGATION USE IN THAT STATE. CALL 252-237-7923/1-800-548-2778 IF YOU HAVE ANY QUESTIONS OR DO NOT UNDERSTAND ANY PART OF THIS LABELING.

RESTRICTED USE PESTICIDE
DUE TO HIGH ACUTE INHALATION TOXICITY OF PHOSPHINE GAS

For retail sale to Dealers and Certified Applicators only.

For use by Certified Applicators or persons under their direct supervision, and only for those uses covered by the Certified Applicator's certification. Refer to the directions in this applicator manual for requirements of the physical presence of a Certified Applicator.

FOR USE AGAINST INSECTS WHICH INFEST STORED
COMMODITIES AND CONTROL OF BURROWING PESTS

Active ingredient: Aluminum Phosphide.....	55.0%
Inert ingredients:	45.0%
<hr/> Total	100.0%



**KEEP OUT OF REACH OF CHILDREN
DANGER - POISON - PELIGRO**



PRECAUCION AL USUARIO: Si usted no les ingles, no use este productor hasta que la etiqueta se le haya sido explicado ampliamente.

(TO THE USER: If you cannot read English, do not use this product until the label has been fully explained to you.)

Manufactured for:



1806 Firestone Parkway
Wilson, NC 27893 USA
Telephone: 252-237-7923/1-800-548-2778
Fax: 252-237-3259
Internet: www.pestcon.com
Email: info@pestcon.com
EPA Est. Number: 005857-NC-001
EPA Reg. No: 72959-1-5857 Fumitoxin Tablets
72959-2-5857 Fumitoxin Pellets

Warranty

Seller warrants that the product conforms to its chemical description and when used according to label directions under normal conditions of use, it is reasonably fit for the purposes stated on the label. Seller makes no other warranty, either expressed or implied, and buyer assumes all risks should the product be used contrary to label instructions.

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1. FIRST AID

Symptoms of exposure to this product are headaches, dizziness, nausea, difficult breathing, vomiting and diarrhea. In all cases of overexposure get medical attention immediately. Take victim to a doctor or emergency treatment facility.

If inhaled:

- Move person to fresh air.
- If person is not breathing, call 911 or an ambulance, then give artificial respiration, preferably by mouth-to-mouth if possible.
- Keep warm and make sure person can breathe freely.
- Call a poison control center or doctor for further treatment advice.

If swallowed:

- Call a poison control center or doctor immediately for treatment advice.
- Have person drink one or two glasses of water and induce vomiting by touching back of throat with finger, or if available administer syrup of ipecac.
- Do not give anything by mouth to an unconscious person.

If on skin or clothing:

- Brush or shake material off clothes and shoes in a well-ventilated area. Allow clothes to aerate in a ventilated area prior to laundering.
- Do not leave contaminated clothing in occupied and / or confined areas such as automobiles, vans, motel rooms, etc.
- Wash contaminated skin thoroughly with soap and water.

If in eyes:

- Hold eye open and rinse slowly and gently with water for 15-20 minutes.
- Remove contact lenses, if present, after the first 5 minutes, then continue rinsing eye.
- Call a poison control center or doctor for further treatment advice.

HOT LINE NUMBER

Have the product container or label or applicator's manual with you when calling a poison control center or doctor, or going for treatment. You may also contact PESTCON SYSTEMS, INC. (252) 237-7923 / 1-800-548-2778 or CHEMTREC - 1-800-424-9300 for emergency medical treatment.

2. NOTE TO PHYSICIAN

PESTCON aluminum phosphide fumigants react with moisture from the air, water, acids and many other liquids to release phosphine gas. Mild inhalation exposure causes malaise (indefinite feeling of sickness), ringing of ears, fatigue, nausea, and pressure in the chest, which is relieved by removal to fresh air. Moderate poisoning causes weakness, vomiting, pain just above the stomach, chest pain, diarrhea and dyspnea (difficulty in breathing). Symptoms of severe poisoning may occur within a few hours to several days, resulting in pulmonary edema (fluid in lungs) and may lead to dizziness, cyanosis (blue or purple skin color), unconsciousness, and death.

In sufficient quantity, phosphine affects the liver, kidneys, lungs, nervous system and circulatory system. Inhalation can cause lung edema (fluid in lungs) and hyperemia (excess of blood in a body part), small perivascular brain hemorrhages and brain edema (fluid in brain). Ingestion can cause lung and brain symptoms but damage to the viscera (body cavity organs) is more common. Phosphine poisoning may result in (1) pulmonary edema, (2) liver elevated serum GOT, LDH and alkaline phosphatase, reduced prothrombin, hemorrhage and jaundice (yellow skin color) and (3) kidney hematuria (blood in urine) and anuria (abnormal or lack of urination). Pathology is characteristic of hypoxia (oxygen deficiency in body tissue). Frequent exposure to concentrations above permissible levels over a period of days or weeks may cause poisoning. Treatment is symptomatic.

The following measures are suggested for use by the physician in accordance with his own judgment:

In its milder forms, symptoms of poisoning may take some time (up to 24 hours) to make their appearance, and the following is suggested:

1. Give complete rest for 1-2 days, during which the patient must be kept quiet and warm.
2. Should patient suffer from vomiting or increased blood sugar, appropriate solutions should be administered. Treatment with oxygen breathing equipment is recommended as is the administration of cardiac and circulatory stimulants.

In cases of severe poisoning (Intensive Care Unit recommended):

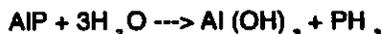
1. Where pulmonary edema is observed, steroid therapy should be considered and close medical supervision is recommended. Blood transfusions may be necessary.
2. In cases of manifest pulmonary edema, venesection should be performed under vein pressure control. Heart glycosides (I.V.) (in case of hemoconcentration, venesection may result in shock). Upon progressive edema of the lungs; immediate intubations with a constant removal of edema fluid and oxygen over-pressure respiration, as well as measures required for shock treatment are recommended. In case of kidney failure, extracorporeal hemodialysis is necessary. There is no specific antidote known for this poisoning.
3. Mention should be made here of suicidal attempts by taking solid phosphide by mouth. After swallowing; emptying of the stomach by vomiting, flushing of the stomach with diluted potassium permanganate solution or a solution of magnesium peroxide until flushing liquid ceases to smell of carbide, is recommended. Thereafter, apply medicinal charcoal.

3. INTRODUCTION

FUMITOXIN® tablets and pellets are used to protect stored commodities from damage by insects and other vertebrate pests. Fumigation of stored products with **FUMITOXIN** in the manner prescribed in the labeling does not contaminate the marketed commodity.

FUMITOXIN metal phosphide fumigants are acted upon by atmospheric moisture to produce phosphine gas.

FUMITOXIN tablets and pellets contain aluminum phosphide (AIP) as their active ingredient and will liberate phosphine via the following chemical reaction:



Phosphine gas is highly toxic to insects, burrowing pests, humans, and other forms of animal life. In addition to its toxic properties, the gas will corrode certain metals and may ignite spontaneously in air at concentrations above its lower flammable limit of 1.8% (v/v). These hazards will be described in greater detail later on in this Applicator's Manual.

FUMITOXIN also contains ammonium carbamate, which liberates ammonia and carbon dioxide as follows:



These gases are essentially nonflammable and act as inerting agents to reduce fire hazards.

FUMITOXIN is prepared in two spherical shapes. The rounded tablets weigh approximately 3 grams and will release 1 gram of phosphine gas. They are about 16mm in diameter. The pellets are about 10mm in diameter, weigh approximately 0.6 gram and release 0.2 gram of phosphine gas.

PESTCON FUMITOXIN Tablets are provided in 21kg cases, contain 14 resealable, gas-tight flasks of 500 tablets each or, 70 flasks of 100 tablets each.

PESTCON FUMITOXIN Pellets are provided in 21kg cases containing 21 resealable, gas-tight flasks of 1660 pellets each or, 14 flasks of 2490 pellets each.

Upon exposure to air, FUMITOXIN tablets and pellets begin to react with atmospheric moisture to produce small quantities of phosphine gas. These reactions start slowly, gradually accelerates and then tapers off again as the aluminum phosphide is spent. FUMITOXIN pellets react somewhat faster than do the tablets. The rates of decomposition of the tablets and pellets will vary depending upon moisture and temperature conditions. For example, when moisture and temperature of the fumigated commodity are high, decomposition of FUMITOXIN may be complete in less than 3 days. However, at lower ambient temperatures and humidity levels, decomposition of FUMITOXIN may require 5 days or more. After decomposition, FUMITOXIN leaves a grey-white powder composed almost entirely of aluminum hydroxide and other approved inert ingredients. This will cause no problems if the fumigant has been added directly to a commodity such as grain. However, the spent powder must usually be retrieved for disposal after space fumigations. If properly exposed, the spent FUMITOXIN will normally contain only a small amount of unreacted aluminum phosphide and may be disposed of without hazard. While spent FUMITOXIN is not considered a hazardous waste, partially spent residual dusts from incompletely exposed FUMITOXIN will require special care. Precautions and instructions for further deactivation and disposal will be given under Section 28 of this Manual.

FUMITOXIN tablets and pellets are supplied in gas-tight containers and their shelf life is unlimited as long as the packaging remains intact. Once opened for fumigation, the aluminum flasks of tablets or pellets may be tightly resealed and stored for future use. Storage and handling instructions will be given in detail under section 19.

4. PRECAUTIONARY STATEMENTS

4.1 Hazards to Humans and Domestic Animals

DANGER: Aluminum phosphide from FUMITOXIN tablets, pellets or dust may be fatal if swallowed. Do not get in eyes, on skin or on clothing. Do not eat, drink or smoke while handling aluminum phosphide fumigants. If a sealed container is opened, or if the material comes into contact with moisture, water or acids, these products will release phosphine, which is an extremely toxic gas. If a garlic odor is detected, refer to the Industrial Hygiene Monitoring instructions found in section 15.6 of this manual for appropriate monitoring procedures. Pure phosphine gas is odorless; the garlic odor is due to a contaminant. Since the odor of phosphine may not be detected under some circumstances, the absence of a garlic odor does not mean that dangerous levels of phosphine gas are not present. Observe proper re-entry procedures specified under section 15.4 in this labeling to prevent overexposure.

4.2 Physical and Chemical Hazards

Aluminum phosphide in tablets, pellets and partially spent dust will release phosphine if exposed to moisture from the air or if it comes into contact with water, acids and many other liquids. Since phosphine may ignite spontaneously at levels above its lower flammable limit of 1.8% v/v, it is important not to exceed this concentration. Ignition of high concentrations of phosphine can produce a very energetic reaction. Explosion can occur under these conditions and may cause severe personal injury. **Never allow the buildup of phosphine to exceed explosive concentrations.** Do not confine spent or partially spent aluminum phosphide fumigants as the slow release of phosphine from this material may result in formation of an explosive atmosphere. Aluminum phosphide tablets and pellets, outside their containers, should not be stacked or piled up or contacted with liquid or water. This may cause a temperature increase, accelerate the rate of gas production and confine the gas so that ignition could occur.

It is preferable to open containers of aluminum phosphide products in open air as under certain conditions, they may flash upon opening. Containers may also be opened near a fan or other appropriate ventilation that will rapidly exhaust contaminated air. When opening, invert the container several times then point the container away from the face and body and slowly loosen the cap. Although the chances for a flash are very remote, never open these containers in a flammable atmosphere. These precautions will also reduce the fumigator's exposure to phosphine gas. Containers may be opened inside the structure to be fumigated provided worker's exposure to phosphine gas does not exceed allowable limits.

Pure phosphine gas is practically insoluble in water, fats and oils, and is stable at normal fumigation temperatures. However, it may react with certain metals and cause corrosion, especially at higher temperatures and relative humidities. Metals such as copper, brass and other copper alloys, and precious metals such as gold and silver are susceptible to corrosion by phosphine. Thus, small electric motors, smoke detectors, brass sprinkler heads, batteries and battery chargers, fork lifts, temperature monitoring systems, switching gears, communication devices, computers, calculators and other electrical equipment should be protected or removed before fumigation.

Phosphine gas will also react with certain metallic salts and, therefore, sensitive items such as photographic film, some inorganic pigments, etc., should not be exposed. Immediately after addition of phosphine to the structure, turn off any lights and unessential electrical equipment.

FUMITOXIN Tablets and pellets are Restricted Use Pesticides due to the high acute inhalation toxicity of phosphine gas. Read and follow the label and the Applicator's Manual. The manual contains complete instructions for the safe use of the pesticide. Additional copies of this Manual are available from:

PESTCON SYSTEMS, INC.
1808 FIRESTONE PARKWAY
Wilson, NC 27893
Telephone: 252-237-7923/1-800-548-2778
Fax: 252-237-3259

INTERNET: www.pestcon.com

DIRECTIONS FOR USE

It is a violation of federal law to use this product in a manner inconsistent with its labeling.

5. PESTS CONTROLLED

FUMITOXIN has been found effective against vertebrate and the following insects and their preadult stages - that is, eggs, larvae and pupae:

almond moth
Angoumois grain moth
bean weevil
bees
cadelle
cereal leaf beetle
cigarette beetle
confused flour beetle
dermestid beetles
dried fruit beetle
dried fruit moth

European grain moth
flat grain beetle
fruit flies
granary weevil
greater wax moth
hairy fungus beetle
Hessian fly
Indian meal moth
Khapra beetle
lesser grain borer
maize weevil
pea weevil

Mediterranean flour moth
pink bollworm
raisin moth
red flour beetle
rice weevil
rusty grain beetle
saw-toothed grain beetle
spider beetles
tobacco moth
yellow mealworm
Africanized bees &
honeybees infested
with tracheal mites

Woodchucks
Yellowbelly marmots (rockchucks)
Prairie dogs (except Utah prairie dogs, *Cynomys Parvidens*)
Norway rats
Roof rats
Mice
Ground squirrels
Moles
Voles
Pocket gophers
Chipmunks

Although it is possible to achieve total control of the listed burrowing and insect pests, this is frequently not realized in actual practice. Factors contributing to less than 100% control are leaks, poor gas distribution, unfavorable exposure conditions, etc. In addition, some insects are less susceptible to phosphine than others. If maximum control is to be attained, extreme care must be taken in sealing, higher dosages must be used, exposure periods lengthened, proper application procedures followed, and temperature and humidity conditions must be favorable.

6. COMMODITIES, WHICH MAY BE FUMIGATED WITH FUMITOXIN

FUMITOXIN may be used for the fumigation of listed raw agricultural commodities, animal feed and feed ingredients, processed foods, tobacco and certain other nonfood items when their commodity temperature is above 40°F (5°C).

6.1 Raw Agricultural Commodities, Animal Feed and Feed Ingredients

FUMITOXIN tablets and pellets may be added directly to animal feed, feed ingredients and raw agricultural commodities stored in bulk. For these commodities not stored in bulk, FUMITOXIN may be placed in moisture permeable envelopes, on trays, etc., and fumigated as with processed foods.

Raw Agricultural Commodities and Animal Feed and Feed Ingredients Which May Be Fumigated with FUMITOXIN

almonds	flower seed	sesame seed
animal feed & feed ingredients	grass seed	seed & pod vegetables
barley	millet	sorghum
Brazil nuts	oats	soybeans
cashews	peanuts	sunflower seeds
cocoa beans	pecans	triticale
coffee beans	pistachio nuts	vegetable seed
corn	popcorn	walnuts
cottonseed	rice	wheat
dates	rye	
filberts	safflower seed	

6.2 Processed Foods

Processed foods may be fumigated with FUMITOXIN. Under no condition shall any processed food or bagged commodity come in contact with FUMITOXIN tablets, pellets or residual dust except that FUMITOXIN may be added directly to processed brewer's rice, malt, and corn grits for use in the manufacture of beer.

Processed Foods Which May Be Fumigated With PESTCON FUMITOXIN

Processed candy and sugar
 cereal flours and bakery mixes
 cereal foods (including cookies, crackers, macaroni, noodles, pasta, pretzels, snack foods, and spaghetti)
 processed cereals (including milled fractions and packaged cereals)
 processed oats (including oatmeal)
 cheese and cheese byproducts
 chocolate and chocolate products (such as assorted chocolate, chocolate liquor, cocoa, cocoa powder, dark chocolate coating and milk chocolate products)
 processed coffee
 corn grits
 cured, dried and processed meat products and dried fish
 dates and figs
 dried eggs and egg yolk solids
 dried milk, dried powdered milk, nondairy creamers and nonfat dried milk
 dried or dehydrated fruits (such as apples, dates, figs, peaches, pears, prunes, raisins, citrus and sultanas)
 processed herbs, spices, seasonings and condiments
 malt
 processed nuts (such as almonds, apricot kernels, brazil nuts, cashews, filberts, macadamia nuts, peanuts, pecans, pistachio nuts, walnuts and other processed nuts)
 soybean flour and milled fractions

processed tea
 dried and dehydrated vegetables (such as beans, carrots, lentils, peas, potato flour, potato products and spinach)
 yeast (including primary yeast)
 rice (brewer's rice grits, enriched and polished)
 wild rice
 other processed foods

6.3 Non-food Commodities, Including Tobacco

The listed non-food items that may be fumigated with FUMITOXIN tablets, pellets or residual dust should not contact tobacco and certain other of the non-food commodities.

Non-food Commodities, Which May Be Fumigated With FUMITOXIN

processed or unprocessed cotton, wool and other natural fibers or cloth
 clothing
 straw and hay
 leathers
 human hair, rubberized hair, vulcanized hair, mohair
 leather products, animal hides and furs
 tobacco
 tires (for mosquito control)
 wood, cut trees, wood chips, wood and bamboo products
 paper and paper products
 dried plants and flowers
 seeds (such as grass seed, ornamental herbaceous plant seed and vegetable seed)
 other nonfood commodities

7. EXPOSURE CONDITIONS

The following table may be used as a guide in determining the minimum length of the exposure period at the indicated temperatures:

Temperature	Minimum Exposure Periods for FUMITOXIN	
	Pellets	Tablets
40°F (5°C)	Do not fumigate	Do not fumigate
41°-53°F (5-12°C)	8 days (192 hours)	10 days (240 hours)
54°-59°F (12-15°C)	4 days (96 hours)	5 days (120 hours)
60°-68°F (16-20°C)	3 days (72 hours)	4 days (96 hours)
above 68°F (20°C)	2 days (48 hours)	3 days (72 hours)

The fumigation must be long enough so as to provide for adequate control of the insect pests that infest the commodity being treated. Additionally, the fumigation period should be long enough to allow for more or less complete reaction of FUMITOXIN with moisture so that little or no unreacted aluminum phosphide remains. This will minimize worker exposures during further storage and/or processing of the treated bulk commodity as well as reduce hazards during the disposal of partially spent aluminum phosphide products remaining after space fumigations. The proper length of the fumigation period will vary with exposure conditions since, in general, insects are more difficult to control at lower temperatures, and the rate of phosphine gas production by FUMITOXIN is lower at lower temperatures and humidity.

It should be noted that there is little to be gained by extending the exposure period if the structure to be fumigated has not been carefully sealed or if the distribution of gas is poor and insects are not subjected to lethal concentrations of phosphine. Careful sealing is required to ensure that adequate gas levels are retained and proper application procedures must be followed to provide satisfactory distribution of phosphine gas. Application of additional FUMITOXIN is recommended if phosphine concentrations drop below an effective level. If re-entry into the treated structure is required, follow the requirements for manpower and respiratory protection usage found under section 10 in this manual. Some structures can only be treated when completely tarped while others cannot be

properly sealed by any means and should not be fumigated. Exposure times must be lengthened to allow for penetration of gas throughout the commodity when fumigant is not uniformly added to the commodity mass, for example, by surface application or shallow probing. This is particularly important in the fumigation of bulk commodity contained in large storage areas.

Remember, exposure periods recommended in the table are minimum periods and may not be adequate to control all stored products pests under all conditions nor will they always provide for total reaction of FUMITOXIN.

It is permissible and often desirable to use a low-flow recirculation system for phosphine gas in certain bulk storages. This method may be used in ship's holds, various types of flat storage and vertical storage bins. Recirculation usually involves the application of fumigant to the surface of the commodity. The phosphine gas is then continuously or intermittently drawn out of the over space and blown into the bottom of the storage using specially designed low volume fans and ductwork. This method facilitates the quick and uniform penetration of phosphine throughout the commodity. In some instances a reduced dosage may be used. Please contact Pestcon Systems, Inc. if assistance is required in designing the recirculation system.

8. DOSAGE RATE GUIDELINES

Allowable and Recommended Dosages Rates

Phosphine is a mobile gas and will penetrate to all parts of the storage structure. Therefore, dosage must be based upon the total volume of the space being treated and not on the amount of commodity it contains. The same amount of FUMITOXIN is required to treat a 30,000-bushel silo whether it is empty or full of grain unless, of course, a tarpaulin seals off the surface of the commodity. The following dosage ranges are recommended for bulk (per 1000 bushels) and space (per 1000 cu. ft.) fumigations:

8.1 Maximum Allowable Dosage Guidelines For Fumigation With FUMITOXIN

Product	per 1000 cu. ft.*	per 1000 bu.*
Pellets	725	900
Tablets	145	180

*NOTE: Maximum Dosage for dates, nuts & dried fruits is 200 pellets, 40 tablets/1000 cu. ft.; 250 pellets, 50 tablets/1000 bu. The above maximum dosages are not to be exceeded. It is important to be aware that a shortened exposure period cannot be fully compensated for with an increased dosage of phosphine.

Somewhat higher dosages, not to exceed the maximum dosage, are usually recommended under cooler, drier conditions or where exposure periods are relatively short. However, the major factor in selection of dosage is the ability of the structure to hold phosphine gas during the fumigation. A good illustration of this point is comparison of the low dosages recommended to treat modern, well-sealed warehouses with the higher ranges used for poorly constructed buildings that cannot be sealed adequately. In certain other fumigations, proper distribution of insecticidal concentrations of phosphine gas reaching all parts of the structure becomes a very important factor in dose selection. An example where this may occur is in the treatment of grain stored in tall silos. Poor gas distribution frequently results when the fumigant is added on top of the grain. In such cases, use of a low-flow recirculation system is recommended under these circumstances. Please contact Pestcon Systems, Inc. if assistance is required in designing the recirculation system.

8.2 Recommended FUMITOXIN Dosages for Various Types of Fumigation

One (1) FUMITOXIN tablet or five (5) FUMITOXIN pellets will produce a concentration of 25 parts per million (ppm) of phosphine gas (PH_3) in a volume of 1000 cubic feet (1 gram PH_3 /1000 cu. ft. is equivalent to 25 ppm).

Although it is permissible to use the maximum dosage listed above, the following recommended dosage ranges can be used as a guideline for various types of fumigation.

When a dosage range is recommended, use the higher rate under conditions of severe infestation, lower temperature and other applicable variables.

Dosage Range

Type of Fumigation

	<u>Pellets</u>	<u>Tablets</u>
1. Vertical Storages (such as silos, concrete bins, steel bins, etc.)	200-900/1000bu. 150-700/1000 cu. ft.	40-180/1000 bu. 30-140/1000 cu. ft.
2. Farm Bins (Butler Type)	450-900/1000 bu. 350-725/1000 cu. ft.	90-180/1000 bu. 70-145/1000 cu. ft.
3. Bulk stored commodities in flat storage, bunkers and commodities stored on ground loosely piled under gas tight covering.	450-900/1000 bu. 350-725/1000 cu. ft.	90-180/1000 bu. 70-145/1000 cu. ft.
4. Packaged commodities (bagged grain, process foods, etc.) in sealable enclosures.	150-450/1000 cu. ft.	30-90/1000 cu. ft.
5. Nuts, dates or dried fruit in storage boxes.	100-200/1000 cu. ft.	20-40/1000 cu.ft.
6. Nuts, dates, or dried fruit in bulk.	125-250/1000 bu. 100-200/1000 cu. ft.	25-50/1000 bu. 20-40/1000 cu. ft.
7. Railcars, containers, trucks, vans and other transport vehicles.	225-500/1000 cu. ft.	45-145/1000 cu. ft.
8. Space fumigation such as cereal mills, feed mills, food processing plants & warehouses.	100-300/1000 cu. ft.	20-60/1000 cu. ft.
9. Stored Tobacco	100-250/1000 cu. ft.	20-50/1000 cu. ft.
10. Non-food products	150-450/1000 cu. ft.	30-90/1000 cu. ft.
11. Stored beehives, supers and other beekeeping equipment for wax moth control and Africanized honeybees with tracheal mites and foulbrood.	150-225/1000 cu. ft.	30-45/1000 cu. ft.
12. Barges	300-900/1000 bu. 250-725/1000 cu. ft.	60-180/1000 bu. 50-145/1000 cu. ft.
13. Shipholds	200-400/1000 bu. 150-330/1000 cu. ft.	40-80/1000 bu. 30-66/1000 cu. ft.
14. Commodity in small containers	1-2 pellets per 10 cu. ft.	
15. Rodent burrows	10-20/per burrow	2-4/per burrow

Higher dosages are recommended in structures that are of loose construction and in the fumigation of bulk stored commodities in which diffusion will be slowed and result in poor distribution of phosphine gas.

9. PROTECTIVE CLOTHING

GLOVES:

Wear dry gloves of cotton or other material if contact with tablets, pellets, or dust is likely.

Gloves should remain dry during use.

Wash hands thoroughly after handling aluminum phosphide products.

Aerate used gloves and other clothing that may be contaminated in a well ventilated area prior to laundering.

10. RESPIRATORY PROTECTION

10.1 When respiratory protection must be worn

Respiratory protection approved by the National Institute for Occupational Safety and Health/Mine Safety and Health Administration (NIOSH/MSHA) must be worn during exposure to concentrations in excess of permitted limits or when concentrations are unknown. Self-contained breathing apparatus (SCBA) must be worn during entry into sites that are under fumigation if the concentration of phosphine is unknown or known to exceed the Short-term Exposure Limit (STEL) for phosphine (1 ppm for 15 minutes).

10.2 Permissible gas concentration ranges for respiratory protection devices

A NIOSH/MSHA approved full-face gas mask - phosphine canister combination may be used at levels up to 15 ppm or following manufacturers use conditions instructions for escape. Above 15 ppm or in situations where the phosphine concentration is unknown, a NIOSH/MSHA approved, SCBA must be worn. The NIOSH/OSHA Pocket Guide DHHS (NIOSH) 97-140 or the NIOSH ALERT - Preventing Phosphine Poisoning and Explosions During Fumigation, lists these and other types of approved respirators and the concentrations limits at which they may be used.

10.3 Requirements for availability of respiratory protection

If FUMITOXIN is to be applied from within the structure to be fumigated, an approved full-face gas mask - phosphine canister combination or SCBA or its equivalent must be available at the site of application in case it is needed.

Respiratory protection need not be available for applications from outside the area to be fumigated such as addition of tablets or pellets to automatic dispensing devices, outdoor applications, etc., if exposures above the permitted exposure limits will not be encountered.

If monitoring equipment is not available on a farm and application of FUMITOXIN fumigant cannot be made from outside the structure, an approved canister respirator must be worn during application from within the structure being treated. However, if entry into an on-farm structure that is under fumigation is required, SCBA must be worn if the gas concentration is unknown or above the permissible limits.

11. REQUIREMENTS FOR CERTIFIED APPLICATOR TO BE PRESENT AND RESPONSIBLE FOR ALL WORKERS AS FOLLOWS:

- A.** A Certified Applicator must be physically present, responsible for, and maintain visual and/or voice contact with all fumigation workers during the application of the fumigant. Once the application is complete and the structure has been made secure the certified applicator does not need to be physically present at the site.
- B.** A Certified Applicator must be physically present, responsible for, and maintain visual and/or voice contact with all fumigation workers during the initial opening of the fumigation structure for aeration. Once the aeration process is secured and monitoring has established that aeration can be completed safely the certified applicator does not need to be physically present and trained person(s) can complete the process and remove the placards.
- C.** Persons with documented training in the handling of Phosphine products must be responsible for receiving, aerating and removal of placards from vehicles, which have been fumigated in transit. Refer to section 12 for training requirements.

12. TRAINING REQUIREMENTS FOR RECEIPT OF IN-TRANSIT VEHICLES UNDER FUMIGATION.

The trained person(s) must be trained by a Certified Applicator following the EPA accepted product applicator's manual that must precede or be attached to the outside of a transport vehicle; or by other training which is accepted by local and/or state authorities. When training has been completed and the employee demonstrates safety knowledge proficiency, the training date must be logged and maintained in the employee's safety training record for a minimum of three years. Refresher training must be done on an annual basis.

This training must cover the following items, each of which may be found in this manual:

- a. How to aerate the vehicle and verify that it contains no more than 0.3-ppm phosphine.
OR
- b. How to transfer the commodity to another storage area without prior aeration and ensure that worker safety limits are not being exceeded during the transfer.
- c. How to determine when respiratory protection must be worn.
- d. How to protect workers and nearby persons from exposure to levels above the 8-hour time weighted average (TWA) of 0.3 ppm or the 15 minute TWA short-term exposure limit (STEL) of 1.0 ppm phosphine.
- e. Proper removal of placards from the vehicle.
- f. How to follow proper residual disposal instruction.

13. GAS DETECTION EQUIPMENT

There are a number of devices on the market for the measurement of phosphine gas at both industrial hygiene and fumigation levels. Glass detection tubes used in conjunction with the appropriate hand-operated air sampling pumps are widely used. These devices are portable, simple to use, do not require extensive training and are relatively rapid, inexpensive and accurate. Electronic devices are also available for both low level and high phosphine gas readings. Such devices should be used in full compliance with manufacturers' recommendations.

14. NOTIFICATION REQUIREMENTS

14.1 Authorities and on-site workers:

As required by local regulations, notify the appropriate local officials (fire department, police department, etc.) of the impending fumigation. Provide to the officials an MSDS and an Applicator's Manual for the product and any other technical information deemed useful. Offer to review this information with the local official(s).

14.2 Incidents involving these products:

Registrants must be informed of any incident involving the use of this product. Please call (252)237-7923/1-800-548-2778 so Pestcon Systems, Inc. can report the incident as per requirements of 40 CFR Part 159.

14.3 Theft of Products:

Immediately report to the local police department thefts of metal phosphide fumigants.

15. APPLICATOR AND WORKER EXPOSURE

15.1 Exposure Limits

Exposures to phosphine must not exceed the 8-hour Time Weighted Average (TWA) of 0.3 ppm or the 15-minute Short-term Exposure limit (STEL) of 1.0-ppm phosphine. All persons are covered by these exposure standards.

15.2 Application of Fumigant

At least two persons, a certified applicator and trained person, or two trained persons under the direct supervision of the certified applicator must be present when entry into the structure for application of the fumigant is required. Depending upon temperature and humidity, FUMITOXIN tablets and pellets release phosphine gas slowly upon exposure to moisture from the air. In most cases, this release is slow enough to permit applicators to deposit fumigant in the desired areas and then vacate the premises without significant exposure to the gas. If the fumigator's exposure will exceed the allowable limits, approved respiratory protection must be worn.

15.3 Leakage from Fumigated Sites

Phosphine gas is highly mobile and given enough time may penetrate seemingly gas-tight materials such as concrete and cinder block. Therefore, adjacent, enclosed areas likely to be occupied must be examined to ensure that significant leakage has not occurred. Sealing of the fumigated site and/or airflow in the occupied areas must be sufficient to bring down the phosphine concentration to a safe level of 0.3 ppm or below.

15.4 Aeration and Re-entry

If the structure is to be entered after fumigation, it must be aerated until the level of phosphine gas is 0.3 ppm or below. The area or site must be monitored to ensure that liberation of gas from the treated commodity does not result in the development of unacceptable levels (i.e., over industrial hygiene levels of phosphine). Do not allow re-entry into treated structure by any person before the level of phosphine reaches 0.3 ppm or below unless protected by an approved respirator.

15.5 Handling Unaerated Commodities

Transfer of incompletely aerated commodity via bulk handling equipment such as augers, drag conveyors and conveyor belts to a new storage structure is permissible. A Certified Applicator is responsible for training workers who handle the transfer of incompletely aerated listed commodities, and appropriate measures must be taken (i.e., ventilation or respiratory protection) to prevent exposures from exceeding the exposure limits for phosphine. The new storage structure must be placarded if it contains more than 0.3 ppm phosphine. If the fumigation structure must be entered to complete the transfer, at least two trained persons, wearing proper respiratory protection, may enter the structure. A certified applicator must be physically present during the entry into the structure.

REMEMBER transporting containers or vehicles under fumigation over public roads is prohibited.

15.6 Industrial Hygiene Monitoring

Phosphine exposures must be documented in an operations log or manual at each fumigation area and operation where exposures may occur. Monitor airborne phosphine concentrations in all indoor areas to which fumigators and other workers have had access during fumigation and aeration. Perform such monitoring in workers' breathing zones. This monitoring is mandatory and is performed to determine when and where respiratory protection is required. Once exposures have been adequately characterized, spot checks must be made, especially if conditions change significantly or if an unexpected garlic odor is detected or a change in phosphine level is suspected.

15.7 Engineering Controls and Work Practices

If monitoring shows that workers may be exposed to concentrations in excess of the permitted limits, then engineering controls (such as forced air ventilation) and/or appropriate work practices must be used to reduce exposure to within permitted limits. In any case, appropriate respiratory protection must be worn if phosphine exposure limits are exceeded.

16. PLACARDING OF FUMIGATED AREAS

All entrances to the fumigated structure must be placarded. Placards must be made of substantial material that can be expected to withstand adverse weather conditions, and must bear the wording as follows:

1. The signal words DANGER/PELIGRO and the SKULL AND CROSSBONES symbol in red.
2. The statement "Structure and/or commodity under fumigation, DO NOT ENTER/NO ENTRE".
3. The Statement, "This sign may only be removed by a certified applicator or a person with documented training after the structure and/or commodity is completely aerated (contains 0.3 ppm or less of phosphine gas)."

If incompletely aerated commodity is transferred to a new storage structure, the new structure must also be placarded if it contains more than 0.3 ppm. Workers exposure during this transfer must not exceed allowable limits.

4. The date the fumigation begins.

5. Name and EPA registration number of fumigant used.

6. Name, address and telephone number of the Fumigation Company and/or applicator.

7. A 24-hour emergency response telephone number.

All entrances into a fumigated structure must be placarded. Where possible, placards should be placed in advance of the fumigation to keep unauthorized persons away. For railroad hopper cars, placards must be placed on both sides of the car near the ladders and next to the top hatches into which the fumigant is introduced.

Do not remove placards until the treated commodity is aerated down to 0.3 ppm phosphine or less. To determine whether aeration is complete, each fumigated structure or vehicle must be monitored and shown to contain 0.3 ppm or less phosphine gas in the air space around and, if feasible, in the mass of the commodity.

17. SEALING OF STRUCTURE

The structure to be fumigated must first be inspected to determine if it can be made sufficiently gas tight. Careful sealing is required so that adequate gas levels are retained. Turn off all ventilation, supply air, air conditioning, and any other air moving systems, which could negatively affect the fumigation. Thoroughly inspect the structure to be fumigated and seal cracks, holes and openings. These areas could include, but are not limited to: windows, doors, vents, chimneys, open pipes and structural flaws. Sealing techniques can vary, but most often include polyethylene sheeting, adhesive tapes and adhesive sprays. Expandable foam or caulking material can work well on structural flaws. Proper sealing will insure sufficient gas levels within the fumigated structure and will decrease the chance of unwanted exposures outside of the fumigated area.

As with all fumigations, it is required that sealing be inspected for leaks. If phosphine above 0.3 ppm is found in an area where exposure to workers or bystanders may occur, the fumigator, using proper respiratory protective equipment must attempt to seal the leak from the exterior of the structure. Failing this, the fumigators, following proper procedures to prevent accidental poisoning, may enter the structure and seal the leaks from the interior. If the concentration inside the structure has decreased below the target level as a result of the leakage, additional fumigant may be added following the sealing repairs.

DO NOT FUMIGATE A STRUCTURE THAT CANNOT BE SEALED SUFFICIENTLY GAS TIGHT.

18. AERATION OF FUMIGATED COMMODITIES

As an alternative to the aeration time periods listed below, each container of the treated commodity may be analyzed for residues using accepted analytical methods.

18.1 Foods and Feeds

Tolerances for phosphine residues have been established at 0.1 ppm for animal feeds and 0.01 ppm for processed foods. To guarantee compliance with these tolerances, it is necessary to aerate these commodities for a minimum of 48 hours prior to offering them to the end consumer.

18.2 Non-food Commodities

Aerate all non-food commodities to 0.3 ppm or less of phosphine. Monitor densely packed commodities to ensure that aeration is complete.

18.3 Tobacco

Tobacco must be aerated for at least three days (72 hours) when fumigated in hogsheads and for at least two days (48 hours) when fumigated in other containers or until concentration is below 0.3 ppm. When plastic liners are used, longer aeration periods will probably be required to aerate the commodity down to 0.3 ppm.

19. STORAGE INSTRUCTIONS

FUMITOXIN tablets/pellets must be stored in a dry, well-ventilated area away from heat, under lock and key. Post as a pesticide storage area. Do not contaminate food, water or feed by storing pesticides in the same areas used to store these commodities. Do not store in buildings where humans or domestic animals may reside. Keep out of reach of children.

19.1 Labeling of Storage

The labeling of the storage area should take into account the needs of a variety of organizations. These include, but are not to be limited to: company policy, insurance carrier, Occupational Safety and Health Administration (OSHA), Emergency Planning and Community Right to Know and local emergency response professionals. At a minimum, the storage must be marked with the following signs and should be locked:

1. Danger, Poison (with skull and crossbones)
2. Authorized Personnel Only
3. National Fire Protection Association (NFPA) Hazard Identification Symbols for the pesticide.

The NFPA has developed Hazard Identification Symbols. This standardized system is designed to provide, at a glance, the information regarding the health, fire and reactivity hazards associated with hazardous materials. The following are the hazard categories and degree of hazard for aluminum phosphide:

<u>Category</u>	<u>Degree of Hazard</u>
Health	4 (Severe Hazard)
Flammability	4 (Severe Hazard)
Reactivity	2 (Moderate)
Special Notice Key	W

NOTE: When using the NFPA Hazard Identification System, the characteristics of all hazardous materials stored in a particular area must be considered. The local fire protection district should be consulted for guidance on the selection and placement of such signs.

20. TRANSPORTATION INSTRUCTIONS

The United States Department of Transportation (DOT) classifies aluminum phosphide as Dangerous When Wet material and it must be transported in accordance with DOT regulations.

20.1 Transport Designations - The following transport designations apply to aluminum phosphide:

Proper Shipping Name:	Aluminum phosphide
Hazard Class:	4.3
Identification No.:	UN 1397
Packing Group:	PG I
Shipping Label:	Dangerous When Wet /Poison
Shipping Placard:	Dangerous When Wet

20.2 Transportation Exemption:

Exemption: DOT-E 10753

Purpose and Limitation: "...The motor vehicles used under the terms of this exemption are not required to be placarded..."

Modes of Transportation Authorized: Motor vehicle (Only private motor vehicles used in pest control operations are authorized to transport the packages covered by the terms of this exemption.)

NOTE: You must have a copy of this exemption with you during transportation. For a copy of this exemption contact: PESTCON SYSTEMS, INC., 1808 Firestone Parkway, Wilson, NC 27893, Telephone: (252) 237-7923/ 1-800-548-2778, Fax: 252-237-3259 or Internet: www.pestcon.com

21. FUMIGATION MANAGEMENT PLAN

The certified applicator is responsible for working with the owners and/or responsible employees of the structure and/or area to be fumigated to develop and follow a Fumigation Management Plan (FMP). The FMP is intended to ensure a safe and effective fumigation. The FMP must address characterization of the structure and/or area, and include appropriate monitoring and notification requirements, consistent with, but not limited to, the following:

1. Inspect the structure and/or area to determine its suitability for fumigation.
2. When sealing is required, consult previous records for any changes to the structure, seal leaks, and monitor any occupied adjacent buildings to ensure safety.
3. Prior to each fumigation, review any existing FMP, MSDS, Applicators Manual and other relevant safety procedures with company officials and appropriate employees.
4. Consult company officials in the development of procedures and appropriate safety measures for nearby workers that will be in and around the area during application and aeration.
5. Consult with company officials to develop an appropriate monitoring plan that will confirm that nearby workers and bystanders are not exposed to levels above the allowed limits during application, fumigation and aeration. This plan must also demonstrate that nearby residents will not be exposed to concentrations above the allowable limits.
6. Consult with company officials to develop procedures for local authorities to notify nearby residents in the event of an emergency.
7. Confirm the placement of placards to secure entrance into any structure under fumigation.
8. Confirm the required safety equipment is in place and the necessary manpower is available to complete a safe and effective fumigation.
9. Written notification must be provided to the receiver of a vehicle that is fumigated in transit.

These factors must be considered in putting a FMP together. It is important to note that some plans will be more comprehensive than others. All plans should reflect the experience and expertise of the applicator and circumstances at and around the structure and/or area.

In addition to the plan, the applicator must read the entire label and applicator manual and follow its directions carefully. If the applicator has any questions about the development of a FMP, contact **PESTCON SYSTEMS, INC.** for further assistance.

The FMP and related documentation, including monitoring records, must be maintained for a minimum of 2 years.

GUIDANCE FOR PREPARATION OF A FUMIGATION MANAGEMENT PLAN

Purpose

A Fumigation Management Plan (FMP) is an organized, written description of the required steps involved to help ensure a safe, legal and effective fumigation. It will also assist you and others in complying with pesticide product label requirements. The guidance that follows is designed to help assist you in addressing all the necessary factors involved in preparing for and fumigating a structure and/or area.

This guidance is intended to help you organize any fumigation that you might perform, **PRIOR TO ACTUAL TREATMENT**. It is meant to be somewhat prescriptive, yet flexible enough to allow the experience and expertise of the fumigator to make changes based on circumstances, which may exist in the field. By following a **step-by-step procedure, which allow for flexibility, a safe and effective fumigation can be performed.**

Before any fumigation begins, carefully read and review the label and the Applicator's Manual. This information must also be given to the appropriate company officials (supervisors, foreman, safety officer, etc.) in charge of the site. Preparation is the key to any successful fumigation. If you do not find specific instructions for the type of fumigation that you are to perform listed in this Guidance Document you will want to construct a similar set of procedures using this document as your guide or contact Pestcon Systems, Inc. for assistance. Finally, before any fumigation begins you must be familiar with, and comply with all applicable federal, state and local regulations. The success of the fumigation is not only dependent on your ability to do your job but also upon carefully following all rules, regulations, and procedures required by governmental agencies.

A CHECKLIST GUIDE FOR A FUMIGATION MANAGEMENT PLAN

This checklist is provided to help you take into account factors that must be addressed prior to performing all fumigations. It emphasizes safety steps to protect people and property. The checklist is general in nature and cannot be expected to apply to all types of fumigation situations. It is to be used as a guide to prepare the required plan. Each item must be considered. However, it is understood that each fumigation is different and not all items will be necessary for each fumigation site.

A. PRELIMINARY PLANNING AND PREPARATION

1. Determine the purpose of the fumigation.

- a. Elimination of insect infestation
- b. Elimination of vertebrate pests
- c. Plant pest quarantine.

2. Determine the type of fumigation, for example:

- a. Space: tarp, mill, warehouse, food plant, or outdoor area
- b. Vehicle: railcar, truck, van, container
- c. Commodity: raw agricultural or processed foods or non-food
- d. Type of Storage: vertical silo, farm storage, flat storage, etc.
- e. Vessels: ship or barge. In addition to the Applicator's Manual, read the US Coast Guard Regulation 46CFR 147A.

3. Fully acquaint yourself with the structure, and commodity to be fumigated, including:

- a. The general structure layout, construction (materials, design, age, maintenance), of the structure, fire or combustibility hazards, connecting structures and escape routes, above and below ground, and other unique hazards or structural characteristics. Prepare, with the owner / operator / person in charge, a drawing or sketch of structure to be fumigated, delineating features, hazards, and other structural characteristics.
- b. The number and identification of persons who routinely enter the area to be fumigated (i.e., Employees, visitors, customers, etc.).
- c. The specific commodity to be fumigated, its mode of storage, and its condition.
- d. The previous treatment history of the commodity, if available.
- e. Accessibility of utility service connections.
- f. Nearest telephone or other means of communication. Mark the location of these items on the drawing/sketch.
- g. Emergency shut-off stations for electricity, water, and gas. Mark the location of these items on the drawing/sketch.
- h. Current emergency telephone numbers of local Health, Fire, Police, Hospital and Physician responders.
- i. Name and phone number (both day and night) of appropriate company officials.
- j. Check, mark and prepare the points of fumigant application locations if the job involves entry into the structure for fumigation.
- k. Review labeling and Applicator's Manual.
- l. Exposure time considerations:
 1. Product (tablets and pellets) to be used.
 2. Minimum fumigation period, as defined and described by the label use directions.
 3. Down time required to be available.
 4. Aeration requirements.
 5. Clean-up requirements, including dry or wet deactivation methods, equipment, and personnel needs, if necessary.
 6. Measured and recorded commodity temperature and moisture.
- m. Determination of dosage:
 1. Cubic footage or other appropriate space/ location calculations.
 2. Structure sealing capability and methods.
 3. Label recommendations.
 4. Temperature, humidity, wind.

5. Commodity/space volume.
6. Past history of fumigation of structure.
7. Exposure time.

B. PERSONNEL

1. Confirm in writing that all personnel in and around the structure and/or area to be fumigated have been notified prior to application of the fumigant. Consider using a checklist that each employee initials indicating they have been notified.
2. Instruct all fumigation personnel to read the Applicator's Manual concerning the hazards that may be encountered, the selection of personal protection devices, including detection equipment.
3. Confirm that all personnel are aware of and know how to proceed in case of an emergency situation.
4. Instruct all personnel on how to report any accident and / or incidents related to fumigant exposure. Provide a telephone number for emergency response reporting.
5. Instruct all personnel to report to proper authorities any theft of fumigant and / or equipment related to fumigation.
6. Establish a meeting area for all personnel in case of an emergency.

C. MONITORING

1. Safety

- a. Monitoring of phosphine concentrations must be conducted in areas to prevent excessive exposure and to determine where exposure may occur. Document where monitoring will occur.
- b. Keep a log or manual of monitoring records for each fumigation structure and/or area. This log, must at a minimum contain the timing, number of readings taken and level of concentrations found in each location.
- c. When monitoring, document even if there is no phosphine present above the safe levels. In such cases, subsequent monitoring is not routinely required. However, spot checks must be made occasionally, especially if conditions change significantly.
- d. Monitoring must be conducted during aeration and corrective action must be taken if gas levels exceed the allowed levels in an area where bystanders and / or nearby residents or domestic animals may be exposed.

2. Efficacy

- a. Phosphine readings should be taken from within the fumigated structure to insure proper gas concentrations. If the phosphine concentrations have fallen below the targeted level the fumigators, following proper entry procedures may re-enter the structure and add additional product.
- b. All phosphine readings should be documented.

D. NOTIFICATION

1. Confirm the appropriate local authorities (fire departments, police departments, etc.) have been notified as per label instructions, local ordinances, or instructions of the client.
2. Prepare written procedure ("Emergency Response Plan"), which contains explicit instructions, names, and telephone numbers so as to be able to notify local authorities if phosphine levels are exceeded in an area that could be dangerous to bystanders and/or domestic animals.
3. Confirm that the receiver of in-transit vehicles under fumigation have been notified and are trained according to Section 12 of this applicator manual.

E. SEALING PROCEDURES

1. Sealing must be adequate to control the pests. Care should be taken to insure that sealing materials would remain intact until the fumigation is complete.
2. If the structure has been fumigated before, review the previous FMP for previous sealing information.
3. Make sure that construction / remodeling has not changed the building in a manner that will affect the fumigation.
4. Warning placards must be placed on every possible entrance to the fumigation structure.

F. APPLICATION PROCEDURES & FUMIGATION PERIOD

1. Plan carefully and apply the fumigant in accordance with the label requirements.
2. When entering into the area under fumigation, always work with two or more people under the direct supervision of a certified applicator wearing appropriate respirators.
3. Apply fumigant from the outside where appropriate.
4. Provide watchmen when the possibility of entry into the fumigation site by unauthorized persons cannot otherwise be assured.
5. When entering structures, always follow OSHA rules for confined spaces.
6. Document that the receiver of vehicles fumigated in-transit has been notified.
7. Turn off any electric lights in the fumigated area of the structure as well as all non-essential electrical motors.

G. POST-APPLICATION OPERATIONS

1. Provide watchmen when the fumigation structure cannot be secured from entry by unauthorized persons during the aeration process.
2. Aerate in accordance with structural limitations.
3. Turn on ventilating or aeration fans where appropriate.
4. Use a suitable gas detector before re-entry into a fumigated structure to determine fumigant concentration.
5. Keep written records of monitoring to document completion of aeration.
6. Consider temperature when aerating.
7. Ensure that aeration is complete before moving a treated vehicle onto public roads.
8. Remove warning placards when aeration is complete.
9. Inform business/client that employees/other persons may return to work or otherwise be allowed to re-enter the aerated structure.

22. APPLICATION PROCEDURES

A FMP must be devised to cover application and exposure period, aeration and disposal of the fumigant so as to keep to a minimum any human exposure to phosphine and to help assure adequate control of the insect pests.

The following instructions are intended to provide general guidelines for typical fumigation sites.

22.1 Farm Bins:

Leakage is the single most important cause of failures in the treatment of farm storages. Since these storages are often small, they usually have a higher leakage area in proportion to their capacity. Most wooden storage structures are so porous that they cannot be successfully fumigated unless they are completely tarped. Do not fumigate a storage that will be entered by humans or animals prior to aeration. Do not fumigate areas which house sensitive equipment containing copper or other metals likely to be corroded by phosphine gas.

1. Read the label, Applicator's Manual, MSDS and related safety material.
2. Inspect the bin to determine if you can fumigate effectively.
3. If the bin is located in an area where nearby workers and / or bystanders or domestic animals would be exposed to phosphine gas because of leakage from the bin:
 - (i) Develop a monitoring procedure that will confirm if leakage from the bin is above the allowable limits in an area that would affect nearby workers or bystanders.
 - (ii) Advise local authorities when and where you will be fumigating. Provide and review with them the MSDS, Applicator's Manual and other relevant safety information.
4. If the bin is in an isolated area on private property (i) and (ii) above are not required.
5. Seal the bin as tightly as possible. It is recommended that the surface of the grain be covered with poly after FUMITOXIN has been applied. Tarping the grain surface will greatly reduce the leak rate of the gas as well as reduce the amount of FUMITOXIN required. Only the volume below the tarp must be dosed. If not tarped, the entire volume of the storage must be treated, whether full or empty.
6. Using the applicator's manual, calculate the dosage of tablets or pellets to be applied based on type of structure, its sealing properties, content type, weather, and commodity temperature and moisture content of the commodity and length of fumigation.
7. FUMITOXIN tablets or pellets required for the fumigation may be scattered over the surface or probed into the grain using a rigid PVC pipe about 5 to 7 feet in length and having a diameter of 1-1/4 inches.
8. Use about 20-50 tablets or 100-250 pellets per probe. Probe the dosage uniformly over the surface. Fumi-Sleeve® dust retainer or packaged fumigants may be used if dust-free applications are desired.
9. Immediately cover the surface of the grain with a plastic tarpaulin.
10. Place no more than 25 percent of the total dose at the bottom if the bin is equipped with aeration fans. **CAUTION:** Make sure that the aeration duct is dry before adding FUMITOXIN. Addition of FUMITOXIN to water in an aeration duct may result in a fire.
11. Seal the aeration fan with 4-mil plastic sheeting.
12. Place placards on all entrances to the bin and near the ladder.
13. Following aeration of the bin, the surface of the grain may be sprayed with an approved protectant to discourage reinfestation.

NOTE: If monitoring equipment is not available on a farm and application cannot be done outside of a structure, an approved canister respirator must be worn during application from within an enclosed indoor area.

22.2 Flat Storage

Treatment of these types of storages often require considerable time and physical effort. Therefore, sufficient manpower should be available to complete the work rapidly enough to prevent excessive exposure to phosphine gas. Vent flasks outside the storage, conduct fumigations during cooler periods, and employ other work practices to minimize exposures. It is likely that respiratory protection will be required during application of fumigant to flat storages. Refer to the sections on Applicator and Worker Exposure and Respiratory Protection.

1. Inspect the site to determine its suitability for fumigation.
2. Determine if the structure is in an area where leakage during fumigation or aeration would adversely affect nearby workers or bystanders if concentrations were above the permitted exposure levels.
3. Develop an appropriate Fumigation Management Plan. (Refer to FMP guidelines.)
4. Consult previous records for any changes to the structure. Seal vents, cracks and other sources of leaks.
5. Using the applicators manual, determine the length of the fumigation and calculate the dosage of tablets or pellets to be applied based upon volume of the building, contents, air and/or commodity temperature and the general tightness of the structure.
6. Apply tablets or pellets by surface application, shallow probing, deep probing or uniform addition as the flat storage is filled.

Storages requiring more than 24 hours to fill should not be treated by addition of fumigant to the commodity stream as large quantities of phosphine may escape before the bin is completely sealed.

Probes should be inserted vertically at intervals along the length and width of the flat storage. Pellets or tablets may be dropped into the probe at intervals as it is withdrawn.

Surface application may be used if the bin can be made sufficiently gas tight to contain the fumigant gas long enough for it to penetrate the commodity. In this instance, it is advisable to place about 25 percent of the dosage in the floor level aeration ducts. Check the ducts prior to addition of FUMITOXIN to make sure that they contain no liquid water.

7. Placement of plastic tarp over the surface of the commodity is often advisable, particularly if the overhead of the storage cannot be well sealed.
8. Lock all entrances to the storage and post fumigation warning placards.

22.3 Vertical Storages (concrete upright bins and other silos in which grain can be rapidly transferred)

1. Inspect the site to determine its suitability for fumigation.
2. Determine if the structure is in an area where leakage during fumigation or aeration would expose nearby workers or bystanders to concentrations above the permitted levels.
3. Develop an appropriate Fumigation Management Plan. (Refer to FMP guidelines.)
4. Consult previous records for any changes to the structure. Close openings and seal cracks to make the structure as airtight as possible. Prior to the fumigation, seal the vents near the bin top, and any openings which connect to adjacent bins.
5. Using the applicator manual, determine the length of the fumigation and calculate the dosage of tablets or pellets to be applied based upon volume of the building, air and/or commodity temperature and the general tightness of the structure.
6. Tablets or pellets may be applied continuously by hand or by an automatic dispenser on the head house / gallery belt or into the fill opening as the commodity is loaded into the bin. An automatic dispenser may also be used to add FUMITOXIN into the commodity stream in the up leg of the elevator.

7. Seal the bin deck openings after the fumigation has been completed.
8. Bins requiring more than 24 hours to fill should not be fumigated by continuous addition into the commodity stream. Probing, surface application, or other appropriate means may be employed to fumigate these bins. Exposure periods should be lengthened to allow for diffusion of gas to all parts of the bin if FUMITOXIN has not been applied uniformly throughout the commodity mass.
9. Place warning placards on the discharge gate and on all entrances.

22.4 Mills, Food Processing Plants and Warehouses

1. Inspect the site to determine its suitability for fumigation.
2. Determine if the structure is in an area where leakage during fumigation or aeration would expose nearby workers or bystanders if concentrations were above the permitted exposure levels.
3. Develop an appropriate Fumigation Management Plan. (Refer to FMP guidelines.)
4. Using the Applicator's Manual, determine the length of the fumigation and calculate the dosage of tablets or pellets to be applied based upon volume of the building, air and/or commodity temperature and the general tightness of the structure.
5. Read the directions found in 4.2 Physical and Chemical Hazards and remove or cover any of the listed items that can become damaged from exposure to phosphine gas.
6. Consult previous records for any changes in the structure. Carefully seal and placard the space to be fumigated.
7. Place trays or sheets of Kraft paper or foil, up to 12-sq. ft. (1.1 sq. M) in area, on the floor throughout the structure.
8. Spread FUMITOXIN on the sheets at a density no greater than 30 tablets per sq. ft. or 150 pellets per sq. ft. This corresponds to slightly more than one-half flask of tablets or one-half flask of pellets per 3'X4' sheet. Check to see that FUMITOXIN has not piled up and that it is spread out evenly to minimize contact between the individual tablets or pellets.
9. Turn off any lights within the treated area and shut off all electrical motors not essential to operations of the storage. Doors leading to the fumigated space must be closed, sealed, and placarded with warning signs.
10. Upon completion of the exposure period, windows, doors, vents, etc., should be opened and the fumigated structure allowed to aerate. The structure should not be entered without proper Personal Protective Equipment (PPE) unless gas readings have been taken and the concentration is below the allowable limits. Gas concentration readings may be taken using low-level detector tubes or similar devices to ensure safety of personnel who re-enter the treated area.
11. Collect the spent FUMITOXIN dust and dispose of it, with or without further deactivation. Refer to Disposal Instructions in this manual.
12. Remove fumigation warning placards from the aerated structure.

22.5 Railcars, Containers, Trucks, Vans, and Other Transport Vehicles

Railcars and containers, trucks, vans, and other transport vehicles shipped piggyback by rail may be fumigated in-transit. However, the aeration of railcars, railroad boxcars, containers and other vehicles is prohibited enroute. It is not legal to move trucks, trailers, containers, vans, etc., over public roads or highways until they have been aerated.

Transport vehicles loaded with bulk commodities, to which FUMITOXIN tablets or pellets may be added directly, are treated in essentially the same way as any other flat storage facility. FUMITOXIN may be added as the vehicle is being filled. The dose may be scattered over the surface after loading has been completed or the tablets or pellets may be probed below the surface. Carefully seal any vents, cracks or other leaks, particularly if the fumigation is to be carried out in-transit. See Section 16 of this Applicator's Manual for recommendations on placarding.

PHOSTOXIN Prepacs or Fumi-Cel® plates (not classified by UL) are recommended for the treatment of transport vehicles or similar storages containing processed foods for which no direct contact is allowed with tablets or pellets.

The Shipper and/or the fumigator must provide written notification to the receiver of railcars, railroad boxcars, shipping containers and other vehicles, which have been fumigated in-transit. A copy of the Applicator's Manual must precede or accompany all transportation containers or vehicles, which are fumigated in-transit. If the Applicator's Manual is sent with the transport vehicle it must be placed securely on the outside of the vehicle.

Proper handling of treated railcars at their destination is the responsibility of the consignee. Upon receipt of the railcar, railroad boxcars, shipping containers and other vehicles, a certified applicator and/or persons with documented authorized training must supervise the aeration process and removal of the placards.

22.6 Tarpaulin and Bunker Fumigations

Use of plastic sheeting or tarpaulins to cover commodities is one of the easiest and least expensive means for providing relatively gas tight enclosures which are very well-suited for fumigation. Poly tarps are penetrated only very slowly by phosphine gas and tight coverings are readily formed from the sheets. The volume of these enclosures may vary widely from a few cubic feet (for example, a fumigation tarpaulin placed over a small stack of bagged commodity) to a plastic bunker storage capable of holding 600,000 bushels of grain or more.

1. Develop an enclosure suitable for fumigation by covering bulk or packaged commodities with poly sheeting. The sheets may be taped together to provide a sufficient width of material to ensure that adequate sealing is obtained. If the flooring upon which the commodity rests is of wood or other porous material, the commodity to be fumigated should be repositioned onto poly prior to covering for fumigation. The plastic covering of the pile may be sealed to the floor using sand or water snakes, by shoveling soil or sand onto the ends of the plastic covering or by other suitable procedures. The poly covering should be reinforced by tape or other means around any sharp corners or edges in the stack so as to reduce the risk of tearing. Thinner poly, about 2 mil, is suitable for most indoor tarp fumigations and for sealing of windows, doors and other openings in structures. However, 4 mil poly or thicker is more suitable for outdoor applications where wind or other mechanical stresses are likely to be encountered.
2. Determine if the enclosure is in an area where leakage during fumigation or aeration would affect nearby workers or bystanders.
3. Develop an appropriate Fumigation Management Plan. (Refer to the FMP guidelines.)
4. Using the guidance given under Section 7, Exposure Conditions, determine the length of the fumigation and calculate the dosage of tablets or pellets to be applied based upon volume of space under the tarp, air and/or commodity temperature.
5. Tablets or pellets may be applied to the tarped stack or bunker storage of bulk commodity through slits in the poly covering. Probing or other means of dosing may be used. Avoid application of large amounts of FUMITOXIN at any one point. The FUMITOXIN should be added below the surface of the commodity if condensation or other source of moisture is likely to form beneath the poly. The slits in the covering should be carefully taped to prevent loss of gas once the dose has been applied and the introduction of water from rain. *PHOSTOXIN Prepacs (not classified by UL) are recommended for the treatment of bagged commodities and processed foods although tablets and pellets on trays or sheets of Kraft paper may be used. Care should be taken to see that the poly is not allowed to cover the FUMITOXIN and prevent contact with moist air or confine the gas.*

6. Distribution of phosphine gas is generally not a problem in the treatment of bagged commodities and processed foods. However, fumigation of larger bunker storages containing bulk commodity will require proper application procedures to obtain adequate results.
7. Place warning placards at conspicuous points on the enclosure.

22.7 In-transit Shiphold Fumigation

22.7.1 General Information

1. Important - In-transit ship or shiphold fumigation is also governed by U.S. Coast Guard Regulation 46 CFR 147A, Interim Regulations for Shipboard Fumigation. Refer to this regulation prior to fumigation.
For further information contact:

Commandant
U.S. Coast Guard
Hazardous Materials Standards Division
GMSO-3
Washington, DC 20593-0001

22.7.2 Pre -Voyage Fumigation Procedures

1. Prior to fumigating a vessel for in-transit cargo fumigation, the master of the vessel, or his representative, and the certified applicator must determine whether the vessel is suitably designed and configured so as to allow for safe occupancy by the ship's crew throughout the duration of the fumigation. If it is determined the vessel does not meet these requirements then the vessel must not be fumigated unless all crewmembers are removed from the vessel. The crewmembers are not permitted to reoccupy the vessel until it has been properly aerated and the master of the vessel and the certified applicator has made a determination that the vessel is safe for occupancy.
2. The certified applicator must notify the master of the vessel, or his representative, of the requirements relating to personal protection equipment*, detection equipment, and that a person qualified in the use of this equipment must accompany any vessel containing cargo under fumigation. Emergency procedures, cargo ventilation, periodic monitoring and inspections, and first aid measures must be discussed with and understood by the master of the vessel or his representative.

**Note: Personal protection equipment means a NIOSH/MSHA approved respirator or gas mask fitted with an approved canister for phosphine. The canister is approved for use up to 15 ppm. SCBA or its equivalent must be used above 15 ppm or at unknown concentrations.*

3. Seal all openings to the cargo hold or tank and lock or otherwise secure all openings, manways, etc., which might be used to enter the hold. The overspace pressure relief system of each tank aboard tankers must be sealed by closing the appropriate valves and sealing the opening into the overspace with gas-tight materials.
4. Placard all entrances to the treated spaces with fumigation warning signs.
5. If the fumigation is not completed and the vessel aerated before the manned vessel leaves port, the person in charge of the vessel shall ensure that at least two units of personal protection equipment and one phosphine gas detection device, and a person qualified in their operation be on board the vessel during the voyage.
6. During the fumigation, or until a manned vessel, leaves port or the cargo is aerated, the certified applicator shall ensure that a qualified person using phosphine gas detection equipment tests spaces adjacent to areas containing fumigated cargo as well as all regularly occupied spaces for fumigant leakage. If leakage of the fumigant is detected, the person in charge of the fumigation shall take action to correct the leakage, or shall inform the master of the vessel, or his representative, of the leakage so that corrective action can be taken.
7. Review with the master, or his representative, the precautions and procedures to follow during the voyage of a shiphold in-transit fumigation.

22.7.3 Application Procedures for Bulk Dry Cargo Vessels and Tankers

1. Apply tablets or pellets by scattering uniformly over the commodity surface, or they may be shallow or deep probed into the commodity mass. Fumi-Sleeves® or packaged metal phosphide products are recommended if dust free applications are required.
2. Immediately after application of the fumigant, close and secure all hatch covers, tank tops, butterworth valves, manways, etc.

22.7.4 In-transit Fumigation of Transport Units (Containers) Aboard Ships

In-transit fumigation of transport units on ships is also governed by DOT RSPA 49 CFR 176.76(h) Transport Vehicles, Freight Containers, and Portable Tanks Containing Hazardous Materials and International Maritime Dangerous Goods Code P9025-1 Amdt. 27-94.

Application procedures for fumigation of raw commodities or processed foods in transport units (containers) are described in Section 22.5 of this manual.

22.7.5 Precautions and Procedures During Voyage

1. Using appropriate gas detection equipment, monitor spaces adjacent to areas containing fumigated cargo and all regularly occupied areas for fumigant leakage. If leakage is detected, the area should be evacuated of all personnel, ventilated, and action taken to correct the leakage before allowing the area to be occupied.
2. Do not enter fumigated areas except under emergency conditions. If necessary to enter a fumigated area, appropriate personal protection equipment must be used (see below). Never enter fumigated areas alone. At least one other person, wearing personal protection equipment, should be available to assist in case of an emergency.

22.7.6 Precautions and Procedures During Discharge

1. If necessary to enter holds prior to discharge, test spaces directly above grain surface for fumigant concentration, using appropriate gas detection and personal safety equipment. Do not allow entry to fumigated areas without personal safety equipment, unless fumigant concentrations are at safe levels, as indicated by a suitable detector.

23. BARGES

Barge fumigation is also regulated by U.S. Coast Guard Regulation 46 CFR 147A as modified by U.S. Coast Guard Special Permit 2-75. This permit, which must be obtained prior to the fumigation, is available from:

Commandant
U.S. Coast Guard
Hazardous Materials Standards Div.
GMSO-3
Washington, DC 20593-0001

Leaks are a common cause of failures in the treatment of commodities aboard barges. Carefully inspect all hatch covers prior to application of FUMITOXIN and seal, if necessary. Placard the Barge. Notify consignee if the barge is to be fumigated in-transit and provide safety instructions for receipt and unloading.

24. SMALL SEALABLE ENCLOSURES

Excellent results may be attained in the treatment of small enclosures since it is often possible to control the temperature during fumigation and also to make the enclosure virtually gas-tight. Take care not to overdose during these fumigations. A single FUMITOXIN pellet will treat a space of from 1.4 to 10 cubic feet. A single FUMITOXIN tablet from 6.9 to 50 cubic feet.

25. BEEHIVES, SUPERS AND OTHER BEE KEEPING EQUIPMENT

FUMITOXIN tablets and pellets may be used for the control of the Greater Wax Moth in stored beehives, supers, and other bee keeping equipment and for the destruction of bees, Africanized bees, and diseased bees including those infested with tracheal mites and foulbrood. The recommended dosage for this use is 30-45 tablets or 150-225 pellets per 1000 cubic feet.

Fumigations may be performed in chambers at atmospheric pressure, under tarpaulins, etc., by placing the tablets or pellets on trays or in moisture permeable envelopes. Do not add more than 2 tablets or 10 pellets to each envelope. Honey from treated hives or supers may only be used for bee food.

26. BURROWING PEST CONTROL

26.1 Use Restrictions

This product may be applied to underground burrow systems located in noncrop areas, crop areas, or orchards occupied by woodchucks, yellowbelly marmots (rockchucks), prairie dogs (except Utah prairie dogs, *Cynomys Parvidens*), Norway rats, roof rats, mice, ground squirrels, moles, voles, pocket gophers, and chipmunks.

All treatments for control of these species in burrows must be made outdoors. Tablets or pellets must be applied directly to underground burrow systems. Before using FUMITOXIN tablets or pellets for burrowing pest control, read the applicable restrictions under Environmental Hazards, Endangered Species and Special Local Restrictions below.

This product may be used out-of-doors only for control of burrowing pests. **THIS PRODUCT MUST NOT BE APPLIED INTO A BURROW SYSTEM THAT IS WITHIN 15 FEET (5 METERS) OF A BUILDING THAT IS, OR MAY BE, OCCUPIED BY HUMANS, AND/OR ANIMALS ESPECIALLY RESIDENCES.** Document any burrows that open under or into occupied buildings and do not apply to these burrows. In addition, check for any other source through which the gas may enter into occupied buildings as a result of application to burrows. If there is any way gas can move through pipes, conduits etc., from burrows do not treat these burrows. Prior to treating a rodent burrow on a property containing an inhabited structure, the applicant must provide the customer (e.g. tenant, homeowner, or property manager) with a MSDS or appropriate sections of the Applicator's Manual.

26.2 Application Directions

Use application procedures appropriate to the type of burrow system being treated. **DOSAGE RATES MUST NOT BE EXCEEDED UNDER ANY CIRCUMSTANCES.**

26.2.1

For species with open burrow systems: locate all entrances to each burrow system. Treatment of more than one entrance in a system is often desirable as systems often overlap and are not defined. Treat all entrances except for those entrances you are sure connect to already treated entrances. Insert 2 to 4 tablets or 10 to 20 pellets into each entrance to be treated. Use the lower rates for smaller burrows and/or when soil moisture is high. Use higher rates for larger burrow systems and when soil moisture is relatively low. Pack each treated entrance with crumpled paper and shovel soil to completely cover the paper. Using crumpled paper will prevent soil from covering the tablets or pellets and slowing down their action. Rocks, clods of soil, cardboard etc. may be used for this purpose. Be sure to seal all untreated entrances by shoveling and packing soil and/or sod to completely seal the opening.

Inspect treated areas 1 or 2 days following treatment for signs of residual activity of target species. Treat all reopened burrows in the same manner prescribed above.

26.2.2

For species with closed burrow systems: (pocket gophers, and moles in some situations). Locate the main underground runway by probing with a smooth-sided rod 12 to 18 inches from a fresh mound. For pocket gophers, begin probing on the flat side of the mound. A sudden reduction in soil resistance to the probe indicates that the

main runway has been located. Once the main runway is located, remove the probe and apply 2 to 4 tablets or 10 to 20 pellets through the probe hole. Adjust treatment rate according to the level of soil moisture, using more tablets or pellets if the soil is relatively dry. Do not treat if soil is extremely dry or if there are no signs of recent gopher or mole activity. Make a tight seal to close probe hole by using a clod of soil or a sod plug to cover the hole or by using the heel of your shoe to push sod and/or soil over the surface opening. If the probe hole is more than one inch in diameter, place crumpled paper in the hole before closing it with soil and/or sod. Two days after treatment, you may check area for residual pest activity by poking holes in main runways of burrows systems, flagging holes and inspecting them two days later. You should retreat all reclosed systems, on both sides of the plug.

26.3 Environmental Hazards

This product is very highly toxic to wildlife. Many non-target organisms exposed to phosphine gas in burrows will be killed. Do not apply directly to water or wetlands (swamps, bogs, marshes, and potholes). Do not contaminate water by cleaning of equipment or disposal of wastes.

26.4 Endangered Species Restrictions

The use of FUMITOXIN in a manner that may kill or otherwise harm an endangered or threatened species or adversely modify their habitat is a violation of Federal laws. Before using this pesticide on range and/or pastureland you must obtain the PESTICIDE USE BULLETIN FOR PROTECTION OF ENDANGERED SPECIES for the county in which the product is to be used. The bulletin is available from your County Extension Agent, State Fish and Game Office, or your pesticide dealer. Use of this product in a manner inconsistent with the PESTICIDE USE BULLETIN FOR PROTECTION OF ENDANGERED SPECIES is a violation of Federal laws.

Even if applicable county bulletins do not prohibit the use of this product at the intended site of application, you may not use this product for control of prairie dogs in the states of Arizona, Colorado, Kansas, Montana, Nebraska, New Mexico, North Dakota, Oklahoma, South Dakota, Texas, Utah or Wyoming unless a pre-control survey has been conducted. Contact the nearest U.S. Fish and Wildlife Service Endangered Species Specialist to determine survey requirements in your area. This survey must be in compliance with the Black-Footed Ferret Survey Guidelines, developed by the U.S. Fish and Wildlife Service, and a determination must be made in accordance with the Guidelines that black-footed ferrets are not present in the treatment area.

CALIFORNIA (all endangered species)

Fresno, Inyo, Kern, Kings, Madera, Merced, Monterey, San Benito, San Luis Obispo, Santa Barbara, Stanislaus and Tulare

See the U.S. EPA Interim Measurers Bulletin for your county. To obtain a copy of the bulletin, contact your county agricultural commissioner or visit the following website: <http://www.cdpr.ca.gov/docs/es/index.htm>. If there is no current bulletin available for your county, contact the U.S. Fish and Wildlife Service office in Portland, OR, to determine whether there are endangered species that might be adversely affected by your proposed use of FUMITOXIN® and the steps you should take to mitigate any such risks.

FLORIDA

Statewide

GEORGIA

Appling, Atkinson, Bacon, Baker, Ben Hill, Bleckley, Berrien, Brantley, Brooks, Bryan, Bullock, Calhoun, Camden, Chandler, Charlton, Chatham, Clinch, Coffee, Colquitt, Cook, Crisp, Decatur, Dodge, Dooly, Dougherty, Early, Echols, Effingham, Emanuel, Evans, Glynn, Grady, Irwin, Jeff Davis, Jenkins, Johnson, Lanier, Laurens, Lee, Liberty, Long, Lowndes, Macon, McCintosh, Miller, Mitchell, Montgomery, Pierce, Pulaski, Screven, Seminole, Telfair, Tattnall, Thomas, Tift, Toombs, Treutlen, Turner, Ware, Wayne, Wheeler, Wilcox, and Worth.

NEW MEXICO

Hidalgo

UTAH

Beaver, Garfield, Iron, Kane, Piute, Sevier, Washington, and Wayne

WYOMING

Albany

26.4.1 Special Local Restrictions

1. NORTH CAROLINA

FUMITOXIN tablets and pellets may only be used for control of rats and mice in the state of North Carolina. Use against other burrowing pests (not insect pests) is not permitted.

2. OKLAHOMA

A special permit for black-tailed prairie dog control by poisoning is required in Oklahoma. Contact the Oklahoma State Department of Wildlife Conservation to obtain this permit.

3. WISCONSIN

A state permit is required for use of pesticides in Wisconsin to Control small mammals, except rats or mice. Please contact your local Department of Natural Resources office for information.

4. INDIANA

Use of **FUMITOXIN** tablets or pellets for mole control is not legal in the state of Indiana.

5. MISSOURI

A state permit is required for use of pesticides in Missouri to control small mammals, except rats and mice. Please contact the Missouri Department of Conservation office for information.

6. KANSAS

A special permit for black-tailed prairie dog control by poisoning is required in Kansas. Contact the Kansas Fish and Game Commission to obtain this permit.

7. CALIFORNIA

Use of **FUMITOXIN** tablets and pellets for chipmunk control is not legal in the state of California.

27. FUMI-SLEEVE DUST RETAINER METHOD OF FUMIGATION - patent no. 4,579, 417 & 4,641,573

The **FUMI-SLEEVE** Dust Retainer is a cotton sleeve designed to slip over the standard 1-1/4" PVC probe. Contact Pestcon Systems, Inc. for more information regarding these sleeves.

The presence of residual dust from spent **FUMITOXIN** tablets or pellets in treated raw agricultural commodities normally presents no problems of toxicity or sanitation. Nevertheless, where it is specified that no tablets or pellets can be placed directly into the commodity during fumigation, conduct the fumigation in the normal manner following the directions below:

1. Determine the structure can be made sufficiently tight by sealing all vents, windows, cracks, or other openings.
2. Determine if the structure is in an area where leakage during fumigation or aeration would affect nearby workers or bystanders if concentrations were above the permitted exposure levels.
3. Develop an appropriate Fumigation Management Plan. (Refer to Fumigation Management Plan guidelines.)
4. Using the applicators manual, determine the dosage and appropriate number of probings to be used.
5. The **FUMI-SLEEVE** dust retainer is slipped over the standard 1-1/4" PVC probe.
6. The probe with dust retainer is then inserted into the commodity.
7. As the probe is withdrawn, leaving the dust retainer in the commodity the appropriate number of tablets or pellets is poured into the probe.
8. After the probe is completely removed, leaving the dust retainer containing the tablets or pellets in the commodity, tie off the top of the retainer in a common overhand knot. If probing is not required the closed sleeve may be placed on the surface of the commodity.

9. Post the structure (ship hold, barge, container on the ship, railcar, other piggyback structure) with appropriate warning signs as well as a sign showing the number of FUMI-SLEEVE dust retainers used.
10. On completion of fumigation remove all retainers from the treated commodity and transport in a well-ventilated container to disposal site.
11. Disposal
 - a. The entire dust retainer and residue can be buried following disposal instructions found elsewhere in this manual.
 - b. Or the residual dust may be emptied from the sleeve and disposed of according to instructions found under disposal instructions in section 28.3 of this manual.
 - c. It is not recommended that you reuse the sleeve.

28. DISPOSAL INSTRUCTIONS

28.1 General

Do not contaminate water, food or feed by storage or disposal.

Unreacted or partially reacted FUMITOXIN is acutely hazardous. Improper disposal of excess pesticide is a violation of Federal Law. If these wastes cannot be disposed of by use according to applicators manual instructions, contact your State Pesticide or Environmental Control Agency, or the Hazardous Waste representative at the nearest EPA Regional Office for guidance. For specific instructions, see Section 29 of this manual, Spill and Leak Procedures.

Some local and state waste disposal regulations may vary from these general recommendations. Disposal procedures should be reviewed with appropriate authorities to ensure compliance with local regulations. Contact your state Pesticide or Environmental Control Agency or Hazardous Waste Specialist at the nearest EPA Regional Office for guidance.

Triple rinse flasks and stoppers with water. They may then be recycled or reconditioned, or punctured and disposed of in a sanitary landfill, or by other procedures approved by state and local authorities. Rinsate may be disposed of in a sanitary landfill by pouring it out onto the ground or by other approved procedures. It is also permissible to remove lids and expose empty flasks to atmospheric conditions until residue in the flasks is reacted. In this case puncture and dispose of in a sanitary landfill or other approved site, or by other procedures approved by state and local authorities.

If properly exposed, the residual dust remaining after fumigation with FUMITOXIN will be a grayish-white powder. This will be a non hazardous waste and contain only a small amount of unreacted aluminum phosphide. However, residual dust from incompletely exposed FUMITOXIN (so called green dust) requires special care.

28.2 DIRECTIONS FOR DEACTIVATION OF PARTIALLY SPENT RESIDUAL DUST FROM FUMITOXIN

Partially spent dust must be deactivated further prior to ultimate disposal. This is especially true in cases of incomplete exposure that has resulted in so-called "green dust" or following a fumigation that has produced large quantities of partially spent material.

Residual dust from FUMITOXIN may be deactivated as follows using the "Wet Method."

Deactivating solution is prepared by adding the appropriate amount of low sudsing detergent or surface-active agent to water in a drum or other suitable container. A 2% solution (or 4 cups in 30 gallons) of detergent is suggested. The container should be filled with deactivating solution to within a few inches of the top.

Residual dust is poured slowly into the deactivating solution and stirred so as to thoroughly wet all of the particles. This should be done in the open air and not in the fumigated structure. Dust from FUMITOXIN tablets or pellets should be mixed into no less than about 10 gallons of water-detergent solution for each case of material used. Wear appropriate respiratory protection during wet deactivation of partially spent dust. Do not cover the container being used for wet deactivation.

Dispose of the deactivated dust-water suspension, with or without preliminary decanting, at a sanitary landfill or other suitable site approved by local authorities. Where permissible, the slurry may be poured out onto the ground. If the slurry has been held for 36 hours or more, it may be poured into a storm sewer.

Caution: Wear a NIOSH/MSHA approved full-face gas mask - phosphine canister combination if exposed to levels between 0.3 ppm to 15 ppm or a Self Contained Breathing Apparatus (SCBA) if exposure is unknown or above 15 ppm during wet deactivation of partially spent material. Do not cover the container being used for wet deactivation. Do not dispose of **FUMITOXIN** dust in a toilet.

Residual dust from **FUMITOXIN** may also be deactivated as follows using the "Dry Method."

Extension of the fumigation period is the simplest method for further deactivation of "green" or partially spent dust prior to ultimate disposal.

Small amounts of partially spent dust, from 2 to 3 kg (4 to 7 lbs.) may be further deactivated by storage in a 1-gallon bucket. Larger amounts of dust (about 11 kg or 25 lbs.) may be held for deactivation in porous cloth bags (burlap, cotton, etc.). **Caution:** Transport these bags in open vehicles. Do not pile up the bags. Do not store "green dust" in bags.

28.3 Directions for Disposal Of Residual Dust From FUMITOXIN

Confinement of partially spent residual dust (as in a closed container) or collection and storage of large quantities of dust may result in a fire hazard. Small amounts of phosphine may be given off from unreacted aluminum phosphide and confinement of the gas may result in a flash.

In open areas, small amounts of residual dust, up to about 5 to 8 kg may be disposed of on site by burial or by spreading over the land surface away from inhabited buildings.

Spent residual dust from **FUMITOXIN** may also be collected and disposed of at a sanitary landfill, incinerator or other approved sites or by other procedures approved by Federal, State or Local authorities. "Green dust" must be further deactivated before disposal at a landfill.

From 2 to 3 kg (4 to 7 lbs.) of spent dust from 2 to 3 flasks of **FUMITOXIN** may be collected for disposal in a 1-gallon bucket. Larger amounts, up to about one-half case, may be collected in burlap, cotton or other types of porous cloth bags for transportation in an open vehicle to the disposal site. Do not collect dust from more than 7 flasks of tablets or 10 flasks of pellets (about 11 kg or 25 lbs.) in a single bag. Do not pile cloth bags together. Do not use this method for partially spent or "green" dust.

Caution: Do not collect dust in large drums, dumpsters, plastic bags or other containers where confinement may occur.

29. SPILL AND LEAK PROCEDURES

29.1 General Precautions and Directions

A spill, other than incidental to application or normal handling, may produce high levels of gas and, therefore, attending personnel must wear SCBA or its equivalent when the concentration of phosphine gas is unknown. Other NIOSH/MSHA approved respiratory protection may be worn if the concentration is known. Do not use water at any time to clean up a spill of **FUMITOXIN**. Water in contact with unreacted tablets or pellets will greatly accelerate the production of phosphine gas that could result in a toxic and/or fire hazard. Wear dry gloves of cotton or other material when handling aluminum phosphide.

Return all intact aluminum flasks to fiberboard cases or other packaging which has been suitably constructed and marked according to DOT regulations. Notify consignee and shipper of damaged cases.

If aluminum flasks have been punctured or damaged so as to leak, the container may be temporarily repaired with aluminum tape or the **FUMITOXIN** may be transferred from the damaged flask to a sound metal container, which should be sealed and properly labeled as aluminum phosphide. Transport the damaged containers to an area suit-

able for pesticide storage for inspection. Further instructions and recommendations may be obtained, if required, from **PESTCON SYSTEMS, INC.** If a spill has occurred which is only a few minutes old, collect the tablets and pellets and place them back into the original flasks, if they are intact, and stopper tightly. Place the collected tablets and pellets in a sound metal container if the original flasks are damaged. Caution: these flasks may flash upon opening at some later time.

If the age of the spill is unknown or if the tablets and pellets have been contaminated with soil, debris, water, etc., gather up the spillage and place it into small open buckets having a capacity no larger than about 1 gallon. Do not add more than about one flask of spilled material, 1 to 1.5 kg (2 to 3 lbs.), to the bucket. If on-site, wet deactivation is not feasible, these open containers should be transported in open vehicles to a suitable area. Wet deactivation may then be carried out as described in 29.2. Alternatively, small amounts of spillage from 4 to 5 flasks (4 to 8 kg, 9 to 18 lbs.) may be spread out in an open area away from inhabited buildings to be deactivated by atmospheric moisture.

29.2 Directions for Deactivation by the Wet Method

If the contaminated material is not to be held until completely reacted by exposure to atmospheric moisture, deactivate the product by the "Wet Method" as follows:

Deactivating solution is prepared by adding low sudsing detergent or surface-active agent to water in a drum or other suitable container. A 2% solution or 4 cups in 30 gallons is suggested. The container should be filled with deactivating solution to within a few inches of the top.

The tablets or pellets should be poured slowly into the deactivating solution and stirred so as to thoroughly wet all of the **FUMITOXIN**. This should be done in the open air. **FUMITOXIN** tablets or pellets should be mixed into no less than about 15 gallons of water-detergent solution for each case of material. Wear appropriate respiratory protection during wet deactivation.

Allow the mixture to stand, with occasional stirring, for about 36 hours. The resultant slurry will then be safe for disposal. Dispose of the slurry of deactivated material, with or without preliminary decanting, at a sanitary landfill or other suitable site approved by local authorities. Where permissible, this slurry may be poured into a storm sewer or out onto the ground.

Caution: If worker protection standards will be exceeded during wet deactivation of unexposed or incompletely exposed **FUMITOXIN**, NIOSH/MSHA approved respiratory protection must be worn. Wear a full-face gas mask - phosphine canister combination if exposed to levels between 0.3 ppm to 15 ppm or a Self-Contained Breathing Apparatus (SCBA) if exposure is unknown or above 15 ppm. Never place tablets, pellets, or dust in a closed container such as a dumpster, sealed drum, plastic bag, etc., as flammable concentrations and a flash of phosphine gas are likely to develop.

FOR ASSISTANCE, CONTACT:

PESTCON SYSTEMS, INC.
1808 FIRESTONE PARKWAY
WILSON, NC 27893
PHONE: (252) 237-7923/1-800-548-2778
FAX: 252-237-3259
INTERNET: www.pestcon.com
or
CHEMTREC (800) 424-9300

CLASSIFIED BY UNDERWRITERS LABORATORIES, INC., AS TO FIRE HAZARD ONLY WHEN USED SPECIFICALLY AS DIRECTED IN THE MANUFACTURER'S INSTRUCTIONS. FUMITOXIN® TABLETS AND PELLETS ARE NON COMBUSTIBLE, BUT EXPOSURE TO MOIST AIR OR WATER RELEASES FLAMMABLE AND TOXIC PHOSPHINE (HYDROGEN PHOSPHIDE) GAS. SPONTANEOUS IGNITION MAY RESULT IF CONTACTED BY WATER, ACIDS, OR CHEMICALS.

5857-2-04

APPENDIX A
ELECTRONIC MODELING FILES

REFERENCES

- Air and Waste Management Association (AWMA). Air Pollution Engineering Manual. Edited by Wayne T. Davis. Second Edition.
- Idaho Department of Environmental Quality (IDEQ). 2002. "State of Idaho Air Quality Modeling Guidance." Air Quality Division, Stationary Source Program. ID AQ-011. December.
- U.S. Environmental Protection Agency (EPA). 2003. "Guideline on Air Quality Models (Revised)." 40 Code of Federal Regulations, Part 51, Appendix W. Office of Air Quality Planning and Standards. Research Triangle Park, NC.
- EPA. 1995. "User's Guide for the Industrial Source Complex (ISC3) Dispersion Models." EPA-454/B-95-003a. Office of Air Quality Planning and Standards. Research Triangle Park, NC.



COPY



Tetra Tech EM Inc.

106 North 6th Street, Suite 202 ♦ Boise, ID 83702 ♦ (208) 343-4085 ♦ FAX (208) 343-4756

December 4, 2003

Mr. Harbi Elshafei
Air Quality Permit Engineer
Idaho Department of Environmental Quality
1410 N. Hilton
Boise, ID 83706

RECEIVED

DEC 05 2003

Department of Environmental Quality
State Air Program

RE: Revised air quality emission inventory and dispersion modeling impact analysis for Reed Barley Storage LLC Permit to Construct (AIRS Facility NO. 053-00008)

Dear Mr. Elshafei:

I have included the revised air quality emission inventory and dispersion modeling impact analysis for Reed Barley Storage LLC Permit to Construct (AIRS Facility NO. 053-00008) for a minor source air quality permit from the Idaho Department of Environmental Quality.

If you have any questions, please feel free to contact me at (208) 343-4085.

Sincerely,

Doug Herlocker

cc: Earl Reed, Reed Barley Storage LLC

Attachment



16994

Reed Barley Storage, Hazelton
Emission inventory & dispersion
Modeling impact analysis

RECEIVED
DEC 05 2003
Department of Environmental Quality
State Air Program

**PARTICULATE EMISSION INVENTORY
AND DISPERSION MODELING IMPACT ANALYSIS FOR
REED BARLEY STORAGE FACILITY LLC**

**SUPPLEMENTAL INFORMATION
FOR
THE MINOR SOURCE PERMIT APPLICATION FOR THE HAZELTON
BARLEY STORAGE FACILITY**

Prepared for:

**IDAHO DEPARTMENT OF ENVIRONMENTAL QUALITY
AIR QUALITY PROGRAM
1410 N. HILTON
BOISE, IDAHO 83706**

Prepared by:



**TETRA TECH EM INC.
106 North 6th Street, Suite 202
Boise, Idaho 83702**

December 4 2003

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APPENDICES

APPENDIX A	ELECTRONIC MODELING FILES
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1.0 INTRODUCTION

Reed Barley Storage Facility LLC (Reed Barley) submitted an air quality permit application to the Idaho Department of Environmental Quality (IDEQ) on June 3, 2003 for its Hazelton barley storage facility. Reed Barley was informed in a letter from the IDEQ, dated August 27, 2003, that their Permit to Construct (PTC) application was determined to be incomplete. IDEQ requested additional information from Reed Barley before the application could be determined complete. Reed Barley contracted Tetra Tech EMI (TtEMI) to prepare the requested additional information, which included a dispersion modeling analysis to evaluate compliance with air quality standards for particulate matter with aerodynamic diameter less than 10 microns (PM_{10}). This document includes the requested dispersion modeling analysis, as well as an updated emission inventory that more accurately reflects fugitive and point source emissions from Reed Barley.

2.0 PROJECT EMISSIONS

This section presents the updated emissions data for total particulate matter (PM) and PM_{10} . No other criteria pollutants or toxic air pollutants are emitted from operations at the Reed Barley. There are several PM_{10} emission sources at Reed Barley, which are described below.

2.1 BAGHOUSE EMISSIONS

There is one baghouse at Reed Barley that controls all PM_{10} emissions within the barley processing system. The barley processing system is comprised of five different activities. These activities are 1) truck unloading 2) grain handling 3) rail loading 4) truck loading, and 5) baghouse waste loading into a truck. Each of these activities releases PM_{10} emissions that are pulled through the processing system to the baghouse using negative pressure. Table 1 shows the percentage of PM_{10} emissions from each activity that enters the baghouse system. The remaining emissions are fugitive emissions, which are discussed in Section 2.2 of this document.

**TABLE 1
PERCENT EMISSIONS ENTERING BAGHOUSE SYSTEM**

Activity	Percent Emissions From Activity That Enter Baghouse System
Truck Unloading – West	90%
Truck Unloading – East	90%
Grain Handling – West	100%
Grain Handling – East	100%
Rail Loading	75%
Truck Loading	75%
Baghouse Waste Loading to Truck	75%

The baghouse has a control efficiency of 99.7 percent, based on manufacturer's specifications (included in original permit application material). Additionally, none of the activities that occur at Reed Barley operate on a continuous 24-hour basis. Table 2 and Table 3 summarize potential baghouse PM and PM₁₀ emissions from Reed Barley based on the baghouse control efficiency and hours of operation for each activity. The Reed Barley baghouse calculations were performed by multiplying the annual barley throughput of 192,030 tons per year (tpy) by the PM and PM₁₀ emission factors found in the U.S. Environmental Protection Agency (EPA) Compilation of Air Pollutant Emission Factors (AP-42) Chapter 9.9.1, *Grain Elevators and Processes*. These emission factors are used to estimate the emissions generated each year by the grain throughput. However, some emissions become fugitive during the grain handling processes. The percentage of emissions that enter the baghouse system is applied to the total emissions, and the baghouse efficiency is then applied. The resulting emissions total is displayed in pounds per year (lb/yr) and tpy in Tables 2 through 6. Because each system operates less than 8,760 hours per year, the emissions in lb/yr are divided by the number of hours each system operates. This gives emissions in terms of pounds per hour (lb/hour).

2.2 FUGITIVE EMISSIONS

Fugitive emissions are released by the same activities and annual throughput that generate emissions captured by the baghouse, except for occasional railcar unloading, which is not part of the baghouse system. Emissions not captured by the baghouse system are classified as fugitive. Table 1 shows the percentage of PM₁₀ emissions captured by the baghouse system from all the different operations at Reed Barley. It must be noted that rail unloading is only performed if a previously loaded railcar requires unloading due to an error or incorrect loading procedure. In effect, no incoming barley will be received through the rail unloading system.



The fugitive PM₁₀ emissions at Reed Barley are uncontrolled except for emissions controlled by a building enclosure. A control efficiency of 70 percent was applied to fugitive emissions released inside a building, based on information provided in the Air & Waste Management Association's Air Pollution Engineering Manual (AWMA 2000). Table 4 and Table 5 summarize potential fugitive PM and PM₁₀ emissions at Reed Barley. Fugitive emissions calculations were performed by multiplying the annual barley throughput in tpy by the PM and PM₁₀ emission factors found in AP-42 Chapter 9.9.1 *Grain Elevators and Processes*. These emission factors are used to estimate the amount of emissions generated per year by the grain throughput amount. A control efficiency of 70 percent is applied to those emission sources that occur inside a building and all fugitive emissions are added to baghouse emissions to estimate total emissions. The resulting emissions total is displayed in lbs/yr and tpy in Tables 2 through 6. Because each system operates less than 8,760 hours per year, the emissions in lb/yr are divided by the number of hours each system operates to provide emissions in terms of lb/hr



**TABLE 2
POTENTIAL BAGHOUSE PM EMISSIONS**

System Number	System	Throughput (tpy)	PM Emission Factor (lb/ton) ^A	Primary Control Device	Primary Control Device Efficiency	PM Emissions (lb/yr)	Hours of Operation per Year	PM Emissions (lb/hr)	PM Emissions (tpy)	Comments
1	Truck Unloading - West	95,055.21	0.0350	Baghouse	99.7%	8.98	295.00	3.04E-02	4.49E-03	Most truck unloading is from hopper trucks. 90% of air goes into system with grain and is fed to a baghouse.
2	Truck Unloading - East	96,015.36	0.0350	Baghouse	99.7%	9.07	295.00	3.08E-02	4.54E-03	Loading on West and East docks is identical
3	Grain Handling - West	95,055.21	0.0610	Baghouse	99.7%	17.40	300.00	5.80E-02	8.70E-03	This takes place underground and 100% of air is contained in system with grain. It all goes to the baghouse.
4	Grain Handling - East	96,015.36	0.0610	Baghouse	99.7%	17.57	300.00	5.86E-02	8.79E-03	Same as Grain Handling - West
5	Rail Loading	190,110.42	0.0270	Baghouse	99.7%	11.55	540.00	2.14E-02	5.77E-03	Takes place in a building and 75% of air is drawn into baghouse system. Other 25% is fugitive emissions.
6	Truck Loading	1,920.31	0.0860	Baghouse	99.7%	0.37	60.00	6.19E-03	1.86E-04	Takes place in a building and 75% of air is drawn into baghouse system. Other 25% is fugitive emissions.
7	Baghouse Waste Loading (Truck)	690.00	0.0860	Baghouse	99.7%	0.13	10.00	1.34E-02	6.68E-05	Takes place in a building and 75% of air is drawn into baghouse system. Other 25% is fugitive emissions.
Total For All Systems:						65.08		0.22	0.03	The baghouse filters emissions from all of these processes. It is a single emission point, but many systems create emissions that are funneled to the baghouse

Notes:

^A Emission factors are for uncontrolled emissions

hr hour

lb pound

PM particulate matter

% percent

tpy tons per year

PM₁₀ particulate matter with aerodynamic diameter less than 10 microns



**TABLE 3
POTENTIAL BAGHOUSE PM₁₀ EMISSIONS**

System Number	System	Throughput (tpy)	PM ₁₀ Emission Factor (lb/ton)	Primary Control Device	Primary Control Device Efficiency	PM ₁₀ Emissions (lb/yr)	Hours of Operation per Year	PM ₁₀ Emissions (lb/hr)	PM ₁₀ Emissions (tpy)	Comments
1	Truck Unloading - West	95,055.21	0.0078	Baghouse	99.7%	2.00	295.00	6.79E-03	1.00E-03	Most truck unloading is from hopper trucks. 90% of air goes into system with grain and is fed to a baghouse.
2	Truck Unloading - East	96,015.36	0.0078	Baghouse	99.7%	2.02	295.00	6.85E-03	1.01E-03	Loading on West and East docks is identical.
3	Grain Handling - West	95,055.21	0.0340	Baghouse	99.7%	9.70	300.00	3.23E-02	4.85E-03	This takes place underground and 100% of air is contained in system with grain. It all goes to the baghouse.
4	Grain Handling - East	96,015.36	0.0340	Baghouse	99.7%	9.79	300.00	3.26E-02	4.90E-03	Same as Grain Handling - West
5	Rail Loading	190,110.42	0.0022	Baghouse	99.7%	0.94	540.00	1.74E-03	4.71E-04	Takes place in a building and 75% of air is drawn into baghouse system. Other 25% is fugitive emissions.
6	Truck Loading	1,920.31	0.0290	Baghouse	99.7%	0.13	60.00	2.09E-03	6.27E-05	Takes place in a building and 75% of air is drawn into baghouse system. Other 25% is fugitive emissions.
7	Baghouse Waste Loading (Truck)	690.00	0.0290	Baghouse	99.7%	0.05	10.00	4.50E-03	2.25E-05	Takes place in a building and 75% of air is drawn into baghouse system. Other 25% is fugitive emissions.
Total For All Systems:						24.62		0.087	0.01	The baghouse filters emissions from all of these processes. It is a single emission point, but many systems create emissions that are funneled to the baghouse.

Notes:

hr hour
lb pound
PM particulate matter
% percent
tpy tons per year
PM₁₀ particulate matter with aerodynamic diameter less than 10 microns



**TABLE 4
POTENTIAL FUGITIVE PM EMISSIONS**

System Number	System	Throughput (tpy)	PM Emission Factor (lb/ton) ^A	Primary Control Device	Primary Control Device Efficiency	PM Emissions (lb/yr)	Hours of Operation per Year	PM Emissions (lb/hr)	PM Emissions (tpy)	Comments
1	Truck Unloading - West	95,055.21	0.0350	Building	70.0%	99.81	295.00	0.34	4.99E-02	Most truck unloading is from hopper trucks. 10% of air escapes system controlled by the baghouse.
2	Truck Unloading - East	96,015.36	0.0350	Building	70.0%	100.82	295.00	0.34	5.04E-02	Loading on West and East docks is identical
3	Rail Unloading	960.15	0.0320	Uncontrolled	0.0%	30.72	10.00	3.07	1.54E-02	Rail unloading is controlled by employing good operating practices. Maximum of one railcar unloaded in a given day.
6	Rail Loading	190,110.42	0.0270	Uncontrolled	0.0%	1,283.25	540.00	2.38	6.42E-01	75% of air from rail loading is drawn into baghouse system. Other 25 % is fugitive emissions.
7	Truck Loading	1,920.31	0.0860	Building	70.0%	12.39	60.00	0.21	6.19E-03	Takes place in a building and 75% of air is drawn into baghouse system. Other 25 % is fugitive emissions.
8	Baghouse Waste Loading (Truck) ^B	690.00	0.0860	Building	70.0%	4.45	10.00	0.45	2.23E-03	Takes place in a building and 75% of air is drawn into baghouse system. Other 25 % is fugitive emissions.
Total For All Systems:						1,531.43		6.78	0.77	The baghouse filters emissions from all of these processes. It is a single emission point, but many systems create emissions that are funneled to the baghouse

Notes:

- ^A Emission factors are for uncontrolled emissions
- hr hour
- lb pound
- PM particulate matter
- % percent
- tpy tons per year
- PM₁₀ particulate matter with aerodynamic diameter less than 10 microns



**TABLE 5
POTENTIAL FUGITIVE PM₁₀ EMISSIONS**

System Number	System	Throughput (tpy)	PM ₁₀ Emission Factor (lb/ton)	Primary Control Device	Primary Control Device Efficiency	PM ₁₀ Emissions (lb/yr)	Hours of Operation per Year	PM ₁₀ Emissions (lb/hr)	PM ₁₀ Emissions (tpy)	Comments
1	Truck Unloading - West	95,055.21	0.0078	Building	70.0%	22.24	295.00	0.08	1.11E-02	Most truck unloading is from hopper trucks. 10% of air escapes system controlled by the baghouse.
2	Truck Unloading - East	96,015.36	0.0078	Building	70.0%	22.47	295.00	0.08	1.12E-02	Loading on West and East docks is identical
3	Rail Unloading	960.15	0.0078	Uncontrolled	0.0%	7.49	10.00	0.75	3.74E-03	Rail unloading is controlled by employing good operating practices. Maximum of one railcar unloaded in a given day.
6	Rail Loading	190,110.42	0.0022	Uncontrolled	0.0%	104.56	540.00	0.19	5.23E-02	75% of air from rail loading is drawn into baghouse system. Other 25 % is fugitive emissions.
7	Truck Loading	1,920.31	0.0290	Building	70.0%	4.18	60.00	0.07	2.09E-03	Takes place in a building and 75% of air is drawn into baghouse system. Other 25 % is fugitive emissions.
8	Baghouse Waste Loading (Truck)	690.00	0.0290	Building	70.0%	1.50	10.00	0.15	7.50E-04	Takes place in a building and 75% of air is drawn into baghouse system. Other 25 % is fugitive emissions.
Total For All Systems:						162.44		1.31	0.08	The baghouse filters emissions from all of these processes. It is a single emission point, but many systems create emissions that are funneled to the baghouse

Notes:

hr hour
 lb pound
 PM particulate matter
 % percent
 tpy tons per year
 PM₁₀ particulate matter with aerodynamic diameter less than 10 microns



Table 6 summarizes total estimated annual and hourly PM and PM₁₀ emissions from Reed Barley.

**TABLE 6
TOTAL ESTIMATED EMISSIONS FROM REED BARLEY STORAGE FACILITY**

Pollutant	Emissions (lb/yr)	Emissions (lb/hr)	Emissions (tpy)
PM	1,596.51	7.00	0.798
PM ₁₀	187.06	1.40	0.094

Notes:

PM particulate matter
 PM₁₀ particulate matter with aerodynamic diameter less than 10 microns
 lb/yr pounds per year
 tpy tons per year

3.0 AIR DISPERSION MODELING ANALYSIS

This section discusses the dispersion modeling analysis completed to evaluate potential PM₁₀ impacts from Reed Barley. The modeling was completed to demonstrate compliance with the National Ambient Air Quality Standards (NAAQS) and State of Idaho ambient air quality standards for PM₁₀. The dispersion modeling analysis was completed in accordance with the guidance and protocols outlined in the U.S. Environmental Protection Agency's (EPA) *Guideline on Air Quality Models (Revised)* (EPA 2003) and IDEQ *State of Idaho Air Quality Modeling Guidance* (IDEQ 2002).

3.1 MODEL SELECTION AND INPUTS

The EPA's *Guideline on Air Quality Models* (EPA 2003) recommends that the Industrial Source Complex Short-term Model Version 3 (ISCST3) be used for source-specific analysis of complicated sources in a nearfield analysis. A complicated source is one with more than one emission point, aerodynamic downwash, dry and wet deposition, or volume and area sources. ISCST3 is a steady-state Gaussian plume model that is appropriate for estimating pollutant concentrations at distances to 50 kilometers (km), and for averaging times from one hour to one year.

The ISCST3 model has recently been revised to include enhanced building downwash and plume rise algorithms. This new version of the ISCST3 model is called ISC-PRIME (Plume Rise Model Enhancements). Based on discussions with IDEQ, ISC-PRIME is the preferred model for evaluating criteria pollutant concentrations from Reed Barley. The latest version of the ISC-PRIME model available



on the EPA SCRAM website, dated 11/27/2002, was used in this modeling analysis.

The ISC-PRIME model was run using the regulatory default options and one full year of meteorological data collected in 2000 from the Heyburn, Idaho meteorological site, which is approximately 20 miles east of Reed Barley. Regulatory default options include the use of stack-tip downwash, buoyancy-induced dispersion, calms processing routines, upper-bound downwash concentrations for super-squat buildings, default wind speed profile exponents, and vertical potential temperature gradients; and excluded the use of gradual plume rise. The model was run using rural dispersion parameters and incorporated terrain into the calculations.

3.2 SOURCE INPUT DATA

The PM₁₀ emission sources at Reed Barley consist of grain unloading from hopper trucks, and railcar, grain handling, product loading to railcar and truck, and baghouse waste loading to trucks. All of the emissions from these sources are ducted to a single baghouse. Fugitive emissions also occur from truck and rail loading, truck and rail unloading, and baghouse waste loading.

The baghouse was characterized in the model as a point source and the fugitive sources were characterized as volume sources. Total PM₁₀ emissions from the Reed Barley are estimated to be approximately 1.40 lb/hr and 0.09 tpy.

Table 7 identifies the emission sources, locations, estimated emissions, and associated release parameters. The baghouse source parameters were established based on manufacturer data. Volume source input parameters were developed using guidance from the *ISC User's Guide* (EPA 1995), and based on physical specifications of the grain handling operations, as summarized below:

Truck loading and unloading:

Truck loading and unloading takes place inside a building. It was assumed that emissions released inside the building are uniformly mixed within the building before exiting the large doors. The dimensions of the source were assumed to be 30-feet high and 50-feet long. Using guidance from the *ISC User's Guide*, the initial sigma-y dimension is described by the following equation:

$$(50) \div (4.3) = 11.6 \text{ feet (3.54 meters)}$$

The initial sigma-z dimension is described by the following equation:

$$(30) \div (2.15) = 13.95 \text{ feet (4.25 meters)}$$



The release height was 4.57 meters.

Rail loading and unloading:

Rail loading and unloading takes place on the rail spur north of the silos. Initial release parameters were developed by assuming that emissions released from these operations occur about the approximate dimensions of the railcar. It is expected that the PM₁₀ emissions will mix with the eddy currents associated with the railcar, buildings, and loading operation equipment prior to transport downwind by ambient wind conditions. The dimensions of the source were assumed to be 30-feet long and 10-feet high. Using the guidance from the *ISC User's Guide*, the initial sigma-y dimension is described by the following equation:

$$(30) + (4.3) = 6.98 \text{ feet (2.13 meters)}$$

The initial sigma-z dimension is described by the following equation:

$$(10) + (2.15) = 4.65 \text{ feet (1.42 meters)}$$

The release height was 3.05 meters.

**TABLE 7
REED BARLEY STORAGE FACILITY
EMISSION SOURCE INPUT DATA**

Source Description	Source ID	UTM Location (mE/mN)	Release Height (m)	Stack Temp (K)	Exit Velocity (m/s)	Stack Diameter (m)	Volume Source Sigma-y (m)	Volume Source Sigma-z (m)	PM ₁₀ Emission Rate (g/s)
Baghouse	Baghouse	733644/4720700	12.00	293.0	28.33	0.72	N/A	N/A	0.0109
Truck Load/Unload West	Truck_W	733640/4720691	4.57	N/A	N/A	N/A	3.54	4.25	0.0145
Truck Load/Unload East	Truck_E	733640/4720683	4.57	N/A	N/A	N/A	3.54	4.25	0.0145
Rail Load	Rload	733634/4720730	3.05	N/A	N/A	N/A	2.13	1.42	0.0239
Rail Unload	Runload	733634/4720730	3.05	N/A	N/A	N/A	2.13	1.42	0.0945
Baghouse Waste Load	Twaste	733640/4720683	4.57	N/A	N/A	N/A	3.54	4.25	0.0189

Notes:

UTM	Universal Transverse Mercator	g	gram
ID	identification	m	meter
K	degrees Kelvin	s	second
N/A	Not applicable		



Reed Barley typically operates between 8:30 a.m. and 4:30 p.m. daily, but increases operation hours to between 7:00 a.m. and 7:00 p.m. during harvest season (approximately 6 weeks). Although PM and PM₁₀ Emission sources don't all operate simultaneously all the time during these operation hours, it was assumed in the modeling that all sources operate continuously 12 hr/day. The exception to this is rail unloading operations, which may have a maximum of 5 railcars unloaded per year. This source was assumed to operate 1 hr/day.

3.3 BUILDING DOWNWASH

The modeling analysis included building dimensions at Reed Barley to assess the potential downwash effects on the baghouse emissions from nearby structures. The direction-specific downwash parameters were calculated using facility plot-plan maps, and EPA's Building Profile Input Program (BPIPPRM) for the ISC-PRIME model. Output from BPIPPRM was incorporated into the ISC-PRIME input files. The building downwash input and output files are included on the disk of modeling files Provided in Appendix A of this document.

3.4 MODEL RECEPTORS

A grid of model receptors was developed for the modeling analysis to describe the area surrounding Reed Barley. The rectangular grid of receptors was developed from the facility's fenceline outward for 6 km in each direction. Spacing intervals between the receptors are 100 m out to 1 km, and 500-m spacing between 1 and 6 km. In addition, receptors were placed along the facility fenceline, at 25 m receptor spacing intervals. Receptor elevations were determined using U.S. Geological Survey 7.5-minute Digital Elevation Model data. A plot of the model receptor locations is shown in Figure 3-1.

3.5 METEOROLOGICAL DATA

The dispersion modeling was run using meteorological data collected in 2000 from the Heyburn, Idaho meteorological site, approximately 20 miles east of the Reed Barley. This one-year dataset was recently provided to TtEMI by IDEQ for a nearby modeling analysis. The nearby proximity of the meteorological station to Reed Barley, along with the similar geographic features of the two sites, indicates that the meteorological dataset is representative of the conditions at Reed Barley. The surface data were combined with approved mixing height data from Boise, Idaho.

The Heyburn meteorological data demonstrate a primary wind direction from the west through west-



northwest. Secondary wind directions are from the southwest and east-northeast. Figure 3-2 presents a windrose representing the 2000 Heyburn meteorological data.

3.6 BACKGROUND CONCENTRATIONS

Ambient background concentrations represent the contribution of pollutant sources not included in the modeling analysis, including naturally occurring sources. Because the modeling indicated that PM₁₀ impacts would exceed the 24-hour or annual significant impact level, background concentrations were added to the modeled concentrations to calculate the total estimated PM₁₀ concentrations. Appropriate PM₁₀ background values were provided to TtEMI by IDEQ that represent rural agricultural settings in southern Idaho. The 24-hour PM₁₀ is 73 micrograms per cubic meter (µg/m³), and the annual background concentration for annual PM₁₀ is 26 µg/m³.

3.7 MODEL RESULTS

ISCPRIME modeling was completed assuming worst-case 24-hour operating conditions for PM₁₀ (during harvest season). Potential PM₁₀ impacts are less than the 24-hour and annual NAAQS. Table 8 summarizes the ISCPRIME PM₁₀ modeling results. The highest impacts from the modeling are very localized and occur just north of the rail loading and unloading operations. Impacts diminish quickly with distance from the fenceline. The emission source that contributes the most to the highest impacts is the rail unloading, which will rarely occur during normal operational parameters. Figures 3-3 and 3-4 show 24-hour and annual PM₁₀ concentration contours respectively.

**TABLE 8
REED BARLEY STORAGE FACILITY
PM₁₀ MODEL RESULTS**

Averaging Period	Highest Modeled Concentration (µg/m ³)	Background Concentration (µg/m ³)	Total Concentration (µg/m ³)	National Ambient Air Quality Standard (µg/m ³)
24-Hour	55.6 ^a	73	128.6	150 ^b
Annual	3.9	26	29.9	50

Notes:

- ^a highest, second-highest modeled PM₁₀ concentration
 - ^b not to be exceeded more than once per calendar year
- µg/m³ micrograms per cubic meter



**FIGURE 3-1
REED BARLEY STORAGE LLC
MODEL RECEPTOR LOCATIONS**

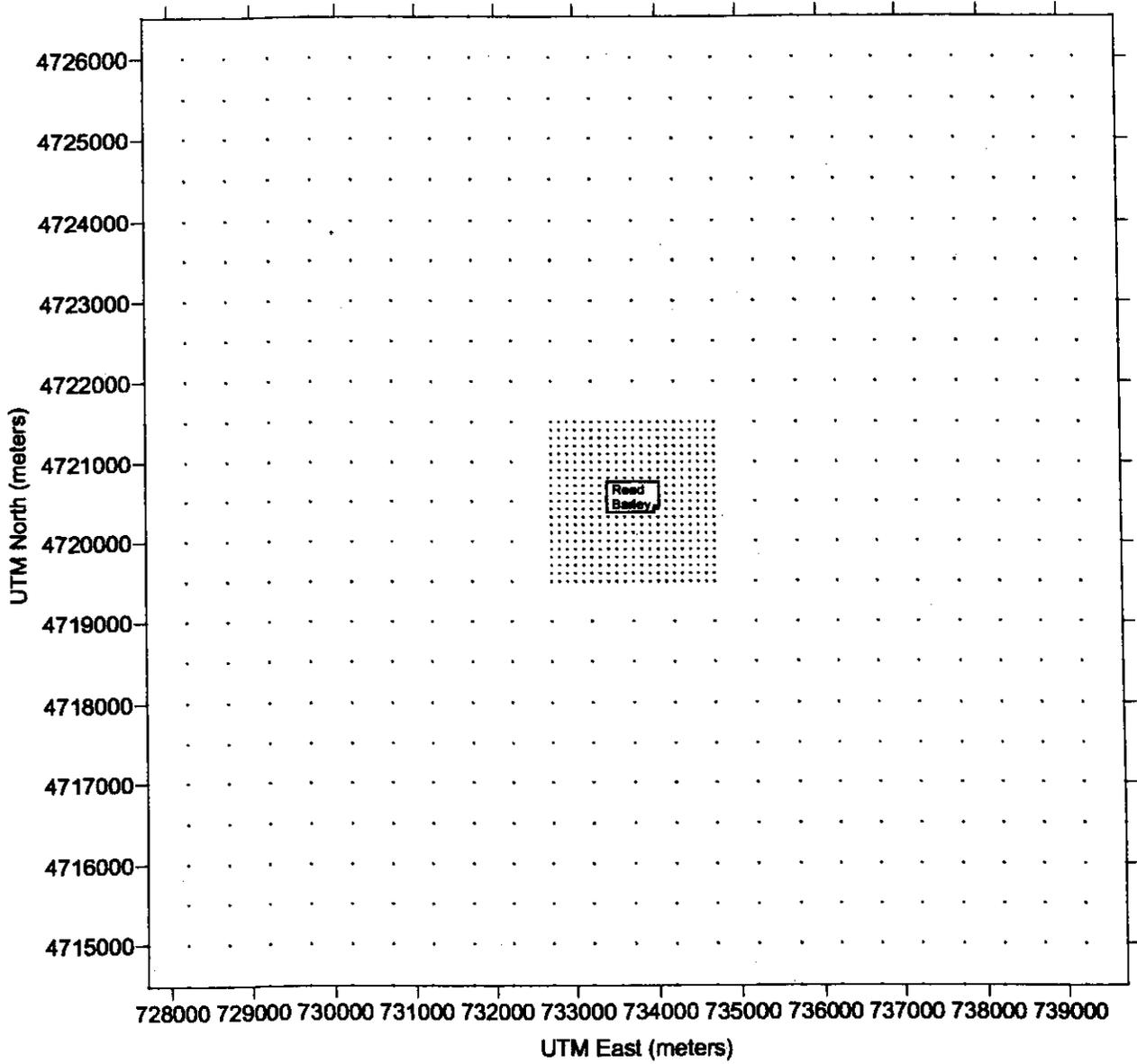
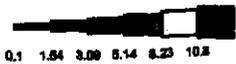
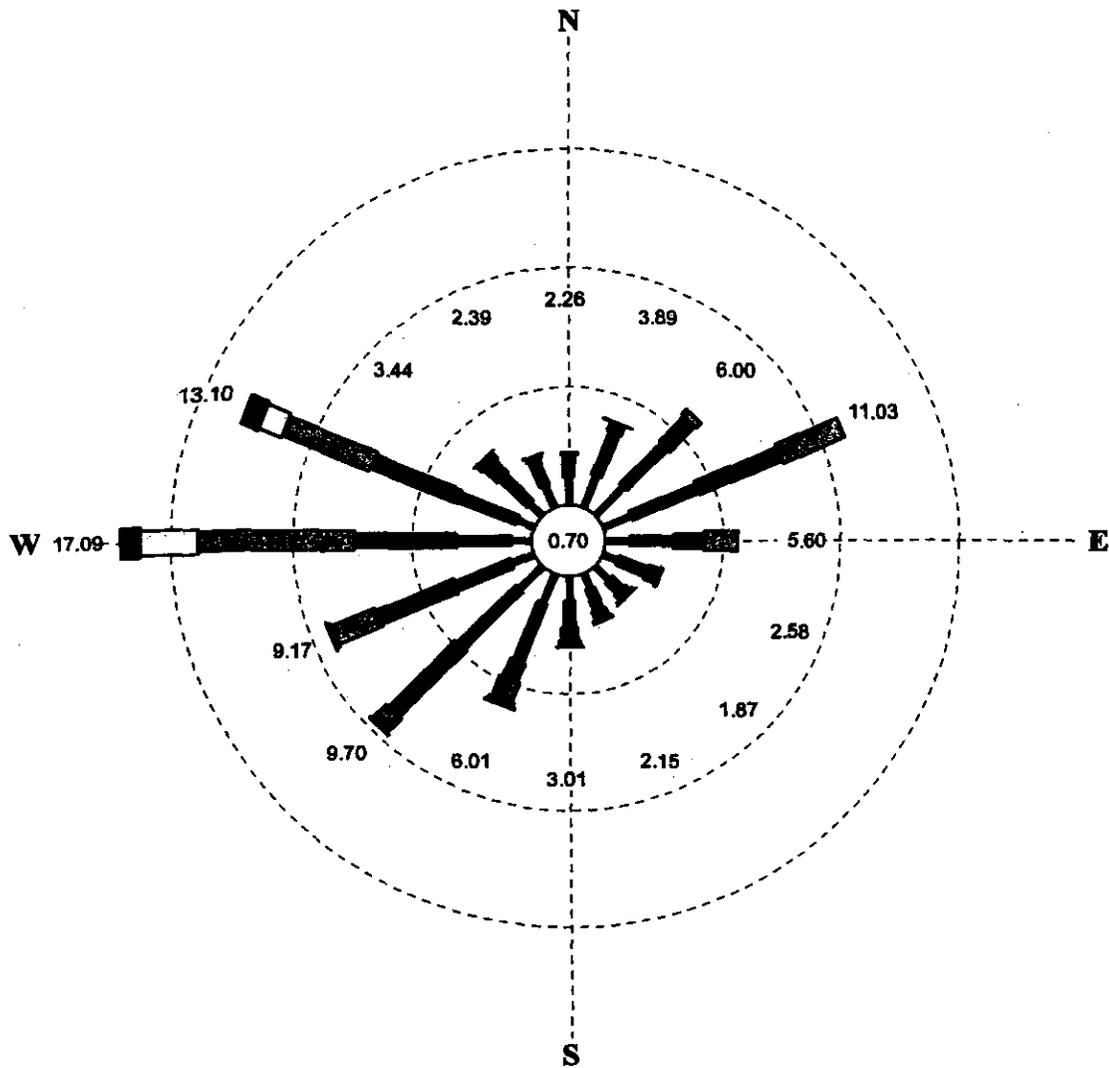


FIGURE 3-2
2000 Heyburn Windrose



Wind Speed (Meters Per Second)

Calms included at center.
 Rings drawn at 5% intervals.
 Wind flow is TO the directions shown.
 48 observations were missing.

FIGURE 3-3
REED BARLEY STORAGE LLC
24-Hour PM-10 Modeled Concentrations (w/ background)

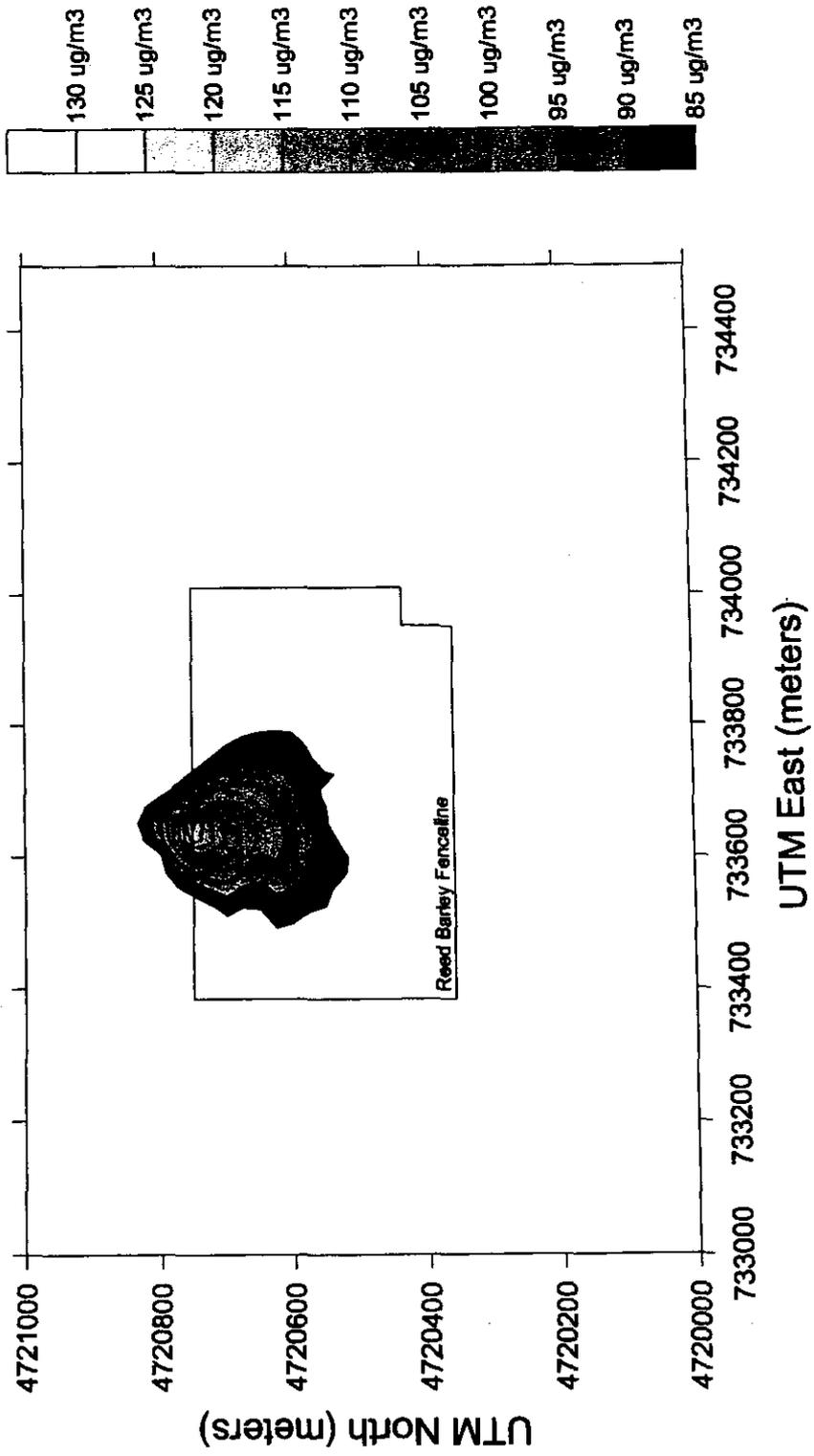
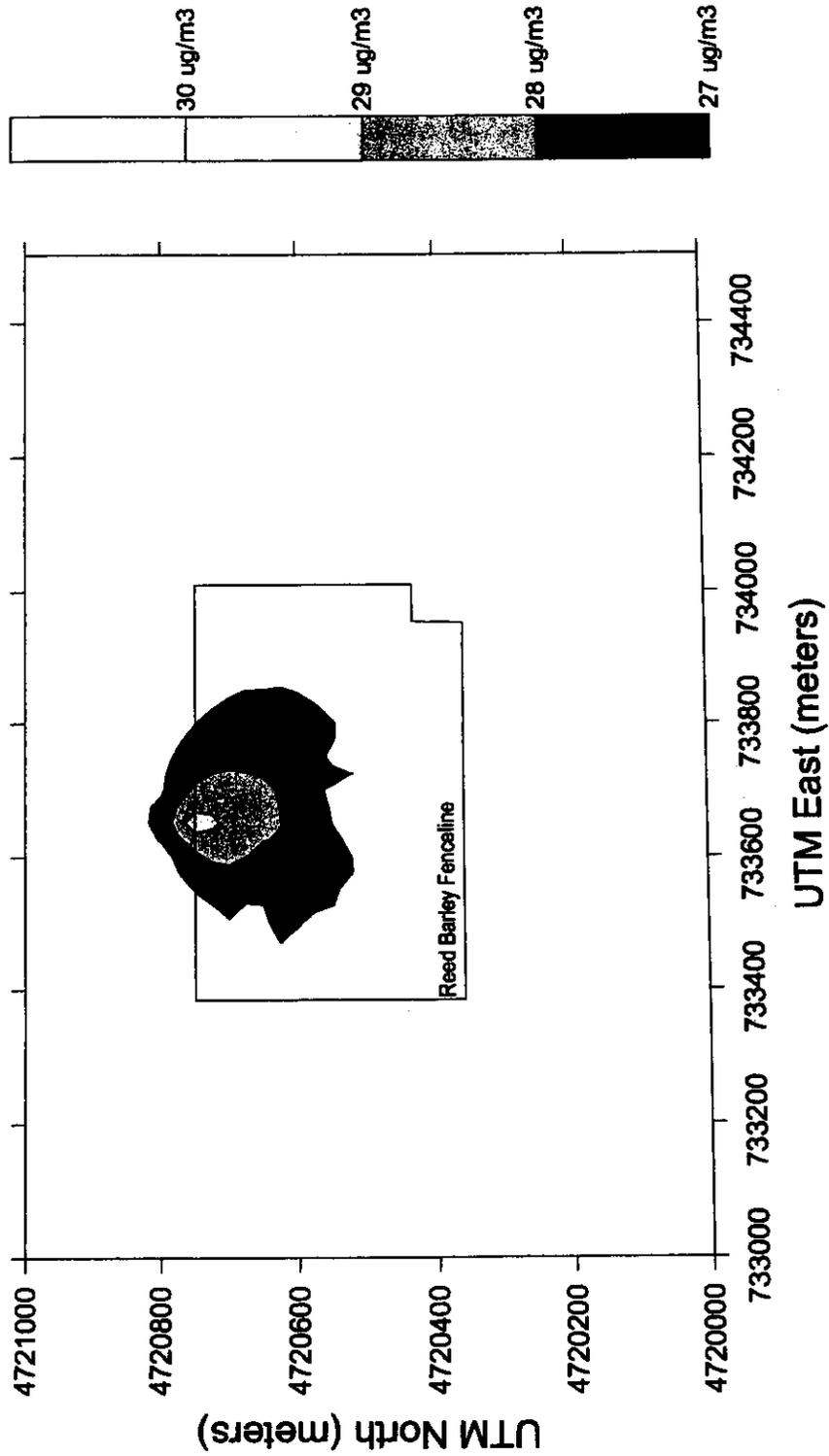


FIGURE 3-4
REED BARLEY STORAGE LLC
Annual PM-10 Modeled Concentrations (w/ background)





Tetra Tech EM Inc.

106 North 6th Street, Suite 202 ♦ Boise, ID 83702 ♦ (208) 343-4085 ♦ FAX (208) 343-4756

February 3, 2004

Mr. Harbi Elshafai
Air Quality Permit Engineer
Idaho Department of Environmental Quality
1410 N. Hilton
Boise, ID 83706

RE: Potential to Emit Estimates for Reed Barley Tier II Air Quality Permit Application and Applicability of New Source Performance Standards

Dear Mr. Elshafai:

Per a letter from the Idaho Department of Environmental Quality (IDEQ) under your signature, dated January 2, 2004, I am providing information you requested to complete a Tier II Air Quality Permit for Reed Barley Storage (Reed). Tetra Tech EMI was contracted by Reed to prepare and submit an air modeling impact analysis, which included a revised air pollutant emissions estimate. The IDEQ letter requested Potential to Emit (PTE) estimates for Reed's operations prior to obtaining an air quality permit. All PTE estimates are based on emissions of particulate matter (PM) and particulate matter less than 10 microns (PM₁₀), which are the only criteria pollutants emitted from Reed. PTE is defined by the Idaho Department of Administrative Procedures act, IDAPA 58.01.01.006.74 as:

The maximum capacity of a facility to emit an air pollutant under its physical and operational design. Any physical or operational limitation on the capacity of the facility to emit an air pollutant provided the limitation or its effect on emissions is state or federally enforceable, shall be treated as part of its design. Limitations may include, but are not limited to, air pollution control equipment, restrictions on hours of operation and restrictions on the type or amount of material combusted, stored or processed. This definition does not alter or affect the term "capacity factor" as defined in 42 U.S.C. Sections 7651 through 7651o. (4-5-00).

According to the definition above, the Reed facility has an estimated "capacity" throughput of approximately 264 tons per hour (11,000 bushels per hour) and 2,312,640 tons per year.

However unrealistic, this estimate is solely used for this exercise and does not represent realistic operation parameters at the Reed facility. The inbound capacity volumes are presented below:

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Department of Environmental Quality
conforms Air Pollution and is recyclable

- 264 tons per hour (Equivalent to 11,000 bushels per hour and based on product handling capacity of the Reed facility)
- 264 tons x 8760 hours = 2,312,640 tons per year

A baghouse system was installed and incorporated into the receiving, storage, and loading operations at the Reed facility. All technical specifications and operating parameters for the baghouse system were previously submitted to IDEQ. However, for this PTE estimate, all PM and PM₁₀ removal efficiencies for the baghouse have been removed. Under the PTE scenario, all PM and PM₁₀ PTE estimates are based on fugitive emissions released without filtration or reduction. The truck unloading, rail loading, and truck loading emissions are controlled by the baghouse system, but for this scenario, it is assumed that 100 percent of PM and PM₁₀ emissions from these processes become fugitive.

The receiving conveyor and load out conveyor are underground, and the bucket elevators, storage bin vents, and distribution conveyor are enclosed in a sealed ductwork system, virtually eliminating emissions from these aspects of the grain handling process. However, in the absence of a baghouse system to apply negative airflow to the sealed ductwork system, it is assumed for this exercise that a small percentage (approximately 10 percent) of emissions from the bucket elevators, storage bin vents, and distribution conveyor are released as fugitive emissions.

Maximum Hourly and Annual PM and PM₁₀ PTE Estimate

The hourly and annual PM and PM₁₀ PTE emissions were estimated by multiplying the hourly grain throughput capacity of 264 tons per hour by 8,760 hours per year, using the PM and PM₁₀ emission factors presented in the Environmental Protection Agency (EPA) AP-42, *Chapter 9.9.1, Grain Elevators and Processes*. The estimated PTE PM and PM₁₀ emissions for the Reed facility are presented and in Table 1 and Table 2.

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**TABLE 1
ALL AMERICAN GRAIN COMPANY
PARTICULATE MATTER LESS THAN 10 MICRONS (PM₁₀) UNCONTROLLED POTENTIAL TO EMIT EMISSIONS**

System Number	System	Throughput (ton/hr)	PM ₁₀ Emission Factor (lb/ton) ^A	Percent of PM ₁₀ Emissions That Become Fugitive	PM ₁₀ Emissions (lb/yr)	Hours of Operation Per Year ^B	PM ₁₀ Emissions (lb/hr)	PM ₁₀ Emissions (ton/yr)	Comments
1	Truck Unloading - West	132	0.0078	100.00%	9,019.30	8760	1.03	4.51	All truck unloading. Assumption made that 100% of PM ₁₀ emissions become fugitive
2	Truck Unloading - East	132	0.0078	100.00%	9,019.30	8760	1.03	4.51	Same as rail unloading - West
4	Handling - West	132	0.034	10.00%	3,931.49	8760	0.45	1.97	Takes place underground or enclosed and assumption that 10% of PM ₁₀ emissions become fugitive
5	Handling - East	132	0.034	10.00%	3,931.49	8760	0.45	1.97	Same as Grain Handling - West
6	Storage Bin Vents	264	0.0063	10.00%	1,456.96	8760	0.17	0.73	Storage silo bin vented with negative pressure to enclosed duct system. Assumption made that 10% of PM ₁₀ emissions become fugitive
7	Truck Loading	13	0.029	100.00%	3,302.52	8760	0.38	1.65	All truck loading. Assumption made that 100% of PM ₁₀ emissions become fugitive
8	Rail Loading	251	0.0022	100.00%	4,837.27	8760	0.55	2.42	All rail loading. Assumption made that 100% of PM ₁₀ emissions become fugitive
Total For All Systems:					35,498.32	8760	4.05	17.75	Total uncontrolled PM₁₀ emissions based on maximum facility capacity

Notes:

^A From Environmental Protection Agency AP-42, Chapter 9.9.1, Grain Elevators and Processes

^B Hours of operation based on 24 hour per day, 7 day per week operation, 52 weeks per year (8760 hours)

hour
pound
year

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**TABLE 2
ALL AMERICAN GRAIN COMPANY
Particulate Matter (PM) UNCONTROLLED POTENTIAL TO EMIT EMISSIONS**

System Number	System	Throughput (ton/hr)	PM Emission Factor (lb/ton) ^A	Percent of PM Emissions That Become Fugitive	PM Emissions (lb/yr)	Hours of Operation per Year ^B	PM Emissions (lb/hr)	PM Emissions (ton/yr)	Comments
1	Truck Unloading - West	132	0.035	100.00%	40,471.20	8760	4.62	20.24	All truck unloading. Assumption made that 100% of PM emissions become fugitive
2	Truck Unloading - East	132	0.035	100.00%	40,471.20	8760	4.62	20.24	Same as rail unloading - West
4	Handling - West	132	0.061	10.00%	7,053.55	8760	0.81	3.53	Takes place underground or enclosed and assumption that 10% of PM emissions become fugitive
5	Handling - East	132	0.061	10.00%	7,053.55	8760	0.81	3.53	Same as Grain Handling - West
6	Storage Bin Vents	264	0.025	10.00%	5,781.60	8760	0.66	2.89	Storage silo bin vented with negative pressure to enclosed duct system. Assumption made that 10% of PM emissions become fugitive
7	Truck Loading	13	0.086	100.00%	9,793.68	8760	1.12	4.90	All truck loading. Assumption made that 100% of PM emissions become fugitive
8	Rail Loading	251	0.027	100.00%	59,366.52	8760	6.78	29.68	All rail loading. Assumption made that 100% of PM emissions become fugitive
Total For All Systems:					169,991.30	8760	19.41	85.00	Total uncontrolled PM emissions based on maximum facility capacity

Notes:

^A From Environmental Protection Agency AP-42, Chapter 9.9.1, Grain Elevators and Processes

Hours of operation based on 24 hour per day, 7 day per week operation, 52 weeks per year (8760 hours)

hour
pound
year

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Table 3 summarizes total estimated annual and hourly PTE PM and PM₁₀ emissions from the Reed facility.

**TABLE 3
TOTAL ESTIMATED POTENTIAL TO EMIT EMISSIONS FROM REED BARLEY
STORAGE FACILITY**

Pollutant	Emissions (lb/yr)	Emissions (lb/hr)	Emissions (tpy)
PM	169,991.30	19.41	85.00
PM ₁₀	34,498.32	4.05	17.75

Notes:

PM particulate matter

PM₁₀ particulate matter with aerodynamic diameter less than 10 microns

lb/yr pound per year

tpy ton per year

The PTE estimates in Table 3 are presented in conjunction with the Reed Tier II Air Quality Permit Application. According to the PTE calculations, Reed is a minor source of PM₁₀ and meets the requirements for a Tier II Air Quality Permit, which will bring Reed into compliance with IDEQ air quality regulations.

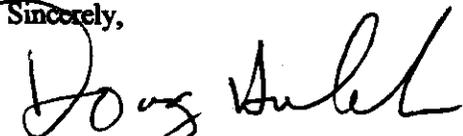
New Source Performance Standards (NSPS)

Reed previously submitted information pertaining to the permanent storage capacity of the facility. The Reed storage capacity of 2.4 million U.S. bushels is based on manufacturer design and is not subject to NSPS rules as defined below. The United States Code Of Federal regulations, Federal Title 40, Protection of the Environment, *Chapter 1-Environmental Protection Agency, Part 60.300-304* defines Grain terminal elevator as:

Any grain elevator which has a permanent storage capacity of more than 88,100 m³ (ca. 2.5 million U.S. bushels), except those located at animal food manufacturers, pet food manufacturers, cereal manufacturers, breweries, and livestock feedlots.

All information in this letter is based on my knowledge of the manufacturing process at the Reed facility and is offered to assist the IDEQ in issuing an air quality permit. Reed is requesting a hard copy draft of the permit prior to being issued for public comment. If you have any questions, please feel free to contact me at (208) 343-4085 or Mr. Earl Reed at (208) 829-4111.

Sincerely,



Doug Herlocker
Air Quality Specialist

cc: Earl Reed

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APPENDIX B

AIRS Form

AIRS/AFS^a FACILITY-WIDE CLASSIFICATION^b DATA ENTRY FORM

Facility Name: Reed Barley Storage, LLC
Facility Location: Hazleton
AIRS Number: 053-00008

AIR PROGRAM POLLUTANT	SIP	PSD	NSPS (Part 60)	NESHAP (Part 61)	MACT (Part 63)	SM80	TITLE V	AREA CLASSIFICATION
								A-Attainment U-Unclassified N- Nonattainment
SO ₂	--							U
NO _x	--							U
CO	--							U
PM ₁₀	B							U
PT (Particulate)	B							U
VOC	--							U
THAP (Total HAPs)	B							NA
			APPLICABLE SUBPART					

^a Aerometric Information Retrieval System (AIRS) Facility Subsystem (AFS)

^b AIRS/AFS Classification Codes:

- A = Actual or potential emissions of a pollutant are above the applicable major source threshold. For HAPs only, class "A" is applied to each pollutant which is at or above the 10 T/yr threshold, or each pollutant that is below the 10 T/yr threshold, but contributes to a plant total in excess of 25 T/yr of all HAPs.
- SM = Potential emissions fall below applicable major source thresholds if and only if the source complies with federally enforceable regulations or limitations.
- B = Actual and potential emissions below all applicable major source thresholds.
- C = Class is unknown.
- ND = Major source thresholds are not defined (e.g., radionuclides).

APPENDIX C

Modeling Analysis

MEMORANDUM

DATE: June 4, 2004
TO: Harbi Elshafei, Program Office
THROUGH: Mary Anderson, Modeling Coordinator, Program office *MA*
FROM: Dustin Holloway, Permitting Analyst *DH*
PROJECT NUMBER: P-030414
SUBJECT: Modeling Review for the Reed Barley Storage, LLC

1. SUMMARY

Tetra Tech EM, Inc. conducted atmospheric dispersion modeling in support of a permit to construct (PTC) application for Reed Barley Storage, LLC (Reed Barley) to show that the stationary source would not cause or contribute to a violation of any ambient air quality standard (IDAPA 58.01.01.203.02). The PTC application is for the Reed Barley facility in Hazelton, Idaho. A full impact analysis was performed for particulate matter with an aerodynamic diameter of 10 microns or less (PM₁₀). The applicant also estimated the ambient impacts of phosphine from Reed Barley. The applicant used the ISCPRIME dispersion model to determine the ambient impacts of PM₁₀ and the toxic air pollutant (TAP) phosphine. The PM₁₀ sources included in this modeling analysis include a baghouse, two truck loading locations, two truck unloading locations, a rail loading location, a rail unloading location, and a baghouse waste loading location. The baghouse is the only point source in the model. The other PM₁₀ sources are fugitive in nature and were modeled as volume sources. The phosphine emissions come from the vents on the silos. Each silo was modeled as a point source to account for downwash from the silos.

Table 1.1 KEY ASSUMPTIONS IN ANALYSIS SUBMITTED BY THE APPLICANT

Assumption	Explanation
Hours of Operation	The modeling analysis assumes the facility will only operate from 7 am to 7 pm
Railcar Unloading	The modeling analysis assumes that railcar unloading only occurs once per day for one hour and that the railcar would only be unloaded between 9 am and 10 am. DEQ conducted a sensitivity analysis to verify that this assumption is conservative

DEQ conducted a sensitivity analysis to determine if the time of day railcar unloading took place effected the ambient PM₁₀ concentrations. DEQ also conducted a sensitivity analysis to determine if the receptor grid was sufficient to show compliance with the applicable ambient air quality standard for PM₁₀ and the allowable ambient concentration for phosphine. Based on the results of the sensitivity analyses, DEQ determined that the model, as submitted by the applicant, demonstrates compliance with all applicable ambient air quality standards.

2. BACKGROUND INFORMATION

2.1 Applicable Air Quality Impact Limits

The Reed Barley facility is located in Hazelton, in Jerome County. Jerome County is unclassifiable for all criteria air pollutants. The pollutants emitted by Reed Barley that require modeling include PM₁₀ and phosphine. The following table summarizes the applicable national ambient air quality standards (NAAQS) for PM₁₀ and the acceptable ambient concentration (AAC) for phosphine.

Table 2.1 APPLICABLE REGULATORY LIMITS

Pollutant	Averaging Period	Significant Contribution Levels ($\mu\text{g}/\text{m}^3$) ^{a, b}	Regulatory Limit ($\mu\text{g}/\text{m}^3$) ^c	Modeled Value Used ^d
PM ₁₀ ^e	Annual	1	50 ^f	Maximum 1 st highest ^g
	24-hour	5	150 ^h	Highest 2 nd highest ⁱ
Phosphine	24-hour	N/A	20	Maximum 1 st highest ^d

a. IDAPA 58.01.01.006.93
 b. Micrograms per cubic meter
 c. IDAPA 58.01.01.577 for criteria pollutants, IDAPA 58.01.01.585 for non-carcinogenic toxic air pollutants IDAPA 58.01.01.586 for carcinogenic toxic air pollutants.
 d. The maximum 1st highest modeled value is always used for significant impact analysis and for all toxic air pollutants.
 e. Particulate matter with an aerodynamic diameter less than or equal to a nominal ten micrometers
 f. Never expected to be exceeded in any calendar year.
 g. Concentration at any modeled receptor.
 h. Never expected to be exceeded more than once in any calendar year.
 i. The highest 2nd high is considered to be conservative for five years of meteorological data, and is required when using only one year of meteorological data.

2.2 Background Concentrations

DEQ provided the applicant with background concentrations for PM₁₀ for rural agricultural areas in southern Idaho. The following table contains the PM₁₀ background concentrations.

Table 2.2 BACKGROUND CONCENTRATIONS

Pollutant	Averaging Period	Background concentrations ($\mu\text{g}/\text{m}^3$) ^a
PM ₁₀	24-hour	73
	Annual	26

a. Micrograms per cubic meter.

3.0 ASSESSMENT OF SUBMITTED, CERTIFIED MODELING ANALYSIS

This analysis is based on the information contained in Reed Barley's submittals dated July 22, 2003; December 4, 2003; and April 8, 2004.

3.1 Modeling Methodology

The following table summarizes the modeling parameters used by the applicant in their dispersion modeling analysis.

Table 3.1 MODELING PARAMETERS.

Parameter	What Facility Submitted	DEQ's Review/Determination
Modeling protocol	None submitted	
Model Selection	ISCRIME	ISCRIME is appropriate for this facility because there are receptors within the cavity regions of the storage silos.
Meteorological Data	2000 Heyburn	The 2000 Heyburn meteorological data is the most representative data available for this facility.
Model Options	Missing meteorological data was allowed for both PM ₁₀ and phosphine modeling Stack tip downwash was turned off for phosphine emissions	The Heyburn meteorological data has missing data. However, the data meets the required 90% completeness per quarter. This is appropriate for stacks with horizontal releases or rain caps.
Land Use	Rural	This is appropriate for the area where this facility is located.
Complex Terrain	Complex terrain was not analyzed in this application	This is appropriate because the maximum concentrations occur at the facility boundary where the terrain is nearly flat. The maximum concentration is primarily from fugitive emissions sources whose impacts occur a short distance from the source.
Building Downwash	ISCRIME was utilized to account for downwash	ISCRIME is an appropriate model for this facility because of the downwash created by the large storage silos.
Receptor Network	25 meter spacing along the fence line; 100 meter spacing out to 1 km; 500 meter spacing from 1 to 6 km	DEQ recommends a finer receptor grid near the fence line, however, the maximum concentration occurs on the fence line and the overall impact is low. See sensitivity analysis section.
Facility Layout	N/A	The facility layout used in the model was compared to the facility plot plans submitted by the applicant. The model incorporates all of the relevant buildings and fence lines identified in the plot plan.

3.3 Emission Release Parameters

The following tables show the release parameters and emissions rates from all of the modeled emissions sources.

Table 3.2 PM₁₀ EMISSIONS POINTS

Point Sources								
Source ID	UTM Easting	UTM Northing	Elevation	Stack Height	Stack Temperature	Exit Velocity	Diameter	Emissions Rate
	m	m	m	m	K	m/s	m	g/s
BAGHOUSE	733,644	4,720,700	1,231.4	12	293	28.33	0.72	0.0109
Volume Sources								
Source ID	UTM Easting	UTM Northing	Elevation	Release Height	Initial Horizontal Dimension	Initial Vertical Dimension	Emission Rate	
	m	m	m	m	m	m	g/s	
TRUCK_W	733,640	4,720,691	1,231.4	4.57	3.54	4.25	0.0145	
TRUCK_E	733,640	4,720,683	1,231.4	4.57	3.54	4.25	0.0145	
RLOAD	733,634	4,720,730	1,231.4	3.05	2.13	1.42	0.0239	
RUNLOAD	733,634	4,720,730	1,231.4	3.05	2.13	1.42	0.0945	
TWASTE	733,640	4,720,683	1,231.4	4.57	3.54	4.25	0.0189	

Table 3.3 PHOSPHINE EMISSIONS POINTS

Point Sources								
Source ID	UTM Easting	UTM Northing	Elevation	Stack Height	Stack Temperature	Exit Velocity	Diameter	Emissions Rate
	m	m	m	m	K	m/s	m	g/s
SILO1	733,534	4,720,712	1,231.4	22.6	293	0.001	0.52	0.006
SILO2	733,561	4,720,712	1,231.4	22.6	293	0.001	0.52	0.006
SILO3	733,588	4,720,712	1,231.4	22.6	293	0.001	0.52	0.006
SILO4	733,615	4,720,712	1,231.4	22.6	293	0.001	0.52	0.006
SILO5	733,669	4,720,712	1,231.4	22.6	293	0.001	0.52	0.006
SILO6	733,696	4,720,712	1,231.4	22.6	293	0.001	0.52	0.006
SILO7	733,723	4,720,712	1,231.4	22.6	293	0.001	0.52	0.006
SILO8	733,750	4,720,712	1,231.4	22.6	293	0.001	0.52	0.006
SILO9	733,634	4,720,720	1,231.4	22.6	293	0.001	0.52	0.006
SILO10	733,634	4,720,704	1,231.4	22.6	293	0.001	0.52	0.006
SILO11	733,651	4,720,704	1,231.4	22.6	293	0.001	0.52	0.006
SILO12	733,651	4,720,720	1,231.4	22.6	293	0.001	0.52	0.006

3.4 Results

The following tables summarize the modeled concentrations at the Reed Barley facility.

3.4.1 Full Impact Analysis Results

Table 3.4 PM₁₀ IMPACT DATA

Pollutant	Averaging Period	Year	Radius of Significant Impact (m)	Receptor Location		
				East (m)	North (m)	Elevation (m)
PM ₁₀	24-hour	2000	400	733,649	4,720,750	1,231.6
	Annual	2000	200	733,649	4,720,750	1,231.6

Table 3.5 DESIGN CONCENTRATIONS FOR CRITERIA POLLUTANTS FOR FULL IMPACT ANALYSIS

Pollutant	Averaging Period	Design Concentration (µg/m ³)	Background Concentration (µg/m ³)	Total Concentration (µg/m ³)	NAAQS (µg/m ³)	Percent of NAAQS
PM ₁₀	24-hour	55.6	73	128.6	150	85.7%
	Annual	3.9	26	29.9	50	59.8%

3.4.2 Toxic Air Pollutants Results

Table 3.6 TOXIC AIR POLLUTANT IMPACT DATA

Pollutant	Year	Averaging Period	Receptor Location		
			East (m)	North (m)	Elevation (m)
Non-Carcinogens					
Phosphine	2000	24-hour	733,698	4,720,750	1,231.7

Table 3.7 TOXIC AIR POLLUTANT ANALYSIS RESULTS

Pollutant	Year	Averaging Period	Maximum Concentration (µg/m ³)	AAC (µg/m ³)	Percent of AAC
Non-Carcinogens					
Phosphine		24-hour	12.7	20	63.5%

4.0 DEQ SENSITIVITY ANALYSIS RESULTS

4.1 Railcar Unloading

DEQ conducted a sensitivity analysis to see what effect the time of day the rail car was unloaded had on the ambient concentrations. The model was rerun with the railcar unloading emissions averaged over the entire 12-hour workday, with the emissions averaged over the first six hours of the workday, and with the emissions averaged over the last six hours of the workday. The annual average concentration and the 24-hour average concentration decreased for all modeled scenarios. All of the resulting concentrations were within the applicable NAAQS. Based on this sensitivity analysis, DEQ determined that the applicant's submittal shows compliance with the applicable NAAQS for PM₁₀ no matter when the railcar is unloaded. The following table summarizes the PM₁₀ concentrations for each modeled operating scenario.

Table 4.1 SENSITIVITY ANALYSIS RESULTS

Scenario	24-hr (µg/m³)	Annual (µg/m³)
Railcar emissions take place during 1 st 6 hrs of shift	40.87	3.64
Railcar emissions take place during 2 nd 6 hrs of shift	37.88	3.66
Railcar emissions averaged over 12 hr workday	39.43	3.65
All railcar emissions occurring in 1hr (Applicant's Estimate)	55.58	3.91

4.2 Receptor Grid

The applicant used a 100 meter grid out to 1 km. DEQ recommends using a finer grid near the area of maximum impact. DEQ conducted a sensitivity analysis on both the PM₁₀ modeling and the phosphine modeling using a 25 meter grid of discrete receptors near the maximum impact. The location of the maximum concentration did not change for PM₁₀ or phosphine. The applicant's submittal with 100 meter grid spacing shows compliance with the applicable standards for PM₁₀ and phosphine.

APPENDIX D

PTC Processing Fee Calculations

PTC Fee Calculation

Instructions:

Fill in the following information and answer the following questions with a Y or N. Enter the emissions increases and decreases for each pollutant in the table.

Company: Reed Barley Storage, Hazelton
Address: P.O. Box 1901
City: Twin Falls
State: ID
Zip Code: 83303
Facility Contact: Earl W. Reed
Title: Owner
AIRS No.: 053-00008

- N Does this facility qualify for a general permit (i.e. concrete batch plant, hot-mix asphalt plant)? Y/N
- Y Did this permit require engineering analysis? Y/N
- N Is this a PSD permit Y/N (IDAPA 58.01.01.205.04)

Emissions Inventory			
Pollutant	Annual Emissions Increase (T/yr)	Annual Emissions Reduction (T/yr)	Annual Emissions Change (T/yr)
NO _x	--	--	--
SO ₂	--	--	--
CO	--	--	--
PM10	0.01	0	0.01
VOC	--	--	--
TAPS/HAPS	0.28	0	0.28
Total:	0.29	0	0.3
Fee Due	\$ 1,000.00		

Comments: Permit to construct processing fee, in accordance with IDAPA 58.01.01.225.