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FUMIGATION HANDBOOK
CHAPTER 5
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CHAPTER 5

FARM SERVICE AGENCY COMMODITY OPERATIONS FUMIGATION PROTOCOL

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5.1 GENERAL INFORMATION

This Chapter provides the procedure for monitoring aluminum phosphide gas fumigation of bagged wheat flour for compliance with USDA Farm Service Agency (FSA) contract requirements. This procedure is referred to as the “Commodity Operations Fumigation Protocol” (COFP) which subjects each lot of bagged wheat flour to a minimum of one phosphine gas fumigation between the time the lot is bagged to the time the lot is delivered to the foreign receiver.

An attempt will be made to have a least one complete COFP fumigation per Notice to Deliver (ND). However, due to expensive time constraints for carriers FSA may waive all or any part of a COFP to meet the logistical needs of a particular carrier.

5.2 FUMIGATION STANDARD

a. Verification.

The Federal Grain Inspection Service (FGIS) is required to verify the licensed or certified applicator’s (fumigator) readings for temperature, exposure hours, and concentration level of the phosphine gas to insure the fumigation meets the minimum time and concentration exposure standard.

b. Temperature Limitations.

When inland temperatures are below 40° F, inland fumigators must not fumigate carriers at the time of loading. Fumigation with phosphine gas is a violation of the Environmental Protection Agency (EPA) labeling requirement when the ambient temperature is below 40° F. The fumigator must fumigate the carrier after arrival at the export port location, provided the ambient air temperature is above 40° F. If it is not, then the fumigator must perform the fumigation aboard ship.

b. Exposure Time.

The minimum time parameters refer to total hours of product exposure at the recommended concentration level and begin when the concentration is documented to have reached the minimum level (300 parts per million (PPM)) level within 24 hours of application. The following table illustrates the COFP minimum fumigation standard:

Temperature	Parts Per Million (ppm)	Minimum Exposure Time
Less than 61°F	>300	*See note below
61°F to 68°F	300	144 Hours
More than 68°F	300	96 Hours

***NOTE:** Fumigation of bagged wheat flour under storage temperatures between 40° F and 60° F with phosphine gas is less effective than at higher temperatures; therefore, gas concentrations above 300 ppm should be maintained as long as possible past the minimum of 144 hours.

5.3 RESPONSIBILITIES

a. General Responsibility.

(1) Fumigator.

- (a) Perform the fumigation, take all ambient temperature and concentration readings, verify the results with official personnel, issue appropriate documentation of the results, and provide timely, legible copies to all interested parties.
- (b) Provide official personnel with the training necessary to understand the placement, operation, and result interpretation of any monitoring equipment used by the fumigator.
- (c) Coordinate with official personnel the time and place to make the first test, and all subsequent tests until the standards are met: approximately 24 hours after the initial treatment, and every 24 hours for 96 - 144 hours.
- (d) Provide official personnel with sufficient notice to arrange for an inspector to perform verification of fumigator's readings for temperature, exposure hours, and concentration level of the phosphine.
- (e) Install sufficient and appropriate monitoring lines or other needed equipment.
- (f) Measure the air around the flour bags, not the temperature of the flour inside the bags. The temperature at the time of the initial 24-hour monitoring will govern the duration time of the protocol. Do not adjust the total hours if the temperature drops below (or rises above) the threshold temperature.

- (g) Determine why the fumigant failed to meet or maintain the minimum 300-ppm concentration and take the necessary corrective action (i.e., adding more fumigant, resealing, or other accepted measures).
- (h) Not count the number of hours elapsed since the last 300-ppm reading toward the total time needed to meet the standard. For example, if the concentration at the 72-hour reading is only 126 ppm, then the lot does not meet the standard's minimum concentration for the last 24 hours. Only 48 hours, when the concentration was known to be at least 300-ppm count toward the total standard time.

(2) Official Personnel.

- (a) Verify the fumigator's readings for temperature, exposure hours, and concentration level of the phosphine to insure the fumigation meets the minimum time and concentration exposure standard. Official personnel will perform these verifications at a reasonable time.

NOTE: it is not mandatory that official personnel witness the initial treatment.

- (b) Understand the placement, operation, and result interpretation of any monitoring equipment used by the fumigator.
- (c) Coordinate with the fumigator the time and place to make the first test, and all subsequent tests until the standards are met approximately 24 hours after the initial treatment, and every 24 hours for 96 - 144 hours.
- (d) Coordinate verification times when more than one fumigation company has lots to read at the same, or different, location(s) on the same day.
- (e) Verify with the fumigator the results of all ambient temperature and concentration readings.

- (f) Ensure that the fumigator is measuring the air around the flour bags, not the temperature of the flour inside the bags. The temperature at the time of the initial 24-hour monitoring will govern the duration time of the protocol. Do not adjust the total hours if the temperature drops below (or rises above) the threshold temperature.
- (g) Not count the number of hours elapsed since the last 300-ppm reading toward the total time needed to meet the standard. For example, if the fumigator monitors the concentration at the 72-hour reading and finds the concentration is only 126 ppm, then the lot does not meet the standard's minimum concentration for the last 24 hours. Only 48 hours, when the concentration was known to be at least 300-ppm count toward the total standard time.

b. Pre-positioned Cargo Responsibilities.

FSA makes purchase in advance and stores commodities for USDA Food Aid programs at export port warehouses. These commodities are not allocated for any specific shipment, but are maintained in case of emergencies. FGIS, at the request of FSA, performs periodic condition inspections to ensure that the pre-positioned commodities have maintained their quality.

(1) Fumigator.

- (a) Segregate pre-positioned flour and fumigate under tarp, as soon as practical, with monitoring devices attached.
- (b) Identify each tarp with a large spray painted number to expedite the identification and verification process. When more than one fumigator is treating flour in the same facility, each fumigator should use a different color /letter tarp code number to identify their respective lots.
- (c) Inspect pre-positioned cargo stored for more than 30 days to determine if the lot still maintains a 300-ppm minimum concentration. Recheck cargo every 30 days. Re-fumigate if the lot is below the minimum standard.

(2) Official Personnel.

- (a) Inspect pre-positioned cargo stored for more than 30 days to determine if the lot still maintains a 300-ppm minimum concentration.
- (b) Recheck every 30 days. The fumigator must re-fumigate if the lot is below the minimum standard.

Note: A list of tarp numbers and corresponding ND numbers may be helpful for identification and verification. Commodity from more than one ND number may be under the same tarp due to warehouse stacking restrictions

c. Container Responsibilities.

(1) Fumigator.

- (a) Determine the suitability of containers for fumigation. Carriers must present fumigation-quality containers for loading as defined in FSA's "NOTICE TO THE TRADE", EOD- 83.
- (b) Fumigate the cargo (as elected by the carrier) under tarp prior to loading the container, at a container-stuffing facility or at a container yard prior to loading aboard the mother vessel.
- (c) Re-fumigate when vessel loading takes place more than 20 days after the initial fumigation, using the COFP at every 20-day interval until loaded. The 20-day cycle will begin with the date the last fumigation reached its minimum standard.

(2) Official Personnel.

- (a) Not determine the suitability of containers for fumigation. This is the responsibility of the carrier or fumigator.
- (b) Witness and document temperature, concentration level and exposure time, by container.

d. LASH Barges Responsibilities.

(1) Fumigator.

- (a) Check all LASH barges for fumigant concentration level before loading aboard the mother ship. Fumigation may take place at the origin load port or at U.S. destination prior to loading aboard the mother vessel. Check LASH barges (same as containers) on a 20-day cycle until loaded.
- (b) Assume LASH barges fumigated at origin and immediately put into a tow meet the 300 ppm concentration level within 24 hours of fumigation. The fumigator will perform the COFP when the concentration is below the minimum standard until the minimum standard is met.
- (c) Fumigate Cargo (under tarp) booked for LASH barges according to the COFP before loading into the barge.

(2) Official Personnel.

- (a) Check all LASH barges for fumigant concentration level before loading aboard the mother ship. Fumigation may take place at the origin load port or at U.S. destination prior to loading aboard the mother vessel. Check LASH barges (same as containers) on a 20-day cycle until loaded.
- (b) Assume LASH barges fumigated at origin and immediately put into a tow meets the 300 ppm concentration level within 24 hours of fumigation. Perform the COFP when the concentration is below the minimum standard until the minimum standard is met. Cargo booked for LASH barges may be tarped and fumigated according to the COFP before loading into the barge.

e. Break-bulk Vessel Responsibilities.

(1) Fumigator.

- (a) Use aluminum phosphide, in dust retention containers, at the rate of 33g/1000 ft³ of hold space and the hatches sealed once fumigation is completed.

- (b) Use the same “in-transit” procedures detailed for bulk grain in FGIS Fumigation Handbook. However, FGIS will NOT guarantee the efficacy of this “in-transit” treatment since the cargo, bagged flour, and probably the vessel, a “tween decker”, will not meet the requirements for this procedure.

The vessel will then sail without further monitoring. The assumption is that the cargo will reach the minimum concentration level during the voyage.

(2) Official Personnel.

- (a) Monitor the fumigation. The fumigator will use the same “in-transit” procedures detailed for bulk grain in FGIS Fumigation Handbook. However, FGIS will NOT guarantee the efficacy of this “in-transit” treatment since the cargo, bagged flour, and probably the vessel, a “tween decker,” will not meet the requirements for this procedure.
- (b) No further monitoring is required because the assumption is made that the cargo will reach the minimum concentration level during the voyage.

5.4 SAFETY

- a. Official personnel must follow all applicable GIPSA and FGIS safety guidelines, the safety guidelines shown on the fumigant containers/canisters, and all local warehouse, port, and/or FGIS field office safety guidelines when working near fumigated warehouse stacks, LASH barges, containers, or ships.
- b. When monitoring/verifying fumigation official personnel must accompany the fumigator, and either the official personnel or the fumigator must be equipped with a fully-operational phosphine gas sensor that is able to continuously measure the presence and amount of phosphine gas outside the tarped bags or closed containers.
- c. Official personnel must follow the safety guidelines established by FGIS Directive 9180.48, "Stowage Examination Services" when boarding or disembarking from barges.
- d. Prior to starting the verification process, official personnel must resolve any outstanding safety problems or concerns.

5.5 DOCUMENTATION

a. Services Performed Report, FGIS 992.

- (1) After each temperature and concentration reading official personnel must record the fumigator's findings in the "Comments" section of a FGIS-992 as indicated below.

"On (date and time) official personnel has verified the temperature to be ___ ° F, phosphine gas concentration to be ___ ppm, and the fumigant exposure time to be ___ hours for ND (Notice to Deliver) number(s) representing _____ bags of flour (vendor's count)."

- (2) Show the above statement regardless of a result(s) that may or may not meet the minimum standard.
- (3) Complete one FGIS 992 for each verification service. Maintain the completed FGIS-992 in a file folder for each individual ND number. However, in an effort to reduce paperwork, and at the field office's discretion, all readings for each ND number may be shown on a single worksheet.
- (4) Each tarp must have a minimum of four FGIS-992s (one for each day, assuming no daily reading failed). A master FGIS-992 with the above statement may be completed and then photocopied to eliminate the need for a large quantity of originals.
- (5) The fumigator is not required to furnish official personnel with a copy of any documents generated. However, official personnel may request a copy of the fumigation company's tarp/carrier listing (or log) referencing ND numbers. Official personnel may also generate their own master reference list.

b. Official Personnel Generated Worksheet.

For efficiency, practicality, and to limit the amount of paperwork involved in some instances of verification (i.e., 25 containers, 5 LASH barges), official personnel may generate their own worksheet for use in conjunction with the FGIS 992. The worksheet must contain all required information.

5.6 CERTIFICATION

When all the tarps under their applicable ND number have met the minimum concentration and time standards, issue to the applicant for verification, an original Commodity Inspection Certificate (FGIS-993).

“FGIS official personnel monitored the fumigator’s readings and verified the temperature and phosphine gas concentration for a period of (96 or 144) hours for ND No. , representing bags of flour (vendor’s count). The phosphine gas concentration level exceeded the required 300-ppm minimum and the ambient temperature was above degrees Fahrenheit.”

The above statement provides verification of compliance with the fumigation standards and eliminates the need to show a range or average of all readings for the ND number. The FGIS-992 on file will provide specific daily readings should a question arise.