VERSION 6.0
FUMIGATION

Gafta
Code of Practice for Fumigation and Pest control

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1.0 Introduction
Pest control management and fumigation are important to all sectors of the food and animal feed industry. This Code of Practice and accompanying guidance notes are intended to improve the level of competence and understanding about infestation, pest control and fumigants in traded combinable crops and animal feed materials. [R]

1.1 Marine fumigation is the fumigation of cargoes in ships’ holds or in containers, which is often (but not always) continued in transit to ensure an efficient and safe fumigation with minimum delays to the ship. In transit fumigation is made possible by the use of phosphine gas (HydrogenPhosphide), which is the only fumigant allowed for this purpose by IMO Recommendations on the Safe Use of Pesticides in Ships (latest version of) which is now incorporated in the IMDG Code Supplement 2008 Edition. The process of in transit marine fumigation begins at the load port, continues for a defined time during the voyage to destination and ends at the discharge port. To provide for safety and efficacy this complicated workflow requires participation of at least three parties throughout this period of time: fumigators at the load port, mariners, and also fumigators at the discharge port. (Refer to Section 8).

1.2 Store and Silo fumigation is the fumigation of goods on land, in a recognised storage facility, e.g. a flat store in bays or a silo in bins. As in the case of marine fumigation this is made possible by the use of phosphine gas - though other fumigants may be used in some situations. Goods in silo bins are treated in similar fashion to those in a ship’s hold. Goods in flat stores present different problems as flat stores are by their nature open spaces, and the space around the goods needs to be enclosed by other means such as gas-tight sheeting, and the fumigated area or building sealed off to prevent access by persons not involved in the fumigation.

1.3 Fumigation of Freight Containers is the fumigation of goods that are being carried in freight containers. The fumigation may be completed before loading, or carried out in transit, provided that safety regulations as required by the mandatory IMDG Code (in its latest version) and all other safety requirements are complied with. (Refer to Sections 7 and 8). [R]

2.0 Scope
Outlined in this Manual are the main areas of importance with respect to pest control and fumigation matters relating to combinable crops and animal feed materials, and should be read in conjunction with the following Manuals/Guide Notes which address the individual requirements for particular logistical operation/procedures: - [R]

• Bulk Storage and Handling
• Supervision, Sampling and Weighing
• Transport by Road
• Phytosanitary Measures (Part 3 Guide Notes)
• Fumigation and Pest Control (Part 3 Guide Notes)
• Fumigation Rules No.132 (Part 3 Rules)
• International Maritime Organisation (IMO) Safe use of Pesticides on Ships (latest version of).
• International Maritime Dangerous Goods (IMDG) - relevant sections (latest version of).
• All relevant local legislation and/or regulations

3.0 General Definitions
General scheme “Definitions” relating to this Manual are set out in Appendix 1.

Key Standards
Standards marked with a “K” in the left hand margin indicate a “key” standard. If an assessor finds a major non-conformance against a key standard this shall result in suspension until rectified. See Scheme Operating Protocols in Scheme Overview.

Records
Where an [R] appears in a standard this indicates that a record(s) must be kept in relation to that standard. See 16.0.

4.0 Specific Terms and Definitions
Specific terms and definitions relating to this manual are as follows:

• Clearance (also known as “gas free”) - is the procedure after the degassing period when the fumigator tests the air in the workspace to make sure that the concentration of fumigant gas has fallen to or below safe levels as defined in the relevant employee safety regulation. [R]

• Clearance Certificate (or Gas Free Certificate) - is the document issued after degassing (venting) of the cargo at or just prior to destination, indicating safe levels of the fumigant tested and declaring that the area does not exceed safe legal limits for workers to enter a fumigated space and/or handle a fumigated product.

• Degassing/Venting - is the process at the end of the exposure period, after the fumigation enclosure is unsealed, when fumigant gas desorbs and diffuses out of the product that was fumigated and the fumigation enclosure.
• **Exposure Time** - is the period of time the product applied (toxic gas or biocide) is in direct contact with the target organism at a specific spot (location) to achieve the desired effect on the pest. The time required for in situ release in case of the active ingredient and/or the time required for dissipation (migration) throughout the product to the relative spot (location) is not part of the exposure time. As long as the product applied is not in direct contact with the target organism, the exposure time has not commenced. The exposure time is dependent on physical, chemical and biological parameters eg temperature, relative humidity, target species, product applied etc.

• **Fumigant Application** - is the process of introduction of a specific toxic gas or a chemical releasing toxic gas into the product to be treated and its enclosure for control of target organism(s).

• **Fumigation** - is the process of application, exposure and dissipation of a toxic chemical in its gaseous state with the purpose of control of target insect pests in the product and its enclosure.

• **Fumigation Certificate (or Fumigant Application Certificate)** - is the document reflecting the service rendered issued after fumigant application stating the characteristics and procedure applied.

• **Fumigator** – means the appointed fumigation company

• **In transit Fumigation** - is the process of fumigation during a voyage. Note: as the vessel will normally sail shortly after completion of fumigant application it is impossible to assess the full efficacy of the fumigation before sailing.

• **Re-circulation System** - the supporting equipment for improvement of gas penetration in the fumigated cargo.

• **Removal/Disposal of Spent Fumigant** - Removal is the process of removal of retrievable parcels (sleeves, sachets, plates, blankets) of residues from the reacted metal phosphides at the end of the exposure/fumigation process. Residues must be handled in accordance with the applicable regulations and manufacturer’s safety guidelines. Disposal - is the process of collection of the waste residues from onboard vessels and other means of transport for neutralisation and destruction by an approved and qualified operator.

• **Treatment Period** - is the period of time required for release (generation) of the toxic gas from the product applied, dissipation throughout the product and the exposure time required to achieve effective action on the target pests in the fumigated product and its enclosure. In addition to the parameters relevant for the exposure time, treatment time depends on the permeability of the commodity, the volume of the fumigated cargo, the commodity or product type etc.

5.0 **Hazard Analysis and Critical Control Points (HACCP)**
The application of a HACCP approach is central to the Gafta Trade Assurance Scheme with the aim of minimising losses, damage and contaminant risks.

Fumigators must demonstrate an awareness of the principles of HACCP and have a HACCP plan in place covering their activities. (See Appendix 2).

The HACCP plan should include a procedure for advising the relevant parties regarding any threats to food or feed safety as required by the relevant regulations.
6.0 General Obligations and Requirements

6.1 This GTAS Fumigators Code of Practice requires fumigators and ship owners and their representatives to comply with all aspects of the international agreements that are relevant to marine fumigation under:-
- SOLAS (Safety of Life at Sea) Convention
- IMO (International Maritime Organisation) Safe Use of Pesticides on Ships
- IMDG (International Maritime Dangerous Goods) Code
and to take account of the Gafta Fumigation Guidance Notes and have the above documents available for inspection.

In all cases this refers to the latest version of the respective codes and agreements.

6.2 Fumigators and ship owners and their representatives are required to comply with all the relevant requirements of the country and ports that vessels are fumigated or ventilated in. For example, in USA ports to the requirements of the US Coastguard, in UK ports to the requirements of the UK Merchant Shipping Regulations and the UK Marine Coastguard Agency requirements, such as MGN284. In addition, any requirements of the country that the ship is flagged to must be adhered to.

The fumigation materials used must be applied strictly in accordance with the manufacturer’s instructions and safety precautions on the label, and records retained.

6.3 The materials used should also take into account any limitations applied by the law of the country of loading or destination or flag of the ship, contracts related to the cargo, or ship owner’s instructions.

6.4 Fumigators are required to retain copies of all documents issued following any fumigation of goods, for a minimum period of five years.

7.0 Training

Only fumigation technicians trained and certificated to the requirements of the country where the fumigation or ventilation activities are taking place should be permitted to carry out any fumigation or ventilation work. Where fumigation takes place in international waters, training and certification should be in accordance with the safe practices of this Code of Practice.

8.0 Fumigation of Bulk and Bagged Cargo in Ship’s Holds with Phosphine

It is the responsibility of the principal to ensure that the suitability of the carrying vessel and the appropriate permissions regarding the operation of fumigation onboard a vessel are agreed and acceptable to the master/owners by incorporating suitable terms in the freight contract (Charter Party).

Prior to the commencement of any fumigation operations a safety assessment must be carried out by the fumigator at load port taking into account the IMO Recommendations and also any limitations applied by the law of the country of loading and destination or flag of the ship, and contracts related to the cargo, or to the ship owner’s instructions. A report of findings and any recommendations should be made in writing to all relevant parties.

When incorporated into contracts for the supply of goods, the Gafta Fumigation Rules No. 132 shall apply.

8.1 Before fumigant application:

8.1.1 Ensure the inspection required in 8.0 and the recommendations made have been performed.

8.1.2 Ensure that all the cargo spaces to be fumigated are suitable for fumigation.

8.1.3 Ensure that the master or his trained representatives have been made familiar with the fumigant label, detection methods, safety procedures and emergency procedures.

8.1.4 The fumigator in charge should verify that gas detection and respiratory protection equipment (as required by IMDG and IMO recommendations) carried on the ship are all in good working order and are suitable and appropriate for the task, and that adequate fresh supplies of consumable items for this equipment are available to allow proper measurement (see also 3.3.1.1). In the event that sufficient quantities of effective safety equipment are not on board, the fumigator-in-charge should remind the master in writing of his responsibility to carry this and should assist the master wherever possible by either supplying the equipment or making arrangements for it to be supplied so that the ship fulfils its responsibility to carry sufficient items.

8.1.5 In accordance with IMDG and IMO Regulations, vessels should carry the necessary medicines and medical equipment, and the latest version of the Medical First Aid Guide for Use in Accident Involving Dangerous Goods (MFAG).

In the event that any of these items are not being carried, the fumigator-in-charge should remind the master in writing of his responsibility to carry this and assist him wherever possible to obtain these items so that the ship fulfils its responsibility to carry these items.
8.1.6 Ensure that the master has been notified in writing of the spaces containing cargo to be fumigated.

8.1.7 Ensure that the master has been notified in writing of any other spaces that are considered unsafe, or could become unsafe to enter during the fumigation.

8.1.8 The fumigator must apply the appropriate efficacy criteria in relation to the required minimum effective dosage, method of treatment and exposure time. Guidance criteria are available in a number of guide notes and handbooks. Some examples of guidance available are:

- A similar table adopted for use in Russia can be viewed at: https://docs.google.com/spreadsheets/d/1TypC1AATIV0BLXWXMTi9V_62UMr2-UlV0qkr2F9Cjts/edit#gid=0

Other National Plant Protection Organisation requirements may apply.

8.2 Following fumigant application:

8.2.1 Ensure that each hold has been checked for leakage and secured properly.

8.2.2 Ensure that the spaces adjacent to (or with possible connection to) the treated cargo spaces have been checked and found to be gas-free. [R]

8.2.3 Ensure that the master or his trained representatives have been made aware of the specific areas to be checked for gas concentrations throughout the fumigation period.

8.2.4 Ensure that responsible crew members have been shown how to take gas readings correctly when gas is present, and they are fully conversant with the use of gas-detection equipment provided.

8.2.5 Ensure that the master or trained representatives have been made aware that even though the initial check may not indicate any leaks, it is essential that monitoring is to be continued in the accommodation, engine-room, etc. because concentrations may reach their highest levels after several days.

8.2.6 Ensure that the master or trained representatives have been made aware of the possibility of gas diffusing through the duct keel and/or ballast tanks and/or fire warning system. [R]

8.2.7 Ensure that the master or trained representatives have been made aware that the master is responsible for all aspects of the safety of the fumigation once the fumigator-in-charge has formally handed over responsibility to him, and left the vessel.

8.2.8 The fumigator-in-charge should ensure that he has supplied a signed statement to the master confirming all points as listed under 3.0 above and all other requirements of the IMO Recommendations and any other relevant requirements as in 1.1 above have been adhered to.

8.3 Obligations on the Parties:

When the owners/charterers/master agree to fumigation being carried out in transit with phosphine, the master should ensure he is familiar with the requirements of IMO Recommendations 3.4.3.1. – 3.4.3.20. This will enable the master to be clear what the obligations of both fumigator and master are. A checklist of these obligations are as follows:

8.3.1 Fumigator

To provide written documentation in respect of the following:

- Pre-Fumigation Inspection report
- Safety recommendations for vessels with fumigated cargoes
- Manufacturer’s information or safety data sheet
- Information on Residue Hazards
- First aid and medical treatment instructions
- Fumigation certificate
- Fumigation plan – for examples of a schematic fumigation plan see Appendix 4
- Instructions for the use of the Phosphine Gas Detecting Equipment
- Precautions and procedures during voyage
- Instructions for aeration and ventilation
- Precautions and procedures during discharge
8.3.1.1 Verify that sufficient additional Respiratory Protective Equipment (RPE) is available on board, to ensure that the requirements of IMO in respect of RPE are available for the duration of the voyage. In case of regulatory requirements RPE may consist of Self Containing Breathing Apparatus. Canister respirators should be properly designed for the fumigant used and not expired. Fumigators should make sure that 4 sets of RPE are on board.

Refer also to IMO Recommendations Annex 4. [R]

8.3.2 Master

8.3.2.1 Appoint a competent crew member to accompany the fumigator during the inspections/testing of empty holds prior to loading to determine whether they are gas tight, or can be made gas tight and if necessary what work is to be carried out to ensure they are gas tight. [R]

8.3.2.2 Ensure the crew is briefed on the fumigation process before fumigation takes place.

8.3.2.3 Ensure the crew search the vessel thoroughly to ensure there are no stowaways or other unauthorised personnel on board before fumigation takes place. [R]

8.3.2.4 Appoint at least two members of the crew to be trained by the fumigator to act as representatives of the master during the voyage to ensure safe conditions in respect of the fumigations are maintained on board the ship during the voyage. [R]

8.3.2.5 After the fumigant has been applied and appropriate tests have been completed the master should provide his representative to accompany the fumigator to make a check that all working spaces are free of harmful concentration of gas (Ref. IMO Recommendations 3.4.3.11). [R]

8.3.2.6 When the fumigator has discharged his responsibilities the fumigator should formally hand over in writing responsibility to the master for maintaining safe conditions in all occupied areas, which the master should accept (IMO Recommendations 3.4.3.12). [R]

8.3.2.7 It must be clearly understood by the master that even if no leakage of fumigant is detectable at the time of sailing this does not mean that leakage will not occur at some time during the voyage due to the movement of the ship or other factors. This is why it is essential the master ensure regular checks are carried out during the voyage.

8.3.2.8 During the voyage, the master should ensure that regular checks for gas leakage should be made throughout all occupied areas and the findings recorded in the ship’s log (IMO Recommendations 3.4.3.13). If any leakage is detected, appropriate precautions to avoid any crew being exposed to harmful concentrations must be taken. If requested to do so by the fumigator the master may prior to arrival at the first discharge port, start the ventilation of the cargo spaces.

8.3.2.9 Prior to arrival at the first discharge port the master should inform the authorities at the port that the cargo has been fumigated in transit. (Ref. IMO Recommendations 3.4.3.16)

8.3.2.10 On arrival at the discharge port the master should not allow discharge of the cargo to commence until he is satisfied that the cargo has been correctly ventilated and aluminium phosphide residues that can be removed, have been removed, and that any other requirements of the discharge port have been met (IMO Recommendations 3.4.3.17).

8.3.2.11 Refer also to IMO recommendations Annex 4

9.0 Fumigation of Bulk and Bagged Cargo with Ventilation in Port.

This procedure can be used either after loading and prior to sailing (9.1) or on arrival at the discharge port prior to discharging (9.2).

9.1 After loading and prior to sailing

Phosphine fumigation is the fumigant that is widely accepted for this procedure as methyl bromide (though frequently used) is not recommended (refer to IMO Recommendations Annex D Para 1.)

Phosphine fumigation and ventilation in port prior to sailing will normally take from 1-2 weeks to complete and therefore is only occasionally specified. All procedures as for intransit fumigation should be followed to ensure a safe and effective fumigation.

9.2 At discharge port prior to discharge

9.2.1 Methyl Bromide is sometimes used for this purpose as it is normally possible to achieve an effective fumigation of...
the cargo in 24-48 hours. Methyl Bromide is banned for use in some countries but allowed in others. Even when it is allowed for use this Code of Practice does not recommend its use for environmental reasons. In the event that methyl bromide is used the crew should be landed and remain ashore until the ship is certified “gas free” in writing by the fumigator-in-charge. The fumigator is responsible for the safety and efficiency of the fumigation, though crew members may remain in attendance to ensure the safety of the ship provided they adhere to safety instructions issued by the fumigator-in-charge.

9.2.2 The ventilation of methyl bromide from cargoes can be a very slow process if sufficient powered ventilation is not available and the master (or his representative) should ensure that the fumigator has ensured that residues of gas are below the TLV or equivalent (Ref IMO Recommendations Annex 2) throughout all parts of the cargo and holds. [R]

9.2.3 Phosphine fumigation and ventilation in port prior to discharge will normally take from 1-2 weeks to complete and therefore whilst only occasionally specified is likely to be required more often following the general ban on the use of methyl bromide. All procedures as for intransit fumigation should be followed to ensure a safe and effective fumigation.

10.0 Fumigation of empty cargo holds and/or accommodation to eradicate rodent or insect infestation

10.1 Methyl bromide is the most common fumigant used for this purpose (though hydrogen cyanide (HCN) or sulfuryl fluoride may increasingly be used in some countries) as it is normally possible to achieve an effective fumigation of the empty spaces in 12-24 hours.

Note: Each type of fumigation product requires specific procedures and expertise from the applicator/fumigator.

Note: Whilst recognising that hydrogen cyanide (HCN) is legally able to be used in some countries this Code does not recommend or endorse its use.

10.2 The crew should be landed and remain ashore until the ship is certified “gas free” in writing by the fumigator-in-charge as per 4.2.1 above.

11.0 In Transit Fumigation of Freight Containers

11.1 The reason for fumigating containers used to carry agricommodities is normally to try to ensure that when the goods arrive at the discharge port they are free of live pests/insects. [R]

11.2 Containers are normally fumigated and subsequently ventilated prior to being loaded on board the ship. Containers that have been fumigated and subsequently ventilated and where a “certificate confirming presence of harmful concentrations of fumigant is below detectable limits” has been issued, can be loaded on board ships as if they had not been fumigated (Ref IMO Recommendations 3.5.2.1). [R]

11.3 Frequently, containers are fumigated but not ventilated prior to loading and these containers are therefore fumigated in transit, as the ventilation process will not take place until after they have been discharged from the ship. The carriage of containers in transit under fumigation is covered by the IMDG Code whereby these containers are classified in Section 3.2 Dangerous Goods List as “FUMIGATED UNIT Class 9 UN 3359”. Also refer to the IMDG Code Supplement Section 3.5.1 and 3.5.2 of chapter called “SAFE USE OF PESTICIDES IN SHIPS”. [R]

WARNING – CONTAINERS ARE STILL SOMETIMES SHIPPED UNDER FUMIGATION WITH NO WARNING NOTICES ATTACHED AND NO ACCOMPANYING DOCUMENTATION STATING THEY HAVE BEEN FUMIGATED. THIS PROCESS IS IN DIRECT CONTRAVENTION OF THE IMDG CODE. THERE MAY BE DANGEROUS AND UNKNOWN LEVELS OF FUMIGANT GAS INSIDE THE CONTAINER WHEN IT ARRIVES AT ITS DESTINATION WHICH IS BOTH ILLEGAL AND DANGEROUS. [R]

WARNING – A CERTIFICATE OF FREEDOM FROM HARMFUL CONCENTRATIONS OF THE FUMIGANT USED IS ONLY VALID AT THE TIME AND PLACE OF ISSUANCE SINCE COMMODITIES CAN DESORB NOXIOUS FUMES FOLLOWING VENTILATION RESULTING IN THE RETURN OF A TOXIC ATMOSPHERE. [R]

11.4 Obligations on the Fumigator

11.4.1 The Fumigator must ensure that as far as is practicable the container is made gas tight before the fumigant is applied either by sealing as necessary, pressure testing or some other accepted method. [R]

11.4.2 The Fumigator must ensure that the containers are clearly marked with appropriate warning signs stating the type of fumigant used and the date applied and all other details as required by the IMDG Code and IMO Recommendations Annex 3. [R]

11.4.3 The Fumigator must ensure the agreed formulation of fumigant is used at the correct dosage to comply with the contractual requirements, and records retained. [R].

11.4.4 The Fumigator must apply the appropriate efficacy criteria in relation to the required minimum effective dosage, method of treatment and exposure time (see also 3.1.8).
11.5 **Obligations on the Exporter**

11.5.1 The exporter is advised to ensure that the containers are clearly marked by the fumigator with appropriate warning signs stating the type of fumigant used and the date applied and all other details as required by the IMDG Code and IMO Recommendations Annex 3.

11.5.2 The exporter is advised to ensure that the master is informed prior to the loading of the containers.

11.5.3 The exporter must ensure that shipping documents show the date of fumigation and the type of fumigant and the amount used all as required in the IMDG Code volume 1 page 35 and specifically section 9.9.

11.5.4 The exporter must follow all specific port regulations.

12.0 **Fumigation of Freight Containers**

Containers that are transported whilst under in transit fumigation are classified by the IMDG Code Dangerous Goods Section as “FUMIGATED UNIT CLASS 9 UN 3359”.

The GAFTA Code therefore requires the Fumigator to perform his operations all in accordance with the IMDG Code Supplement Sections 3.5.1 and 3.5.2. For additional information refer to the GAFTA Fumigation Guidance Notes.

13.0 **Store and Silo Fumigation**

13.1 The GTAS Fumigators Code of Practice requires fumigators, storekeepers and silo operators to comply with all the relevant requirements of the country in which fumigation is taking place, together with the fumigant manufacturers requirements and the fumigation guidelines within this manual, and to the treatment options detailed in Annex 1.

13.2 The GTAS Code of Practice requires that accredited fumigators maintain a detailed record of all fumigations carried out under all sections of this standard, including the following:

- method of fumigation,
- date of application
- date of ventilation
- type, quantity and dosage rate of fumigant used

14.0 **Bulk Shipments – Insecticide Treatments**

14.1 Bulk cargoes are sometimes treated either in silo or store shortly before loading, or during the actual loading process, by the application of one of a number of different insecticides.

14.2 The insecticide must be applied strictly in accordance with the manufacturer’s label.

14.3 The insecticide must be applied strictly in accordance with the local regulations.

14.4 The insecticide must be applied strictly in accordance with phytosanitary requirements.

14.5 The insecticide must be applied strictly in accordance with any contractual obligations.

14.6 Insecticide is normally applied either mixed with water or as a concentrate, and is applied to a moving stream of grain in order to achieve a sufficiently even and effective distribution of the insecticide.

14.7 It is a requirement to record all details of the treatments applied, including:

- name of insecticide applied [R]
- date of treatment [R]
- cargo/batch volume and identification [R]
- dosage rate applied [R]
- total amount of insecticide applied [R]
- method of application [R]

15.0 **Complaints Procedure**

The fumigator must have a documented procedure for handling complaints. This procedure must include systems for:

- The prompt documentation and investigation of complaints
- The prompt feedback to the Company with findings
- Deciding on internal actions required to prevent re-occurrence

16.0 **Records**

16.1 Internally produced records must be signed by the person carrying out the task/activity.

16.2 Records must be legible and kept in suitable conditions that allow ready retrieval and prevent deterioration.

16.3 Records must be kept for a minimum of five years unless there are additional requirements.
APPENDIX 1

Definitions

For the purposes of this Code the following definitions shall apply:

- **Animal Feed Materials**: shall mean raw materials and straight feeds, feed additives, etc., (as defined under the applicable Feedingstuffs Regulations) intended as an animal feed material.
- **Biodiesel**: a transport fuel usually made from vegetable oils used as a diesel replacer.
- **Bio ethanol**: a transport fuel made from sugar and cereal crops used as a petrol replacer.
- **Biofuels**: liquid or gaseous fuel for transport produced from biomass.
- **Bioliquids**: liquid fuel for energy purposes other than for transport, including electricity and heating and cooling, produced from biomass.
- **Biomass**: the biodegradable fraction of products, waste and residues from biological origin from agriculture (including vegetal and animal substances), forestry and related industries including fisheries and aquaculture, as well as the biodegradable fraction of industrial and municipal waste.
- **Broker**: - shall mean a person or company acting as an intermediary between buyer and seller and drawing an agreed commission for services rendered. A Broker does not act as a principal in the transaction.
- **COSH**: - shall mean Control of Substances Hazardous to Health Regulations.
- **Carrier**: - shall mean the shipping company, haulage company or operator of any vessel under this code.
- **Codex Alimentarius**: - Latin, meaning Food Law or Code, is a collection of internationally adopted Food and/or Feed Standards presented in a uniform manner.
- **Combinable Crops**: shall mean grain, pulses (peas and beans) and oilseeds (rapeseed and linseed, as-grown cereal seeds and herbage seeds (grass, clover, etc.), pulse seeds and oilseeds for seed processing.
- **The Code Of Practice For The Control Of Salmonella**: - shall mean the Code of Practice for the Control of Salmonella during the storage, handling and transport of raw materials intended for incorporation into, or direct use as, animal feedingstuffs, current in the country where the code is being applied. In the absence of any such national code, the Gafa Code of Practice for Salmonella shall apply.
- **The Company**: - shall mean any company who is a principal in a transaction or for whom a service is being provided.
- **Contamination**: - shall mean the undesired introduction of impurities of a chemical or microbiological nature or of foreign matter during production, sampling, packaging, storage or transport.
- **Control (verb)**: To take all necessary actions to ensure and maintain compliance with criteria established in the HACCP plan.
- **Control (noun)**: The state wherein correct procedures are being followed and criteria are being met.
- **Control Measure**: Any action and activity that can be used to prevent or eliminate a food safety hazard or reduce it to an acceptable level.
- **Corrective Action**: Any action to be taken when the results of monitoring at the CCP indicate a loss of control.
- **Critical Control Point (CCP)**: A step at which control should be applied and is essential to prevent or eliminate a food safety hazard or reduce it to an acceptable level.
- **Critical Limit**: A criterion which separates acceptability from unacceptability.
- **derogated Protein**: shall mean fishmeal, dicalcium phosphate or tricalcium phosphate of animal origin or hydrolysed protein (as defined in the EU Transmissible Spongiform Encephalopathies [TSE] Regulations) which are prohibited in farmed animal feeds intended for ruminants but permitted in such feeds intended for non-ruminants;
- **Desk Trader**: - shall mean any trader, whether or not employing staff, but with no owned storage, laboratory or transport facilities.
- **Deviation**: Failure to meet a critical limit.
- **Farmed Animals**: - shall mean cattle, sheep, goats, deer, pigs, poultry, rabbits, horses, fish or any other animals which may be used for human consumption;
- **Farmed Ruminants**: - shall mean cattle, sheep, goats or deer.
- **Feed** Or **“Animal Feed”**: - shall mean any substance or product, including additives, whether processed, partly processed or unprocessed, intended to be used for oral feeding to animals.
- **Food**: - shall mean any substance or product, whether processed, partially processed, intended to be, or reasonably expected to be ingested by humans.
- **Forbidden Materials**: - shall mean materials classified in the International Database for Transport of Feed (IDTF) as being forbidden or materials that are not classified in the IDTF.
- **Fumigants**: - shall mean gases which are toxic to target infestations.
- **Fumigator**: - shall mean a contractor whose business it is to apply fumigants to eradicate infestations.
- **Gafa Code of Practice For Salmonella**: - shall mean the Code of Practice for the Control of Salmonella during the storage, handling and transport of raw materials intended for incorporation into, or direct use as, animal feedingstuffs, current in the country where the code is being applied. In the absence of any such national code, the Gafa Code of Practice for Salmonella shall apply.
- **Gafa Approved Analyst**: - shall mean a laboratory engaged in the profession of sample analysis providing certificates of quality at loadports. They carry out analysis in accordance with the Methods of Analysis Form No. 130, the Gafta Rules and Code of Conduct for Approved Registered Analysts for commodities traded on Gafta contracts. They are members of GAFTA.
GAFTA FUMIGATION

- **Gafta Approved Superintendent**: shall mean a company engaged in the profession of inspection. They carry out their duties in accordance with the respective contract terms, sampling rules and Code of Practice, inspection, verifications, examinations, quality and condition assessment, sampling measurements. They are members of GAFTA.

- **Goods**: shall mean all animal feed materials, combinable crops, finished products and processed materials for food and/or feed purposes.

- **Grower**: shall mean the farmer producer of the raw materials.

- **HACCP**: A system which identifies, evaluates, and controls hazards which are significant for food and feed safety.

- **HACCP Plan**: A document prepared in accordance with the principles of HACCP to ensure control of hazards which are significant for food and feed safety in the segment of the supply chain under consideration.

- **Haulier**: shall mean the operator of any vehicle engaged in the transport of goods by road.

- **Hazard**: A biological, chemical or physical agent in, or condition of, food or feed with the potential to cause an adverse health effect to humans or animals.

- **Hazard analysis**: The process of collecting and evaluating information on hazards and conditions leading to their presence to decide which are significant for food and feed safety and therefore should be addressed in the HACCP plan.

- **ICRT**: shall mean the International Committee (for) Road Transport

- **IDTF**: shall mean the International Database (for the) Transport of Feed

- **Load Compartment**: shall mean the sub-divided part of the load carrying area of a bulk vehicle or vessel into which goods are loaded and transported.

- **Loading Inspector**: shall mean a person in a quality system who on the basis of training and experience has sufficient knowledge and expertise to inspect cargo spaces for suitability for loading the goods. The appointed person shall have certification or accreditation to perform this role.

- **Merchant**: shall mean a trading business, employing staff operating with a combination of storage and/or laboratory and/or transport facilities.

- **Monitor**: The act of conducting a planned sequence of observations or measurements of control parameters to assess whether a CCP is under control.

- **Principal**: shall mean the buyer or seller in a transaction.

- **processed Animal Protein**: shall mean meat and bone meal*, meat meal*, bone meal*, blood meal*, dried plasma* and other blood products*, hydrolysate protein, hoof meal, horn meal, poultry offal meal, feather meal, dry greaves, fishmeal, dicalcium phosphate and tricalcium phosphate of animal origin, gelatin and any other similar products including mixtures, feed additives and premixtures, containing these products.*whether of mammalian or non-mammalian origin;

- **Producer**: shall mean a farmer, grower, processor or manufacturer of food or feed.

- **[R]**: the symbol [R] in the text indicates the requirement to keep a record.

- **Recall**: the process by which the removal of an unsafe or illegal goods/product in the possession of the consumer is made.

- **Risk**: shall mean a function of the probability of damage to goods or an adverse health effect and the severity of that damage or effect, consequential to a hazard.

- **Road Haulage**: shall mean all appropriate forms of transport including bulk tippers, bulk blowers, flat-beds, walking floor and bulk tanker vehicles used for any movement of goods by road.

- **Step**: A point, procedure, operation or stage in the supply chain including raw materials, from country of origin to country of destination.

- **Store**: shall include any building, shed, silo, bin, tank or other container used to store goods;

- **Storekeeper**: shall mean the operator of any store used to store goods.

- **Sustainability**: an integrated approach to environmental, social and economic impact issues (both internal and external) leading to long term sustainable profit and growth without compromising the ability of future generations to meet their own needs.

- **Testing Facility**: shall mean any facility that operates testing or analytical apparatus for the purpose of establishing quality criteria not relating to Gafta contracts.

- **Trader**: shall mean a desk trader or a merchant.

- **Transport**: shall mean any movement of goods by road, rail, inland waterway, shipment by sea or by container.

- **Undesirable Substance**: shall mean any substance or product, with the exception of pathogenic agents, which is present in and/or on the product intended for animal feed and which presents a potential danger to animal or human health or could adversely affect livestock production.

- **Validation**: Obtaining evidence that the elements of the HACCP plan are effective.

- **Vehicle**: shall include trailers or other containers used to transport goods by road.

- **Verification**: The application of methods, procedures, tests and other evaluations, in addition to monitoring to determine compliance with the HACCP plan.

- **Vessel**: shall mean ship, barge or coaster.

- **Withdrawal**: The process by which the removal of an unsafe or illegal product from the supply chain is made, but does not involve the removal of product in the consumer’s possession.
A. Introduction

When trading goods into certain markets, suppliers are often requested to implement quality assurance systems to their trading operations, many of which call for HACCP-based systems. Such markets will in addition seek the quality assurance operations to be independently audited/verified. This section aims to introduce the concept of HACCP.

The first section of this document sets out the principles of the Hazard Analysis and Critical Control Point (HACCP) system adopted by the Codex Alimentarius Commission. Codex Alimentarius Commission Code of Practice - General Principles of Food Hygiene. CAC/RCP 1 1969 Rev.4 - 2003 www.codexalimentarius.net

The section from “Guidelines for the Application of the HACCP System” onwards provides general guidance for the application of the system while recognizing that the details of application may vary depending on the circumstances of the logistics operation. It is this application that a trading company would be independently audited/verified against.

The HACCP system, which is science-based and systematic, identifies specific hazards and measures for their control to ensure the safety of food and feed products. HACCP is a tool to assess hazards and establish control systems that focus on prevention rather than relying mainly on end product testing. Any HACCP system is capable of accommodating change, such as advances in equipment design, processing procedures or technological developments.

HACCP can be applied throughout the food and feed chain from primary production to final consumption and its implementation should be guided by scientific evidence of risks to human and animal health.

The successful application of HACCP requires the full commitment and involvement of management and the workforce. It also requires a multidisciplinary approach; this multidisciplinary approach should include, when appropriate, expertise in storage, transport, inspection, and analysis. The application of HACCP is compatible with the implementation of quality management systems, such as the ISO 9000 series, and is the system of choice in the management of food safety within such systems.

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**Principles of the HACCP System**

The HACCP system consists of the following seven principles:

- **PRINCIPLE 1** Conduct a hazard analysis.
- **PRINCIPLE 2** Determine the Critical Control Points (CCPs).
- **PRINCIPLE 3** Establish critical limit(s).
- **PRINCIPLE 4** Establish a system to monitor control of the CCP.
- **PRINCIPLE 5** Establish the corrective action to be taken when monitoring indicates that a particular CCP is not under control.
- **PRINCIPLE 6** Establish procedures for verification to confirm that the HACCP system is working effectively.
- **PRINCIPLE 7** Establish documentation concerning all procedures and records appropriate to these principles and their application.
Guidelines for the Application of the HACCP System

Prior to application of HACCP to any sector of the food and feed chain, that sector should be operating according to the General Principles of Food Hygiene, the appropriate Codex Codes of Practice, and appropriate food safety legislation. Management commitment is necessary for implementation of an effective HACCP system. During hazard identification, evaluation, and subsequent operations in designing and applying HACCP systems, consideration must be given to the impact of raw materials, ingredients, food manufacturing practices, role of manufacturing processes to control hazards, likely end use of the product, categories of consumers of concern, and epidemiological evidence relative to food safety.

The intent of the HACCP system is to focus control at CCPs. Redesign of the operation should be considered if a hazard which must be controlled is identified but no CCPs are found.

The HACCP application should be reviewed and necessary changes made when any modification is made in the product, process, or any step.

It is important when applying HACCP to be flexible where appropriate, given the context of the application taking into account the nature and the size of the operation.

Application

The application of HACCP principles consists of the following tasks as identified in the Logic Sequence for Application of HACCP (Diagram 1).

I. ASSEMBLE HACCP TEAM

The supply operation should assure that the appropriate commodity knowledge and expertise is available for the development of an effective HACCP plan. Ideally, this may be accomplished by assembling a multidisciplinary team. Where such expertise is not available on site, expert advice should be obtained from other sources. The scope of the HACCP plan should be identified. The scope should describe which segment of the supply chain is involved and the general classes of hazards to be addressed (e.g. does it cover all classes of hazards or only selected classes).

II. DESCRIBE PRODUCT

A full description of the commodity should be drawn up, including relevant safety information such as: composition, physical/chemical structure, microcidal/static treatments (heat treatment, antioxidants, fumigation etc.), packaging, durability and storage conditions and method of distribution.

III. IDENTIFY INTENDED USE

The intended use should be based on the expected uses of the product by the end user or consumer.

IV. CONSTRUCT FLOW DIAGRAM

The flow diagram should be constructed by the HACCP team. The flow diagram should cover all steps in the supply operation. When applying HACCP to a given operation, consideration should be given to steps preceding and following the specified operation.

V. ON SITE CONFIRMATION OF FLOW DIAGRAM

The HACCP team should confirm the actual supply operation against the flow diagram during all stages and amend the flow diagram where appropriate.

VI. LIST ALL POTENTIAL HAZARDS ASSOCIATED WITH EACH STEP, CONDUCT A HAZARD ANALYSIS, AND CONSIDER ANY MEASURES TO CONTROL IDENTIFIED HAZARDS (SEE PRINCIPLE 1)

The HACCP team should list all of the hazards that may be reasonably expected to occur at each step in the supply chain from country of origin to the final country of destination.

The HACCP team should next conduct a hazard analysis to identify for the HACCP plan which hazards are of such a nature that their elimination or reduction to acceptable levels is essential to the supply of a safe food or feed material.

In conducting the hazard analysis, wherever possible the following should be included:

- the likely occurrence of hazards and severity of their adverse health effects;
- the qualitative and/or quantitative evaluation of the presence of hazards;
- survival or multiplication of microorganisms of concern;
- production or persistence of toxins, chemicals or physical agents; and,
- conditions leading to the above.

The HACCP team must then consider what control measures, if any, exist which can be applied for each hazard. More than one control measure may be required to control a specific hazard(s) and more than one hazard may be controlled by a specified control measure.
B. **DETERMINE CRITICAL CONTROL POINTS (SEE PRINCIPLE 2)**
There may be more than one CCP at which control is applied to address the same hazard. The determination of a CCP in the HACCP system can be facilitated by the application of a decision tree (e.g. Diagram 2), which indicates a logic reasoning approach. Application of a decision tree should be flexible, given whether the operation is for storage, loading, discharge, sampling, analysis, transport or other. It should be used for guidance when determining CCPs. This example of a decision tree may not be applicable to all situations. Other approaches may be used. Training in the application of the decision tree is recommended.

If a hazard has been identified at a step where control is necessary for safety, and no control measure exists at that step, or any other, then the operation or process should be modified at that step, or at any earlier or later stage, to include a control measure.

C. **ESTABLISH CRITICAL LIMITS FOR EACH CCP (SEE PRINCIPLE 3)**
Critical limits must be specified and validated if possible for each Critical Control Point. In some cases more than one critical limit will be elaborated at a particular step. Criteria often used include measurements of temperature, quality and condition, undesirable substances and sensory parameters such as visual appearance, smell or odour.

D. **ESTABLISH A MONITORING SYSTEM FOR EACH CCP (SEE PRINCIPLE 4)**
Monitoring is the scheduled measurement or observation of a CCP relative to its critical limits. The monitoring procedures must be able to detect loss of control at the CCP. Further, monitoring should ideally provide this information in time to make adjustments to ensure control of the process to prevent violating the critical limits. Where possible, process adjustments should be made when monitoring results indicate a trend towards loss of control at a CCP. The adjustments should be taken before a deviation occurs. Data derived from monitoring must be evaluated by a designated person with knowledge and authority to carry out corrective actions when indicated. If monitoring is not continuous, then the amount or frequency of monitoring must be sufficient to guarantee the CCP is in control i.e. undesirable substances monitoring. All records and documents associated with monitoring CCPs must be signed by the person(s) doing the monitoring and by a responsible reviewing official(s) of the company.

E. Monitoring of undesirable substances based on HACCP/Risk Assessment principles.
Operators should implement a sampling and analysis plan within the HACCP framework for the testing for undesirable substances. The operator should determine the frequency of sampling and analysis for goods that are handled and stored in accordance with customer requirements. The Gafta Sampling Rules No. 124 are applicable where the goods are traded on Gafta contracts, otherwise sampling should be in accordance with another agreed internationally recognised method.

The principle of sampling and analysis frequency is related to quantity of goods handled. As the quantity increases the number of samples taken per tonne of goods decreases. The number of samples to be drawn and inspected over a period in which the goods are examined for presence of undesirable substances may be calculated using the formula:

\[
\text{Frequency} = \frac{\text{Volume} \times \text{Chance} \times \text{Seriousness}}{100}
\]

The standard value for chance is 1. The operator may raise or lower this value if valid reasons are given. Considerations that may affect the standard value for chance include:
- History
- Seasonal influences
- Chances of re-contamination (e.g. microbiological parameters)
- New source/new suppliers
- Recent incidents

Operators may only select a chance value that is below 1 on the basis of supporting historical analysis data. Seriousness is an expression of the perceived degree of harmfulness of an undesirable substance. Where the level of seriousness is deemed to be high or very high a factor of 5 is used. Where the level of seriousness is deemed moderate then factor 3 should be used. If the seriousness level is judged to be low or small then a factor of 1 should be used. Where food and feed goods are concerned undesirable substances such as heavy metals, pesticides or mycotoxins should apply a minimum value of 3 but more likely 5.

Operators must have a written down monitoring protocol with a documented system for the keeping of records.

The analysis of samples drawn under the monitoring protocol should be tested by analysts in accordance with contract requirements, i.e. analysts listed on the Gafta Register of Approved Analysts and/or GTAS certified Analysts and/or analysts accredited under ISO/IEC 17025 using officially recognised methods covered by the scope of the accreditation.
HACCP Scoring

This is a simple means of assigning scores for
• the likelihood of occurrence
• the severity for each hazard that could be encountered in a Raw Material Haulage, or Raw Material Storage operation.

The HACCP team should assess each and every possible hazard that could be encountered.

The likelihood of occurrence is based on measurements and observations of previous situations and is assigned a score of 1 – 3 as per the table below.

A score of 1 would be a low risk of occurrence (practically impossible or not probable), 2 would be a medium risk (may occur, has been known to occur) and 3 is a high risk of occurrence (occurs regularly).

Similarly the severity of occurrence is based on the consequence of the hazard occurring and its likely impact is also assigned a score of 1 – 3. A score of 1 would be small (leading to minor injury or illness) 2 would be medium (leading to substantial injury) and 3 is high (leading to fatal consequences).

These two scores are then multiplied together to give an overall Hazard score for that Hazard.

It is suggested that Hazard scores of 5 or below should be considered within the pre-requisite programme.

Hazard scores of 6 or above should be considered as significant hazards and should be dealt with by Critical Control Points.

Nevertheless it is the responsibility of the HACCP team to consider and evaluate each hazard in the light of the business concerned.

HACCP Scoring System

<table>
<thead>
<tr>
<th>Likelihood of occurrence</th>
<th>Definite (3)</th>
<th>Probable (2)</th>
<th>Possible (1)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>3</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>Severity if it occurs</td>
<td>9</td>
<td>6</td>
<td>3</td>
</tr>
</tbody>
</table>

F. ESTABLISH CORRECTIVE ACTIONS (SEE PRINCIPLE 5)

Specific corrective actions must be developed for each CCP in the HACCP system in order to deal with deviations when they occur.

The actions must ensure that the CCP has been brought under control. Actions taken must also include proper disposition of the affected food or feed material. Deviation and material disposition procedures must be documented in the HACCP record keeping.

G. ESTABLISH VERIFICATION PROCEDURES (SEE PRINCIPLE 6)

Establish procedures for verification. Verification and auditing methods, procedures and tests, including random sampling and analysis, can be used to determine if the HACCP system is working correctly. The frequency of verification should be sufficient to confirm that the HACCP system is working effectively. Examples of verification activities include:

• Review of the HACCP system and its records;
• Review of deviations and material dispositions;
• Confirmation that CCPs are kept under control.

Where possible, validation activities should include actions to confirm the efficacy of all elements of the HACCP plan.
H. ESTABLISH DOCUMENTATION AND RECORD KEEPING (SEE PRINCIPLE 7)

Efficient and accurate record keeping is essential to the application of a HACCP system. HACCP procedures should be documented. Documentation and record keeping should be appropriate to the nature and size of the operation.

Documentation examples are:
- Hazard analysis;
- CCP determination;
- Critical limit determination.

Record examples are:
- CCP monitoring activities;
- Deviations and associated corrective actions;
- Modifications to the HACCP system.

An example of a HACCP worksheet is attached as Diagram 3.

a. Diagram 1. Sequence For Application Of HACCP

1. Assemble HACCP Team
2. Describe Product
3. Identify Intended Use
4. Construct Flow Diagram
5. On site Confirmation of Flow Diagram
6. List all Potential Hazards
   Conduct a Hazard Analysis • Consider Control Measures
7. Determine CCPs (See Diagram 2)
8. Establish Critical Limits for each CCP
9. Establish a Monitoring System for each CCP
10. Establish Corrective Actions
11. Establish Verification Procedures
12. Establish Documentation and Record Keeping
b. Diagram 2. Example Of Decision Tree To Identify CCPs
(answer questions in sequence)

Q1: Do control preventative measure(s) exist?
   - Yes
   - No
     - Is control at this step necessary for safety?
       - Yes
       - No
         - Not a CCP
         - Stop
     - Modify step, process or product

Q2: Is the step specifically designed to eliminate or reduce the likely occurrence of a hazard to an acceptable level?
   - Yes
   - No

Q3: Could contamination with identified hazard(s) occur in excess of acceptable level(s) or could these increase to unacceptable levels?
   - Yes
   - No
     - Not a CCP
     - Stop

Q4: Will a subsequent step eliminate identified hazard(s) or reduce likely occurrence to an acceptable level?
   - Yes
   - No
     - Not a CCP
     - Stop

Critical Control Point

Modify step, process or product

Stop

Modify step, process or product

Stop
c. Diagram 3  Example Of A HACCP Worksheet

1  Describe Product

2  Diagram Process Flow

3  List (example below)

<table>
<thead>
<tr>
<th>Step</th>
<th>Hazard(s)</th>
<th>Control Measure(s)</th>
<th>CCPs</th>
<th>Critical Limit(s)</th>
<th>Monitoring Procedure(s)</th>
<th>Corrective Action(s)</th>
<th>Record(s)</th>
</tr>
</thead>
</table>

4  Verification
Note: these methods can also be used for store and silo fumigation when the appropriate gas-tight sheeting or other sealing materials are used.

i) Application of tablets or pellets to cargo surface (or into the top half meter)
High concentrations of gas build up in the head space, potentially resulting in a lot of leakage through the hatch covers unless they are very well sealed. Very little penetration down into the cargo. Powdery residues cannot be removed.

Good kill of insects in top part of cargo but negligible effect on eggs or juvenile or even adults in lower part of cargo.

ii) Application of tablets or pellets by probing into the cargo a few meters
Less loss of gas through hatch covers than in No i). Better penetration of gas than when applied on surface only but unlikely to be fully effective unless holds are relatively shallow and voyage time relatively long. Powdery residues cannot be removed.

iii) Application of tablets or pellets by deep probing into the full depth of the cargo
This is difficult to achieve and currently practically impossible if the cargo is more than 10 metres deep. Ensures effective fumigation provided voyage time is relatively long to allow gas to distribute. Powdery residues cannot be removed.

iv) Application of aluminium phosphide in blankets, sachets or sleeves, placed on the surface of the cargo (or into the top half metre).
All points the same as No i) except that with this method powdery residues can be removed prior to discharge.

v) Application of tablets or pellets by probing into the cargo a few meters in retrievable sleeves
All points as for No ii) except that with this method powdery residues can be removed prior to discharge.

vi) Fitting of an enclosed powered re-circulation system to the hold and application of aluminium phosphide tablets or pellets to the surface
Will ensure the gas is distributed throughout the cargo evenly and rapidly making maximum use of the fumigant in the shortest possible time. Powdery residues cannot be removed.

vii) Fitting of an enclosed powered re-circulation system to the hold and application of aluminium phosphide in blankets, sachets or sleeves on the surface or probed into the top one or two metres
As for No vi) except that with this method, powdery residues can be removed. Also gaseous residues can be removed more easily than with other methods, as once the powdery residues have been removed the re-circulation system can be used to assist this to happen rapidly.

viii) Deep probing into the full depth of the cargo (however deep) with tablets or pellets (in retrievable sleeves when required)
This is being developed but is not yet fully available.

Will enable good distribution of gas to be achieved without the requirement for a powered re-circulation system, provided the voyage is long enough.

ix) Use of powered re-circulation system with phosphine from cylinders
This is not yet available but could be in the future and will enable phosphine fumigation to be carried out without using aluminium phosphide. This will mean no powdery residues to deal with and therefore residue and safety problems at discharge port will be minimised. A powered re-circulation system will be needed to enable this system to work with maximum efficacy. The diagrams below compare the distribution pattern from a powered re-circulation system with fumigation and no re-circulation.

The re-circulation system consists of a permeable tubular loop placed in the lower part of a hold prior to commencement of loading operations. The tubular loop is connected via an impermeable tube/hose to the headspace of the hold, this is to ensure that the gas is homogeneously and rapidly distributed throughout the cargo. The mixture of gas and air is circulated by a spark proof ventilator.
**APPENDIX 4**

**Example of Schematic Fumigation Plan**

<table>
<thead>
<tr>
<th>Hold 1</th>
<th>Hold 2</th>
<th>Hold 3</th>
<th>Hold 4</th>
<th>Hold 5</th>
<th>Hold 6</th>
<th>Hold 7</th>
</tr>
</thead>
<tbody>
<tr>
<td>Volume</td>
<td>Volume</td>
<td>Volume</td>
<td>Volume</td>
<td>Volume</td>
<td>Volume</td>
<td>Volume</td>
</tr>
<tr>
<td>0000 m³</td>
<td>0000 m³</td>
<td>0000 m³</td>
<td>0000 m³</td>
<td>0000 m³</td>
<td>0000 m³</td>
<td>0000 m³</td>
</tr>
<tr>
<td>AIP/MgP</td>
<td>AIP/MgP</td>
<td>AIP/MgP</td>
<td>AIP/MgP</td>
<td>AIP/MgP</td>
<td>AIP/MgP</td>
<td>AIP/MgP</td>
</tr>
<tr>
<td>00.0 kgs</td>
<td>00.0 kgs</td>
<td>00.0 kgs</td>
<td>00.0 kgs</td>
<td>00.0 kgs</td>
<td>00.0 kgs</td>
<td>00.0 kgs</td>
</tr>
</tbody>
</table>

Total volume = 0000 m³ Total fumigant AP/MP = 00 kgs

It is hereby certified that the above mentioned fumigant formulation was applied to the above vessel on (date). After the application of the fumigant all holds were closed and sealed and warning placards posted on all entrances to all fumigated holds. The cargo was treated at the rate of (00) grams of active ingredient per cubic metre of hold space using the ( ) method.

Total amount of residue retaining sleeves (if applicable):

Required minimum exposure time:

Estimated voyage time:

Date: Port:

Fumigator-in-charge: Master: