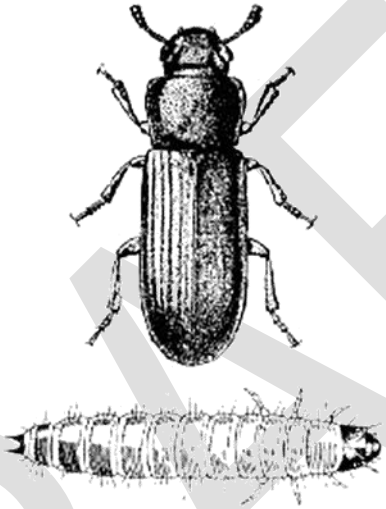
Permit Application Handbook for Structural Fumigations



Ontario Ministry of the Environment, Conservation and Parks

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i Definitions

- **Aeration:** The process of removing fumigant gas from the air of a structure or commodity to the safe re-entry concentration.
- **Appropriate Monitoring Equipment**: fumigant gas monitoring equipment that is functioning correctly, properly calibrated, and capable of detecting the fumigant at the sensitivity, resolution, and performance specifications required by the pesticide label, in order to accurately determine fumigant gas concentrations.
- **Contact Time (CT)** the fumigant gas concentration over time ($g \cdot h/m^3$), also known as dosage and exposure time, and represents the cumulative exposure of the fumigant to the pests. The CT is often considered the target dosage required to be effective against the pests and is accumulated over a period of time.
- **Dosage:** the total amount of fumigant applied, normally expressed in (g/m^3)**.**
- **Dose rate:** the rate at which the fumigant is released or applied over time (g/h).
- **Fumigant Gas:** means a fumigant that: (a) is a gas at a temperature of 20°C and standard pressure, or (b) produces or evolves a gas at a temperature of 20°C and standard pressure and functions as a pesticide exclusively or primarily by the action of the gas.
- **Fumigant**: a pesticide that is, or that produces or evolves a gas or vapour, and that functions as a pesticide exclusively or primarily by the action of the gas or vapour.
- **Fumigation Management Plan:** is an organized, written description of the steps involved to ensure a safe and effective fumigation and must be prepared by the exterminator.
- **Fumigation Site:** is the area where the fumigant gas will be applied such as a building or portion of a building, or a storage vehicle or structure.
- **Fumigation Zone**: marked area around the fumigation site that can be secured to prevent unauthorized access to the fumigation site. The fumigation zone may also be defined in the product label and include distance requirements.
- **Fumigation:** a structural extermination performed by means of a fumigant.
- **General Space Fumigation:** a fumigation within enclosed spaces, buildings, or portions of a structure.
- **Grain Bin:** cylindrical storage structure (short and wide) normally made of galvanized steel panels and used to store grain, often considered a farm-style bin.
- **Grain Elevator Fumigation:** fumigation of a grain elevator facility/complex where grain is received, stored, and distributed. A traditional elevator employs conveyor belts to transfer the grain to storage into silos.

- **Half Loss Time (HLT):** the time it takes to lose half of the total concentration of fumigant gas during the exposure time (e.g., due to leakage, adsorption, absorption, or other natural processes).
- **Hopper:** inverted pyramidal shaped structure used to store and transfer bulk agricultural commodities.
- **Monitoring Intervals (or Regular Monitoring):** the process of measuring fumigant gas concentrations at predetermined intervals specified on the pesticide label or as recommended in this document. Monitoring must occur frequently enough to detect rises or spikes in gas concentrations so that timely protective actions can be taken, such as using appropriate respiratory protection or expanding fumigation zone boundaries.
- **Product Label**: the most current federally approved label for the pesticide product.
- **Rate of Air Exchange:** the number of times that the outdoor air replaces the volume of air in a building per unit time in the structure or building during aeration.
- **Silo:** vertical cylindrical storage structure (tall and narrow) made from concrete or steel used to store bulk agricultural commodities. Occasionally it is referred to as an “elevator bin”.
- **Sufficient Distance:** if the product label has an established distance for the fumigation zone, the measurement can be used to comply with the sufficient distance requirements in the regulations. If the label does not include a specific measurement for the fumigation zone, the exterminator is responsible for establishing the sufficient distance.
- **Supporting Documentation:** materials sent to the Ministry in support of an application for a permit. Please see the corresponding checklist section of this handbook for key information to be included such as pesticide calculations, site maps, and fumigation procedures.
- **Tarpaulin:** a covering that suppresses the release of gas which is placed over the commodity or structure to be fumigated. Coverings are made of polyethylene or other durable material which can retain the gas with minimal leakage.
- **Temperature Inversion**: an atmospheric meteorological condition that occurs when cold, dry, and dense air at ground level is trapped under air that is warm, moist, and less dense. A Temperature Inversion can prevent the safe dispersal of any released fumigant gas.

1.0 Preface

This handbook has been developed by the Ministry of the Environment, Conservation and Parks (MECP) to assist appropriately licensed exterminators in:

1) **Submitting a complete permit application,** by identifying key information that must be included in the application and supporting documentation; and
2) **Preparing supporting documentation,** by providing instructions and outlining fumigation procedures, recommended gas-monitoring intervals, and maximum fumigant concentrations that should be followed.

The information in the handbook is tailored towards two types of structural fumigations permits that are routinely requested: General Space Fumigations and Grain Elevator Fumigations. Accordingly, the primary purpose of this handbook is to provide practical guidance for these types of fumigations. Completed supporting documentation submitted to the ministry for these fumigations may serve as a Fumigation Management Plan, which some fumigant products require.

The Support Documentation Checklists have been developed to ensure permit applications are complete. For general space fumigations, refer to section 3.0, and for grain elevator fumigations refer to section 4.0 of this handbook. Refer to the definition section for further clarity on terminology used in the handbook.

Permit applications and support documentation will not be considered for review until all the required information is received by the Regional Pesticides Specialist who is responsible for the region or county in which the proposed fumigation will take place. The ministry will acknowledge receipt of a permit application within 5 business days and issue a decision within 45 business days of receiving a completed application under normal circumstances. Permit applications and support documentation may be reviewed in a shorter time frame if the applicant can demonstrate that a fumigation is required based upon a health, economic or other emergency.

The handbook may also support preparing applications for other structural fumigation permit requests, such as when the rules cannot be met to fumigate vehicles or other specified structures described in Section 63 of Ontario Regulation 63/09. Moreover, the handbook provides useful information for other fumigation activities that are exempt from permit requirements but are still required to monitor gas concentrations and determine when levels are safe.

This handbook takes precedence over past versions of the Permit Application Guide for Structural Fumigation referenced in MECP's Fumigation Module, a component of the Ontario Pesticide Training & Certification training manual (available from University of Guelph, Ridgetown Campus, at 1-888-620-9999).

This permit application handbook is provided for informational purposes only and should

not be construed as legal advice. Where there is a discrepancy between this handbook and Ontario Regulation 63/09 made under the *Pesticides Act*, the regulation prevails. Applicants and permit holders should refer to Ontario Regulation 63/09 and the *Pesticides Act* for a complete understanding of their legal responsibilities.

For information on the use of fumigants for specific pest management problems, users may consult pest management guides available from numerous sources including: certified crop advisers, pesticide manufacturers, educational resources, university specialists and internet sites.

Permit application requirements may be updated periodically. Please contact your Regional Office for any updates.

1.1 Fumigations: Permits and Exemptions

The use of a Class B (restricted) fumigant gas for a structural extermination requires that the exterminator comply with the rules in regulation, be appropriately licensed, and follow the registered product label. In some situations, fumigations activities may require that the exterminator obtain an approved "use permit" from the Director under the *Pesticides Act* when the fumigation poses elevated risk.

Below is a summary of the different types of fumigation activities that can occur, some of which require a permit and some that are exempt from permit requirements. For detailed information on the rules and conditions, refer to the Ontario Regulation 63/09 and the *Pesticides Act*.

A permit is required to use a Class B fumigant gas for:

1) **Section 60: Indoor fumigations, no covering or sealed container (commonly referred to as a space fumigation)**.
    - Used to control pests within enclosed spaces such as entire buildings or parts of the structure.

2) **Section 63: Fumigations in vehicles or specified structures (when rules cannot be met).** If all the rules in regulation can be met, the fumigation becomes exempt from needing a permit. Grain elevator facilities fall under this section and require a permit if they cannot comply with the rules.
    - Used to control pests in vehicles (railcars, trailers, boxcars, and ships) or specified structures (shipping container, bin, hopper, silo, or other storage structure used for agricultural purposes).

3) **Section 58**: **To destroy bees in a structural extermination,** by an appropriately licensed exterminator or by an Inspector under the *Bees Act*.
    - Used to exterminate bees inside of a structure, such as a colony of

diseased bees within a wood-framed beehive.

Certain fumigation activities using a Class B fumigant gas are not subject to permit requirements. If the rules cannot be met by the exterminator, then the fumigation cannot be carried out. These include the following sections:

1) **Section 61: Fumigations in vaults.**
   - Used to fumigate commodity inside gas-tight vaults.

2) **Section 62**: **Indoor fumigations under a covering or sealed container.**
   - Used to fumigate a commodity placed under a sealed covering or inside a sealed container that is situated inside a building.

3. **Section 64**: **Fumigation of rodent burrows.**
   - Used to fumigate rodent burrows made by rats or groundhogs using aluminum phosphide.

4. **Section 65**: **Outdoor fumigation of soil.**
   - Used to fumigate soil using a fumigant gas or chloropicrin under a covering that suppresses the release of gas.

2.0 General Information

Unless exempt under Ontario Regulation 63/09 of the *Pesticides Act* (the Act), an approved permit is required when treating a building or portion of a building with a fumigant gas (e.g., phosphine (PH_3) [includes aluminum phosphide (AlP), magnesium phosphide (MgP), phosphine gas and carbon dioxide (PH_3/ CO_2)], methyl bromide (MBr), etc.).

In addition, the user must possess the appropriate fumigation exterminator licence. If the regulation and/or pesticide product label requires that two persons be present while releasing or aerating the fumigant gas, then both persons must hold the appropriate licence. Some product labels may also require additional mandatory annual training before the fumigant can be used.

To obtain an approved permit, the following must be completed and submitted; Application for a Permit to Use a Pesticide for Structural Pest Control from the Ontario Central Forms Repository, along with all required support documentation (see checklists) and must be forwarded electronically to the Regional Pesticides Specialist. The Regional Pesticides Specialist may contact you to arrange for a site visit or to clarify the support documentation submitted.

Upon receipt and review of the complete application and support documentation, the

Director under the *Pesticides Act* may issue a permit pursuant to Section 7 and 11(1) of the Act. The Director may refuse to issue or cancel a permit or may impose terms and conditions in issuing or after issuing a permit or may alter the terms and conditions of a permit that has been issued, upon reasonable and probable grounds pursuant to Section 11(3) of the Act. If refused, the applicant will be notified in writing the reason(s) for a refusal and the appeal procedure will be outlined.

Full supporting documentation must accompany all permit applications regardless of whether supporting documentation (such as maps) have been submitted for past and approved permits for the same facility.

Each permit application with supporting documentation that is submitted is evaluated on a case-by-case basis and further supporting documentation may be requested as determined by the MECP. Environmental standards and management approaches may be modified from time to time. This may result in changes to supporting documentation requirements.

2.1 Instructions for the Completion of an Application for a Permit

Applicant Information:

- Provide the applicant's full name. The applicant is the individual who will be using the fumigant gas (e.g., Fumigation-General licensed exterminator);
- Provide the applicant's exterminator licence number;
- Identify the full name of the pest control company employing the applicant;
- Provide the full mailing address of the pest control company;
- Provide the full name of the person who holds the company's operator licence;
- Provide the operator licence number;
- Provide the pest control company's telephone number and fax number (if available); and
- List all assisting licensed exterminators' names, licence numbers, and duties.

Application Site Information:

- Provide the business name of the premises to be treated;
- Indicate the type of facility (e.g., warehouse, food plant, brewery, flour mill, grain elevator, etc.);
- Provide the full address of the premises;
- Indicate if the whole facility is to be treated or only certain areas (e.g., baking section, processing room, silos) and provide the total volume (m^3) of the area(s) to be treated;
- Provide the intended starting date (day/month/year) and time (a.m. or p.m.) for the release of the fumigant gas; and
- Provide the intended completion date (day/month/year) and time (a.m. or p.m.) that aeration will begin. For grain elevators requiring multiple fumigations, this date will be the last day of the calendar year fumigations are anticipated to take place.

Pesticide and Pest Information:

- Provide the product or trade name of the pesticide;
- Provide the common name of the pest to be controlled;
- Indicate all active ingredients;
- Provide the registration number (under the federal *Pest Control Products Act*) from the front panel of the product label;
- Provide the application rate and amount in the following units:

- MBr - kg/100m^3 and kg of total gas (including spare gas)
- SF - g/m^3 and kg of total gas (including spare gas)
- PH_3 [AlP or MgP] - number of tablets, pellets, or sachets per 100 m^3 and kg of total gas
- PH_3 /CO_2 - target concentration and kg of phosphine gas (including spare gas)

- If the application is for use in a grain elevator requiring multiple fumigations over the permit period, a total amount of product is not required to be entered; and
- The applicant must sign the application. Indicate the date signed as day/month/year.

3.0 General Space Fumigation Supporting Documentation Requirements

Submit your permit application and supporting documentation electronically to the appropriate Regional Pesticides Specialist. The information provided in the supporting documentation can serve as a fumigation management plan. The following sections outline the supporting documentation requirements. Please date and number each page and use the checklist provided to ensure the package is complete.

3.1 Calculations

Provide your calculations used for Box 20 of the application form (i.e., dosage rate and total gas, including spare gas). Follow the pesticide label calculations. For example, a structure with a volume of 20,000 m^3 will require 14 kg of phosphine when a dosage of 350 pellets/100 m^3 is used, resulting in a total amount of 70,000 pellets (based on the release of 0.2 g of PH_3 per pellet).

For fumigations with MBr or SF, include the estimated Half Loss Time (HLT) for the structure and the target contact time (CT) for the target pest. Also, provide the method by which HLT and CT will be monitored during the fumigation to determine if/when additional gas is needed to ensure CT is met for the target pest.

3.2 Integrated Pest Management

Outline all the pest management procedures that are carried out at the facility to manage pest populations. Fumigation should not be a substitute for proper sanitation and good housekeeping and should be used as a last resort. Pest populations can be reduced if the proper methods of handling, storing and processing are followed. Provide information on how effective these methods have been for controlling pests and why fumigant use is needed. Specify if there are fumigant use requirements for any imports/exports.

3.3 Record of Mandatory Training for Employees

When applicable, provide records of mandatory annual training specified on the label provided to employees regarding fumigant use at the facility. The ministry may request a copy of the training material. The training material must meet the requirements for mandatory training found on the product label.

3.4 Detailed Site Maps

The site maps must include the information outlined in Table 1.

Table 1: Map Features and Description for Space Fumigation

Map feature	Description
Compass direction	Indicate North on every map submitted
Fumigation zone and locations of fumigation zone extension if needed.	The fumigation zone is a marked area around the fumigated building(s) that can be secured to prevent unauthorized access to the fumigation site. The fumigation zone may also be defined in the product label. It is usually the property fence line. In some cases, the fumigation zone must be extended to include an adjacent property or road to provide for additional distance as required by the pesticide label or gas monitoring during aeration of the fumigant. The extended fumigation zone must be secured by the fumigator to prevent unauthorized access during the aeration process.
Outdoor gas monitoring stations	Indicate the location of outdoor gas monitoring stations where the gas concentrations will be taken down wind along the fumigation and/or extended fumigation zone, as well any other locations deemed appropriate by the exterminator (e.g., sensitive/high risk areas).
Weather monitoring station	Indicate the location of weather monitoring stations where temperature, relative humidity, and wind direction readings will be taken.
Indoor gas monitoring station (command post)	Location of command post where indoor air monitoring will be conducted.
Gas cylinder locations	If gas cylinders releasing the fumigant gas are located outside of the fumigated area (e.g., PH_3 /CO_2, MBr, or SF), indicate their location.
Structure(s) to be fumigated	Indicate which buildings are to be fumigated; include the dimensions (l, w, h) and total volume of the buildings. (**Note**: the total volume must match the amount on the permit application form.) Indicate the shortest distance from the outside wall of the fumigated building(s) to the fumigation zone, and, if appropriate, the extended fumigation zone.
Other building(s) **within** the fumigation zone	Indicate the shortest distance between the outside wall of the fumigated building(s) and the outside wall of all surrounding buildings not under fumigation but within the fumigation zone. Indicate the purpose/use of other buildings within the fumigation zone (e.g., warehouses, silos, truck bays, etc.). Include any structures such as storage silos attached to or directly adjacent to the fumigated building.

Occupied buildings on-site but **outside** the fumigation zone	Note the location of and shortest distance to any out-building(s) located on the premises that will be occupied or require access by any person(s) during the fumigation or aeration process. **Note:** these buildings must be located outside the fumigation zone. For example, if a guard house or other building must be manned during the fumigation and aeration process these buildings must be indicated on the site map and be located outside the fumigation zone. A fumigant gas monitoring station must be placed immediately outside of the outbuilding and between it and the building under fumigation.
Other features off-site, outside the fumigation zone	Indicate the shortest distances from the outside wall of the fumigated building(s) to other buildings, roads, public parks, etc. immediately outside the fumigation zone. Indicate the purpose/use of buildings immediately outside the fumigation zone (e.g., type of facility/name of commercial establishment/residence). Provide similar details of any other nearby building that may be impacted during the aeration process. For example, indicate the presence of a high-rise residential building nearby to the fumigation/aeration of a multi-story mill.
Aeration points	Indicate the location, size, and capacity of exhaust systems (e.g., 40 cm 18,800 ft^3/m or CFM (32,000 m^3/hr) roof exhaust fan), the location of shipping doors or other sites where aeration of fumigant gas from the building will occur.
Fan locations	Indicate the locations of any fans used during the fumigation process. Include the wind direction of the fans.

3.5 Detailed Floor Plans

Plans of each floor level of the building(s) under fumigation must be provided.

- For all fumigant types:
  - Identify the location of gas introduction site for each floor,
  - Indicate locations of indoor fumigant gas monitoring stations (e.g., one sampling line for every 5000 m^3),
  - Provide locations of rooms, equipment, doors, staircases, and elevators, and
  - If the building will be aerated in sections (staged aeration), designate each section on the floor plan.
- If using MBr, also provide the following information:
  - Fan placement and air flow direction (at least one 40 cm fan for every 1400 m^3)
  - Fumigant gas cylinder size and direction of travel for the fumigators releasing the fumigant gas if internal gas release is used. Note: this is a higher risk activity, external release of the gas through shooting lines is recommended.
- If using SF, also provide the following information:
  - Fan placement and air flow direction (label may recommend one fan for

each 2000 m^3 and at least one fan for each area or floor level).

- If using PH_3 /CO_2, also provide the following information:
    - Fan placement and air flow direction (label may recommend low speed fans distributed evenly, placed on the floor, and angled upwards).

3.6 Pre-Fumigant Gas Release Procedures

Outline the pre-fumigant gas release procedures in the order they will occur. Please include, if applicable, the following information:

- Copies of notification letters for the local fire and police departments and the local Medical Officer of Health and owner/representative of the building(s) under fumigation. The notification letters must include the information prescribed in Ontario Regulation 63/09 Section 60(3) and be dated and delivered up to seven days, but not less than 24 hours, before the fumigant gas release (see Section 3.14 of this handbook).
- If adjacent buildings or public areas such as parks, sports fields, boat or other watercraft docking sites are outside of the fumigation zone, but in close proximity to the fumigation zone, good fumigation practices will determine if these require securing to prevent public access. If these areas are secured and access is required for any portion of the fumigation process, or if extending the fumigation zone results in road closures, then provide copies of letters, sent by the fumigator to relevant local authorities/property owners requesting access/temporary control. Also provide copies of approval letters signed by the owner/custodian of the adjacent property or road indicating that occupancy of the adjacent property or road is permitted. The time period for access/temporary control (e.g., for the entire fumigation and aeration, only the aeration, etc.) must be specified. Include copies of any relevant municipal by-laws that may be required for a road closure.
- Identify security measures that will be in place (e.g., number of guards, placards on fumigated buildings and adjoining or adjacent buildings within the fumigation zone, illumination of placards, locks etc.). Specify how and where barricades will be set up and secured to ensure public access is prevented.
- Specify the sealing procedures for doors, windows, tunnels, roof ventilation, drains, holes in corrugated metal walls due to missing rivets/rust etc., or other materials that the fumigant gas can penetrate. Provide specifications on tarpaulins (e.g., >4 ml single-use plastic tarpaulins are required if using SF), sealing tape and foam.
- If the building is to be aerated in stages, section by section or floor by floor, outline how each section/floor will be sealed to allow a staged aeration.
- If MBr inside release is used, describe cylinder preparation (e.g., use of curved pipes or T fittings), dry run procedure and safety equipment check as appropriate.
- List monitoring equipment that will be used to detect leakage, and to monitor and record fumigant gas concentrations inside the building and in outdoor air.

- If using PH_3/ CO_2 also include indoor air monitoring equipment for carbon dioxide measurement prior to re-entry.
- Include a statement from the manufacturer or manufacturer's specifications for the equipment to be used for monitoring fumigant concentrations outdoors at the fumigation zone and for re-entry. Ensure the equipment can detect gas concentrations at the range and resolution needed to comply with the product label re-entry concentrations indicated in Table 5 of Section 3.13. The equipment must also accurately measure gas concentrations at or below the occupational exposure limits for workplaces set by the Ontario Ministry of Labour, Immigration, Training and Skills Development under the *Occupational Health and Safety Act.*

- Provide the date of the last calibration of monitoring equipment and a signed statement, from the person who performed the calibration, confirming this calibration was performed in accordance with the manufacturer's recommendations.
- Provide a list of back-up supplies in the event of equipment failure.

3.7 Fumigant Gas Release Procedures

Outline the fumigant gas release procedures in the order they will occur. Please include, if applicable, the following information:

- Details on the use of fans (e.g., when fans will be turned on and off or if they will be left running continuously) and how they are controlled.
- Description of fumigant gas release sequence (e.g., floor to floor and building to building as applicable). If indoor release for MBr is used, provide the location of the cylinders and the route the fumigators will take to release the gas.
- Description of the fumigant gas leak detection process and how any leaks will be sealed.
- A brief emergency response plan (include Spills Action Centre, notification of emergency services, etc.).

3.8 Indoor Air Monitoring of the Fumigation

Indicate how indoor fumigant gas concentration, ambient air temperature, commodity temperature (if required by label), and relative humidity readings will take place. Include monitoring intervals (see Table 2 for recommendations). The proposed monitoring intervals will become part of the permit requirements. For MBr, users must follow the work time restrictions and air monitoring schedule specified in the label. They also must discuss the specific air and temperature monitoring equipment requirements with the registrant prior to fumigation.

Table 2: Recommended Monitoring Intervals - Indoors

Fumigant	Required Concentration of Fumigant Gas Monitoring	Relative Humidity, Ambient Indoor Air, and/or Commodity Temperature Monitoring
▪ MBr	• Immediately after gas release and every 15 minutes for the first hour; and then • every hour until aeration is complete.	• Immediately after gas release and every 15 minutes for the first hour; and then • every hour until aeration is complete.
▪ SF ▪ PH_3/ CO_2 ▪ MgP (generator)	• Immediately after gas release and every 15 minutes for the first hour; • every hour for the initial six hours; • every two hours for the next six hours; • every four hours for the remaining exposure time; and then, • at least every 30 minutes until aeration is complete	• Immediately after gas release and every 15 minutes for the first hour • every hour for the initial six hours; • every two hours for the next six hours; and then, • every four hours for the remaining exposure time (monitor until end of aeration for low temperature fumigations when aerating/re-heating/re-aerating the building).
▪ AlP or MgP (tablets/ pellets/ sachets)	• Immediately after introduction of the tablets/pellets/sachets; • six hours after the introduction of the fumigant gas; and then, • every 12 hours during the remaining exposure time, and then, • at least every 30 minutes until aeration is complete.	• Immediately after introduction of the tablets/pellets/sachets; • six hours after the introduction of the fumigant gas; and then, • every 12 hours during the remaining exposure time.

3.9 Outdoor Air Monitoring during the Fumigation

- Include a description of the location(s) where monitoring for outdoor air fumigant gas concentrations will occur during gas release, while the gas is being held in the building, and until the airing out is complete (e.g., downwind and along the fumigation zone). Note that depending on the proximity of occupied residential homes or businesses outside the fumigation zone it may be necessary to monitor fumigant gas concentrations along the other fumigation boundaries as well, regardless of wind direction. Include monitoring intervals (see Table 3 for recommendations). The proposed monitoring intervals will become part of the permit requirements.
- Provide procedures/equipment for outdoor temperature readings, wind speed and direction, weather conditions, and relative humidity monitoring locations and

frequency.

- If other buildings on the premises are outside the fumigation zone and are to be occupied or re-entered during the fumigation (e.g., guard houses, maintenance buildings, etc.), provide details of how fumigant gas monitoring of these buildings will be carried out and any evacuation procedures required.
- In the event the fumigation zone must be extended, provide details on where it will be established and where monitoring will occur.

Table 3: Recommended Monitoring Intervals – Outdoors

Fumigant	Wind direction/speed and fumigant gas concentrations along the **fumigation zone perimeter,** during the fumigation and aeration period, should occur:
▪ MBr ▪ SF ▪ PH_3/CO_2 ▪ MgP (generator)	▪ regularly during gas release, then ▪ once every half hour for the next two hours, then ▪ once every hour for the next two hours, then ▪ once every four hours until aeration commences, then ▪ regularly during aeration until airing out is complete.
▪ AlP or MgP (tablets/ pellets /sachets)	▪ regularly for one hour, commencing six hours after pellet/tablet/sachet introduction, then ▪ once every six hours, then ▪ regularly during aeration until airing out is complete.

Table 4 outlines the fumigant gas concentrations readings that must not be exceeded, at or beyond the fumigation zone, at any time, during the entire fumigation process (including aeration). The MECP uses the label re-entry concentrations. The fumigator must also be aware of the occupational exposure limits set by the Ontario Ministry of Labour, Immigration, Training and Skills Development for people working in fumigated areas.

Table 4: Maximum Gas Concentrations – Outdoors

Fumigant	**Fumigant gas concentrations at or beyond the fumigation zone during the entire fumigation process** **(ppm)**	**Time period**
MBr	1.0	At any time
SF	1.0 (1-hour period) OR 5.0 (30-minute period)	Specific
PH_3	0.1 for any PH3 or 5,000 for CO_2	At any time

3.10 Aeration Procedures

Include a statement that aeration will not occur under temperature inversion conditions. A temperature inversion is a thin layer of the atmosphere where the decrease in temperature with height is much less than normal (or in extreme cases, the temperature increases with height). An inversion, also called a "stable" air layer, acts like a lid, keeping normal convective overturning of the atmosphere from penetrating through the inversion. This can cause several weather-related effects such as the trapping of a fumigant gas below the inversion.

- If available, provide the rate of air exchange for the building under fumigation based on the use of the exhaust systems (i.e., the number of times that the outdoor air replaces the volume of air in a building per unit time, typically expressed as air changes per hour or the number of times that the exhaust system replaces the air within a room or area within the building).

- A detailed description of the aeration procedure that will be used based upon wind direction. Provide a scenario for north, south, east, and west and any other direction (e.g., north-east, south-west etc.) depending on proximity of adjacent buildings. Describe the process if the aeration is to be:
  - **Controlled**: using one or two doors and windows, roof exhausts and/or creating a chimney effect. Indicate which exhaust system unit(s) will be used, taking into account the rate of air exchange of these units, so as not to aerate the building in too short a time and risk exceeding the acceptable outdoor air fumigant gas concentration. One method to control the rate of fumigant gas release is opening an up-wind shipping door and, using remote control, turning a single roof exhaust fan (selecting the smallest unit) on and off every 10 minutes for the initial two hours of aeration; and/or
  - **Staged**: if several separate buildings are involved in the fumigation, or, if the building is divided into sealed sections, and only one building or section is aerated at a time. Note: the outdoor air fumigant gas monitoring timetable must be carried out for each building or section before aerating the subsequent buildings or sections.

- If the outdoor temperatures are low and the fumigant label allows use under low temperature conditions, provide a detailed description of how the building will be aerated (i.e., an aerating, re-heating, and re-aerating timetable).
- If other buildings on the premises are outside the fumigation zone and are to be occupied or re-entered during the aeration (e.g., guard houses, maintenance buildings etc.), provide details of how fumigant gas monitoring of these buildings will be carried out during the aeration process and evacuation procedures required in case of any emergency.

- Outline in detail how the aeration process will be stopped if outdoor air fumigant gas concentrations approach the values indicated in Table 4.

3.11 Outdoor Air Monitoring during the Aeration

The supporting documentation must state that outdoor air fumigant gas monitoring will be conducted downwind along the fumigation zone during the aeration. Regular monitoring must be carried out during the entire aeration process until it is completed. The times and locations for the monitoring must be specified. Sensitive areas (e.g., buildings or other identified sensitive receptors), may require the exterminator to monitor these locations regardless of wind direction during aeration.

3.12 Air Monitoring Record Keeping Procedures – All Stages of the Fumigation

Record keeping requirements for the product label must be followed. At a minimum the date, time, monitoring location, and gas concentrations must be recorded. The permit conditions may outline additional requirements for record keeping.

3.13 Re-entry Procedures

Aeration is determined to be complete when appropriate equipment is used to ensure concentrations of fumigant gas throughout the fumigated building(s) are at or below the established re-entry concentration, in addition to following any minimum aeration time periods specified on the label. Re-entry concentrations are outlined in Table 5. Provide the procedures that will be used to ensure the fumigation site meets the requirements for safe entry.

Under the *Occupational Health and Safety Act* administered by the Ontario Ministry of Labour, Immigration, Training and Skills Development, employers are required under section 4 of Regulation 833 to limit the exposure of workers to specified hazardous biological or chemical agents (such as fumigants). Licensed exterminators should be aware that these limits are set for the protection of workers in the workplace and the Time-Weighted Average Limit (TWA), Short-Term Exposure Limit (STEL), and Ceiling Limit (C) must not be exceeded. For information on how to calculate the Time-Weighted Average Exposure Values (TWAEV), refer to Schedule 1 of Regulation 833. Occupational exposure limits for specific fumigants can be found by referring to the alphabetical listing available online: Current occupational exposure limits for Ontario workplaces under Regulation 833 | ontario.ca.

Table 5: Re-entry Concentrations

Fumigant Gas	Re-entry Concentrations (ppm)
Methyl Bromide	Below 1.0
Sulfuryl Fluoride	Below 1.0
Phosphine	Below 0.1

Carbon Dioxide	Below 5000

3.14 Notification Letters

Provide copies of the notification letters which will be sent at least 24 hours, but not more than seven days, before the starting date of the proposed fumigation to the following parties:

- The owner or a representative of the owner of the building where the fumigation is to be performed and, if the building contains one or more dwelling units, to every occupant 16 years of age or over of every dwelling unit.
- The owner or a person apparently in charge of every building:
  (a) physically attached to the building(s) where the extermination is to be performed,
  (b) on the same parcel of land as the building(s) where the extermination is to be performed, and
  (c) where the extermination constitutes an actual or potential hazard to the occupants.
- The Medical Officer of Health, the police service, and the fire department responsible for the area in which the extermination is to be performed.

Each notification letter must include the following information:

- the address where the extermination is to be performed;
- the name of the licensed exterminator and the exterminator's emergency phone number;
- the pesticide being used;
- the date when it is proposed to perform the extermination; and,
- occupants are to vacate and remain out of the building(s) where the extermination is to be performed, and every building physically attached to that building, during the periods of extermination and airing out.

A letter must be provided to the facility owner/operator/manager that includes the following:

- A statement that the purpose of the letter is to provide an opportunity for the facility to consult with occupational health and hygiene experts to ensure the fumigant gas concentration does not exceed the limit for workers in the workplace.
- A statement of the occupational exposure limit set by Ontario Ministry of Labour, Immigration, Training and Skills Development for the fumigant as prescribed in Ontario Regulation 833 of the *Occupational Health and Safety Act*.

- A statement indicating the concentration of fumigant gas that will be considered appropriate for re-entry.

3.15 Checklist for Space Fumigation Permit Applications

- ☐ Completed Application for a Permit to Use a Pesticide for Structural Pest Control (signed and dated)
- ☐ Record of pest management procedures
- ☐ Calculations
- ☐ Detailed site maps
- ☐ Detailed floor plans
- ☐ Pre-fumigant gas release procedures
- ☐ Fumigant gas release procedures
- ☐ Indoor air monitoring procedures during the fumigation
- ☐ Outdoor air monitoring procedures during the fumigation
- ☐ Aeration procedures
- ☐ Outdoor air monitoring procedures during the aeration
- ☐ Re-entry procedures after aeration is complete
- ☐ Notification letters
- ☐ Letter to facility owner/operator/manager with required information on TWAEV
- ☐ Recent calibration records of monitors to be used and detection limits
- ☐ Date and number each page

3.16 Final Report Requirements

Ontario Regulation 63/09 subsection 60(7) requires the exterminator to notify the Director under the Act within seven days of the completed fumigation and advise if any unexpected or adverse consequences occurred. As a condition of the approved permit the Director will require specific information be provided to the Regional Pesticides Specialist by e-mail. This information may include:

- Indoor air fumigant gas monitoring data and graphs showing fumigant gas concentrations and temperature, and relative humidity levels for free air space on all floors in the structure and within infested commodities (if appropriate). Include times when any spare gas was introduced.
- Outdoor air fumigant gas monitoring data showing fumigant gas concentrations from the time of fumigant gas release to the end of the aeration process. Include the monitoring locations, wind speed and direction, temperature, relative humidity, and weather conditions.
- For methyl bromide and sulfuryl fluoride permits, a graph plotting indoor fumigant

gas concentration (g/m^3) vs time (hours) and a calculation of the cumulative CT (g·hours/m^3) for each sampling line.

- Total amount of fumigant gas (in kg) used.
- A statement indicating that fumigant gas concentrations inside all rooms of the fumigated building(s) and, if appropriate, any adjoining and/or adjacent building(s), were assessed to determine whether airing out was complete before allowing re-entry.
- If any commodities require extended aeration include a statement that this procedure was carried out.
- Any additional information requested in the approved permit conditions.

4.0 Grain Elevator Fumigations: Supporting Documentation Requirements

Fumigations that cannot conform to the exemptions will require a permit from the MECP. Grain elevator fumigation locations are often large country point or terminal point grain elevators where workers are present in the basement and silo/ bin floor areas within the fumigation zone while the gas is being held in the silos/ bins. For these facilities, a permit can be issued for multiple fumigations over the duration of the permit period.

Submit your permit application and supporting documentation to the appropriate Regional Pesticides Specialist. The information provided in the supporting documentation can serve as a fumigation management plan. The following sections outline the supporting documentation requirements. Please date and number each page and use the checklist provided to ensure the package is complete.

4.1 Facility Operations

Describe the grain handling process at the facility: from delivery to storage in silos or bins, removal from storage, and selection of silos/bins to be fumigated. Include how long it takes to fill silos/bins, whether filling or emptying occurs over several days, and the criteria for choosing silos/bins for fumigation.

4.2 Calculations

Provide the calculations for each fumigation site (e.g., grain bin/concrete vertical silo, flat house etc.) that will be fumigated. Include the volume of the structure, dosage rate

of the fumigation and total amount of fumigant required by the product label. The calculated amounts can be a range to allow for higher concentrations if needed. For permits submitted to conduct a single fumigation, provide the calculations used to determine the amount requested in the application form. Permit applications for multiple fumigations over the permit period do not require the total amount of fumigant to be entered, as it may not be known how often fumigations will be required.

4.3 Integrated Pest Management

Outline all the pest management procedures that are carried out at the facility to manage pest populations. Fumigation should not be a substitute for proper sanitation and good housekeeping and should be used as a last resort. Pest populations can be reduced if the proper methods of handling, storing and processing are followed. Provide information on how effective these methods have been for controlling pests and why fumigant use is needed. Specify if there are fumigant use requirements for any imports/exports.

4.4 Record of Mandatory Training for Employees

When applicable, provide records of mandatory annual training specified on the label provided to employees regarding fumigant use at the facility. The ministry may request a copy of the training material. The training material must meet the requirements for mandatory training found on the product label.

4.5 Detailed Site Maps

The site maps must include the information outlined in Table 6. Examples provided in appendix 1.

Table 6: Map Features and Description for Grain Elevator Silos/Bins, Flat Houses, etc.

Map Feature	Description
Compass direction	Indicate North on every map submitted.
Location of fumigation site(s)	The fumigation site is the silo, grain bin, or other storage structure where the fumigant gas will be applied. The map must identify locations of all fumigation sites that may be in use during the permit period.
Fumigation zone and locations of fumigation zone extension if needed.	The fumigation zone is a marked area around the fumigation site to prevent unauthorized access. An extended fumigation zone may be required in the event outdoor fumigant gas concentrations exceed the product label requirements. Review the product label for fumigation zone distance requirements.
Work areas near fumigation site/ inside the fumigation zone	Identify all areas near the fumigation site or within the fumigation zone (if required by product label) that may be occupied during the fumigation process. Include air monitoring locations that will be used when the fumigant gas is being held in the fumigation site.

Other building(s) within the fumigation zone	Identify other buildings or structures that are within the established fumigation zone and indicate the shortest distance between the outside wall of the fumigation site and the outside wall of all surrounding buildings/structures not under fumigation but within the fumigation zone. Indicate the purpose/use of other buildings within the fumigation zone (e.g., warehouses, silos, grain bins, truck bays, weigh scales, etc.).
Other features outside the fumigation zone	Identify the location of any out-building(s) located on the premises that will be occupied or require access by any person(s) during the fumigation or aeration process. Note: these buildings must be located outside the fumigation zone.
Outdoor gas monitoring stations	Indicate the location of outdoor gas monitoring stations where gas concentration measurements will be taken down wind along the fumigation and/or extended fumigation zone, as well any other locations deemed appropriate by the exterminator (e.g., sensitive/high risk areas).
Weather monitoring station	Indicate the location of weather monitoring stations where temperature, relative humidity, and wind direction readings will be taken.
Ventilation points	Indicate the location of ventilation points within the fumigation site during the fumigation process (e.g., windows, fans, etc.).
Aeration points	Identify points where aeration of fumigation sites will occur such as grain bin/silo fans, transfer belts, doors, and windows.

4.6 Pre-Fumigant Gas Release Procedures

Outline the pre-fumigant gas release procedures in the order they will occur.
Please include, if applicable, the following information:

- Copy of the notice to be provided to company owners (if appropriate) and employees regarding the use of fumigant gas at the facility.
- Provide the procedure for inspecting grain bins/silos etc. to determine if the bins or other structures can hold the gas and are capable of being fumigated.
- Specify the sealing procedures for structures being fumigated. For example, sealing of bin top grain inflows, access hatches, vents, grain outflows, cracks, and any connections to adjacent bins. Provide specifications on tarpaulins and other equipment used for sealing the structure such as sealing tape, adhesive sprays, or foam.
- Provide the procedure to determine where the fumigation zones will be positioned around the fumigation sites. In situations where fumigation zones will be inside the facility, include locations where signage will be posted to mark the fumigation zone. Include contingency plans to extend fumigation zones if gas concentrations exceed the product label requirements during monitoring.
- If the product label allows for the omission of fumigation zones inside the facility based on all workers wearing detection equipment, provide the procedure used to

ensure all workers are trained to use the device and are familiar with the procedures if gas thresholds are exceeded. List monitoring equipment that will be used for gas detection at the fumigation zone, industrial hygiene monitoring and for personal protection. Include the detectors' upper and lower detection limits and alarm settings.

- Provide the date of the last calibration of monitoring equipment and a signed statement from the person who performed the calibration, confirming this calibration was performed in accordance with the manufacturer's recommendations.
- Provide a list of back-up supplies in the event of equipment failure.
- Provide locations where sign A will be posted at all fumigation sites.

4.7 Fumigant Gas Release Procedures

Outline the fumigant gas release procedures in the order they will occur. Please include the following information (if applicable):

- Details on how the fumigant will be introduced to the fumigation site. If using a dispenser system for solid formulations added to the grain, provide information on how the system is calibrated.
- The number of licensed fumigators present during fumigant introduction.
- If internal circulation is used inside grain bins or silos, include a description of how the system is sealed to assure no gas escapes.
- Include lock out procedures to ensure fumigation sites are not accidentally accessed. Lockouts may be either by computer lockout system or by physical lock.
- Description of fumigant gas leak detection process and how any leaks will be sealed.
- Description of fumigant monitoring procedure when fumigant is being introduced to the grain.
- Include the minimum and maximum time structures will be kept under fumigation.
- A brief emergency response plan (include Spills Action Centre, notification of emergency services, etc.).

4.8 Indoor / Outdoor Air Monitoring and Recording Procedures When Gas is Held in the Fumigation Site

Research has found that phosphine gas moves with air currents inside grain bins and silos. If grain temperatures are warmer than the outside air, the gas tends to move upward in the grain bin or silo. If grain temperatures are cooler than outside air, gas tends to move downward.

Consideration to gas movement due to temperature variation should be given when scheduling monitoring times and locations. Table 7 provides air monitoring recommendations when gas is held in the fumigation site when the fumigation zone is located inside a structure and Table 8 provides air monitoring recommendations when the fumigation zone is outdoors.

- Provide procedures for monitoring relative humidity and temperature and the frequencies that will be used for indoor and outdoor air.
- If a fumigation zone is required to be established, provide the procedure and schedule for air monitoring at the fumigation zone.
- If all employees are equipped with gas monitoring devices, provide the schedule and locations of air samples to comply with industrial hygiene monitoring requirements as per the product label.
- Note: If weekend shutdown periods occur when silos/bins are under fumigation, gas levels may build up on the top bin floor or in the basement if ventilation is restricted during these periods. Ventilation should be maintained if possible, and gas monitoring should be conducted prior to workers entering these areas after shutdowns.

Table 7: MECP Indoor Fumigation Zone Monitoring Recommendations

Fumigant	Measurements are taken around the perimeter of the fumigation zone:
AlP or MgP (tablets/ pellets /sachets)	■ 12 hours after introduction of the fumigant is complete then, ■ at least once in the morning prior to the beginning of the workday; and ■ at least once in the afternoon during the workday; and ■ according to any monitoring requirements on the permit.
Phosphine and Carbon Dioxide (PH_3 /CO_2)	■ regularly during gas; then ■ once every half hour for the next two hours to determine if any leaks are present; and ■ at least once 12 hours after gas release is complete; then ■ at least once in the morning prior to the beginning of the workday; and ■ at least once in the afternoon during the workday; and ■ according to any monitoring requirements on the permit.

Table 8: MECP Outdoor Fumigation Zone Monitoring Recommendations

Fumigant	Wind direction, speed, and gas concentrations are taken downwind along the fumigation zone:
AlP or MgP (tablets/ pellets /sachets)	■ 12 hours after introduction of the fumigant is complete; then, ■ at least once in the morning prior to the beginning of the workday; and

	■ at least once in the afternoon during the workday.
Phosphine and Carbon Dioxide (PH_3 /CO_2)	■ regularly during gas release; then, ■ once every half hour for the next two hours to ensure there are no excessive leaks; then, ■ at least once 12 hours after gas release is complete; then, ■ at least once in the morning prior to the beginning of the workday; and ■ at least once in the afternoon during the workday.

4.9 Aeration

Provide a detailed description of the aeration procedure that will be used for each type of structure, including the following information:

- A statement that aeration will not occur under inversion conditions.
- The number of licensed fumigators on site for the aeration process.
- A description of how aeration will be conducted (e.g., by transferring grain along a conveyor belt to a new bin, by exhaust fans at the base of the silo, etc.).
- Describe how the fumigation zone will be determined during aeration of the fumigation site, and how it may be extended if gas concentrations exceed limits according to the label at the fumigation zone. This distance is determined by the fumigator and must be of a sufficient distance to prevent impact to unprotected workers.
- If the fumigation zone cannot be extended, provide a procedure where the aeration can be slowed down to reduce the concentration of gas at the fumigation zone.
- Include air monitoring procedures in the fumigation zone during aeration for each fumigation site. Indoor locations will require monitoring around the perimeter of the fumigation zone and outdoor locations will require downwind monitoring along the fumigation zone (refer to Table 9 for recommendations). Also provide relative humidity and temperature monitoring for indoor and outdoor air during aeration and specify the frequencies.
- Provide the procedure used to ensure the entire fumigation site is clear of gas below the concentration required on the product label after the fumigation is complete.
- If aeration is done by transferring grain to another bin, provide the procedure used if only part of the bin is emptied, and aeration is done over multiple grain transfers.

***Important:** Ontario Regulation 63/09 under the *Pesticide Act* states that the fumigation is not complete until air samples taken throughout the structures are below the required re-entry concentrations. If a silo or grain bin is fumigated, the applicant must

demonstrate a method to determine that the gas levels within the entire silo/bin are below the required concentration.

Table 9: MECP Recommendations for Monitoring During Aeration

Fumigant	Air Monitoring Procedures
AlP or MgP (tablets/ pellets /sachets) And (PH_3 /CO_2)	■ Indoor: Regularly monitor gas concentrations along the perimeter of the fumigation zone until aeration is complete ■ Outdoor: Regularly monitor gas concentrations windspeed and direction downwind along the fumigation zone until aeration is complete

4.10 Air Monitoring Record Keeping Procedures – All Stages of the Fumigation

Record keeping requirements for the product label must be followed. At a minimum the date, time, monitoring location, and gas concentrations must be recorded. The permit conditions may outline additional requirements for record keeping.

4.11 Re-entry Procedures

Aeration is determined to be complete when appropriate equipment is used to ensure concentrations of fumigant gas throughout the fumigation site are below or at the established re-entry concentration, in addition to following any minimum aeration time periods specified on the label. Refer to the re-entry concentrations outlined in Table 5 of Section 3.13. Provide the procedures that will be used to ensure the fumigation site meets the requirements for safe entry.

Under the *Occupational Health and Safety Act* administered by the Ontario Ministry of Labour, Immigration, Training and Skills Development, employers are required under section 4 of Regulation 833 to limit the exposure of workers to specified hazardous biological or chemical agents (such as fumigants). Licensed exterminators should be aware that these limits are set for the protection of workers in the workplace and the Time-Weighted Average Limit (TWA), Short-Term Exposure Limit (STEL), and Ceiling Limit (C) must not be exceeded. For information on how to calculate the Time-Weighted Average Exposure Values (TWAEV), refer to Schedule 1 of Regulation 833. Occupational exposure limits for specific fumigants can be found by referring to the alphabetical listing available online: Current occupational exposure limits for Ontario workplaces under Regulation 833 | ontario.ca

4.12 Notification Letters

Provide copies of the notification letters which will be sent at least 24 hours, but not more than seven days, before the starting date of the proposed fumigation to the following parties:

- The owner or a representative of the owner of the building where the fumigation is to be performed.

- The owner or a person apparently in charge of every building,
  (a) physically attached to the building(s) where the extermination is to be performed,
  (b) on the same parcel of land as the building(s) where the extermination is to be performed, and
  (c) where the extermination constitutes an actual or potential hazard to the occupants;
- The Medical Officer of Health, the police service, and the fire department responsible for the area in which the extermination is to be performed.

Each notification letter must include the following information:

- the address where the extermination is to be performed;
- the name of the licensed exterminator and the exterminator's emergency phone number;
- the pesticide being used;
- the date when it is proposed to perform the extermination; and,
- unauthorized personnel are to vacate and remain out of the fumigation zone where the extermination is to be performed, during the periods of extermination and airing out.

A letter must be provided to the facility owner/operator/manager that includes the following:

- A statement that the purpose of the letter is to provide an opportunity for the facility to consult with occupational health and hygiene experts to ensure the fumigant gas concentration does not exceed the limit for workers in the workplace.
- A statement of the occupational exposure limit set by Ontario Ministry of Labour, Immigration, Training and Skills Development for the fumigant as prescribed in Ontario Regulation 833 of the *Occupational Health and Safety Act*.
- A statement indicating the concentration of fumigant gas that will be considered appropriate for re-entry.

4.13 Grain Elevator Checklist

Submit your permit application and support documentation to the appropriate Regional Pesticides Specialist and use the checklist below to ensure the package is complete.

- ☐ Application for a Permit to Use a Pesticide for Structural Pest Control
- ☐ Calculations
- ☐ Record of pest management procedures

- Records of mandatory employee/contractor training
- Detailed site maps
- Pre-fumigant gas release procedures
- Fumigant gas release procedures
- Indoor/outdoor air monitoring when silos/grain bins are under fumigation
- Aeration procedures
- Indoor/outdoor air monitoring procedures during aeration
- Re-entry procedures after aeration is complete
- Notification letters
- Letter to facility owner/operator/manager with required information on TWAEV
- Recent calibration records of monitors to be used and detection limits
- Date and number each page

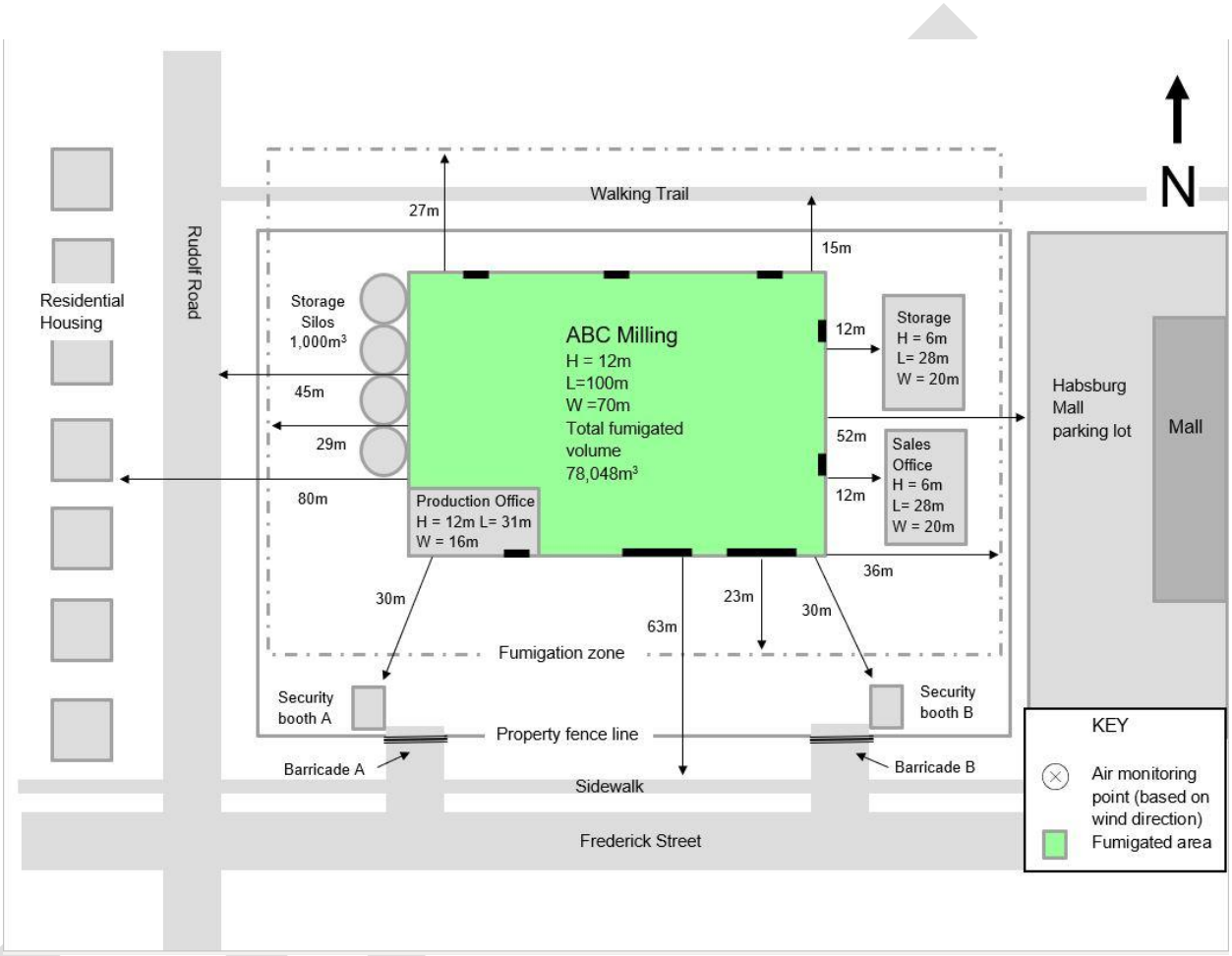
4.14 Yearly Summary Report Requirements

The information required in the yearly report will be outlined in the permit conditions. Examples of summary report requirements are provided below:

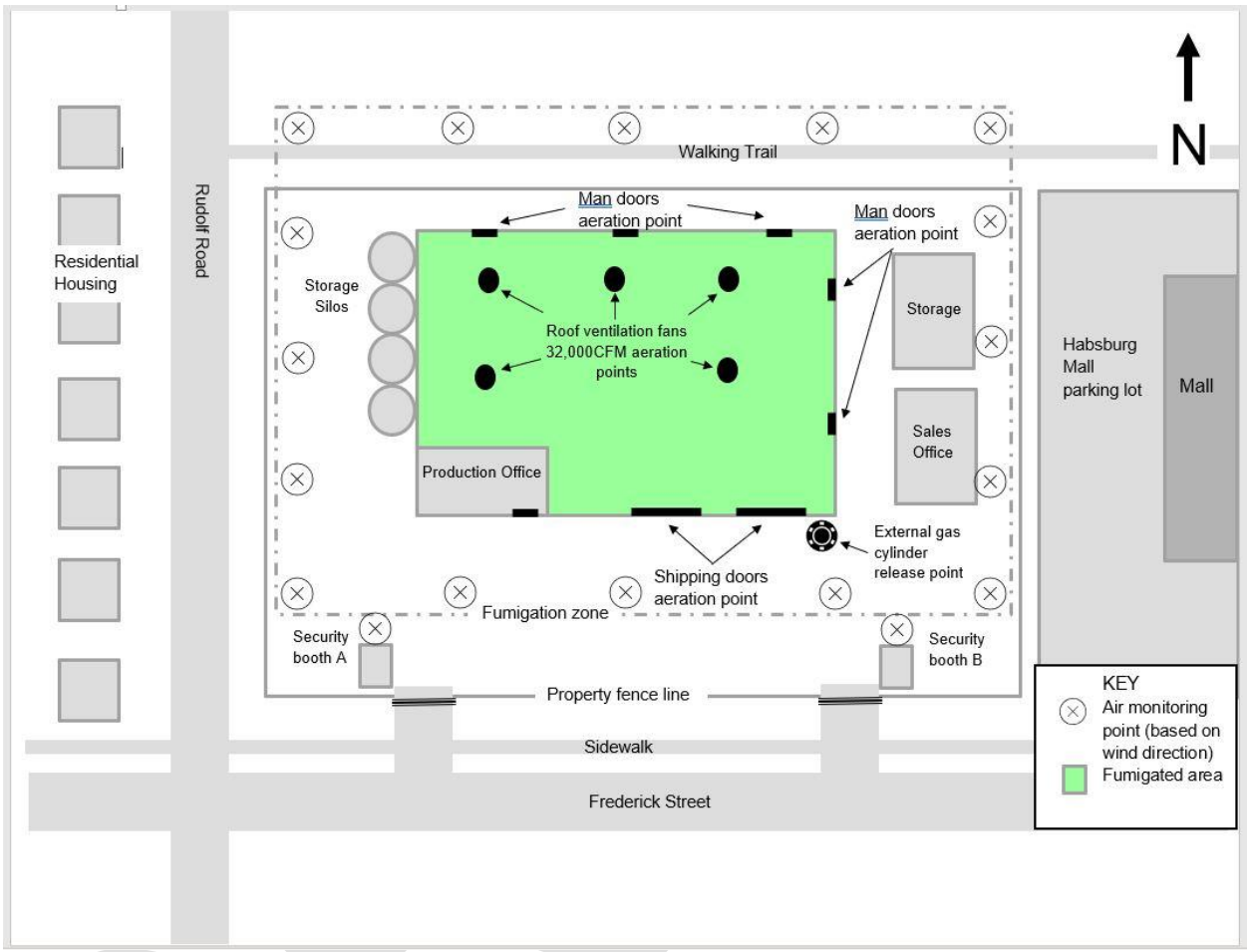
- A copy of the written notification to the management of the Company describing the occupational exposure limit set by Ontario Ministry of Labour, Immigration, Training and Skills Development for the fumigant.
- The total number of silos/bins fumigated during each month.
- The total number of pellets and total amount (in kg) of pesticide used in each silo/bin fumigation.
- The total amount (in kg) of pesticide used during each month.
- Any unexpected or adverse consequences that arose during any fumigations.

Appendix A: Example Space Fumigation Site Maps

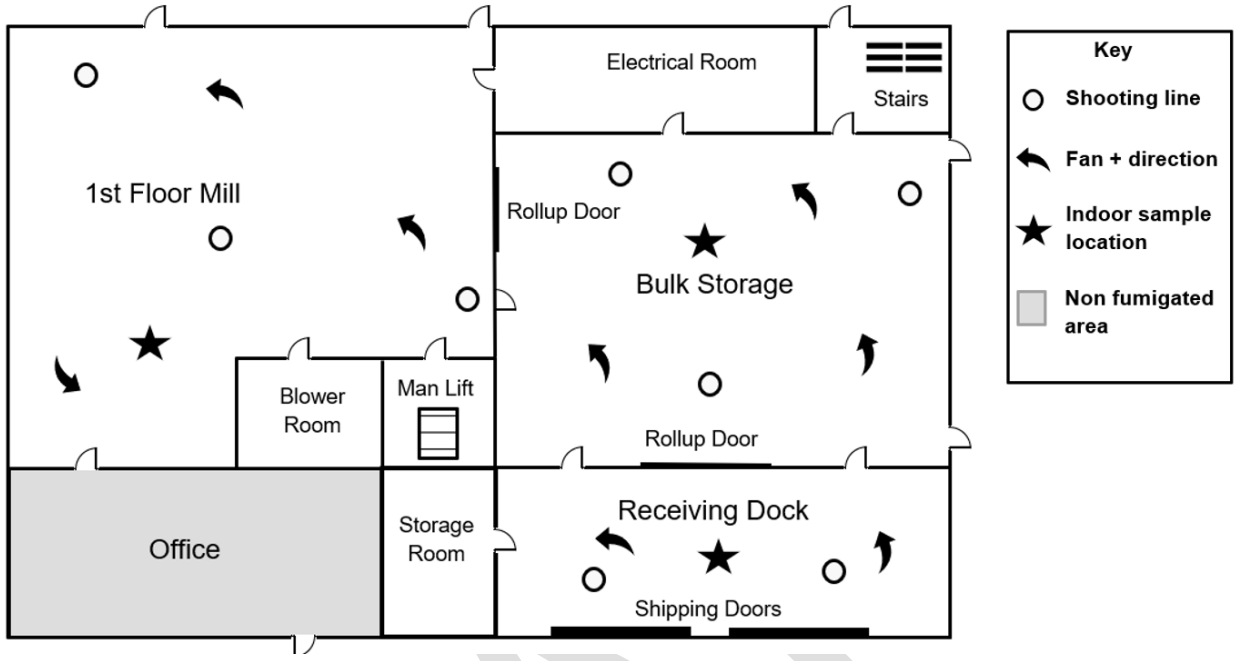
Outdoor map elements: identification of surrounding buildings and spaces, volumes of buildings and distances from fumigated structure.



Outdoor map elements: monitoring locations, aeration points, security booth, barricade and fumigation zone.



Indoor map elements



Appendix B: Example Grain Elevator Fumigation Maps