

abattoirs

Plant Construction, Equipment and Operation Guidelines

To Qualify for Licensing under the *British Columbia
Meat Inspection Regulation*



BC Centre for Disease Control
AN AGENCY OF THE PROVINCIAL HEALTH SERVICES AUTHORITY

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A. Inspected Meat & Meat Products in British Columbia

A subject of interest to consumers is the assurance that all meat and meat products are properly inspected for safety and wholesomeness.

There are two types of meat inspection service. One is in registered abattoirs that qualify for federal inspection and the second is those that qualify under the provincial inspection system. Before abattoirs can qualify for either inspection service, specific standards of construction must be met through approval of detailed blueprints and plans. In British Columbia, the BC Centre for Disease Control contracts with the Food Production and Inspection Branch, Canadian Food Inspection Agency to provide inspection of abattoirs under provincial inspection. This booklet identifies the procedures and guidelines to qualify an establishment for the provincial program.

There are three matters associated with meat inspection that must be clearly understood:

1. Meats inspected under the provincial program are not eligible for export, nor are they allowed to enter plants under federal inspection.
2. It is important that the inspection of meat for wholesomeness not be confused with the grading of meat. Grade terms such as "Canada A1" on beef, are used as indications of quality and are dependent upon the conformation and finish of the carcass.
3. There are many slaughterhouses licensed under the *Provincial Stock Brands Act*. These slaughterhouses are licensed in order that the operators can be forced to keep records of cattle purchases for use by law enforcement agencies in cases of rustling. This license is not associated with inspection of carcasses in relation to food safety.

B. General Principles Utilized in the Development of Guidelines

The principles applied to the development of guidelines for meat slaughter and primary processing plants have included:

1. The role of government, either Federal or Provincial, should be to monitor food operations and products to determine and to ensure food products are produced, processed, transported, stored and offered for sale under acceptable sanitary conditions, and food products must be safe for human consumption.

The role of industry includes complete responsibility for production, processing, transportation and sale of food products under acceptable sanitary conditions and ensuring safety for human consumption.
2. The guidelines should be related to health and safety requirements acceptable in Canada and not related to additional demands placed on operations by importing countries. This is considered to be the main difference between Provincial Standards, and Canada Export Standards.
3. The guidelines should be clearly defined for the benefit of both the industry and the consuming public, and it is the responsibility of the regulatory agency to justify and support prescribed standards in a meaningful way.

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4. At the outset of any program that relates to application of standards, it is reasonable that the standards should be applied, in total, to all new plants. With respect to existing plants, it is possible to apply negotiated time frames for standards other than those directly related to consumer health and safety.
5. It is essential that the standards/legislation for the humane treatment of food animals be applied to all meat slaughter plants. There may be certain adjustments required on methods of application, but the intent and principles must remain intact.
6. The main emphasis should be placed on the purpose and intent of the legislation and standards. There should be sufficient flexibility in application of guidelines to enable incorporation of newer methods and techniques, and to accommodate proposals for change where the purpose and intent can be maintained.
7. There should be a process established whereby industry in particular, and the consuming public in general, is permitted a continuing review of the standards prescribed and efforts made to accommodate any valid proposals for change.
8. There are provincial and municipal requirements with respect to meat slaughter plants, which are not specifically related to the development of these guidelines. It is assumed that, in addition to these guidelines, the general laws of the land apply.

C. Planning and Locating Meat Plants

Site and Location

Prior to site selection, plan development, and plant construction, it is essential that all regulatory requirements of Municipal, Provincial and Federal governments are known. In many instances the initial action will be assuring that land use and zoning requirements, as well as building codes are recognized. It is important that land use conflicts or potential conflicts be recognized and addressed at the outset. Also of importance is early consideration to proposed means of water supply and waste disposal systems. This is of particular importance where municipal water and waste disposal systems are not available.

In addition to the requirements that relate to zoning and land use, including approval of the Health Authority, plants should be located at a site which is free from conditions that might interfere with the sanitary operation of the plant; (e.g., set reasonably apart from barnyards, stables, dead meat operations other than approved rendering operations, waste disposal facilities and offensive trades).

NOTE: Since there are specific technical considerations with respect to site selection, design, construction, equipment, and operation of slaughter plants, it is recommended that operators proposing new plants or major revisions to existing plants retain the services of consultants knowledgeable in the packinghouse industry.

Application for Approval

Application for approval for a provincially licensed slaughter plant should be made through:

Director, Food Protection Services, BC Centre for Disease Control, 655 12th Ave W, Vancouver BC V5Z 4R4, 604-660-5357. The application form can be viewed and printed at <http://www.BCCDC.ORG/content.php?item=144>.

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Application Detail

A plan, covering the following details, must be submitted with the formal application:

- (a) A plot plan showing the boundaries of the plant property; location of the plant in respect to other buildings or structures; streets; driveways and parking sites including drainage systems and surfacing materials (e.g., gravel, pavement, etc.); railway lines; sewer lines; gas and water mains; and power lines. The scale and the north point should be shown;
- (b) A floor plan of each level of the plant, showing the purpose for which each room is to be used, location of walls, partitions, windows, doors, posts, conveyor rails and all equipment (including draw-off fans, refrigeration units, hose bibs, sanitizers, and hand-wash stations);
- (c) A floor plan showing location and size of floor drains, location and size of direct drains for pieces of equipment using large amounts of water; curbing, gutters and slope of floor towards drains, and the hot and cold water outlets;
- (d) The exterior elevations of the building, showing doors, windows, and platforms;
- (e) A cross section of the plant showing ceiling and rail heights;
- (f) A roof plan showing skylights, vents, drainage and other pertinent information;
- (g) A schedule of room "finishes" must be on or attached to the plans, including a schedule of door sizes, construction and type of door frame; lighting intensity for each room;
- (h) An equipment layout with accompanying "flow charts" of operations. The design and construction of the equipment must be shown and, where necessary, cross-sections provided to show method of construction and operation; and
- (i) Where the plans refer to significant alterations or changes within an existing plant, the existing layout and construction should be attached to explain the nature, extent, and effect of proposed changes.

NOTE: The plans, as submitted, must also include the following information:

- (a) The sewage disposal system to be used (e.g., municipal or private), and preferably, documentation of approval from the approving agency.
- (b) The ventilation system proposed for the plant.
- (c) The procedures for humane slaughter.
- (d) The procedures for blood collection or disposal.
- (e) Complete details of the water supply. The source and water treatment, where necessary, must be described. Professionally engineered water systems may be required depending on source and type of meat products being produced. Documentation from the local Health Authority verifying it has no objection to the plant's potable water supply.
- (f) The method of handling and disposal of inedible and condemned products is to be identified.
- (g) The ambient temperature of reduced temperature rooms.

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D. General Plant Construction Standards

Materials used to construct the plant should be strong, durable, and promote maintenance inside and out. Masonry and steel construction have proven to be the most acceptable.

Floor, wall, and ceiling material, as well as coatings and joint sealant must be of an approved type. Generally, they must form a durable, smooth, impervious surface, which is readily cleanable.

Finishing materials must be those approved in Part B of the Meat Hygiene Manual, Agriculture and Agri-Food Canada, or demonstrated equivalent.

Floors

All workroom floors must be coved and constructed of hard impervious material such as, dense acid resisting, non-dusting, and waterproof concrete, and graded 1-2 cm/m to the drains.

Freezer floors must be provided with adequate insulation to prevent frost penetration into the underlying soil.

Since plant construction generally determines the plants capability to meet acceptable operating conditions, floor construction is a major consideration, and must be properly designed to eliminate future problems.

Drains

An adequate number of floor drains must be provided in all areas of the establishment. The number and location of drains is determined by the design and volume of the operations. All drain lines must be sloped, deep seal-trapped, properly vented to the outside air, and equipped with effective rodent screens. Floors must slope uniformly to drain inlets, with no low spots that could collect liquids. In critical areas, overhead drain lines should be avoided.

As a general rule, one drain inlet, 30 cm x 30 cm or equivalent, should be provided for each 40 m² of floor space. The number of drain inlets and their size should be increased in areas of high water usage to provide for constant removal of fluid wastes. Direct drainage must be provided for equipment discharging large volumes of water in order to prevent flooding of surrounding areas.

Where several 10-cm drainage lines discharge into one trunk line, the trunk line must be proportionately larger in order to effectively handle the fluids discharged into it.

Properly constructed valley drains are permitted if installed as an integral part of the floor. Properly sloped gutter or channel drains are also permitted if constructed of an acceptable material (metal or vitreous tile) and covered with removable sectional grated covers. These sectional covers should not be longer than 120 cm.

NOTE: All drains must be constructed of a material approved by the National Building Code. As well, all plumbing and drainage must comply with applicable local plumbing and building codes.

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Walls and Ceilings

Walls and ceilings must be smooth, level, hard and consist of impervious material such as acceptable prefabricated panels, and be free from pitting, indentations, cracks, crevices and ledges. All corners and junctions of walls and floors must be coved in the kill floor, coolers, condemned and processing areas, and other areas subject to frequent cleaning and moisture. Ceilings should be at least 3.3 m in height. Ceilings of rooms intended for livestock receiving, slaughtering and dressing should be at least 4.8 m in height. All mortar joints must be smooth and flush. Scoring cement plaster walls should be discouraged. To promote light reflection and sanitation, wall and ceiling surfaces should be white or light-coloured.

Whenever practical, materials that do not require painting should be used. Materials that are absorbent and difficult to keep clean must not be used. Examples of unacceptable materials include wood, plasterboard and porous acoustic-type boards. Walls should be provided with suitable sanitary-type bumpers or sloped curbs to protect them from damage by hand trucks or lifters.

Windowsills should be at least 1 m from the floor to avoid damage on impact from chill tanks, lifters and hand trucks.

Ceilings of interlocking, rust-resistant metal sheeting, such as heavy gauge, heavy-duty, galvanized steel, anodized aluminium or stainless steel are permitted if fastened to the metal infrastructure by acceptable means. When galvanized metal is used, the zinc coating must be at least ASTM A525 grade G-90. Open joist construction of ceilings is permitted, provided joists are treated to prevent rusting, corrosion, dust accumulation and can be readily cleaned and sanitized.

Rails in the establishment must be properly designed and constructed. The following table outlines minimum rail heights and configurations depending on species in the various sections of an establishment.

RAIL HEIGHT GUIDELINES

SPECIES	BLEEDING	DRESSING	COOLER		
	Minimum distance from top of rail to floor	Minimum distance from top of rail to floor	Minimum distance from top of rail to floor	Maximum distance from top of rail to shackle contact point on carcass	Minimum distance from spacing from walls, pillars, etc.
Cattle	3.7 m	3.1 m	3.1 m	30 cm	60 cm
Calves	3.7 m	2.4 m <i>(or above level of inspection platform)</i>	2.4 m	30 cm	60 cm
Sheep and Goats	2.4 m	2.0 m <i>(or above level of inspection platform)</i>	2.0 m	30 cm	60cm
Swine • Head on • Head off	2.6 m <i>(above slickers platform)</i>	3.1 m	2.7 m 2.4 m	30 cm	60 cm
Horses	4.3 m	3.4 m	3.4 m	38 cm	60 cm

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Doorways and Doors

Doorways should be a minimum of 1.5 m wide so that products transferred on rails, hand trucks or lifters do not come in contact with them. Doors and doorjambs should be made of rust-resistant material and be self-closing. The juncture between the wall and the doorjamb must be sealed with a flexible sealing compound. All doors leading outside must be self-closing.

Stairs

All stairs in product-handling rooms should be of impervious material with solid treads, dosed risers and curbed sides of at least 5 cm in height, measured at the front edge of the tread. Catwalks or mezzanines above processing areas should be of solid masonry or metal construction with raised edges.

Lighting

All areas of the plant must be properly lighted, and generally provided with a minimum intensity of not less than 200 lux. Where special illumination is required for the proper conduct of work by plant employees and inspectors, an illumination intensity of at least 1,000 lux must be in place. To prevent glare and provide the maximum illumination, special attention must be given to the amount and direction of lighting in inspection areas. Readings should be taken at a height of 1 m or at the work situation. The lighting intensity of beef coolers should be measured at the front shank level of carcasses in a full cooler.

Artificial light sources must not impart illumination that distorts the normal appearance of meat. Normal non-colour corrected lights are acceptable. Meat products must be protected from contamination resulting from the breakage or shattering of light sources or fixtures.

NOTE: The electrical service must meet National Building Code standards as well as provincial and local codes.

Ventilation

In planning and designing a plant's ventilation system, care must be taken to separate departments, control air movement and eliminate undesirable conditions such as steam, excess moisture, odours, dust, dirt or variations in temperature.

Airflow systems should be designed to create a positive air flow from dean to soiled areas (i.e., processing to kill floor). Adequate means must exist to provide sufficient exchange of air in all parts of the licensed establishment, and to keep air fresh, free of odours, steam and vapour. All refrigerated rooms must be kept free of excessive moisture. Refrigerated rooms must be kept free of excessive moisture with a recommendation to have at least five changes of air per hour.

Fresh air intakes should not be located in an area prone to contamination sources such as odours, dust, or smoke. Air intakes must be equipped with effective filters, which prevent the entry of insects or dust. In refrigerated workrooms, mechanical ventilation must keep walls and ceilings free of condensation.

All equipment that produces heat, steam, vapour, smoke or odour must be properly vented. High-temperature edible and inedible rendering equipment, dryers and evaporators must be equipped with condensers.

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Windows in operational rooms of meat plants must be of a type and installed in such a manner that no contamination of meat products can occur. With existing plants, windows will be acceptable subject to site specific evaluation and time frame negotiations.

Water Supply

Hot and cold potable water, under adequate pressure, and in sufficient quantities, must be provided throughout the plant. The operator is responsible for the water supply and must ensure the water is bacteriologically and chemically safe. Water samples must be forwarded to a recognized municipal or provincial laboratory at a frequency deemed necessary by the inspector based on source and/or on historical sampling records. Water potability certificates obtained by licensed establishments must confirm potability of water and ice according to local and provincial standards.

If non-potable water is used for fire prevention or for condensers in refrigeration systems, it must be kept entirely separate from the potable water system, clearly identified, and never used where edible products are processed, handled, packaged, or stored.

If automatic chlorinators are used in a licensed establishment, management must establish procedures to ensure quality control for water potability. Two fundamental controls include:

- (a) an automatic metering device for adding chlorine in the correct concentration. A warning device to indicate malfunction may be required.
- (b) at least twice daily, tests shall be made to determine free residual chlorine level, at a specific point following thorough mixing in the water system .

Records of residual chlorine tests must be maintained by the operator, and be made available to inspection staff as required. A reliable chlorine test kit must be provided in order that in-plant monitoring can be achieved.

Hand Washing Facilities, Sanitizers and Hose Connections

Hot and cold water hand washing facilities (remote control operated is recommended) must be easily accessible to all processing and slaughtering areas. These facilities must be serviced with dispensable soap and paper towels.

Rust-resistant metal sanitizers, of appropriate size and number must be provided, so that knives and saws can be sanitized. Sanitizers should be able to maintain a temperature of 82°C, be equipped with an overflow, and, except in the kill floor area, connected to a drain.

In poultry establishments, sanitizers are required at the following stations: trimming, neck cutting and giblet salvage.

To facilitate room and equipment clean-up, an adequate number of hose connections must be provided throughout a licensed establishment. Hot water, of at least 82°C must be available at the point of discharge to sanitize equipment during slaughter, evisceration, and processing operations. For general clean-up operations, water may be kept at a lower temperature, provided satisfactory cleaning and sanitizing agents are used. Dial-type thermometers should be installed at hose outlets or at the source of hot water supply. If the temperature indicator is located at the source of hot water supply, then the distance to the outlet must be taken into consideration. The use of long hoses should be avoided. Suitable racks or reels for hose storage should be in place.

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Refrigeration

The requirements for refrigerated storage and capacity will depend on the site-specific operation and as such, minimum sizes are not included in this document.

Carcasses must be promptly chilled and placed in adequately refrigerated and conveniently located rooms. Unchilled carcasses must not be placed with those that have already been chilled. To properly chill carcasses, the internal temperature (at the bone in the deep musculature) should be brought to 4°C, within a minimum period of time. In order to achieve proper cooling, chill coolers should be maintained at 2°C. Holding coolers must be maintained at 4°C. A suitable area must be designated in a cooler for chilling and storing "held carcasses" and parts. This section should be segregated from the remainder of the cooler and sealed or locked. A sufficient length of side rail, equipped with lockable devices (i.e., lockable rail) may be sufficient for these purposes.

Offal coolers must be adequately refrigerated and constructed such that the internal offal temperature is lowered to 4°C or less as quickly as possible after evisceration.

All sharp freezers should be at -30°C or less and holding freezers at -18°C or less. All freezer rooms used for the destruction of trichea must be equipped with locked thermographs and facilities.

Processing rooms should be kept at a temperature of 10°C. Otherwise, meat products can only be out of refrigeration for a period of 2 hours or less and an associated HACCP based safety protocol is required.

Waste Disposal

A) SEWAGE SYSTEMS

Sewage disposal systems, either municipal or private systems must be provided at all plants and must comply with all municipal and provincial requirements. Plan submissions will preferably be accompanied by a letter from the authority having jurisdiction stating that the proposed system is acceptable.

B) CONDEMNED AND INEDIBLE PRODUCTS

The requirements for handling condemned and inedible products will vary with each plant. The intent is to provide:

- (i) Proper separated storage for condemned and inedible products. In some cases, a separate room will be required; in smaller operations use of metal containers with lids is satisfactory.
- (ii) Proper means for collecting and removing from the premises these products in such a manner that no objectionable condition occurs. It is recognized that local assessment and decision may be necessary.

C) HIDE STORAGE

Where hides are salvaged, a hide storage room maintained in good sanitary condition must be provided. In small volume plants, where hide pick-up arrangements are made for removal at the close of each day's kill, this room may be incorporated with the condemned room.

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D) CATCH BASIN

Catch basins, grease traps, interceptors and other means of separating organic matter from plant effluent should be located in the inedible section of the plant or outside. These facilities should be constructed such that skimmings are not moved through an edible area, and that ease of maintenance and sanitizing are achieved.

Rodent and Insect Control

Construction must be such that flies, insects, and rodents are prevented from entering the plant. Examples of preventative measure can include items such as self closing, sealed doors, effective screens on all windows and other openings, "fly chaser" fans, ducts, or similar devices. As well, fly and insect control must also occur in the livestock section and plant surroundings.

Surroundings

Roadways on the premises should be properly graded, dust-proofed, and drained in order to prevent the collection of water or dust.

No portion of an establishment can be used as living quarters unless it is permanently separated from the establishment by a wall, floor, or ceiling. There can be no direct access from the living quarters to any part of the establishment.

E. Equipment Standards

Equipment Construction & Design

In general, the equipment used should be of simple design, easily cleaned, and made of non-corrosive and rust-resistant material such as stainless steel. The use of wood in meat production and handling areas is prohibited other than in freezers and dry storage areas.

Stainless steel used in meat plants should be of 300 or 18/8 series because of its superior corrosion resistance.

New materials containing plastics, resins, fibreglass, and latex must receive approval prior to installation and use. As previously stated the main criteria for equipment approval is ease of cleaning and inspection. To facilitate dismantling, quick-opening devices that require simple or no tools is preferred.

Contamination by drippings from bearings, lubricants, gears, and motors must be prevented. On welded equipment, all welded joints must be continuously smooth and even. Where stuffers and grinders are used, metal detectors should be provided.

Stationary equipment must be located in such a manner to provide sufficient access for cleaning. Long chutes are discouraged, but if used, then must be demountable for cleaning.

Sections, Rooms, and Pens

Livestock pens, chutes and/or squeezes must be provided at all slaughtering operations. All floors, alleyways, and chutes should be paved, properly drained, scored, cleated, and properly inclined to prevent slipping. As well, space must be provided to observe the animals in motion for the ante-mortem inspection.

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Pre-slaughter holding pens should be constructed of acceptable masonry and metal construction. As well, these pens must have adequate lighting and ventilation and be constructed to permit daily washing.

Stunning and bleeding areas must be constructed to ensure the humane treatment of animals.

Bleeding areas should be curbed and adequately graded to properly sized blood and wash-up drains in order to prevent blockage.

Regarding slaughter and dressing rooms, several basic principles must be considered to ensure the operation is operated and maintained in a sanitary manner. These principles include:

- a) Rooms of adequate size and shape to provide ample space for all operations.
- b) Adequate segregation must be provided when more than one species of animals is on the same floor.
- c) Minimum rail heights and configuration depending on species.
- d) A heldrail for all inspection and further trimming of carcasses.
- e) Adequate spacing of carcasses to facilitate sanitary dressing.
- f) Measures to prevent splashing and cross-contamination by carcass movement.
- g) Sufficient and properly located hot and cold-water outlets for clean-up purposes, sanitizing and hand-washing facilities.
- h) Sufficient space and facilities for soaking, scrubbing, and cleaning of hide-on calf carcasses.
- i) Adequate facilities and floor space for beef head inspection and processing.
- j) In the slaughter of swine, an adequately sized and properly located scalding tank.
- k) When viscera inspection trucks are used, adequate facilities are provided, which facilitate frequent washing and sanitizing.
- l) Where edible offal is harvested, the layout and equipment must be such that this step is carried out in a sanitary manner.

Processing rooms must be equipped with adequate lighting, ventilation, and freedom from steam and condensation in order to ensure the sanitary production of prepared meat products. Room size and equipment layout must be carefully planned to ensure risk from environmental, equipment, or personnel contamination is minimized.

Processing rooms, except those used for cooking, formulation, or preparation of meat products prior to cooking (or handling relatively stable food products) must be maintained at 10°C or lower.

Smokehouses must be constructed, equipped, and drained so they can be easily and regularly cleaned. Each smokehouse must be properly vented and equipped with an accurate recording thermometer.

Dry storage rooms must be located and designed to protect against dust, moisture, and other undesirable conditions. These rooms must be maintained in a clean and sanitary condition at all times.

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Rooms used for packaging, shipping, and receiving fresh cured and perishable meat products must be maintained at a temperature of 10°C or lower. Otherwise, meat products can only be out of refrigeration for a period of 2 hours or less and an associated HACCP based safety protocol is required. Shipping areas or docks must be constructed to ensure product is protected from inclement weather conditions.

An office must be provided for the use of meat inspection staff in all meat plants. As a guide, an appropriate office for use by one inspector is a minimum of 3m X 3.6m, and correspondingly increased to accommodate 2 or more inspectors, and located separate from the operational area of the establishment.

Special Requirements for Poultry Slaughtering and Processing

General construction standards are similar as for those required for other meat processing establishments. However, because of the special operational requirements necessary in a poultry plant additional consideration must be given regarding a poultry plant's layout. The general layout of a poultry slaughter and processing establishment must follow the ensuing sequence: live receiving, hanging, stunning, bleeding, scalding, plucking, singeing, washing, evisceration, inspection, trimming, washing, chilling, further processing (if not sold in carcass form), packaging, freezing, (if not sold fresh), and shipping. Of primary importance, is the assumption that operations are designed and laid out to reduce contamination of the finished product.

F. Sanitation

The production of meat and meat products under hygienic conditions is critical in ensuring a safe and wholesome product. As such, a written sanitation program must be included in a meat plant's general maintenance plan and is regarded as a fundamental operational requirement.

The sanitation program is a comprehensive document and outlines those cleaning and sanitizing functions, which ensure the hygienic maintenance of the building, each piece of equipment and each step in the operation. The contents of the sanitation program will vary between meat plants depending on plant functions and products produced but should include the following:

- Those steps for cleaning and disinfecting all pieces of equipment the building interior, and the building exterior.
- General housekeeping practices (garbage collection and waste disposal both during and after operations).
- A description of critical areas within the operation and details to ensure control of these areas.
- Steps to be taken during the pre-operational inspection, and the operational inspection, to ensure the equipment and product are maintained in a sanitary manner prior to and during operations.
- Personal hygiene of employees and steps management will undertake to ensure these requirements are consistently met.
- The proper storage and use of all ingredients (both meat and non-meat) with regard to freedom of any type of extraneous contamination.

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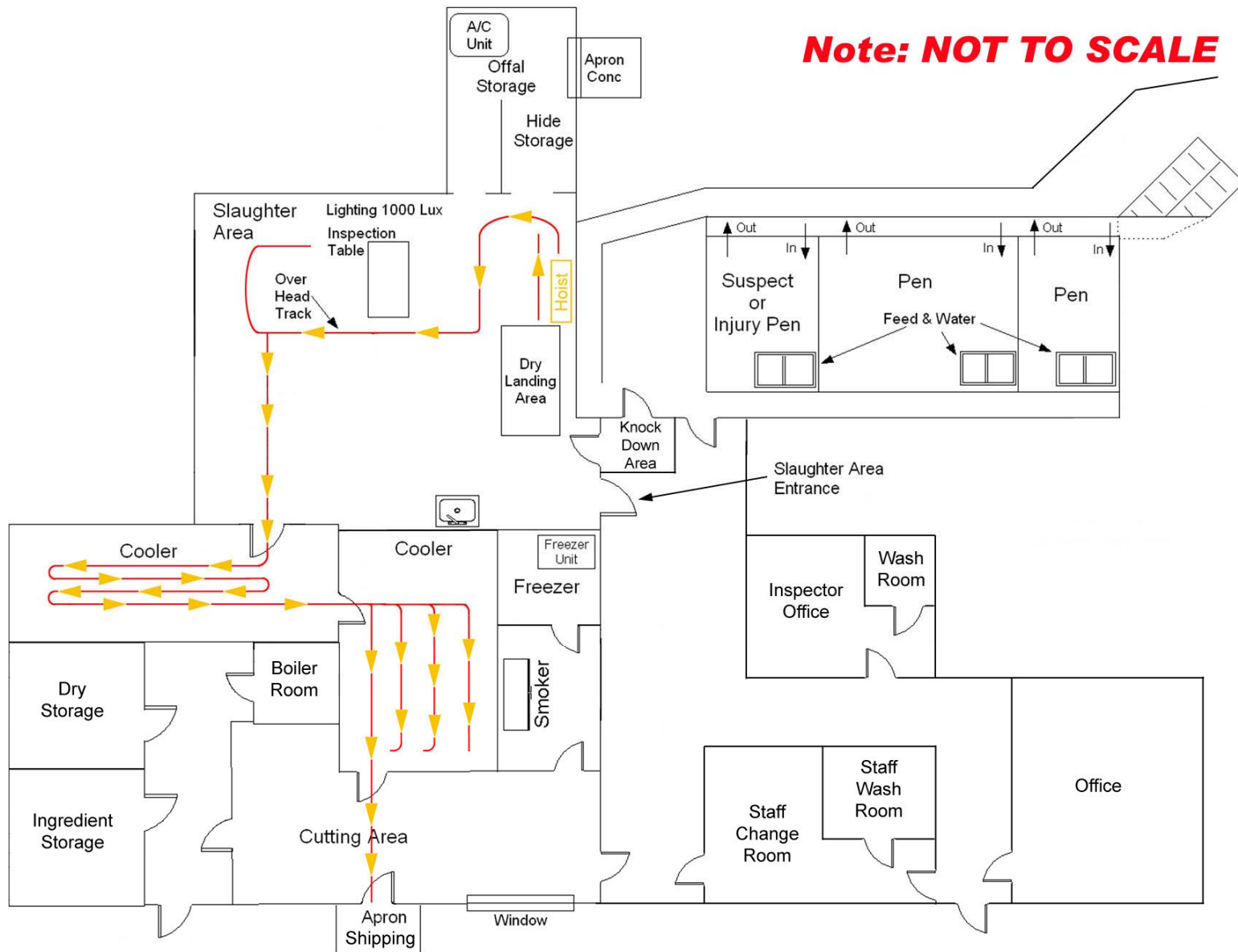
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G. Inspection Procedures and Standards

Since the production of clean and wholesome meat is the primary objective, there are particular areas and activities in the plant that are critical to ensuring this objective. These areas and activities are briefly outlined as follows:

- Daily pre-operational inspections of all rooms and areas in which animals and/or meat products are processed. The objective of this inspection is the maintenance of environmental, equipment and personnel conditions that will help ensure only wholesome meat products are produced.
- Ante-mortem inspections of animals.
- Post-mortem inspections of animals.
- Re-inspection of carcasses and/or meat products.
- Daily and frequent inspections of all aspects of the process during operations from killing to final dressing.

H. Typical Layout: Red Meat Abattoir



I. Typical Layout: Poultry Abattoir

