Guidelines for Environmental Protection Measures at Chemical and Waste Storage Facilities

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Acknowledgment

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Use of the Guideline

The *Guidelines for Environmental Protection Measures at Chemical and Waste Storage Facilities* is intended for use by owners/operator/designers of chemical and waste storage facilities and the Ministry of the Environment. This document will aid the reader in assessing the necessary environmental protection measures for chemical and waste storage areas and protection measures for human health. This document can be used as a resource during planning of upgrades to existing storage areas and for the design and operation of new facilities.

This guideline is intended to supplement, not replace existing codes and regulation. Owners of chemical and waste storage facilities should comply with all other applicable legislation and any existing certificates of approval. For detailed guidance on how to apply for a certificate of approval, consult the "approvals guidance manuals" prior to undertaking any new development or modifications to existing facilities. The Ministry of the Environment may use this guideline to develop certificate of approval conditions or to promote environmental protection measures at facilities arising from inspections and in response to environmental incidents (i.e., spills).

This guideline may be used by the Ministry of the Environment abatement staff as a reference and guide to best practices when inspecting chemical and waste storage areas at existing facilities. The Ministry of the Environment expects to use this guideline as a means to assess existing storage equipment and/or spill containment provisions against a set of best practices and to assist the environmental officer in evaluating whether the design and operation of a facility presents an unacceptable risk or may result in an adverse effect.

Officers will consider various risk factors in determining whether an existing chemical or waste storage facility should undertake improvement in order to conform to the guideline criteria. The risk factors would include but would not necessarily be limited to the following:

- proximity of the site to sensitive receptors
- toxicity and hazard of the chemicals
- quantity of chemicals or waste being stored
- potential severity of the impact to the environment should a release occur
- history of environmental incidents
- compliance history
- relative degree to which the existing storage provisions do not conform.

Relation to Codes and Regulations

Technical staff at the Ministry of the Environment's Environmental Assessment and Approvals Branch may use this guideline in reviewing certificate of approval applications and evaluating the proposed storage provisions. The technical reviewer will compare the details of the application to the environmental protection measures contained within the guideline and may develop specific conditions within the certificate of approval to require that the site be designed and operated to conform to the guideline.

In preparing this document, the Ministry of the Environment recognizes that viable alternative storage solutions exist and they may be equivalent to or exceed the environmental protection measures contained within the guideline. It should also be noted that this guideline is a "starting point" for evaluating and designing storage facilities for chemicals and waste. No single document is currently available that documents and interprets all requirements as required by both federal and provincial legislation and Municipal By-Laws. The Ministry of the Environment has attempted to provide a document that will assist its staff and facility owners and operators in the understanding of current best practices in chemical and waste storage.

As noted above, this document is a guide to common current best practices and is not all encompassing. The design and operation of all storage facilities requires a further understanding of legislative requirements, best practice measures and documents produced by professional associations. In particular, a review of Part 4 of the Fire Code would be an essential part of meeting any regulatory requirements associated with storage of flammable and combustible liquids. Similarly, a review of the Building Code would also enable owners to ensure their structures associated with chemical and waste storage are constructed as per regulatory requirements. Through the adoption of environmentally protective procedures, adherence to regulatory requirements and installation of proper controls, the hazards associated with chemical and waste storage can be minimized and can reduce the likelihood of adverse impact to the environment.

The design of storage facilities and their respective safety measures and procedures falls within the definition of professional engineering, and is subject to the *Professional Engineers Act*.

As stated earlier, the intent of this document is not to be an exhaustive collection of rules or a source for interpreting legislation. Upon review of this document, it is essential that the appropriate legislation be referenced where required. In order to aid in this task, a summary of some pertinent legislation has been attached to this document and can be found in Appendix A. In addition to these summaries, the internet links to

Ontario statutes and regulations can be accessed at:

http://www.e-laws.gov.on.ca/

or

they can be acquired through Publications Ontario: 1-800-668-9938 or (416) 326-5300.

Federal statutes and regulations can be accessed in English at:
http://laws.justice.gc.ca/en/search.html

or

in French at:
http://lois.justice.gc.ca/fr/recherche.html

or

Contact the government hotline at: 1-800-O-Canada (1-800-622-6232).

Glossary of Terms

aboveground storage tank	a storage tank in which more than 90% of the storage tank volume is above the surrounding earth, backfill or concrete and which operates at atmospheric pressures plus or minus 10 kPa.
adverse effect	one or more of: a. impairment of the quality of the natural environment for any use that can be made of it b. injury or damage to property or to plant or animal life c. harm or material discomfort to any person d. an adverse effect on the health of any person e. impairment of the safety of any person f. rendering any property or plant or animal life unfit for human use g. loss of enjoyment of normal use of property h. interference with the normal conduct of business.
chemical products	materials which are derived from chemical reactions, are intended as raw materials for chemical reactions or are blended or used as solvents or carriers.
combustible liquid	any liquid having a closed cup flash point at or above 37.8 degrees Celsius and below 93.3 degrees Celsius.
container	a vessel defined as, but not limited to; a storage tank (aboveground or underground), used oil tank, drum, utility tank, holding or sewage tank.
facility	any on-site chemical, product or material storage location including manufacturing, distribution, wholesalers, waste management industries and laboratories. This includes waste transfer, processing, storage and disposal sites.
flammable liquid	any liquid having a closed cup flash point below 37.8 degrees Celsius and a vapour pressure not exceeding 275.8 kPa (absolute) at 37.8 degrees Celsius.
flash point	the minimum temperature at which a liquid within a container gives off vapour in sufficient concentration to form an ignitable mixture with air near the surface of the liquid.

Glossary of Terms

hazardous waste	as defined by R.R.O. 1990 Regulation 347 General – Waste Management.
liquid industrial waste	as defined by R.R.O. 1990 Regulation 347 General – Waste Management.
representative sample	a sample portion of material or waste that is nearly identical in content and consistency as possible to that in the larger body of material or waste being sampled.
storage	the containment of a chemical, waste, product or material on a temporary basis which does not constitute disposal of such an item. (Note: The containment of waste over an extended period requires a certificate of approval and may be considered waste management rather than storage).
subject waste	as defined by R.R.O. 1990 Regulation 347 General – Waste Management.
trained personnel	personnel knowledgeable in the following through instruction and/or practice: a. relevant waste management legislation, regulations and guidelines b. major environmental concerns pertaining to the chemical/waste to be handled c. occupational health and safety concerns pertaining to the processes and chemical/waste to be handled d. management procedures including the use and operation of equipment for the processes and chemicals/wastes to be handled e. emergency response procedures f. specific written procedures for the control of nuisance conditions g. specific written procedures for refusal of unacceptable loads h. the requirements of a certificate of approval.
underground storage tank	a storage tank that has more than 10% of its volume encased in earth, backfill, concrete, or any other material.
vapour pressure	the pressure exerted by a liquid as determined by ASTM D 323, “Vapor Pressure of Petroleum Products (Reid Method)”.

waste	**for the purpose of this document only**: chemicals and other materials destined for disposal or recycling, including off-spec chemical products and any other chemical material or substance that is generated either intentionally or unintentionally, that is no longer wanted and can not be either redistributed or used in any other manner. Included in this definition are: chemicals that can no longer be used for their intended use, mislabeled or unlabeled chemicals, abandoned or waste chemicals; material in deteriorating or damaged containers, residuals in chemical containers, used or spent chemicals, and, debris contaminated with a hazardous material (e.g., rags, paper towels).

Excluded from this document are:

1. Radioactive or nuclear materials subject to regulations of the *Nuclear Safety And Control Act*, (Canada), S.C. 1997, c. 9, as amended

2. Stockpiles of solid materials such as aggregates, sands and gravels, coal, mine tailings, waste rock and concentrates from mining operations

3. Storage areas such as lagoons, settling ponds and trenches.

Section

1 Introduction

The following general principles should be applied to the assessment of environmental and public health protection measures at chemical and waste storage facilities:

Material Identification (Characterization and Labelling)

- Environmental protection measures should be in place at all chemical and waste storage facilities.
- Owner/operator should complete a review of all materials used at facility.
- Specific environmental protection measures should be based on sound engineering principles taking into account the diverse risks and properties of the materials being stored.

Containment

- Measures should be provided at chemical and waste storage facilities to prevent the uncontrolled release of chemicals and wastes into the environment consistent with public health and safety.
- All subject waste storage facilities must comply with the *Environmental Protection Act* R.S.O.1990, c.E.19 and R.R.O. 1990, Regulation 347 General – Waste Management. In applying the guideline, consideration should be given to the potential for releases to enter the natural environment and cause an adverse affect, with applicable sections of the guideline adopted in accordance with the degree of risk.

Security

- Access and use of chemicals and wastes should be restricted to those who have been adequately trained in the materials (trained personnel).

Contingency Planning

- Site owners/operators should identify emergency contact persons and implement appropriate procedures with respect to chemicals and wastes.
- Any plan should be completed in consultation with the municipality and local fire department.

- Human health and safety should take precedence over environmental protection in cases of emergency.

Minimizing Environmental Risk

As a first line of defense, all storage facilities should be designed, fabricated and installed in such a manner that risk of loss (e.g., building or stored material) is minimized. Materials considered for the construction of storage facilities should be compatible with the safe long-term storage of the chemicals or wastes under consideration. The degree to which measures are taken to ensure the integrity of a storage facility should be dictated by the severity of the potential environmental, health and safety risk associated with the chemical or waste to be stored.

The following should be considered when evaluating existing facilities, installing new facilities or prior to initiating changes to existing facilities:

- No changes are made in the chemicals or wastes to be stored in a given facility until an assessment has been made of the suitability of the facility for such a change.

- Where possible, storage facilities are not located where, in the event of a spill, waste or chemical product may enter a natural watercourse or a sewage or drainage system, contaminate potable surface or groundwater supplies, or contribute to air contamination and odour issues.

Worker Safety

The following measures for worker protection should be considered at each chemical and waste storage facility, in accordance with requirements of the *Occupational Health and Safety Act* and regulations. The owner/operator of the chemical and/or waste storage facility should conduct a risk assessment and take into consideration regulation respecting Control of Exposure to Biochemical or Chemical Agents and the regulations respecting designated substances (see Appendix A).

The risk assessment should include:

- details of engineering controls
- work practices
- hygiene facilities and practices
- personal protective equipment (PPE) required to be worn by the operator/carrier
- ventilation requirements

- appropriate procedures
- use of less hazardous chemicals (product substitution).

Emergency measures such as eye wash fountains, deluge showers, etc. should be provided and maintained in good repair, commensurate with the identified level of risk. Appropriate worker training in the proper use, care and maintenance should be provided to ensure effective use of required personal protective equipment. This training should include any fit testing of respiratory equipment if required.

Personal Protective Equipment (PPE) should include the following:

- impervious gloves (type and material)
- coveralls
- boots (rubber or safety)
- eye protection (safety glasses/chemical goggles)
- exhaust and/or make-up air
- details of respiratory equipment (particulate respirator, half face piece respirator, full face piece respirator, self contained breathing apparatus or supply air respirator certified by NIOSH) if required.

Section

2 Tanks and Piping

General Requirements

The purpose of the guideline is to help owners of storage facilities to assess the necessary environmental protection measures for chemical and waste storage areas. As part of these measures, proper storage in tanks and transport of the contents in associated piping will assist in promoting the following:

- environmental protection (air, surface and groundwater)
- personnel protection
- fire protection.

In applying this guideline, consideration should be given to the potential for releases to enter the natural environment. Depending on the location of the storage system, there are various sources of risk. Sewer systems, underground utilities, soil, surface water and groundwater are typical areas that may be affected if improper methods of above and underground storage are implemented.

Through a thorough assessment of the process, its requirements and location within the facility, applicable sections of this guideline can be adopted in accordance with the degree of risk. For example, indoor tanks remote from exterior doors and sewer drains may not require the same degree of secondary containment as an outdoor tank. Similarly, the required level of monitoring may increase if an underground tank is the storage of choice. Unless there are compelling site-specific reasons to install underground storage tanks, use of these systems should be avoided.

Also, consideration should be given to reducing losses from these systems in the form of:

- seals to minimize storage evaporative losses
- preventative maintenance programs
- double walled tanks
- vault installations
- synthetic liners.

Codes and Standards

When considering the requirements for the design and manufacturing of the appropriate tank and its installation, it is important to refer to the applicable codes and standards available on this topic. The following list will assist owners in determining these requirements. It should be noted that this is not an exhaustive list.

Installation and Design:

- Building Code, made under the *Building Code Act, 1992*
- Electrical Safety Code, made under the *Electricity Act, 1998*
- Relevant standards (e.g.,ULC, CSA, ASTM).

Storage of flammable and combustible liquids:

- *Fire Protection and Prevention Act, 1997* and associated codes/regulations
- *Technical Standards and Safety Act, 2000* and associated codes/regulations
- Transportation of Dangerous Goods Regulations, made under the *Transportation of Dangerous Goods Act, 1992* (Canada)
- *Occupational Health and Safety Act* and associated regulations.

Requirements for Storage Tanks

For all applications of storage tanks and associated equipment (storage tank system), the construction materials should be of sufficient structural strength and type to withstand normal operating conditions. The owner of the system should ensure that the material type is compatible with the contents of the tanks and associated equipment.

All storage tanks that rest on the ground should be constructed with a double bottom or underlain by a barrier that will not deteriorate. Bottom contact with gravel, soil or spill absorbents around the base of the tank may increase the likelihood of bottom corrosion and should be avoided. The bottom of some tanks may be below ground level, thereby trapping moisture and increasing the rate of corrosion.

If the tank is lined or internally coated, the coatings should be compatible with the substance stored. Using one or a combination of corrosion resistant materials such as non-metallic cladding or coatings, cathodic protection, or paints can also provide protection. Design and installation of cathodic protection should be in accordance with specified codes and standards. Tank and piping connections of two different metals that create a corrosion inducing galvanic cell should be avoided. Included in corrosion protection are exposed exterior surfaces of all aboveground tanks, piping and ancillary equipment.

When installing a tank system, the following should be considered:

- Appropriate foundations should be stable under all operating conditions to ensure protection from physical damage.

- Foundations and tanks should be protected from, or resistant to, all forms of internal and external wear, vibration, shock, corrosion, fire, heat, vacuum and pressure which might cause the storage tank system or foundation to fail where failure could result in personal or environmental damage.

- Construction materials associated with storage tank systems, foundations, containments and containment accessories should be consistent with safe long-term storage of the chemical or waste being stored.

- If an external coating is used to protect the tank from external corrosion, the coatings should be fiberglass-reinforced-plastic, epoxy, or other suitable dielectric material.

- The coating should have a coefficient of thermal expansion compatible with that of the tank material.

- Changes in the facility operation should not be permitted until an assessment has been completed to ensure that the suitability (e.g., material compatibility, pressure and vacuum relief systems) for such a change is feasible. Changes to the facility may require an amendment to the certificate of approval, if there is a certificate of approval for the site.

- Aboveground tanks should be accessible by fire fighting and other emergency response equipment.

- In orienting tanks, consideration should be given to minimizing impingement on person or property by a released chemical/waste or a fire.

- Minimum separation distances (e.g., between tanks, from wells, from waterways, from means of egress) for flammable and combustible storage tanks should be in accordance with applicable regulations and codes.

Requirements for Piping

In general, overhead piping is preferable to underground piping. In applications where overhead piping is not possible, extra care and appropriate measures should be taken during the installation. Similar to tank requirements, piping and associated connectors should be of sufficient structural strength to withstand normal operating conditions and the material should be compatible with that of the waste or chemical that is transported.

Piping should be installed to eliminate or minimize physical damage by vehicles or equipment. Care should be taken in low-lying areas or in areas where there is significant pedestrian traffic to avoid any other occupational health and safety hazards.

Overflow piping from tanks should be extended to near the floor of the containment area to ensure wastes or chemicals are directed into the designated area. To avoid any fire, health or safety problem, the discharges from vents should not terminate in, near or underneath any building.

Requirements for Accessories and Instrumentation

To keep operating personnel informed as to the existing conditions, instrumentation should be provided on all storage tanks and piping to and from the tanks. Controls such as alarms should be provided to give warning of conditions (e.g., high pressure or liquid levels) that could result in a spill if not corrected. Back-up methods of detecting high levels in a tank are also recommended. All remote or instrument-operated valves should be set to fail in the safest position.

There are various methods of preventing unsafe conditions in the tank. Tank systems should be protected from over-pressurization, excessive vacuums or thermal excursions. Tank conditions may be caused by operator error, filling, emptying, atmospheric temperature changes, reactions, pumping, refrigeration, heating and fire exposure. Devices that can assist in preventing these conditions are:

- rupture discs
- pressure/vacuum relief devices, gauges and controllers
- thermal alarms
- fail-safe vessel designs
- other means determined by a qualified engineer.

When determining the location of these devices, consideration should be made for the safety of the operating personnel, public health and safety and environmental protection. Ancillary equipment should be located in such a way as to protect it from physical damage from moving vehicles or other facility operations.

Tanks Temporarily Out-of-Service and Permanent Closure

If an aboveground storage tank will not be used for an extended period of time, considerations should be made to block piping or close valves to isolate the out-of-service tank. The tank should be inspected monthly, including a determination of the level of material in the tank, and the associated piping/secondary containment. It is also recommended that piping be emptied and made vapour-free. Prior to re-use of a tank system, the tank and all associated piping should be inspected to ensure that they are in operable condition. It is recommended that old out-of-service storage tanks not be used for waste storage (e.g., old underground storage tanks should not be used to store waste oil).

Section

2 Tanks and Piping

Tanks that are set for permanent closure should be made vapour-free, as should the associated piping. As part of the decommissioning of a tank, measures should be implemented to remediate or manage any associated environmental contamination.

Section

3 Secondary Containment

Secondary Containment - General

Containment systems should be installed around all liquid chemical or waste storage containers to collect and contain a leak, spill or overfill from the tank, connections, vents or pressure relief devices. An appropriate assessment should be completed on all storage areas to determine the likelihood that a spill or overflow condition would cause an adverse effect to the environment. This assessment will assist the owner/operator of the facility to determine the degree of containment that may be required. In lower risk areas such as indoor applications, the facility itself can be used as containment, but for a higher-risk area such as an outdoor storage area, an appropriately sized containment area with adequate engineering controls may be required. In considering the storage of more than one product within a common containment enclosure, whether by initial design or subsequent change in tank service, compatibility should be established to minimize the potential for violent reactions between two or more chemicals.

Containment systems should be designed such that the horizontal trajectory of a potential leak from a tank will be confined within the impoundment. As a guide, the perpendicular distance from the tank face to the top of the inside face of any containment should be a minimum of half the height of the tank above the top of the containment wall. In cases involving very high risk of loss or damage, calculations should be made to determine the required distance. For areas with restricted space, a higher containment wall or shields placed in areas of risk should be considered. The secondary containment system should isolate and protect the tank from vehicular traffic, fire, and spills of incompatible materials that might occur in adjacent storage or work areas.

Containment areas may be emptied manually, by pumps or by ejectors. However, all should be manually activated and the condition of the accumulation should be examined before starting to be sure no contaminants will be discharged into the environment. Another option for removal would be disposal off-site using approved carriers and receivers.

Examination of the material may include visual, odour or analytical tests, as applicable to the type of materials contained within the tank systems. Accumulations from a secondary containment system should be treated or decontaminated in accordance with local requirements (e.g., municipal by-laws) for discharges to sanitary sewer or in accordance with a site certificate of approval and sector specific Effluent Monitoring and Effluent Limits Regulations made under the *Environmental Protection Act* for direct discharges.

Containment Capacity

The contained volume of the impoundment within a containment system enclosing one or more tanks is given as the total enclosed volume, minus the volume up to the height of the containment of:

- all tanks
- all tank foundations.

The volume of piping, pumps, pump bases, pipe supports and other minor obstructions may be ignored if their total volume is less than 2 % of the volume of the impoundment. Containments should be sized so as to provide a minimum impoundment volume equal to the greater of:

- 110% of the volume of the largest tank
- 100% of the volume of the largest tank plus the greater of 10% of the volume of the largest tank or 10% of the aggregate volume of all remaining tanks.

Construction Requirements

All containment areas should be structurally sound, impermeable and able to withstand chemical deterioration and structural stresses from internal and external causes. Soil conditions should be reviewed with regard to settling and drainage. If necessary, barriers or other protection should be provided to protect the containment from possible structural damage due to heavy vehicles. If the containment floor is subject to hydraulic pressure, the migration of moisture into the containment system should be prevented. Containments in flood plains should be designed and constructed to withstand structural damage and overtopping by 1 in 100 year run-off or a storm event.

The secondary containment system should be designed and constructed, coated or lined with a permeability rate to the material stored of 1×10^{-6} cm/sec or less and be chemically compatible with the contents of all tanks within the containment area. Tank containment systems should not be located over any existing piping or drainage system whether active or inactive. Any inactive piping should be removed prior to the installation of the storage facility. The floor of the containment should have a minimum slope of 1.5% towards a sump to ensure that any runoff or spilled material will be contained.

There should be no sewer connections from any containment area, other than through the containment valve. There should be no piping through the basin floor. It is recommended that piping through the containment wall be avoided. If piping through containment walls is unavoidable, it should be sealed so that spilled material cannot escape from the space around the piping.

If a synthetic liner is used as a secondary containment system, synthetic liners should be at least 60 mm in thickness and should be made of a material that will not deteriorate in an underground environment. All punctures, tears or inadequate seams in the liner should be repaired prior to backfilling. The liner should be installed with a slope to the sump of at least 1.5%.

Multiple tanks containing the same materials should be piped in such a way so as to prevent failure of one tank (or piping) from causing the remainder of the tanks to lose their contents. If this is not possible, the tanks should be regarded as one tank and the containment sized accordingly. All containments should be equipped with a sump with a minimum capacity of 1.5 m^3 from which runoff or spilled material may be pumped, or drained by means of a containment valve. Containment valves should be locking position indicator valves. They should be normally locked in the closed position, with access restricted. The valve may be opened for short periods to drain storm water from a containment (may be subject to *Ontario Water Resource Act*). However, the valve should be attended at all times during the drainage periods, and shut and locked immediately thereafter. Aside from routine operating checks, the only other time that a containment valve should be open is when deemed essential in an emergency situation.

Underground Installations

When using a double-walled tank for a secondary containment system, the tank should be designed such that the outer wall can contain a release from the inner wall and it should enclose the entire primary tank. The interstitial space should be regularly monitored. The outer wall should be protected against corrosion similar to the inner tank to prevent rupture. The outer wall should be designed to handle the maximum pressure of the inner wall.

If a vault is used as a secondary containment system, the vault should be a continuous structure with a chemical resistant water stop used at all joints. The tank or tanks within the vault should be supported or backfilled in a manner consistent with generally acceptable engineering practices.

For underground installations, appropriate signs should be put in place to indicate the location of the underground facility. Also, an underground barrier should be put in place to prevent possible rupture during excavations that could otherwise encroach upon the underground system.

Leak Detection

Storage tanks should be monitored for leakage using one or more of the following methods when a risk assessment deems it necessary:

- inventory monitoring
- routine monitoring of the interstitial space of a double-walled tank
- vapour wells for monitoring soils in the excavation zone
- groundwater monitoring wells
- automatic tank gauging equipment
- other equivalent methods as approved by relevant Codes and Standards.

A qualified engineer should design all leak detection systems according to appropriate codes and standards.

Piping and Pumps

Pumps handling flammable materials and water cooled pumps with a continuous flow of water through them should be placed on a separate pad outside the containment. Appropriate containment should be considered for pumps outside the main containment area. Pumps in other services may be placed inside or outside the containment area. The elevation of pumps within the containment area should be such that they are not rendered inoperative due to an accumulation of rainwater or material from minor leaks. Pipes draining containment systems should be capable of handling the maximum potential water spray cooling and fire protection system flow within the containment.

All piping and containment valves should be protected from freezing. In above ground applications, heat tracing and insulation is the recommended approach. For underground piping, burial below frost level will aid in preventing frozen lines. If this is impossible, the line should also be heat traced and insulated.

Any coupling or open-ended valve used for making a transfer should be located within the secondary containment system of the transfer station.

Transfer, Loading and Off-Loading

Secondary containment, with sufficient capacity to accommodate overfills and spills which are likely to occur during the transfer including leaks or spills from connections, couplings, vents, pumps and valves, and hose failure should be provided for transfer loading/unloading areas. The ground around the loading/unloading system area should be sloped a minimum of 1.5% toward a containment system. Where secondary

containment is not provided, alternate measures offering an equivalent level of protection should be implemented to reduce spill risk.

All personnel involved in the transfer and loading/unloading operation should be provided with personal protective equipment to protect against any associated hazards. Procedures should be in place to ensure that the personnel are trained for using such equipment during the transfer and loading/unloading operation.

At all times, a trained operator or carrier should supervise, monitor and control the transfer to prevent overfill and spill during the entire period of transfer and while the tank is connected to the loading or unloading device. Prior to the transfer, the operator or carrier must ensure that the material to be transferred will be transferred to the proper tank and that the receiving tank has available capacity to receive the volume to be transferred.

All connections should be leak-free, undamaged, fully functional and checked for leakage before and after the transfer has been initiated. During unloading/loading from/to a tank car, brakes must be set and wheels must be chocked. Where a fire hazard exists, sources of ignition should be controlled. Where a product transfer line or fill line is not drained of liquid upon completion of a transfer operation, the line should be equipped with a valve (e.g., a dry disconnect shutoff valve) that prevents discharges from the line.

Where siphoning or back flow is possible, fill pipes should be equipped with a properly functioning check valve, siphon break or equivalent device or system which provides automatic protection against backflow.

Overfill and spill prevention equipment and practices should be employed for all storage tank fill systems, and could include one or more of:

- operator controls
- high-level alarms or trips
- automatic by-pass to an overflow tank if the overflow tank is equipped with overflow protection
- other equivalent systems for preventing overfills.

Subject wastes should be transferred, loaded and offloaded in accordance with s. 16, s.18 and s.19 of R.R.O. 1990, Reg. 347. Where feasible, consideration should be given to use of vapour balance systems to minimize emissions (working losses) generated during the loading/unloading of tanks and during the dispensing of products from tanks. Submerged fill should be used where practical to reduce vapour losses during loading/unloading operations.

Section

4 Gases and Volatile Liquids

General Requirements

Gaseous or volatile liquid chemicals or wastes for the purpose of this document will include those with true vapour pressures above 76 kPa, consistent with the following objectives:

- environmental protection (i.e., air, surface and groundwater)
- personnel protection
- fire protection.

The primary approach to this objective will be the application of loss control technology and optimum dispersion into the atmosphere of uncontrollable losses. In response to major disasters, storage of many volatile materials (e.g., ammonia and chlorine) has been the subject of extensive development of safety. Reference should be made to available sources of information for safety procedures and emergency response plans for such storage systems.

Codes and Standards

Compressed gases and gas cylinders should be stored in accordance with:

- Ontario Fire Code
- *Occupational Health and Safety Act* and associated regulations.

In orienting pressurized cylinders, consideration should be given to minimizing impingement to person or property by a chemical release, a fire or a projectile.

Storage systems should be designed, constructed and installed in accordance with:

- Building Code, made under the *Building Code Act, 1992*
- Electrical Safety Code, made under the *Electricity Act, 1998*
- Boilers and Pressure Vessels Regulation, made under *Technical Standards and Safety Act, 2000*
- Code Adoption Document and relevant design Codes and Standards.

Storage of flammable liquids should be stored in conformance with the:

- Fire Code, made under the *Fire Protection and Prevention Act, 1997*
- *Technical Standards and Safety Act, 2000,* as applicable
- Transportation of Dangerous Goods Regulations, made under the *Transportation of Dangerous Goods Act, 1992* (TDGA) (Canada)
- *Occupational Health and Safety Act,* as applicable.

Tank and Piping Requirements

Storage tanks and associated piping and equipment (i.e., the storage tank system) should be of sufficient structural strength to withstand normal handling and be installed on a foundation that is stable under all operating conditions. Storage tank systems and foundations should be protected from, or resistant to, all forms of internal and external wear, vibration, shock, corrosion, fire, heat, vacuum and pressure which might cause the storage tank system or foundation to fail where failure could result in personal or environmental damage.

Overhead piping is preferable to underground piping for filling tanks from the process or from raw material sources such as tank car or tank truck unloading stations.

All storage tanks which rest on the ground should be constructed with a double bottom or underlain by a barrier which will not deteriorate (i.e., a permeability rate to the material stored equal to or less than 1×10^{6} cm/sec). The storage tank should be closed system and pressure resistant.

Construction materials associated with storage tank systems and foundations should be consistent with safe long-term storage of the chemical or waste being stored. Changes in the facility service should not be permitted until an assessment has been made to assure the suitability of the facility (e.g., material compatibility, pressure and vacuum relief systems) for such a change in service. If the tank is lined or internally coated, the coatings should be compatible with the substance stored, with coating specifications adhering to good engineering practice and relevant standard requirements.

The exposed exterior surfaces of all aboveground tanks, piping and ancillary equipment should be protected from corrosion. Protection should be provided by using one or more corrosion resistant materials, non-metallic cladding or coatings, or paints. Bottoms of tanks which are in contact with soil and are subject to corrosion should be protected from external corrosion by either corrosion-resistant materials and/or cathodic protection system. Tank and piping connections of two different metals that create a corrosion inducing galvanic cell should be avoided.

Tank Accessories/Instrumentation

Instrumentation should be provided on all storage tanks and piping to and from the tanks in order to keep operating personnel informed about existing conditions. Alarms should be provided to give warning of conditions which, if not corrected, may result in a spill. For toxic and/or non-biodegradable materials, a back-up method of detecting high levels should be provided. A back-up method of detecting high pressure (including remote alarms) should be provided. All remote or instrument-operated valves should be set to fail in the safest position. Tanks should be protected by one or a combination of devices to protect against:

- over-pressurization
- thermal excursions
- operator error
- atmospheric temperature changes
- reactions
- heat
- fire exposure.

The following devices can be used:

- rupture discs
- pressure relief devices
- gauges
- controllers
- thermal alarms
- fail-safe vessel designs
- alarms or other means determined by a qualified engineer.

Discharge from pressure relief devices should not terminate in, near or underneath any building if the discharge could pose a fire, health or safety problem. For indoor storage of toxic gases, gas detectors/sensors and alarms are strongly recommended.

Tank Location

Locations of the various components of any chemical or waste storage system should consider the safety of the operating personnel, public health and safety and environmental protection. Tank locations are generally based on process needs and accessibility to production equipment so as to provide good materials flow. However, in locating the tank, consideration should be given to the hazards associated with the flammability and toxicity of the chemical or waste and relevant Codes and Standards.

Tanks, piping and ancillary equipment should be located in such a way to protect them from physical damage that may result from moving vehicles. All aboveground tanks should be accessible to fire fighting and other emergency response equipment. In orienting tanks, consideration should be given towards minimizing impingement to person or property by a released chemical or a fire.

Tanks Temporarily Out-of-Service and Permanent Closure

If a storage tank will not be used for an extended period of time, consideration should be made to block piping or close valves to isolate the out-of-service tank. The tank should be inspected monthly, including a determination of the level of material in the tank, and the associated piping/secondary containment. It is also recommended that piping be purged with an inert gas. Prior to the re-use of a tank system, the tank and all associated piping should be inspected to ensure that they are in operable condition. It is recommended that old out-of-service storage tanks not be used for waste storage (i.e., old underground storage tanks should not be used to store waste oil).

Tanks that are set for permanent closure should be purged with an inert gas, as should the associated piping. As part of the decommissioning of a tank, measures should be implemented to remediate or manage any associated environmental contamination.

Secondary Containment

Pressurized storage tanks containing gaseous or volatile chemicals or wastes with true vapour pressures greater than 76 kPa may not normally require containment systems. The ground around the tank, however, should be sloped a minimum of 1.5% away from the tank.

Control of Vapour Emissions from Tanks

Emergency vents and reliefs for closed system pressurized tanks should be located to maximize dispersion of gases in the event of an emergency. In extreme cases, this may require the use of vent stacks or pipes to disperse gases at a height which does not impinge on personnel or private property. Alternatively, flammable vapours from vents and reliefs may be directed to flare stacks for combustion. A certificate of approval may be required and it may contain specific conditions which must be implemented to control the emission.

Section

5 Container Storage

Storage of Solids and Non-stationary Containers

The purpose of this section of the guideline is to ensure the containment of all spills and accidental losses of chemicals or wastes from storage systems for solid chemicals or wastes (packaged or stockpiled) are consistent with the following objectives:

- environmental protection (air, surface and groundwater)
- personnel protection
- fire protection.

Container Storage Requirements

At most industrial facilities, storage of chemicals and waste in pails, drums and totes is a common practice. Storage of all forms of containers will be similar whether they are stored in an outdoor or indoor facility. The requirements, other than protection from weather conditions, remain the same. The containers should be stored in a manner to ensure:

- accessibility to the fire response personnel and/or fire department
- accessibility to material control personnel
- stability of containers
- appropriate segregation
- appropriate labelling.

Containers should be stored in accordance with the:

- *Fire Protection and Prevention Act, 1997*
- *Occupational Health and Safety Act*
- Associated regulations.

In order to meet proper container storage requirements, a facility specific arrangement plan should be implemented. Items such as storage area locations and accessibility to materials should be considered. A majority of these decisions can be made based on process needs and the ability to provide optimum handling and transportation. However, in locating the storage area, consideration should be given to the hazards associated with the flammability and toxicity of the chemical or waste and/or relevant codes, standards and regulations. Special consideration should be given to ensuring that the area used to store the chemicals and waste is accessible to fire fighting and other emergency response personnel and equipment.

Section

5 Container Storage

The location of the storage area should promote protection of both the containment structures and packages of the stockpiled materials from moving machinery and vehicles. The following checklist is not exhaustive, but will assist in the safe management of containers:

a) Stacking:
- number of stacks should be minimized
- stacks are made-up of similar container types (shape)
- use of appropriate platforms or pallets
- aisle space for adequate access

b) Labelling:
- proper identification of material (ensure compatibility)
- date of material manufacture
- fill-date of container

c) Inventory Control:
- arrival date at facility
- material types
- location within facility
- fill dates.

In addition to the items listed under stacking, owners/operators should closely evaluate the quantities and placement of stackable containers to avoid fire and safety hazards. Closed containers of flammable liquids do have a stacking height restriction which is outlined in Part 4 of the Ontario Fire Code. Densely packed container storage areas may make good use of valuable floor space, but may create accessibility problems, give rise to safety issues and hinder fire fighting.

Outdoor Storage Requirements

In order to maximize the space required for bulk solids and non-stationary containers, outdoor storage areas are typically utilized. To minimize the risk to the environment and facility personnel, an assessment should be completed to determine the following:

- stormwater contamination
- storm and sanitary sewer contamination
- wind effects
- temperature extremes
- accessibility.

Section

5 Container Storage

In most circumstances, it is preferable that the storage of chemicals and waste areas be covered with a roof, bermed or enclosed to prevent stormwater contact. This is particularly important for materials that react to water or that may pollute any stormwater discharge. The enclosure should be designed to protect against severe weather conditions and any hazards associated with the chemical or waste. The following are additional examples of items that should be considered when evaluating building requirements:

- flammability and combustibility
- reactivity
- corrosivity
- temperature requirements
- ventilation requirements
- compatibility (storage of different materials)
- any other material hazards.

When stockpiles of raw materials are stored outdoors, covers should be put in place to avoid stormwater (e.g., snow and rain) contamination. When orienting stockpiles, consideration should also be given to prevailing wind conditions and directions. If covers are used on small stockpiles, they should be in place at all times when work with the stockpiles is not occurring. If the stockpiles are so large that they cannot feasibly be covered and contained, erosion control practices such as crust forming agents should be implemented.

Secondary Containment

Storage containers should not be placed directly on the ground. Storage containers should be impermeable (i.e., leak tight) and constructed of a material compatible with the materials being stored in the primary containment system. Protective coatings can be applied and maintained in good condition where required to protect the containment structure from chemical degradation. The runoff of uncontaminated stormwater from adjacent areas and from the stockpiles should be prevented from entering the sewer or storm drains by placing a curb or a berm along the perimeter of the area. The containment areas should be free of drains that connect directly or indirectly to a storm or sanitary sewer system.

Containment areas should be sloped and curbed so that spills and drainage are directed to an appropriate collection, treatment or disposal system in a manner that minimizes the pooling of water on the site (minimum slope of 1.5 % recommended). When storing small quantities of container storage, the capacity of the secondary containment should be 10 % of the total volume of material stored plus the size of the largest container. Stacked drums or containers should be stored such that the horizontal trajectory of a

potential leak will be confined within the impoundment. As a guide, the perpendicular distance from the drum or container face to the top of the inside face of any containment should be a minimum of half the height of the highest drums or containers above the top of the containment wall. In cases involving very high risk of loss or damage, calculations should be made to determine the required distance.

When storing larger quantities of chemicals or wastes in containers, the secondary containment features should be constructed to a minimum height of 15 cm above the surrounding floor or grade. This may be achieved by the inclusion of non-combustible sills, curbs, ramps or dykes (i.e., steel or concrete) during construction of the facility. Storage of small quantities (usually in indoor applications) can be accomplished through specialized equipment such as over pack drums, spill containment pallets or spill trays manufactured from steel or plastic.

Containment areas may be emptied manually, by pumps or by ejectors. However, all should be manually activated and the condition of the accumulation should be examined before starting to be sure that no contaminants are discharged into the environment. Examination could include visual, odour or analytical tests, as applicable to the type of materials contained.

Material that accumulates from a secondary containment system should be treated or decontaminated in accordance with local requirements (e.g., municipal by-laws) for discharges to sewer or in accordance with certificate of approval and sector specific Effluent Monitoring and Effluent Limits Regulations made under the *Environmental Protection Act* for direct discharges. If the containment system is created in such a way that the risk of releases into the natural environment is minimal then the guideline should be applied to that degree. For example containers stored indoors in remote areas, away from exterior doors and sewer drains may not require the same degree of secondary containment as containers stored outdoors.

Storage Area Security

The security of chemical and waste storage areas is important to protect the environment and facility operators. Chemical and/or waste storage areas can be either indoors or outdoors, but in both cases they should be protected from unauthorized access. Only authorized and trained personnel should have access to the storage area.

Outdoor chemical and waste storage compounds should be completely fenced. This fencing should be constructed in such a manner as to discourage entry into the compound by climbing or other means. A risk assessment should be completed to determine the requirements of the fencing, including but not limited to height, dimensions, building type and materials in storage. The following are some factors that may help determine security requirements:

- number of storage containers
- type of chemical or waste being stored
- quantity of material stored
- location of the storage area
- accessibility of storage area
- frequency of use.

Upon determination of the security requirements, additional considerations such as safe storing distances should be evaluated. A risk assessment may necessitate that additional control measures be put into effect to secure the storage area. Other security measures, including the following should be investigated as part of the security risk assessment:

- distance from fence-line to containers
- lighting
- locks
- security cameras.

Section

7 Inspection and Monitoring

General

Primary storage equipment containing chemicals or wastes, including containers, cabinets, drums, tanks, valves and piping should be visually inspected for leaks, structural integrity and any other signs of deterioration (e.g., corrosion, wearing of protective coatings) on a regular basis. In the absence of a regulatory requirement, daily visual inspections of stored chemicals and/or wastes should be completed and recorded. However, for critical or highly hazardous chemicals and/or wastes, more frequent inspections may be necessary.

Containment Inspections

Secondary containment systems in an outdoor environment should be examined at least weekly or after each significant precipitation event to ensure that the containment is free of debris, rainwater, snow or other materials that could compromise the capacity and integrity of the containment system. Examination may include visual, odour or analytical tests, as applicable to the type of materials being stored. Accumulations from a secondary containment system should be treated or decontaminated in accordance with local requirements (e.g., municipal by-laws) for discharges to sewer or in accordance with a site certificate of approval and sector specific Effluent Monitoring and Effluent Limits Regulations made under the *Environmental Protection Act* for direct discharges.

Detailed inspection of the integrity of both the primary and secondary containment systems (e.g., presence of cracks, condition of seals) should be completed periodically. Routine leak detection and inventory reconciliation measures should be implemented and the results should be recorded for aboveground and underground tanks. These detection methods include manual dips (water and product), monitoring of interstitial spaces, examination of monitoring wells, or other methods that are based on manufacturer's recommendations, regulatory requirements or best practices. Tanks and tank systems that contain corrosives or materials that may induce corrosion or tank material deterioration should be internally inspected at least every ten years. They should be inspected more frequently if recommended by the manufacturer or if required by a regulation. Internal inspections of the tanks and tank systems should be completed in compliance with any applicable regulations or certificates of approval.

Mechanical/Electrical Systems

Mechanical systems, including ventilation systems, sump pumps, emergency alarms, impressed current corrosion protection systems, level alarms and other systems should be inspected on a routine basis to ensure proper functioning based on the manufacturer's recommendations, regulatory requirements or best practices. Any mechanical system that has a regulatory requirement needs to be inspected, monitored and tested in accordance with those regulations.

Record Keeping

All inspections of chemical and waste storage systems should include a review of the adequacy, completeness, amount, type and accessibility of all spill response equipment. During visual inspections, a checklist and log should be maintained that details the following:

- person responsible for the inspection along with the date of the inspection
- storage areas and containers subject to the inspection
- condition of containers, cabinets, drums, tanks, valves and piping
- quantity of chemicals and/or wastes in storage
- condition of leak detection and spills prevention systems (e.g., cathodic protection system, valves, overfill protection, secondary containment berms).

Appendix B of this guideline document provides sample inspection checklists for owners and operators of chemical and waste storage areas. The intent of this checklist is to assist owners and operators in generating their own checklist and in determining the most appropriate inspection schedule for their chemical and waste storage sites.

Section

8 Emergency Preparedness

Emergency Preparedness and Response

Many chemicals and/or wastes can pose a risk to the environment or result in an adverse occupational health and safety incident if handled or stored inappropriately. In order to minimize environmental impacts, facilities should have an emergency preparedness plan to deal with events such as chemical/waste spills, fires, explosions, vandalism and other emergency situations. The plan should address:

- hazard identification
- prevention measures
- emergency planning
- emergency response
- remedial actions.

Response Plans

In developing emergency response plans, facilities should consult the requirements of all relevant legislation, as well as industry codes of practice which may prescribe plan contents or require certain procedures to be followed. Any plan should be completed in consultation with the municipality and the local fire department. Further guidance on emergency response plans is available in the CAN/CSA-Z731-03 Emergency Preparedness and Response.

The Emergency Response Plan should include:

Location and Material Information:

- A description of the storage location (including site plans, floor plans, etc), type and amount of chemicals and/or wastes typically in storage, including reference to Material Safety Data Sheets (MSDS)
- Identification of potential environmental emergencies/hazards that may occur, the effects of a potential accidental release and the measures that are required to prevent or respond to emergencies
- A description of the measures that would be used to prevent an environmental emergency, including: the location and type of fire fighting and fire suppression systems; and the spill containment measures (e.g., spill kits, secondary containment berms, double walled storage tanks, etc.)
- A list of the emergency contact numbers for relevant facility staff: spills and/or clean-up response contractors; emergency responders; and agency reporting requirements

- A list of the community communication and notification requirements, which include public education and information programs.

Personnel Requirements:

- Assignment of roles and responsibilities for activating, coordinating and implementing the emergency response plan, including: specific medical or rescue duties; fire response; and spill response duties
- Administrative issues and identification of personnel responsible for management of the response plan and the responsibility for updating the plan
- A description of the actions that facility personnel should take to respond to: fires; explosions; or any other unplanned release to air, soil, or surface water, including: consideration of provisions for monitoring chemicals and waste during a spill; requirements for personal protective equipment; reporting; recordkeeping; containment; clean-up; and disposal concerns
- The steps to report, record and contain fires, explosions and other similar emergencies
- Training requirements for personnel who would be activating, coordinating and implementing the plan including the use and maintenance of personal protective equipment
- The requirement for emergency response exercises (administrative, tabletop drills and operational exercises) should be included.

Emergency Information Requirements:

- Maintenance and inspection requirements for: preventive measures (e.g., secondary containment system); emergency response and personal protective equipment; and fire suppression systems, including record keeping requirements
- The steps that would be necessary to shut down critical operations (e.g., electricity, natural gas etc.)
- The site or location specific evacuation plan and head count procedures
- A procedure for re-evaluation of the plan's effectiveness, follow-up after incidents, and post-drill reviews.

Spill Reporting

Incidents and accidents involving the release of chemicals or waste by the way of spills, fires and other releases **must** be reported in a timely manner to the Spills Action Centre and the local MOE District Office, in addition to any other appropriate agencies/jurisdictions. Reporting requirements are listed in the following Ontario statutes, and regulations made under these Acts:

- *Environmental Protection Act*

- *Ontario Water Resources Act*
- *Technical Standard*s and *Safety Act, 2000*
- *Pesticides Act.*

Reporting requirements are listed in the following federal Acts and regulations made under these Acts:

- *Transportation of Dangerous Goods Act, 1992* (TDGA) (Canada)
- *Canadian Environmental Protection Act, 1999* (Canada).

There are additional requirements for reporting to other ministries and government officials (e.g., Ministry of Labour). The owner/operator of a facility that stores chemicals or waste should be knowledgeable about the specific requirements for his/her facility.

Facilities should ensure that a record is kept of all incidents involving spills, fires and other releases into the environment. As a minimum, this record should include the following:

- date of the occurrence
- detailed description of events that lead up to the occurrence
- amount of materials released to the environment
- the actions taken to control and clean-up the spill
- corrective actions implemented
- evaluation of the corrective action.

Section

9 Labelling

General

Labels and hazardous safety marks provide critical information to carriers, receivers and transporters of chemicals and wastes. Labels act as a hazard awareness tool for people involved in the handling and transportation of chemicals and wastes, including truck drivers, train crews, loading dock workers and security personnel. Labels also provide for the quick identification of storage vessel contents and hazards by emergency responders in the event of an emergency situation, such as an accidental release of chemicals or wastes from a container.

Any containment device used for hazardous materials must be labelled with the appropriate hazardous communication. This includes containers, cabinets, drums, tanks, valves and piping.

Regulatory Requirements

It is the facility owner's responsibility to ensure that all chemicals and wastes are appropriately packaged and labelled. It is important that an inventory of all materials is up-to-date and that the respective labels are available for use. Refer to the Regulatory Summaries in Appendix A for additional guidance on specific labelling requirements.

There are several regulations and/or certificates of approval that require facilities to appropriately package and label chemicals and waste. They include (not limited to):

- Fire safety and regulatory labels required by the Workplace Hazardous Materials Information System Regulation, made under *the Occupational Health and Safety Act*
- Fire Code, made under the *Fire Protection and Prevention Act, 1997*
- Liquid Fuels Regulation, made under the *Technical Standards and Safety Act, 2000*
- Storage of PCB Material Regulation, made under *Canadian Environmental Protection Act, 1999* (Canada)
- Transportation of Dangerous Goods Regulations (if stored in course of transport or transport is planned), made under the *Transportation of Dangerous Goods Act, 1992* (Canada)
- General Regulation under the *Pesticides Act* and Refrigerants Regulation (for refrigerant containers) made under the *Environmental Protection Act*
- Regulation 347 General – Waste Management, made under the *Environmental Protection Act*.

Labelling of Waste

In addition to the above labels, hazardous or liquid industrial wastes should also be labelled with a date, which indicates the point at which the container was filled, sealed and prepared for shipment. Accurate recording of the date on storage containers allows for an effective tracking system. All storage of wastes should be minimized and regular pick-ups should be scheduled.

Labels should be visible, legible, of an appropriate size and colour, and displayed against a background of contrasting colour. Labels should be made of durable and weather-resistant material to withstand harsh conditions without substantial deterioration or detachment of colour, symbols, letters, or numbers.
Where practicable, identification codes can be stencilled or printed on the package or container as an additional means of identification. For wastes, colour coding (e.g., banding of drums or alternate method) maybe used to identify waste streams. Where labels deteriorate or become dislodged from a container, they should be replaced without delay.

Section

10 Training

General Requirements

Responsible chemical and waste management is the responsibility of the owner/operator of the facility. Training for the use of chemicals including storage requirements is necessary to ensure the safety of all personnel and to minimize risk to the environment. In addition to training increasing knowledge about chemical hazards, personnel should be trained on associated equipment that may be used to handle, store or use chemicals and wastes.

Training should be specific to the chemicals and/or wastes stored at a site and may include:

- The description of potential hazards and health effects, including: the interpretation and understanding of Material Safety Data Sheets (MSDS) (e.g., ingredients and properties of substances); and proper labeling techniques.
- Identification of procedures and special precautions for safe storage, use and handling, and loading and off-loading, including the use of personal protective equipment.
- Site and location specific emergency response procedures, which include fire and spill containment, and clean up methods for specific types of contaminants.
- Description of any terms and conditions of a certificate of approval, where one has been issued.

Regulatory Requirements

There are several regulations that require facilities to train their employees with regard to chemicals and waste. They include (not limited to):

- Workplace Hazardous Materials Information System Regulation, made under *the Occupational Health and Safety Act*
- Fire Code, made under the *Fire Protection and Prevention Act 1997*
- Regulations made under the *Technical Standards and Safety Act, 2000:*
    - Liquid Fuels Regulation
    - Fuel Oil Regulation
    - Gaseous Fuels Regulation
    - Propane Storage and Handling Regulation
- Waste Management – PCB's, made under the *Environmental Protection Act*
- Storage of PCB Material Regulation made under the *Canadian Environmental Protection Act, 1999*
- Environmental Emergency Regulation made under the *Canadian Environmental Protection Act, 1999*

- Transportation of Dangerous Goods Regulations (if stored in course of transport or transport is planned), made under the *Transportation of Dangerous Goods Act, 1992* (Canada).

Individuals that handle, offer for transport or transport hazardous materials regulated under the Transportation of Dangerous Goods Regulations (TDGR) must be trained. Training must be specific to the types of "Dangerous Goods" that the facility manages.

TDGR training certificates are valid for three years and after they expire re-certification training should be completed.

Training for hazardous materials handlers:

- TDG training requirements and handling responsibilities
- descriptions of dangerous goods classes and compatibility/risk groups
- dangerous goods list (e.g., Schedule 1) data and other sources of information
- dangerous goods safety marks, placards and requirements
- shipping document data and exceptions
- details of small and large means of containment
- emergency actions, information and requirements
- accidental release procedures and responsibilities.

The aforementioned training is important for individuals handling hazardous materials, however when flammable or combustible liquids are involved, specific training should be provided. This training would vary by the type of flammable and combustible liquids that are involved.

Training for flammable and combustible liquid handlers:

- emergency procedures, including fire and spill response emergency procedures
- correct procedures for dispensing of the liquid
- importance of constant attendance during all loading or unloading operations
- extinguishing procedures for fires involving flammable and combustible liquids
- flammable and combustible liquid colour coding and identification systems.

Training of personnel should be managed through a formalized education and training program that would provide job specific training, competency requirements and records for each of the employees. This specific training should include the type of training required, the contents of the training, the necessary education and experience as well as the specified certifications (e.g., trades certificates). Useful training programs would include an evaluation of training effectiveness and testing the knowledge of the trained individuals. Refresher training should be completed in accordance with relevant regulations or based on the needs of a risk assessment.

Records of training should be maintained and may include:

- type of training
- description
- date of completion
- employees in attendance
- any expiry dates.

Records must be maintained in accordance with the requirements of relevant legislation or in the absence of a regulatory requirement, training records should be maintained for a minimum of two (2) years after the expiry of a training certificate. If no certificate is issued, records should be retained to demonstrate that employees have full and current training in accordance with identified training needs.

Only trained persons should be permitted to use, handle and transport chemicals and wastes. Access to chemical and waste storage areas should be limited to trained individuals. In addition to training required for chemicals and waste, specialized training courses may be required for select tasks such as:

- fork lift truck operation
- working in confined spaces
- service of equipment
- use of equipment containing chemicals and/or waste.

Only trained individuals with valid certificates should install, repair, service or remove storage systems and equipment that contain, or have contained, flammable or combustible liquids or gases (e.g., fuel oil and gasoline products) and gaseous fuels and other hazardous materials, chemicals and wastes.

List of Resources

The American National Standards Institute (ANSI) has the B-31.3 Refinery Piping Code and other standards and codes.

API 620 - American Petroleum Institute Specification 620, "Recommended Rules for Design and Construction of Large, Welded, Low-Pressure Storage Tanks", June l990, American Petroleum Institute Publishers, 1220 L Street, NW, Washington, DC 20005.

API Standard 650 - Welded Steel Tanks for Oil Storage, ninth edition, May 1993 (includes Addendum 1, December 1994; Addendum 2, December 1995; and Addendum 3, December 1996).

API Recommended Practice (RP) 651 — Cathodic Protection of Aboveground Petroleum Storage Tanks, first edition, April 1991.

API RP 652 - American Petroleum Institute Specification 652, "Lining of Aboveground Petroleum Storage Tank Bottoms", l99l, American Petroleum Institute Publishers, l220 L Street, NW, Washington, DC 20005.

API Standard 653 — Tank Inspection, Repair, Alteration, and Reconstruction, second edition, December 1995 (includes Addendum 1, December 1996).

API 1615 - American Petroleum Institute Specification 1615, "Installation of Underground Petroleum Storage Systems", l987, with l989 supplement, American Petroleum Institute Publishers, 1220 L Street, NW, Washington, DC 20005.

API 1632 - American Petroleum Institute Specification l632", Cathodic Protection of Underground Petroleum Storage Tanks and Piping System", l987, American Petroleum Institute Publishers, l220 L Street, NW, Washington, DC 20005.

API Standard 2000 — Venting Atmospheric and Low-Pressure Storage Tanks: Nonrefrigerated and Refrigerated, fourth edition, September 1992.

API RP 2003 — Protection Against Ignitions Arising Out of Static, Lightning, and Stray Current, fifth edition, December 1991.

API PUBL 2210 — Flame Arrestors for Vents of Tanks Storing Petroleum Products, second edition, 1982.

API RP 2350 — Overfill Protection for Petroleum Storage Tanks, first edition, March 1987.

The American Society of Mechanical Engineers (ASME) has the Pressure Vessel Code and other codes relevant to tanks and storage vessels.

List of Resources

The American Society of Nondestructive Testing (ASNT) certifies welding and non-destructive examination (NDE) and non-destructive testing (NDT) inspectors.

ASTM D2996-88 - American Society for Testing and Materials Designation D2996-88, "Specification for Filament-Wound Reinforced Thermosetting Resin Pipe", 1988, American Society for Testing and Materials, 1916 Race Street, Philadelphia, PA 19103.

ASTM D3299-88 - American Society for Testing and Materials Designation D3299-88, "Filament-Wound Glass-Fiber-Reinforced Thermoset Resin Chemical-Resistant Tanks", 1988, American Society for Testing and Materials, 1916 Race Street, Philadelphia, PA 19103.

ASTM D4021-92 - American Society for Testing and Materials Designation D4021-92, "Standard Specification for Glass-Fiber-Reinforced Polyester Underground Petroleum Storage Tanks", 1992, American Society for Testing and Materials, 1916 Race Street, Philadelphia, PA 19103.

ASTM D4097-88 - American Society for Testing and Materials Designation D4097-88, "Contact-Molded Glass-Fiber-Reinforced Thermoset Resin Chemical-Resistant Tanks", 1988, American Society for Testing and Materials, 1916 Race Street, Philadelphia, PA 19103.

The American Welding Society (AWS) certifies welding inspectors with the designation AWS QC-1 (Quality Control) Welding Inspector and has guidelines on safe welding.

California Stormwater Quality Association, 2003. Stormwater Best Practice Management Handbook, Industrial and Commercial.

CAN4-S601-M84 - Underwriters' Laboratories of Canada, No. CAN4-S601-M84, "Standard for Shop Fabricated Steel Aboveground Horizontal Tanks for Flammable and Combustible Liquids", 1984, Underwriters' Laboratories of Canada, 7 Crouse Road, Scarborough, Ontario, Canada M1R 3A9.

CAN4-S630-M84 - Underwriters' Laboratories of Canada, No. CAN4-S630-M84, "Standard for Shop Fabricated Steel Aboveground Vertical Tanks for Flammable and Combustible Liquids", 1984, Underwriters Laboratories of Canada, 7 Crouse Road, Scarborough, Ontario, Canada M1R 3A9.

Hazardous Substances and Waste Dangerous Goods Regulations R.R.S., c. E-10.2, r. 3 (Saskatchewan Environment).

NACE Standard RP-01-69 - National Association of Corrosion Engineers, "Recommended Practice - Control of External Corrosion on Underground or

Submerged Metallic Piping Systems, RP-01-69", April 1992 Revision, National Association of Corrosion Engineers, Box 218340, Houston, Texas 77218.

NACE Standard RP-02-85 - National Association of Corrosion Engineers, "Recommended Practice - Control of External Corrosion on Metallic Buried, Partially Buried, or Submerged Liquid Storage Systems", 1985, National Association of Corrosion Engineers, Box 218340, Houston, Texas 77218.

NFPA No. 30 - National Fire Protection Association, "Flammable and Combustible Liquids Code, No. 30", 1996, NFPA, Batterymarch Park, Quincy, MA 02269.

NFPA 70 — National Electric Code, 1996.

NFPA 77 — Static Electricity, 1993.

NFPA 780 — Lightning Protection Code, 1995.

NLPA 631 - National Leak Prevention Association, "Spill Prevention, Minimum 10-Year Life Extension of Existing Steel Underground Storage Tanks by Lining Without the Addition of Cathodic Protection", 1991, NLPA P.O. Box 1643, Boise, ID 83701.

NYCRR Part 599 - Standards for New or Modified Hazardous Substance Storage Facilities (New York State Department of Environmental Conservation).

NYCRR Part 598 - Handling and Storage of Hazardous Substances.

SSPC-SP #6 - Steel Structures Painting Council, "Steel Structures Painting Manual, Chapter 2 - Surface Preparation Specifications, Commercial Blast Cleaning", June 1991, Steel Structures Painting Council, 4400 Fifth Avenue, Pittsburgh, PA 15213.

ULC-C107.7-1993 - Underwriters' Laboratories of Canada, No. ULC-C107, "Glass Fiber Reinforced Plastic Pipe and Fittings for Flammable Liquids", 1993, Underwriters' Laboratories of Canada, 7 Crouse Road, Scarborough, Ontario, Canada M1R 3A9.

ULC Standard S603 - Underwriters' Laboratories of Canada, No. ULC-S603-92, "Standard for Steel Underground Tanks for Flammable and Combustible Liquids", 1992, Underwriters Laboratories of Canada, 7 Crouse Road, Scarborough, Ontario, Canada M1R 3A9.

ULC-S603.1 - Underwriters' Laboratories of Canada, No. ULC-S603.1-M1982, "Standard for Galvanic Corrosion Protection Systems for Steel Underground Tanks for Flammable and Combustible Liquids", 1992, Underwriters Laboratories of Canada, 7 Crouse Road, Scarborough, Ontario, Canada M1R 3A9.

List of Resources

US EPA, 1995. AP 42, Fifth Edition. Compilation of Air Pollutant Emission Factors, Volume 1: Stationary Point and Area Sources.

40 CFR 280 - Part 280 of Title 40 of the Code of Federal Regulations, "Technical Standards and Corrective Action Requirements for Owners and Operators of Underground Storage Tanks (UST)", July 1, 1993, Superintendent of Documents, U.S. Government Printing Office, Washington, D.C. 20402.

40 CFR 281 - Part 281 of Title 40 of the Code of Federal Regulations, "Approval of State Underground Storage Tank Programs", July 1, 1993, Superintendent of Documents, U.S. Government Printing Office, Washington, D.C. 20402.

40 CFR 302.8 - Section 8, Part 302 of Title 40 of the Code of Federal Regulations, "Continuous Releases", July 1, 1990, Superintendent of Documents, U.S. Government Printing Office, Washington, D.C. 20402.

APPENDIX A

REGULATORY SUMMARIES

Legislation:	*Environmental Protection Act,* R.S.O. 1990, c. E.19
General Overview:	Establishes powers to ensure environmental protection and to promote resource conservation.
Application - Classes of Chemicals Regulated:	• All
Application - Facilities Regulated:	• Applies to all provincially regulated facilities.
Key Requirements – Design:	Certificates of Approval: • No person shall use, operate, establish, alter, enlarge or extend, a waste management system; or a waste disposal site, unless a certificate of approval or provisional certificate of approval has been issued by the Director and except in accordance with any conditions set out in such certificate. Certificates of approval may impose conditions on the design of chemical and waste chemical storage facilities.
Key Requirements – Operational:	General Prohibition on Discharge: • No person shall discharge into the natural environment any contaminant, and no person responsible for a source of contaminant shall permit the discharge into the natural environment of any contaminant from the source of contaminant, in an amount, concentration or level in excess of that prescribed by the regulations. • No person shall discharge a contaminant or cause or permit the discharge of a contaminant into the natural environment that causes or is likely to cause an adverse effect. Certificates of Approval: • No person shall use, operate, establish, alter, enlarge or extend, a waste management system; or a waste disposal site, unless a certificate of approval or provisional certificate of approval has been issued by the Director and except in accordance with any conditions set out in such certificate. Certificates of approval may impose conditions on the storage of chemicals and waste chemicals.
Key Requirements – Training:	• None
Key Requirements – Emergency Planning and Response:	Spills: • Every person having control of a pollutant that is spilled and every person who spills or causes or permits a spill of a pollutant that causes or is likely to cause an adverse effect shall forthwith notify the following persons of the spill, of the circumstances thereof, and of the action that the person has taken or intends to take with respect thereto, the ministry; any municipality within the boundaries of which the spill occurred or, if the spill occurred within the boundaries of a regional

	municipality, the regional municipality; where the person is not the owner of the pollutant and knows or is able to ascertain readily the identity of the owner of the pollutant, the owner of the pollutant; and where the person is not the person having control of the pollutant and knows or is able to ascertain readily the identity of the person having control of the pollutant, the person having control of the pollutant. • The owner of a pollutant and the person having control of a pollutant that is spilled and that causes or is likely to cause an adverse effect shall forthwith do everything practicable to prevent, eliminate and ameliorate the adverse effect and to restore the natural environment.
Other Citations:	• None -

Legislation:	*Environmental Protection Act*, R.S.O. 1990, c. E.19
Regulation:	General -- Waste Management, R.R.O. 1990, Reg. 347
General Overview:	Defines and designates hazardous waste and non-hazardous waste and provides approval and operating standards for waste disposal sites and waste management systems. Provides a comprehensive system for monitoring hazardous and liquid industrial wastes, from their point of generation, through to their ultimate disposal.
Application - Classes of Chemicals Regulated:	• Applies to all chemical wastes. Exceptions include: - Rock fill or mill tailings - Pickle liquor transferred by a generator for direct transportation to a site at which it is to be wholly utilized as a treatment chemical in a sewage works that is subject to the *Ontario Water Resources Act*, or a wastewater treatment facility that discharges into a sanitary sewer - Solid photographic waste that contains silver, including spent chemical recovery cartridges that contain silver, transferred by a generator and destined for a site at which it is to be processed for recovery of silver - Hazardous waste or liquid industrial waste transferred by a generator for direct transportation to a site to be: wholly used at the site in an ongoing agricultural, commercial, manufacturing or industrial process or operation used principally for functions other than waste management if the process or operation does not involve combustion or land application of the waste; promptly packaged for retail sale to meet a realistic market demand; or, offered for retail sale to meet a realistic market demand, only if the carrier has in his or her possession while transporting the material a document from the owner or operator of the site to which the material is being transported agreeing to accept the material, specifying what use will be made of it and stipulating that the process or operation described in that subparagraph is ongoing at the time the material is being transported.
Application - Facilities Regulated:	• Applies to all sites generating or receiving regulated chemical wastes.
Key Requirements – Design:	• None
Key Requirements – Operational:	<u>Registration:</u> • Every generator who operates a waste generation facility that is involved in the production, collection, handling or storage of subject waste shall, before transferring any subject waste from that waste generation facility, submit an initial Generator Registration Report to the Director in respect of the facility; and on or before February 15 in each year, submit an annual Generator Registration Report to the Director in respect of each waste generation facility operated by the generator. • Where there is a change from the information submitted in an initial Generator Registration Report or in the most recent annual Generator Registration Report or any previous supplementary Generator Registration Reports in respect of the generator's name, address or telephone number, the name of the contact for the generator, the name of the responsible official for the generator or the addition of subject wastes or where there is a significant change from such previously submitted information in respect of the description or physical or chemical characteristics of the subject wastes, the generator who submitted the applicable report shall send a supplementary Generator Registration Report to the Director within 15 days after the change.

- Associated with the Generator Registration Report, there is a Registration Fee which is made up of three components:
  - $50 annual fee
  - $5 per manifest used during the calendar year in which the Report is submitted
  - a sum calculated at the rate of $10 per tonne of hazardous waste generated during the calendar year in which the Report is submitted.

Subject Waste Storage:

- If a waste generation facility stores subject waste, the operator and the owner of the facility shall ensure that subject waste must be stored, handled and maintained so as to prevent leaks or spills of the waste, or damage to or deterioration of the container in which the waste is stored.

Subject Waste Storage Greater than Three Months:

- The first time that subject waste is stored at the waste generation facility for more than 90 days, a notice must be given to the Regional Director, within five business days after the 90th day of storage, that,
  - describes, as accurately as possible, the nature, amount and location of subject waste stored, or expected to be stored in the future, at the waste generation facility for more than 90 days
  - indicates how frequently subject waste is expected to be stored in the future at the waste generation facility for more than 90 days.
- Subject waste must not be stored for a period exceeding 24 months unless an application for a certificate of approval respecting the storage of subject waste by the waste generation facility has been made and not yet determined.

Transfer of Wastes - General:

- No generator shall permit subject waste to pass from the generator's control or to leave the waste generation facility except by transfer of the subject waste to a waste transportation system operating under a certificate of approval or provisional certificate of approval and where the generator has completed a manifest in respect of the waste in accordance with the Manual and the Regulation or by direct discharge to a sewage works subject to the *Ontario Water Resources Act*, R.S.O. 1990, c. O.40 or established before August 3, 1957 or into a sewage system regulated under Part 8 of the Building Code, O.Reg. 403/97, made under the *Building Code Act*, 1992, S.O. 1992, c. 23.

Transfer of Wastes - Waste Carrier:

- No generator shall transfer a particular subject waste from a waste generation facility to a waste transportation system unless a valid generator registration document for that waste generation facility with a waste number for that particular subject waste is posted on the ministry website.
- Whenever liquid industrial waste or hazardous waste is being transferred to or from a waste transportation vehicle, the driver of the vehicle must be present unless the generator or receiver is present.
- In all transfers of subject waste under the Regulation, every generator shall use the generator registration number issued in respect of the waste generation facility from which the subject waste is being transferred and the applicable waste numbers set out in the Manual.

- A paper of electronic waste generator manifest must be used to document shipments of subject waste, with waste manifests completed and processed in accordance with the Regulation.

Transfer of Wastes - On-Site Disposal:

- Every generator shall keep a record of the subject waste disposed of at the waste generation facility including the name, waste number, quantity and disposition of the waste.

Transfer of Wastes – Labelling:

- No generator shall transfer subject waste to a waste transportation system unless the subject waste is so packaged or marked that it meets the transport requirements of the *Transportation of Dangerous Goods Act, 1992* (Canada), S.C. 1992, c. 34.

Transfer of Waste – Receipt at Waste Management Site:

- The receiver must process the paper of electronic waste generator manifest in accordance with the Regulation.

Refrigerant Waste Collectors:

- Stationary and mobile refrigerant waste collectors are subject to specific record keeping requirements.
- A stationary refrigerant waste disposal site that is the ordinary place of business of a stationary refrigerant waste collector or that is operated by a wholesale dealer in refrigerants is exempt from section 27 of the *Environmental Protection Act*, R.S.O. 1990, c. E.19 if:
  - access to stationary refrigerant waste is controlled by gates, fencing, attendants or other security measures
  - containers in which stationary refrigerant waste is stored are clearly marked as to contents
  - stationary refrigerant waste is stored in a location and manner that prevents damage or deterioration
  - stored stationary refrigerant waste is readily accessible for inspection by a provincial officer
  - there is available, at or near the site, firefighting equipment and spill clean-up and containment equipment appropriate to the quantities and types of stationary refrigerant waste on or likely to be on the site
  - written notice is given to the Director within ninety days after the establishment of the site, specifying the location of the site and the quantities and types of stationary refrigerant waste on or likely to be on the site.
- Waste manifest requirements do not apply in respect of stationary refrigerant waste under certain conditions and to mobile refrigerant waste.

Selected Waste Depots (Waste Anti-Freeze, Waste Lubricants and Waste Oil Filters):

- Specific requirements are defined for: providing a written notice of intent to operate a depot; providing security measures at the depot; posting of operating hours and adhering to these hours; depositing waste forthwith into storage containers; restricting who may accept, handle, store or deposit selected waste at the depot; taking all reasonable steps to ensure that only allowable wastes are accepted at the depot; segregation and storage of waste; labelling of containers; implementing spill prevention and secondary containment measures; completing routine inspections for leaks and records of inspections; providing fire-fighting and spill response equipment; keeping records of wastes received; establishing a written agreement for routine removal of wastes; and

	removal of wastes and notification upon closure of the depot. Records: • Records of-on-site disposal of subject wastes may be disposed of after two years. • Generator retains Copy 2 (Green) for a period of two years, if paper manifest used. • Receiver retains Copy 5 (Blue) for a period of two years, if paper manifest used. • Stationary and mobile refrigerant waste records may be disposed of after two years. • Selected waste depot leak and spill inspection records must be kept for a period of two years after being made. • Selected waste depot waste receipt records must be kept for a period of two years after being made.
Key Requirements – Training:	Selected Waste Depots (Waste Anti-Freeze, Waste Lubricants and Waste Oil Filters): • Each operator and owner of a selected waste depot shall ensure that each person who accepts, handles, stores or deposits selected waste at the depot is knowledgeable about requirements specified in the Regulation.
Key Requirements – Emergency Planning and Response:	Refrigerant Waste Collectors: • Firefighting equipment and spill clean-up and containment equipment appropriate to the quantities and types of stationary refrigerant waste on or likely to be on the site must be available at or near the site. Selected Waste Depots (Waste Anti-Freeze, Waste Lubricants and Waste Oil Filters): • Fire-fighting and spill response equipment must be provided and be readily accessible.
Other Citations	• *Transportation of Dangerous Goods Act, 1992* (Canada), S.C. 1992, c. 34 • MOE Registration Guidance Manual for Generators of Liquid Industrial and Hazardous Waste

Legislation:	*Environmental Protection Act,* R.S.O. 1990, c. E.19
Regulation:	Waste Management - PCBs R.R.O. 1990, Reg. 362
General Overview:	Stipulates requirements for PCB storage sites.
Application - Classes of Chemicals Regulated:	• Applies to PCB and PCB-related wastes.
Application - Facilities Regulated:	• Applies to provincially regulated facilities storing PCB wastes.
Key Requirements – Design:	• None
Key Requirements – Operational:	<u>Approvals:</u> • PCB storage sites are exempt from certificate of approval requirements, provided certain conditions are met. • No person shall dispose of, decontaminate or otherwise manage PCB waste or dilute PCB waste that is in the form of a liquid except, in or to a waste management system operating under a certificate of approval issued after the 1st day of January, 1981 containing terms specifying the manner in which PCB waste may be stored, handled, treated, collected processed, diluted or disposed of; or in accordance with written instructions of the Director. • No person shall have at a waste disposal site PCB wastes received by the person after the 15th day of January, 1982 unless, the PCB waste was delivered to the waste disposal site under written instructions of the Director; or the waste disposal site is operated under a certificate of approval containing a condition referring to this section and specifying the circumstances under which PCB waste may be accepted at the waste disposal site. <u>PCB Waste Transfers:</u> • Every operator of a waste disposal site shall report to the Director the inventory information required to be recorded by telephone immediately, and in writing within three days, after a PCB waste first comes on the site; and in writing within thirty days after any other PCB waste is taken to or from the site. <u>Storage Requirements</u>: • Every person storing PCB waste shall ensure that the PCB waste is in a safe and secure location so as to prevent PCB waste coming into contact with any person and so that any liquid containing PCBs that may escape can he readily recovered and will not discharge, directly or indirectly, into a watercourse or groundwater. <u>Records</u>: • Every operator of a waste disposal site shall keep records, with prescribed information, of all PCB waste held by the operator after

	the 15th day of January, 1982 • Two years after an operator of a waste disposal site gives written notice to the Director that the operator has ceased to be a holder of PCB waste, the operator may dispose of inventory records.
Key Requirements – Training:	• None
Key Requirements – Emergency Planning and Response:	• None
Other Citations	• Director Instructions (specific to PCB storage site)

Legislation:	*Environmental Protection Act*, R.S.O. 1990, c. E.19
Regulation:	Classification and Exemption of Spills, O. Reg. 675/98
General Overview:	Establishes classes of spills and spills exempt from reporting under the act
Application - Classes of Chemicals Regulated:	• All
Application - Facilities Regulated:	• Applies to all provincially regulated facilities.
Key Requirements – Design:	• None
Key Requirements – Operational:	Records: • For every Class V, VII, VIII, IX, X and XI spill, the person having control of the pollutant shall record the details of the spill, in accordance with the regulation, and shall keep the record for two years after the spill.
Key Requirements – Training:	• None
Key Requirements – Emergency Planning and Response:	Spills: • Defines classes of spills that are exempt from reporting under the act. • A class X spill is a spill that is described in a spill contingency plan as "not reportable" if the spill contingency plan adheres to the Canadian Standard *CAN/CSA-Z731-95, Emergency Planning for Industry* or such other standard as may be approved in writing by the Director as being appropriate for the industry; the spill contingency plan has been provided to the Director for review, if so requested by the Director; and other prescribed conditions are met.
Other Citations:	• None

Legislation:	*Ontario Water Resources Act,* R.S.O. 1990, c. O.40
General Overview:	Establishes powers to regulate the water supply, sewage disposal and to control sources of water pollution. The act also provides for the approvals and licensing of wells, water works and sewage works projects
Application - Classes of Chemicals Regulated:	• All
Application - Facilities Regulated:	• Applies to all facilities.
Key Requirements – Design:	• None
Key Requirements – Operational:	• None
Key Requirements – Training:	• None
Key Requirements – Emergency Planning and Response:	Discharges to Waters: • Every person that discharges or causes or permits the discharge of any material of any kind into or in any waters or on any shore or bank thereof or into or in any place that may impair the quality of the water of any waters is guilty of an offence. • Every person that discharges or causes or permits the discharge of any material of any kind, and such discharge is not in the normal course of events, or from whose control material of any kind escapes into or in any waters or on any shore or bank thereof or into or in any place that may impair the quality of the water of any waters, shall forthwith notify the Minister of the discharge or escape, as the case may be.
Other Citations:	• None -

Legislation:	*Pesticides Act*, R.S.O. 1990, c. P.11
Regulation:	General, R.R.O. 1990, Reg. 914
General Overview:	Stipulates requirements for storage of pesticides.
Application - Classes of Chemicals Regulated:	• Pesticides registered under the *Pest Control Products Act* (Canada), R.S.C. 1985, c. P-9
Application - Facilities Regulated:	• Applies to facilities used to store pesticides. • A person is exempt from the act and regulation with respect to the storage of a pesticide, if the pesticide is to be formulated into another pesticide, manufactured or incorporated into a product, or transported out of Ontario. • A person who stores a pesticide for the treatment, control, mitigation or prevention of pests in or on people or animals is exempt from the requirements of the act and the regulation for such storage if the person is a member of a College as defined in the *Regulated Health Professions Act, 1991*, S.O. 1991, c18; a medical officer of health or a member of the staff of a board of health under the *Health Protection and Promotion Act*, R.S.O. 1990, c. H.7; or a member of the College of Veterinarians of Ontario.
Key Requirements – Design:	• A compartment, room or structure used to store a Schedule 1, 2 or 5 pesticide must be ventilated to the outside atmosphere.
Key Requirements – Operational:	<u>General Protective Measures:</u> • No person shall store a pesticide in such a manner that the pesticide is likely to come into contact with food or drink intended for human or animal consumption. • Pesticides shall be stored in such a manner that the pesticide is not likely to impair the health or safety of any person, in an area that is maintained in good repair and in a clean and orderly condition with sufficient precautions taken to prevent the pesticide from contaminating the natural environment or any other pesticide stored in the same area. • Sufficient security measures must be taken so that the express permission of the person responsible is required to enter the compartment, room, structure or outside area in which Schedule 1, 2 or 5 pesticides are stored. • No vendor, operator, exterminator or agriculturist shall store a Schedule 1, 2 or 5 pesticide except in an area that has no floor drain that leads into or drains directly or indirectly into a storm sewer, sanitary sewer or watercourse; and near which adequate respiratory protection and adequate protective clothing are kept readily available for emergency purposes • No vendor, operator, exterminator or agriculturist shall store a Schedule 1 or 5 pesticide except in an area that is used exclusively for the storage of pesticides. <u>Labelling</u>: • Pesticide shall be stored in an area that has a warning sign prominently displayed at the entrances to the storage area (at each door leading into the storage area for Schedule 1, 2 or 5 pesticides or near the storage area for outdoor storage) bearing, in clearly visible block letters the words "Warning" and "Authorized Persons Only", and the words "Chemical Storage" or "Pesticide

	Storage". • Pesticide shall be stored in an area near which there is prominently displayed a list of emergency telephone numbers, including those of the fire department, hospital and poison control centre. • No person shall have possession of a pesticide other than in the container in which it was originally offered for sale, unless the pesticide is in a secondary container of a type and composition that is customarily used or approved by the pesticide's manufacturer for that pesticide and that bears a label stating the trade name or common name and the concentration of each active ingredient in the pesticide, and the pesticide's registration number under the *Pest Control Products Act* (Canada), R.S.C. 1985, c. P-9 or the *Fertilizers Act*, R.S.C. 1985, c. F-10. <u>Theft or Loss of Pesticide</u>: • A person responsible for a pesticide shall forthwith notify the Director whenever any pesticide is stolen or otherwise passes out of the person's possession or control other than in the normal course of affairs.
Key Requirements – Training:	• No person shall store a pesticide unless the person is the holder of a vendor's license, operator's license or exterminator's license authorizing the holder to sell or use the pesticide or a pesticide reformulated from it or is exempt from requiring a vendor's license, operator's license or exterminator's license to sell or use such pesticide or a pesticide reformulated from it.
Key Requirements – Emergency Planning and Response:	<u>Emergency Response Equipment</u>: • Adequate respiratory protection and adequate protective clothing are to be kept readily available for emergency purposes by a vendor, operator, exterminator or agriculturist storing a Schedule 1, 2 or 5 pesticide. <u>Notification of Storage:</u> • Every general vendor or limited vendor who stores a Schedule 1, 2, 3, 4, 5 or 6 pesticide for sale shall annually give a written notice to the fire department responsible for the area in which the pesticide is stored. • Every operator who stores a Schedule 1, 2 or 5 pesticide for use shall annually give a written notice to the fire department responsible for the area in which the pesticide is stored. • These notices shall be in the form or format approved by the Director, and shall identify the pesticide, describe its location and conditions of storage, and identify the person responsible for the pesticide. <u>Spills or Releases:</u> • If the original container of a Schedule 1, 2, 3 (excepting products labelled as domestic) or 5 pesticide is damaged or broken, the person responsible for the pesticide shall ensure that, under the direction of the person who registered the pesticide under the *Pest Control Products Act* (Canada), R.S.C. 1985, c. P-9 or the *Fertilizers Act*, R.S.C. 1985, c. F-10, any spillage is cleaned up to the satisfaction of the Director, and any area, carrier or commodity that came in contact with the pesticide is decontaminated to the satisfaction of the Director. Any pesticide not kept and any water or other solvent used for cleaning up or decontaminating must be disposed of in accordance the *Environmental Protection Act*, R.S.O. 1990, c. E.19 and the General -- Waste Management Regulation R.R.O., 1990, Reg. 347 or in another manner approved by the Director. • A person responsible for a pesticide shall forthwith notify the Director in the event of a fire or other occurrence that may result in the pesticide being released into the environment out of the normal course of events, if the release would be likely to cause

	impairment of the quality of the environment for any use that can be made of it; would be likely to cause injury or damage to property or to plant or animal life; would be likely to cause harm or material discomfort to any person; would be likely to adversely affect the health of any person; would be likely to impair the safety of any person; or would be likely to render directly or indirectly any property or plant or animal life unfit for use by humans.
Other Citations	• *Pest Control Products Act* (Canada), R.S.C. 1985, c. P-9

Legislation:	*Fire Protection and Prevention Act, 1997*, S.O. 1997, c. 4
General Overview:	The act outlines the responsibility for providing fire protection services in Ontario through the appointment of a provincial fire marshal. The act includes provisions for the establishment of a Fire Code regulation, which governs fire safety standards for equipment, systems, buildings, structures, land and premises. The act also outlines rights of entry in emergencies and fire investigations and provisions for inspections, orders, offences and enforcement activities.
Application - Classes of Chemicals Regulated:	• None
Application - Facilities Regulated:	• None
Key Requirements – Design:	• None
Key Requirements – Operational:	• None
Key Requirements – Training:	• None
Key Requirements – Emergency Planning and Response:	• None
Other Citations:	• Fire Code, O. Reg. 388/97 -

Legislation:	*Fire Protection and Prevention Act, 1997*, S.O. 1997, c. 4
Regulation:	Fire Code, O. Reg. 388/97
General Overview:	The Ontario Fire Code contains requirements to control the risks associated with fires, including the handling, storage and use of flammable and combustible liquids and other combustible materials.
Application - Classes of Chemicals Regulated:	Applies to all classes of chemicals, with emphasis on flammable and combustible liquids (Part 4). Part 4 contains provisions that apply to all occupancies and includes specific requirements for certain types of occupancies. Part 4 does not apply to: • Storage, handling, transportation and use of flammable or combustible liquids to which the *Gasoline Handling Act* and the *Energy Act* (both repealed and replaced by the *Technical Standards and Safety Act, 2000* S.O. 2000, c. 16) apply • Storage, handling and use of flammable or combustible liquids at airports, piers and wharves regulated under Federal law • Underground areas to which the *Occupational Health and Safety Act*, R.S.O. 1990, c. O.1 and its regulations apply • Storage of aerosol products which are covered under Subsection 3.2.5. of the National Fire Code • Storage of flammable or combustible liquids on farms for individual farm use.
Application - Facilities Regulated:	All provincially regulated buildings. Specific requirements apply to facilities storing flammable and combustible liquids.
Key Requirements – Design:	• Design requirements for the storage of flammable and combustible liquids (e.g., location and spacing, materials of construction, corrosion protection, building design; design standards; leak testing of installed tanks) are specified for: - container and tank construction supports, container storage and handling locations, piping and transfer systems - foundations and anchorage of tank systems, storage rooms and cabinets, explosion proofing, fire suppressions systems - piping, pumps, valves and fittings, spills control and drainage systems, normal and emergency ventilation equipment - electrical equipment, primary and secondary containment, leak detection systems. • Electrical equipment in a location where flammable or combustible liquids are present must conform to the Electrical Safety Code, O. Reg. 164/99, made under the *Electricity Act, 1998*, S.O. 1998, c. 15 Schedule A. • Where flammable or combustible liquids are processed, handled, stored, dispensed or used within rooms or enclosed spaces, ventilation shall conform to Part 4 of the Fire Code and the Building Code, O.Reg. 403/97. • Specific design requirements are established for fuel dispensing stations, bulk plants, piers and wharves, process plants, distilleries, tank vehicles and laboratories.
Key Requirements – Operational:	<u>Storage and Dispensing of Flammable and Combustible Materials:</u> • Indoor and outdoor storage practices for minimizing fire hazards are defined, including limitations on: storage locations; quantities stored; types of storage containers used; separation and clearance distances; palletized storage; area, size, height

and location of storage piles; fire access aisles; separation from other dangerous goods.

- Requirements and restrictions for the dispensing and transfer of flammable and combustible liquids and the control of static electric charge are defined.
- Liquid level measurement (leak detection) requirements for tank storage are defined.

Maintenance – Flammable and Combustible Liquids:

- Maintenance of equipment involved in the storage, handling, processing and use of flammable or combustible liquids whose failure would significantly increase the fire or explosion hazard and whose maintenance requirements are not addressed in another part of the Code must be maintained in accordance with its listed requirements and if not listed, be maintained in accordance with the manufacturers' recommendations or good engineering practice.
- Maintenance and operating procedures must be established to prevent the escape of flammable or combustible liquids to areas where they could create a fire or explosion hazard.
- Every storage tank shall be tested for leakage whenever a leak is suspected, and at the time of installation before backfilling in the case of an underground tank, or before filling or putting into service in the case of an aboveground tank.
- Maintenance requirements for piping and transfer systems are defined, including drainage, removal and tagging of systems.

Markings and Labelling – Flammable and Combustible Liquids:

- Containers for flammable or combustible liquids must be distinctly marked or labelled in easily legible type which is in contrast to any other printed matter on the label with a warning to indicate that the material in the container is flammable, it should be kept away from heat, sparks and open flames, and it should be kept closed when not in use. These markings are not required when the container is labelled in conformance with the *Transportation of Dangerous Goods Act, 1992* (Canada), S.C. 1992, c. 34, the *Hazardous Products Act,* R.S.C. 1985, c. H-3, and the *Pest Control Products Act* (Canada), R.S.C. 1985, c. P-9 and regulations under these Acts.
- Cabinets for container storage shall be labelled in conspicuous lettering to indicate that the cabinet contains flammable materials and that open flames must be kept away.
- A storage tank and its filling and emptying connections shall be identified in conformance with CPPI, "*Using the CPPI Colour- Symbol System to Mark Equipment and Vehicles for Product Identification*" or to *CAN/CGSB-24.3, "Identification of Piping Systems."*

Markings and Labelling – General:

- Areas where smoking is not permitted shall be identified by signs or covered by instructions established under a fire safety plan made available to all persons.

Operating Procedures:

- Standard procedures for normal operations and for emergencies shall be given in printed form to all employees engaged in the operation of equipment for the transfer of flammable and combustible liquids and shall be posted or readily available

	for convenient reference. Fire Exits: • Access to exits, including outside areas, shall be maintained free of obstructions. • Defines requirements for the placement and maintenance of exit signs and emergency lighting. Special Cases: • Specific storage requirements are established for: - Fuel dispensing stations, bulk plants, piers and wharves, process plants, distilleries, tank vehicles and laboratories storing or processing flammable or combustible liquids - Cellulose nitrate plastics - Ammonium nitrate - Compressed gas cylinders. • Propane cylinders must be stored in conformance with the *Propane Storage, Handling and Utilization Code*. Records: • Records of tests and corrective measures, including flammable and combustible liquid tank leak tests and liquid level measurements, and hydrant tests, must be kept for two years after they are made. If the time interval between tests exceeds 2 years, the written records shall be kept for the period of the test interval plus one year. • Records of a required fire drill must be kept for 12 months after the fire drill. • A permanent record containing the maintenance date, the examiner's name and a description of any maintenance work or hydrostatic testing carried out shall be prepared and maintained for each portable extinguisher. • An approved record shall be kept of inspections of each sprinkler system.
Key Requirements – Training:	• Supervisory staff and other occupants must be instructed so that they are aware of their responsibilities for fire safety under the Fire Safety Plan. • A copy of the fire emergency procedures and other duties for supervisory staff as laid down in the fire safety plan shall be given to all supervisory staff. • Standard procedures for normal operations and for emergencies shall be given in printed form to all employees engaged in the operation of equipment for the transfer of flammable and combustible liquids. • Instruction and training in normal day-to-day operations in the transfer, use and handling of flammable and combustible liquids must be given to all personnel involved in these activities, including: emergency procedures; importance of constant attendance during all loading or unloading operations, extinguishing procedures for fires involving flammable and combustible liquids, and flammable and combustible liquid colour coding and identification system. • Employees engaged in the operation of equipment for the transfer of flammable or combustible liquids shall be trained in the location, function and operation of valves used for the operation of fire protection equipment and manual emergency

	shut-off valves.
Key Requirements – Emergency Planning and Response:	Fire Protection Equipment: • Defines requirements for the placement, type and number of portable fire extinguishers. • Requirements for the installation, inspection and testing of fire suppression systems, including standpipes, hose systems, sprinkler systems and water supplies are defined based on the types of chemicals stored and nature of occupancy. • Fire alarm and voice communication systems for life safety requirements are defined. Emergency Plans: • Fire Safety Plans, approved by the Chief Fire Official, which includes the emergency procedures to be used in case of fire, roles and responsibilities, fire drills including the emergency procedures, the control of fire hazards, maintenance of building facilities, contingency plans and schematic diagrams, describing the type, location and operation of building fire emergency systems are required for certain occupancies. • At least one copy of the fire emergency procedures must be prominently posted and maintained on each floor area. • Fire drill requirements are defined, with frequency of drills dependent on the type of occupancy. Records of drills must be kept for 12 months after the fire drill. • Any person using, storing or handling explosives shall establish fire emergency procedures. Spill Prevention, Containment and Response - Flammable or Combustible Liquids: • A spill must be prevented from reaching waterways, sewer systems and potable water sources by a barrier of non-combustible construction of sufficient capacity to contain the spill, or grading the site or sloping the floor to divert the spill to a drainage system meeting Code requirements. • Requirements for containing and responding to spills of flammable or combustible liquid are prescribed, including the provision of spill response equipment. • A spill control procedure must be approved by the Chief Fire Official and be implemented for any occupancy where flammable or combustible liquids are stored, handled, processed or used. Remedial Actions – Flammable and Combustible Liquid Tanks: • When a leak is detected in a storage tank by a required leakage test or by a required leakage detection measure the storage tank must be replaced, in the case of an underground tank, or be repaired or replaced in the case of an aboveground tank, the escaped liquid shall be removed; and, the Chief Fire Official shall be notified within 24 hr of detection of the leak.

Other Citations:	• *Transportation of Dangerous Goods Act, 1992* (Canada), *S.C.* 1992, c. 34 and Regulations • *Hazardous Products Act* (Canada), R.S.C. 1985, c. H-3 • *Pest Control Products Act* (Canada), R.S.C. 1985, c. P-9 • Building Code, O.Reg. 403/97 • *Technical Standards and Safety Authority Act, 2000*, S.O. 2000, c. 16
	Please refer to the Fire Code for specific design standards including API, ASTM CGSB, CSA, NFPA and ULC standards.

Legislation:	*Occupational Health and Safety Act*, R.S.O. 1990, c. O.1
General Overview:	Sets out the rights and duties of all parties in the workplace and establishes procedures for dealing with workplace hazards.
Application - Classes of Chemicals Regulated:	• Applies to toxic/hazardous substance (a chemical agent whose presence or use in the workplace may endanger the health or safety of a worker).
Application - Facilities Regulated:	• Applies to all workplaces, with the exception of farming operations, workplaces under federal (Government of Canada) and servants at private residences.
Key Requirements – Design:	• None
Key Requirements – Operational:	<u>Protection of Worker:</u> • An employer must take every precaution reasonable in the circumstances for the protection of a worker. <u>Provision and Maintenance of Equipment:</u> • An employer shall ensure that the equipment, materials and protective devices as prescribed are provided, maintained in good condition and used as prescribed. <u>Inspections</u>: • Unless otherwise required, at least monthly inspections of the physical condition of the workplace (or if not practical to inspect the workplace at least once a month, inspection of the physical condition of the workplace at least once a year, with inspections of at least a part of the workplace each month) by the health and safety representative or worker representative of the joint health and safety committee. <u>Provision of Information</u>: • The employer must consult and provide information to a health and safety representative or the committee with respect to testing strategies for investigating industrial hygiene at the workplace. A health and safety representative or a designated committee member representing workers is entitled to be present at the beginning of this testing conducted. • For every unexpired material safety data sheet required by the act. An employer must: - Make available in the workplace in such a manner as to allow examination by the workers - Provide a copy on request or if so prescribed, to the medical officer of health of the health unit in which, and the fire department which serves, the location in which the workplace is located

	- File a copy with a Director on request or if so prescribed.
Key Requirements – Training:	• An employer shall provide information, instruction and supervision to a worker to protect the health or safety of the worker. • An employer shall acquaint a worker or a person in authority over a worker with any hazard in the work and in the handling, storage, use, disposal and transport of any article, device, equipment or a biological, chemical or physical agent. • An employer shall review, in consultation with the committee or health and safety representative, if any, for the workplace, the training and instruction provided to a worker and the worker's familiarity therewith at least annually.
Key Requirements – Emergency Planning and Response:	• No specific requirements.
Other Citations:	• Specific requirements for designated substances may be specified in *Designated Substance regulations* made under the *Occupational Health and Safety Act*. Designated substances include: Acrylonitrile, Arsenic, Asbestos, Asbestos on Construction Projects, Benzene, Coke Oven Emissions, Ethylene Oxide, Isocyanates, Lead, Mercury, Silica and Vinyl Chloride.

Legislation:	*Occupational Health and Safety Act*, R.S.O. 1990, c. O.1
Regulation:	Workplace Hazardous Materials Information System (WHMIS) Regulation RRO 1990, Reg. 860
General Overview:	WHMIS is a Canada-wide system designed to provide employers and workers information about hazardous materials used in the workplace. The WHMIS Regulation sets out in detail the employer duties respecting labels, material safety data sheets (MSDS) and worker education.
Application - Classes of Chemicals Regulated:	• Applies to "controlled products", as defined by the (Federal) Controlled Products Regulations, SOR/88-66 and includes: Compressed Gas; Flammable and Combustible Material; Oxidizing Material; Poisonous and Infectious Material; Corrosive Material; Dangerously Reactive Material. Relevant Exceptions**:** • Does not apply to controlled products being transported or handled (includes storing dangerous goods in the course of transportation) in accordance with the requirements of the Ontario *Dangerous Goods Transportation Act*, R.S.O. 1990, c. D.1 or the *Transportation of Dangerous Goods Act, 1992 (*Canada), S.C. 1992, c. 34. • Partial exemptions exist for materials packaged as consumer products; explosives; pest control products; prescribed substances within the meaning of the *Nuclear Safety and Control Act*; and hazardous wastes.
Application - Facilities Regulated:	• Applies to all workplaces covered by the *Occupational Health and Safety Act*. (Note: Canada Labour Code and the Canada Occupational Safety and Health Regulations implement WHMIS in federal workplaces.)
Key Requirements – Design:	• None
Key Requirements – Operational:	Labelling: • Every controlled product in storage must be labelled with a supplier or workplace label which contains prescribed information. • An employer shall ensure the safe use, storage and handling of a controlled product in a workplace through worker education and the use of colour coding, labels, placards or another mode of identification when the controlled product is contained or transferred in, a pipe, a piping system including valves, a process vessel, a reaction vessel, or a tank car, tank truck, ore car, conveyor belt or similar conveyance. MSDS: • An employer who receives a controlled product from a supplier (or produces a controlled product at a workplace) must obtain (or prepare) an unexpired (dated within the last three years) material safety data sheet (MSDS) with prescribed information. (s. 17, 18). • When a supplier MSDS is three years old, the employer shall, if possible, obtain from the supplier an unexpired supplier material MSDS if any of the controlled product remains in the workplace. If unable to do so, the employer shall add all new hazard information for the controlled product to the existing supplier MSDS on the basis of the ingredients disclosed in it. (s. 17) • The employer is required to update a workplace MSDS every three years, unless new hazard information becomes available, in

	which case the MSDS must be updated within 90 days of the new information becoming available. (s. 18) • MSDSs are to be readily available to workers, and to the joint health and safety committee, if any, or to a health and safety representative, if any (s.38(1)(a) and (b) of the OHSA). Hazardous Wastes: • Sections 5 to 25 (worker education, labels and MSDS) do not apply to hazardous waste. An employer shall ensure the safe storage and handling of hazardous waste generated at a workplace through a combination of identification and worker education.
Key Requirements – Training:	• An employer shall ensure that a worker who works with or in proximity to a controlled product is informed about all hazard information concerning its use, storage and handling. Instruction is to include: - Contents required on a supplier label and workplace label, and the purpose and significance of the information contained on the labels - Contents required on a material safety data sheet and the purpose and significance of the information contained on a material safety data sheet - Procedures for the safe use, storage, handling and disposal of a controlled product - Procedures for the safe use, storage, handling and disposal of a controlled product when it is contained or transferred in: a pipe, a piping system including valves, a process vessel, a reaction vessel, or a tank car, a tank truck, an ore car, a conveyor belt or a similar conveyance - Procedures to be followed when fugitive emissions are present - Procedures to be followed in case of an emergency involving a controlled product.
Key Requirements – Emergency Planning and Response:	• None, except training (see above).
Other Citations	• (Federal) Controlled Products Regulations, SOR/88-66: defines what a controlled product is, and also sets out in detail the information that the supplier is required to put on a label and a material safety data sheet. • (Federal) Ingredient Disclosure List, SOR/88-64: Contains the names of chemicals which must be identified on a material safety data sheet, if they are ingredients of a controlled product, and present above a specified concentration.

Legislation:	*Occupational Health and Safety Act*, R.S.O. 1990, c. O.1
Regulation:	Industrial Establishments, R.R.O. 1990, Reg. 851
General Overview:	Safety, building features and industrial hygiene aspects of industrial establishments are regulated.
Application - Classes of Chemicals Regulated:	Applies to toxic/hazardous substance (a chemical agent whose presence or use in the workplace may endanger the health or safety of a worker).
Application - Facilities Regulated:	All provincially regulated establishments (e.g., office building, factory, arena, shop or office, and any land, buildings and structures appertaining thereto).
Key Requirements – Design:	Storage/Dispensing/Use of Flammable Liquids: • Design requirements for rooms where flammable liquid are stored, dispensed or used are defined, including requirements for ventilation, spill containment systems and fire resistance rating of storage areas. Hazardous Rooms: • Design requirements for a room containing a substance which, because of its chemical nature, the form in which the substance exists or its handling or processing may explode or become easily ignited creating a condition of imminent hazard to a person's health or safety are defined. Ventilation Requirements: • An industrial establishment shall be adequately ventilated by either natural or mechanical means such that the atmosphere does not endanger the health and safety of workers. Specific requirements are defined. Tanks: • A properly designed guardrail is required around a vat, bin or tank, the top of which is less than 107 centimetres above the surrounding floor, ground, platform or other surface. Access to Storage Facilities: • Design requirements for access ladders, including ladders for tanks, are defined. Lifting Devices: • Design requirements for lifting devices (e.g., lift truck, fork lift) are defined.

	Building Design: • Except as prescribed by the regulation, the Building Code O.Reg. 403/97 applies to all industrial establishments with respect to: access to an exit; exit from a floor area; structural adequacy; the fire resistance rating of a separation for an access to an exit and a process room that contains a flammable substance; and the fire protection rating of a closure.
Key Requirements – Operational:	Pre-Start Reviews • A pre-start safety review is required for certain storage activities (e.g., if flammable liquids are located or dispensed in a building, room or area or material, articles or things are placed or stored on a structure that is a rack or stacking structure). Personal Protective Equipment and Measures: • A worker exposed to the hazard of head, eye or foot injury shall wear head protection, eye protection or foot protection, as appropriate in the circumstances. • A worker exposed to the hazard of injury from contact of the worker's skin with a noxious gas, liquid, fume or dust shall be protected by wearing apparel sufficient to protect the worker from injury; or a shield, screen or similar barrier appropriate in the circumstances. • Where a worker is exposed to the hazard of falling and the surface to which he or she might fall is more than three metres below the position where he is situated: the worker shall wear a serviceable safety belt or harness and lifeline adequately secured to a fixed support and so arranged that the worker cannot fall freely for a vertical distance of more than 1.5 metres. • Where a worker is exposed to the hazard of falling into liquid that is of sufficient depth for a life jacket to be effective as protection from the risk of drowning, there shall be an alarm system and rescue equipment, appropriate in the circumstances, to ensure the worker's rescue from the liquid and, the worker shall wear a life jacket; or the employer shall develop written measures and procedures to prevent the worker from drowning and shall implement them. • Where a worker is exposed to a potential hazard of injury to the eye due to contact with a biological or chemical substance, an eyewash fountain shall be provided. • Where a worker is exposed to a potential hazard of injury to the skin due to contact with a substance, a quick-acting deluge shower shall be provided. • Where workers are exposed to a substance that is poisonous by ingestion and can contaminate the skin, shower rooms and individual lockers for street and work clothes shall be provided. • No food, drink or tobacco shall be taken into, left or consumed in any room, area or place where any substance that is poisonous by ingestion is exposed. • Protective clothing or other safety device that has been worn next to the skin shall be cleaned and disinfected prior to being worn by another worker. • Where a worker is likely to be exposed to an atmosphere at atmospheric pressure with an oxygen content of less than 18 per cent, the worker shall be protected by mechanical ventilation so that the worker's safety and health is not endangered. Where these measures are not practicable, the worker shall be protected by air supplied breathing equipment so that the worker's safety and health is not endangered.

	Storage/Dispensing/Use of Flammable Liquids: • Specifies how and where containers of flammable liquids not required for immediate use can be stored indoors and outdoors, based on the flash point of the liquid and whether containers are open or sealed. • Portable containers used for dispensing flammable liquid in a work area shall be made of material suitable to provide for the safety of all workers and have spring-loaded cap; and a flame arrestor. • Describes proper material handling procedures, such as placement of cylindrical objects, storage of compressed gas cylinders, dispensing of flammable liquids and entry into bulk material storage containers. Labelling: • A piping system containing a substance which, because of its toxicity, temperature, pressure, flammability or other property, is hazardous, shall have its contents and direction of flow positively identified: at valves and fittings; where a pipe passes through a wall or floor; and where circumstances may make such contents and direction of flow doubtful. These requirements do not apply to a piping system in a petrochemical plant where processing and maintenance are carried out by a competent person under controlled conditions so as to provide for the protection of all workers. Confined Space • Operational controls for entering confined spaces (e.g., storage tanks), including lock out, testing, purging of hazardous atmospheres and emergency response requirements, are defined. • A silo, bin, hopper, structure, container or thing that is not a confined space and that is used for storing or containing bulk material may be entered only where: the supply of material thereto is stopped and precautions are taken that will prevent any further supply; the worker entering is wearing a safety harness or other similar equipment attached to a rope or lifeline such that the worker shall not be endangered by any collapse or shifting of material in the silo, bin, hopper, structure, container or thing; and at least one other worker equipped with a suitable alarm and capable of rendering any necessary assistance is keeping watch nearby. Fire Protection: • The requirements of the Fire Code, O. Reg. 388/97 respecting fire extinguishers and obstruction-free exits are applicable at all industrial establishments. Compressed Gas Cylinders: • A storage cylinder for compressed gas must have a valve connection that prevents an inadvertent connection which would result in a hazardous mixture of gases; be secured in position during transportation, storage or use; have the valve protection cap in position when the cylinder is not in use; when containing acetylene, be in an upright position; and be protected from physical damage. Lifting Devices: • Operational requirements and restrictions for lifting devices are defined.

	Maintenance: • Where repairs or alterations are to be made on a drum, tank, pipeline or other container, the drum, tank, pipeline or other container shall have internal pressures adjusted to atmospheric before any fastening is removed; be drained and cleaned or otherwise rendered free from any explosive, flammable or harmful substance; and not be refilled while there is any risk of vaporizing or igniting the substance that is being placed in the drum, tank, pipeline or other container. These requirements do not apply to a pipeline where hot- tapping and boxing-in are carried out by a competent person under controlled conditions so as to provide for the protection of all workers.
Key Requirements – Training:	Exposure to Chemical Agents: • A worker who may be exposed to a chemical agent that may endanger the worker's safety or health must be trained to use the precautions and procedures to be followed in the handling, use and storage of the agent; in the proper use and care of required personal protective equipment; and in the proper use of emergency measures and procedures. Confined Space (e.g., tank): • A competent person must test and evaluate the confined space. Lifting Devices: • Lifting device shall be operated only by, a competent person, or a worker being instructed who is accompanied by a competent person.
Key Requirements – Emergency Planning and Response:	Reporting of Accidents/Incidents: • Defines reporting requirements to the Ministry of Labour and joint health and safety committee, the health and safety representative and the trade union, if any, in the event a worker is killed, critically injured, disabled from performing his or her usual work, or requires medical attention because of an accident, explosion or fire at a workplace (Section 5).
Other Citations:	• Fire Code, O.Reg. 388/97 • Building Code, O.Reg. 403/97 • See *Occupational Health and Safety Act* for additional comments on designated substances.

Legislation:	*Technical Standards And Safety Act, 2000*, S.O. 2000, c. 16
General Overview:	The act is designed to enhance public safety in Ontario by providing for the efficient and flexible administration of technical standards. The act is the enabling legislation for a fuel oil code, liquid fuels handling code, natural gas and propane installation code, and propane code through the Fuel Oil Code Adoption Document, June 1, 2001, Gaseous Fuels Code Adoption Document June 1, 2001, Liquid Fuels Handling Code Adoption Document, June 1, 2001 and Propane Code Adoption Document June 1, 2001.
Application - Classes of Chemicals Regulated:	• Hydrocarbon fuels
Application - Facilities Regulated:	• Facilities that handle hydrocarbon fuels.
Key Requirements – Design:	• None
Key Requirements – Operational:	• None
Key Requirements – Training:	• None
Key Requirements – Emergency Planning and Response:	• None
Other Citations:	• Fuel Oil, O. Reg. 213/01 • Gaseous Fuels, O. Reg. 212/01 • Liquid Fuels, O. Reg. 217/01 • Propane Storage and Handling, O. Reg. 211/01

Legislation:	*Technical Standards and Safety Act, 2000,* S.O. 2000, c. 16
Regulation: **Code:**	• Codes and Standards Adopted by Reference, O. Reg. 223/01 • Fuel Oil, O. Reg. 213/01 • Fuel Oil Code Adoption Document June 1, *2001* (Code Adoption Document) • CAN/CSA-B139-00, "Installation Code for Oil Burning Equipment" (Code)
General Overview:	Applies to the installation, testing, maintenance, repair, removal, replacement, inspection and use of appliances, equipment, components and accessories where fuel oil is to be used as a fuel, but it does not apply to equipment referred to in the Liquid Fuels Regulation, O. Reg. 217/01 or to the transmission of fuel under the Oil and Gas Pipeline Systems, O. Reg. 210/01.
Application - Classes of Chemicals Regulated:	• Fuel oil (kerosene or any hydrocarbon oil as classified in CSA Standard CAN/CSA-B140.0).
Application - Facilities Regulated:	Every person engaged in an activity, use of equipment, process or procedure (including, but not limited to, design, installation, alteration, repair, service, removal, purging, activation, storage, handling, modification and use of equipment) to which the act and this regulation apply shall comply with the act and this regulation.
Key Requirements – Design:	<u>Design Drawings</u>: • A person who plans to construct a central oil distribution system or facility or to make a modification to it shall submit drawings of the proposed system or facility to the director for registration. <u>System Design and Approvals:</u> • No person shall offer for sale, sell, lease, rent, buy, install, use or supply fuel to an appliance, equipment, tank system or other thing, except a stationary diesel engine or turbine, unless it is approved prior to activation. • Design requirements for the aboveground storage tanks (AST) and underground storage tanks (UST)are specified, including (Code, Code Adoption Document): - Certification/approval of equipment, including design and construction - Protection of means of egress - Leak detection , including need for and installation of groundwater wells and vapour monitoring systems for USTs - Supports, foundations and anchorage of tank systems - Fill and vent pipes, including overfill protection - Corrosion protection - Fuel oil pumps, piping, tubing, pipe testing, and valves

	- Location of tanks inside/outside buildings, including clearances - Tank/pipe testing requirements - Electrical systems - Interconnection of tanks - Protection from vehicles - Liquid level gauges - Operating pressures - AST secondary containment.
Key Requirements – Operational:	<u>General Duty</u>: • No person shall operate or permit to be operated an appliance or tank system unless it is maintained in a safe operating condition and it complies with this Regulation. <u>Registration of Tanks:</u> • No person shall supply fuel oil to an underground tank unless the underground tank is registered. • No distributor shall supply fuel oil to a container or tank system that is connected to an appliance or work unless the distributor is satisfied that the installation and use of the appliance or work comply with this Regulation and, unless the distributor has inspected the appliance or work at least once within the previous 10 years; or unless the distributor has inspected the appliance or work in accordance with a quality assurance inspection program. <u>Contractor registration:</u> • No person shall act as a contractor unless the person is registered for that purpose. <u>Maintenance:</u> • Where an appliance or work is installed in an industrial, institutional or assembly building that is defined in the code adoption document, the owner of the building shall ensure that, the appliance or work and its fuel features are maintained in accordance with the manufacturer's recommended maintenance procedures; an evaluation of the maintenance procedures is carried out in consultation with the manufacturer or, as required by the director, at least once every 10 years and, where indicated by the evaluation, new or upgraded procedures are established; and an inspection of the appliance or work and its fuel features is carried out at least once every 10 years to ensure that they are in a safe operating condition and that the installation complies with this Regulation. • The inspection must be carried out by a person who is the holder of a certificate for that purpose. • The owner of the building must keep a record of an inspection made under this section until the next inspection and report are completed.

	Offloading: • When tank vehicles are being unloaded, vehicle operators shall remain in constant view of the fill pipe and in constant attendance at the delivery control valve. (Code) Records for USTs: • The owner or operator of an underground tank system shall maintain records, for not less than 5 years, of all cathodic protection measurements; impressed-current protection system checks; line leak detection system tests; leak-detection equipment tests and checks; precision leak test results; and inspections, tests, or maintenance checks of the underground tank system. (Code) Tank Disuse and Removal: • Requirements for inspections, maintenance, removal of product, and removal of tanks/remediation are specified for disused tanks, with requirements depending on whether the tank is above or below ground and the duration of disuse. (Code, Code Adoption Document) AST Secondary Containment Maintenance: • Secondary containment shall be inspected on a regular basis, not less than once per week, to ensure the removal of any accumulated surface water, snow, drums, portable containers, objects, or product that would reduce the fluid volume capacity to provide a volume of liquid at least 10% greater than the volume of the tank (one tank) or a volume of liquid not less than the volume of the largest tank plus 10% of the aggregate volume of all the other tanks, or 10% greater than the volume of the largest tank, whichever is greater (dyke with more than one tank). (Code) • Where secondary containment is provided with valves that allow the removal of accumulated surface water or product, they shall be closed and locked when not engaged in a supervised draining operation, and the valve positions must be clearly marked, whether opened or closed. (Code) • Controls for the drainage system shall be accessible under fire exposure conditions and located outside the secondary containment area. (Code) Inspection of Aboveground Vertical Tanks: • Aboveground Vertical Tanks are subject to periodic inspection, based on the design of the tank. (Code) • If the inspection does not confirm the acceptability of an aboveground tank for continued service, the owner of the tank shall stop using the tank and shall immediately withdraw all product from the tank and notify the distributor; or if the owner upon further investigation wishes to continue using the tank, the owner shall take corrective action to ensure the acceptability of the tank for continued service; and have a report prepared by an engineer that confirms the acceptability of the tank for continued service, and submit a copy of the report to the regulatory authority. (Code)
Key Requirements – Training:	Certification: • No person shall install, alter, purge, activate, repair, service or remove any appliance or any equipment or other thing

	employed or to be employed in the handling or use of fuel oil unless the person is the holder of a certificate for that purpose under Fuel Industry Certificates, O. Reg. 215/01. General Training: • Personnel performing the installation, operation, and maintenance work shall be trained in such functions.
Key Requirements – Emergency Planning and Response:	Reporting Dangerous Occurrence: • Where it appears that an accidental release, leak, explosion or fire has occurred because of the use, storage or handling of fuel oil, a certificate holder, license holder, operator, contractor or distributor shall forthwith notify the Spills Action Centre of the Ministry of the Environment and a registered contractor or license holder shall have in place procedures for such notification. Unacceptable Conditions: • A distributor, contractor or certificate holder is of the opinion that an unacceptable condition exists must undertake prescribed activities, depending on whether an immediate hazard does or does not exist. Tank Leaks: • In the event of the suspicion of a leak or where required by the Director, the owner of a facility, the authorization holder of a facility, the owner of the storage tank system, the authorization holder of the storage tank system, the owner of the property in which the equipment is installed, the user of the equipment, or the driver of the tank vehicle as the case may be, shall confirm whether a leak exists and determine the source of the leak. (Code Adoption Document) • In the event of a spill, or where a leak is confirmed, or where there is discovery of a petroleum product that has escaped to the environment or inside a building or where required by the Director, the owner of a facility, the authorization holder of a facility, the owner of the storage tank system, the authorization holder of the storage tank system, the owner of the property in which the equipment is installed, the user of the equipment, or the driver of the tank vehicle, as the case may be, shall notify forthwith the Spills Action Centre of the Ministry of the Environment; provide all information, as required; cease the use of and empty products from any leaking part of the storage tank system; repair, replace, or remove all defective underground or aboveground storage tank systems or equipment; and, do everything practical to comply with "Environmental Management Protocol for Operating Fuel Handling Facilities in Ontario". (Code Adoption Document)
Other Citations:	• Environmental Management Protocol for Operating Fuel Handling Facilities in Ontario (TSSA Standard) • Electrical Safety Code, O. Reg. 164/99 made under the *Electricity Act 1998*, S.O. 1998, c. 15 • CSA Standard CAN/CSA-B140.0
	Please refer to the CAN/CSA-B139-00, "Installation Code for Oil Burning Equipment" for specific design standards including ULC, CSA, API and related standards.

Legislation:	*Technical Standards and Safety Act, 2000,* S.O. 2000, c. 16
Regulation: **Code:**	• Codes and Standards Adopted by Reference O. Reg. 223/01 • Liquid Fuels, O. Reg. 217/01 • Liquid Fuels Handling Code Adoption Document June 1, 2001 (Code Adoption Document) • Liquid Fuels Handling Code August, 2001 (Code)
General Overview:	Applies to facilities where gasoline or an associated product is handled, loaded or dispensed to be used as a fuel in motor vehicles or as a fuel oil. The Regulation does not apply to: equipment or installations associated with standby generators or heating oil systems; any matter regulated under Ontario Regulation 213/01 (Fuel Oil); any matter relating to the subject matter of this Regulation that is regulated by the Government of Canada; the storage, handling and use of equipment or installations for gaseous fuels; processing plants where the resulting product is not used as a fuel; petroleum refineries; or equipment or installations at underground parts of an underground mine that are subject to the *Occupational Health and Safety Act*; or, fuels packaged as consumer goods.
Application - Classes of Chemicals Regulated:	• Gasoline and associated products (any product of petroleum, other than gasoline, wax and asphalt or any other liquid product used as a fuel).
Application - Facilities Regulated:	• Applies to facilities where gasoline or an associated product is handled, loaded or dispensed to be used as a fuel in motor vehicles or as a fuel oil. • Excluded facilities are: equipment or installations associated with standby generators or heating oil systems; any matter regulated under the Fuel Oil Regulation, any matter relating to the subject matter of this Regulation that is regulated by the Government of Canada; the storage, handling and use of equipment or installations for gaseous fuels; processing plants where the resulting product is not used as a fuel; petroleum refineries; equipment or installations at underground parts of an underground mine that are subject to the *Occupational Health and Safety Act*, or fuels packaged as consumer goods.
Key Requirements – Design:	<u>System Design and Approvals:</u> • No person shall use in a private outlet, retail outlet, marina or bulk plant equipment that is not approved. • Design requirements for the aboveground storage tanks (AST) and underground storage tanks (UST) are specified, including (Code): - Approval of equipment, including design and construction (tanks and portable containers) - Location of tanks inside/outside buildings, including clearances - Supports, foundations and anchorage of tank systems - Fill and vent pipes, including overfill protection and labelling - Tank/pipe testing requirements

	- Corrosion protection - Pumps and dispensers - Leak detection systems - Protection from vehicles - Electrical systems - AST secondary containment. <u>Modification of a facility:</u> • The holder of a license for a facility to handle gasoline and associated products shall not make a modification to the facility until the license holder applies for and receives written permission from the director to make the modification. <u>Special Cases</u>: • Additional design requirements are specified for full serve / self serve facilities, cardlock / keylocks, marinas, bulk plants, private outlets, farms, and mobile facilities
Key Requirements – Operational:	<u>Authorizations, Licenses and Approvals:</u> • No person shall handle gasoline or an associated product unless the person is the holder of a license or registration, or of a certificate for that purpose. • No person shall operate a retail outlet, a marina or a bulk plant unless it is licensed. <u>General Duty - Safe Operating Conditions:</u> • An operator or license holder shall ensure that every container, equipment, facility or any other thing that is employed in the handling of gasoline or associated products is maintained in a safe operating condition. <u>Posting of license:</u> • A license holder shall post the license or a copy of the license such that it is readily visible at the retail outlet, marina or bulk plant. <u>Product Transfer/Dispensing</u>: • Product must be transferred from a storage tank by pumping, except at a bulk plant where multiple tanks are located in a common dike where tank balancing may be done by gravity transfer. (Code) • Product shall not be transferred from a storage tank by any method that will increase the internal pressure within the tank. (Code) • Where dispensing equipment for refuelling of vehicles is connected to an aboveground storage tank there shall be an automatically operated valve that will close down the system when the system is not being operated, and an approved valve at the dispense. A manually operated valve located at the tank may be used for utility tanks which must be kept

closed when product is not being dispensed. (Code)

- Requirements for fuel dispensing are defined, including types of approved containers, segregation of combustible and non-combustible materials, management of portable containers, control of ignition sources,

Labelling:

- Aboveground storage tanks shall be permanently marked to identify the product they contain, on at least two sides, in a size to ensure clear legibility from at least 4.5 metres or from outside a dike, whichever distance is greater, in conformance with colour requirements of the "CPPI Colour-Symbol System to Mark Equipment and Vehicles for Product Identification" standard on a contrasting background. Labels are to be situated on the sides of tanks, in order to provide clear identification, and be maintained to be clearly legible at all times. (Code)
- Valves for ASTs shall be identified with a tag of anodized or enamelled metal or petroleum resistant plastic to denote the class of product controlled by the valve. The colour of the tag shall comply with the CPPI document. (Code)
- At every dispensing facility “No Smoking – Turn Ignition Off” and a sign that sets forth the types of portable containers acceptable for the filling of gasoline are required. Additional signs are required for diesel fuel and fuels with alcohol content. (Code)

Fire Safety:

- Every facility shall be provided with a minimum of two fire extinguishers which are located so as to be readily accessible and which are maintained to have an effective total rating equivalent to at least 20-B C. Where the requirements of the Ontario Fire Code exceed these requirements, the Chief Fire Official may require compliance with the Ontario Fire Code. (Code)
- The operator of a facility shall ensure that required fire extinguishers are inspected, tested and maintained in accordance with the requirements of the Ontario Fire Code. (Code)

Leak Detection:

- Manual or automatic leak detection systems are required, with the type of system and specific operational requirements dependent on the type and location of the tank. (Code)
- Where underground piping connected to an aboveground storage tank terminates in an underground piping sump accessible from grade level, leak detection must be performed on a daily basis with a record maintained. (Code)

Corrosion Protection for USTs:

- The corrosion protection system for UST systems shall be tested and certified in writing to be in working order by a professional engineer or by a person with qualifications approved by the Director, at intervals not exceeding two (2) years. (Code)
- Where it is found that the UST cathodic protection system cannot be certified as required, the owner or operator shall bring the corrosion protection system to proper working order within 180 days or discontinue handling of product with that system. (Code)

- Aboveground storage tanks and all connected piping and fittings shall be maintained so as to prevent corrosion from occurring. (Code)

AST Secondary Containment Maintenance:

- The operator of a dyked aboveground storage tank shall ensure that the dike is maintained. (Code)
- Dikes shall be inspected on a regular basis to ensure that neither surface water nor product is accumulating therein. (Code)
- Accumulated surface water or product that would reduce the fluid volume capacity of the dike below 110% of the tank (one tank) or the capacity of the largest tank plus 10 percent of the aggregate capacity of all other tanks, or 110 percent of the largest tank, whichever is greater (dyke with more than one tank) (Code)

Inspection of ASTs Installed in Accordance With ULC Standard S630 or Standard API 650:

- ASTs are subject to periodic inspection, based on the design of the tank. (Code)
- If the inspection does not confirm the acceptability of an aboveground tank for continued service, the owner of the tank shall stop using the tank and shall immediately withdraw all product from the tank and notify the Technical Standards and Safety Authority, or if the owner or operator wishes to continue using the tank, take corrective action to ensure the acceptability of the tank for continued service, and have a report prepared by a professional engineer that confirms the acceptability of the tank for continued service and submit a copy of the report to the Technical Standards and Safety Authority. (Code)

Tank Disuse, Closure and Removal and Environmental Restoration:

- Requirements for inspections, maintenance, removal of product, and removal of tanks/remediation are specified for disused tanks, with requirements depending on whether the tank is above or below ground and the duration of disuse. (Code)
- Where an underground storage tank system upgraded in accordance with Regulation 532 of revised Regulation of Ontario 1990 leaks, the owner shall immediately remove the leaking underground steel storage tank system and within 180 days of the discovery of the leak remove all remaining underground steel storage tank systems referred to in this section at the facility. Where the owner removes or replaces an underground storage tank system that person shall: take immediate action to recover all escaped product; implement procedures that will clean up the environment in accordance with the Code; test all remaining ULC Standard S615 and ULC Standard S603.1 storage tank systems for integrity and ULC Standard S603.1 for adequacy of corrosion protection, and remove, replace, or repair and re-certify defective tanks and/or defective equipment. (Code)
- Where aboveground or underground storage tank systems have been removed permanently, the owner of a facility, the operator of a facility, or the owner of the property on which the equipment is installed, as the case may be, shall, have an assessment report completed which delineates the full extent of any petroleum product that has escaped to the environment or inside a building both on-site and where necessary and practical, off-site; and immediately notify the Ministry of the Environment as per the *Environmental Protection Act* and the *Ontario Water Resources Act*. (Code)

	Records: • Records, required to be made, maintained or kept by this Document, shall be kept for the life of the facility or equipment to which they relate, unless otherwise stated. (Code) • Where a facility is sold or leased, and for all records required to be maintained by this Document pertaining to the facility, the owner of the facility shall, receive the records on expiry of a lease, turn any records over to the lessee at the start of a lease, or turn any records over to a purchaser in the case of a sale of the facility. (Code) • Required records include, but are not limited to (Unless noted retention requirements are as defined above): - Tank, pipe and corrosion protection system installation, testing and certification - Leak detection records and logs (Variable, depending on location of tank and method of leak detection) - Inspection records for temporary closure of USTs - Weekly visual leak detection inspections of ASTs (life of tank) - Periodic inspections of ASTs installed in accordance with ULC Standard S630 or Standard API 650 - Training records (variable retention, depending on type of facility and training material). Special Cases: • Additional operational requirements are specified for full serve / self serve facilities, cardlock / keylocks, marinas, bulk plants, private outlets, farms, and mobile facilities
Key Requirements – Training:	Authorizations, Licenses and Approvals: • No person shall handle gasoline or an associated product unless the person is the holder of a license or registration or of a certificate for that purpose. • No person shall act as a contractor unless the person is registered for that purpose. • No person shall install, repair, service or remove equipment at a facility unless the person holds a certificate for that purpose. General Training: • Class I or Class II product shall not be dispensed at any facility by any person unless, that person is trained by the owner or operator of the facility in the proper use of equipment and procedures for dispensing product, and the person dispensing product remains in attendance at the vehicle during fuelling. (Code) • A person who employs another person as an attendant of a facility shall take every reasonable precaution to ensure that the attendant complies with the Liquid Fuels Handling Regulation and the Code Document, and shall ensure that every employee at the facility is trained in the use of all equipment and to take action in the event of a spill or leak of product or any emergency condition. A record of the training is to be maintained. Emergency Plans: • The operator of a facility shall ensure that all employees are trained in the use of the emergency procedures required by

	and shall maintain a record signed by the employee confirming such training. (Code)
Key Requirements – Emergency Planning and Response:	Reporting Dangerous Occurrence: • Where it appears that asphyxiation, explosion or fire has occurred because of the use, handling or storage of gasoline or an associated product, the owner or operator of the facility or the holder of the license, registration or certificate shall forthwith notify the Spills Action Centre of the Ministry of the Environment, and an operator of a facility or a license holder shall have in place procedures for such notification. The discovery of a petroleum product that has escaped into the environment or inside a building, a spill or a confirmed leak shall be reported the Spills Action Centre of the Ministry of the Environment by the operator of the facility or the license holder. Unacceptable Conditions: • A distributor, contractor or certificate holder is of the opinion that an unacceptable condition exists must undertake prescribed activities, depending on whether an immediate hazard does or does not exist. Emergency Plans: • At every facility there shall be available, written emergency procedures outlining actions to be taken by employees in the event of a spill, leak, fire, or explosion. (Code) Tank Leaks: • In the event of the suspicion of a leak or where required by the Director, the owner of a facility, the operator of a facility, the owner of the property in which the equipment is installed, or the driver of the tank vehicle, as the case may be, shall confirm whether a leak exists and determine the source of the leak. (Code) • In the event of a spill, or where a leak is confirmed, or where there is discovery of a petroleum product that has escaped to the environment or inside a building or where required by the Director, the owner of a facility, the operator of a facility, the owner of the property in which the equipment is installed, or the driver of the tank vehicle, as the case may be, shall: notify forthwith the Spills Action Centre of the Ministry of the Environment; provide all information as required; cease the use of and empty products from any leaking part of the storage tank system; repair, replace, or remove all defective underground or aboveground storage tank systems or equipment; and do everything practical to comply with GA 1/99. (Code)

Other Citations:	• CPPI Colour Symbol System to Mark Equipment and Vehicles for Product Identification • Electrical Safety Code, O. Reg. 164/99 made under the *Electricity Act, 1998,* S.O. 1998, c. 15	• GA 1/99: Environmental Management Protocol for Operating Fuel Handling Facilities in Ontario (TSSA Standard) • Fire Code, O. Reg. 388/97
	Please refer the Liquid Fuels Handling Code for specific design standards including American National Standards Institute/ASME, ASTM, CGSB, CSA, API., CPPI, TSSA, PACE, NRCan and other related standards.	

Legislation:	*Technical Standards and Safety Act, 2000,* S.O. 2000, c. 16
Regulation: **Code:**	• Codes and Standards Adopted by Reference, O. Reg. 223/01 • Gaseous Fuels, O. Reg. 212/01 • Gaseous Fuels Code Adoption Document June 1, 2001 (Code Adoption Document) • CSA B-149.1-00 Natural Gas and Propane Installation Code (Code)
General Overview:	Establishes requirements and minimum standards for the installation of gas-fired appliances and equipment and includes requirements for cylinders used for storing compressed natural gas.
Application - Classes of Chemicals Regulated:	Any of the following gases or mixtures of them: natural gas, manufactured gas, or mixtures of propane gas and air, propane, propylene, butanes (normal butane or isobutane), and butylenes.
Application - Facilities Regulated:	Applies to: the installation of appliances, equipment, components, and accessories where gas is to be used for fuel purposes; t he installation of piping and tubing systems extending from the termination of the utility installation for natural gas or from the distributor's propane tank; and the installation of vehicle-refuelling appliances and associated equipment meeting the requirements of a general purpose appliance to fill a natural-gas-fuelled vehicle. Facilities that store or handle propane, except: marine or pipeline terminals; petroleum refineries; gas when used as a feedstock in chemical plants; utility pipeline distribution and transmission pipelines; storage and handling of liquefied natural gas or underground reservoirs for natural gas; refrigerated storage or underground reservoirs for propane; butane fuel cylinders of 250 g capacity or less; the installation of containers and equipment to be used for propane in distribution locations and filling plants and on tank trucks, tank trailers, and cargo liners; and, propane used as refrigerant. (Regulation, Code Adoption Document)
Key Requirements – Design:	• None
Key Requirements – Operational:	<u>Protective Measures:</u> • For natural gas compression, compressors, cylinders, valves, regulators, gauges, piping, tubing, hose, and other equipment shall be protected against damage. (Code) • Each side of a natural gas container storage area exposed to vehicle traffic shall be protected by barriers, posts, or guardrails. (Code) <u>Natural Gas Cylinder Design Requirements</u> • Design, certification, re-examination, re-marking and labelling requirements are specified. (Code) • Procedures for filling cylinders are specified. (Code)

	Storage Practices: • Natural gas cylinders in storage must be located not less than 20 ft (6 m) from any flammable liquid, oxidizing, or combustible gas other than natural gas, or shall be separated in a manner acceptable to the Director. (Code) • Cylinders that have been in service and are not connected for use or filling shall be stored outdoors in a storage cabinet meeting prescribed design criteria. (Code) • Portable containers stored outdoors shall be located at prescribed distances from property lines, with the distance dependent on the aggregate capacity of expanded gas stored. (Code) Records: • Records showing the results of reinspection and retest of natural gas cylinders shall be kept by the facility carrying out the inspection until the date of expiration of the retest period; or the date the cylinder is reinspected, whichever occurs first. (Code)
Key Requirements – Training:	General Training: • Personnel performing installation, operation, and maintenance work shall be properly trained in such functions. (Code) Certification: • No person shall install, alter, purge, activate, repair, service or remove any appliance, equipment or other thing employed or to be employed in the handling or use of gas unless the person is the holder of a certificate for that purpose, except in the presence of the holder of the certificate.
Key Requirements – Emergency Planning and Response:	Reporting Dangerous Occurrence: • Where it appears that carbon monoxide poisoning, asphyxiation, explosion or fire has occurred because of the use, storage or handling of gas, a certificate holder, ROT holder, contractor or distributor shall forthwith notify the Spills Action Centre of the Ministry of the Environment, and a contractor or distributor shall have in place procedures for such notification. Unacceptable Conditions: • If a distributor, or holder of a certificate or ROT is of the opinion that an unacceptable condition exists must undertake prescribed activities, depending on whether an immediate hazard does or does not exist.
Other Citations:	• Fuel Industry Certificates Regulation
	Please refer *CSA-B149.1-00 Natural Gas And Propane Installation Code* for specific design and related standards referenced in the Code.

Legislation:	*Technical Standards and Safety Act, 2000,* S.O. 2000, c. 16
Regulation: **Code:**	• Codes and Standards Adopted by Reference, O. Reg. 223/01 • Propane Storage and Handling, O. Reg. 211/01 • Propane Code Adoption Document June 1, 2001 (Code Adoption Document) • CSA-B149.2-00 - Propane Storage and Handling Code (Code)
General Overview:	Applies to the storage, handling, transportation and transfer of propane and the installation of containers and equipment to be used for propane in distribution locations and filling plants.
Application - Classes of Chemicals Regulated:	Propane
Application - Facilities Regulated:	Facilities that store or handle propane, except: pipeline terminals; petroleum refineries; propane when used as a feedstock in chemical plants; utility pipeline distribution and transmission pipelines; underground reservoirs for propane; butane fuel cylinders of 250 g capacity or less; and propane used as refrigerant.
Key Requirements – Design:	• Electrical connections between an appliance and building wiring shall comply with the local electrical code or, in the absence of such, with the Canadian Electrical Code, Part I. (Code) • Design specifications for tanks and cylinders address: (Code, Code Adoption Document) - Certification/approval of equipment, including design and construction of cylinders, tanks and piping - Vent lines and discharge lines from regulators and line relief valves - Dyking to divert accumulation of flammable or combustible liquids around propane storage areas - Relief/ hydrostatic relief and check valves - Corrosion protection for tanks and piping - Liquid level and pressure gauges - Location of tanks/cylinders - Emergency shutoff valves - Tank saddles and supports - Pressure regulators - Painting of tanks and cylinders - Piping, tubing, hose, and fittings - Electrical requirements - Protection of equipment (e.g., fencing).

Key Requirements – Operational:	Licenses/Approvals: • No person shall operate a retail outlet, a filling plant, a vehicle conversion centre, a cylinder handling facility or a container refill centre without the appropriate license. • Where the Regulation requires the approval of an appliance or equipment or other thing employed or to be employed in the handling or use of propane, no person shall lease, rent, buy or install the appliance or equipment or other thing unless it is approved or will be approved prior to activation. (Code) • No person shall operate a cylinder handling facility, a container refill centre or a filling plant, unless the facility is licensed, including director's written permission for changes to the facility and shall post a copy of the license such that it is readily visible at the business address set out on the registration. Contractor registration: • No person shall act as a contractor unless the person is registered for that purpose. General Duty: • An owner and every person responsible for the operation of an appliance, a container, equipment, a work or any other thing employed in the handling or use of propane shall ensure that it is maintained in a safe operating condition and it complies with the Regulation. Fire Prevention: • Requirements for controlling sources of ignition and posting of warning signs are defined. (Regulation, Code) • Readily ignitable materials, including weeds and long dry grass, shall be removed from within 10 ft (3 m) of a container, and this area shall be kept clear of such material at all times. (Code) Storage Practices: • Acceptable storage locations and practices are defined, including security requirements, protection of means of egress, and management of cylinders in storage. (Code) Inspections, Monitoring and Maintenance: • A person who operates a facility shall complete a documented inspect, or shall have the person's supplier of propane complete a documented inspection, each of them at least once a year, to determine that they comply with this Regulation or, where an approval was granted to a facility before this Regulation came into force, that it complies with the approval requirements of the predecessor to this Regulation as it existed when the facility was approved. • Corrosion control monitoring of underground storage tanks shall be done on an annual basis. Measurement shall be done by a permanently installed meter. • Monitoring of the bar holes installed around underground storage tanks for leakage shall be done on a semi-annual basis, and records of the test results shall be maintained. • Cylinders must be requalified and re-marked on a periodic basis. (Code)

	Transfer of Propane Between Containers: • While propane is being transferred from one container to another, a person who is the holder of a certificate recognized by the authority having jurisdiction shall remain at the container being filled. (Code) • The person filling any container shall be held responsible for ensuring that the maximum permitted filling density is not exceeded. (Code) • Restrictions are placed on where a container can be filled, purged or gauged. (Code) Labelling: • Cylinders shall be manufactured, tested, inspected, and marked in accordance with the requirements of relevant CSA or CGSB Standards and the Transportation of Dangerous Goods Regulations, SOR/2001-286. (Code) • Refillable cylinders with a capacity of 45 lbs (20 kg) or less shall be equipped with an effective gas-tight seal such as a plug, cap, or other equally effective device. A protective cap for the valve outlet shall be attached to the cylinder portion of a cylinder connection device. A protective cap for the cylinder portion of a cylinder connection device shall bear a marking as follows: PLACE CAP ON CYLINDER VALVE OUTLET WHENEVER THE CYLINDER IS NOT CONNECTED FOR USE. (Code) Records: • Facility inspection reports are to be dated and signed by that person and that clearly identifies the person who carried out the inspection and kept for at least three years from the date of inspection at the filling plant, container refill centre or cylinder handling facility referred to in the report; or at the place of business set out on the person's license. • A person who operates a filling plant or a container refill centre shall maintain records and plans of the location of the underground piping and tubing of the plant or centre, as the case may be, at the plant or centre and shall, on request, produce them for examination by an inspector. • Underground storage tank corrosion system test results. • Semi-annual bar hole test results.
Key Requirements – Training:	General Training: • Personnel performing installation, operation, and maintenance work shall be properly trained in such functions. (Code) Certification: • No person shall handle propane unless the person holds a certificate or record of training (ROT) under Fuel Industry Certificates O.Reg. 215/01 for that purpose. • No person shall install, alter, purge, activate, repair, service or remove any appliance or equipment or other thing employed or to be employed in the handling or use of propane unless the person is the holder of a certificate or ROT for that purpose, except for the installing, altering, purging, activation, repair, service or removal is done by a person without a required certificate in the actual presence of a holder of a certificate for that purpose.

	• Propane shall only be transferred from one container to another by a person who is the holder of a certificate recognized by the authority having jurisdiction. (Code) Container Refill Centre or a Filling Plant: • Each employee who handles propane, each person who is authorized to transfer propane to a container and each person to whom the holder issues an access code, card or key to dispense propane is trained in the safe handling of propane, including the safe operation and use of propane dispensing equipment; and in the use of emergency shut-down switches, valves and procedures in respect of propane.
Key Requirements – Emergency Planning and Response:	Reporting Dangerous Occurrence: • Where it appears that carbon monoxide poisoning, asphyxiation, explosion or fire has occurred or an accidental release, vent or spill has occurred because of the use, handling or storage of propane, the registration, license, certificate or ROT holder shall notify forthwith the Spills Action Centre of the Ministry of the Environment and a registration or license holder shall have in place procedures for such notification. Unacceptable Conditions: • If a distributor, or holder of a certificate or ROT is of the opinion that an unacceptable condition exists must undertake prescribed activities, depending on whether an immediate hazard does or does not exist.
Other Citations:	• Fuel Industry Certificates, O. Reg. 215/01 • Canadian Electrical Code, Part I
	Please refer CSA-B149.2-00 - Propane Storage and Handling Code for specific design and related standards referenced in the Code.

Legislation:	*Canadian Environmental Protection Act, 1999*, S.C. 1999, c. 33 (CEPA)
General Overview:	CEPA, 1999 is an act respecting pollution prevention and the protection of the environment and human health in order to contribute to sustainable development. The act describes the duties of the federal government and the public in protecting the environment, including responsibilities for enforcement, toxic substances and information gathering.
Application - Classes of Chemicals Regulated:	The act defines and discusses control of toxic substances and fuels.
Application - Facilities Regulated:	The act is applicable to any individual or corporation, whose activities may be regulated under the act or associated regulations.
Key Requirements – Design:	• None
Key Requirements – Operational:	Responding to Requests for Information: • The Minister may, for the purpose of conducting research, creating an inventory of data, formulating objectives and codes of practice, issuing guidelines or assessing or reporting on the state of the environment, publish in the Canada Gazette and in any other manner that the Minister considers appropriate a notice requiring any person described in the notice to provide the Minister with any information that may be in the possession of that person or to which the person may reasonably be expected to have access. Pollution Prevention Plans: • The Minister may, at any time, publish in the Canada Gazette and in any other manner that the Minister considers appropriate a notice requiring any person or class of persons described in the notice to prepare and implement a pollution prevention plan for prescribed chemicals.
Key Requirements – Training:	• None
Key Requirements – Emergency Planning and Response:	Environmental Emergency Plans: • See regulatory summary for federal Environmental Emergency Regulations SOR/2003-307. Release of Toxic Substance: • Where there occurs or is a likelihood of a release into the environment of a substance specified on the CEPA List of Toxic Substances in contravention of a regulation any person any person who owns or has the charge, management or control of a

	substance immediately before its release or its likely release into the environment or causes or contributes to the release or increases the likelihood of the release shall, as soon as possible in the circumstances: - Notify an enforcement officer or any other person designated pursuant to the regulations and provide a written report on the matter to the enforcement officer or other person - Take all reasonable measures consistent with the protection of the environment and public safety to prevent the release or, if it cannot be prevented, to remedy any dangerous condition or reduce or mitigate any danger to the environment or to human life or health that results from the release of the substance or may reasonably be expected to result if the substance is released - Make a reasonable effort to notify any member of the public who may be adversely affected by the release or likely release.
Other Citations:	• *Federal Aboveground Storage Tank Technical Guidelines* for outside aboveground storage tank systems that contain petroleum products and that are located on federal lands and *Federal Underground Storage Tank Technical Guidelines* for underground storage tank systems that contain petroleum products or allied petroleum products and that are located on federal lands. These guidelines are based on Environmental Code of Practice documents published by the Canadian Council of Ministers of the Environment, and address subjects such as design review, protection devices and public safety.

Legislation:	*Canadian Environmental Protection Act, 1999*, S.C. 1999, c. 33 (CEPA)
Regulation:	Environmental Emergency Regulation, SOR/2003-307
General Overview:	Defines requirements for notifying Environment Canada of the storage of prescribed toxic and other hazardous substances and the need to prepare and implement environmental emergency plans for these substances.
Application - Classes of Chemicals Regulated:	• Substances set out in column 1 of Schedule 1 of the Regulations, having a concentration equal to or greater than the applicable concentration set out in column 2 of Schedule 1. Substances listed in Schedule 1 include hydrocarbons, volatile organic compounds and inorganic chemicals. (E2 Reg.) • For CEPA-toxic substances on Schedule 1 of CEPA 1999 and those proposed for addition, emergency planning requirements can be triggered by publication of a Notice in the Canada Gazette. (CEPA)
Application - Facilities Regulated:	• Any person who owns or has the charge, management or control of a substance set out in column 1 of Schedule 1 of the Environmental Emergency Regulation that is located at a place in Canada if the substance is (i) in a quantity that at any time is equal to or exceeds the quantity set out in column 3 of Schedule 1 for that substance; or (ii) the substance is stored in a container that has a maximum capacity equal to or exceeding the quantity set out in column 3 of Schedule 1 for that substance. (E2 Reg.) • Any person who is subject to a Notice published in the Canada Gazette Part II. (CEPA)
Key Requirements – Design:	• None
Key Requirements – Operational:	Notifications: • Notice/declaration of identification of substance and place to Environment Canada if (i) either the maximum expected quantity on site or the largest storage container exceeds the specified threshold quantity (E2 Reg.) or (ii) as specified in a Notice published in the Canada Gazette Part II. (CEPA)
Key Requirements – Training:	• Individuals who (i) are to carry into effect the emergency plan in the event of an environmental emergency are to be trained (E2 Reg.) or (ii) as specified in a Notice published in the Canada Gazette Part II. (CEPA)
Key Requirements – Emergency Planning and Response:	Emergency Plan: • If (i) both the quantity and container capacity equal or exceed the threshold quantity for a substance set out in Schedule 1 of the Regulations (E2 Reg.), or (ii), as specified in a Notice published in the Canada Gazette Part II (CEPA) an emergency response plan, with prescribed information, must be prepare which covers the prevention of, preparedness for, response to and recovery from

	an environmental emergency. • A copy of the plan must be readily available for the individuals who are to carry into effect the plan in the event of an environmental emergency and, if the place where one or more substances are located is a place of work, a copy must be available at that place. (E2 Reg.) • The environmental emergency plan must updated and tested at least once a year. (E2 Reg.) <u>Notices</u>: • Notice/declaration of preparation to Environment Canada stating that an environmental emergency plan has been prepared if certain criteria are met. (E2 Reg.), or (ii) (E2 Reg., CEPA) • Notice/declaration of implementation to Environment Canada stating that the implementation and testing of the environmental emergency plan have been completed. (E2 Reg., CEPA) <u>Records</u>: • The person must keep with the plan, a record of the results from the annual updates and tests for a period of not less than five years beginning on the day the record is made. (E2 Reg) <u>Emergency Reporting</u>: • As soon as possible in the circumstances, where an environmental emergency involving a substance set out in column 1 of Schedule 1, the person who owns or has the charge, management or control of a substance immediately before the environmental emergency; or causes or contributes to the environmental emergency must: - notify the Ontario Regional Office Environmental Protection Environment Canada and provide a written report to the Director Environmental Protection Ontario Region Environment Canada (E2 Reg., CEPA, s. 201) - take all reasonable emergency measures consistent with the protection of the environment and public safety to prevent the environmental emergency, or to repair, reduce or mitigate any negative effects on the environment or human life or health that result from the environmental emergency or that may reasonably be expected to result from it - make a reasonable effort to notify any member of the public who may be adversely affected by the environmental emergency (E2 Reg., CEPA, s. 201).
Other Citations	• None

Legislation:	*Canadian Environmental Protection Act, 1999*, S.C. 1999, c. 33 (CEPA)
Regulation:	Storage of PCB Material Regulations, SOR/92-507
General Overview:	Describes safety and environmental protection requirements for facilities storing PCB materials or PCB equipment, including requirements for storage containers, inspections and record keeping and emergency procedure plans.
Application - Classes of Chemicals Regulated:	• Applies to any of the following PCB material that is not being used daily: - PCB liquids in an amount of 100 L or more - PCB solids or PCB substances in an amount of 100 kg or more - PCB liquids, solids or substances, or any combination thereof, in an amount less than that referred to above, that contains 1 kg or more of PCBs - PCB equipment that contains an amount of PCBs or PCB liquids, solids or substances referred to above, excepting PCB equipment that is shut down for less than six months. Relevant Exceptions**:** • Does not apply to the handling, offering for transport or transporting of PCB material governed by the federal *Transportation of Dangerous Goods Act, 1992* (Canada), S.C. 1992, c. 34.
Application - Facilities Regulated:	• Applies to every person who owns, controls or possesses PCB material, or who owns or manages a property in or on which PCB material is located or a parcel of land on which PCB material is located.
Key Requirements – Design:	• PCB materials shall be stored in a building, room, shipping container or other structure, or an area that is enclosed by a woven mesh wire fence or any other fence or wall with similar security characteristics, where the fence or wall is at least 1.83 m high. • Design criteria for containers used to store PCB materials are defined. • Design criteria for mechanical ventilation systems, fire alarm systems, floors, curbing, floor drains, sumps, etc. for PCB storage areas are defined.
Key Requirements – Operational:	Management Practices: • Except where required for the purposes of treatment or destruction, no person shall mix or dilute any PCB liquid, PCB solid or PCB substance with any other substance. Security Measures: • The entrance to a PCB storage site shall be kept locked or guarded. • A register that contains the name of each person, and the name, address and telephone number of that person's place of business shall be maintained at the site of persons who are authorized to enter the site, and who enters the site.

	• Only authorized persons are permitted to enter the site. Storage Practices: • Requirements for the placement, stacking and spacing of drums of PCBs and PCB equipment are defined. • Labelling requirements for containers, equipment and storage facilities are defined. Inspections: • All floors, curbing, sides, drains, drainage systems, weatherproof roofs or barriers, fences and walls of the PCB storage site, any fire alarm system, fire extinguishers and fire suppression system, and all PCB equipment, containers used for the storage of PCB material and materials for clean-up at the PCB storage site are to be inspected each month, or other intervals as directed by Environment Canada. Records: • Requirements for inventory and inspection records are defined. Reporting: • Requirements for reporting changes in PCB inventories are defined.
Key Requirements – Training:	• Requires employees who are authorized to enter the PCB storage site to be: - Made familiar with the contents of the fire protection and emergency procedures plan - Made aware of the hazards of PCBs and are familiar with the use of protective equipment and clothing and the clean-up procedures referred to in the "Guidelines for the Management of Wastes Containing Polychlorinated Biphenyls (PCBs)", CCME-TS/WM-TRE008, September 1989, issued by the Canadian Council of Ministers of the Environment, as amended.
Key Requirements – Emergency Planning and Response:	• Every owner or manager of a PCB storage site shall develop and have in effect at the PCB storage site a fire protection and emergency procedures plan, deposit one copy of the plan with the local fire department (or, if there is no local fire department, to the local officer appointed by the provincial Fire Marshall or to any other local authority responsible for fire protection) and keep one copy of the plan at the PCB storage site and another copy at the owner or manager's place of business. • Absorbent materials for clean-up must be stored near the PCB storage site. • Requirements for fire alarms, fire suppression systems and fire extinguishers are defined.
Other Citations:	• Guidelines for the Management of Wastes Containing Polychlorinated Biphenyls (PCB's), published by the Canadian Council of Ministers of the Environment.

APPENDIX B

SAMPLE INSPECTION CHECKLIST

CHECKLIST FOR ROUTINE INSPECTIONS OF ABOVEGROUND STORAGE TANKS

Inspection Completed By: _____ Date: _____

Question	Tank ID				Comments / Observations
Tanks, pipes and dispensing stations are appropriately labelled, with labels in good condition.					
Tank, support structure and vents are free of rust, weeps, wet spots, or excessive dents on the tank's surface.					
Tank is free of drips or signs of leakage around valves, piping and gauges.					
Tank gauges are in good repair, with no evidence of cracking, sticking or freezing.					
Tank fill pipe is free of blockage and in good condition.					
Tank vents are in good repair and free of obstructions (e.g., ice or snow).					
Automatic shutoff devices, overfill alarms, float valves and similar spill prevention equipment operating are in good repair.					
Tank and pipe coating is in good condition.					
Corrosion protection and grounding systems are functioning properly and in good repair.					
Vehicular impact protection measures are in good repair.					
Secondary containment dikes, bunkers and berms are in good repair and free of cracks.					
Drainage valves and pumps are locked in the closed/off position.					
Secondary containment dikes, bunkers and berms are free from debris, accumulated water or snow and cracks and corrosion.					
Precautionary signs (e.g., emergency response requirements, "No Smoking" signs) are present and in good repair.					
Spill prevention measures (i.e., spill kits) are available and in close proximity?					
Inventory control records are maintained in accordance with established procedures.					

CHECKLIST FOR ROUTINE INSPECTIONS OF UNDERGROUND STORAGE TANKS

Inspection Completed By: _____ Date: _____

Question	Tank ID				Comments / Observations
Tanks, pipes and dispensing stations are appropriately labelled, with labels in good condition.					
Fill pipes, valves or other piping are free of drips or signs of leakage.					
Tank vents are in good repair and free of obstructions (e.g., ice or snow).					
Aboveground pipe coating is in good condition.					
Tank fill pipe is free of blockage and in good condition.					
Fill caps closed and locked when not in use.					
Vehicular impact protection measures are in good repair.					
Automatic shutoff devices, overfill alarms, float valves and similar spill prevention equipment operating are in good repair.					
If equipped with a cathodic protection system, is it operating properly?					
If equipped with a tank interstitial monitoring device, is it operating properly?					
Secondary containment structures (e.g., load/unload area) are in good repair and free of cracks.					
Drainage valves and pumps are locked in the closed/off position.					
Secondary containment structures (e.g., load/unload area) are free from debris, accumulated water or snow and cracks and corrosion.					
Precautionary signs (e.g., emergency response requirements, “No Smoking” signs) are present and in good repair.					
Spill prevention measures (i.e., spill kits) are available and in close proximity.					
Inventory control records are maintained in accordance with established procedures.					

APPENDIX C

CHEMICAL COMPATIBILITY CHART

CHEMICAL COMPATIBILITY CHART

1	Acids, Mineral, Non-oxidizing	1																																								
2	Acids, Mineral, Oxidizing		2																																							
3	Acids, Organic		G, H	3																																						
4	Alcohols and Glycols	H	H, F	H, P	4																																					
5	Aldehydes	H, P	H, F	H, P		5																																				
6	Amides	H	H ,GT				6																																			
7	Amines, Aliphatic and Aromatic	H	H, GT	H		H		7																																		
8	Azo Compounds, Diazo Compounds and Hydrazines	H, G	H, GT	H, G	H, G	H			8																																	
9	Carbamates	H, G	H, GT						G, H	9																																
10	Caustics	H	H	H		H				H, G	10																															
11	Cyanides	GT, GF	GT, GF	GT, GF					G			11																														
12	Dithiocarbamates	H,F, GF	H,F, GF	H,GT,GF		GF, GT		U	H, G				12																													
13	Esters	H	H, F						H, G		H			13																												
14	Ethers	H	H, F												14																											
15	Fluorides, Inorganic	GT	GT	GT												15																										
16	Hydrocarbons, Aromatic		H, F														16																									
17	Halogenated Organics	H, GT	H,F, GT					H, GT	H, G		H, GF	H						17																								
18	Isocyanates	H, G	H,F, GT	H, G	H, P			H, P	H, G		H,P, G	H, G	U						18																							
19	Ketones	H	H, F						H, G		H	H								19																						
20	Mercaptans and Other Organic Sulfides	GT, GF	H,F,GT						H, G									H	H	H	20																					
21	Metals, Alkali and Alkaline Earth, Elemental	H,F,GF	H,F,GF	H,F,GF	H,F,GF	H,F,GF	GF,H	GF,H	GF,H	GF,H	GF,H	GF,H	GF,H,GT	GF,H				H,E	GF,H	GF,H	GF,H	21																				
22	Metals, Other Elemental & Alloys as Powders, Vapors, or Sponges	H,F, GF	H,F, GF	G,F					H,F,GT	U	GF,H							H,E	GF,H		H,F,GF		22																			
23	Metals, Other Elemental & Alloys as Sheets, Rods, Drops, etc.	H,F, GF	H,F, GF						H,F, G									H,F						23																		
24	Metals and Metal Compounds, Toxic	S	S	S			S	S			S														24																	
25	Nitrides	GF,HF	H,F,E	H,GF	H,E,GF	GF,H			U	H,G	U	GF,H	GF,H	GF,H				GF,H	U	GF,H	GF,H	E				25																
26	Nitriles	H,GT,GF	H,F,GT	H							U											H,P			S	GF,H	26															
27	Nitro Compounds, Organic		H,F,GT			H					H,E											H,E,GF				H,E,GF		27														
28	Hydrocarbons, Aliphatic, Unsaturated	H	H, F			H																	H,E						28													
29	Hydrocarbons, Aliphatic, Saturated		H,F																											29												
30	Peroxides and Hydroperoxides, Organic	H,G	H,E		H,F	H,G		H,GT	H,F,E	H,F,GT		H,E,GT	H,F,GT					H,E	H	E	H,F,GT	H,E	H,G		H,G	H,E,GF	H,P,GT		H,P		30											
31	Phenols and Cresols	H	H,F						H,G										H,P			GF,H				GF,H					H	31										
32	Organophosphates, Phosphothioates, Phosphodithioates	H,GT	H,GT						U		H,E											H									U		32									
33	Sulfides, Inorganic	GT,GF	HF,GF	GT		H			E										H												H,GT			33								
34	Epoxides	H,P	H,P	H,P	H,P	U		H,P	H,P		H,P	H,P	U								H,P	H,P	H,P		H,P	H,P					H,P	H,P	U	H,P	34							
35	Combustible and Flammable Materials, Miscellaneous	H,G	H,F,GT																			H,F,G				H,F,GF					H,F,GT					35						
36	Explosives	H,E	H,E	H,E					H,E		H,E			H,E								H,E	H,E	H,E	E	E					H,E	H,E		H,E	H,E	H,E	36					
37	Polymerizable Compounds	P,H	P,H	P,H					P,H		P,H	P,H	U									P,H	P,H	P,H	P,H	P,H					P,H	P,H		P,H			H,E	37				
38	Oxidizing Agents, Strong	H,GT		H,GT	H,F	H,F	H,F,GT	H,F,GT	H,E	H,F,GT		H,E,GT	H,F,GT	H,F	H,F		H,F	H,GT	H,F,GT	H,F	H,F,GT	H,F,E	H,F,E	H,F		H,F,E	H,F,GT	H,E	H,F	H,F	H,G	H,F	H,F,GT	H,F,GT	H,F,G	H,F,G	H,E	H,F,GT	38			
39	Reducing Agents, Strong	H,GF	H,F,GT	H,GF	H,F,GF	H,F,GF	H,GF	H,G				H,GT	H,F				H,F,E	H.E	H,GF	H,GF	H,GF						H,GF	HE			H,E	H,GF	H,GT,GF		H	H,GF	H,E	H,P,GF	H,F,E	39		
40	Water and Mixtures Containing Water	H	H						G										H,G			H,GF	H,GF		S	H,GF								GT,GF						GF,GT	40	
41	Water Reactive Substances							EXTREMELY REACTIVE. DO NOT MIX WITH ANY CHEMICAL OR WASTE MATERIAL														EXTREMELY REACTIVE. DO NOT MIX WITH ANY CHEMICAL OR WASTE MATERIAL														EXTREMELY REACTIVE. DO NOT MIX WITH ANY CHEMICAL OR WASTE MATERIAL						41

Legend

Code	Consequences
H	Heat Generation
F	Fire
G	Innocuous and non-flammable gas generation
GT	Toxic Gas formation
GF	Flammable Gas formation
E	Explosion
P	Violent Polymerization
S	Solubilization of toxic substance
U	May be hazardous, but Unknown

To use the chart reference the group name for the hazardous material or chemical and read across from the left column and up/down to the chemical group which you are evaluating. Example: Caustics are not compatible with Acids, Organic (Heat Generation)

Modified from EPA-600/2-80-076 April 1980 "A METHOD FOR DETERMINING THE COMPATIBILITY OF CHEMICAL MIXTURES" Municipal Environmental Laboratory Office of Research and Development, U.S. Environmental Protection Agency, Cincinnati, Ohio 45268.

APPENDIX D

ABBREVIATIONS

ABBREVIATIONS

ABBREVIATION	DESCRIPTION
ANSI	American National Standards Institute
API	American Petroleum Institute
ASTM	American Society of Testing Materials
CASQA	California Stormwater Quality Association
CSA	Canadian Standards Association
E2	Environmental Emergencies Regulation
EPA	*Environmental Protection Act*
FICR	Fuel Industry Certificates Regulation
FOR/C	Fuel Oil Regulation/Code
GFR	Gaseous Fuels Regulation
HSWDGR	Hazardous Substances and Waste Dangerous Goods Regulations (Saskatchewan)
LFR/C	Liquid Fuels Regulation/Code
MCA	Manufacturing Chemists Association
MOE	Ministry of the Environment
MSDS	Material Safety Data Sheets
NACE	National Association of Corrosion Engineers
NFPA	National Fire Protection Agency
NGPIC	Natural Gas and Propane Installation Code
NIOSH	National Institute for Occupational Safety and Health
NLPA	National Leak Prevention Association
NYCRR	New York Code Rules and Regulations
OBC	Ontario Building Code
OFC	Ontario Fire Code
OHSA	*Occupational Health and Safety Act*
OWRA	*Ontario Water Resources Act*
PSHC	Propane Storage and Handling Code
PSHR	Propane Storage and Handling Regulation
SPM	Storage of PCB Material
SSPC	Steel Structures Painting Council
TDGR	Transportation of Dangerous Goods Regulations
TSSA	*Technical Standards and Safety Act, 2000*
ULC	Underwriters' Laboratories of Canada
ULC/ORD	Underwriters' Laboratories of Canada /Other Recognized Documents
US EPA	United States Environmental Protection Agency
WHMIS	Workplace Hazardous Materials Information System