

## Regulation IO – 8.0: Chemicals & Petroleum Products Storage Facilities

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### 8.1 Application

This section is intended for use by the employer/employees / operators / designers of chemical and waste storage facilities. This document will aid the reader in assessing the necessary safety & health protection measures for Chemicals & Petroleum products storage areas. This document can be used to participate in the plan for execution of safe operations of the facilities involved in chemicals & petroleum products handling & storage activities.

This section is also intended to supplement, not replace any existing codes and regulations of local & federal Authority. Owners of chemical and Petroleum storage & handling facilities must comply with all other applicable legislation and obtain Certificates of Approval in the form of Operations Fitness Certificate (OFC) as applicable.

OFC for chemicals may not be required for companies/facilities dealing with any activities/operations other than chemicals & petroleum products or with minimum quantity of chemicals & petroleum products as accepted and accepted by Trakhees at the time of issuance of NOC for license.



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Other jurisdictions' legislation/local authority in the emirate of Dubai approval is also required to be obtained as & when applicable prior to commence physical operations in the client facility. These regulations are presented for the benefit and consideration of the users/clients and not to limit how risk can be minimized or eliminated.

The purpose & part of this section is to ensure the containment of all spills and accidental losses of chemicals or its wastes from storage systems (above & on word storage tanks) for liquids with true vapor pressures below 76 kPa consistent with the following objectives:

- a. Environmental protection (air, surface and groundwater);
- b. Personnel protection; and,
- c. Fire protection.

In applying this regulation, consideration shall be given to the potential for releases to enter the natural environment, including sewer systems, in relation to applicable sections of the Trakhees regulations adopted in accordance with the degree of risk (e.g., indoor tanks remote from exterior doors and sewer drains may not require the same degree of secondary containment as an outdoor tank).

### 8.2 Engineering Controls

- 8.11.2 All storage facilities shall be designed, fabricated & installed and provided with adequate protection in such a manner that risk of loss is minimized
- 8.11.2 Materials of construction of storage facilities shall be consistent with the safe long term storage of the chemicals or industrial wastes under consideration.
- 8.11.2 Changes in the chemicals or its process or part of operational wastes to be stored in a given facility shall not be permitted until authority of Trakhees has given necessary approval for such a change in service.
- 8.11.2 The degree to which measures are taken to ensure the integrity of a storage facility shall be dictated by the severity of the potential environmental, health and safety effects of the loss of the product to be stored.
- 8.11.2 Where possible, storage facilities shall not be located where, in the event of a spill, waste product may enter a natural watercourse or a sewage or drainage system, or contaminate potable surface or groundwater supplies, or contribute to air contamination.
- 8.11.2 The following measures for worker protection must be considered at each chemical and waste storage facility,
  - 8.2.6.1 The employer/ owner of the chemical and/or waste storage facility must conduct a risk assessment, taking into account of *Regulation respecting Control of Exposure to*



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*Biochemical or any Chemical Agents.* The risk assessment must include: details of engineering controls; work practices; hygiene facilities and practices; and, personal protective equipment (PPE) required to be worn by the operator/carrier.

8.2.6.2 PPE should include the use of impervious gloves ( type and material), coveralls, boots (rubber or safety), eye protection (safety glasses/chemical goggles), 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.

8.2.6.3 Emergency measures such as eye wash fountains, deluge showers, etc. must be provided and maintained in good repair, commensurate with the identified level of Risk

8.2.6.4 Worker training in the proper use, care and maintenance of any required personal protective equipment, including fit testing of respiratory equipment, if used, must be provided

### 8.3 Environmental Safety Controls

8.3.1 Environmental protection measures are required for all chemicals facilities and their waste storage.

8.3.2 Specific environmental protection measures shall be based on sound engineering principles taking into account the diverse risks and properties of the materials being stored.

8.3.3 Required Measures shall 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.

8.3.4 Human health and safety shall take precedence over environmental protection in cases of emergency.

8.3.5 In applying these Guidelines, consideration shall be given to the potential for releases to enter the natural environment, with applicable sections of the Guideline adopted in accordance with the degree of risk.

8.3.6 Reference to Environmental Regulations shall be made for strict compliance with the environmental requirements as mentioned therein and also in local regulations (Dubai Municipality) including all applicable Federal Regulations & Standards.

### 8.4 Liquid Chemical Storage Tanks – Above Ground

8.4.1 Consideration should be given to reducing emission losses from fixed roof tanks by installing an internal floating roof and seals to minimize storage evaporative losses. For floating roof tanks, primary seals and secondary seals should be provided and maintained in good repair to serve



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as a vapor conservation device by closing the annular space between the edge of the floating deck and the tank wall. Aboveground storage tanks and associated piping and equipment (storage tank system) shall be of sufficient structural strength to withstand normal handling and installed on foundation stable under all operating conditions.

- 8.4.2 Aboveground storage tank systems and foundations shall 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.
- 8.4.3 Overhead piping is preferred over underground piping for filling tanks from the process or from raw material sources such as tank car or tank truck unloading stations. Should underground piping be used, piping shall be installed and protected in accordance with Guideline requirements for underground tank systems.
- 8.4.4 Overflow lines from tanks should be extended to near the floor of the dike area.
- 8.4.5 All storage tanks which rest on the ground shall be constructed with a double bottom or underlain by a barrier which will not deteriorate with a permeability rate to the material stored.
- 8.4.6 Materials of construction of storage tank systems, foundations, dykes and dyke accessories shall be consistent with safe long-term storage of the chemical or waste being stored.
- 8.4.7 Changes in the facility service shall not be permitted until authority of Trakhees has given necessary approval for such a change in service. (e.g. material compatibility, pressure and vacuum relief systems) for such a change in service.
- 8.4.8 If the tank is lined or internally coated, the coatings must be compatible with the substance stored, with coating specifications adhering to good engineering practice and relevant Standard requirements.
- 8.4.9 The exposed exterior surfaces of all aboveground tanks, piping and ancillary equipment shall be protected from corrosion. Protection shall be provided by using one or a combination of corrosion resistant materials, non-metallic cladding or coatings, cathodic protection, or paints. Design and installation of cathodic protection shall be in accordance with specified codes and standards.
- 8.4.10 Bottoms of tanks which are in contact with soil and are subject to corrosion shall be protected from external corrosion by either corrosion resistant materials or cathodic protection system.
- 8.4.11 Tank and piping connections of two different metals which create a corrosion inducing galvanic cell shall be avoided.



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- 8.4.12 The practice of placing gravel and spill absorbents around the base of the tank may increase the likelihood of bottom corrosion and shall be avoided. Over time, the bottom of some tanks, especially older ones, may be below ground level, thereby trapping moisture and increasing the rate of corrosion. Therefore, this practice should be avoided.
- 8.4.13 Instrumentation shall be provided on all storage tanks and piping to and from the tanks in order to keep operating personnel informed as to the existing conditions.
- 8.4.14 Alarms shall be provided to give warning of conditions, such as high pressures or liquid levels, which, if not corrected, may result in a spill.
- 8.4.15 For toxic and/or non-biodegradable materials a back-up method of detecting high levels should be provided.
- 8.4.16 All remote or instrument-operated valves should be set to fail in the safest position.
- 8.4.17 Tanks shall be protected from over-pressurization, excessive vacuums or thermal excursions that may be caused by operator error, filling, emptying, atmospheric temperature changes, reactions, pumping, refrigeration, heating and fire exposure by one or a combination of:
- 8.4.17.1 open vents;
  - 8.4.17.2 rupture discs;
  - 8.4.17.3 pressure/vacuum relief devices gauges and controllers;
  - 8.4.17.4 thermal alarms;
  - 8.4.17.5 fail-safe vessel designs; or,
  - 8.4.17.6 Other means determined by a qualified engineer.
- 8.4.18 Discharge from vents shall not terminate in, near or underneath any building if the discharge could pose a fire, health or safety problem.
- 8.4.19 Discharge from vents shall not terminate in, near or underneath any building if the discharge could pose a fire, health or safety problem.
- 8.4.20 Locations of the various components of any chemical or waste storage system shall consider the safety of the operating personnel, public health and safety, and environmental protection.
- 8.4.21 Tanks, piping and ancillary equipment shall be located in such a way to protect them from physical damage that may result from moving vehicles.
- 8.4.22 All aboveground tanks shall be accessible by fire fighting and other emergency response equipment.
- 8.4.23 If an aboveground storage tank is not used for up to 180 days, the flow of product into the piping shall be blocked or valves closed and locked to isolate the disused tank. The tank shall



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be gauged monthly for necessary/immediate action if required to maintain safety of the tanks & its associated accessories.

- 8.4.24 When an aboveground storage tank is decommissioned permanently, the fluid content of the tank and all connected piping shall be emptied and the tank and connected piping made vapor-free followed by obtaining gas free certificate from competent authority's approved third party agency.
- 8.4.25 Before reuse, a tank temporarily taken out of service shall be inspected to ensure it is in a safe condition.
- 8.4.26 Permanently closed tanks shall be decommissioned with measures implemented to remediate or manage any associated environmental contamination.
- 8.4.27 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 shall be sloped a minimum of 1.5% toward a containment system.
- 8.4.28 Where secondary containment is not provided, alternate measures offering an equivalent level of protection shall be implemented to reduce spill risk
- 8.4.29 All the personnel involved in the transfer and loading/unloading operation shall be provided with personal protective equipment as required to protect against any associated hazards. Procedures shall be in place to ensure that the personnel are trained for using such equipment during the transfer and loading/unloading operation.
- 8.4.30 All connections shall be leak free, undamaged and fully functional and checked for leakage before and after the transfer has been initiated.
- 8.4.31 During unloading/loading from/to a tank car, brakes must be set and wheels must be chocked.
- 8.4.32 Where a fire hazard exists, sources of ignition shall be controlled.
- 8.4.33 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 such as a dry disconnect shutoff valve which prevents discharges from the line.
- 8.4.34 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.
- 8.4.35 Overfill and spill prevention equipment and practices shall be employed for all storage tank fill systems, and could include one or more of:



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- 8.4.35.1 operator controls;
  - 8.4.35.2 high-level alarms or trips;
  - 8.4.35.3 automatic by-pass to an overflow tank if the overflow tank is equipped with overflow protection; or,
  - 6.4.35.4 other equivalent systems for preventing overfills.
- 8.4.36 Where feasible, consideration should be given to use of vapor balance systems to minimize emissions (working losses) generated during the loading/unloading of tanks and during the dispensing of products from tanks.
- 8.4.37 Submerged fill should be used where practical to reduce vapor losses during loading/unloading operations.

### **8.5 Liquid Chemicals Storage Tank – Under Ground**

- 8.5.1 Underground storage tanks and associated piping and equipment (storage tank system) shall be of sufficient structural strength to withstand normal handling and installed on foundation stable under all Operating Conditions
- 8.5.2 Underground storage tank systems shall 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.
- 8.5.3 Materials of construction of storage tank systems shall be consistent with safe long-term storage of the chemical or industrial liquid waste being stored.
- 8.5.4 Changes in the facility service shall not be permitted until authority of EHS-Trakhees has been given necessary approval for such a change in service. (e.g. material compatibility, pressure and vacuum relief systems).
- 8.5.5 If the tank is lined or internally coated, the coatings must be compatible with the substance stored, with coating specifications adhering to good engineering practice and relevant Standard requirements
- 8.5.6 Steel underground storage tanks and piping which are in contact with soil shall be protected from corrosion using one or a combination of corrosion resistant materials or cathodic protection. Design and installation of cathodic protection, monitoring, isolation from stray currents, and sacrificial anodes shall be in accordance with acceptable standard of Authority having Jurisdiction.
- 8.5.7 Tank and piping connections of two different metals which create a corrosion inducing galvanic



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cell shall be avoided.

- 8.5.8 Instrumentation shall be provided on all storage tanks and piping to and from the tanks in order to keep operating personnel informed as to the existing conditions.
- 8.5.9 For toxic and/or non-biodegradable materials a back-up method of detecting high levels should be provided.
- 8.5.10 All remote or instrument-operated valves should be set to fail in the safest position.
- 8.5.11 In locating the components of any underground chemical or waste storage system the safety of the operating personnel, public health and safety and environmental protection shall be considered. Consideration must be given to nearby underground infrastructure (such as underground pipes, sewers, and wires/ cables).
- 8.5.12 If an underground storage tank is temporarily removed from service, routine inspections, at least monthly, shall be conducted to verify that the fill pipe caps and dispensers are secured and locked, no loss of product or water infiltration has occurred, the tank has not been dislodged, and corrosion protection systems are operating. Should this situation be anticipated for an extended period of time (e.g., greater than 180 days) tank contents shall be removed & Purged followed by a testing & certification of approved third party.
- 8.5.13 Before reuse, a tank temporarily taken out of service shall be inspected to ensure it is in a safe condition for use.
- 8.5.14 Permanently closed tanks shall be removed and decommissioned where possible, with measures implemented to remediate or manage any associated environmental contamination or residual risk should the tank be left in place.
- 8.5.15 Underground storage tanks must be monitored for leakage using one or more of the following methods:
  - 8.5.15.1 Inventory monitoring;
  - 8.5.15.2 Routine monitoring of the interstitial space of a double-walled tank;
  - 8.5.15.3 Vapor wells for monitoring soils in the excavation zone;
  - 8.5.15.4 Groundwater monitoring wells;
  - 8.5.15.5 Automatic tank gauging equipment; or
  - 8.5.15.6 Other equivalent methods as approved by relevant Codes and Standards.
- 8.5.16 All leak detection systems shall be designed by qualified engineers according to codes & standards acceptable to the Authority having jurisdiction.
- 8.5.17 Transfer, loading & offloading of the underground storage tank shall follow the applicable



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requirements specified in the sub-section: 8.4 (between 8.4.27 to 8.4.37).

### 8.6 Storage of Gases & Volatiles Liquids

- 8.11.2 Underground storage tanks and associated piping and equipment (storage tank system) shall be of sufficient structural strength to withstand normal handling and installed on foundation stable under all Operating Conditions
- 8.6.2 Underground storage tank systems shall 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.
- 8.6.3 Materials of construction of storage tank systems shall be consistent with safe long-term storage of the chemical or industrial liquid waste being stored.
- 8.6.4 Changes in the facility service shall not be permitted until authority of EHS-Trakhees has been given necessary approval for such a change in service. (e.g. material compatibility, pressure and vacuum relief systems).
- 8.6.5 If the tank is lined or internally coated, the coatings must be compatible with the substance stored, with coating specifications adhering to good engineering practice and relevant Standard requirements
- 8.6.6 Steel underground storage tanks and piping which are in contact with soil shall be protected from corrosion using one or a combination of corrosion resistant materials or cathodic protection. Design and installation of cathodic protection, monitoring, isolation from stray currents, and sacrificial anodes shall be in accordance with acceptable standard of Authority having Jurisdiction.
- 8.6.7 Tank and piping connections of two different metals which create a corrosion inducing galvanic cell shall be avoided.
- 8.6.8 Instrumentation shall be provided on all storage tanks and piping to and from the tanks in order to keep operating personnel informed as to the existing conditions.
- 8.6.9 For toxic and/or non-biodegradable materials a back-up method of detecting high levels should be provided.
- 8.6.10 All remote or instrument-operated valves should be set to fail in the safest position.
- 8.6.11 In locating the components of any underground chemical or waste storage system the safety of the operating personnel, public health and safety and environmental protection shall be considered. Consideration must be given to nearby underground infrastructure (such as



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underground pipes, sewers, and wires/ cables).

- 8.6.12 If an underground storage tank is temporarily removed from service, routine inspections, at least monthly, shall be conducted to verify that the fill pipe caps and dispensers are secured and locked, no loss of product or water infiltration has occurred, the tank has not been dislodged, and corrosion protection systems are operating. Should this situation be anticipated for an extended period of time (e.g., greater than 180 days) tank contents shall be removed & Purged followed by a testing & certification of approved third party.
- 8.6.13 Before reuse, a tank temporarily taken out of service shall be inspected to ensure it is in a safe condition for use.
- 8.6.14 Permanently closed tanks shall be removed and decommissioned where possible, with measures implemented to remediate or manage any associated environmental contamination or residual risk should the tank be left in place.
- 8.6.15 Underground storage tanks must be monitored for leakage using one or more of the following methods:
- 8.6.15.1 Inventory monitoring;
  - 8.6.15.2 Routine monitoring of the interstitial space of a double-walled tank;
  - 8.6.15.3 Vapor wells for monitoring soils in the excavation zone;
  - 8.6.15.4 Groundwater monitoring wells;
  - 8.6.15.5 Automatic tank gauging equipment; or
  - 8.6.15.6 Other equivalent methods as approved by relevant Codes and Standards.
- 8.6.16 All leak detection systems shall be designed by qualified engineers according to codes & standards acceptable to the Authority having jurisdiction.
- 8.6.17 Transfer, loading & offloading of the underground storage tank shall follow the applicable requirements specified in the sub-section: 8.4 (between 8.4.27 to 8.4.37).

### 8.7 Storage of Solids

- 8.7.1 The purpose of this clause 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) consistent with the objectives of (i) Environmental protection (air, surface and groundwater); (ii) Personnel protection; (iii) Fire protection.
- 8.7.2 Bulk solids (not in containers or packages) should be stored inside. If this is not feasible, then all outside storage areas should be covered with a roof, and bermed, or enclosed to prevent



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storm water contact. The enclosure shall be designed to withstand storms and be anchored into the ground.

- 8.7.3 Stockpiles of raw materials should be covered and contained to prevent storm-water from running into the covered piles. The covers must be in place at all times when work with the stockpiles is not occurring. (Applicable to small stockpiles only).
- 8.7.4 If the stockpiles are so large that they cannot feasibly be covered and contained, erosion control practices shall be implemented at the perimeter of the site and at any catch basins to prevent erosion of the stockpiled material off site.
- 8.7.5 Stockpiles shall be protected from wind erosion. Use of sheltered area or use of crust forming agents is recommended practice
- 8.7.6 Storage area locations will normally be based on process needs and accessibility to materials so as to provide optimum handling and transportation. However, in locating the storage area, consideration shall be given to the hazards associated with the flammability, and toxicity of the chemical or waste and relevant Codes and Standards acceptable to the authority having jurisdictions
- 8.7.8 In siting and orienting stockpiles, consideration shall be given to prevailing wind conditions.
- 8.7.8 The storage area shall be accessible by fire fighting and other emergency response equipment.
- 8.7.10 The storage area shall be located in such a way to protect containment structures and packages and stockpile of the material from moving machinery and vehicles.

### 8.8 Drums & Non Stationary Containers

- 8.8.1 Importance shall be given to the potential for releases to enter the natural environment, including sewer systems, with applicable sections of this regulation adopted in accordance with the degree of risk (e.g., containers stored indoors remote from exterior doors and sewer drains may not require the same degree of secondary containment as containers stored outdoors).
- 8.8.2 Storage of drums containing flammable liquids inside and outside buildings and shelters (e.g., number of drums per stack, maximum number of drums, fire department access ways) shall be in accordance with the *applicable codes & standards (DM Codes & NFPA) acceptable to authorities having jurisdiction*.
- 8.8.3 Drums and non-stationary containers should be clearly identified as to their contents, well sealed and constructed of materials which are resistant to corrosive attack from the contents.
- 8.8.4 An inventory record should be kept for all drums and containers stored within a storage area.



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- 8.8.5 The method of container storage shall be determined to ensure stability of the stored products. If containers are to be stacked, they must be stacked on stable platforms or pallets.
- 8.8.6 Groups of containers must be arranged such that the contents are compatible and do not increase the potential for violent chemical reactions or explosive hazards.
- 8.8.7 Storage areas containing materials which could react with water to generate heat, cause fire, explosion or other adverse reaction shall be provided with an enclosure such as a warehouse or storm shelter to protect the containers from exposure to the elements. The enclosure shall be designed to withstand storms and be anchored into the ground.
- 8.8.8 Outdoor storage areas shall be kept free of weeds and combustible materials.
- 8.8.9 Containers shall be closed at all times when not in use
- 8.8.10 Containers stored outdoors shall be protected from damage due to weather by means of shelter, drum lids or other means
- 8.8.11 Storage area locations will normally be based on process needs and accessibility to materials so as to provide optimum handling and transportation. However, in locating the storage area, consideration shall be given to the hazards associated with the flammability, and toxicity of the chemical or waste and relevant Codes and Standards.
- 8.8.12 The storage area shall be located in such a way to protect containment structures and containers from physical damage that may result from moving vehicles.
- 8.8.13 The storage area shall be accessible by fire fighting and other emergency response equipment.
- 8.8.14 Container storage areas shall be equipped with secondary containment where this containment is required to prevent stored materials from entering the natural environment or any storm, sanitary sewage or water supply system.
- 8.8.15 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. Examination shall include visual, odor or analytical tests (by Trakhees Pre-qualified agency), as applicable to the type of materials contained.
- 8.8.16 Accumulations from a secondary containment system shall be treated or decontaminated in accordance with local requirements (e.g., DM & Trakhees Regulations) for disposal at Dubai Municipality disposal site.
- 8.8.17 Container and stockpile storage areas must be protected from unauthorized access. If a facility's outdoor compound is completely fenced with a fence substantially constructed to discourage



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climbing and unauthorized entry, additional fencing around the immediate storage area shall be assessed by Trakhees and advice the clients accordingly for compliance.

- 8.8.18 Containers, cabinets, drums, tanks, valves and piping containing chemicals or wastes must be visually inspected for leaks, structural integrity and any sign of deterioration (e.g., corrosion, wearing of protective coatings) on a routine basis & critical or highly hazardous installations/areas shall require more frequent inspections by the clients internally and inspection records on the same shall be maintained at the client premises.
- 8.8.19 A more detailed inspection for integrity of containment systems (e.g., presence of cracks, condition of seals) must be completed periodically.
- 8.8.20 Ventilation systems, sump pumps, emergency alarms, impressed current corrosion protection systems, level alarms and other mechanical systems must be inspected on a routine basis to ensure proper functioning based on manufacturer recommendations, regulatory requirements or best practice. Inspection records on such activity shall be maintained.
- 8.8.21 The client internal inspection should include a review of the adequacy, amount and type and accessibility of spill response equipment.
- 8.8.22 Routine leak detection and inventory reconciliation measures should be implemented and results recorded for aboveground and underground tanks, consisting of manual dips (water and product), monitoring of interstitial spaces, examination of monitoring wells, or other methods, based on the regulatory requirements.
- 8.8.23 Tanks and tank systems that contain corrosive materials or are subjected to conditions that may induce corrosion or deterioration of tank construction materials shall be internally inspected more frequently.
- 8.8.24 During visual inspections a checklist and log should be maintained that details the following:
- 8.8.24.1 Person responsible for the inspection;
  - 8.8.24.2 Storage areas and containers subject to the inspection;
  - 8.8.24.3 Condition of containers, cabinets, drums, tanks, valves and piping;
  - 8.8.24.4 Quantity of chemicals and/or wastes in storage; and
  - 8.8.24.5 Condition of leak detection and spills prevention systems (e.g. cathodic protection system, valves, overfills protection, secondary containment berms).
- 8.8.25 Many chemicals and wastes can be hazardous or dangerous to the environment if handled or stored inappropriately. To minimize environmental impacts, facilities shall have an emergency preparedness plan to deal with events such as chemical spillage, fires, explosions, vandalism



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and other emergency situations. The plan shall address: hazard identification; prevention measures; emergency planning; emergency response; and remedial actions.

- 8.8.26 In developing an emergency preparedness plan consideration shall be given to:
- 8.8.26.1 Administrative issues, including management updating and control of the plan;
  - 8.8.26.2 Description of the 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);
  - 8.8.26.3 Identification of environmental emergencies/hazards that can reasonably be expected to occur, the potential effects of an accidental release and measures required to prevent or respond to the emergencies;
  - 8.8.26.4 Description of the measures to be used to prevent an environmental emergency, including the location and type of fire fighting and fire suppressions systems and spills containment measures (e.g. spill kits, secondary containment berms, double walled storage tanks, etc);
  - 8.8.26.5 Assignment of roles and responsibilities for activating, coordinating and implementing the plan, including specific medical or rescue duties, fire response and spills response duties;
  - 8.8.26.6 Listing of emergency contact numbers for relevant facility staff, spills clean-up / response contractors; emergency responders and agency reporting requirements;
  - 8.8.26.7 Community communication and notification requirements, including public education/information programs
  - 8.8.26.8 Maintenance and inspection requirements for preventive measures (e.g., containment system), emergency response and personal protective equipment, and fire suppressions systems, including record keeping requirements;
  - 8.8.26.9 Description of actions facility personnel must take to respond to fires, explosions, or any unplanned release to air, soil, or surface water, including consideration to provisions for monitoring chemical agents during a spill, requirements for personal protective equipment, reporting, recordkeeping, containment, clean-up and disposal concerns;
  - 8.8.26.10 The steps to take to report/record and contain fires, explosions and other similar emergencies;
  - 8.8.26.11 Steps taken to shut down critical operations (e.g. electricity, natural gas, etc);
  - 8.8.26.12 Evacuation and head count procedures;



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- 8.8.26.13 Training requirements for personnel activating, coordinating and implementing the plan, including provision of emergency response exercises (administrative, tabletop drills and operational exercises) and training on the use and maintenance of personal protective equipment.
- 8.8.26.14 Routine review and evaluation of the plan for effectiveness, including post-incident and post-drill review.
- 8.8.27 Incidents and accidents involving spills, fires and other releases shall be reported to Port Emergency Control Room (04-8833111) followed by notification of separate incident/accident report to Trakhees as early as possible but not later than 24 hrs from the time of accident/incident.
- 8.8.28 Facilities shall ensure that a record is kept of all incidents involving spills, fires and other releases. This record should include, as a minimum, the following:-
  - 8.8.28.1 Date of Occurrence
  - 8.8.28.2 Detailed description of event that lead-up to the occurrences.
  - 8.8.28.3 Amount of Materials released to the environment.
  - 8.8.28.4 The actions taken to control & clean-up the spills.
  - 8.8.28.5 Corrective actions implemented that would prevent reoccurrences

### 8.9 Labeling Of Chemicals

- 8.9.1 Labels and hazardous safety marks shall provide critical information as required by the authority having jurisdiction to handlers and transporters of chemicals and wastes. Reference shall be made by the client on the “Code of Practice for the Management of Dangerous Goods in the Emirate of Dubai”
- 8.9.2 Labels act as a hazard awareness tool for people involved in the handling and transportation of chemicals and wastes, including truck drivers, loading dock workers and security personnel.
- 8.9.3 Labeling shall be placed in such a way that leads to quick identification of storage vessel contents and hazards for emergency responders in the event of an emergency situation, i.e. An accidental release of chemicals or wastes from a container or fire incident.
- 8.9.4 Containers, cabinets, drums, tanks, valves and piping must be labeled with their contents and any appropriate hazard communication, fire safety and regulatory labels.
- 8.9.5 Hazardous or liquid industrial wastes should also be labeled with a date, which indicates the point at which the container was filled, sealed and prepared for shipment



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- 8.9.6 Labels should be visible, legible, of an appropriate size and color, and displayed against a background of contrasting color.
- 8.9.7 Labels should be made of durable and weather-resistant material to withstand conditions that they will be exposed to without substantial deterioration or detachment of color, symbols, letters, or numbers
- 8.9.8 Where practicable, identification codes can be stenciled or printed on the package or container as an additional means of identification.
- 8.9.9 For wastes, color coding (e.g., banding of drums or alternate method) may be used to identify waste streams. In the event that labels deteriorate or become dislodged from a container, appropriate measures shall be employed to ensure that labels are replaced without delay.

### 8.10 Training of Employees

- 8.10.1 Individuals responsible for chemical and waste management must be trained by approved third party prior to engaging them in the chemicals (including its waste) handling & storage activities.
- 8.10.2 Training must be specific to the chemicals and/or wastes used/stored at a site and must include:
  - 8.10.2.1 Potential hazards and health effects, including the interpretation and understanding of Material Safety Data Sheets (MSDS) (e.g. ingredients and properties of substances) and labeling;
  - 8.10.2.2 Procedures and special precautions for safe storage, use and handling, and loading and off-loading, including use of personal protective equipment;
  - 8.10.2.3 Emergency response procedures, including fire and spill containment / clean-up methods for specific types of contaminants;
  - 8.10.2.4 Any terms and conditions of a Certificate of Approval, where one has been issued.
- 8.10.3 Individuals, who handle, offer for transport or transport hazardous materials and chemicals that are considered “Dangerous Goods” must be trained. Training must be specific to the types of “Dangerous Goods” that the facility manages. Training topics shall include:
  - 8.10.3.1 Transport of Dangerous Goods training requirements and handling responsibilities;
  - 8.10.3.2 Descriptions of Dangerous Goods classes and compatibility / risk groups;
  - 8.10.3.3 Dangerous Goods List data & other sources of information.
  - 8.10.3.4 Dangerous goods safety marks, placards and requirements;
  - 8.10.3.5 Shipping document data and exceptions;
  - 8.10.3.6 Details of small and large means of containment



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- 8.10.3.7 Emergency actions, information and requirements;
- 8.10.3.8 Accidental release procedures and responsibilities
  
- 8.10.4 Transport of Dangerous Goods training certificates validity shall not be more than three years & within which time refresher training must be completed.
- 8.10.5 Where individuals are involved in the transfer, use and handling of flammable and combustible liquids, including fuel oils and gasoline products, specific training must be provided and may include, depending on the type of flammable and combustible liquid:
  - 8.10.5.1 Emergency procedures, including fire and spill emergency procedures;
  - 8.10.5.2 Procedures for dispensing product;
  - 8.10.5.3 Importance of constant attendance during all loading or unloading operations,
  - 8.10.5.4 Extinguishing procedures for fires involving flammable and
  - 8.10.5.5 Combustible liquids, and
  - 8.10.5.6 Flammable and combustible liquid color coding and identification system
- 8.10.6 Training of personnel should be managed through a formalized education and training program, which includes consideration of:
  - 8.10.6.1 Job specific training and competency requirements, including the amount and type of introductory and continuing/refresher training required, required education and experience, specified certifications (e.g., trades certificate) for a given position;
  - 8.10.6.2 Training program contents;
  - 8.10.6.3 Training program delivery methods (e.g. informal meetings, formal classroom training and on-the-job training);
  - 8.10.6.4 Evaluation of training effectiveness (both training programs and knowledge of trained individuals);
  - 8.10.6.5 Record keeping.
- 8.10.7 Refresher training should be completed on a routine basis, as a minimum, in accordance with relevant Regulations or other frequency, based on risk management decisions.
- 8.10.8 Only trained persons shall be allowed to use, handle and transport chemicals and wastes. Access to chemical and waste storage buildings and areas should be limited to trained individuals.
- 8.10.9 Only trained individuals with valid certificates & employed by approved third party shall be permitted to install, repair, service or remove storage systems and equipment that contain, or



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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.

8.10.10 Records of training should be maintained and may include the type and description of the training, the date the training was completed, the employees attending the training and any expiry dates for specific training.

8.10.11 Training records should be maintained for a minimum of two (2) years after the expiry of a training certificate or, if no certificate is issued, records should be retained to demonstrate that employees have full and current training in accordance with identified training needs.

### 8.11 Storage with Compatibility

8.11.1 Store Chemicals according to their compatibility with chemicals/materials, rather than in alphabetical order.

8.11.2 Incompatible chemicals should not be stored in close proximity to each other. Separate the following groups of chemicals from each other.

8.11.2.1 Oxidizers

8.11.2.2 Water Reactive

8.11.2.3 Flammables

8.11.2.4 Acids

8.11.2.5 Caustics (Bases)

8.11.3 Client shall ensure all containers are in good condition and properly labeled as per the sub-section 8.9 of this regulation.

### Compatible Chemical Groups

The following chemical groups shall be referred to for identification of compatibility of chemicals. However, final decision on chemicals compatibility storage must be based on the requirements as specified in the relevant Material Safety Data Sheet of the chemicals and also as recommended by the manufacturer.

#### **8.11.3.1 Inorganic Materials**

8.11.3.1.1 metals, hydrides

8.11.3.1.2 halides, sulfates, sulfites, thiosulfates, phosphates, halogens



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- 8.11.3.1.3 amides, (except ammonium nitrate), nitric acid
- 8.11.3.1.4 hydroxides, oxides, silicates, carbonates, carbon
- 8.11.3.1.5 sulfides, phosphides, carbides, nitrides
- 8.11.3.1.6 borates, chromates, manganates, permanganates
- 8.11.3.1.7 acids (except nitric)
- 8.11.3.1.8 sulfur, phosphorus, arsenic,

### **8.11.3.2 Organic Materials**

- 8.11.3.2.1 acids, anhydrides,
- 8.11.3.2.2 alcohols, glycols, amines, amides, imines, imides
- 8.11.3.2.3 hydrocarbons, esters, aldehydes
- 8.11.3.2.4 ketones, ketenes, halogenated hydrocarbons, ethylene oxide
- 8.11.3.2.5 Epoxy compounds.
- 8.11.3.2.6 peroxides, hydro peroxides,
- 8.11.3.2.7 sulfides, polysulfides, nitriles
- 8.11.3.2.8 phenols, cresols

### **INCOMPATIBLE CHEMICALS**

The previously outlined storage scheme may not suffice to prevent the mixing of incompatible chemicals. Even chemicals of the same classification may form highly hazardous combinations. So always read the label and the Material Safety Data Sheet carefully. For compatibility data more specialized literature may have to be consulted.

Following is a list & example of common **incompatible** chemicals.

<b>Chemical</b>	<b>Incompatible With</b>
Acetic Acid	Chromic acid, nitric acid, hydroxyl compounds, ethylene glycol, perchloric acid, peroxides, permanganates
Acetone	Concentrated nitric and sulfuric acid mixtures, chlorinated solvent/alkali mixtures
Acetylene	Chlorine, bromine, copper, fluorine, silver, mercury
Alkali & alkaline earth metals (such as powdered aluminum, or magnesium, calcium, lithium, sodium, potassium)	Water, carbon tetrachloride or other chlorinated hydrocarbons, carbon dioxide, halogens
Ammonia (anhydrous)	Mercury (in manometers, for example), chlorine, calcium hypochlorite, iodine, bromine, hydro-fluoric acid (anhydrous)



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Ammonium nitrate	Acids, powdered metals, flammable liquids, chlorates, nitrites, sulfur, finely divided organic or combustible materials
Aniline	Nitric acid, hydrogen peroxide
Arsenical materials	Any reducing agent
Azides	Acids
Bromine	See chlorine
Calcium oxide	Water
Carbon (activated)	Calcium hypochlorite, all oxidizing agents
Carbon tetrachloride	Sodium
Chlorates	Ammonium salts, acids, powdered metals, sulfur, finely divided organic or combustible materials
Chromic acid & chromium trioxide	Acetic acid, naphthalene, camphor, glycerol, alcohol, flammable liquids in general
Chlorine	Ammonia, acetylene, butadiene, butane, methane, propane (or other petroleum gases), hydrogen, sodium carbide, benzene, finely divided metals, turpentine
Chlorine dioxide	Ammonia, methane, phosphine, hydrogen sulfide
Chloroform	Strong bases, ketones and strong base, alkaline metals, aluminum, strong oxidizers
Copper	Acetylene, hydrogen peroxide
Cumene hydro peroxide	Acids (organic or inorganic)
Flammable liquids	Ammonium nitrate, chromic acid, hydrogen peroxide, halogens
Fluorine	Everything
Hydrocarbons (such as butane, propane, benzene)	Fluorine, chlorine, bromine, chromic acid, sodium peroxide
Hydrofluoric acid (anhydrous)	Ammonia (aqueous or anhydrous)
Hydrogen peroxide	Copper, chromium, iron, most metals or their salts, alcohols, acetone, organic materials, aniline, nitromethane, combustible materials
Hydrogen sulfide	Fuming nitric acid, oxidizing gases
Hypochlorites	Acids, activated carbon
Iodine	Acetylene, ammonia (aqueous or anhydrous), hydrogen
Mercury	Acetylene, fulminic acid, ammonia
Nitrates	Sulfuric acid
Nitric acid (concentrated)	Acetic acid, aniline, chromic acid, hydrocyanic acid, hydrogen sulfide, flammable liquids, flammable gases,
Nitrites	Acids
Nitroparaffins	Inorganic bases, amines




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Oxalic acid	Silver, mercury
Oxygen	Oils, grease, hydrogen; flammable liquids, solids or gases
Perchloric acid	Acetic anhydride, bismuth and its alloys, alcohol, paper, wood, grease, oils
Peroxides, organic	Acids (organic or mineral), avoid friction, store cold
Phosphorus (white)	Air, oxygen, alkalis, reducing agents
Potassium	Carbon tetrachloride, carbon dioxide, water
Potassium chlorate	Sulfuric and other acids
Potassium perchlorate (see also chlorates)	Sulfuric and other acids
Potassium permanganate	Glycerol, ethylene glycol, benzaldehyde, sulfuric acid
Silver	Acetylene, oxalic acid, tartaric acid, ammonium compounds, fulminic acid
Sodium	Carbon tetrachloride, carbon dioxide, water
Sodium nitrite	Ammonium nitrate and other ammonium salts
Sodium peroxide	Ethyl or methyl alcohol, glacial acetic acid, acetic anhydride, benzaldehyde, carbon disulfide, glycerin, ethylene glycol, ethyl acetate, methyl acetate, furfural
Sulfides	Acids
Sulfuric acid	Potassium chlorate, potassium perchlorate, potassium permanganate (similar compounds of light metals, such as sodium, lithium)
Tellurides	Reducing agents