MICHIGAN DEPARTMENT OF
ENVIRONMENT, GREAT LAKES, AND ENERGY

SECONDARY CONTAINMENT

GUIDANCE

Contents

WHAT IS SECONDARY CONTAINMENT?

Secondary containment is a control measure, placed or built around an accumulation container or tank, to prevent its contents from leaving the area. Secondary containment may be a secondary barrier or an outer wall of a double enclosure that will contain any leak or spill from a container or tank. This helps protect the surface water, groundwater, and soil, and reduces worker exposure to regulated substances. This enclosure is usually needed wherever regulated substances or hazardous waste are being handled, accumulated, and stored in tanks, totes, drums, small pails, or other containers.

Secondary containment systems can be simple or complex. The containment area may be in a detached shed or building, an open area outdoors, an underground vault, in a separate room, or in a dedicated portion of a larger space. It may include liquid-tight storage cabinets, berms, curbs, sills, sunken floors, special liners, drip pans or buckets, double-walled tanks, or other structures. Containment systems can be purchased as ready-made units or custom built on site.

Some regulations require additional protective measures besides secondary containment. For example, the underground storage tank regulations require release detection along with spill, overfill, and corrosion protection.

Without adequate secondary containment, environmental contamination may result from improper handling, accidental leaks, spills, and overfills. Contamination may occur anywhere on your property, but some common locations include the following:

- Floor and storm drains.
- On-site septic systems.
- Cracked floors and improperly sealed containment vaults.
- Loading and off-loading areas, including the dock area and locations having spigots, hose connections, etc., used to transfer materials.
- Metallic chip dumpsters and other waste or recyclable material storage areas.
- Product storage areas including tanks and associated piping.
- Areas where exhaust fans are located (due to condensation and dripping).

If you have contamination on your property, you must properly report it when required, and clean it up to reduce risk to public health and the environment. For additional details on when a release must be reported to the Department of Environment Great Lakes, and Energy (EGLE), please see the resources at Michigan.gov/ChemRelease. Additional reporting may be required under the storage tank regulations implemented by the Department of Licensing and Regulatory Affairs (LARA) as well.

BENEFITS OF SECONDARY CONTAINMENT

Adequate secondary containment can:

- ✓ Reduce disposal costs.
- ✓ Reduce workplace hazards from spills.
- ✓ Protect plant assets.
- ✓ Increase resale value of property.
- ✓ Enable material recovery or reclamation.
- ✓ Reduce the facility's liability risk.
- ✓ Lower cleanup and maintenance costs.
- ✓ Prevent soil, surface water, and groundwater contamination (avoids contaminated drinking wells, fish kills, and other negative impacts).
- ✓ Ensure you comply with regulations.
- ✓ Potentially lower insurance premiums (some insurance companies may require it).

Even facilities that are not *required* to have secondary containment should have it as a safety precaution.

WHO IS REQUIRED TO HAVE SECONDARY CONTAINMENT?

The various statutes and rules that apply to the handling, accumulation, and storage of hazardous substances define regulated substances differently. Moreover, some regulations apply to both products and wastes, while others apply only to waste. As such, it is important to know what materials you handle to determine which regulations apply. Generally, substances, whether a product or a waste, may require secondary containment if they are included on regulatory lists or are considered flammable, corrosive,

reactive, and/or toxic under the regulations. Most facilities that have any of the following regulated substances are required to have secondary containment for those substances:

- Flammable and combustible materials
- Hazardous substances
- Hazardous waste
- Materials included on the federal Comprehensive Environmental Response, Compensation and Liability Act (CERCLA) List
- Materials included on the Part 5 Polluting Materials List
- Oil and other petroleum-based products or waste
- Salt (sodium chloride, potassium chloride, calcium chloride, and magnesium calcium chloride and sodium chloride)

Although most hazardous substances and polluting materials are liquid, some solids have also been linked to environmental contamination incidents. The regulatory requirements and the agencies that oversee those requirements vary with the type and volume of material you have. The regulations may use different terms for secondary containment as well (i.e., containment system, diked area, emergency containment structure, impoundment, vault, or spill containment).

SECONDARY CONTAINMENT REGULATIONS

Secondary containment is required by several state and federal laws and regulations, depending on the type and quantity of hazardous substances handled, accumulated, and stored. In addition to the state and federal regulations, you may have local requirements that are not discussed in this publication. Local requirements are often incorporated into zoning, building, or fire protection regulations.

You may also have substances that are regulated by more than one agency and under different regulations. For example, oil is regulated by the Michigan Department of Environment, Great Lakes, and Energy (EGLE), the Fire Marshal, and the United States Environmental Protection Agency (U.S. EPA). In those situations, you will need to incorporate the most stringent requirements into your secondary containment system. It is highly recommended that you contact all of the agencies involved and, if necessary, schedule a joint meeting to discuss what would be best for your situation.

How to read regulations:
Federal regulations will be preceded by a number, followed by "CFR," which stands for Code of Federal Regulations, and then the Part number. Environmental federal laws include "40 CFR" in their citation. These regulations are overseen by the U.S. EPA unless authority has been given to the state(s) to implement the program. In this document, citations for state laws include the year it passed, followed by "PA" for Public Act, and then the act number. Rules promulgated under state law start with an "R" in their citation. Many of Michigan's environmental laws have been included in the Natural Resources and Environmental Protection Act (1994 PA 451, as amended) and renumbered with a "Part" number.

EGLE SECONDARY CONTAINMENT REGULATIONS

Single drum lockable secondary containment with squirt control

Hazardous Waste

Hazardous waste is regulated under Michigan's Part 111 administrative rules, promulgated under Part 111 of the Natural Resources and Environmental Protection Act, 1994 Public Act (PA) 451, as amended (NREPA), and the corresponding regulations promulgated under the federal Resource Conservation and Recovery Act. These regulations are overseen by EGLE's Materials Management Division and apply to the handling of both listed and characteristic hazardous waste. The hazardous waste regulations you must follow depend on if you are:

- A generator and how much hazardous waste you create in a month and how much you accumulate at your facility at any one point in time [40 CFR 265.175, R 299.9303, R 299.9306, and R 299.9307];
- A transporter [R 299.9404 and R 299.9405]; or
- A treatment, storage, or disposal facility (TSDF) [R 299.9616, R 299.9617, and R 299.9620].

Your pertinent regulations also depend on if you are accumulating or storing hazardous waste in containers or tanks, what those wastes are, and if those wastes are in a liquid or solid form [R 299.9306, R 299.9307, 40 CFR 264.175, R 299.9614, R 299.9615, 40 CFR 265.175, 40 CFR 265.191, 40 CFR 265.192, 40 CFR 265.193, and 40 CFR 265.196]. It may be difficult to quickly detect any leaks when using underground storage tanks to accumulate or store hazardous waste.

Generator Hazardous Waste Container Accumulation Area

Large quantity generators (LQGs) accumulating any amount of hazardous waste and small quantity generators (SQGs) accumulating over 2,200 pounds of nonacute hazardous waste must have secondary containment for the following:

- Containers holding hazardous waste with free liquids
- Hazardous waste with the codes of F020, F021, F022, F023, F026, or F027
- Accumulation of more than 2.2 pounds of acute or severely toxic hazardous waste

Generator Categories

In ONE month, non-acute hazardous waste is generated at the following volumes:

LQG: more than 2,200 pounds and/or 2.2 pounds or more of acutely and severely toxic hazardous waste.

SQG: 220 pounds to less than 2,200 pounds. Accumulation never exceeds 13,200 pounds.

VSQG: less than 200 pounds. Accumulation never exceeds 2,200 pounds.

There are also accumulation time limits. Remediation waste has alternate generator category limits and unique handling requirements. Contact EGLE Materials Management Division staff in your district office to discuss secondary containment requirements for remediation waste.

The containment must be able to hold 100 percent of the largest container or ten percent of the volume of all the containers in the system, whichever is larger. You also have to include enough capacity to hold any precipitation that may accumulate in the containment area.

Four drum lockable secondary containment cabinets with squirt control

If you have hazardous waste in a solid form and it is not one of the above hazardous waste codes, the regulations do not specify a secondary containment volume. Very small quantity generators (VSQG) do not have specific secondary containment requirements unless they accumulate more than 2,200 pounds of nonacute hazardous waste or 2.2 pounds or more of acutely and severely toxic hazardous waste. Their hazardous waste must be managed so there is no unauthorized release into the environment, including air, ground, surface or groundwater, or into drains or sewers.

Two drum lockable secondary containment cabinets with squirt control

LQGs and SQGs are required to accumulate wastes in an area that is designed and operated to remove any spilled or leaked waste and accumulated precipitation in a timely manner to prevent any overflow of the system. The containers need to be elevated or otherwise protected from contact with any accumulated liquid. The containment area must be inspected weekly and the inspections, including any corrective measures taken to maintain compliance, must be documented and available for inspection for at least 3 years [R 299.9306, R 299.9307, R 299.9311, 40 CFR 264.175, 40 CFR 262.16 and 40 CFR 262.17].

In addition, LQGs are also required to have a 50-foot isolation distance from property lines for ignitable and reactive hazardous waste storage [R 299.9307 and 40 CFR 262.17]. LQGs are also required to have adequate aisle space to allow for the unobstructed movement of personnel, fire protection equipment, spill control equipment, and decontamination equipment to any area of facility operation in an emergency [R 299.9307 and 40 CFR 262.255].

If you have tanks, are a transporter, or treatment, storage, or disposal facility, discuss your requirements with EGLE Materials Management Division staff in your district office.

There are no specific secondary containment requirements for universal waste unless there are signs of leakage or spillage, or damage to the container that could lead to leakage. Those materials would have to be put in another container that prevents further release. All universal wastes must be managed in a manner that prevents releases and immediately contains any release that does occur. Waste streams eligible for management as a universal waste include aerosol cans, batteries, electric lamps, mercury

switches, thermostats, thermometers, other devices containing elemental mercury, some pesticides, and pharmaceuticals [R 299.9228 and 40 CFR 273]. Note too that some universal waste types may be required to have secondary containment under other regulations, like Michigan's Part 5 polluting materials rules discussed below.

Oil, Chemicals on the Part 5 Polluting Materials List, and Salt

Oil, chemicals on the Part 5 polluting materials list, and salt are regulated under Michigan's Part 5 administrative rules promulgated under Part 31 of the NREPA. These regulations are overseen by EGLE's Water Resources Division and apply to the following materials stored at a Part 5 regulated facility, which includes oil storage facilities and on-land facilities [R 324.2002]:

- Oil (means any kind or any form, including petroleum, gasoline, fuel oil, grease, animal and vegetable oil, sludge, oil refuse, and oil mixed with waste) in multiple containers or aboveground tanks with a combined volume of 1320 gallons or a single tank containing more than of 660 gallons. Also check if the federal Spill Prevention Control and Countermeasure (SPCC), fire prevention code requirements, and Part 5 exemptions apply to your situation.
- Chemicals on the Polluting Materials List in quantities at or greater than 440 pounds stored outdoors, or 2,200 pounds stored indoors [R 324.2009].
- Salt in liquid and solid form. This includes sodium chloride, potassium chloride, calcium chloride, or magnesium chloride in quantities of at or greater than 5 tons in solid form or 1000 gallons in liquid form [R 324.2002].

The above includes not only "pure" product or waste but also applies to materials included as an ingredient or component of another product or waste at greater than one percent. The Part 5 Rules require secondary containment for outdoor storage of chemicals and salts, but do not include specific requirements on how the containment must

Part 5 Definitions

On-land facility means a temporary or permanent land-based industry, plant, establishment, firm, storage site, or other facility, which receives, processes, manufactures, uses, stores or ships polluting materials and at which there is present an amount of any polluting material equal to or more than its threshold management quantity and which is so situated that loss of polluting materials could directly or indirectly reach the surface or groundwaters of this state, including any facility which discharges through a public sewer system.

Oil storage facility means a temporary or permanent land-based industry, plant, establishment, firm, or other facility which receives, processes, manufactures, uses, stores, or ships oil, and at which there is present an amount of oil equal to or more than the threshold management quantity and which is so situated that oil could directly or indirectly reach the surface or groundwaters of this state, including any facility that discharges through a public sewer system.

On-land and oil -storage facility **do not include** oil field petroleum or brine storage facilities, recreational marinas, installations of oil-containing electrical equipment, or any transportation-related facilities, as defined in 40 CFR part 112.

be constructed. However, the secondary containment must meet the following requirements [R 324.2005}:

- Be constructed of materials capable of containing any spilled or leaked material so the material can be recovered and can also not escape to any public sewer system or to surface or groundwaters.
- Provide capacity of at least 10% of the total volume of the tanks or containers within the secondary containment structure or 100% of the largest single tank or container within the secondary containment structure, whichever is larger. Allow surveillance of the tanks or containers for the timely detection of leaks and recovery of any spillage, as well as the removal and proper disposal of any captured precipitation so that the minimum required capacity is always maintained.

Indoor storage areas and areas where oils, salts, and chemicals are used must be designed, constructed, maintained, and operated to prevent the release of spilled materials through sewers, drains, or into any public sewer system or to surface or groundwaters.

Containment Building

Solid salt needs to be enclosed, covered, contained, or otherwise protected to prevent run-on and any runoff, seepage, or leakage to any public sewer system or to the surface or groundwaters. The storage area must also be at least 50 feet from a designated wetland or the shore or bank of any lake or stream. Solid polluting material containment structures located within a 100-year floodplain need to be designed and constructed to remain effective during a 100-year flood.

If you have any of the above regulated volumes of salt and chemicals, you are also required to prepare a Pollution Incident Prevention Plan (PIPP) [R 324.2006].

LARA SECONDARY CONTAINMENT REGULATIONS

Underground Storage Tanks Containing Petroleum Products or CERCLA Hazardous Substances

Underground storage tanks (USTs) containing petroleum products or CERCLA Hazardous Substances are regulated under Michigan's Storage and Handling of Flammable and Combustible Liquids Rules, the Michigan Underground Storage Tank Rules (MUSTR) and the Fire Prevention Code, PA 207 of 1941 as amended. The flammable and combustible liquids rules adopt by reference, with Michigan amendments, the following National Fire Protection Association (NFPA) pamphlets:

- NFPA 30, 2012 edition
- NFPA 30A, 2012 edition
- NFPA 31, 2011 edition
- NFPA 37, 2010 edition

These regulations are overseen by the LARA, Bureau of Fire Services, Storage Tank Section.

A regulated underground storage tank is defined as a tank or combination of tanks and underground connected piping that have at least ten percent of their volume underground and which are, were, or may have been used to contain a regulated substance. These substances include:

- Petroleum, such as gasoline, diesel fuel, and oil; and
- Any hazardous substance on the CERCLA list such as, but not limited to, methanol, MTBE, and ethylene glycol.

Tanks not regulated include farm and residential tanks 1,100 gallons or less used for non- commercial purposes, tanks storing heating oil for consumptive use on the premises, and tanks with a capacity of 110 gallons or less. Check the regulations for additional exemptions.

You will be required to have secondary containment for all new underground storage tank (UST) and piping or any replaced piping.

Double-walled tanks and piping, integral containment systems, or other methods like vaults may be used for secondary containment. Integral containment systems include steel tanks with a fiberglass jacket with a sensor between the tank wall and jacket to indicate if any leaks occur. If you are considering an alternative method, you are required to demonstrate that it will be effective and receive prior approval by LARA's Storage Tank Division. All secondary containment methods must be able to contain a release from the inner tank and piping. It is necessary to check the containment at least once every 30 days for evidence of a release. In addition to secondary containment requirements, there are also release detection, spill, and overfill protection, and corrosion protection requirements. Contact the LARA main office at 517-241-8847 or LARA-UST-AST@Michigan.gov or your LARA district inspector to discuss UST requirements for secondary containment.

Aboveground Storage Tanks Containing Flammable and Combustible Liquids

Like USTs, aboveground storage tanks (ASTs) containing flammable and combustible liquids are regulated under Michigan's Storage and Handling of Flammable and Combustible Liquids Rules, the Fire Prevention Code, and the following NFPA pamphlets:

- NFPA 30, 2012 edition
- NFPA 30A, 2012 edition
- NFPA 31, 2011 edition
- NFPA 37, 2010 edition.

They are also overseen by the LARA Bureau of Fire Services' Storage Tank Section.

Most ASTs must have secondary containment. Secondary containment can be provided by diking around the tanks, remote impoundment, or secondary containment, or by methods other than diking and remote impoundment. These methods include vaults, special enclosures, secondary containment tanks, and integral secondary containment. All storage areas must be designed and capable of preventing any liquid spillage from entering a public sewer, the groundwater, surface water, or subsurface soils.

Contact the LARA main office at 517-241-8847 or LARA-UST-AST@Michigan.gov or your LARA district inspector to discuss AST requirements for secondary containment.

DESIGN AND CONSTRUCTION

Many options exist for designing and constructing secondary containment systems. Size, function, reliability, safety, and accessibility are all basic considerations for the design of containment systems. You need to consider a number of factors when determining which system would be best for your situation. To assure that the containment system serves the purpose of preventing leaks or spills, the following should be considered when designing the system:

- **Size -** The containment area must be large enough to meet the regulatory volumes specified for the type of material stored. Sill or curb height and storage room size requirements for flammable and combustible liquids are specified in those applicable regulations. In addition, those standards restrict dike height around tanks and include dimensions and slopes for earthen wall dikes. The calculations needed to determine adequate volume of the containment area vary with the different regulations. Check the regulations for the specific requirements. To determine your general empty containment volume in cubic feet, multiply the width by the length of the storage area floor by the height of the dike/sill/curb.

  Width x Length x Height = Cubic Feet

  To convert this number from cubic feet to gallons, multiply it by 7.48.

  Cubic Feet x 7.48 = Gallons

  This calculation, however, does not address displacement volumes of the containers stored in the containment area nor any ramps or other construction which affects the volume. See Appendix A for examples of calculating size.

- **Squirt distance control** – This is required to contain any liquids spurting from containers if a leak occurred. This can be done by providing adequate space, so the containers are not placed close to the outside walls of the system. A general rule of thumb for determining squirt distance is to measure the tallest height of the containers and use that measurement as the minimum distance between the stored containers and the edge of the containment area. Splash guards or baffles may also be attached to the walls to extend the height of the wall to prevent squirting outside of the system. Depending on the material stored, these may be made out of plastic, fiberglass, concrete, or metal. If you are considering using ready-made units, be aware that some units, like spill control pallets, may not have adequate squirt protection. Spill control pallets used when storing liquid materials will not be acceptable for compliance with some regulations. Oversized containers that hold smaller primary containers are also available for secondary containment.

- **Structural strength** – The containment area base and walls must be sufficiently strong to support the weight of the loads placed on it, including the materials and equipment that will enter the area. The system needs to be constructed of long-lasting materials that can withstand weathering effects and wear and tear and be able to withstand a full hydrostatic head. Sealed, reinforced concrete is normally a strong and long-lasting material. Nonreinforced concrete can be used in some situations for low curbing and small areas but is not recommended because of its inability to withstand heavy loads and long-term use. Nonreinforced concrete is also subject to cracking. Asphalt may be used in low dikes or curbing for some systems but is not recommended. It deteriorates with age, freeze-thaw cycles, is easily damaged, and is subject to severe cracking.

Examples of containment include:

- Curbing
- Dikes, berms, or retaining walls
- Drip pans
- Enclosed cabinets with sealed flooring
- Portable containment units
- Spill diversion and lined detention ponds
- Weirs, booms, or other barriers
- Double walled tanks with leak detection systems

- **Impermeability** – The system must constructed.so the containment is resistant to penetration of the materials contained in the structure. For example, a solid concrete structure with a liner that prevents the material from penetrating the concrete and infiltrating into the ground. The system must be free of cracks and gaps. Walls and floors of the area must be of a liquid-tight construction. Side walls should be integrally constructed or keyed onto the floor. All the joints and cracks need to be caulked or coated. The surface of the system must be resistant to penetration by materials stored there and be compatible with those materials. The structure must be made of noncombustible materials if flammable or combustible materials are stored in the area. Poured concrete, concrete block, welded steel or aluminum, fiberglass, plastics, and earth have been used for constructing containment systems.

  Concrete's permeability varies with the mix of concrete, percent of Portland cement, water, and other aggregate materials. Air entrainment in concrete mix will also impact its permeability. Asphalt must not be used for areas containing substances, like solvents or oils, that can dissolve the asphalt. It may be necessary to install a liner or seal the containment surface with epoxy or another type of coating. For example, acids or corrosives should not be contained in concrete systems unless the area has been coated or lined to make it resistant. It may be necessary to reapply the sealant if it becomes worn or replace the sealant if the stored material changes and the original sealant is no longer effective. One visual way to determine if a sealant is intact is by applying the coating layers in contrasting colors to easily reveal damage. When selecting a sealant or liner, consider the following:

  - ✓ How compatible is the liner with what you will be storing?
  - ✓ How quickly will the material seep through the liner — what is its permeation rate?

- ✓ How does the liner withstand weather conditions — how resistant is it to the sun, heat, cold, and precipitation?
- ✓ What are the methods for repairing or replacing the liner, if needed?
- ✓ What is the manufacturer's warranty for structural strength and impact resistance?

- **Compatibility** - Consider if you have incompatible substances that need to be transferred or stored when designing and constructing your secondary containment. It will be necessary to separate incompatible materials from other materials by means of a dike, berm, wall, or other device. Look at the Safety Data Sheet for storage recommendations and search Web sites about material compatibility.
- **Integrity -** The containment structure must be built so any leaking materials are unable to release into the environment or sewer systems. Side walls and the base should not be penetrated by drains, piping channels, or openings of any kind where liquids may escape. If drains or openings exist, any discharges into them must be manually controlled. Joints and cracks must be sealed. Concrete blocks are not reliable construction materials because they are difficult to seal. In addition, they are subject to severe cracking in the mortar between the blocks, and the blocks themselves are porous
- **Precipitation Management –** Any containment system outdoors needs to include a large enough volume to allow for any precipitation (rain, snow, and stormwater run-on) that may enter the structure in addition to the required containment volume for stored materials. This additional capacity is calculated by using the 25-year, 24-hour storm event. In 2015 in Michigan, this event varied from 3.49 to 4.98 inches of rainfall. If your secondary containment is indoors, you will not need to have additional volume to address precipitation. There are regulations, however, which do not allow indoor storage of some materials. In addition, the fire regulations may limit roof and other construction over flammable and combustible material storage areas.

  Containers must be elevated or protected from contact with any accumulated liquid, or the base should be sloped to direct liquids away from the containers. Precipitation must be removed from the sump or collection area in a timely manner to prevent overflow of the containment system. The use of gravity drains to remove liquids is not allowed, Pumps should be manually operated. Do not use automatic sump pumps. Two other factors to consider:

  1. Any collected liquids from secondary containment structures must be characterized to determine if it is a regulated hazardous waste or liquid industrial by-product. If hauled off site, the applicable waste regulations must be followed.

  2. If it is discharged on site, it must be in accordance with the rules associated with Part 31 (Water Resources Protection) of Act 451 (i.e., Part 4 - Water Quality Standards, Part 5 - Spillage of Oil and Polluting Materials, and Part 22 Groundwater Quality). The Part 5 and Part 22 rules allow discharges of captured precipitation from secondary containment to the ground if the discharge does not contain released materials and meets the conditions listed in R 324.2005(2) and the water quality standards overseen by the Water

Resources Division. The discharge cannot be, or become, injurious; and cannot cause runoff to, ponding on, or flooding of adjacent property. It also can not cause erosion or nuisance conditions. When doing a visual inspection before discharging, look for odor, color, turbidity, floatable matter, deposits, or stains. If your facility is also subject to the Storm Water Discharge Permit Program, you will need to meet the sampling and monitoring requirements explained in your permit. Drainage activities should be performed by qualified facility personnel.

Floor drains are strongly discouraged in areas storing hazardous substances. In many situations, floor drains would be prohibited. If a drain is allowed, then the drain must meet one of the following:

1. Be connected to a sanitary sewer by permission of the local wastewater authority; or
2. Be connected to a holding tank and the wastewater and sludge is characterized, and pumped out by a permitted and registered hazardous waste or liquid industrial by-products hauler; or
3. Have a discharge permit from EGLE's Water Resources Division.

Use no shrink grout or no shrink concrete to seal off floor drains. Removal of the drainpipe is recommended, especially if it is polyvinyl chloride (PVC), before plugging the drain. If you have a permissible floor drain, you may want to surround it with a riser to prevent any spills or unintended discharges from reaching the sewer system. Also keep absorbents or blocking devices like portable berms nearby to use if necessary to quickly seal off a drain.

In addition to addressing weather conditions, you will need to meet any fire protection regulations that require you to have a drainage system. If required, this system would have to have sufficient capacity to handle sprinkler water and other water from fire protection efforts. This can be accomplished by using a special drain or scupper. A scupper is an opening that lets water run off a floor. If you have a special drain or scupper, you may need to have additional secondary containment for runoff. Discuss the fire protection requirement with the local fire marshal, wastewater treatment plant authority, and EGLE Materials Management Division district office staff.

Sumps or open-grated floor trenches incorporated into the design are helpful in the removal of accumulated liquids. The use of sumps instead of underground piping and holding tanks has the following advantages:

- ✓ Easier to inspect for structural damages
- ✓ Easier to repair any damages
- ✓ Easier to detect any releases

Pumps should be manually controlled and appropriate for the type of material being removed.

LONG-TERM MAINTENANCE

It is not enough just to install secondary containment. You mustalso make sure it is functioning properly. Conduct routine inspections, have maintenance programs, and make any necessary repairs. Perform any tank integrity testing as required. Some regulations require that you keep a record of inspections, testing, and repairs.

Here are some things to look for when inspecting aboveground secondary containment or diked areas:

- ✓ Are cracks forming, joints crumbling?
- ✓ Is the surface coating intact?
- ✓ Are the base or walls stained?
- ✓ Are any of the containers leaking?
- ✓ Do you see precipitation or spillage?
- ✓ Is any liquid touching the containers?
- ✓ Are any metal surfaces corroded?
- ✓ Do precipitation removal devices work?
- ✓ Is the area protected from trespassers?
- ✓ Is there any debris in the area?
- ✓ Are the containers arranged to allow required aisle width?
- ✓ Are drainage systems or trenches blocked?
- ✓ If outside, is there any erosion, excessive weed, or other vegetative growth?
- ✓ Is there unhealthy or stressed vegetation present?
- ✓ Is the storage area properly labeled?

- **Protection and Security** - Access to the containment system needs to be restricted to protect against tampering or trespassers, yet it must allow for routine employee and emergency personnel and equipment entry. The flammable and combustible liquid regulations specify aisle widths, spacing distances between storage tanks, and limit the stacking of containers. There are isolation distances from property lines and streets, alleys, or other public ways, and sources of ignition which must be met. Ignition sources include open flames; lightning; smoking; cutting and welding; hot surfaces; frictional heat; static; electrical and mechanical sparks; spontaneous ignition, including heat- producing chemical reactions; and radiant heat. Storage areas must also meet the applicable fire resistance rating for the volume and class of materials stored. It may be necessary to post the area with “No Smoking” signs. The area should be protected from temperature extremes and from precipitation whenever possible. In addition, the storage area must be kept free of weeds and other debris.
- **Ventilation and Lighting** - The containment area must be adequately ventilated to avoid the buildup of explosive or flammable fumes and to protect workers entering the area. This ventilation can be accomplished by natural or mechanical ventilation with discharge or exhaust to a safe location outside the building. See the flammable and combustible liquid regulations for ventilation rates. Without adequate ventilation, a secondary containment area could become a confined space. These spaces are regulated by the Department of Consumer & Industry Services. The area should also be properly lighted for safety and to deter vandalism.

- **Loading and Unloading** - Safe material handling in and out of the containment system and in the dock area must be considered when building secondary containment. These areas need to have safe approaches, like ramps, to avoid worker injury and to avoid spillage of containers as the substances are moved in and out of the area. Consider how trucks, dollies, and forklifts will enter the area if they are used to move containers. Avoid excessive sill height which would hinder movement in and out of the area. However, the flammable and combustible liquid regulations do include specific curb heights if you are storing those types of materials.

  You should also consider truck access and maneuvering room. There must be some provision made to prohibit any spilled material in a dock area from entering public sewers, drainage systems, or waterways. This can be accomplished by not having any drains in the truck well and by providing diking around the dock area. If drains are present, they should be equipped with traps, separators, or have locking lids or caps. It is also recommended that materials and absorbents capable of blocking the drain should be kept nearby in case the need arises. Some companies manufacture drain covers for this purpose.

- **Emergency Response Equipment** – LQGs are required to have extensive emergency response and preparedness resources in place to respond to the hazards presented by the waste being accumulated. When designing an accumulation areas make sure to include adequate extinguishing systems (fire extinguishers, sprinklers, hoses, access to fire hydrants), communication systems (alarm boxes and phones), and space for spill control equipment (adsorbents, spill kits, shovels, etc.).

ADDITIONAL SPILL PREVENTION

Spills can usually be prevented by using common sense and being careful when storing and transferring materials. All containers must be compatible (which means it does not react) with the material stored in the containers, must be free of leaks, and kept closed when not in use. Additional tips include:

- ✓ Train all personnel in spill prevention techniques. Some regulations indicate who at a minimum must be trained regarding handling hazardous material and waste.
- ✓ Practice safe product loading and unloading procedures.
- ✓ Have inventory control procedures — track material from receipt to disposal.
- ✓ Post warning and instructional signs in appropriate places.
- ✓ Adequately label all containers.
- ✓ Use pumps or funnels to transfer liquids.
- ✓ Keep lids and covers on containers to control spills and evaporation.
- ✓ Use seal-less pumps.
- ✓ Install spill basins or dikes in storage areas.
- ✓ Install splash guards and drip boards on tanks and faucets.
- ✓ Use drip buckets under liquid spigots.
- ✓ Prohibit outside draining or replacement of fluids over the ground or on pavement not designed for containment.

You might also be able to reduce the damage caused by spills if you notice them quickly. Routinely check your business for leaks and spills of hazardous substances. Some of the regulations specify how often you must monitor your business. Watch for strange odors and discoloration or corrosion of walls, work surfaces, ceilings, and pipes. Also note if anyone has irritation of their eyes, nose, or throat. All of these can indicate the presence of leaks or poorly maintained equipment.

Another way to reduce your chance of spills is to use safer, alternative materials. There are many resources available that provide suggestions for pollution prevention and waste minimization. Contact your trade association, the U.S. EPA, or EGLE's Pollution Prevention Programs for more information.

LEAKAGE INTO CONTAINMENT AREA

In the event you find leakage into the containment area, collected materials will need to be removed as quickly as possible to avoid overflow. It will be necessary to determine if the precipitation and/or other fluids collected would be hazardous waste. If so, then that fluid would have to managed under Part 111 of 1994 PA 451 requirements. If the fluid is not hazardous waste, you may be able to discharge it to a municipal sanitary sewer system if you have their **prior permission**. Otherwise, you will need to hire a permitted and registered liquid industrial by-products hauler to pump out the material and haul it to a licensed treatment, storage, or disposal facility, following the liquid industrial by-products generator requirements.

Spill reporting requirements vary with the different materials. Know what is required to be reported before a spill occurs. If contamination occurs because of a spill, it will be necessary to clean up the site. Check the regulations and discuss the requirements with the appropriate EGLE district office staff. For additional details on when a release must be reported to the Department of Environment Great Lakes, and Energy (EGLE), please see the resources at Michigan.gov/ChemRelease.

CLOSING A STORAGE OR ACCUMULATION AREA

When you want to stop using a storage or accumulation area, your requirements will depend on what you were storing, how it was stored, and whether the site was a licensed hazardous waste TSDF. Many of the regulations are too complex to adequately summarize in this document so you need to talk to the regulating agency for specific requirements.

If you are a **hazardous waste generator**, the requirements vary depending on your generator status. SQGs must remove all hazardous waste from tanks, discharge control equipment, and discharge confinement structures and manage the collected waste as a hazardous waste. The accumulation area must meet the requirements of Part 201 of Act 451 for any cleanup required. LQGs must notify EGLE thirty days prior to closing an accumulation area. They must remove all hazardous waste from tanks, discharge control equipment, and discharge confinement structures and manage it as a hazardous waste. The accumulation area must meet the requirements of Part 201 of Act 451 for any cleanup that is required. No later than ninety days after closing, the LQG must submit a certification to EGLE verifying the closure performance standards were achieved. Closure of any generator hazardous waste accumulation area must result in no further maintenance and control any future release of hazardous waste or related substances. All waste residues, equipment, structures, and soils must be

characterized, removed, and properly disposed or decontaminated. Generators must keep written documentation of their closure activities and should contact the EGLE Materials Management Division local district office for questions about closing accumulation areas.

A general practice for closing a container accumulation area includes the following:

- Ensure that all the cracks and joints are sealed to prevent the rinse water and any contamination from seeping into the soil.
- Scrub any solid residues or stained areas in the storage pad until the stains are no longer visible.
- Triple-rinse, at a minimum, with high-pressure steam or other appropriate cleaning techniques to decontaminate the area.
- Determine if the rinse water is a hazardous waste before disposing. If it is hazardous waste, then handle it according to Part 111 of 1994 PA 451. Depending on the situation, you might be able to discharge that rinse water to a municipal wastewater system if you have their **prior permission** or it will need to be hauled by a licensed waste transporter.

If the facility was a **TSDF,** the site has additional site-specific closure obligations. Before closing a TSDF accumulation or storage area, talk to an EGLE Materials Management Division licensing engineer to confirm the site-specific requirements. TSDF accumulation and storage areas must be closed in a manner that results in no further maintenance and controls any future release of hazardous waste or related substances. Follow the closure plan included in the license and notify the Materials Management Division at least 45 days prior to closure of the closure plans. TSDF's that were never licensed must submit a closure plan to EGLE for review and approval. At least six working days before starting any closure activities EGLE must be notified of the closure plans to enable staff scheduling time to sample or observe the closure activities. If contamination is found, you will be required to clean up the site and meet the federal corrective action clean-up requirements.

If the site involves a **regulated UST**, close it according to Parts 211 and 213 of 1994 PA 451. There are two types of closures for regulated USTs — temporary and permanent. If the site involves a **regulated AST,** close it according to 1941 PA 207. This includes tanks that will be out of service for more than 12 months. You will be required to have the tank emptied of all liquid, cleaned to a vapor-free condition, and safeguarded against trespassing. Discuss these requirements with staff from LARA's Underground Storage Tank Section.

If the area was used for **storage of other hazardous substances**, you will need to make sure the site is not contaminated. If it is, then you will need to clean it up according to Part 201 of 1994 PA 451 requirements. Contact district staff in EGLE's Remediation and Redevelopment Division for more information about determining if contamination is present and any cleanup requirements.

MORE INFORMATION

Specific requirements for secondary containment vary with the type of material stored and the regulating agency. Contact the regulatory agency that oversees your particular storage for the current requirements. For more information contact the following agencies:

- **PART 31 – Part 5 Rules Guidance – EGLE Water Resources Division: Michigan.gov/Part5**
- **PART 111 Rules – EGLE Materials Management Division: Michigan.gov/Waste**
- **PART 201 – EGLE Remediation and Redevelopment Division: Michigan.gov/Remediation**
- **PART 211 and PART 213 – LARA Storage Tank Division: 517-241-8847**
- **Worker Safety - MIOSHA Consultant Education & Training Division**
- **Safety Standards Part 75. Flammable Liquids - MIOSHA: Michigan.gov/MIOSHAStandards**
- **Spill Prevention Control and Countermeasure (SPCC) Rule – U.S. EPA: EPA.gov/oil-spills-prevention-and-preparedness-regulations**
- **Local Requirements – Local, city, township, and county including zoning, building, fire, and health departments for any local requirements.**

APPENDIX A – DETERMINING ADEQUATE SECONDARY CONTAINMENT

EXAMPLE 1 – HAZARDOUS WASTE CONTAINER STORAGE AREA

This example shows how to decide if an outdoor container storage area has enough secondary containment for 200 55-gallon drums of liquid hazardous and non- hazardous wastes. See Figure 1 for a floor plan and details of the storage area.

Container Storage Area Details and Calculations:

1. Calculate the total volume of the storage slab and sump. This will give an initial secondary containment volume for the area.

Slab (Initial Volume)

Length of Slab = 50 Feet: Inner Wall to Inner Wall

Width of Slab = 50 Feet: Inner Wall to Inner Wall

Height of Shortest Retaining Wall = 1.17 Feet: 14 Inch Center Curb

Volume of Slab = 2,925 Cubic Feet

(Estimated by the Formula for a Cube: Length x Width x Height)

Convert to Gallons by multiplying Cubic Feet by 7.48 = **21,879.00 Gallons**

Sump (Volume Added)

Diameter of Sump = 2 Feet

Cross Sectional Area of Sump (3.14 x Radius Squared) = 3.14 Square Feet

(Radius = 1/2 x the Diameter of the Sump)

Depth to the Bottom of the Sump = 2.50 Feet

Volume of Sump = 7.85 Cubic Feet

(Estimated by the Formula for a Cylinder: Cross Sectional Area x Height)

Convert to Gallons by multiplying Cubic Feet by 7.48 = **58.72 Gallons**

2. Next, calculate the volume displaced by items placed or constructed within the storage area, including a ramp and the drums to be stored.

Ramp (Volume Displaced)

Length of Ramp = 10 Feet

Width of Ramp = 5 Feet

Height of Ramp = 1.17 Feet

Volume Displaced by Ramp = 29.25 Cubic Feet

(Estimated by the Formula for a Wedge: 1/2 x Length x Width x Height)

Convert to Gallons by multiplying Cubic Feet by 7.48 **218.79 Gallons**

Drums Stored (Volume Displaced)

Total Number of 55-Gallon Drums Stored = 200 Drums

Diameter of One 55-Gallon Drum = 2 Feet

Area taken Up by One 55-Gallon Drum = 3.14 x Radius Squared = 3.14 Square Feet
(Radius = 1/2 x the Diameter of a Drum)

Height of Portion of Drum that is at or Below Height of Shortest Wall = 1.17 Feet Volume Displaced by 200 Drums Stored = 734.76 Cubic Feet
(1 Drum Volume Estimated by the Formula for a Cylinder: Cross Sectional Area x Height)

Convert to Gallons by multiplying Cubic Feet by 7.48 **5,496.00 Gallons**

3. Calculate lost volume from precipitation since the area is outside and with no run-on controls. The Michigan worst case for run-on is a 24-hour rainfall event that happens once every 25 years: about 4.8 inches of rain.

Precipitation (Volume Lost)

Rainfall from a 25-Year, 24-Hour Storm Event = 4.8 Inches
(Divide by 12 Inches to Convert to Feet = 0.4 Feet)

Volume of Water in Slab Area from Rainfall = 1000 Cubic Feet
(Estimated by the Formula for a Cube:
Length of Slab x Width of Slab x Rainfall in Feet)

Convert to Gallons by multiplying Cubic Feet by 7.48 **7,480.00 Gallons**

4. Now calculate the volume available to contain leaks and spills from drums stored in the area by taking the initial area volume and subtracting item displacement volumes and lost volume from precipitation.

Net Volume Available for Secondary Containment

Volume Available = Slab Volume + Sump Volume - Ramp Volume - Drums Stored - Precipitation

8,801.65 Gallons

Required Container Capacity

Hazardous waste regulations require secondary containment for containers to contain 100% of the largest container stored in the area or 10% of the total amount of wastes stored in the area. Therefore, use the authorized waste storage capacity of the area and multiply it by 10% and then compare the result to the largest container to find out how much containment is required. In this case, the largest container is 55 gallons, and the total authorized storage capacity is 200 55-gallon drums or 11,000 gallons.

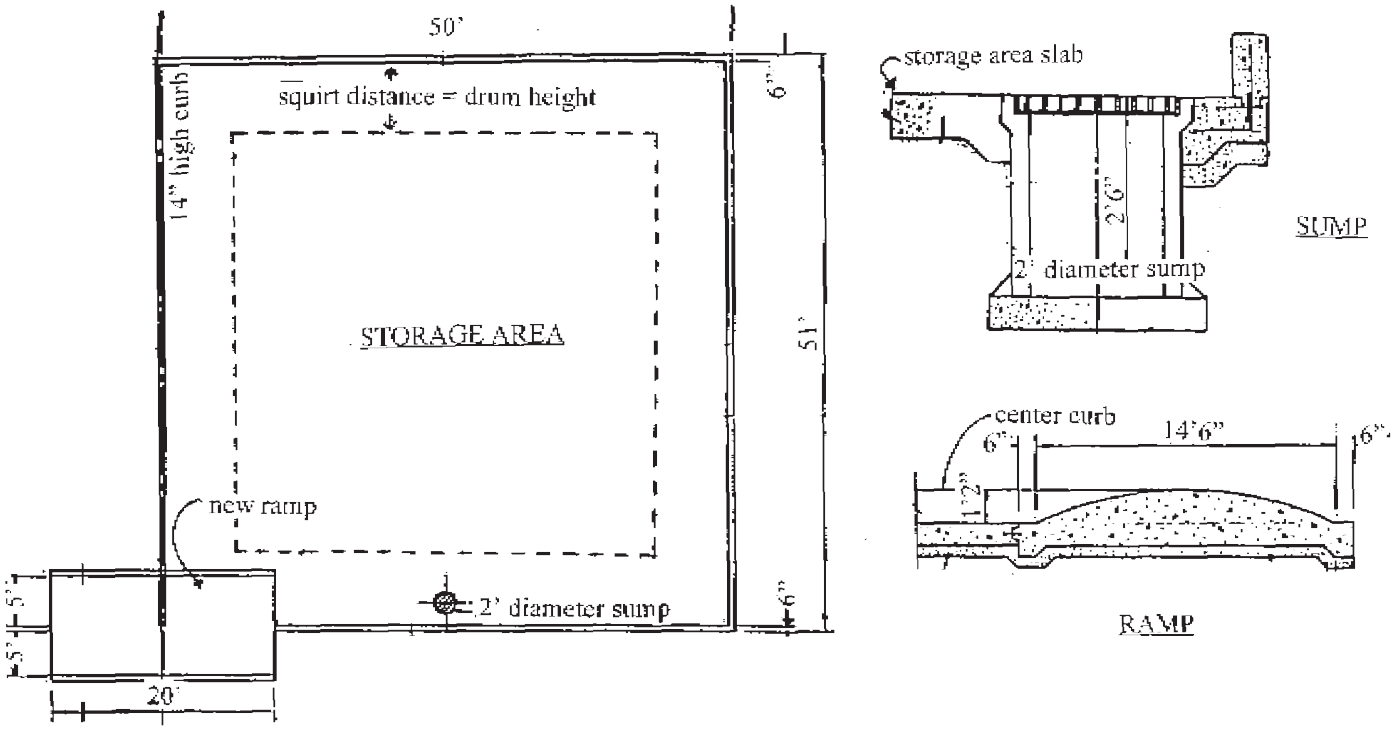
Total Authorized Waste Storage for this Storage Area = 11,000 Gallons

Largest Container in Storage Area = 55-Gallon Drum

Total Authorized Waste Storage x 10% (0.1 x 11,000) = **1,100.00 Gallons**

The required containment capacity is 1,100 gallons, which is less than the 8,801.65 gallons available for containment. Therefore, the secondary containment is adequate as long as it is sufficiently impermeable and free of cracks and gaps to contain leaks and spills from the wastes stored.

Figure 1: Floor plan and storage area details



EXAMPLE 2 – HAZARDOUS WASTE CONTAINER STORAGE AREA

This example shows how to decide if an outdoor tank farm has adequate secondary containment. See Figure 2 for a floor plan and details of the tank farm.

Tank Farm Details and Calculations

1. Calculate the total volume of the tank farm's slab and sump. This will give an initial secondary containment volume.

   Slab (Initial Volume)

   Length of Slab = 37 Feet: Inner Wall to Inner Wall

   Width of Slab = 22 Feet: Inner Wall to Inner Wall

   Height of Shortest Retaining Wall = 4 Feet

   Volume of Slab = 3,256 Cubic Feet

   (Estimated by the Formula for a Cube: Length x Width x Height)

   Convert to Gallons by multiplying Cubic Feet by 7.48 = **24,354.88 Gallons**

Sump (Volume Added)

Length of Sump = 2 Feet

Width of Sump = 2 feet

Depth of Sump = 2 Feet

Volume of Sump = 8 Cubic Feet

(Estimated by the Formula for a Cube: Length x Width x Height)

Convert to Gallons by multiplying Cubic Feet by 7.48 = **59.84 Gallons**

2. Calculate the volume displace by the tanks within the tank farm.

6,000 Gallon Tank (Volume Displaced)

Tank Diameter = 10 Feet

Tank Radius (1/2 x Diameter) = 5 Feet

Height of Portion of Tank at or Below Height of Shortest Wall = 4 Feet

Volume Displaced by 6,000 Gallon Tank = 314 Cubic Feet

(Estimated by the Formula for a Cylinder: 3.14 x Tank Radius Squared x Height)

Convert to Gallons by multiplying Cubic Feet by 7.48 = **2,348.72 Gallons**

8,000 Gallon Tank (Volume Displaced)

Tank Diameter = 12 Feet

Tank Radius (1/2 x Diameter) = 6 Feet

Height of Portion of Tank at or Below Height of Shortest Wall = 4 Feet

Volume Displaced by 8,000 Gallon Tank = 452.16 Cubic Feet

(Estimated by the Formula for a Cylinder: 3.14 x Tank Radius Squared x Height)

Convert to Gallons by multiplying Cubic Feet by 7.48 = **3,382.16 Gallons**

3. Calculate lost volume from precipitation since the area is outside and with no run-on controls. The Michigan worst case for run-on is a 24-hour rainfall event that happens once every 25 years: about 4.8 inches of rain.

Precipitation (Volume Lost)

Rainfall from a 25-Year, 24-Hour Storm Event = 4.8 Inches

(Divide by 12 Inches to Convert to Feet = 0.4 Feet)

Volume of Water in Slab Area from Rainfall = 325.6 Cubic Feet

(Estimated by the Formula for a Cube:

Length of Slab x Width of Slab x Rainfall in Feet)

Convert to Gallons by Multiplying Cubic Feet by 7.48 **2,435.49.00 Gallons**

4. Now calculate the volume available to contain leaks and spills from tanks stored in the area by taking the initial tank farm volume and subtracting displaced volumes and lost volume from precipitation.

   Net Volume Available for Secondary Containment

   Volume Available = Slab Volume + Sump Volume – 6,000 gallon tank – 8,000 tank – Precipitation

   16,248.35 Gallons

Required Container Capacity

Hazardous waste regulations require secondary containment for tanks to contain 100% of the largest tank stored in the area. In this case, the largest tank is 8,000 gallons.

Largest Tank in Storage Area = **8,000 Gallons**

The required containment capacity is 8,000 gallons, which is less than the 16,248.35 gallons available for containment. Therefore, the secondary containment is adequate, as long as it is sufficiently impermeable and free of cracks and gaps to contain leaks and spills from the wastes being accumulated.

Figure 2: Floor plan and tank farm details