Washington State
Department of Transportation

Secondary Containment

Environmental Services Office
Hazardous Materials Program
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Secondary Containment

Secondary containment is a safeguard measure used to prevent accidental releases or spills of toxic or hazardous substances to the environment (water, soil & air). Secondary containment can be a structure that is chemically compatible to hold a release and remain liquid tight until clean up occurs. Secondary containment can also be an engineered means to redirect a spill away from water or other sensitive receptor to a temporary diversion system.

The WSDOT Standard Specification 1-07.15, requires Spill Prevention Control and Countermeasure Plans on all WSDOT projects. The specification requires secondary containment and references Washington State Department of Ecology and International Fire Code requirements.

This focus sheet on secondary containment provides guidance regarding the following:

1. What is required?
2. What needs secondary containment?
3. How should secondary containment be built and maintained?
4. What encourages compliance?

I. What is required?

Fuel tanks stored on site must have secondary containment and all other spill sources that may be a threat to human health or the environment must have secondary containment. The phrase “may be a threat” is subjective, and without prescriptive regulatory guidance, WSDOT PEs and Ecology inspectors use professional judgment to determine the necessary and reasonable secondary containment requirements that fit each individual circumstance.

Permit or specification language does not have exemption language that allows projects to deviate from the requirements when secondary containment is impractical. However, WSDOT PEs has the authority to modify Standard Specification requirements as reasonably necessary, whether to allow for deviations or to increase protection measures in high risk situations.

Secondary Containment requirements that apply to WSDOT projects include, but are not limited to:

- International Fire Code (IFC)
- Construction Stormwater General NPDES Permit
- WSDOT Standard Specification
- WSDOT Project Special Provisions (optional)

International Fire Code (IFC)

The IFC Section 3406.2 specifically addresses the storage and dispensing of flammable and combustible liquids on farms and construction sites. The IFC directs secondary containment requirements for permanent and temporary above ground storage tanks (ASTs). Applicable secondary containment sections include:

- Section 3406.2.6 Spill control drainage control and diking requires, "…Outdoor storage areas shall be provided with drainage control or diking as set forth in **Section 3404.2.10.**"
- Section 3404.2.10 Drainage and diking requires, "The area surrounding a tank or group of tanks shall be provided with drainage control or shall be diked to prevent accidental discharge of liquid from endangering adjacent tanks, adjoining property or reaching waterways."
- Section 3404.2.10.1 Volumetric capacity. Must hold largest amount of liquid from the largest tank within the diked area.

Exception in Section 3404.2.10

"1. The ***fire code official*** **is authorized to alter or waive** (emphasis added) these requirements based on a technical report which demonstrates that such tank or group of tanks does not constitute a hazard to other tanks, waterways or adjoining property, after consideration of special features such as topographical conditions, nature of occupancy and proximity to buildings on the same or adjacent property, capacity, and construction of proposed tanks and character of liquids to be stored, and nature and quantity of private and public fire protection provided.

2. Drainage control and diking is not required for *listed* secondary containment tanks."

Construction Stormwater General NPDES Permit

This NPDES Permit is required when projects disturb one acre or more of surface soil. The NEW permit is effective on January 1, 2011, and now has secondary containment requirements in Section S9.D.9 (page 32).

Page 11 and page 27 of the NPDES Permit requires BMPs to be consistent with Ecology manuals. Guidance on secondary containment can be found in the following Ecology Stormwater Management Manuals:

1. Volume II – Construction Stormwater Pollution Prevention, BMPC153
2. Volume IV – Source Control BMPs

2001 NPDES Permit, Section S9.D.9

"Provide cover, containment, and protection from vandalism for all chemicals, liquid products, petroleum products, and other materials that have the potential to pose a threat to human health or the environment. On-site fueling tanks must include secondary containment. Secondary containment means placing tanks or containers within an impervious structure capable of containing 110% of the volume contained in the largest tank within the containment structure. Doublewalled tanks do not require additional secondary containment."

WSDOT Standard Specification Section 1-07.15(1)

Contractors are required to prepare a project specific Spill Prevention Control and Countermeasure (SPCC) Plan prior to any construction activity. SPCC plans must be written to meet requirements established by WSDOT Standard Specification Section 1-07.15(1).

The April 4, 2011 Amendment & GSP Update Package changed the requirements for SPCC plans. Projects that go to Ad after April 4th are subject to the new requirements. The major changes include:

- Added secondary containment language per new NPDES Permit requirements
- Reference to Section 3406 of the International Fire Code for requirements on temporary fuel storage
- Combined pertinent language prior to deleting GSP 071501.FR1

The WSDOT Hazardous Materials SPCC web page provides SPCC plan templates, checklists, examples and additional information.

Eastern Region EXAMPLE – Supplemental Special Provision SPCC requirements

Section 1-07.15(1) is supplemented with the following:

This project contains environmentally sensitive area(s). In addition to the requirements of Section 1-07.15(1) when working in the area(s) listed below, the Contractor shall comply with the following requirements:

1. Equipment maintenance, refueling, and cleaning activities shall be located in an area that will not impact any environmentally sensitive area should a spill or leakage occur.
2. Prior to entering any environmentally sensitive area, hydraulic systems on equipment shall be drained and filled with vegetable oil or another non-petroleum based fluid approved by the Engineer.
3. The Contractor shall supply a list of SPCC response equipment that will be used in any environmentally sensitive area and the size and type of spill containment kits shall be included in the SPCC plan.
4. When working over surface waters within environmentally sensitive areas, hydraulic equipment shall have a spill containment system placed under it in such a manner as to fully contain leaks or broken hoses. The following area(s) are considered environmentally sensitive: ***$$***

WSDOT Standard Specification Section 1-07.15(1)7 – Spill Prevention

The SPCC plan shall "Describe the following items:

"…D. Secondary containment for each potential spill source listed in 4, above. Secondary containment structures shall be in accordance with Section S9.D.9 of Ecology's Construction Stormwater General NPDES Permit, where secondary containment means placing tanks or containers within an impervious structure capable of containing 110% of the volume contained in the largest tank within the containment structure. Double-walled tanks do not require additional secondary containment.

E. BMP Methods used to prevent discharges to ground or water during mixing and transfers of hazardous materials and fuel. Methods to control pollutants shall use BMPs in accordance with Ecology's Construction Stormwater General NPDES Permit. BMPs guidance is provided in Ecology's Stormwater Management Manuals, such as Volume II – Construction Stormwater Pollution Prevention, BMP C153 and Volume IV Source Control BMPs…"

Regional Special Provisions

Regional Special Provisions are added contract language created on a case by case basis. A Special Provision can require more stringent conditions when project specific circumstances warrant increased protection measures and to influence early contractor compliance.

II. What needs secondary containment?

Requirements

Secondary containment requirements are not straightforward and regulatory guidance is not black and white. This is a good thing, because secondary containment should be adjusted to match site specific conditions without unnecessarily increasing project costs.

The NPDES Permit **requires** secondary containment for:

1. On-site fueling tanks (except double walled tanks) ***NOTE***: Even though "Doubled-walled tanks do not require additional secondary containment," extra preventative measures may still be necessary with high risk construction activities in environmentally sensitive areas.
2. Chemicals, liquid products, petroleum products, and other materials that ***have the potential*** to pose a threat to human health or the environment. (*This is a **subjective and left to interpretation** based on Other Factors described below)*.

The 401 or HPA Permits ***may*** **require more stringent** secondary containment for in water or over water work activities.

Regulatory inspectors in the Northwest Region typically expect the following materials and work activities to always have secondary containment:

- Fuel tanks (single walled)
- Fuel transfer activities, for both mobile and stationary areas
- Volumes of stored or used liquid located adjacent/up gradient to water, where there is a reasonable potential of a worst case scenario spill could reach water. Examples such as:
  - Large volumes stored in drums and tanks
  - Large volumes used in large generators and pumps, hydraulic power packs
  - Moderate volumes located directly near water (within 5-10 ft) or unprotected drainage system that directly discharges to water
- Storage of material that may potentially pose a threat to human health or the environment that is not in constant or regular daily use (i.e., general good housekeeping practices following Ecology's BMPs)

Single Walled Fuel Tanks

Material Storage

Fuel Transfers

Other Factors

Multiple other factors must be considered when deciding what needs secondary containment. To assess spill risks, evaluate the project and the surrounding environment and consider worst case scenarios. Consider how things could fail and how to prevent or protect in event of a failure. Consider the location, type and quantity of stored materials or any risky construction activities (e.g., fueling) and take into account the topography (slope and gradient) and the proximity to water or other environmentally sensitive areas. Could a worst case scenario spill reach water?

Apply practicality and use common sense when enforcing secondary containment requirements. Use "worst case" to assess risk, but apply the knowledge listed below to establish reasonable means to manage the risk. Recognize that there is only so much energy, time, and money to expend to achieve full compliance on a project. Make a good faith effort to control pollution sources and require what is reasonable based on the project specific circumstances and environmental conditions.

Consider the following factors when making a judgment call pertaining to secondary containment:

1. Surrounding environment
2. Timeframe in use
3. Condition of equipment
4. Security and vandalism
5. Weather
6. Available manpower
7. Equipment and materials

Surrounding Environment

1. Is the work located over water, or below the Ordinary High Water Line?
2. Is the work or storage area located near environmentally sensitive areas, such as
   a) stormwater systems and ditches that discharge directly to water or wetlands?
   b) shallow groundwater or protected drinking water aquifers?
3. What is the distance of the nearest waterway or drainage system?
4. Will rain/stormwater come in contact with chemicals, fuels, or other hazardous materials used or stored on the project?

Spill + Water = BIG/MULTIPLE FINE$

If the project is near water or other sensitive receptor, you may need to apply increased protections. It is not *only* about secondary containment, because other measures like using pristine equipment, increased maintenance and inspection, enhanced security, and increased man power should also be considered in lieu of or together with varied levels of secondary containment needs.

Timeframe in Use

1. Will the spill source be on the project for a long period of time?
2. Would the containment structure become susceptible to wear and tear?

Long Term Project = Increased Risk

Depending on the project location, increased security of the project, storage and staging areas (i.e., fencing & lightening) may be needed. Don't forget the IFC requirements for fittings, devices and padlocks that prevent malicious tampering or siphoning.

Consider increasing the robustness of containment to increase the durability and resistance of wear and tear and exposure to weather elements over time. Or, ensure regular inspection, maintenance and replacement of containment throughout the entire project.

Condition of Equipment

1. Is equipment relatively new and/or in good condition?
2. Based on experience, is there a reasonable potential for equipment failure?
3. Does the equipment have unprotected high pressure hoses and valves?
4. Could high vibrations or friction cause increase wear and tear on containment structure?

Portable Pump

Equipment Must Be Maintained

Secondary containment is not an option for leaking equipment. Equipment should always be inspected and maintained; otherwise it should be removed from the job site. Leaking equipment usually results in violations.

Many spills are a result of sprays from hydraulic hoses due to damage, chaffing, sharp bend points, broken fittings or maintenance /testing. Hoses should be protected from damage. Some hydraulic power packs have built in secondary containment.

Inspections, tests, maintenance and repair are the first lines of defense against spills. If these are not performed appropriately, or the nature of the work is in environmentally sensitive areas, add or increase secondary containment protection measures. Otherwise, if the first lines of defense are faithfully carried out, secondary containment of equipment may not be necessary.

Security and Vandalism

1. Is the project located in an area easily accessible by pedestrians?
2. Is there a high rate of crime in the project area?
3. Does the project and designated areas have adequate fencing and lighting?
4. Does equipment and storage tanks have protection measures, such as
   a) devices, such as Power Cord and Plug Locks, oil pump starters
   b) padlocks on pumps or hoses to secure to hanger
   c) anti-siphoning device
   d) self closing nozzles
   e) automatic shut off valves
   f) locks on drain or other valves

Fencing

Electrical Locks

AST Fill Port Lock

Alarm Systems

Cap Lock

Emergency Shut-Off Valve

Locking Container

Weather

1. Is construction work occurring during the raining season?
2. Could extreme hot or cold temperatures cause plastic or structures to become brittle or fracture

Weathered Plastic

Plastic Cover

Cover with Containment Pallet

How's the Weather?

Increase protection measures to prevent storm water from coming in contact with hazardous substances stored or used on the project. Otherwise, storm water polluted with chemicals must be diverted with drainage controls, contained, and sampled to determine proper disposal (See Ecology BMP C153, page 4-46).

Ecology BMP C153, page 4-46 directs that during the wet weather season (Oct 1 – April 30), each secondary containment facility shall be covered during non-working days, prior to and during rain events.

Areas with increased rainfalls (e.g., Quillayute & Quinault) must consider whether the 110% containment capacity can adequately hold a spill plus precipitation. A cover system may be a more effective means of protection.

Extreme cold or hot temperatures may cause some plastics to crack or melt. If unexpected extreme weather conditions occur, increase the frequency of inspections, maintenance, repair and replacement of plastic secondary containment systems. If extreme conditions are typical for the project area (i.e., summer months in Yakima or winter months in Spokane), then contact product manufactures for recommendations on materials that are capable of withstanding those conditions. Learn the minimum and maximum temperatures the material can tolerate.

Available Manpower

1. Is there a commitment of man power to conduct regular frequent inspections?
2. Is there staff on hand who are trained and experienced in spill response?

Trained staff on hand?

Increase protective measures if there is a lack of staff or expertise to conduct inspections, maintenance, documentation, and spill response actions. Consider stronger durability, increased capacity, fail safe diversions, cover, added spill kits, and increased security.

Equipment and Materials

1. Is there an adequate supply of equipment and materials to quickly control and remove any quantity of spills?
2. Is the equipment and materials located where they are immediately available?

Enough materials on hand?
Equipment available?

Secondary containment methods must be added or enhanced to compensate for the lack of equipment or materials that are used to immediately control, contain, and/or remove spilled product and associated contaminated media.

Secondary containment should be appropriately constructed based on the surrounding environment and specific project circumstances. Sometimes, other preventative measures can be used in lieu of secondary containment, as approved by the PE. Following the same rational described in the IFC Section 3404.2.10, secondary containment can be altered or even waived based on site specific circumstances. For example, secondary containment can be avoided all together if materials are not stored on the project and only brought on site for immediate use on an as needed basis (e.g., mobile fuel trucks instead of temporary above ground tanks). On the other hand, although not required, secondary containment may be reasonable for double-walled fuel tanks, such as a tank located in a high construction traffic zone, with little or no security and placed immediately up gradient and adjacent to a water body.

PEs and inspectors must rely on their professional judgment and use their discretion to determine what is reasonable. WSDOT HazMat Specialists are available to assess spill risks and provide recommendations. If the PE determines that secondary containment is not practical or necessary, the PE should be prepared to present a rational argument that demonstrates the PE is aware of the circumstance and has considered the predicted flow direction, rate of flow, and total quantity and whether the worst case scenario spill could reasonably be expected to reach a water body; And/or describe alternative measures that provide equivalent environmental protection.

III. How should secondary containment be built and maintained?

It isn't always easy to assess whether secondary containment is adequate. The proper method of secondary containment is a matter of good engineering practice, thus there is no approved specific method. A few pointers are provided to help evaluate a containment system's ability to effectively hold a spill for at least 72 hours. Types of secondary containment are driven by the following primary variables:

1. Chemical Type
2. 72 Hour Spill Holding Timeframe
3. Quantity
4. Surface Topography
5. Vibration Damage
6. Frequency of Inspection and Maintenance

Chemical Type

The type of chemical dictates what material is chemically compatible to hold a spill without disintegrating or breaking through, thus being considered "impervious." Vendors of spill response and containment equipment can help determine products that will properly contain various chemical substances.

Petroleum products (gasoline, diesel, hydraulic oil, etc.) are the primary chemicals stored or used on most WSDOT projects. Typical products used to contain petroleum spills include temporary structures such as pop-up pools or materials like plastic sheeting used as a liner in containment systems.

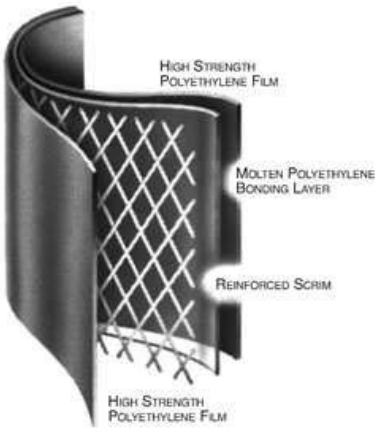
Chemically Compatible?

Plastic sheeting is made in various thicknesses. A thickness of 20-25 mil is recommended for temporary containment liners that is expected to last one to two years. A 6 mil thickness punctures or tears easily, but it may be effective for short term durations, with little wear and tear and not exposed to extreme hot or cold environments.

Polyvinyl Chloride (PVC) plastic sheeting liners can be made to resist oils, alcohols, hydrocarbons, waste products and other corrosive liquids. PVC liners are lightweight, flexible and best used where soil conditions are stable with minimal amount of sharp rocks. PVC's flexibly allows for stretching to help prevent stress cracking, which may occur with High Density Polyethylene (HPDE). PVC has a wide range of thicknesses available, from 6 to 45 mils or more.

High Density Polyethylene (HDPE) essentially does the same as PVC, but is slightly stiffer which may provide increased durability and resistance properties.

Extra Heavy Duty Liner



72-Hour Spill Holding Timeframe

Ecology's BMP C153 requires that containment must hold a spill for at least **72 hours** in order to be considered "sufficiently impervious." The 72 hour standard first came from EPA's attempt to define "sufficiently impervious" in 40 CFR Part 112 (Oil Pollution Prevention regulation). The rationale was that a containment system that is impervious to oil for 72 hours would allow time for discovery and removal of an oil discharge in most cases. In the 2002 rule revisions the proposed EPA 72 hour standard was withdrawn; however Ecology continues to maintain the 72 hour standard per BMP C153. Ecology expects spill cleanup work to start immediately once a spill is discovered and in most cases be completely cleaned up within 72 hours.

BMP C153

"Secondary containment facilities shall be impervious to the materials stored therein for a minimum contact time of 72 hours"

For storage of large quantities of chemicals other than petroleum, consider asking the product supplier to specify in writing that the containment system meets Ecology's 72 hour impermeability standard. If there is a justifiable reason that clean up cannot feasibly occur within 72 hours of a spill (highly uncommon), provide additional protection measures (i.e., increased inspections, limit quantities stored, etc.) and then consider more robust products that exceed the 72 hour standard.

Quantity

The NPDES permit and amended WSDOT Specification 1-07.15(1) requires the capacity to equal 110% of the volume contained in the largest tank (or container) within the containment structure. The extra 10% is intended to accommodate precipitation and a safeguard against miscalculations.

Ecology's Spill Prevention, Preparedness and Response Program began creating a new Excel tool to help calculate containment volumes. For more information or a copy of this calculation tool, contact the Ecology Spills Program at 360-407-6458. For area calculations, see EPA example at: http://www.epa.gov/region6/6sf/sfsites/oil/samppln.htm

EPA Example Calculation

Formula: **(volume of single largest tank + 10%) x 0.1337 cubic feet/gallon**

Question: **What is the area of the minimum containment volume for a 25,000 gallon fuel tank?**

Calculation:
25,000 gal + 10% = 27,500
27,500 x 0.1337 = 3676.75

Answer: **Containment area must be 3,676.8 cubic feet.**

Surface Topography

Secondary containment should be as level as possible. If using plastic sheeting, the surface should be clear of rocks and debris that could puncture the material. If a containment structure must be placed on a slope, the downhill slide of the structure wall must be taller. Ecology's Excel tool (mentioned above) also helps calculate dimensions of secondary containment walls on slopes.

Sloped Surfaces

Vibration Damage

Increase protection if operating equipment is subject to vibration. Use thicker material, vibration dampening, and require more frequent inspections.

Hydraulic Hoses Subject to Vibration Damage

Maintenance Schedule Log

Frequent Inspections

Frequency of Inspection and Maintenance

The frequency of inspection and maintenance depends on several variables as described above. Inspection and maintenance should be regular, routine and documented as necessary.

IV. What encourages compliance?

Good communication is the best means to encourage compliance. When a regulatory inspector is assigned to a project, increase your chances of a positive outcome by clarifying gray areas in advance with respect to how the inspector might interpret the permit conditions. Ask for clarifications. Inspections are designed to help WSDOT and the Contractor maintain legal compliance. Do not be afraid to ask for technical assistance, whether it be from Ecology or your WSDOT HazMat Specialist. Working together is important and discussions to improve the situation are encouraged.

To prevent the most common spill violations, projects should

i) follow their Spill Prevention, Control and Countermeasures (SPCC) Plan,

ii) give more attention to secondary containment needs, and

iii) encourage better housekeeping practices.

Unfortunately sometimes, there is a lack of resources or commitment to comply with the requirements. Some projects lack the manpower, equipment and material to expeditiously follow the SPCC plan or permit requirements. When a contractor fails to comply with a PE's repeated attempts to correct a problem, here are a few suggestions.

i) Remind WSDOT staff and Contractors about the significant costs and fines associated with spills. In addition to construction delays and clean up costs, there are significant fines. Under water quality regulations, a spill to water is $10,000 to $100,000 per day **per violation.** Damage to habitat may also result in a Natural Resource Damage Assessment fine. For habitat protected under the Endangered Species Act, damage or "taking" of habitat may result in civil penalties up to $25,000 per violation. There can by many violations in a single spill incident.

ii) Call the WSDOT HazMat Specialist to conduct an internal assessment, where the specialist works directly with the PE and then the PE uses the report to communicate and encourage compliance

iii) Call local fire marshal, who enforces the International Fire Code

iv) Call Ecology's spill prevention program to request an informal assessment

v) Utilize some of the following WSDOT Standard Specification "hammers" to contractually force compliance:

vi) **1-05.1 Authority of the Engineer** – The Engineer and Project Engineer can suspend all or part of the Contract Work. WSDOT can also use other resources to complete the Work.

vii) **1-05.2 Authority of Assistants and Inspectors** –Inspectors are not authorized to accept or approve any Work not meeting the intent of the Contract. Inspectors have the authority to reject defective material and suspend Work that is being done improperly, subject to the final decision of the PE.

- Compliance with environmental laws and regulations is part of the Contract.

viii) **1-05.6 Inspection of Work and Materials** – The Engineer can order the Contractor to remove and replace materials used without inspection. The Contractor shall correct any substandard Work or materials. The Engineer will reject unsuitable Work or materials or materials even though previously inspected or paid for.

- This condition allows WSDOT to reject secondary containment structures, systems or BMPs that are not installed properly.

ix) **1-05.7 Removal of Defective and Unauthorized Work** – WSDOT will not pay for unauthorized or defective Work. This is anything that doesn't conform to the Contract, Work done beyond the lines and grades set by the Plans or Engineer, or extra Work and materials furnished without the Engineer's approval.

- This applies to improper secondary containment structures, systems or BMPs.

x) **1-05.13 Superintendents, Labor, and Equipment of Contractor** – The Engineer can, with written statement, remove a superintendent from the project for failing repeatedly to follow the Engineers written or oral orders, directions, instructions, or determinations. This also applies to other employees of the Contractor.

- Poor environmental performance caused by the Contractor, whether chronic or acute, does not have to be tolerated.

xi) **1-08.1 Subcontracting** – Approval to subcontract shall not relieve the Contractor's responsibility to carry out the Contract or to relieve the Contractor of any obligation or liability under the Contract. In addition, the Engineer can request the Subcontractor to be removed from the project.

xii) **1-08.6 Suspension of Work** – The Engineer may suspend all or any part of the Work if unsuitable weather prevents satisfactory and timely performance of the Work, if the Contractor does not comply with the Contract, or it is in the public interest.

- Suspending work is usually a last resort effort, but it does catch the Contractor's attention because they are responsible for any lost working days.

V. For More Information

If you have questions, or need additional information please refer to the following resources:

- Ecology Spill Prevention, Preparedness, & Response Program, Spills web page at http://www.ecy.wa.gov/programs/spills/spills.html
- WSDOT Hazardous Materials and Solid Waste Program, Spill Prevention web Page at http://www.wsdot.wa.gov/Environment/HazMat/SpillPrevention.htm
- WSDOT Environmental Service's Hazardous Materials Program Manager at 360-570-6656.