
Hazardous substances within the South Tacoma Groundwater Protection District must be stored in secondary containment. Secondary containment must be able to hold 10% of the volume of all containers, or 100% of the largest container, whichever is greater. Secondary containment can be double-walled storage tanks, plastic spill pallets, concrete berms, or in some cases, a building.

Often, a cost effective choice is to install a concrete structure, typically with steel-reinforced concrete, around the hazardous substance storage area. A concrete structure’s ability to contain a release depends on its structural integrity and ability to repel liquids. The following items need to be assessed and evaluated when using a concrete structure for secondary containment.

### Chemical Attack of Concrete
Concrete (a mixture of Portland Cement, water, and mineral aggregate) without a coating or sealant is relatively permeable to liquids and chemical attack from hazardous substances. The porous nature of unprotected concrete will allow spills of certain hazardous substances, particularly solvents, to penetrate through the concrete to the underlying soil. Visual evidence of chemical attack includes erosion and spalling of the concrete.

### Protective Coatings and Sealants
A protective coating or sealant should be applied to the interior of a secondary containment concrete structure. This will protect the concrete from chemical attack. Epoxy resins are often used for a coating material. When properly selected and applied, epoxies are tough, durable, and provide a good resistance to acids, caustics, and solvents. Other materials used for protective coatings may include polyvinyl chloride, acrylics, polyurethanes, neoprene, chlorinated rubber, enamels, various mortars, or acid-proof shotcrete.
Protective Coatings and Sealants
A protective coating or sealant material within a concrete secondary containment should be compatible with the hazardous substances being stored. The Portland Cement Association publication, *Effects of Substances on Concrete and Guide to Protective Treatments*, contains tables that describe the effect on concrete by a wide array of chemicals and describes and tabulates recommended protective treatments associated with each of these chemicals.

A qualified individual should perform surface preparation and application of a protective coating system. This individual should use proper equipment and follow application procedures recommended by the coating system manufacturer. The goal of applying protective coatings is to make the secondary containment structure impermeable. However, releases from primary containment structures must be removed promptly. Coatings will degrade over time and need to be regularly inspected for wear, cracks, and other failures. Coating system repairs should be performed as soon as a problem area is discovered.

Joints
Concrete structures used for secondary containment should be constructed with as few joints as possible. Deteriorated joint sealant, moisture accumulation in the joint, and concrete deterioration around the joint are indications of joint failure. Timely repairs should be performed to prevent a potential release to the surrounding environment.

A waterstop should be installed in the joint to obstruct any flow through the joint. Waterstops should be chemically compatible with the hazardous substances that they are intended to contain.

Evaluation and Repair of Cracks
Cracks in concrete structures can allow moisture or hazardous substances to contact the steel reinforcement embedded in the concrete, causing the steel to corrode. The American Concrete Institute Publication 224.1R, *Causes, Evaluation, and Repair of Cracks in Concrete Structures*, describes the causes of cracking, evaluation techniques and criteria, and discusses various crack repair techniques and procedures.

Sealants for Joints and Cracks
All joints and cracks should be filled and sealed with a flexible sealant. The sealant should be impermeable, deformable to accommodate any joint movement, remain bonded to the joint, resistant to sunlight and weather, and chemically compatible with the protective coating material. A registered structural engineer should be consulted prior to making repairs to existing cracks or joints, which may compromise the integrity of a structure used for secondary containment.