Q3: What does "sufficiently impervious secondary containment" typically mean regarding construction methods and materials at an MRW fixed facility?

A3: Sufficiently impervious secondary containment depends on the substance that requires containment. For moderate risk wastes (MRW), the substances that need to be contained include hazardous materials from a broad spectrum of chemical types. In 2006 some of the highest totals of MRW Waste types collected statewide, excluding used oil collected at used oil collection sites, are shown in the table below.

2006 HHW and CESQG Collected, Except Used Oil sites

MRW Waste Types	HHW	CESQG	Total	Percent
Antifreeze	472,886	4,668,859	5,157,745	21.7%
Latex Paint	3,713,914	119,872	3,833,786	16.1%
Oil-Based Paint	2,684,818	262,881	2,947,699	12.4%
Lead Acid Batteries	2,286,696	26,170	2,312,866	9.7%
Flammable Liquids	930,259	788,031	1,718,290	7.2%
Used Oil (non-contaminated)	1,607,202	75,473	1,682,675	7.1%
Pesticide/Poisons Liquids and Solids	550,588	18,927	569,515	2.4%

(Numbers in the above table are in pounds)

The type of secondary containment that would be sufficiently impervious for lead acid batteries could be a sealed/coated asphalt concrete containment pad. Asphalt is relatively impervious to battery acid. However, for oil-based paint, oil, or flammable liquids, asphalt concrete would be inappropriate. These three MRW types, that together represent over 26 percent of the total waste stream are liquid hydrocarbons (petroleum products) which will dissolve asphalt concrete pavement. Hydrocarbon wastes should not be stored over blacktop because it is not sufficiently impervious. (See image of dissolved asphalt from hydrocarbon spillage below.) In addition, some solvents, which are typically in the flammable liquids category, have been shown to readily pass through cement concrete slabs and into the soils and groundwater below.

The recommended containment at a fixed facility for these liquid hydrocarbon wastes is cement concrete coated with a chemically-resistant coating, usually an epoxy-based product. Ecology has developed guidance that should be used to help determine what would constitute sufficiently impermeable secondary containment. There is a general guidance document for hazardous wastes, which is available on the Ecology website, Guidance for Assessing Dangerous Waste Secondary Containment Systems. An excerpt from this document states some of the basic secondary containment permeability limitations of bare cement concrete.

"Concrete not otherwise protected by application of a coating or sealant is relatively permeable to liquids and is susceptible to chemical attack from releases or spills of liquid dangerous wastes. The porous nature of unprotected concrete will allow any spills or releases of certain dangerous wastes, particularly solvents and various organic chemicals, to readily penetrate through the concrete into the underlying soil. This will result in soil contamination even if the overlying concrete is relatively unaffected."

Pesticide/Poison liquids is another major category of MRW. The pesticide/poison liquids and solids category represents less than 3 percent of the total MRW waste stream by quantity. However, other categories of poisons, including solid poisons, and pesticides in combination with flammable liquids or in aerosol containers, add another full 1 percent to the total MRW waste stream. This is typically the most acutely toxic part of the MRW stream and consequently calls for special handling.

Some pesticide products are carried in a flammable liquid media and therefore asphalt is not a sufficiently impervious form of secondary containment. Further, some pesticides will degrade the actual chemical bonds of exposed cement concrete. This causes the concrete structure to crack and crumble. A typical solution is to use cement concrete coated with chemically-resistant epoxy. Chemically-resistant epoxy coatings typically have a limited ability to flex or stretch. Asphalt concrete by its nature is quite flexible and usually not an appropriate base for epoxy coatings. Therefore a properly prepared cement concrete base is the standard for secondary containment.

Before a chemically-resistant epoxy coating is applied to cement concrete, the surface of the slab needs to be prepared properly; otherwise, the epoxy will not effectively adhere to the surface. Epoxy coatings have been placed at MRW facilities without preparing the slab surface. In most cases this has resulting in epoxy separating from the surface in traffic areas. Most manufacturers of epoxy coatings suggest that after the concrete slab is cured, the surface cement layer needs to be removed to allow access to the fine aggregate particles in the slab. This is usually done by specialty coating contractors using machines designed for this purpose. The slab surface is then cleaned of the cement dust and the epoxy applied, often "built-up" in one or more layers or a base/primer layer followed by finish layer(s).

The top layer of coating often includes additives or is worked to a consistency to increase the traction of the walking surface in case the floor is wet due to a spill or water from normal floor cleaning. Some epoxies need specific temperatures and humidity ranges to properly cure and provide the desired chemical-resistance properties of the coating system. This will be stated clearly by the manufacturer of the product, and their directions should be followed closely by the installer.

* Note: The answers provided to Frequently Asked Questions are guidance for implementing WAC 173-350-360. Following this guidance is not a requirement of operation or design for MRW facilities, as facilities may meet regulatory requirements through other means. Local Health Departments should be consulted to determine what will be sufficient to meet the regulatory standards.

For website related questions please contact Al Salvi 360-407-6287.
