

**ASTM E 2435-05:
Standard Guide for Application of
Engineering Controls to Facilitate Use or Redevelopment
of Chemical-Affected Properties**

Design of Engineering Controls

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November 2, 2005**

Considerations for the Design of Engineering Controls

- ◆ Performance standards
- ◆ Exposure pathways
- ◆ Design specifications
- ◆ Installation
- ◆ Monitoring and maintenance
- ◆ Activity and use limitations

Basis for Performance Standards

- ◆ Risk-based approach intended to:
 - ◆ Prevent direct contact
 - ◆ Limit migration of chemicals of concern
- ◆ Design life is equal to or lesser than:
 - ◆ Expected life of exposure hazard
 - ◆ Life of the structure or site use

Design Specifications Process

- ◆ Use qualified designers
- ◆ Secure multiple stakeholder input
- ◆ Develop basis of design information
- ◆ Specify design components
- ◆ Evaluate each design component
- ◆ Prepare record drawings

Exposure Pathway Considerations

Prevent direct contact:

- ◆ Obstruct direct contact with soil
- ◆ Impede the release of wind-driven soil particulates

Control soil or groundwater vapors:

- ◆ Inhibit the migration of vapors into indoor air

Control groundwater flow:

- ◆ Implement groundwater flow barriers

Engineering Covers



Soil Direct Contact Guidelines

Soil Engineering Control	Exposure Pathway	Thickness to achieve performance objective
Asphalt	<u>Contact</u> , inhalation, leaching to water,	1-3 in. surface over 4-6 in. base
Concrete	<u>Contact, inhalation, leaching to water</u>	3-4 in. surface over 4-6 in. base
Flexible Membrane Liner (FML)	contact, <u>inhalation, leaching to water</u>	FML plus structural member
Soil Covers	<u>Contact, inhalation, leaching to water</u>	Varies from 18 in to 60 in. dependent upon soil type

Vapor Controls



Vapor Control Technologies

- ◆ Prevention from entry
- ◆ Sealing
- ◆ Passive barriers
- ◆ Building pressurization
- ◆ Active soil depressurization (ASD)
- ◆ Removal after entry
- ◆ Building ventilization
- ◆ Air cleaning

Groundwater Barriers



Groundwater Control Technologies

- ◆ Seepage barriers
- ◆ Sealing utility lines
- ◆ Interceptor wells and trenches
- ◆ Slurry walls
- ◆ Permeable reactive barriers (PRBs)

Installation of Engineering Controls

- ◆ Establish QA/QC program
- ◆ Specify qualified installers
- ◆ Document installation

Monitoring and Maintenance Program

- ◆ Must comply with enforcement instruments
- ◆ Specify periodic monitoring
- ◆ Describe schedule and procedures
- ◆ Define how to assess monitoring results
- ◆ Define how to re-evaluate when end uses, regulations, or risk levels change

Monitoring and Maintenance Program



Soil Control Performance Monitoring Guidelines

Cover Type	Design Life	Inspection Frequency	Action Level
Asphalt	10 -15 yrs	Annual	Open cracks, alligator crack pattern
Concrete	20 – 30 yrs	Biennial	Open joints, wide cracks
Flexible Membrane Liner (FML)	50 Yrs	Annual	Tares, structural member movement
Soil covers	15 – 20 yrs	Semi-annual	Erosion, large cracks

Consideration of Activity and Use Limitations

- ◆ Identify the specific activity and use limitations
- ◆ Record the activity and use limitations in real property records

Summary

- ◆ **ASTM E 2435 – 05:**
 - ... outlines a rational, risk-based approach for the design, implementation and monitoring of engineering controls that can facilitate the use or redevelopment of chemical-affected properties

Contacts:

- ◆ To order copies of the ASTM 2435-05 Standard Guideline:

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