Wisconsin DNR Remediation & Redevelopment

Issues & Trends Webinar Series

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Brief Overview of the Important Concepts in "Guidance for Cover Systems as Soil Performance Standard Remedies", publication RR-709
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Topics

- General discussion and overview of requirements
- Cover design criteria and concepts
- Examples

General

- Covers in lieu of or in addition to removing or cleaning up the soil
- May only be used to address contaminated soil, as defined in the rule
- Not an applicable standard for a remedy for waste or waste fills, up to PM to determine if a mixture is to be addressed as soil or waste

General, continued

- Contaminant migration pathways a cover can address are:
  - Direct contact
  - Migration to GW
  - Migration to SW
  - Migration to wetlands
  - Migration to endangered habitats
- Overarching general design requirements:
  - Contain and minimize the spread of contamination
  - Appropriate remedy, if implemented to minimize the spread of contamination for as long as the soils exceed RCLs.
- No specific engineering design standards or criteria, site by site decision. Use the guidance.

General Goals for all Covers

- Implement to address :
  - Erosion
  - Cracking and deterioration
  - Incompatible human activities such as digging, gardening and construction
  - Settlement and shifting
  - Damage from migration of groundwater into the cover
  - Contaminant migration, including migration to the surface of the cover and vapor migration

Design Concepts for Direct Contact Pathway Covers

- Design goal. Site specific factors, including, but not limited to:
  - Effectiveness in meeting the general design goals;
  - Current and known planned land use;
  - Surrounding land use;
  - The nature of the contaminants (concentrations, mobility and toxicity, etc.);
  - How long contaminant concentrations will remain above RCLs;
  - Measures to prevent access;
  - Quality of design, construction and O&M; and
  - The reliability access restrictions, O&M and inspections.

Design Concepts for Direct Contact Pathway Covers, con't

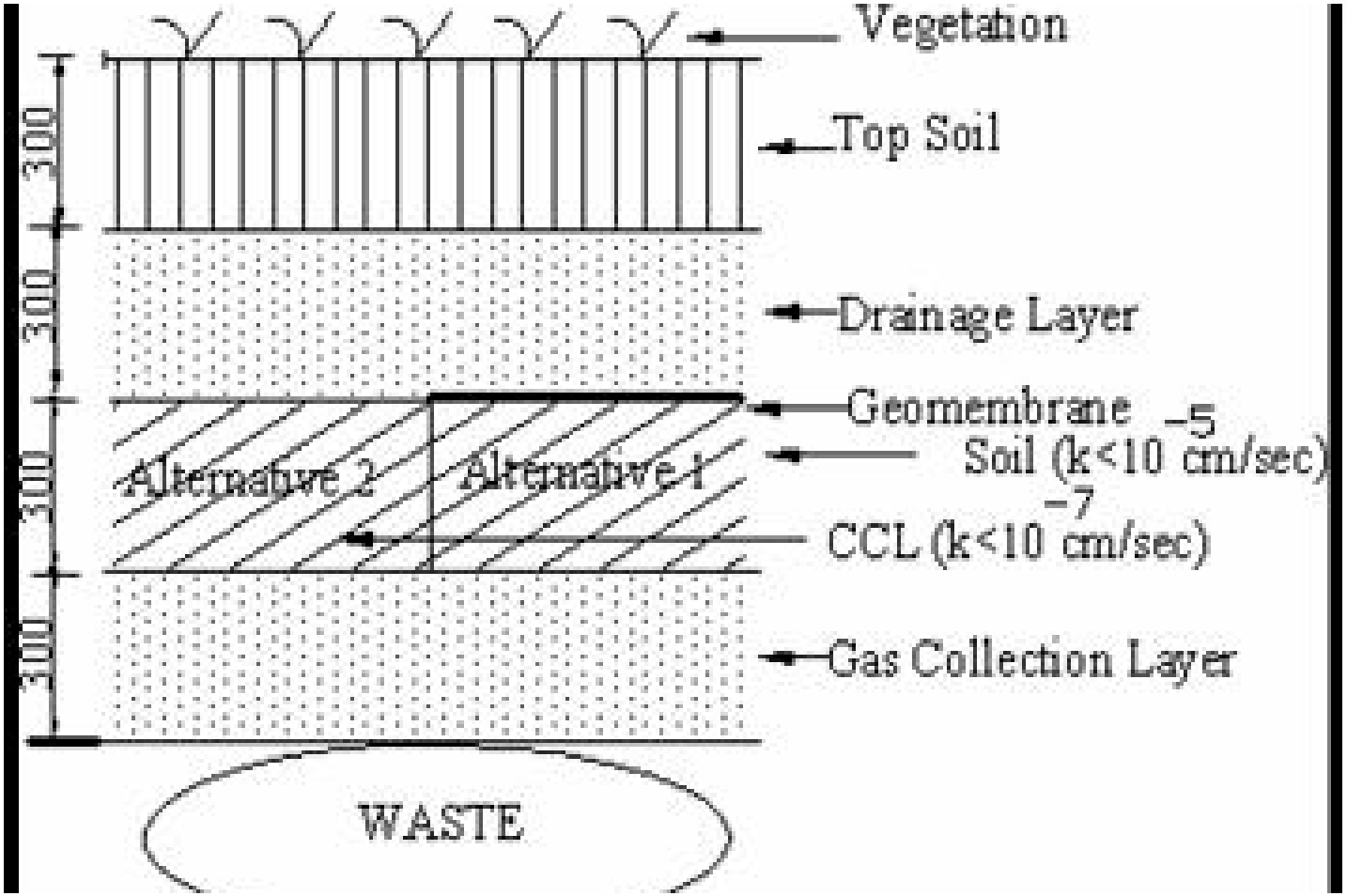
- Cover constructed of soil materials – recommended normal design (starting point) - 2 feet of clean soil fill over the contaminated soil, compacted in lifts, 6" vegetated topsoil or alternatives to vegetated topsoil, such as pavement, bark mulch or gravel. Can vary design based on the above criteria.
- Properly designed and constructed pavement – design concepts outlined in guidance
- Building or structure basements/slabs – design concepts outlined in guidance
- Vapor migration must be accounted for; covers can allow additional horizontal vapor migration

Design Concepts for Migration to GW Pathway Covers

- Design goal. Minimize the migration of contaminants from contaminated soil to groundwater. If infiltration through contaminated soil needs to be significantly minimized (not always the case), then the cover system should include a layer or layers that reduces such infiltration to the greatest extent practicable. The design should take into account :
  - The nature of the contaminants (concentrations, longevity, solubility, recalcitrance, mobility and toxicity, etc.);
  - How long contaminant concentrations will remain above RCLs;
  - Depth of the contamination;
  - Whether the additional infiltration above the amount allowed by the cover would allow groundwater remedial goals to be met;
  - The quality of construction and the operation, maintenance and inspection program for the site; and
  - The reliability O&M and inspections.

Design Concepts for Migration to GW Pathway Covers, con't

- Natural attenuation sites can have the cover as part of the remedy; it often isn't the only mechanism causing GW contaminant reduction. That cover may not have to limit infiltration to the greatest extent practicable.
- W&MM Program LF design, with modifications, can be used, it will limit infiltration to the greatest extent practicable.
- Some types of pavements can be designed to minimize infiltration, but standard pavement doesn't, but can be part of a NA site remedy
- Buildings or structures could minimize infiltration to the extent practicable



Example of Landfill Multi-Layer Cover

Other Pathways and Design

- General Design Runoff Migration to Surface Water, Wetlands and Endangered Habitats Cover System – similar to direct contact discussion
- General construction concepts that meet the guidance should be outlined in a design submittal for new covers

Operation and Maintenance

- Meet NR 724 – normal inspection and maintenance activities to keep cover in good condition and continue to function to meet the purpose
- Maintain vegetation, gravel, bark, etc. so it remains in good condition, deep rooted plants on vegetated covers should be prevented by mowing.
- Pavement deterioration should be repaired promptly at most sites. Exposure to contaminants may occur.
- Inspected at least once a year, more frequent for some designs.
- Inspection log must be kept and submitted if required. The Department inspection audits these sites periodically and can ask to see the log.

Deteriorated Concrete

Eroded Topsoil and Grass

Pothole/Deterioration

Cracked/Failed Concrete Pavement

Failed Asphalt

Failed Gravel

Continuing Obligations

- Closure letter conditions for covers
- GIS Registry
- Maintenance agreements needed where someone besides the RP is responsible for cover maintenance

Submittals and Review

- Closure package:
  - Description of cover, including design and as-built plans as necessary for new covers
  - How cover will maintain protectiveness for all pathways the cover addresses
  - Maintenance agreements
  - O&M plan
  - Registry package
- Closure review - RR staff may require additional actions to ensure the cover system is protective in order to allow closure.
- Other submittals can be used to make demonstrations in advance that a design is appropriate prior to closure with fee:
  - Preliminary design plan
  - Remedial action option report and descriptions of proposed assurances and institutional controls.

New Guidance – Cover Changes Process

- New process guidance in development, not technical
- Closure letters require written approval for changes and replacement of covers
- Guidance on the submittals, process and fees for various change to cover after closure scenarios

Example 1

- Former foundry with Pb in soil contamination in floodplain, future land use is a park, direct contact and erosion to SW pathways
  - Design – 2 feet of clean soil and 6 inches vegetated cover
  - Basis – contamination won’t degrade or move, need enough cover to prevent exposure due to flooding, site won’t be watched or monitored for more than once a year
  - O&M – inspect and make any needed repairs once a year

Example 2

- Former wood treating facility with As contamination, existing asphalt pavement and building cover, direct contact pathway
  - Design – 6 inches of asphalt over 1 foot of sand
  - Basis – cover should prevent As exposure if properly maintained, needs good O&M
  - O&M - Inspect and make any needed repairs once a year. Specific repair procedures for cracks and holes are described. The entire cover should be replaced at the end of the normal expected life of the asphalt – probably after about 20 to 25 years at the longest, so the plan should spell out how that will be done.

Example 3

- Gas station with existing deteriorated asphalt pavement with undocumented construction, benzene just above direct contact RCLs in limited area, no GW contamination expected, direct contact pathway
  - Design – use existing pavement
  - Basis – limited contamination, so with current and planned uses and proper pavement maintenance so it doesn’t deteriorate further, should not be a risk
  - O&M - Inspect and make any needed repairs once a year.

Example 4

- Solvent discharge from underground piping, source actions done, GW contamination concentrations increasing, plume continuing to expand. Owner wants to use area for outdoor storage, groundwater pathway
  - Design – if infiltration reduction is shown to be needed as part of a remedy, use LF cover design with pavement instead of vegetative topsoil or specially designed pavement that reduces infiltration. Must evaluate vapor migration, may need a soil venting system to control horizontal vapor migration.
  - Basis – Source and direct contact pathway dealt with, but deeper vadose zone soils could still be a source and infiltration reduction may help groundwater achieve standards. Site won't be closed until standards reached or NA shown to work through monitoring showing stable or receding plume.
  - O&M - Inspect and make any needed repairs once a year.

Example 5

- Gas station with good concrete pavement, soil contamination above direct contact RCLs 2 feet below surface, groundwater monitoring shows receding plume. No vapor issues. Direct contact and groundwater pathways.
  - Design – use existing pavement
  - Basis – depth of contamination plus good cover should prevent direct contact provided it is maintained and kept in good condition. Existing cover and other mechanisms are effective for the use of NA for groundwater.
  - O&M - Inspect and make any needed repairs once a year.

Example 6

- Gas station with existing deteriorated asphalt pavement with undocumented construction, soil contamination above direct contact RCLs 4 feet or more below surface. No vapor issues. Some contamination may exist below an existing building slab. Groundwater monitoring shows receding plume.
  - Design – use existing cover and slab
  - Basis - depth of contamination and existing cover and slab should prevent direct contact if properly maintained. The existing poorer cover is OK for direct contact because of the depth of the contamination, provided it is maintained and not allowed to deteriorate further. Existing cover and other mechanisms are effective for the use of NA for groundwater.
  - O&M - Inspect and make any needed repairs once a year.

Questions and Information

- Additional questions/discussion
- Cover guidance download: http://dnr.wi.gov/files/PDF/pubs/rr/RR709.pdf

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