Agricultural Chemical Cleanup Program

USING ENGINEERED BARRIERS AS REMEDIAL OPTIONS TO PREVENT OR MITIGATE GROUNDWATER CONTAMINATION AND THEIR ELIGIBILITY UNDER THE ACCP FUND

I. PURPOSE OF GUIDANCE

The focus of this guidance is on the use of engineered barriers (i.e. asphalt, concrete or geomembranes) to reduce infiltration through soil contaminated with pesticides and/or nitrogen above applicable cleanup levels. Engineered barriers should be used to protect groundwater in situations where removal of all the contaminated soil is not practical and the remaining soil contamination may cause or unreasonably extend groundwater contamination.

This guidance document is intended to assist DATCP staff, responsible parties, consultants, and other interested parties, on the use of barriers as a feasible remedy for dealing with residual soil contamination at sites that are being cleaned up under ATCP 35, Wis. Adm. Code. Furthermore, this document is intended to assist individuals in developing and presenting to DATCP the information needed to allow for reimbursement of the barrier by the ACCP fund.

The use of barriers to protect groundwater would be part of a "Performance Standard" as described in NR 720.19 (2). The barrier would be an engineering control that must be maintained so that residual soil contaminants do not pose a threat to public health, safety and welfare, or the environment. Specifically, the barriers should prevent Enforcement Standard exceedances in groundwater immediately downgradient of the residual contamination. The use of a barrier as a performance standard will require a deed restriction and appropriate public notice for site closure.

II. CONSIDERATIONS FOR EVALUATING AND SELECTING BARRIERS AS A REMEDIAL OPTION FOR RESIDUAL SOIL CONTAMINATION

A. Site Characterization

The effectiveness and benefits of using barriers to reduce surface infiltration and protect groundwater are influenced by the natural and human influences on the site. The residual contaminant mass, the site geology, hydrogeology, hydrology, and the facility management practices should all be evaluated to assess the viability of a barrier

as an effective remedial option. Specifically, questions that should be raised during the site evaluation include the following:

- Has the soil contamination at the facility been remediated to the extent practicable?
  The answer should be yes. The soil that can be excavated should be beneficially re-used. Elimination of the threat to groundwater is a better solution than an engineered remedy.
- Is the mass of residual pesticides and/or nitrogen high enough to warrant a deed restriction on the property?
  The answer should probably be yes. If the mass of contaminants is high enough that DATCP will require soil to be excavated when obstacles to excavation are removed, it is a good idea to reduce infiltration at those contaminated areas.

Geological Factors

- What is the permeability of the existing surface materials?
  If the answer is low($<10^{-6}$ cm/sec), why bother installing an engineered barrier?
- What is the permeability of the native soil?
  This will affect the distance the barrier extends beyond the maximum horizontal extent of residual contamination.
- What are the geologic features (soil layering or variations in soil type) that affect infiltration and/or the long-term stability of the barrier?
  The site geology must be considered in the barrier design.
- Is the residual soil contamination in contact with coarse-grained backfill material?
  The barrier must isolate the residual soil contamination from infiltrating water, including water that may accumulate in the backfill.

Hydrogeological Factors

- What are the background concentrations of the contaminants of concern?
  If the residual contamination causes only a slight increase in the contaminant of concern, installing a barrier may not be appropriate.
- Is there engineering control of groundwater at the site?
  If the contaminants can be recovered by an active system, an engineered barrier might reduce the removal of contaminants. Having the soil "washed" by infiltrating water may help remediate the residual contamination.
- What is the depth to the water table and how does it fluctuate in relation to contaminated soil?
  If the depth to water is very shallow, or if the contamination is within the smear zone of the water table, a barrier will not be effective at protecting groundwater.
- How much dilution will occur within the aquifer?
  If the aquifer will significantly dilute the contaminants and the plume is stable or receding, remediation by natural attenuation may be sufficient.

Hydrological factors

- How does the site drainage affect infiltration and runoff/run-on conditions?
  If the existing grades or regrading the site will reduce groundwater contamination, maybe that would be enough.
- Is there ponding or focused recharge at the area of concern?
  The area should be graded to divert water away from the barrier and the edges of the barrier. Eaves troughs may be needed on buildings or downspouts from buildings may need to be re-routed. (Note: These costs may not be eligible for reimbursement from the ACCP).

Site management factors

- Will placing the barrier at the time of excavation be more cost-effective than dealing with the problem later?
  Use of the barrier option should be anticipated and not an afterthought.
- What are the long-term plans for the site?
  If the site will be abandoned and demolished in the near future, or if a building will be put up over the contamination, an engineered barrier is not appropriate.
- Is there equipment or chemicals that will damage the barrier?
  The barrier must be designed to account for the operations in that area.

B. Description of the "Engineered Barrier"

Consultants that propose to use barriers as remedial options must prepare a plan describing the purpose, installation, maintenance, and method of measuring the performance of their "engineered control". The following questions should be considered for each of the above topics:

Purpose

Has the consultant described why the barrier is needed?
Will the barrier option address all of the residual soil contamination?
Is the extent of the barrier appropriate given the site geology, depth to groundwater, and contaminant distribution?
Will the barrier be effective in the proposed setting?

Design and Installation

Where will the barrier be placed, both horizontally and vertically?
How will the barrier be installed?
How thick will the barrier be?
Are there any technical specifications that will be followed by the subcontractor?
Will the consultant provide any oversight for the installation?
If a geomembrane is proposed, will a drainage layer be installed?
If pavement is used, will it be installed in lifts?
Has the RP or consultant proposed any cost sharing for areas that will be paved at the same time?

Maintenance
How often will the barrier be examined?
What are the criteria for repairing the barrier?
How will the barrier be repaired?
How will site employees be notified of the importance of the barrier?
Who will be responsible for maintenance of the barrier if the site is closed?
Who will pay for maintenance of the barrier, and will maintenance be claimed as an ACCP expense?

Performance
How will the performance of the barrier be measured?
Are there any baseline measurements to aid in evaluating the performance?
Is groundwater monitoring being proposed?

C. Reimbursement

The initial placement of the barrier and any consultant oversight may be reimbursed under ACCP provided that the applicable rules of ATCP 35, Wis. Adm. Code, are followed, and the costs for installing the barrier are reviewed in advance by DATCP. The consultant and the DATCP project manager should refer to this guidance to determine if a barrier is a feasible remedial option. Generally, if the barrier is technically feasible and will protect groundwater from residual soil contamination, the costs should be reimbursed. In areas where pavement is required by code , or where an area is or will be covered by a building, costs for paving would probably not be reimbursed.

Typical costs for pavement and geomembranes (including installation) are similar and may range from about $0.50 to $1.00 per square foot, depending on the methods of installation. Designing the barrier, consultant oversight time for installation, if needed, and maintenance, will be additional costs.