



## FREQUENTLY ASKED QUESTIONS (FAQ) & ANSWERS

Recognition of when an alternate groundwater remedy will be required for groundwater remediation at permitted solid **waste landfills**

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### **Introduction**

Once a landfill owner/operator has recognized an exceedance of natural site background in the facility's point of compliance, groundwater monitoring network, the facility must enter the Assessment or Phase II sampling programs. Upon entering the applicable program, the Virginia Solid Waste Management Regulations (VSWMR) require owner/operators establish Groundwater Protection Standards (GPS) based on risk-based alternate concentration limits (ACLs) when no Federal Safe Drinking Water Act Maximum Contaminant Level (MCL) has been promulgated or site-specific (background-based) concentrations are either not available or not established.

If GPS are exceeded, plume delineation and remediation of impacted groundwater will be required under 9 VAC 20-81-260 unless the exceedance can be tied to a source other than the landfill or be shown as caused by an error in sampling, laboratory analysis, or statistical evaluation. While the groundwater remedy implemented on site is designed to successfully achieve GPS within a reasonable timeframe, there may be instances where the clean-up method will not be able to achieve remedial endpoints. Such remedy failure may be due to a number of site-specific causes including aquifer type/characteristics or contaminant class, or simple plume behavior such as off site expansion or groundwater discharge to sensitive environmental receptors.

In those cases where the remedy cannot meet the remedial endpoints, the VSWMR require an owner/operator implement an 'Alternate Remedy' to address the contamination issues unless it can be successfully shown that achieving the remedial endpoints is technically infeasible regardless of the remedy applied. This Frequently Asked Questions (FAQ) document is provided as a reference for owner/operators who may have questions on the process of implementing an Alternate Remedy, including timing-concerns, how

recognition of the need for an alternate remedial approach takes place, as well as submittal requirements, and implementation steps.

As defined under the VSWMR, the decision to implement an Alternate Remedy can be made by either the owner/operator or the Director. In either case, the decision will be based on groundwater quality data obtained after the initial remedy has been implemented and allowed to function on site during one or more Corrective Action Site Evaluation (CASE) periods (defined in the facility Permit) such that sufficient groundwater sampling events have been completed with which to assess groundwater quality trends or recognize impact to environmental receptors.

If you need further assistance with questions related to this FAQ or general corrective action related groundwater issues, please contact the solid waste Groundwater Program Coordinator, Mr. Geoff Christe at (804) 698-4283 or via email at [geoff.christe@deq.virginia.gov](mailto:geoff.christe@deq.virginia.gov). You may call your Regional Office groundwater contact concerning the performance of the chosen remediation technique on your site.

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### **1] What performance characteristics does a remedy have to meet?**

**See 20-81-260.C.3.c.(1)**

*The remedy has to be able to achieve all applicable GPS in all portions of the plume beyond the waste disposal unit boundary while at the same time:*

- ✓ ensuring protection of human health and the environment (HH&E);
- ✓ controlling the source (i.e., the disposed solid waste) of the groundwater release; and where applicable,
- ✓ complying with all applicable standards for the management of investigatively-derived waste.

### **2] What factors have to be evaluated prior to choosing a groundwater remedy?**

**See 20-81-260.D.1.a**

*Any groundwater remedy chosen should have some degree of certainty that if applied, it will be able to meet the performance characteristics noted above. Specifically the effectiveness and protectiveness of the remedy should be assessed against current site conditions and the ability of remedy or its components to:*

- ✓ control the source of the release,
- ✓ be successfully implemented including obtaining any Permits required from other media,
- ✓ be successfully monitored in the lateral and horizontal dimensions by monitoring wells
- ✓ properly manage investigatively-derived waste, and
- ✓ take into account any public concerns associated with the remedy type or timeframe to reach remedy completion viewed in light of current or potential risk to HH&E .

### **3] What role does 'risk' play in remedy selection?**

*The following regulatory requirements must be addressed during the process of selecting an appropriate groundwater remedy, be it the original remedy selected, or an Alternate Remedy:*

- ✓ What are the short term exposure risks associated with remedy implementation (D.1.a.(1).(d))? This most commonly relates to investigatively-derived wastes during remedy construction phases.
- ✓ What are the potential risks to HH&E during the period prior to remedy completion (D.1.b.(5))? This most commonly relates to impact to current water supplies or unpermitted discharge to state waters.
- ✓ What are the potential risks associated with exposure to any remaining wastes on site or future releases from the landfill (D.1.a.(1).(b +f))?
- ✓ What will be the overall magnitude of the reduction of risk as result of remedy implementation (D.1.a.(1).(a))? This issue will be different for each site as it pertains to the level at which GPS is currently exceeded. For instance, if contaminants reside at concentrations marginally above GPS, the choice of a less aggressive remedy may be justifiable.

In the discussion above it is important to recognize that remediation of groundwater is undertaken to remove future risk of exposure to the contaminants on site, not simply current exposure risk. There is no provision to waive clean-up requirements solely based on the provision that no one is 'currently' exposed to the contaminants present in the groundwater on site (i.e., there are no potential receptors or there is an incomplete exposure pathway).

There may be cases where site conditions or land-use on surrounding properties changes (i.e., residential development) after the initial remedy choice has been made. In such cases the selected remedy may no longer be appropriate for long-term application because the land use changes alter the original results of the risk-factors screen completed prior to remedy implementation.

#### **4] To what performance factors is the groundwater remedy compared?**

**See 20-81-260.C.3.c.(1)**

First and foremost, the remedy has to achieve GPS in all points of the plume beyond the waste mass. The remedy also has to demonstrate protection of HH&E, control the source of the release (to prevent or minimize future releases), and (if applicable) properly address the handling of investigatively-derived waste.

If the Permit contains site specific conditions in Module XIV, the remedy must also be able to meet these conditions.

#### **5] How is remedy performance demonstrated or quantified once it is implemented on site?**

Site data collected since remedy implementation is presented in documents titled Corrective Action Site Evaluation (CASE) reports (260.G.1). These documents, which the Department has developed Submission Instructions for (available via links on the DEQ website), address the criteria listed under 260.D.1.b.(8), 260.D.1.c and (with respect to PPR-based remedies) 260.C.2f, as well as any site-specific requirements included as conditions in Module XIV of the facility's solid waste permit.

The general purposes of the CASE are to:

- ✓ demonstrate progress (or lack thereof) toward meeting all remedial endpoints (GPS) and goals of 260.C.3.c.(1),
- ✓ discuss whether any changes in site conditions have taken place that have altered the risk factors assessed during original remedy selection, as well as to review the

- ✓ effectiveness of the monitoring well network used to monitor the effects of the remedy on the aquifer system.

## **6] Who has responsibility for determining a remedy is not performing in a manner that will allow it to achieve all remedial endpoints within a reasonable timeframe?**

Recognition of remedy non-performance may be made by either the owner/operator (by reviewing the groundwater data acquired since remedy implementation), or by the Director during review of the information supplied in the CASE reports (260.G.2). In either case, performance data collected after remedy implementation forms the basis of any decision reached such that either party will be making a decision on the same collected evidence.

## **7] How soon could someone reasonably make such a determination?**

The Department recognizes that the implemented remedy must have been given the necessary 'time' to work. As a result, care will be taken to avoid coming to a premature conclusion on the remedy's ability to meet GPS.

Performance of the remedy will ultimately be judged based on review of such factors as:

- ✓ Review of statistically valid trends in groundwater quality within the plume.
- ✓ Review of lateral and vertical plume dimensions (i.e., evidence of expansion).
- ✓ Review of the adequacy and functionality of the corrective action monitoring network.
- ✓ Evidence of continued (or increased) leachate generation even after placement of final cover on the waste mass.
- ✓ Review of any change in the risk factors on site (or documentation of plume migration off site) since remedy implementation which could negatively impact HH&E.
- ✓ Review of any change in the anticipated remedy completion date (as originally presented in the Corrective Action Plan or Proposal for Presumptive Remedy) which suggests the chosen remedy is working slower than anticipated.
- ✓ Other site specific factors (i.e., impacts to surface water, change in surrounding land use, landfill gas migration issues, etc.).

## **8] Does the VSWMR define a timeframe under which corrective action must be completed?**

EPA's 2004 RCRA Corrective Action guidance noted that remedial endpoints in RCRA corrective action programs should be met within 'reasonable time frames', but neither EPA or the Commonwealth have defined the term 'reasonable timeframe'. EPA's 1993 Subtitle D guidance does not set a timeframe within which positive improvement in groundwater quality should be expected once in Corrective Action. However, the Subtitle D guidance does require all potential remedies be screened against estimated completion timeframes during the Assessment of Corrective Measures process.

Because the Department has other regulatory means with which to require an owner/operator address any immediate risk to HH&E from landfill-derived groundwater impacts, the concept of 'reasonable timeframe' is generally not used as a basis for determining remedy non-performance. As an example, if a plume is showing downward trends in contaminant concentrations, but is also expanding to off-site properties, a more aggressive remedial approach will be required for that reason alone. Alternate Remedy implementation will not be waived simply because the original estimated cleanup timeframe is being met by the current remedy.

Lastly, an owner/operator, after review the anticipated cleanup timeframe associated with the chosen remedy, may decide the long-term monitoring/O & M costs are unacceptable. Therefore, a more aggressive remedy may be more cost-effective to implement if it means corrective actions are completed in 10 years versus 20 years.

**9] Isn't it true that some remedies can have an almost instantaneous effect on groundwater quality, while others may take much longer to work? How many sampling events must be undertaken in order to 'see' potential trends in groundwater quality?**

It is true that many factors control how quickly a potential remedy may impact groundwater quality in the aquifer. Because of this, the Department only reviews the trends observed in the corrective action sampling data after a sufficient number of sampling events have been completed. Most statistically valid trend models will require at least 10 independent data points (sampling events) be completed before such analysis can be completed. Therefore, by the time the 2<sup>nd</sup> CASE report is completed, it is expected that the remedy will have had sufficient time within which to affect the aquifer in a quantifiable manner and such impact should be recognized in trend analysis.

Any failure to recognize an improving trend could indicate remedy non-performance, or improper design of the monitoring network, possibly compounded by inaccurate groundwater flow rate/direction assumptions.

It is important to acknowledge that while groundwater quality trends play an important role in remedy performance decisions, the other review factors listed under question #7 above cannot be ignored.

**10] What are my options if DEQ reaches a decision that my chosen remedy isn't going to be able to achieve remedial endpoints?**

DEQ's goal within the groundwater corrective action process is to work with the facility to reach the appropriate remedy selection and have continued communication regarding remedy performance and possible need for Alternate Remedy selection. Under the VSWMR, the Director is given several authorities regarding remedy performance including requiring an owner/operator to:

- ✓ Implement Interim Measures (260.F.1 + 2) as an augmentation to the original groundwater remedy. Such action, by definition is a step below requiring a totally new remedy be implemented across the plume. If Interim Measures are not considered an appropriate option...
- ✓ Implement an Alternate Remedy (260.G.2), or if site conditions warrant ...
- ✓ Demonstrate that achievement of GPS cannot be practically attained on site with any available remedial technology (260.G.3). In such case, the owner/operator will still be required to implement other measures to control future exposure to the landfill derived contaminants in the aquifer.

**11] I agree that Interim Measures are needed. What actions are required on my part?**

The factors that should be considered when reviewing the need for Interim Measures are listed under 9 VAC 20-81-260.F.3. Consistent with 9 VAC 20-81-260.F.2, Interim Measures shall be implemented within a time frame set by the Director. The Director will likely require an owner/operator submit an Interim Measures work plan for review/approval. Interim Measures

implementation timing would be set in the work plan approval letter issued by the Regional Office. Periodic progress reports may be required by the Director during any 'phases' of Interim Measures implementation.

As defined in the VSWMR, Interim Measures are actions (typically short term) which "contribute to the performance of any remedy that may be required pursuant to meeting the groundwater protection standard". An Interim Measure is not a stand-alone 'remedy' and its use does not trigger the need for a new round of public participation or Permit modification.

**12] I agree an Alternate Remedy is needed; so what actions are required on my part?**

In some cases, an owner/operator may have already described the Alternate Remedy in detail in the existing Corrective Action Plan (CAP). In such cases the new remedy can be implemented as described in the CAP without major modification to the Permit.

In those cases where the Alternate Remedy is not described in the CAP, the owner/operator will have to submit to the Director a revised CAP describing the Alternate Remedy and any modifications to the existing Corrective Action monitoring well network required by the new remedy. Because this remedy will not have gone to public comment in the previous CAP, a new round of public participation would be required. The revised CAP will be referenced in an amended Permit Module XIV via the Permit modification process described in the VSWMR.

**13] My consultant tells me my remedy is working, but DEQ seems to disagree based on the CASE report review comments. Do I have to come to a consensus with DEQ regarding recognition of remedy failure before Alternate Remedy implementation a required?**

Anytime the Department concludes that the original remedy will not be able to achieve the remedial endpoints on site, such decision will be clearly spelled out in the technical review of the facility's CASE report. The review letter will then indicate whether Interim Measures or Alternate Remedy should be the next course of action. The letter will be signed by the Regional Land Protection and Revitalization Manager and will provide a timeframe under which the proposal for Interim Measures or Alternate Remedy will be submitted.

If there is any confusion over the basis on which the DEQ has reached its decision, the Department review letter will allow the owner/operator to request a meeting with the Regional Office within 30-days of CASE review issuance. The meeting will provide a format for the owner/operator to discuss with DEQ any of DEQ's technical review comments or provide a basis for the disagreement on need for further actions to address remedial endpoints. DEQ will gladly provide any needed clarification on its comments and always strives to informally resolve these issues.

In the end, if necessary, the VSWMR give the Director unilateral authority to make a determination that the implemented remedy is not performing in a manner to meet remedial endpoints and require Alternate Remedy (or Interim Measures) use (260.G.2). Prior to completion of such action, you will be able to present any additional information or argument pursuant to the allowances of the Administrative Process Act (APA).

**14] Would there be compliance ramifications in ignoring a Director request to implement Interim Measures or an alternate clean-up technique?**

*As with any non-compliance issue, this would be addressed in accordance with Department policy, including the Solid Waste Inspection Manual and the Enforcement Manual.*

**15] What other options would I have if I disagree with the need for an Alternate Remedy on site?**

*You are always encouraged to discuss your technical disagreement with DEQ and the Department strives to resolve such matters informally through such dialogue with a facility. If resolution cannot be reached informally, a unilateral decision by DEQ to require an alternate remedy would be addressed pursuant to the APA and the owner/operator would have both regulatory and statutory options to present information and argument along with other rights.*