

[SLIDE 1] Remediation

I am here to talk to you today about the **[SLIDE 2]** remediation requirements of the Voluntary Action Program, including how to address contamination that has emanated from the property to an off-property receptor. I will discuss the types of remedies you can use to meet applicable standards, how to document those remedies and how to make change to the remedies. Finally, we'll go over the technical guidance documents that are available for the remedy rule. Keep in mind that when you read the VAP rules, they refer to the volunteer for specific obligations with regards to VAP remediation requirements. This is because the rule applies to the volunteer but as the volunteer's representative, you, as a CP, are responsible for satisfying those remedial obligations before issuing the NFA letter.

[SLIDE 3] As you know, the end goal of environmental assessment implemented through a Phase II property assessment, or Phase II, is to identify the specific types and concentrations of chemicals of concern, or COCs, either hazardous substances or petroleum, that exceed the VAP risk goals within relevant environmental media.

The applicable standards for most properties under the VAP are based upon the risk goals of 1E-5 for excess cancer risk (equivalent to 1 in 100,000), and 1 for non-cancer risk, commonly referred to as the Hazard Index. Where conditions at a property exceed these risk based standards, the CP must make a decision to implement some kind of remedial activity to achieve compliance with applicable standards and risk goals. Before a CP can issue a NFA letter under the VAP, he or she must demonstrate that applicable standards and risk goals are attained in all relevant environmental media. If the property exceeds applicable standards in any media, then a remedy must be employed to mitigate the risk and/or achieve compliance with the applicable standard.

[SLIDE 4] Remedial activities must be conducted to meet applicable standards when a Phase II reveals that the concentrations of COCs, in any relevant environmental media where a complete exposure pathway exists, do not comply with one or more of the following applicable standards:

- a) Generic numerical standards set forth in rule 08;

- b) Property specific risk assessment or risk derived applicable standards set forth in rule 09;
- c) Background levels as determined in accordance with rule 07, or
- d) Any other applicable standard as defined by the rules.

For each complete exposure pathway, an applicable standard needs to be developed during the Phase II, including a property-specific risk assessment, if required. For those complete pathways which fail to comply with applicable standards, the CP must implement a remedy that results in compliance with applicable standards, or otherwise renders the pathway incomplete.

[SLIDE 5] Pathways to off-property receptors that cannot be remedied.

The statute specifies that the covenant not to sue, or CNS, releases the person who undertook the voluntary action from civil liability to the state to address a release of hazardous substance or petroleum on or from the property. This would include releases that have left the property. In some cases it may be difficult for the volunteer to implement a remedy on another property. The owner of the other property may refuse access, or there may be insufficient access to collect samples for a Phase II. If the volunteer demonstrates that they have made diligent efforts but have been unsuccessful in implementing a remedy for an off-site receptor, then the pathway can be omitted from the voluntary action.

[SLIDE 6] The CP can request an off-property receptor pathway omission if volunteer has met the following criteria:

- Determined potential off-property receptors;
- Determined potential complete pathways to those receptors;
- Contacted each property owner(s) and provided each owner written notice of the potential pathways and potential risks associated with the pathway;
- **[SLIDE 7]** Explained to each owner the activities that might be reasonably employed to investigate and address the pathway;
- Offered to pay all reasonable costs associated with installation of the remedy, including the costs of repairing any damages caused as a result; and

- Documented all discussions and correspondence that resulted in the owner refusing to have the remedy installed;
- Documented any other reason that prevented the installation of a reasonable remedy

[SLIDE 8] The CP must request the pathway omission from the agency prior to issuing an NFA letter. The written request for approval to omit the pathway must include a description of the voluntary action property, the pathway in question and the receptor property or properties. The CP must provide documentation that the pathway omission criteria have been met and that the receptor property owner has been notified of the potential pathways and associated risks. The agency will review the request, taking into account whether approving the pathway omission will allow the rest of the voluntary action to go forward and result in improved environmental conditions. A complete request will be acted upon within 90 days of receipt. The volunteer is responsible for all the costs incurred by the agency to review the pathway omission request; this will be handled with a VAP T.A. account. Such requests can be withdrawn at any time.

Achieving applicable standards

[SLIDE 9] In some cases, the property may not have achieved compliance with applicable standards before you issue the NFA letter. This commonly occurs when remedies for ground water need time to reach the standard. The VAP remediation rule codified in Ohio Administrative Code, or OAC 3745-300-11 states that for any property that has implemented a remedy that will but has not yet achieved those standards can still be issued an NFA letter. However, the NFA letter must demonstrate the implementation of interim remedial measures that maintain protectiveness for all potential receptors until the remedy has achieved applicable standards.

[SLIDE 10] Remediation can be diverse and falls into the following categories:

- Active remediation;
- Passive remediation;
- Institutional controls; and
- Engineering controls.

[SLIDE 11] Active Remediation - Active remediation are those remedial activities that will reduce the mass, toxicity, mobility or concentration of the COC. The most common form of active remediation is excavation and disposal of contaminated soils. Other types of active remediation may include air sparging, soil washing, groundwater pump and treat, soil vapor extraction, dual phase extraction and in-situ bioremediation. Active remediation may also involve short term activities such as soil removal and disposal.

[SLIDE 12] Passive Remediation - Passive remediation involves those remedial activities that rely upon in-place natural methods documented in peer reviewed scientific literature that are intended to reduce the mass, toxicity, mobility or concentration of a COC over distance and time through natural attenuation processes.

[SLIDE 25] An example of passive remediation is monitored natural attenuation. Natural attenuation is a generic term for the physical processes of adsorption, absorption, advection, dispersion, diffusion, dilution from recharge, and volatilization.

[SLIDE 14] Some other types of natural attenuation can include the following chemical processes:

- aerobic biodegradation;
- anaerobic biodegradation;
- chemical oxidation processes; and
- hydrolysis and other reactions.

[SLIDE 15] It should be noted that in the VAP a reliance on natural attenuation to achieve compliance with applicable standards must be supported with sufficient environmental monitoring data. The remedy itself is “monitored natural attenuation” rather than simply “natural attenuation.” The environmental data must be collected with regard to space and time to prove that the applicable standards will be met during the performance time period for the remedy. There is guidance available that covers this in detail.

[SLIDE 16] Institutional Controls - Institutional controls are placed on a property to achieve compliance with an applicable standard. They are typically used to eliminate a particular pathway. A few key points to note about institutional controls:

- Institutional controls must be established by recording a deed restriction or environmental covenant that imposes a restriction on the property;
- Institutional controls must be transferable with the property and recorded with the county recorder in the same manner as a deed to the property;
- Institutional controls must be effective at eliminating or mitigating complete exposure pathways to hazardous substances and/or petroleum contamination, and finally,
- Institutional controls must be capable of being monitored, maintained, and enforced by the owner or operator of the property.

Some examples of institutional controls include a deed restriction (or environmental covenant, if the NFA letter has been submitted in request of a CNS) to restrict various activities such as land use, groundwater use, sub-surface construction, and restrictions against human activity patterns at a property.

[SLIDE 17]Engineering Controls

Compliance with applicable standards can also be demonstrated by employing an engineered control at the property. An engineering control relies on its ability to block a complete exposure pathway, thereby eliminating the potential for exposure. Keep in mind that if your remedy relies upon an engineering control, then you have to prepare and submit an operation and maintenance, or O&M plan that is associated with the engineering control. We will talk later in more detail about O&M plans.

[SLIDE 18]Examples of engineered controls or engineering controls include:

- parking lot or pavements acting as barriers to direct contact of contaminated soil,
- soil caps to prevent leaching of chemicals into the ground water,
- soil caps to eliminate direct contact by receptors to chemicals within the zone of compliance,
- foundations and building floor slabs engineered to eliminate direct contact by the occupants to underlying COCs and/or eliminate or reduce leaching of COCs, and
- sub-slab vapor diversion systems to prevent vapor infiltration into the building interiors.

[SLIDE 19] It's important to point out the differences between engineering controls and risk mitigation measures.

[SLIDE 20] Risk mitigation measures are used to protect construction workers during construction or excavation activities. Risk mitigation measures are needed if it is anticipated that the point of compliance for direct contact with soil will be breached, or an engineering control is going to be breached during or after conducting the voluntary action. Risk mitigation measures are also needed if workers will be in direct contact with ground water not meeting applicable standards.

[SLIDE 21] If the risk mitigation measures are necessary for the property to meet applicable standards after issuance of the NFA letter for the property, the risk mitigation measures must be implemented through a risk mitigation plan.

Documentation and oversight of remedial activities

[SLIDE 22] As mentioned before, the NFA letter must demonstrate how remedial activities meet the applicable standards on the property. The volunteer must also provide monitoring and maintenance schedules. The type of documentation needed is dependent on the type of remedy implemented.

[SLIDE 23] Institutional controls and activity and use limitations
Ohio's uniform environmental covenant law changed portions of the VAP statute and created a new procedure for creating use restrictions, including deed restrictions such as commercial/industrial land use restrictions or restrictions against ground water use. This law applies to "environmental response projects", which include properties that are subject to an NFA letter submitted with a request for a CNS. Activity and use limitations, or AULs, are established through environmental covenants instead of declarations or up front deed restrictions. This requirement does not apply to NFA letters that do not request a CNS from the director of the Ohio EPA.

[SLIDE 24] The VAP has guidance on environmental covenants which includes language for the most common generic types of use restrictions. The guidance and an environmental covenant template are located on the VAP website.

[SLIDE 25] AULs are land use restrictions such as commercial/industrial use requirements, restrictions against groundwater use, and restrictions against the construction of sub-surface structures such as basements for routine human occupancy. Where required, the CP must include a draft environmental covenant with the NFA letter. The VAP encourages you to discuss the language of the proposed environmental covenant with the Ohio EPA prior to finalizing the document and sending it in to the agency with the NFA letter. It is also beneficial to discuss the implications of the language in the proposed environmental covenant with your client and the volunteer and make sure they understand what obligations there are for maintaining the AULs. The recording of the environmental covenant happens within 30 days of the issuance of CNS.

[SLIDE 26] Risk mitigation measures

Risk mitigation plans are a means of documenting the risk mitigation measures. Risk mitigation measures can also be defined as health and safety precautions that are taken to reduce or eliminate human exposures. They are undertaken to protect people performing construction or excavation activities, working with an environmental media, and working with COCs that could exceed applicable standards. Risk mitigation measures may also be employed to reduce potential risks while temporarily breaching a zone of compliance. A risk mitigation plan is required if the risk mitigation measures are necessary for the property to meet applicable standards after issuance of the NFA letter for the property.

[SLIDE 27] The risk mitigation plan must include, at a minimum:

- A description of the purpose of the plan, including a summary of the potential health risks associated with the COCs at the property;
- A description of the specific precautions against exposure to be taken at the property;
- Directions on how to handle environmental media at the property that may contain COCs;
- The locations at the property where the risk mitigation plan will be implemented, including a property map;

- **[SLIDE 28]** Provisions for when the risk mitigation plan will be implemented at the property;
- Provisions for giving notice of the risk mitigation plan to construction workers working in areas where risk mitigation measures are necessary;
- A summary explanation of the precautions that each contractor must require of and communicate to its employees and subcontractors;
- Provisions for annually notifying the director as to whether implementation of the risk mitigation plan occurred; and if implemented, details of the events that required; and
- The criteria for termination of the risk mitigation plan.

A template for the risk mitigation plan template is located on the VAP web site.

[SLIDE 29] Engineering controls and remedies in progress

An O&M plan is required if the NFA letter relies on one or both of the following:

1. An engineering control that involves operation and maintenance necessary to maintain applicable standards at a property following the issuance of the NFA letter. Examples of such engineering controls are caps, whether asphalt or soil, that prevent direct contact or leaching, or a soil vapor extraction system.
2. Any remedial activity that has been built and implemented but has not achieved compliance with applicable standards prior to issuance of the NFA letter. Such remedies may include various kinds of active or passive remediation. Keep in mind that if the remedial activities are not completed prior to issuance of the NFA, they must be completed within five years or the time frame agreed to in an O&M agreement. In addition, interim measures may be necessary to ensure protection of human health and the environment until applicable standards are achieved.

[SLIDE 30] When a remedy is required to have an O&M plan, the CP must develop and implement an O&M plan that includes the following components:

- A summary of the applicable standards and the purpose of the remedial activities;
- A plan for implementing the remedial activities, including normal operation and maintenance;

- A plan for evaluating the effectiveness of the remedial activities;
- A description of equipment required to operate and maintain the remedial activities;
- A plan for adjustments to normal operation and maintenance. Examples of adjustments that may be necessary to maintain the effectiveness of the remedial activity, but which may not be within the scope of normal operation and maintenance, include changing the pumping rates in extraction wells or installing additional wells or larger pumps to achieve gradient control;
- **[SLIDE 31]** A plan for addressing potential problems with the remedial activities. This should also include a description of the means for detecting the problems and a schedule for periodically inspecting the remedial activities;
- A description of all records that will be kept for documenting the effective implementation of the remedy; and
- A strategy for terminating the remedial activities, including a description of the data and information that will be collected to support the termination criteria.

[SLIDE 32] That said, once an O&M plan is in place, at least once annually following the issuance of the NFA letter, the CP or other persons responsible for the plan must submit a report to the director of the Ohio EPA that demonstrates the efficacy of the remedy being proposed under the O&M plan. Furthermore, the report must include a confirmation that the remedy, whether engineering control, active remediation or passive remediation, remains in place for the property to comply with the applicable standards.

The O&M plan, when required, must be prepared and implemented prior to the issuance of the NFA letter. Once an O&M plan is prepared and submitted to the director, an O&M agreement must be entered into between the director of Ohio EPA and the person responsible for the O&M activities.

[SLIDE 33] VAP has a generic template for drafting O&M Agreements. Keep in mind that an O&M Plan and draft O&M agreement is required to be submitted with a NFA letter. O&M agreement negotiations between the volunteer (or whoever will be responsible for

implementation) and the Ohio EPA VAP Legal staff are generally conducted following submittal of the NFA Letter.

[SLIDE 34] Remedy changes after the CNS has been issued

The volunteer may choose to change the remedy after the covenant has been issued. In order to assure that the property continues to comply with applicable standards and the CNS remains in good standing, the volunteer needs collect any data necessary to support the remedy revision and maintain the existing remedies until they are replaced or terminated. Keep in mind that remedy modifications or enhancements done in accordance with the O&M plan do not constitute a remedy change.

[SLIDE 35] The volunteer may choose to submit a remedy revision notice to demonstrate that the new remedial activity has been implemented in accordance with this rule. The notice should include the following:

- A description of the remedial activities necessary to maintain compliance with applicable standards;
- A statement from the CP that the property complies with applicable standards;
- A list of the data, reports and documents used to verify that the property meets applicable standards;
- A description of the remedial activity that is being discontinued;
- A new environmental covenant if the applicable standards require a new or revised institutional control; and
- A new O&M plan and agreement if the applicable standards require an engineering control.

[SLIDE 36] Once the volunteer has submitted a remedy revision notice, they can request a remedy revision acknowledgement or a remedy revision approval from the agency.

[SLIDE 37] If the volunteer requests a remedy revision approval, then they need to open a TA account to cover the agency costs to review the remedy revision notice and to process the approval letter. A remedy revision approval would give the volunteer assurance as to the adequacy of the new remedy to meet applicable standard, and there would not be the

expectation of a compliance audit. Keep in mind, however, that a remedy revision that involves a land use change that cannot be supported by the data collected for the original NFA letter requires the issuance of a new NFA letter.

If the volunteer requests an acknowledgement, the agency does not review the revision, but would consider those sites for a compliance audit. In any event, the volunteer would still need to open a TA account if the remedy revision requires a new or modified O&M plan or agreement or new environmental covenant.

[SLIDE 38] The technical guidance compendium, or TGC, on the Ohio EPA website currently has four guidance documents that specifically relate to the VAP remediation rule.

[SLIDE 39] The first TGC document is titled “Using a passive remedy to ensure compliance with applicable standards for potential “future” exposure scenarios.” The question posed here is whether a passive remedy implemented through an O&M plan can be used to ensure that applicable standards will not be exceeded for potential “future” exposure pathways to on and off-property receptors. The short answer is yes, a passive remedy can be implemented to ensure compliance with applicable standards. Bear in mind that similar to an active remedy, a passive remedy will require an O&M Plan to demonstrate that the assumptions that support the passive remedy continue to be valid. However, as with any other remedy, the volunteer or CP must demonstrate that the passive remedy is an appropriate remedial activity for the property.

[SLIDE 40] The second TGC document deals with injection wells used to inject fluids for remedial purposes. A well is defined as a bored, drilled or driven shaft, or a dug hole, whose depth is greater than the largest surface dimension according to rule 01. Fluid means a material or substance which flows or moves whether in a semisolid, liquid, sludge or gas phase, or any other form per rule 01. As you know by now, the remediation rule requires a voluntary action to comply with other laws of the state when conducting remedial activities.

For remedial projects, a formal permit may not be necessary if the fluids to be injected do not exceed primary drinking water standards. However, as a CP, you must apply and receive a Class 5X26 exemption for a remediation project. A summary and information on how to

obtain such an exemption for a remediation project can be found at the website on your screen.

[SLIDE 41] The third TGC document deals with hazardous waste reporting requirements; specifically, shipment of hazardous waste to off-site licensed permitted Hazardous Waste Treatment/Storage/Disposal facilities from a VAP property. As we said earlier, when completing remedial activities under the VAP, you must comply with all other applicable rules and regulations pertaining to the laws of the state. One such requirement is the filing of a hazardous waste annual report. Whenever the volunteer generates 1000 kg of hazardous waste a month or is otherwise subject to OAC 3745-52-34(A) and ships the hazardous waste off-site, they must comply with the annual reporting requirements found in OAC 3745-52-41. Examples of typical hazardous wastes at VAP sites may include contaminated media (for example, soil and groundwater), spent filter media like wastewater treatment sludge, spent carbon units, contaminated personal protective equipment and hazardous wastewater.

[SLIDE 42] Information regarding how to file an annual report can be found on the Division of Materials and Waste Management website. You can also call (614) 644-2917 and ask to speak to an Environmental Specialist. In addition, treatment, storage, and disposal facilities receiving the waste are required to file annual reports in Ohio regarding hazardous waste received from off-site. The Division of Materials and Waste Management uses this information to cross check and make sure that all hazardous waste generators who should have filed an annual report did so. Therefore, if the remedy resulted in the generation of hazardous waste subject to these reporting requirements and an annual report is not filed, the volunteer will likely receive a Notice of Violation from Ohio EPA. Always comply with the rules and regulations of other divisions or agencies when completing remedial activities at a VAP property.

[SLIDE 43] The fourth and final TGC document deals with the installation of a fence as a remedy. The question that frequently arises is whether fencing used to restrict access to a property as a remedial activity should be incorporated into an institutional control, or is better treated as an engineering control? The short answer is if a volunteer chooses to install and maintain a fence for use as part of its remedial activities, the volunteer should treat the fence as an engineering control and not an institutional control or AUL.

[SLIDE 44] If a fence is implemented as part of an AUL and at any point is damaged or compromised, then the CNS is immediately declared void by law, pursuant to ORC 3746. However, if the fence is used as part of an engineering control and it is damaged or compromised, the volunteer has the opportunity to repair or replace it as directed by the property's O&M plan. Pursuant to ORC 3746, the volunteer is afforded a final opportunity to correct issues related to a property's non compliance with an engineering control (known as the "opportunity to cure") before Ohio EPA begins the covenant revocation process. This opportunity to cure is not available to correct a property's noncompliance with AULs, when the CNS has been voided.

[SLIDE 45] There are many scenarios that could cause a fence to be damaged or compromised, including heavy storms, intruders, or even normal wear and tear. In addition, unforeseen circumstances may require the temporary removal of a fence (or portions of a fence) during the movement of large machinery or vehicles into or outside the fenced area. By using a fence as an AUL, the volunteer loses the ability to modify the fencing or cure any defects that would void the CNS. Alternatively, a volunteer who installs and maintains a fence as an engineering control has an opportunity to inspect and make any necessary repairs to the fence, thus avoiding the automatic voidance of the covenant.

[SLIDE 46] Now that we've covered all the basics of the VAP remediation rule, I wanted to give you a list of common errors by CPs while applying this rule. This list is not in any order of priority.

- ❖ Failure to include an O&M Plan in the NFA letter when the remedy includes an engineering control
- ❖ Failure to declare the building slab or foundation or parking lot as an engineering control when its presence is used to reduce rainwater infiltration and leaching, or as a barrier to direct contact soil exposures.
- ❖ **[SLIDE 47]** Failure to mitigate the risks to construction workers if those risks exceed applicable standards. These measures are usually specified in a risk mitigation plan, which would also be required in the NFA Letter.

- ❖ Failure to demonstrate the effectiveness of a remedy at its conclusion through sampling of environmental media. In the case of groundwater and soil vapors, multiple rounds of confirmation sampling may be required.
- ❖ **[SLIDE 48]** Failure to properly characterize the soils, sediment, or groundwater for disposal to an off-site facility. Bear in mind that RCRA regulations could apply to pre-1980 releases if the soils or groundwater, once excavated, are designated as RCRA listed wastes.
- ❖ Failure to appropriately document the implementation of the remedy, or obtain the proper permits while implementing the remedy.
- ❖ **[SLIDE 49]** Failure to record deed restrictions, and assure that the conditions on which a property-specific risk assessment is based remain valid.
- ❖ Failure to provide multiple rounds of sampling data when monitored natural attenuation is the chosen remedy.
- ❖ Failure to make a provision for financial assurance mechanisms under the O&M agreement.
- ❖ **[SLIDE 50]** Failure to implement appropriate response requirements as remedial measures for the type and classification of groundwater.
- ❖ Failure to verify the Urban Setting Designation still exists at a property when the USD is used to change the groundwater response requirements or remedial activities.

That concludes our discussion of the VAP remediation rule.