New Jersey Department of Environmental Protection: summary of existing guidance regarding Ground Water Remedial Action Permit Applications - vertical delineation of ground water contamination and monitored natural attenuation proposals (November 2019)

Over the last several years, the New Jersey Department of Environmental Protection - Site Remediation & Waste Management Program (SRWMP) has received Remedial Action Reports (RAR) and Ground Water Remedial Action Permit (GWRAP) Applications that are deficient in several areas. In particular, the vertical delineation of ground water is often incomplete, and key information is not submitted regarding the evaluation of monitored natural attenuation (MNA) as a remedial alternative. If the appropriate information is not submitted in the RAR or GWRAP Application, the SRWMP then needs to contact the licensed site remediation professional (LSRP) and possibly the person responsible for conducting the remediation (PRCR) to obtain the information, resulting in a delay in issuing the remedial action permit. In some cases, the RAR or GWRAP Application needs to be withdrawn by the PRCR or is considered incomplete and a GWRAP will not be issued by the SRWMP.

This document summarizes key points in various guidance documents, including the "Ground Water Technical Guidance for Site Investigation, Remedial Investigation, and Remedial Action Performance Monitoring" and "Monitored Natural Attenuation Technical Guidance," to assist the PRCR in ensuring vertical delineation of the contaminant plume is complete, and that their MNA GWRAP Application is complete prior to submission. These guidelines apply to most cases but are not all-inclusive. LSRPs must apply their independent professional judgement when varying from rules and deviating from guidance and provide a technical and scientific justification with multiple lines of evidence.

Vertical Delineation

When reviewing RARs and GWRAP Applications, the following two issues regarding the vertical delineation of ground water routinely have been noted.

Pursuant to N.J.A.C. 7:26E-4.3(a)4, "The person responsible for conducting the remediation shall conduct a remedial investigation of contaminated ground water by delineating the horizontal and vertical extent of ground water contamination to the ground water remediation standard" regardless of what contaminants of concern are present. Vertical delineation is required for all contaminants, not just those with a specific gravity greater than 1. For example, vertical delineation is required on sites where gasoline discharges have occurred. Therefore, "clean zone" sampling analytical results (concentrations at or below standards) are required to demonstrate attainment of the applicable ground water remediation standards at the conclusion of the remedial action and prior to the issuance of the Response Action Outcome (RAO). The June 2014 policy statement "Interpretation of Completing a Remedial Investigation at a Contaminated Site," which describes what is required to consider the remedial investigation complete, allows for modeling and/or projections of "clean zones." However, the same guidance also states that sampling data must be submitted prior to issuance of the RAO that demonstrates attainment of the applicable remediation standards. The June 2014 Policy statement can be found at: www.state.nj.us/dep/srp/srra/training/matrix/important_messages/June2014_revised_ri_complete_policy_statement.pdf.

The second issue is the placement of the vertical delineation sampling points. When monitoring wells are installed for the purpose of vertical delineation, they should be located in the source area or immediately downgradient of the source area. The SRWMP has reviewed many RARs where the vertical delineation

sampling points are tens to hundreds of feet away from the source area being investigated. As per the Ground Water Technical Guidance for Site Investigation, Remedial Investigation, and Remedial Action Performance Monitoring, "Monitoring well(s) should be located within the source area, where possible, or as close downgradient as feasible to monitor the effectiveness of source area remediation. Well clusters should be installed downgradient from, and as close to, the source area to monitor the vertical extent of the source area and to assure that the source remedial action is effective." Please note that this section of the technical guidance supersedes the 2001 guidance from the Site Remediation News pertaining to diving MTBE plumes.

Monitored Natural Attenuation

The SRWMP has also received many GWRAP Applications proposing MNA that do not meet the basic criteria as outlined in the Monitored Natural Attenuation Technical Guidance (MNA Guidance) document.

The two most common issues are (1) the number of rounds of ground water monitoring data necessary to evaluate the effectiveness of MNA and (2) the evaluation of the ground water contaminant plume behavior (i.e., is the plume growing, stable, or shrinking). Although not explicitly stated in regulation, the evaluation of the plume behavior should include a demonstration that the source area for the ground water contamination has been properly addressed. As noted in the MNA Guidance document, MNA may be appropriate as a ground water remedy if no source is present. If source material remains, the SRWMP may not be able to determine the protectiveness of the MNA remedial action.

<u>Number and timing of ground water sample collection</u>

Section 6.1 of the MNA Guidance document states that a minimum of eight rounds of ground water monitoring data should be used to demonstrate the applicability of MNA. Historical site investigation or remedial investigation data may be used to comprise the total of eight rounds, where these data reflect only post-remedial action conditions. Of these eight rounds, four consecutive quarterly ground water monitoring events are necessary to evaluate spatial and temporal distribution. Many of the MNA proposals received by the SRWMP are deficient relative to the number of rounds of ground water monitoring data used to evaluate the effectiveness of MNA in two ways.

The first issue is the minimum number of rounds of ground water monitoring data are not submitted. Many of the MNA proposals are being submitted with only three or four rounds of ground water monitoring data. There may be situations where this may be appropriate [such as ground water contaminant concentrations near the ground water remediation standard(s)], but many times these submittals then lack the technical and scientific justification or lines of evidence to support the claim that the ground water contamination is naturally attenuating.

The second issue is the timing of when the ground water sampling events occurred. As stated in the MNA Guidance document, the eight rounds should be collected after all active remedial actions have been completed. As stated above, historical site investigation or remedial investigation ground water monitoring data may be used to comprise the total of eight rounds, but only if these data reflect only post-remedial action conditions. There have been many instances where MNA proposals have been submitted using pre-remedial action ground water monitoring data to demonstrate a decreasing trend. By including these data, it is not possible to determine whether a decreasing trend is due to the active remedial actions or natural attenuation.

Evaluation of Ground Water Plume Behavior

Another issue with MNA proposals is the evaluation of the ground water plume behavior. Evidence of a shrinking or stable plume is required for MNA to be considered as a remedy as discussed in Section of 6.1 of the MNA Guidance document. A shrinking plume is demonstrated with concentration trends and the areal extent of the plume both decreasing over time. A stable plume is demonstrated when the concentration trends remain the same over time, the areal configuration of the plume remains the same over time, and the contaminant concentrations in the sentinel well remain below the ground water remediation standards throughout the evaluation timeframe. To make the determination that a plume is stable, it may require a more thorough evaluation of the secondary and possibly tertiary lines of evidence that natural attenuation is occurring at the site.

As addressed in Section 4.1 of the MNA Guidance document, the MNA proposal must include documentation demonstrating that source identification, removal, and control are complete, including ground water contaminant concentrations indicating that the source has been removed. Regarding the stable plume scenario, the SRWMP has received several MNA proposals for sites that have ground water contaminant concentrations that are indicative of free or residual product or evidence of remaining source material. Some MNA proposals are being submitted with contaminant concentrations in soil clearly above the impact to ground water soil screening levels or where potential areas of concern were not properly investigated or both. For these scenarios, the SRWMP requires submittal of technical and scientific justification detailing how the natural attenuation remedial action will be protective of public health and safety and of the environment.