Back to School, Back to Work: Spotlight on ROS

by Lisa M Alexander

Summer is winding down and it's that time of year again: back to school, back to work – or both. September 29th will be the Boston office kick off for this year's Audit Case Study Training (4 hrs DEP credit), using a case that started as simple "L2" Audit of a cleanup with Remedy Operation Status (ROS). We will again start with a "homework" assignment and a short questionnaire to fill out, followed by three hours of "in-house" training with MassDEP facilitating informal discussions. Be sure to bring the completed "homework" assignment as your "admission" to the training.

To get us all thinking about ROS – what needs to happen and what can go wrong – this month's article includes summaries and findings from three ROS sites we audited in the last year or so. Note: none of these cases will be used in the case study!

NOAF/SITE INSPECTION

Groundwater Collection of Cadmium to Protect a Wetland (Millbury)

This cadmium-contaminated site began with Immediate Response Action (IRA) assessment actions in 2005. The elevated cadmium observed in groundwater was believed to have resulted from the biological degradation of residual petroleum in the soils creating localized reducing conditions that released naturally occurring cadmium from the soils. In 2007, a Release Abatement Measure (RAM) was implemented to capture the contaminated groundwater to prevent its migration to nearby wetlands. The groundwater is used on site as part of an industrial process. The RAM was incorporated into a Phase IV Remedy Operation Status in 2008.

Following submittal of a 2009 ROS Status Report, the site was selected for a Level 2 Remedial System Inspection audit. MassDEP staff accompanied the LSP to the site where both MassDEP and the LSP collected several discrete samples from surface water in the wetlands and groundwater collected from the system. Following evaluation of the samples, MassDEP issued the audit finding indicating no violations were identified and the system working as designed.

NOAF, 2-0015886, Millbury

NOAF/NON

Bioventing an Oil Contaminated Site near a River (Williamstown)

In June 2000, bioventing was selected as the Comprehensive Remedial Alternative for this oil-contaminated site. The Phase III discussion regarding the selection of Remedial Alternatives pointed out that bioventing *may* have limited effectiveness depending on the actual thickness of the light non-aqueous phase liquid (LNAPL) in soil and groundwater. After the installation of the remedy, discussions in the Phase IV Final Inspection Report stated that one measure of the success of the system during monitoring would include carbon dioxide readings of 5 to 10%, indicative of aerobic degradation.

The February 2009 ROS Status Report noted sheens on groundwater in one monitoring well in June and December 2008, along with persistent intermittent LNAPL breakouts to a nearby river, requiring deployment of a containment boom at a riverbank adjacent to the site. These findings suggested the oil was neither eliminated nor controlled despite the installation and operation of the bioventing system. Additionally, carbon dioxide readings at the site ranged from only 0% to 0.1% in all nine vapor monitoring points, far less than a minimum 5% indicative of petroleum breakdown. Data provided and analyzed in the February 2009 report suggested that the remediation strategy was not making progress toward a Permanent Solution and that, in fact, an Immediate Response Action (IRA) was needed at the site.

Violations listed for this NOAF/NON were:

- 310 CMR 40.0893(2)(b) and (d): failure to control or eliminate contaminant migration and progress toward a Permanent Solution;
- 310 CMR 40.0893(2)(c): failure to properly establish, operate and maintain a remedial monitoring program, and, following significant changes in site conditions that had caused changes in the monitoring program (e.g., sheens on river, lost monitoring wells), failure to note those changes in the monitoring program and also, failure to address the use and maintenance or disposal of the containment boom; and
- 310 CMR 40.0893(2)(f): failure to submit timely ROS Status Reports every six months (reports were generally from 1 to 7 months late, with more than 13 months having elapsed between two status reports).

Actions required at the end of the Audit:

- Perform an Immediate Response Action within 14 days and inspect and maintain boom in the river;
- Replace or repair two monitoring wells;
- Perform monthly gauging and bailing of LNAPL as needed in several monitoring wells;
- Additional assessment in the downgradient direction;
- Terminate existing Remedy Operation Status and submit and Tier I Permit, Tier II Permit Classification or Extension application;
- Submit a revised Phase III; and
- When appropriate actions are completed, submit a Post-Audit Completion Statement.

NOAF/NON# NON-WE-09-3A037, RTN 1-00367, Williamstown

NOAF/Audit Inspection
Soil Vapor Extraction at Site with TCE, nearby Residences and River (Essex)
This site is the location of trichloroethylene release near a residential property and a brook. A Condition of Substantial Release Migration had been identified at the site in 2008 and an IRA was initiated to assess vapor migration toward the residence, evaluate when groundwater contaminants were entering the brook, and generally conduct subsurface assessment to confirm migration pathways (this was not completed).

A remedial system was installed, comprised of a series of horizontal sub-slab depressurization pipes located under the floor of the building to extract vapors and send them to a knockout drum and two 300 pound vapor phase carbon treatment units. In general, the system runs continuously, except in high water table situations (usually late winter/early spring). The system has been shut down at least once to observe rebound and was brought back online after vapors built up below the slab. It should also be noted that the most recent ROS Status Reports prior to the Audit showed an expanded area of contamination on the site plans included with the report (including an adjacent residential property not previously included).

The field inspection for this site focused primarily on the Remedial System's discharge, including onsite screening of the treatment system influent and effluent. The Audit focused on the ROS Status Reports and a limited review of information in the files. While violations were not specified *per se*, several comments were included in the "Inspection Outcome" and the NOAF noted that the site had been flagged for Comprehensive Audit. Comments focused on:

- Failure to complete the proposed plume delineation (and failure to demonstrate that either the vertical or horizontal extent of the groundwater plume had been determined);
- Failure to demonstrate that there is sufficient understanding of the subsurface geology to determine plume migration pathways;
- Failure to remove remediation wastes from the site within the 120 days required by the MCP;
- Use of a single analytical sample to make determinations about the effectiveness of the treatment system;
- Request for additional technical justification for risk evaluations since the system was off for almost one and a half years; and
- Failure to demonstrate the current remedial approach on which the ROS is based is controlling the plume or that it will achieve a Permanent Solution.

NOAF/Audit Inspection, RTN 3-19187, Essex

NOAF/NON & UAO/PAN
GW Extraction & Treatment at Oil Site near Private Wells, Wetlands (Athol)
This former car dealership is the site of an oil release in an area where private wells are present. A 1999 Phase IV Remedy Implementation Plan proposed a pump and treat system to contain and treat petroleum-contaminated groundwater. At the time the system was designed, it was proposed in the Operation, Maintenance and Monitoring (OMM) plan that the system would run primarily from April to November of each year.

In early 2009, MassDEP conducted a site inspection focusing on the ROS system and recent inspection and monitoring reports for the site. An NOAF/NON was issued in April 2009 noting several violations that required attention and correction.

On March 14, 2010, when the NOAF/NON violations were not addressed, MassDEP issued a Unilateral Administrative Order and a Penalty Assessment Notice for $4,730.

Violations listed in the NOAF/NON were:

- 310 CMR 40.0893(2)(b)-(f):
    - (b) Failure to adequately design the remedial system (the March 2008 ROS report indicated that the groundwater had been remediated to asymptotic levels; however, despite influent samples from 2007 that exceeded applicable standards, there was no re-sampling in April 2008 to demonstrate that the site had been actually been remediated to the applicable GW-1 standards);
    - (c) Failure to properly operate and maintain the system;
    - (d) Failure to eliminate or control each source of oil and/or hazardous material at the site;
    - (e) Failure to eliminate Substantial Hazards present from the groundwater to the residential wells and abutting wetlands (the NOAF/NON also notes the possibility of uncontrolled sources of contamination at the site);
    - (f) Failure to properly document the operation, maintenance and monitoring of the system in Status Reports in April and October 2008.

MassDEP also noted failure to appropriately locate monitoring wells to evaluate areas of potential environmental concern, failure to sample wells in known contaminated areas and failure to target probable contaminants associated with leaded gasoline, waste oil and fuel oil. The work conducted at the site did not demonstrate that remedial goals were being met as required by 310 CMR 40.0893(6) prior to initiating "rebound" monitoring.

Actions required at the end of the Audit:

- Terminate the ROS; and
- Correct violations in the NOAF/NON and submit a Post-Audit Completion Statement.

Despite the NOAF/NON requirements, the additional work was not completed. On March 14, 2010, MassDEP issued a Penalty of $4,730 for violations listed under 310 CMR 40.0893(2)(b), (c), (d), (e) and 310 CMR 40.0893, failure to submit ROS reports.

NOAF/NON, NON-WE-09-3A028, RTN 1-2000014, Athol
UAO-WE-10-3001/PAN-WE-10-3003, RTN 1-2000014, Athol