Reviewing LTMO Evaluations

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LTMO

Purpose

- Specifically Discuss Approach to Review of LTMO Results, Since Many Will not Perform Analyses.
- LTMO Studies Require Quality Control/Assurance Review
  - As Client – Perform What was Asked?
  - As Regulator – Appropriate for Site, Consistent with Requirements and Objectives?
- Discussion for Regulators, Applicable for Clients

Overview

- Will Cover:
  - General Considerations in Review
  - Data Amount, Quality, and Comparability
  - Evaluation of Recommendations Relative to Hydrogeology and Plume Behavior
  - Comparison of Recommendations to LTM Objectives and Regulatory Requirements
  - Personnel Qualifications
  - Logistical Impacts of Recommendations
  - Verification of Estimated Cost Impacts

General Considerations in Review

- Inevitably Requires Some Qualitative Evaluation of LTM Program by Technical Staff
- Review LTMO Recommendations for
  - Adequate Consideration of Subsurface Conditions
  - Adequate Considerations of Objectives, Requirements, Constraints
  - Balance (Look for Both Redundancy and Gaps)
- Documentation (Rationale, Output of Computer Programs)

Data Review

- The LTMO Evaluation Hinges on Historical Data
- Require Some Familiarity with Data
  - Were Samples Collected in Valid Way?
  - Were Analytical Methods Valid?
    - Detection Limits Adequate
    - Dilutions, Qualifiers
  - Errors in Transcription for Use in LTMO?

Data Review, Continued

- Sufficient Amount of Data?
  - More than 6 Past Sampling Events for Temporal Study (including appropriate seasons)?
  - 20-30 Monitoring Point for Quantitative Spatial Analysis?
  - Appropriate Time Frame for Data (e.g., Only Since Start of Remedy)
- Data Comparability
  - Sampling and Analytical Methods

Data Review, Continued

- Red Flags
  - Questions about Data Set
    - Poor Quality (Field or Lab)
    - Elevated Detection Limits Relative to Standards/Goals, Differences in Dilutions
    - Mixed Data
    - Non-Representative Conditions
      - Pre-Remediation
      - Drought, Flood, etc.
  - Insufficient Data

LTMO Recommendations and Site Hydrogeology

- Review Requires Technical Knowledge of Site Conditions and Hydrogeology
- Have Well Developed Conceptual Model
- Consider
  - Speed of Contaminant Transport (Does Proposed Frequency Account for Time to React?)
  - Definition of Preferred Pathways (e.g., Fractures, Channels, Pumping Wells?)
  - Vertical Distribution of Wells (Retain Wells in All Applicable Contaminated Aquifers, Levels?)
  - Plume Behavior (Degradation/Dispersion, Burial by Recharge)
- Assumptions in Methods Consistent with Site Conditions?

Review of Recommendations Relative to Monitoring Objectives

- Verify Real LTM Objectives were Stated in Report
- Compare Recommended Frequency and Network (and Analytical Changes) to Objectives
  - Adequate to Assess Migration Outside the Current Plume Boundaries?
  - Adequate to Assess Progress toward Remediation
  - Adequate to Assess Unexpected Behavior (e.g. Rebound, Outside Contaminants)
  - Adequate to Provide Early Warning to Exposure Point
  - Meet Stakeholder Concerns?

Review of Recommendations for Other LTM Aspects

- Recommendations of LTMO May Address other Aspects
  - Proposed Changes to Sampling Methods
  - Proposed Changes Analytical Methods
- Proposed Methods Must Provide Data of Adequate Quality
- Adequate Steps Should be Taken to Assess Comparability of Past, Future Data
- Are there Plans for Documentation of Changes to LTM Program in Revised Sampling and Analysis Plan?

Review for Regulatory Compliance

- Do Recommendations Meet Minimum State and Federal Regulatory Requirements?
  - Permit Requirements (or Propose Changes in Manner Consistent with Regulatory Program)
  - Minimum Sampling
    - Upgradient and Downgradient
    - Spacing of Perimeter Wells
    - Point of Compliance Wells
    - Within Plume
  - Analytical Parameters (Long List is Unchanged by LTMO Process, but is Monitored Less Frequently)

Review for Regulatory Compliance, Continued

- Do Recommendations Meet Minimum State, Federal Regulatory Requirements (Continued)?
  - Minimum Number of Sample Rounds and Seasonal Sampling Required by Regulation
  - Appropriate Statistical Analysis
  - Applicable Regulatory Monitoring Program
    - Corrective Action Monitoring Program
    - Detection Monitoring Program after Corrective Action Complete

Other Review Considerations

- Personnel Qualifications
  - Look for Qualifications in Workplan
  - Adequate Technical Competence of Preparer
    - Hydrogeology
    - Statistics
    - Professional Registration
  - If not Qualified, What Next?

Other Review Considerations, Continued

- Logistical Considerations
  - Sample Timing (Weather Conditions)
  - Combining Sampling Rounds, Avoid Multiple Mobilization, Require Different Equipment
  - Availability of Wells for Sampling (e.g., Seasonal Homes, Irrigation Wells)

Verification of Cost Impacts

- Particularly for Managers, Clients
  - Verify that Baseline Costs Appropriately Stated
  - Evaluate Assumed Hourly Rates, Analytical Costs
  - Evaluate Reasonableness of
    - Time and Analytical Savings
    - Crew-Size Changes (Maintain Safety)
    - Include Mob Costs and Preparation/Coordination
  - Assess Impact on Reporting and Data Management
  - Assess Costs for Additional Monitoring Wells in Light of Past Costs for Similar Wells

Summary

- Some Qualitative Assessment Needed
- Requires Understanding of Site Conditions
- Clear LTM Objectives a Must
- Assure Adequate Data Amount and Quality for Site Decisions
- Reality of Cost Projections
- Now Better Prepared to Assess the Adequacy of the LTMO