
Groundwater
Restoration Remedial Action
Completion
EPA United States Environmental Protection Agency

Welcome!

- Introduction to your instructors

Course Objectives

- Understand EPA's recommendations for determining if a groundwater restoration remedial action is complete;
- Understand recommendations for evaluating contaminant of concern concentration levels on a well-by well basis;
- Have exposure to the groundwater statistics tool and understand how it may be used to evaluate well-specific data; and
- Understand how well-specific conclusions may be used to make a determination that the restoration remedial action is complete

Course Outline

- Overview of the Guidance for Evaluating Completion of Groundwater Restoration Remedial Actions – November 2013
- Overview of the Recommended Approach for Well-specific Analysis and the Groundwater Statistics Tool- August 2014

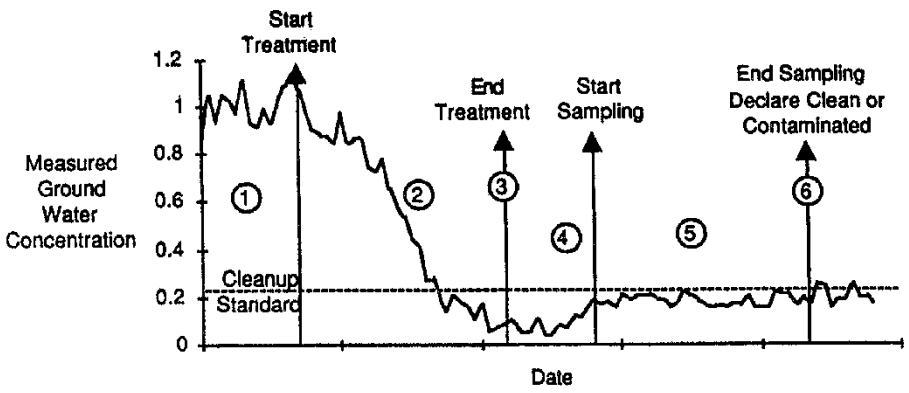
GROUNDWATER COMPLETION GUIDANCE

Purpose of the Guidance

- Provide guidance for EPA Regions on how to determine when a groundwater restoration remedial action is complete.
- Provide EPA Superfund Program and stakeholders an OSWER document that clarifies groundwater attainment expectations that are referenced and/or discussed in a number of existing OSWER and EPA -wide guidance

Existing Attainment Guidance and Approach

"**Methods for Monitoring Pump-and-Treat Performance", June 1994.**
Office of Research and Development Publication EPA/600/R-94/123

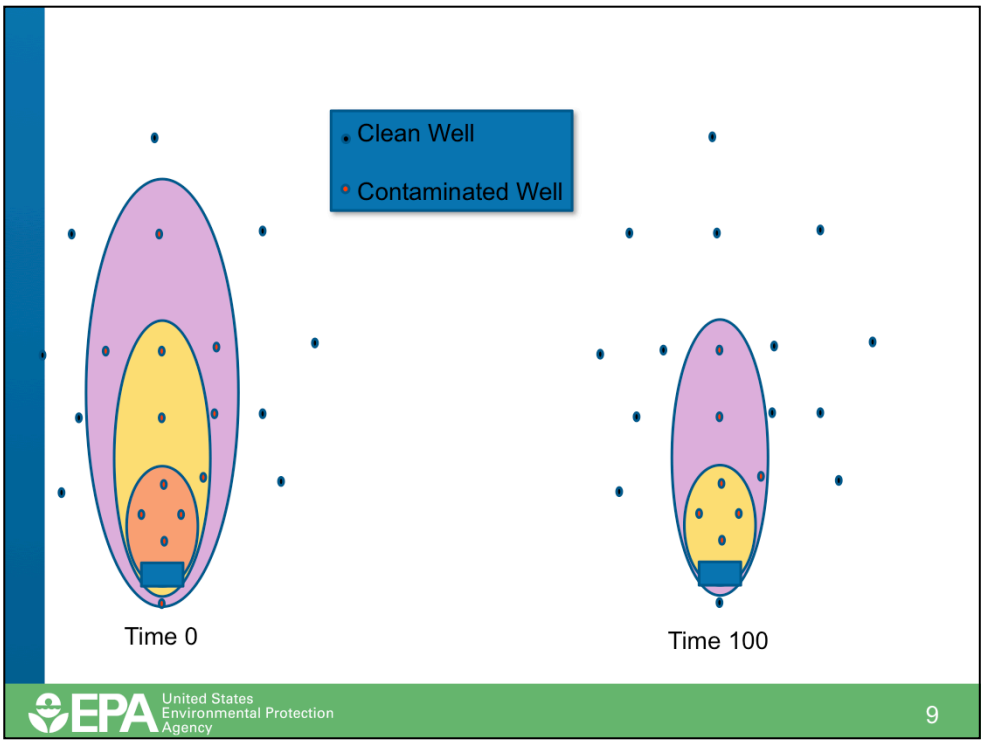


Guidance Overview

- Recommends evaluating contaminant of concern (COC) concentration levels on a well-by-well basis
- EPA Regions should use monitoring well-specific conclusions to provide a technical and scientific basis supporting the Agency's conclusion that the groundwater has met and will continue to meet cleanup levels for all COCs in the future

Well-by-Well Analysis - Why?

- Groundwater restoration is a long term and dynamic process
- Monitoring well network
  - Well network should be designed to adequately characterize and evaluate the contaminated aquifer
  - Number of wells and frequency of sampling changes as lateral and vertical extent of contaminated aquifer change during remediation
- Well specific conclusions should be made throughout the lifetime of the remedial action


Clean Well
Contaminated Well
Time 0
Time 100
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Well-by-Well Analysis: An Overview

- Two “Phases”
  - Remediation Monitoring Phase
  - Attainment Monitoring Phase

Remediation Monitoring Phase

- Phase of the remedy where either active or passive remedial activities are being implemented to reach groundwater cleanup levels selected in a remedy decision document
- The completion of this phase provides stakeholders a decision point for determining that the groundwater in a well has reached cleanup levels for all contaminants of concern
- **Decision point to start evaluating attainment**

Attainment Monitoring Phase

- Phase of the remedy and monitoring conducted after cleanup levels have been reached
- Considerations of active versus passive systems
- Evaluations done on a contaminant by contaminant-specific basis
- The completion of this phase when monitoring data analysis provides conclusions that:
  - The contaminant cleanup level has been met; and
  - Groundwater will continue to meet the contaminant cleanup level in the future

Remedial Action Completion Determination

- Based on well-specific conclusions
- Guidance does not recommend:
  - Aggregating conclusions between well
  - Aggregating conclusion between intervals for wells with multiple discrete screening depths
- Well-specific conclusions should be evaluated in conjunction with the conceptual site model to ensure well network sufficient to characterize lateral and vertical extent of contaminated aquifer

Remedial Action Completion Determination

- Well-specific conclusions should be evaluated in conjunction with the conceptual site model to ensure well network sufficient to characterize lateral and vertical extent of contaminated aquifer
- Rationale is documented in a Final Close Out Report

QUESTIONS ON THE GUIDANCE?

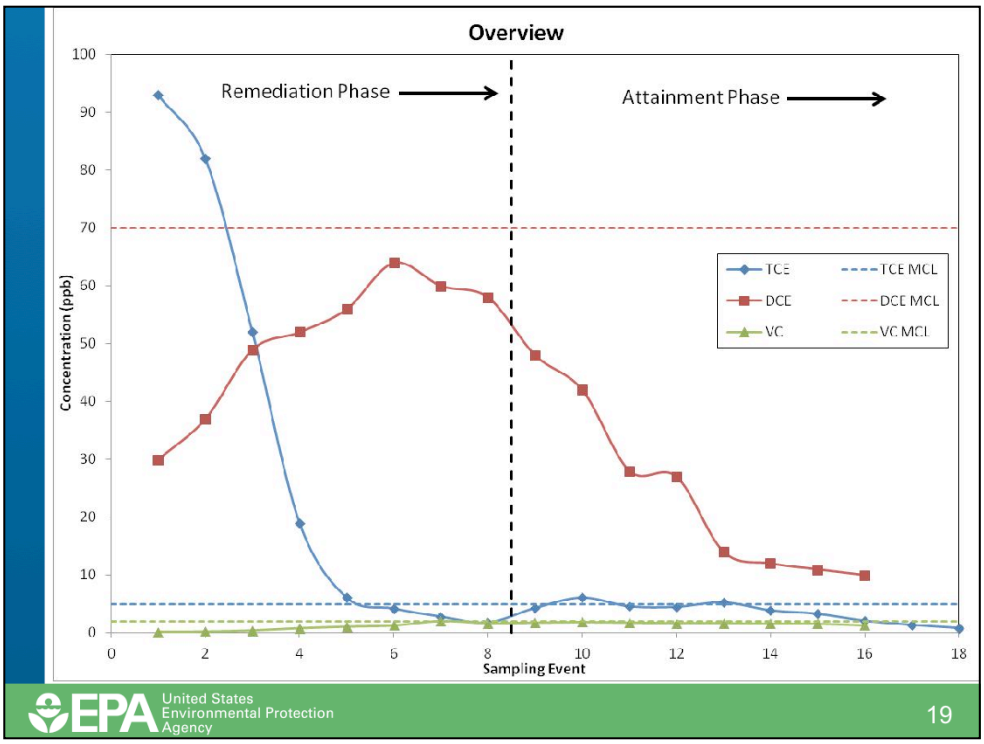
RECOMMENDED APPROACH AND STATISTICAL TOOL

Recommended Approach

- Provides a methodology for conducting a well-specific analysis
- Document contains recommendations on:
  - Data set considerations
  - Remediation Monitoring Phase statistical evaluation (if needed)
  - Attainment Monitoring Phase statistical evaluation (if needed)

Statistical Tool

- Comports with the Recommended Approach
- Tool to use statistics to evaluate completion of a groundwater remediation action at a specific well (for a specific contaminant)
- Other potential uses


Overview
Remediation Phase
Attainment Phase
Concentration (ppb)
Sampling Event
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DCE
VC
TCE MCL
DCE MCL
VC MCL
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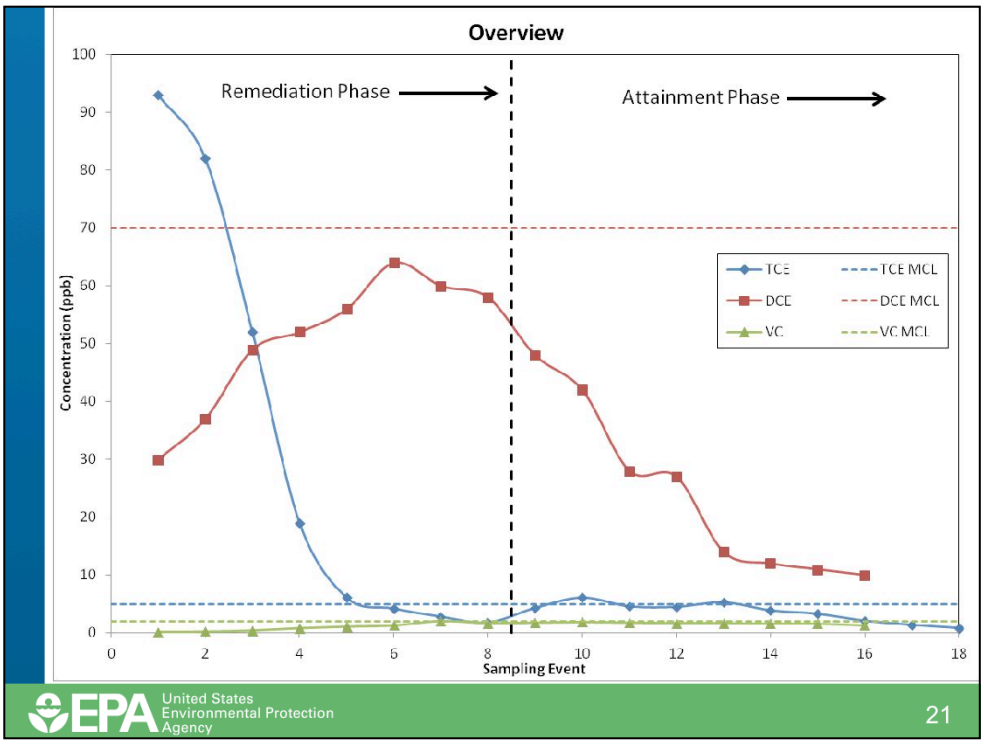
Remediation Monitoring Phase Completion Determination

- Done for ALL contaminants in a well
- Goal(s):
  - Provide a decision point to start attainment monitoring phase data collection and analysis
  - Terminate active systems if they are being employed
- Methodology:
  - Nonstatistical or visual evaluation
  - Statistical tools (2 types)
    - Mean test
    - Trend test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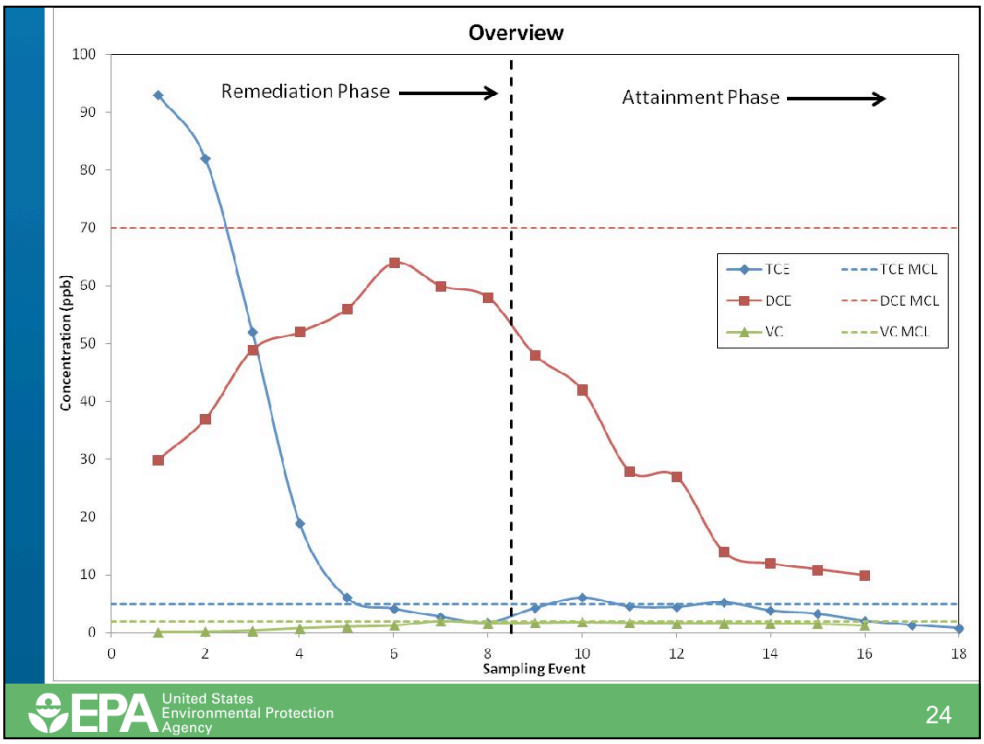
Attainment Monitoring Phase Completion Determination

- Performed for each contaminant separately
- Goal(s):
  - Provide assurance that the cleanup level for each contaminant in the well has been met; and
  - Provide assurance that the groundwater in the well will remain below contaminant cleanup level(s) in the future
- Steady State Considerations
  - Active systems versus passive systems
  - Data set considerations

Attainment Monitoring Phase Completion Determination

- Guidance recommends two lines of evidence to support completion of this phase
- Methodology:
  - Nonstatistical or visual evaluation
  - Meeting contaminant cleanup level?
    - Mean test
  - Groundwater anticipated to continue to meet contaminant cleanup levels in the future?
    - Trend test (slope)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QUESTIONS ON THE RECOMMENDED APPROACH AND STATISTICAL TOOL?

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