U.S. EPA Superfund Approach to Groundwater Protection and its Role in EPA's Relationship with NRC

Stuart Walker
U.S. Environmental Protection Agency
Office of Superfund Remediation
and Technology Innovation (OSRTI)

Presented to the
Public Meeting on NRC Groundwater Task Force
in Rockville, MD. on October 4, 2010

EPA

Purpose

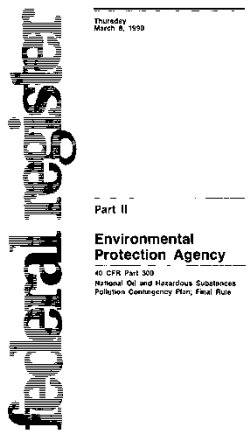
- Overview of EPA Superfund Approach to Groundwater Protection
- Overview of EPA MOU with NRC
  - » Including role of groundwater protection in the MOU

EPA

Q:\COMP\ENVIR\CERCLA

COMPREHENSIVE ENVIRONMENTAL RESPONSE, COMPENSATION, AND LIABILITY ACT OF 1980
"SUPERFUND"

February 24, 2004



federal register

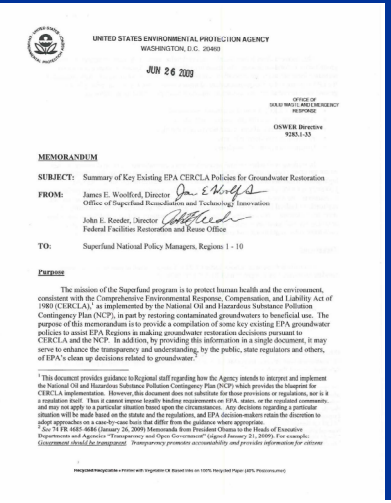
Thursday
March 8, 1990

Part II

Environmental Protection Agency

40 CFR Part 300
National Oil and Hazardous Substances Pollution Contingency Plan; Final Rule

1. EPA CERCLA Groundwater Protection Approach (Statute, Regulations, and Guidance)



UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
WASHINGTON, D.C. 20460

JUN 26 2009

OFFICE OF SOLID WASTE AND EMERGENCY RESPONSE

OSWER Directive 9283.1-33

MEMORANDUM

SUBJECT: Summary of Key Existing EPA CERCLA Policies for Groundwater Restoration

FROM: James E. Woolford, Director
Office of Superfund Remediation and Technology Innovation

John E. Reeder, Director
Federal Facilities Restoration and Reuse Office

TO: Superfund National Policy Managers, Regions 1 - 10

Purpose

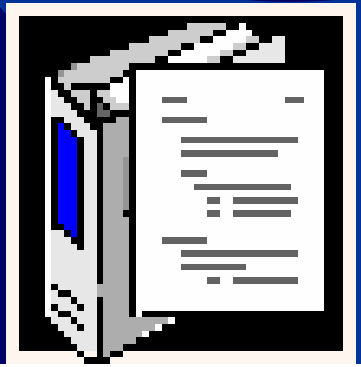
The mission of the Superfund program is to protect human health and the environment, consistent with the Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (CERCLA),[1] as implemented by the National Oil and Hazardous Substance Pollution Contingency Plan (NCP), in part by restoring contaminated groundwaters to beneficial use. The purpose of this memorandum is to provide a compilation of some key existing EPA groundwater policies to assist EPA Regions in making groundwater restoration decisions pursuant to CERCLA and the NCP. In addition, by providing this information in a single document, it may serve to enhance the transparency and understanding, by the public, state regulators and others, of EPA's clean up decisions related to groundwater.[2]

[1] This document provides guidance to Regional staff regarding how the Agency intends to interpret and implement the National Oil and Hazardous Substance Pollution Contingency Plan (NCP) which provides the blueprint for CERCLA implementation. However, this document does not substitute for those provisions or regulations, nor is it a regulation itself. Thus it cannot impose legally binding requirements on EPA, states, or the regulated community, and may not apply to a particular situation based upon the circumstances. Any decisions regarding a particular situation will be made based on the statute and the regulations, and EPA decision-makers retain the discretion to adopt approaches on a case-by-case basis that differ from the guidance where appropriate.
[2] See 74 FR 4685-4686 (January 26, 2009) Memoranda from President Obama to the Heads of Executive Departments and Agencies "Transparency and Open Government" (signed January 21, 2009). For example: *Government should be transparent. Transparency promotes accountability and provides information for citizens*

Recycled/Recyclable • Printed with Vegetable Oil Based Inks on 100% Recycled Paper (40% Post-consumer)

EPA Addresses Site Cleanup Under Several Laws, Programs

- Comprehensive Environmental Response, Compensation & Liability Act, CERCLA or "Superfund"
- National Contingency Plan (NCP) is regulation for CERCLA
- National Priorities List (NPL) guides EPA on which sites need further attention



EPA

Groundwater Expectation -- CERCLA

- CERCLA 121 (d)(2)(A):
  - » ... Such remedial action shall require a level or standard of control which at least **attains Maximum Contaminant Level Goals** established under the Safe Drinking Water Act and **water quality criteria** established under section 304 or 303 of the Clean Water Act, where such goals or criteria are relevant and appropriate under the circumstances of the release or potential release.

EPA

Groundwater Expectation -- NCP

- CFR 300.430(a)(1)(iii)(F):

" …**return usable groundwaters to their *beneficial uses* wherever *practicable***, within a ***timeframe that is reasonable…"***

" When restoration of groundwater to beneficial uses is not practicable, …**prevent further migration** of the plume, **prevent exposure** to the contaminated groundwater, and evaluate further risk reduction."

EPA

Groundwater Principles Memorandum Restoration (June 26, 2009)

- Groundwater restoration expectation
- 5 Principles of groundwater remediation
- Summarizes existing policy:
  - » Whether action is warranted
  - » Role of institutional controls (ICs)
  - » Groundwater classification
  - » Cleanup levels
  - » Point of compliance

EPA

Whether Action is Warranted

- Action is generally warranted:
  - » Current or potential drinking water aquifers exceeds risk based standards (e.g., MCLs) or
  - » Poses an unacceptable risk (10-4 for carcinogens)
  - » Exceeds protective levels for other routes of exposure
    - —Vapor intrusion, or threat to sediment quality, surface water quality, wetlands or critical habitats

EPA

Groundwater Classification

- *EPA Guidelines/or Ground-Water Classification* (Final Draft, December 1986), or

- EPA endorsed Comprehensive State Ground Water Protection Program (CSGWPP)

Land-use is not a basis for groundwater use classifications.

EPA

Cleanup Level

- Applicable or Relevant and Appropriate Requirements (ARARs) such as Federal or State MCLs or non-zero MCLGs or
- Risk-based levels if no ARARs or ARARs not sufficiently protective
  - » Generally use “tap water” scenario in EPA PRG calculator to determine risk based concentrations

Cleanup levels need to address drinking water exposure and other routes of exposure (e.g., for vapor intrusion; sediment; surface water; wetlands, as a source to other media).

EPA

Common ARARs for Radionuclides in Groundwater

- Federal MCLs (40 CFR Part 141 (SDWA))
  - » 5 pCi/l [0.185 Bq/l] of radium-226 and -228 combined
  - » 4 mrem/yr [0.04 mSv/yr] from beta particles and photon emitters to total body or any internal organ
  - » 15 pCi/l [0.555 Bq/l] for gross alpha particle activity (excluding radon and uranium)
  - » 30 micrograms per liter of uranium
- Uranium in groundwater (40 CFR Part 192 (UMTRCA))
  - » 30 pCi/l [1.11 Bq/l] of uranium-234 and -238 combined
- State MCLs if more stringent than federal

EPA

Point of Compliance

- Cleanup levels are to be achieved throughout the plume or,
- Where there is a waste management area, at the edge of the waste management area

EPA

Role of Institutional Controls (ICs)

- Basis for Action -- ICs not considered
  - » "baseline assessment is essentially an evaluation of the no-action alternative." (NCP)

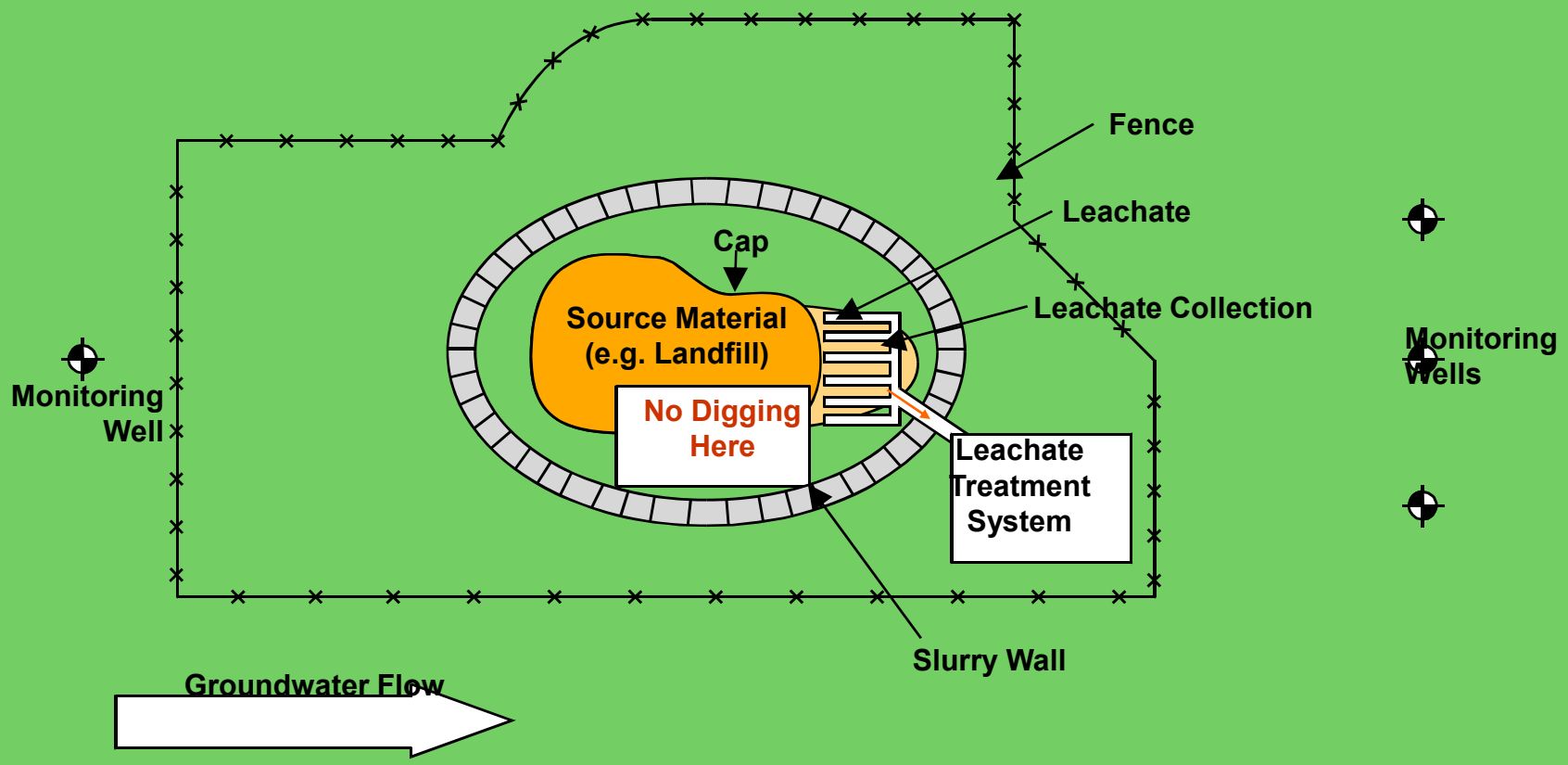
- Remedy -- IC by itself generally should not substitute for active remediation
  - —"Institutional controls will usually be used as supplementary protective measures during implementation of ground-water remedies" (NCP)

EPA

Guidance: Uranium in Groundwater

- *Use of Uranium Drinking Water Standards Under 40 CFR 141 and 40 CFR 192 as Remediation Goals for Groundwater at CERCLA Sites* (11/6/01) OSWER Directive 9283.1-14
- Guidance on the use of MCL and UMTRCA uranium standards as ARARs for groundwater
- When both standards are ARARs, must attain or waive both
  1. 30 micrograms per liter of total uranium
  2. 30 pCi/l [1.11 Bq/l] of uranium-234 and 238 combined
- Use MCL ARAR point of compliance for UMTRCA
- Includes a list of radionuclides under 4 mrem/year beta and 15 pCi/l [0.555 Bq/l] alpha MCLs

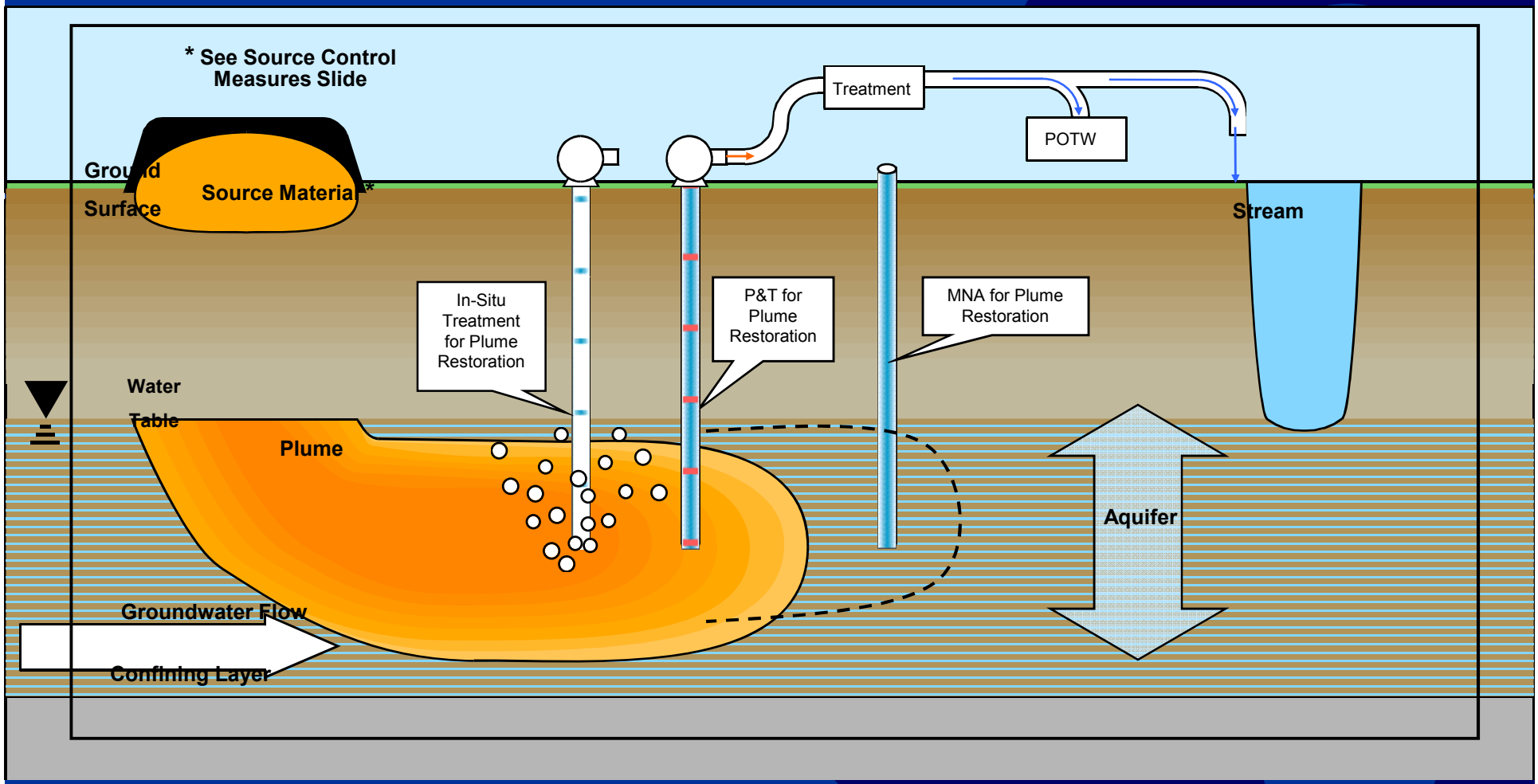
Source Control Measures



What is a Restoration Remedy for Groundwater?

- Use cleanup goals for the appropriate beneficial use – e.g., drinking water standards for drinking water aquifers
- Practicable to restore all or part of the aquifer (to federal, state, & risk-based standards)
- Restoration must have an endpoint with a reasonable timeframe
- The remedy should show a decrease in the extent of the plume and a reduction in contaminant concentrations in the plume

Restoration of Ground Water

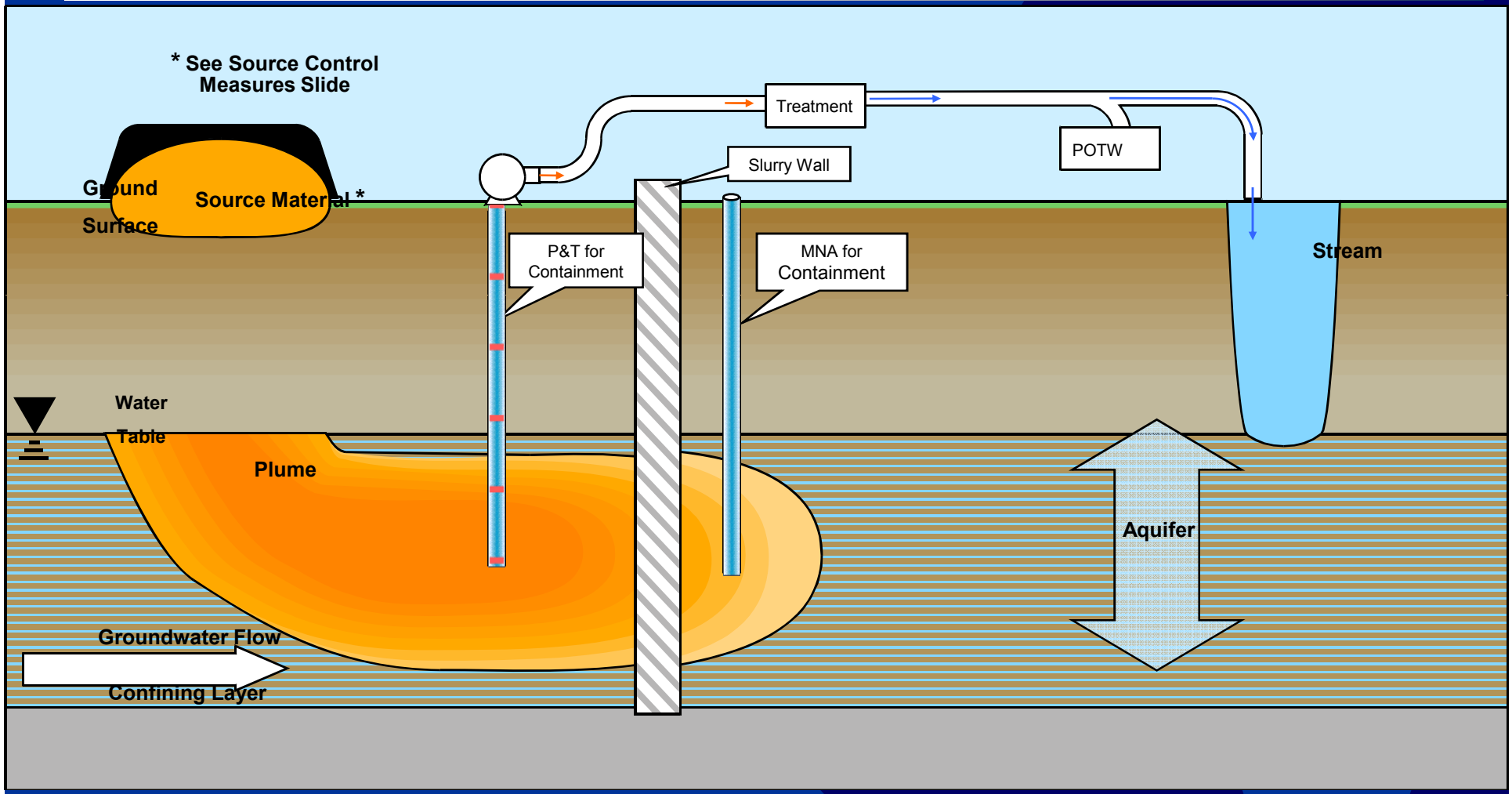


What Is Not a Restoration Remedy for Ground Water?

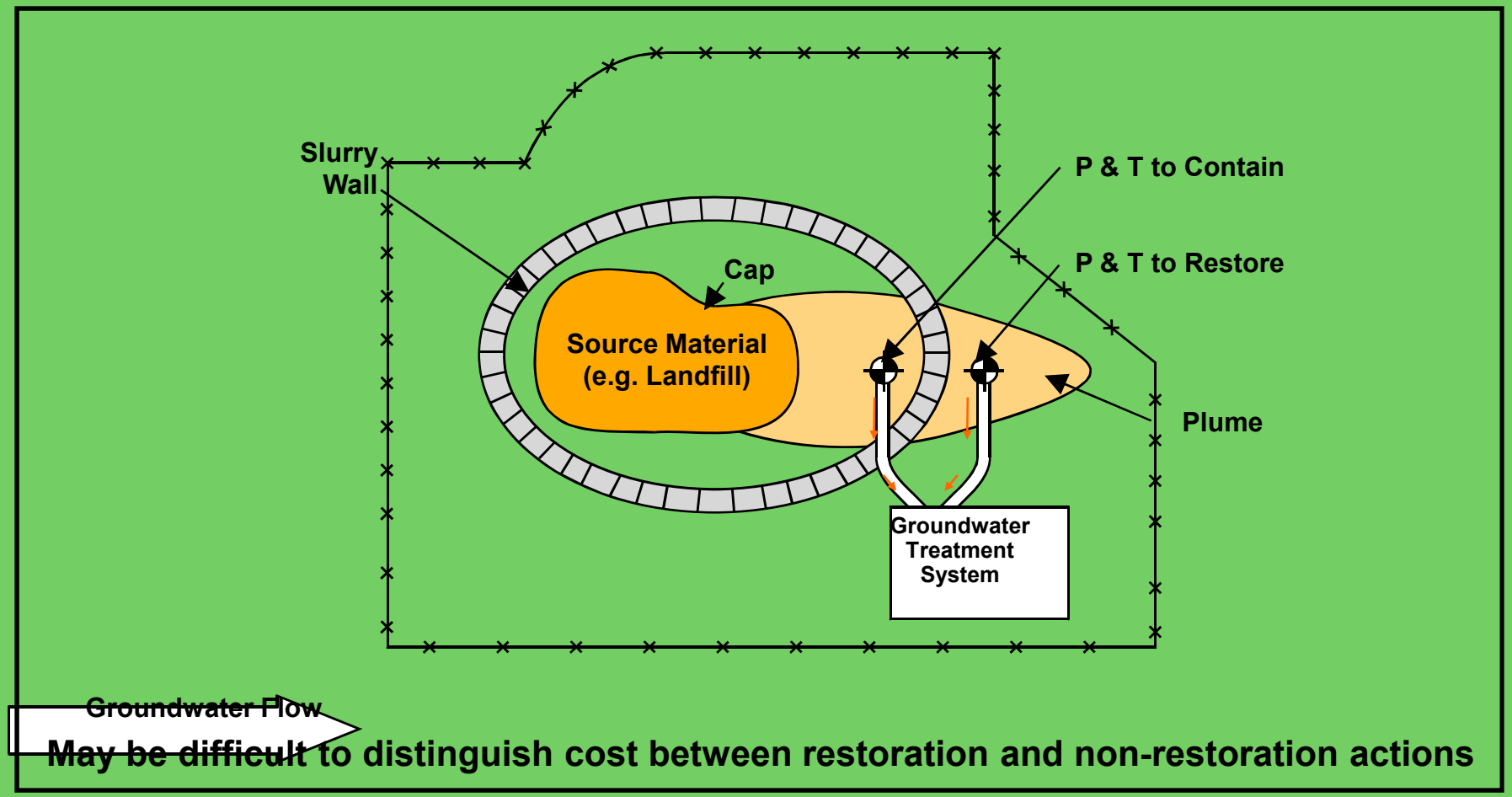
- "The following shall not be deemed to constitute treatment or other measures to restore contaminated ground water:
  - » Source control maintenance measures
  - » Ground water measures initiated for the primary purpose of providing a drinking water supply, not for the purpose of restoring ground water." [NCP 300.435(f)(4)]

EPA

Non-Restoration of Ground Water



Remedy With Multiple Goals



May be difficult to distinguish cost between restoration and non-restoration actions

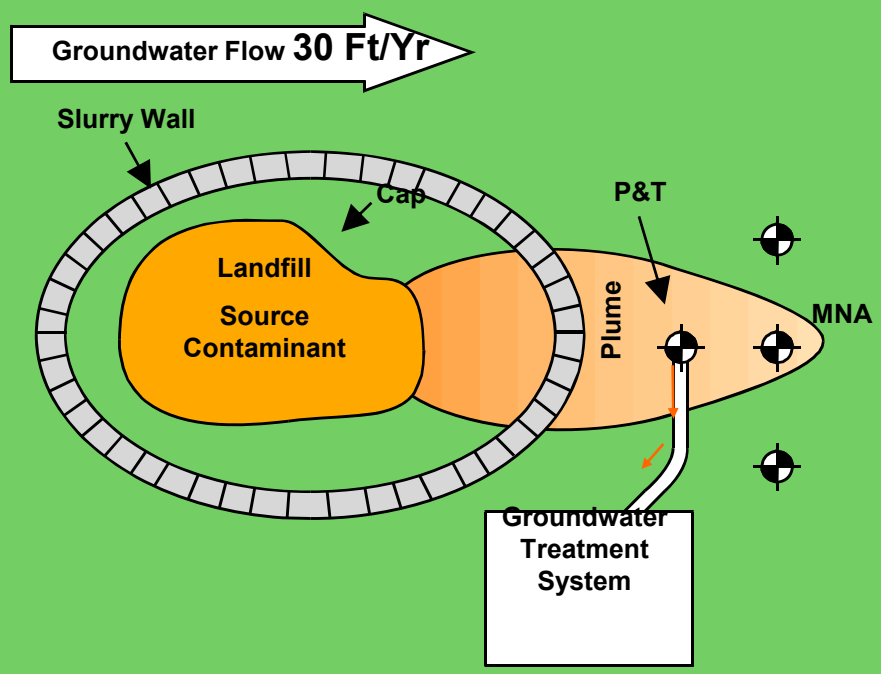
Remedies for Surface Water

- In general, the same principals apply to both ground water and surface water remedies (e.g., source control, LTRA, sources of contamination, etc.).
- However, there are physical differences between ground water and surface water remedies (e.g., flow velocities).
- Remedies to prevent migration of contaminants from sources or migration of contaminated ground water to a stream are containment, not restoration.

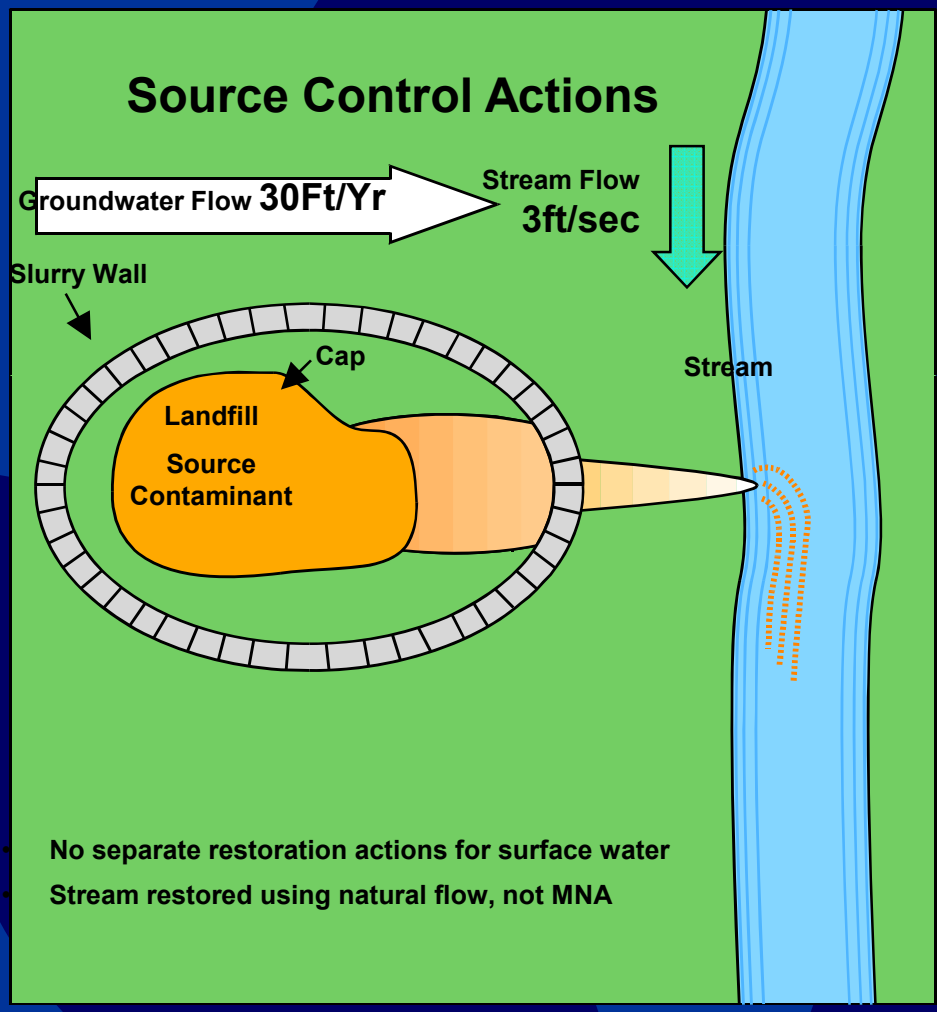
EPA

Ground Water vs. Surface Water Actions

Ground Water Action

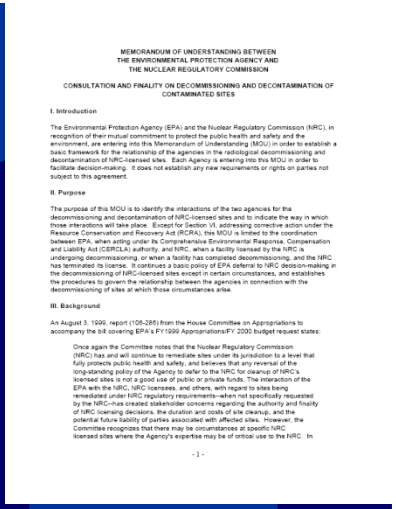


Source Control Actions



- No separate restoration actions for surface water
- Stream restored using natural flow, not MNA

EPA



MEMORANDUM OF UNDERSTANDING BETWEEN
THE ENVIRONMENTAL PROTECTION AGENCY AND
THE NUCLEAR REGULATORY COMMISSION

CONSULTATION AND FINALITY ON DECOMMISSIONING AND DECONTAMINATION OF CONTAMINATED SITES

I. Introduction

The Environmental Protection Agency (EPA) and the Nuclear Regulatory Commission (NRC), in recognition of their mutual commitment to protect the public health and safety and the environment, are entering into this Memorandum of Understanding (MOU) in order to establish a basic framework for the relationship of the agencies in the radiological decommissioning and decontamination of NRC-licensed sites. Each Agency is entering into this MOU in order to facilitate decision-making. It does not establish any new requirements or rights on parties not subject to this agreement.

II. Purpose

The purpose of this MOU is to identify the interactions of the two agencies for the decommissioning and decontamination of NRC-licensed sites and to indicate the way in which those interactions will take place. Except for Section VI, addressing corrective action under the Resource Conservation and Recovery Act (RCRA), this MOU is limited to the coordination between EPA, when acting under its Comprehensive Environmental Response, Compensation and Liability Act (CERCLA) authority, and NRC, when a facility licensed by the NRC is undergoing decommissioning, or when a facility has completed decommissioning, and the NRC has terminated its license. It continues a basic policy of EPA deferral to NRC decision-making in the decommissioning of NRC-licensed sites except in certain circumstances, and establishes the procedures to govern the relationship between the agencies in connection with the decommissioning of sites at which those circumstances arise.

III. Background

An August 3, 1999, report (106-285) from the House Committee on Appropriations to accompany the bill covering EPA's FY1999 Appropriations/FY 2000 budget request states:

> Once again the Committee notes that the Nuclear Regulatory Commission (NRC) has and will continue to remediate sites under its jurisdiction to a level that fully protects public health and safety, and believes that any reversal of the long-standing policy of the Agency to defer to the NRC for cleanup of NRC's licensed sites is not a good use of public or private funds. The interaction of the EPA with the NRC, NRC licensees, and others, with regard to sites being remediated under NRC regulatory requirements--when not specifically requested by the NRC--has created stakeholder concerns regarding the authority and finality of NRC licensing decisions, the duration and costs of site cleanup, and the potential future liability of parties associated with affected sites. However, the Committee recognizes that there may be circumstances at specific NRC licensed sites where the Agency's expertise may be of critical use to the NRC. In

- 1 -

2. MOU Between EPA and NRC

EPA

MOU Overview

- MOU focuses on coordination between EPA CERCLA authority and NRC decommissioning or previously license- terminated sites
  - » One section refers back to EPA's existing policy under RCRA at NRC sites

EPA

MOU Overview (continued)

- MOU provides consultation procedures for EPA and NRC
- EPA reaffirms 1983 deferral policy
  - » Expanded to now cover previously licensed, in addition to currently licensed sites

EPA

Consultation Triggers

- NRC will contact EPA when:
  1. **Radionuclide MCLs will be exceeded in groundwater**
  2. Residual soil levels will exceed concentrations in Table 1

EPA

Consultation Triggers (continued)

- NRC will contact EPA when:
  3. NRC contemplates future use of site will be restricted by conditions in license termination
  4. NRC contemplates use of alternative criteria for license termination (i.e., site-specific dose greater than 25 mrem/yr may be allowed)

EPA

MOU Table 1 (soil)

- Soil concentrations based on:
  - » 1 x 10^{-4} cancer risk
  - » UMTRCA as an ARAR (radium & thorium)
  - » Hazard Index of 1 (total uranium)
- Residential and commercial/industrial land uses

MOU Table 1: Consultation Triggers for Residential and Commercial/Industrial Soil Contamination

Except for radium-226, thorium-232, or total uranium, concentrations should be aggregated using a sum of the fraction approach to determine site specific consultation trigger concentrations. This table is based on single contaminant concentrations for residential and commercial/industrial land use when using generally accepted exposure parameters. Table users should select the appropriate column based on the site's reasonably anticipated land use.

Radionuclide	Residential Soil Concentration	Industrial/Commercial Soil Concentration
H-3	228 pCi/g	423 pCi/g
C-14	46 pCi/g	123,000 pCi/g
Na-22	9 pCi/g	14 pCi/g
S-35	19,600 pCi/g	32,200,000 pCi/g
Cl-36	6 pCi/g	10,700 pCi/g
Ca-45	13,100 pCi/g	3,740,000 pCi/g
Sc-46	105 pCi/g	169 pCi/g
Mn-54	69 pCi/g	112 pCi/g
Fe-55	269,000 pCi/g	2,210,000 pCi/g
Co-57	873 pCi/g	1,420 pCi/g
Co-60	4 pCi/g	6 pCi/g
Ni-59	20,800 pCi/g	1,230,000 pCi/g
Ni-63	9,480 pCi/g	555,000 pCi/g
Sr-90+D	23 pCi/g	1,070 pCi/g
Nb-94	2 pCi/g	3 pCi/g
Tc-99	25 pCi/g	89,400 pCi/g
I-129	60 pCi/g	1,080 pCi/g
Cs-134	16 pCi/g	26 pCi/g
Cs-137+D	6 pCi/g	11 pCi/g
Eu-152	4 pCi/g	7 pCi/g
Eu-154	5 pCi/g	8 pCi/g

EPA

Table 1 & MCLs

- Table 1 and **MCLs included** since levels may be **used by EPA as action levels** at CERCLA sites

EPA

MOU limited to NRC

- MOU does ***not*** affect how CERCLA actions are conducted
  - » Table 1 does not establish cleanup levels
  - » CERCLA cleanups should still consider 10^{-6} risk goal first (not 10^{-4})
- Agreement States not included
  - » EPA would consider similar MOUs

EPA

Types of MOU Consultations

- Three types of consultations envisioned by NRC
  - » Level 1 – Decommissioning or License Termination plan triggers MOU
  - » Notification – Plan that triggers MOU was issued before MOU
  - » Level 2 – Post decommissioning or decontamination, MOU still triggered

EPA

Sites with MOU Consultations

- Completed **"Level 1 Consultations"**
  1. **Rancho Seco, CA**
  2. ABB Incorporated, CT
  3. Mallinckrodt Inc., MO
  4. NWI Breckenridge, MI
  5. Cabot Performance Materials, PA

EPA

Sites with MOU Consultations, cont

- Completed **"Notifications"**
  1. **Connecticut Yankee, Haddam Neck, CT**
  2. Kirtland Air Force Base, NM
  3. Kaiser Aluminum, OK
  4. Kerr-McGee, Cimarron, OK
  5. Saxton, PA
  6. Nuclear Fuel Services, TN
  7. Union Carbide, TN

EPA

Sites with MOU Consultations, cont

- Completed **"Level 2 Consultations"**
  1. Battelle Memorial Institute, OH
  2. Kaiser Aluminum, OK
  3. Kerr-McGee, Cushing, OK
  4. Cabot Performance Materials, PA

EPA

EPA advice in consultation letters

- Several reoccurring themes in EPA's MOU consultation letters:
  1. NRC should consider selection institutional controls to ensure NRC's assumptions about limited future exposure are correct
  2. NRC should consider using more site-specific data rather than default parameters when conducting dose assessment modeling

EPA

EPA advice in consultation letters, cont

3. **NRC should consider a flexible approach concerning groundwater potential use determinations or timing of remediation**
4. NRC should consider using supplemental standards type of approach for radium and thorium sites with limited exposure

EPA

Non-CERCLA/non-MOU sites

- Non-CERCLA Agreement states sites sometimes look at MOU as template for discussion with other state agencies or EPA
- Other Non-CERCLA sites may be evaluated using guidance EPA has on evaluating NRC sites when asked if cleanup is “protective”

EPA

Guidance: NRC Evaluations

- *Evaluation of Facilities Currently or Previously Licensed NRC sites under CERCLA* (2/17/00) OSWER Directive 9272.0-15P
- Guidance on how to determine if an NRC cleanup meets CERCLA levels of protection
- Protectiveness evaluations of NRC decommissioning
  - » EPA determination made using site-specific information, **not** dose limits in NRC rule
- Evaluating need for CERCLA response action – NPL listing and removal

EPA

For More Copies or Information

- Guidance documents are on Superfund Radiation Webpage
  - » http://www.epa.gov/superfund/health/contaminants/radiation/index.htm
- EPA/NRC MOU Webpage
  - » http://www.epa.gov/superfund/health/conmedia/gwdocs/
- Superfund Groundwater Webpage
  - » http://www.epa.gov/superfund/health/conmedia/gwdocs/
- For further information or questions, Stuart Walker
  - » Phone: (703) 603-8748
  - » Fax: (703) 603-9133
  - » Email: Walker.Stuart@epa.gov

EPA

EPA