Welcome to RCRA Corrective Action Internet Briefing
Sponsored by EPA's Technology Innovation Office &
the Corrective Action Programs Branch in the
Office of Solid Waste

Handbook of Groundwater Protection and Cleanup Policies for RCRA Corrective Action

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Acknowledgements:

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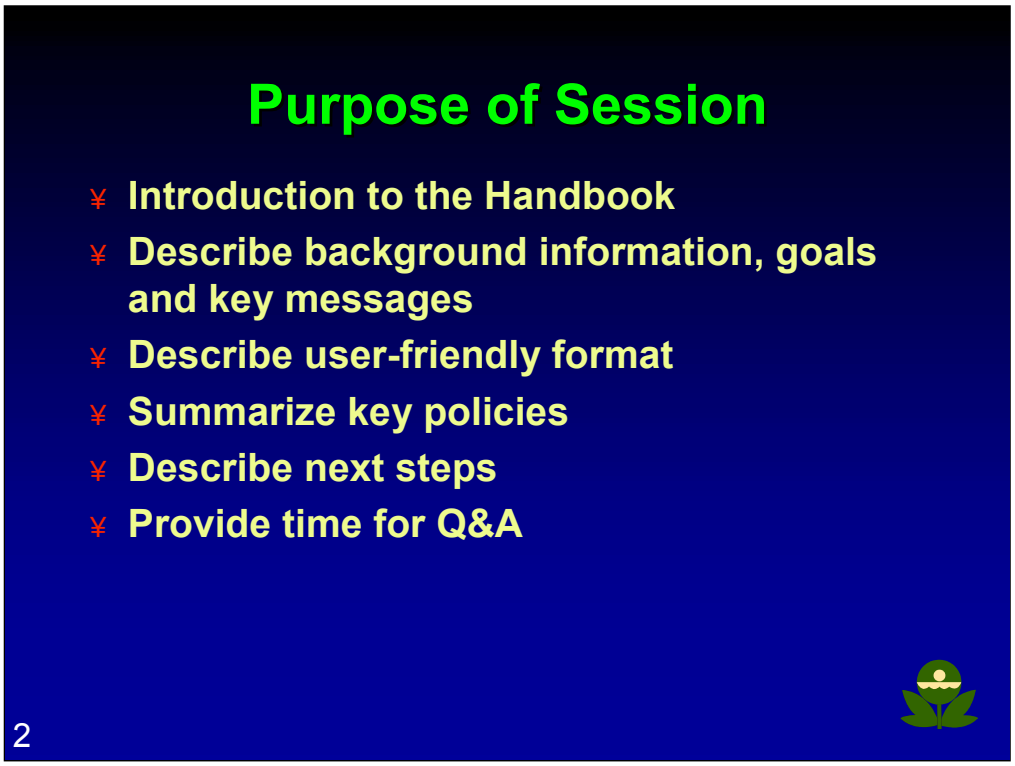
We also acknowledge and thank EPA's technology Innovation Office - specifically Jeff Heimerman and Carlos Pachon and their contractor EMS for their help in pulling together this internet seminar.



•introduce you to a new and different kind of guidance document.

•hope it will be a valuable resource to anyone involved with groundwater protection and cleanup.

•By the end of this seminar, we hope that you'll:

- understand why we developed the handbook,

- who we developed it for,

- and how to use it and take advantage of the hyperlink features of the electronic version of the document;

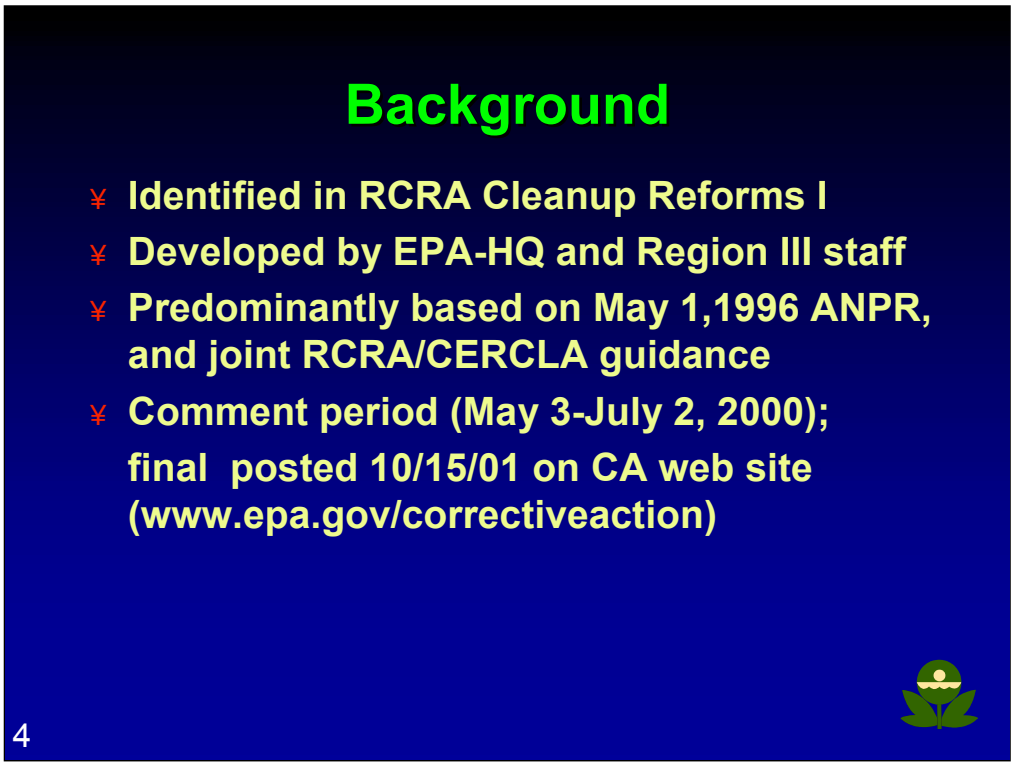
•be more familiar with the policies included in the Handbook

•next steps we're taking to keep the handbook current and to promote a national dialogue on groundwater issues.

•Also, we'll have several opportunities for Q@As during the seminar.

•In general, I hope we'll be able to convince you that the Handbook is a "user-friendly, comprehensive publication that helps you find and understand numerous policies concerning groundwater protection and cleanup."

We will be mentioning various publications upon which the Handbook is based. All of those publications are available through the internet from the reference page of the Handbook. And the Handbook itself along with many other helpful resources are available from the links page at the end of this presentation.



First mentioned in July 199 RCRA Cleanup Reforms. - RCRA stands for the Resouce Conservation and Recovery Act. The purpose of RCRA Corrective Action is similar to that of the more widely known Superfund Program in that we too focus on cleaning up environmental contamination, but the RCRA program focuses more on operating industrial facilities. Primary objective of the 1999 as well as the subsequent 2001 reform efforts are to promote faster, focused more flexible cleanups, and foster creative solutions to contamination problems.

- As mentioned previously, EPA-HQ jointly developed the document with EPA Region III staff. I hope there will be future opportunities for staff from EPA regions or states to actively participate in developing national guidance.

- The policies in this Handbook are based on previous guidance - especially Section III of the May 1, 1996 Advance Notice of Proposed Rulemaking which is one a key implementation guidance documents for the national corrective action program.

- Comment period for the draft version of the Handbook was held in Spring 2000 - received comments from regulated community, states, EPA regions and one public interest group.

Goals

- **Help meet reform objectives: faster, focused, more flexible cleanups and foster creative solutions by ...**
  - **Compiling, summarizing and clarifying key groundwater policies in one document, and thus...**
  - **Reducing time consuming uncertainties and confusion**
  - **Promote national dialogue on groundwater issues**

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We recognized our approach to protect and cleanup groundwater was conveyed in various guidance documents, memos, federal registers, etc. So, we thought it would be helpful to summarize all of those policies in one document and link users to the more detailed references.

By clarifying all of the these policies into one document can ultimately improve the pace of cleanups by reducing uncertainties and confusion.

•1/2 of our nation relies on groundwater for drinking water - nearly all populations in rural areas depend on groundwater.

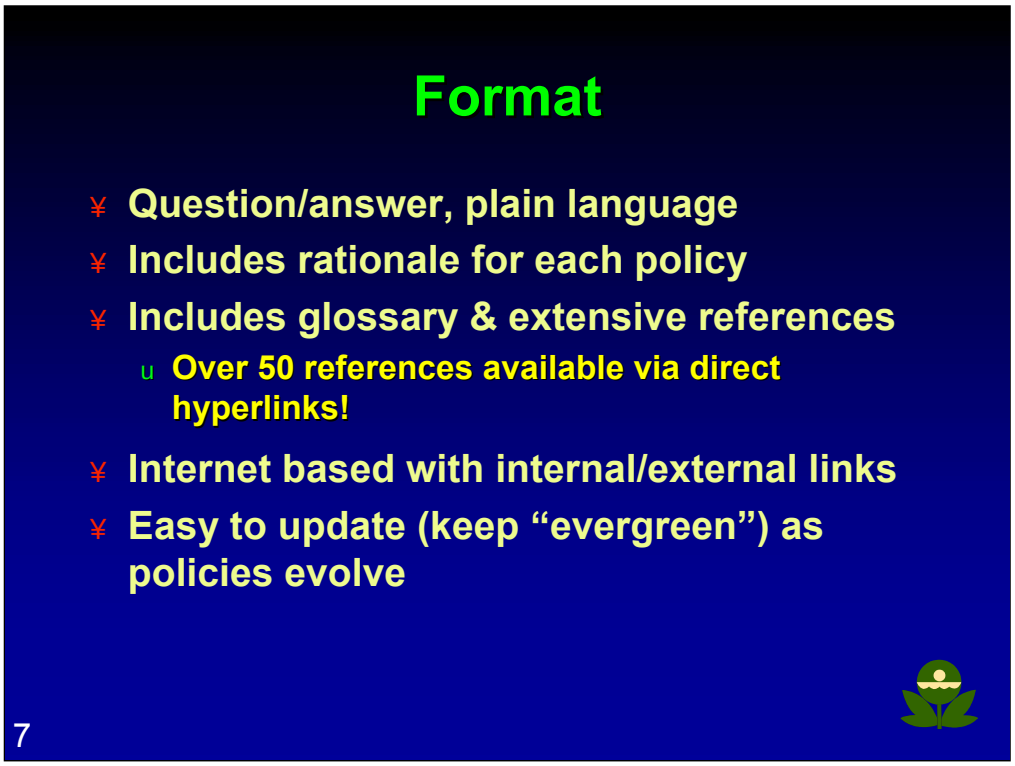
•groundwater supplies the majority of water in streams and rivers in large areas of the country. Need for clean groundwater will only increase as populations increase

•The Handbook promotes a results-based, phase approach. This is nothing new - stabilization initiative in early 1990's to promote early action and risk reduction, and numerous other Superfund and RCRA guidances describe the benefit of a phased approach to cleanups. General message - we should focus on achieving results, and we should approach complex groundwater problems in phases to make progress toward cleanup goals, and to learn from our experiences.

•document highlights areas of flexibility. Examples, groundwater use, and short-term and intermediate goals.

•document clearly conveys that it provides "guidance" and therefore, it does not impose legally binding requirements. However, the Handbook does describe how EPA generally expects to implement groundwater cleanups in a manner that is consistent with RCRA regulations and statutes.

The last key message is perhaps the most important. The Handbook conveys that states will be the primary implementers of the corrective action program; therefore, it's critical that users consult with states to ensure they adequately address state requirements and guidance.



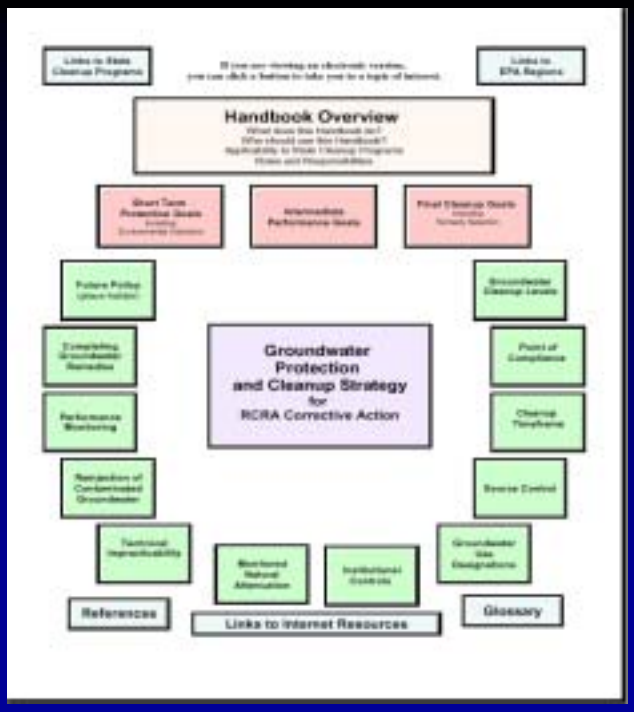
This slide is an opportunity to describe some innovative features of the Handbook.

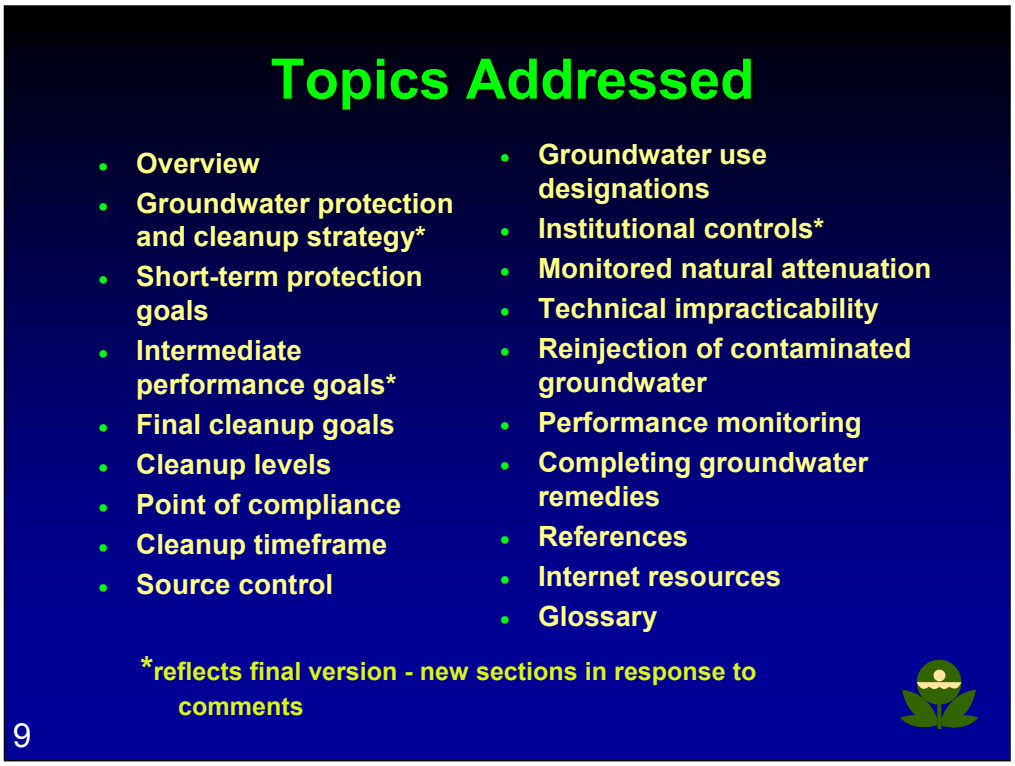
First, we wrote the Handbook in a plain language, question/answer format. - several advantages - people often come to EPA with questions; Joel and Deb and I have heard a lot of these questions over the years and we tried to address as many of the commonly asked questions as possible. Also - we hope that the Q&A format will help us keep the document current. For example, we intend to keep a list of questions that aren't addressed in the Handbook and try to address those new questions in future updates. So, it's important that you ask questions today!

We also included a stand alone rationale for each policy to give EPA's justification for a particular approach.

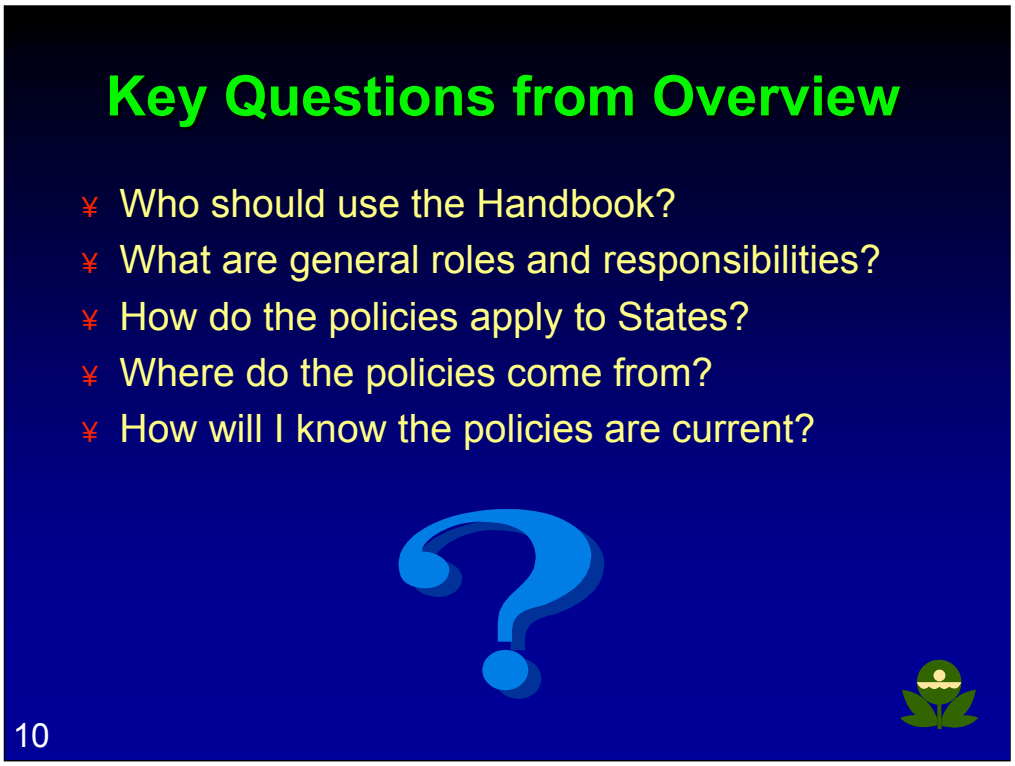
What I really like is the internal and external links that are available to individuals viewing an electronic version of the document .

Lastly, we address each policy topic in typically 2-5 pages. We designed it this way so we could easily update an existing policy or add new policies. And, we fully anticipate that will will likely be doing both of these kinds of updates.


Handbook Overview
Groundwater Protection and Cleanup Strategy for RCRA Corrective Action
References
Links to Internet Resources
Glossary



This slide lists all of the topics and sections we present in the Handbook. Today, we'll be touching on each section, but due to time, we will be covering some of the topics very quickly.

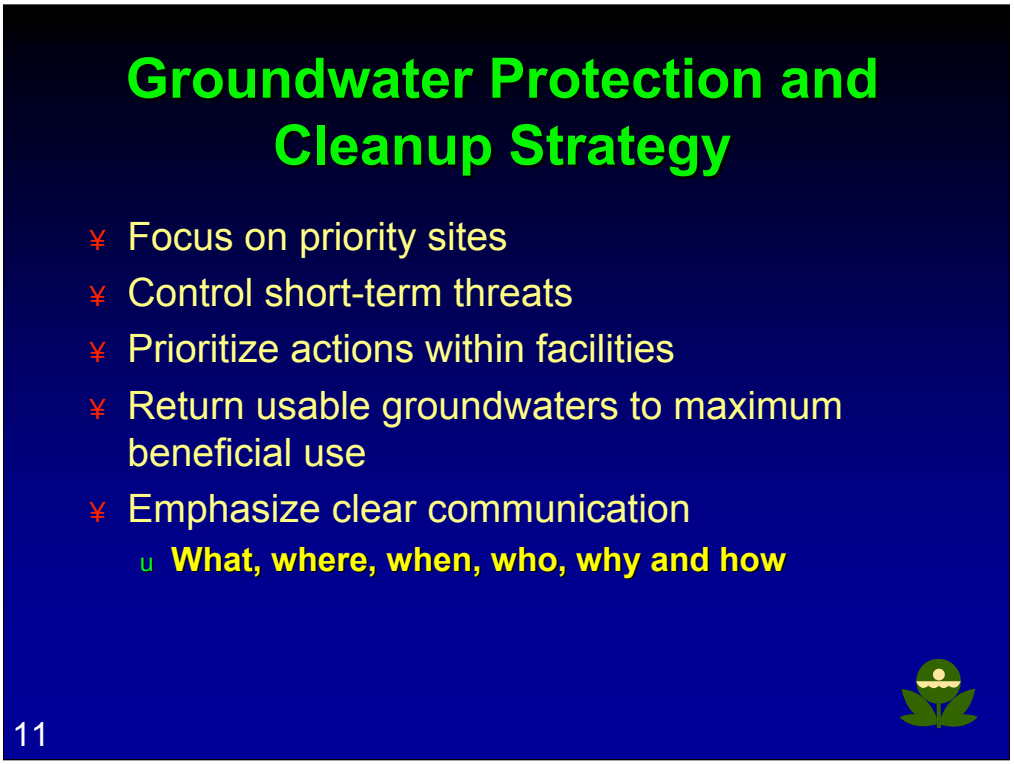


We developed the Handbook to help anyone involved with groundwater protection and cleanup issues - including EPA and state regulators, members of the regulated community, and members of a local community or national public interest groups. We even have a section describing the roles and responsibilities of these various stakeholders to clarify who is actually responsible for particular activities.

Very importantly, we describe how this Handbook applies to state cleanup programs. We wrote this section in response to state comments - In particular, the Handbook says that “EPA expects states to consider this guidance carefully when they have a lead role in implementing cleanups at RCRA corrective action facilities. However, since the document is guidance and not a binding statute or regulation, states have considerable latitude in making decisions that would lead to equivalent levels of protection EPA would achieve if the federal government was implementing the program.”

Policies come from existing guidance (1996 ANPR, 1999 MNA directive, etc.)

Designed the document so we could keep in current.



Intro - The strategy and its goals are the foundation of the handbook,

Promote a results based phased approach. The remaining policies serve as tools to use within this framework. The strategy has 5 parts

•Focus resources at priority sites - The program has already screened and ranked its universe and is focusing efforts on those sites that should be addressed sooner rather than later.

••Control short-term threats - short term goal (environmental indicators) Current Human Exposures Under Control and Migration of Contaminated GW Under Control

••Prioritize actions within facilities to address the greatest risks first (intermediate goal) consistent with a phased approach. Make sense approach. Especially important at complex sites. Also, these interim actions can demonstrate progress toward the final goal.

••Make progress towards our ultimate goal of returning usable groundwater to its maximum beneficial use (final cleanup goal)

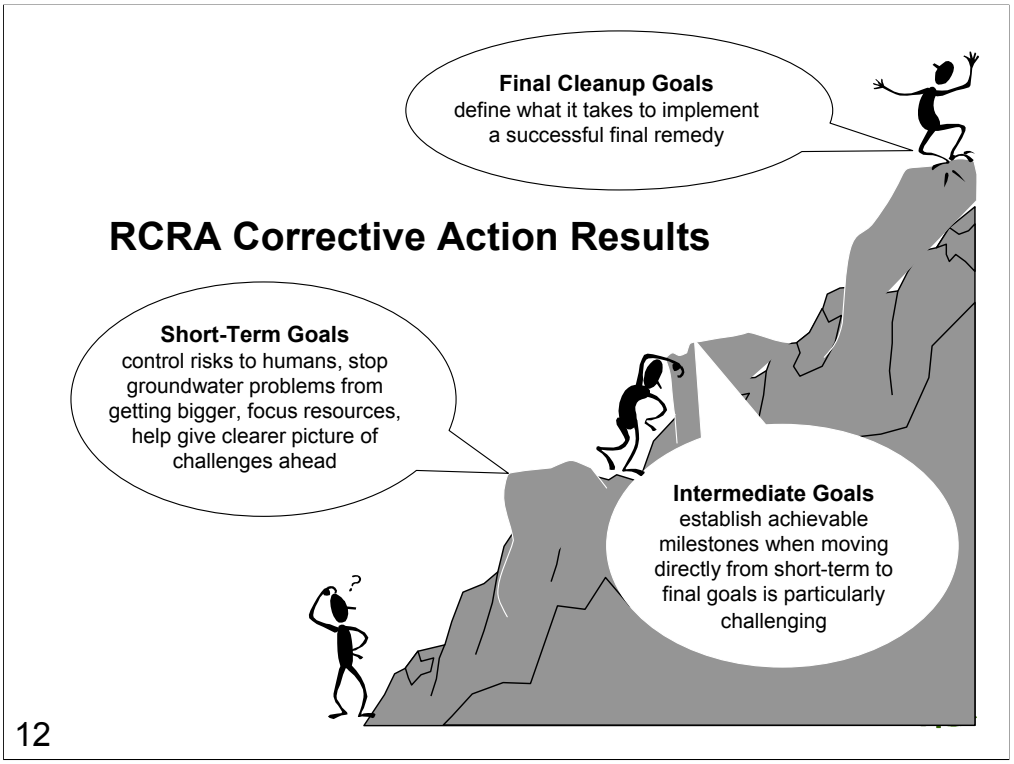
••Emphasizing clear communication. This strategy promotes better communication by recommending that facilities and regulators discuss short, intermediate and final goals in terms of clearly defined objectives. We recommend that you discuss these objectives in terms of what, where, when, who, why and how.

•This strategy focuses on environmental results rather than process.

•This section describes how the corrective action groundwater is consistent with EPA's overarching groundwatergoal which is–

to prevent adverse effects to human health and the environment, which includes protecting the integrity of our nation's resources.

As subsets of this overarching groundwater goal, the agency has groundwater goals for both prevention and remediation and this section also discusses how the CA strategy supports those goals as well.



How do we implement a program without an administrative process. By having clearly defined goals. We have :.short-term protectiveness goals, intermediate performance goals and final cleanup goals.

We've put together a little cartoon that we think captures this approach. You have the ant man scratching his head thinking "How am I going to climb this mountain or clean up this site?" Let me consider my short term goal.

Short term - control risks to human, stop groundwater problems from getting bigger, focus resources, and most importantly it gives a picture of challenges ahead.

EXAMPLE: When I begin an investigation I meet with the facility and we discuss what do we need to do to meet the short term goals Often there's some gw data that tells me there's a problem and so we might need additional wells to define a plume. Notice the man is also looking up. Not only are we taking actions to meet the short term goal, but we're also thinking about the final cleanup goal. So we might install some wells near areas which might be potential sources. Now we're moving on the path up the mountain. You find out from your monitoring network that you need to put in a pump and treat to stabilize the plume, Notice we're not done, because the final goal includes controlling sources to the extent practicable. Also, pumping a plume to stabilize it is not an efficient remediation strategy. We're still investigating and we find a source. Intermediate goal might be source removal - bring you closer to that final goal.(helps you demonstrate progress toward meeting the final goal) You try a technology and that going to give you more information about the site to help you more efficiently reach the final cleanup goal.

They're not discreet element but goals that work together.

Short Term Protection Goals
(Environmental Indicators)

- Ensure:
  - **Humans are not being exposed to unacceptable levels; and**
  - **Contaminated groundwater is not migrating above levels of concern**
- Other key messages:
  - **Who evaluates and determines**
  - **Discusses key exposure routes (e.g., air and groundwater/surface water)**
  - **Relationship to intermediate and final goals**

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The CA program has 2 short term goals. They are: (slide and give names)

In general terms to meet the Current Human Exposures Under Control EI a facility needs to demonstrate that under current conditions and activities at the site no one is being exposed to unacceptable levels of contamination. This EI considers all media, but I want to focus on groundwater. For simplicity the entire site is paved, but we have a groundwater a plume on the site, as long as no one is drinking or using the contaminated groundwater, then the facility has met this EI.

For the Gw EI - You need to define the physical limits of the plume and show that its not getting larger. Some key things to consider with regard to this indicator are:

For this indicator, it doesn't matter whether the plume is on-site or off-site as long as the plume is stable.

This EI is not tied to exposure unless the gw discharges to a surface water body.

Other Key messages in this section - I've been to conferences where regulators discuss who should do these evaluations. The determination is the regulator's responsibility.

At region 3 we've had great success with facilities or their consultant filling out the EI evaluation forms. (These forms ask a series of questions which help you determine if you have sufficient information to make the determination.) Like any other submission we verify that the information is true and accurate and if we don't agree with a facility's interpretation we tell them what they need to do to fill that data gaps.

This section also discusses key exposure routes - For example the Current Human Exposures Under Control EI becomes more complicated when a groundwater plume migrates under homes because then you need to consider potential exposure through indoor air . And, the Migration of Contaminated Groundwater Under Control EI becomes more complicated when a plume discharges to a surface water body. In that case you need to consider whether the current groundwater discharge is causing adverse impacts to the surface water body, its sediments and ecosystems. We hope to provide additional guidance for these exposure routes in the future. Finally as stated before, meeting your Short term goal is not the end of the journey but just a step on the way. It's an opportunity to inform stakeholders that the site is stabilized and to layout the path forward.

This is a section that was added in response to industry's concern that we needed to recognize that at some sites there may be a significant amount of time between achieving the Environmental Indicators and reaching the final goals and that we need a way to demonstrate and communicate **progress** even though we haven't met our final goals yet. We didn't want it to be a bean counting exercise; they are **facility-specific**; and the handbook says their helpful when they show progress and:

focus resources

improve environmental conditions

enhance performance of the cleanup

This goal is consistent with phased approaches currently being implemented in the program.

The specific goal will depend on the environmental conditions, contaminants (some site will not need them at all)

Example - source control activities, or cleaning up an off-site plume are both good examples. More specifically - a facility may have had to install vapor recovery systems under individual homes due to an off-site plume. Cleaning up the off-site plume would be a great intermediate goal (show progress) , and the facility would be able to reduce its long term liability associated with the vapor recovery systems.

The Handbook provides additional examples.

Final Cleanup Goals

- Three threshold criteria:
  - **Protect human health and environment**
  - **Achieve "media cleanup objectives"**
  - **Controls sources to the extent practicable**
- Other key messages:
  - **Return usable groundwaters to maximum beneficial uses wherever practicable**
  - **Long-term containment where appropriate**
  - **Streamlined evaluations**

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3 threshold criteria for evaluating final remedies. Apply to gw remedies. They are: protect hh and env; achieve media cleanup objectives; and control source to the extent practicable

protect hh&e - is the mandate from the RCRA statute - ensure that activities such as bottled water are provided when necessary.

achieve media cleanup objectives - That's the what, where, when, who, why and how I talked about earlier. For final groundwater cleanups. The "what" is your cleanup levels, the "where" is your POC and the "when" is your cleanup time frames. (Joel)

controlling sources - offers a way to demonstrate progress to meeting the overall mandate.

Use these general goals as threshold criteria to screen potential remedies. The handbook also includes a discussion of the 7 balancing criteria,.

Final gw goal is to return usable groundwater to its max beneficial use. This goal is important to ensure the short and long term availability of our nations resources.

The maximum beneficial use is the use that warrants the most stringent cleanup levels. Groundwater can have several uses, drinking water, serve to recharge a stream, industrial uses, or agricultural uses. Example - if you have industrial use of groundwater in an area, but there are also residential wells right next door, then of these two uses, the residential drinking water use would be the maximum beneficial use, because that is the use which results in the lower cleanup level.

Other situations where containment may be appropriate: 1) Technical Impracticability (Guy) and 2) Groundwater has no use or value (such as very low yielding aquifer which is a type of Class III aquifer under EPA's classification system) in that case source control and/or containment may be appropriate. Be careful when selecting remedies in a aquifer designated as non use. For example: 1) verify that there are no human or ecological receptors that could be exposed.; 2) be sure that the facility has the financial ability to maintain the remedy for as long as necessary. The handbook discusses several additional criteria to consider for containment remedies.

Groundwater Cleanup Levels

- Chemical concentrations supporting facility-specific objectives
  - **Use existing cleanup standards when available and appropriate**
  - **Risk range (10^{-4} to 10^{-6}) and hazard quotient of one applies**
  - **Lower or higher could be appropriate**
  - **Consider gw use designation, exposures, and cross-media transfer (e.g., to surface water and air), and ecologic protection**

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Groundwater cleanup levels are the facility-specific chemical concentration in groundwater the regulator will establish for a final remedy. EPA recommends that cleanup levels be based on the maximum beneficial use of the groundwater to ensure protection of human health and the environment. So, for an aquifer which is or could be used for drinking water, cleanup levels should be protective for drinking water use.

What does EPA consider to be protective? Use existing cleanup standards which are available and appropriate, such as Maximum Contaminant Levels (MCLs) or State drinking water standards. If no standard, or if the exposure assumptions that went into developing that standard aren't appropriate, then do risk assessment: consider all of the ways that people or other receptors might reasonably be exposed to the groundwater, and set levels that would be protective for those exposures.

This raises the issue of standardized exposure assumptions: we often rely on tables of screening levels - action levels - which are developed using standardized exposure assumptions - these tables are very useful as screening tools, but before we rely on them as cleanup levels, we need to make sure that the exposure assumptions that went into developing the action levels are appropriate for the kinds of exposures that may be present at your facility. The handbook provide links to risk assessment guidance.

The policy describes EPA's acceptable risk range for carcinogens, and the hazard quotient for non-carcinogens. Multiple contaminants or exposure pathways at a facility might require setting a lower cleanup level because of unacceptable risk to human receptors from combined effects of hazardous constituents. The handbook also describes situations where a higher cleanup level might be appropriate, for example if groundwater at a facility is also contaminated by naturally occurring or up gradient sources - we might set cleanup levels at those background levels.

Cleanup levels should also consider cross media transfer and ecological receptors, not just ingestion or direct contact of the groundwater. Example - VOC plume under homes - potential for vapors to get into the homes and cause inhalation exposure.

Just because no one is currently drinking the groundwater, the cleanup level may still be based on drinking water standards if EPA or the State considers the aquifer to be a reasonably expected future source of drinking water. However, if the aquifer is designated as non-drinking water use and it is verified that no one is actually drinking the water, the cleanup level might not be based on drinking water standards but should be protective for the uses and exposures that could occur under its designation. Example - if the GW is designated non drinking water but is used for industrial or other purposes, such as at a car wash, cleanup levels should be developed for those uses.

Point of Compliance (POC)

- Conveys general definition - location to measure and meet cleanup numbers
- Different POC options depending on goals, e.g.,
  - **Short term - plume boundary**
  - **Final - throughout the plume/unit boundary if goal involves returning groundwater to particular cleanup level**
  - **Intermediate - facility specific**

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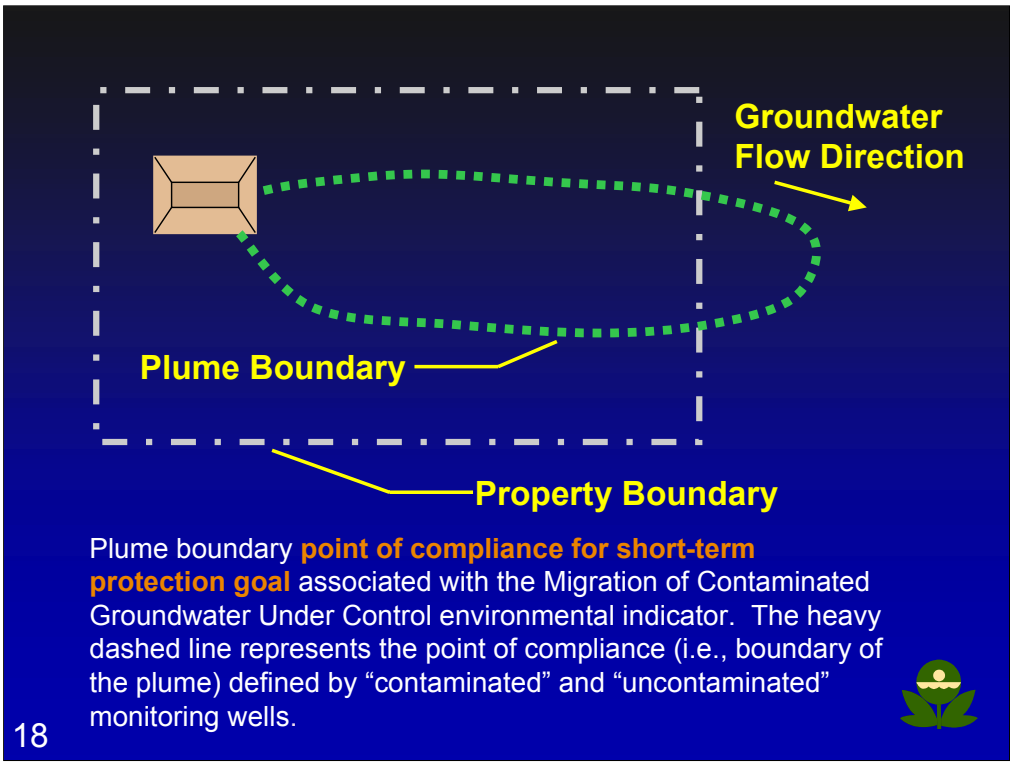
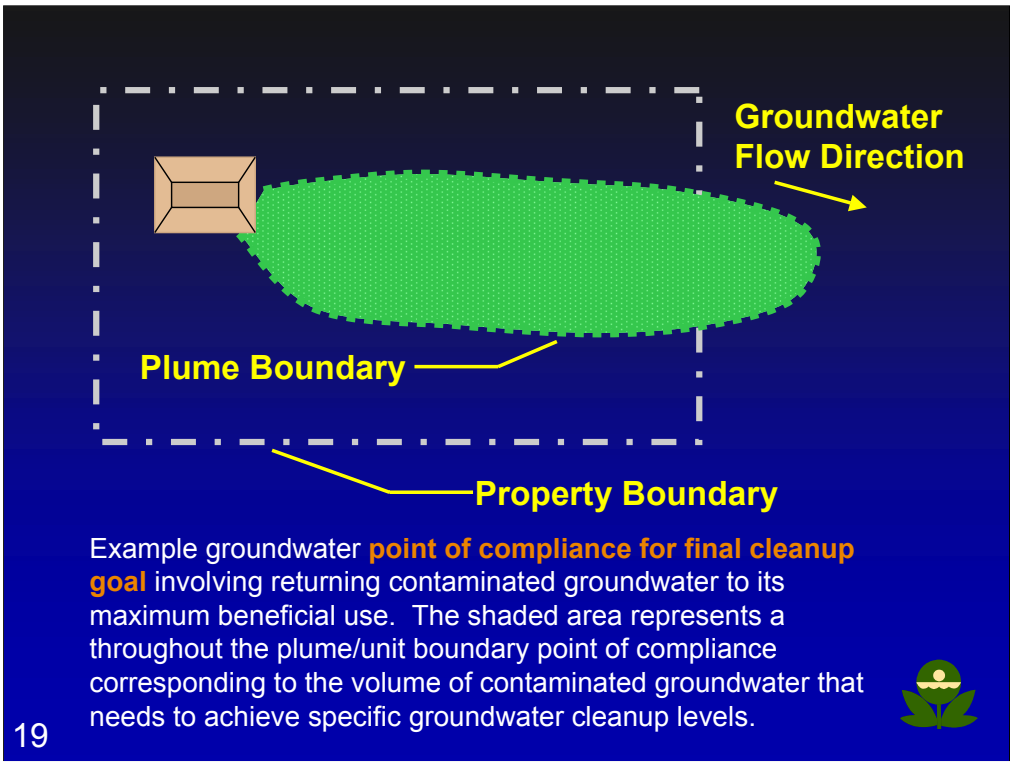
This policy provides a general definition of point of compliance as where a facility should monitor groundwater quality and/or achieve specific cleanup levels to meet facility-specific goals.

This general definition recognizes that the point of compliance is related to the specific goal we are trying to meet, whether it is short term protection, intermediate performance, or final cleanup.



Point of Compliance - Short Term

EPA's short term goal for contaminated groundwater is to prevent further migration of contaminated groundwater. In this case, the existing plume boundary could be established as the point of compliance for meeting the short term goal.

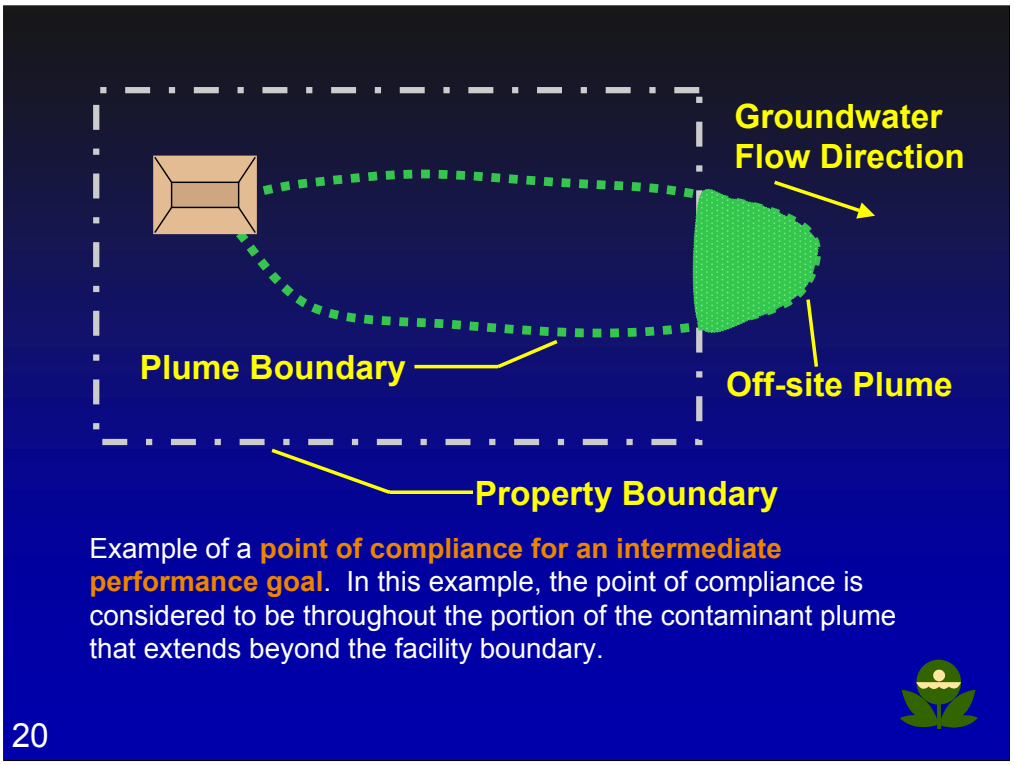


Point of Compliance - Final

For final remedies, facilities should meet groundwater cleanup levels throughout the contaminant plume or, when waste is left in place, cleanup levels should be met throughout the plume beyond the boundary of the waste unit.

EPA refers to this point of compliance as the “throughout the plume/unit boundary point of compliance.”

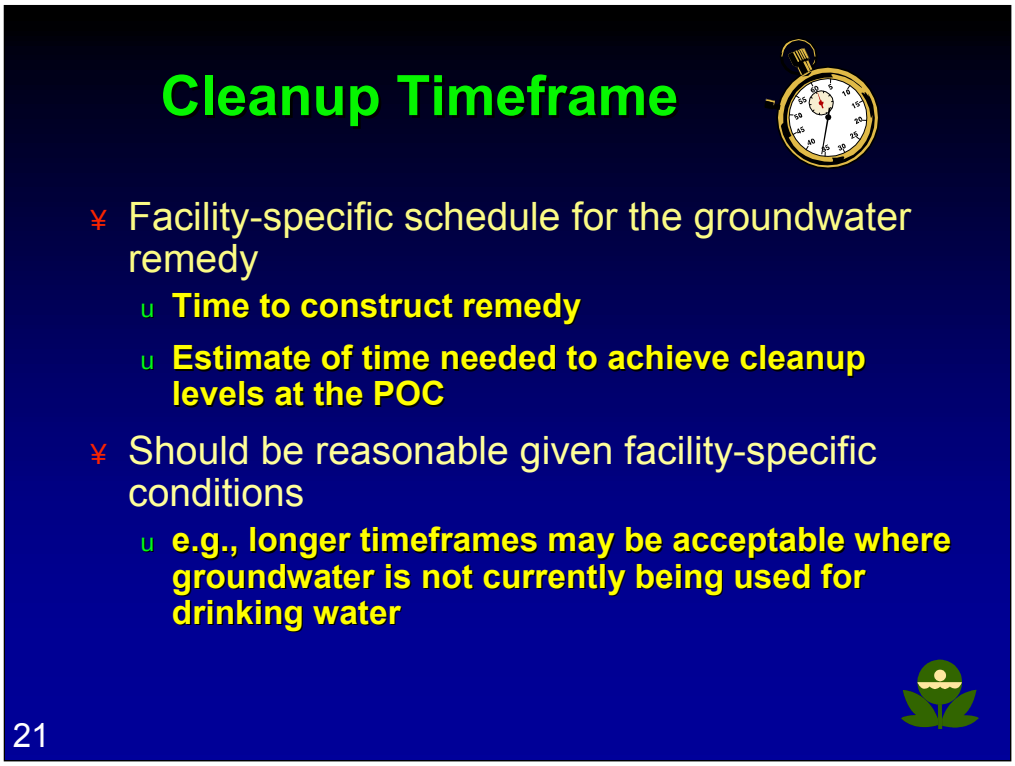
This point of compliance is consistent with the point of compliance in Superfund, which Superfund refers to in some guidance documents as the area of attainment.



Point of Compliance - Intermediate

If a facility establishes an intermediate goal, the need for and location of the point of compliance depends on facility-specific circumstances. For example, if a groundwater contaminant plume extended offsite, an intermediate goal could be established to clean up the offsite groundwater first. So we might establish the area of the offsite contaminated groundwater as an intermediate point of compliance. This could be considered a facility boundary point ofcompliance. However, we should point out that a facility boundary POC would generally not be appropriate as an intermediate performance when a contaminant plume has not yet gotten to the property boundary. In that case, a facility boundary POC would allow continued migration of a plume, which would not be consistent with EPA's short-term goals of preventing further migration of contaminated groundwater. Also inconsistent with EPA's overall goal of preventing contamination where ever possible.

To summarize, EPA's policy on POC is one of the policies that is very goal driven - the point of compliance may vary depending on which goal we are pursuing - but we make it clear that our ultimate final goal remains returning contaminated groundwater to its maximum beneficial use - which means the on-site groundwater as well.



Cleanup Time Frame

Cleanup time frame - the facility specific schedule for constructing and implementing a remedy as well as a time estimate to achieve cleanup levels at the POC. Time should be reasonable given facility specific conditions.

Factors that can affect time frames - groundwater use designations - for example if an aquifer is designated a potential drinking water source but is not currently used, a longer cleanup time frame may be acceptable. This could affect the type of remedy that may be selected. Monitored natural attenuation may be more acceptable in this case.

Establishing cleanup time frames is important for several reasons:

1 - to evaluate the relative time frame for cleanup to compare potential remedies

2 - to develop measurable performance standards to determine if a remedy is making progress towards achieving short-term goals as well as final cleanup levels.

3- to establish the time it takes to construct and implement a remedy. E.g., the time to establish hydraulic control of a plume so that it does not migrate towards users of groundwater is something that facilities could achieve very quickly relative to final cleanup goals.

4- to communicate to the public how long it might take before groundwater is fully cleaned up, so that they do not have unrealistic expectations about how long it will take.

Source Control

Source control refers to a range of actions, such as removal, treatment, or containment, of source material.

EPA defines sources as contaminated material that acts as a reservoir for the continued migration of contamination to surrounding environmental media. For example, an area of contaminated soil from past spills may be acting as a source for ongoing groundwater contamination. If we don't deal with the contaminants in the soil, we may not be able to clean up the groundwater in a reasonable time frame.

Source control is one of the three threshold criteria for final remedies identified under the Final Remediation Goals policy and should be part of every remedy as needed and to the extent practicable to ensure long-term protection.

Sources are not necessarily stationary - for example a dense non-aqueous phase liquid (DNAPL) in the subsurface could be migrating along an impermeable boundary or moving down along fractures.

Source control can take many forms, from containment to treatment or removal. We often get into long debates about the balance between treatment and containment - when is it ok to contain a source rather than treat or remove a source. In deciding what form source control should take, EPA relies on the concept of Principle Threats.

EPA defines sources as principle threats when they are highly toxic or highly mobile that cannot be reliably contained, or would represent a significant risk to Human Health or the Environment should exposure occur.

So, if a source represents a principle threat, EPA prefers that facilities use treatment, or a combination of treatment and containment, rather than just containment. In contrast, containment alone may be fine for sources which represent low long-term threats and can be reliably contained. The policy does recognize situations where treatment of even principle threat wastes may not be appropriate.

EPA generally expects facilities to control sources regardless of the groundwater use designation to prevent continued degradation of the environment.

Groundwater Use Designations

- Based on use, value and vulnerability
  - **state-wide system**

- Examples of factors to consider:
  - **Quantity, quality, and yield**
  - **Reasonably expected future use**
- Other key messages:
  - **Discourages current use as only factor**
  - **States generally define use**
  - **Many states designate all gw as drinking water**

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Groundwater Use Designations –

EPA's goals for cleanup of contaminated groundwater include returning usable groundwaters to their maximum beneficial use. We need a way to identify which groundwaters are usable, to determine what all the likely uses are or could be, so that we can then determine what the maximum beneficial use is because that directly relates to establishing appropriate and protective groundwater cleanup levels.

The handbook defines a groundwater use designation system as a determination of the reasonably expected use(s), resource value, and/or the vulnerability of groundwater in a particular area.

The groundwater use designation system should account for these factors and be designed to:

- prevent adverse effects to HH&E
- protect the integrity of the Nation's groundwater resources
- the system should be applied consistently to all groundwater in the state
- provide opportunity for public participation

The Handbook has links to guidance on use designations. That guidance was specifically written for States to develop what EPA called Comprehensive State Groundwater Protection Programs. Some of the factors that should be considered include physical characteristics of the aquifer, such as quantity, natural quality, and yield, but they also include such things as current use, reasonably expected future use, and impacts to ecological receptors. EPA discourages current use of groundwater as the only factor to consider when designating groundwater use.

The handbook includes a link to the EPA groundwater classification system.

EPA prefers to rely on State groundwater use designations, when appropriate and protective. States should have the primary responsibility for managing and protecting their groundwater resources. Some states don't have groundwater use designation systems, because they designate all their groundwater as drinking water. Even in those states there may still be ways to prioritize actions - states could establish the anticipated timing for groundwater use in different areas, which could affect the cleanup timeframe, even though the ultimate cleanup goal of drinking water standards remains the same.

Now we get into some of the topics that I mentioned initially we will be covering pretty quickly.

First, institutional controls refer to "non-engineered measures such as administrative or legal controls that we can use to minimize the potential for exposure to environmental contamination by limiting land or resource use." Examples,

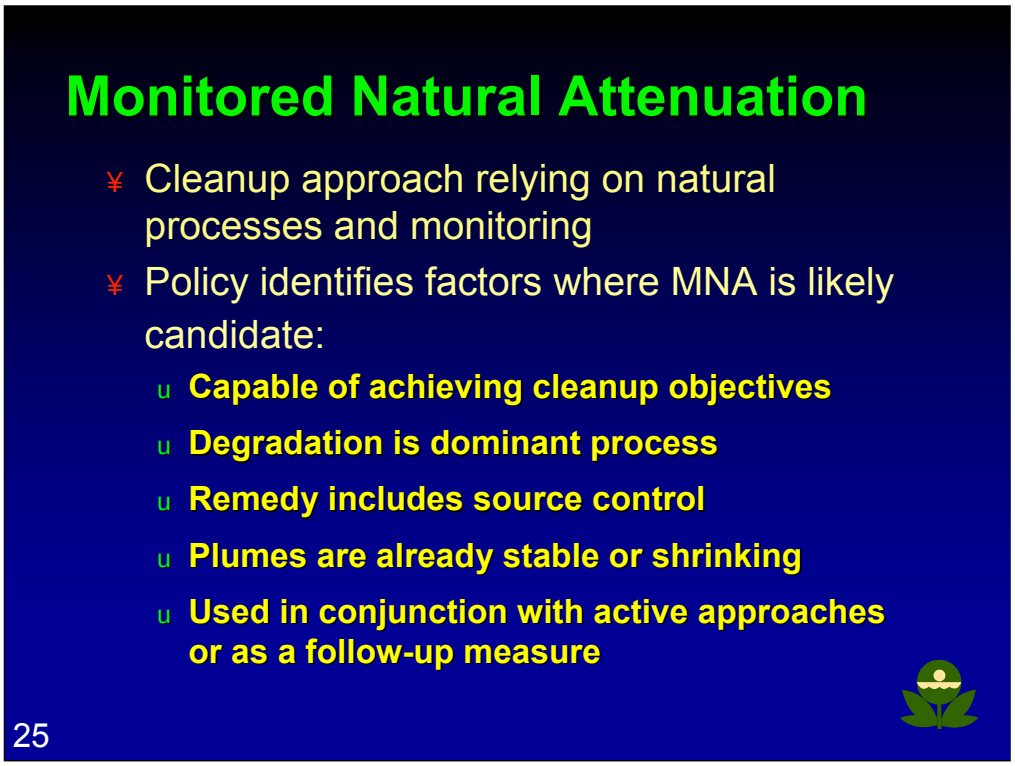
- gov't controls - zoning, restrictions on water use

-proprietary controls - easements that provide rights to access property or restrict land use.

- enforcement tools - such as government permits or orders

- informational devices such as notices or state registries.

Main message in handbook is that we should treat institutional controls like any other component of a remedy designed to achieve a particular goal. As such, institutional controls should go through an evaluation phase, selection, implementation and operation and maintenance.



Based primarily on 1999 policy directive.

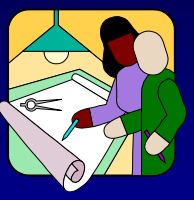
MNA refers to an approach to cleanup environmental contamination by relying on natural physical, chemical or biologic processes that can reduce the toxicity, mobility, volume or concentration of contaminants.

We spent a lot of time in the second half of 1990s developing policy and technical guidance on monitored natural attenuation. Primary messages

- MNA is not a no-action remedy. Lots of technical justification needed. Handbook lists many of the factors that should be considered in evaluating the acceptability of an MNA remedy.

Technical Impracticability (TI)

- Situations where achieving groundwater cleanup levels for a final remedy is not practicable from an "engineering perspective"
  - **Needs to be technically justified**
  - **Mere presence of NAPL not sufficient**
  - **Alternative remedial strategy**
  - **POC applies outside TI zone**
  - **Can be revisited if cleanup becomes "technically practicable" in future**



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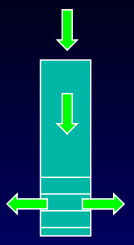
Based primarily on 1993 guidance.

Concept is that state or EPA regulators often identify desired cleanup goals. Technical impracticability provides a way of justifying when regulators agree that facilities can't achieve those desired results from an engineering perspective - factors include feasibility, reliability, scale or magnitude of a project and safety.

Key messages

See above.

Reinjection of Contaminated Groundwater



- Describes exemption to ban on injecting hazardous wastes into or above a drinking water aquifer
  - **Allows injection of groundwater contaminated with "hazardous wastes" back into aquifer**
  - **Must be treated to substantially reduce hazardous constituents either before injection or as a result of subsequent in-situ treatment**
  - **Part of a RCRA or Superfund cleanup**
- Coordination with State is important!

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A big part of RCRA is to prevent environmental contamination.

As such, specific sections of RCRA prohibit activities that would introduce hazardous wastes or hazardous constituents onto or into the land or water. RCRA section 3020(a) is an example of such a ban - this provision banned the injection of hazardous waste or water containing hazardous waste into a formation which contains an underground source of drinking water.

However, RCRA section 3020(b) contained an exemption to that ban provided that certain provisions were met (see above).

The policy in the Handbook is based on a memo EPA issued in December 2000 clarifying that exemption. The memo cleared the way for many insitu treatment technologies that rely on adding something to the water which promotes treatment of the contamination either before injection or in the ground after injection.

But it's really important to coordinate the the state or this issue because while the exemption might apply based on federal provisions, states may have their own restrictions.

Performance Monitoring

- Periodic measurement of chemical and/or physical parameters
  - **to evaluate whether facility is achieving particular goals**
- Type, location and frequency should be based on monitoring objectives and facility-specific factors
- Should continue for a specified time after facility achieves final cleanup goals

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Policy on performance monitoring reflects that ground water cleanup actions often take a considerable amount of time - and we should be monitoring the system to make sure that the remedy is protective and is making progress toward achieving particular goals.

Main message is that performance monitoring systems should be flexible so they can be adapted when needed.

Some programs recommend that monitoring be continued to a pre-defined time period (such as three years) after a cleanup # is achieved to ensure that contaminant concentrations don’t rise or “rebound” after an active cleanup system is shut down.

Completing Groundwater Remedies

- Final Handbook recognizes three phases of completion
  - **implementing (i.e., construction is completed and remedy is operating) the remedy**
  - **achieving final cleanup goals with controls**
  - **fulfilling all cleanup obligations including long-term monitoring**

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Even though we recognize cleaning up groundwater is very challenging, we can't have a results-based program without addressing what it means to be complete with a groundwater remedy.

The Handbook recognizes three phases of completion (see above)

Note, EPA is currently developing additional guidance on completing corrective action. If needed, we intend to revise the completion policy section of the Handbook to be consistent with any new guidance we issue.

Next Steps

- Promote continued open dialogue
- Update Handbook to reflect changes in policies and add new topics; e.g.,
  - **site characterization**
  - **groundwater / surface water interaction**
  - **groundwater to indoor air**

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We mention in the Handbook that issuing this comprehensive guidance does not shut the door on discussions about groundwater policies. On the contrary, we hope that the Handbook will promote discussions on groundwater protection and cleanup issues. This seminar is an example of those discussions.

We also intend to update the Handbook as needed. Some of the topics we anticipate will be addressed in a future update include (see above)

For additional information or questions, please call or e-mail:

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Handbook, fact sheet, cover letter and FR notice available at:

http://www.epa.gov/correctiveaction

Links to related resources