Module 2: Basics of Performing Site Assessments and Conducting the PA

EPA United States Environmental Protection Agency

2-1

Module Objectives

- **By the end of this module, participants will be able to:**
  - Identify the major questions an assessment must answer
  - Define a "site" for a CERCLA assessment
  - Formulate a conceptual site model (CSM)
  - Explain the basic structure and elements used to evaluate and score a site
  - Define the goals and activities of a PA
  - Identify the types of information available for use during the PA
  - Summarize the activities conducted during the site reconnaissance
  - Describe the contents of the PA report
  - List the three main deliverables in the PA process

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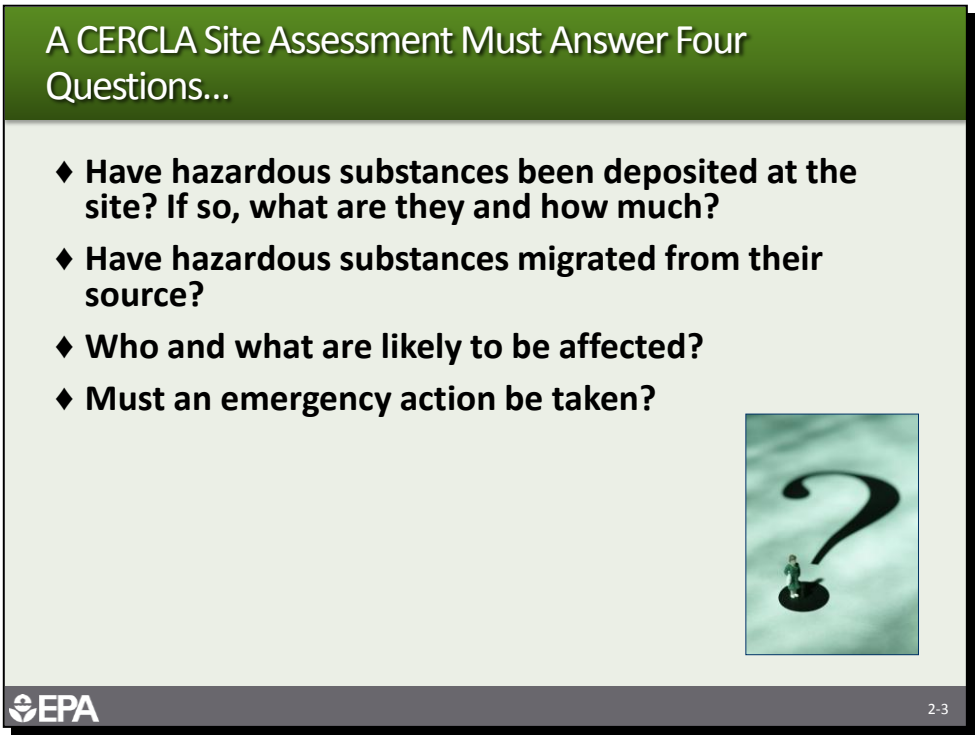
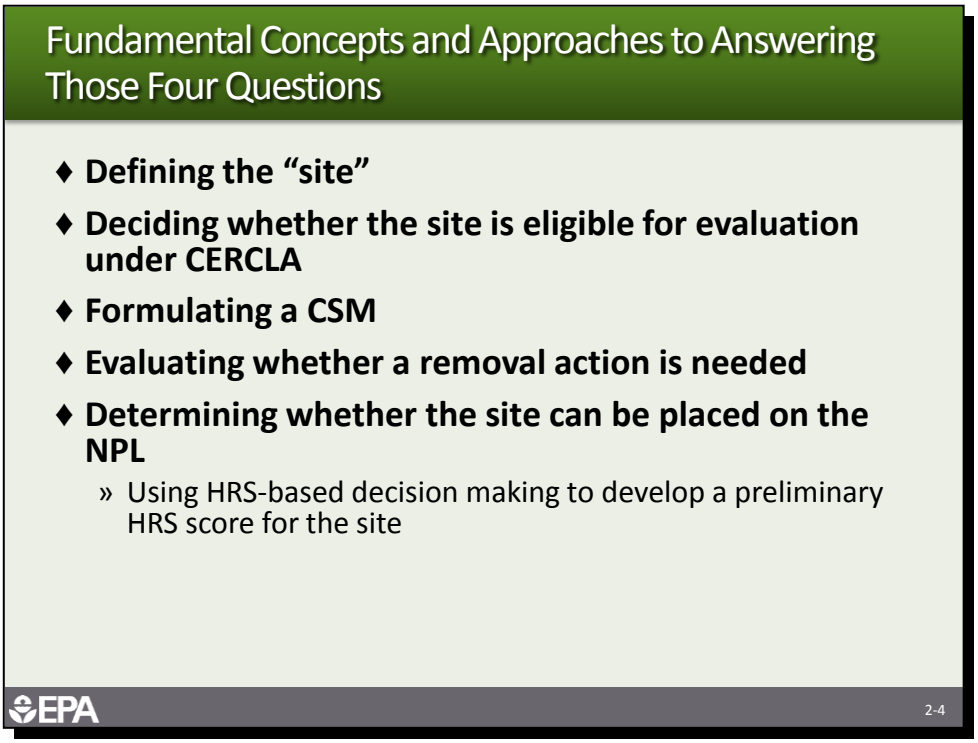


Notes

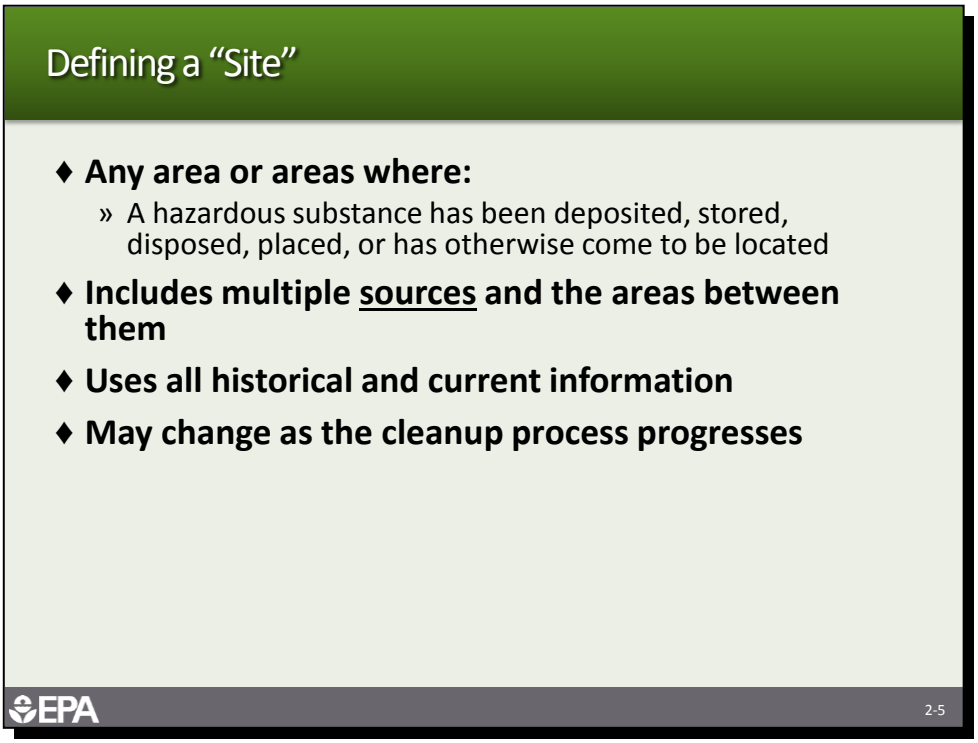
- **A CERCLA site assessment must answer four questions:** The purpose of a site assessment under CERCLA is to evaluate whether hazardous substances released at a site pose a risk to public health or the environment and what future action should be taken. In general, four questions must be addressed during the assessment:

  1. **Have hazardous substances been deposited at the site? If so, what are they and how much?** The assessment must first determine whether hazardous substances, not excluded from CERCLA authorities, are present at the site. This decision includes identifying the sources of hazardous substances and their corresponding waste characteristics, such as the physical nature of hazardous substances, the amount or volume of the substances, and the toxicity, mobility, persistence and bioaccumulation potential of the substances.
  2. **Have hazardous substances migrated from their source?** The assessment must address the likelihood that hazardous substances have been released or have the potential to be released from their source. For example, is there evidence that a tank has leaked or ruptured and released hazardous substances to the groundwater?
  3. **Who and what are likely to be affected?** The assessment must identify actual and potential targets (people or sensitive environments) that are exposed to hazardous substances released from sources identified at the site.
  4. **Must an emergency action be taken?** The assessment must evaluate whether the nature of the release warrants a referral to EPA's removal program. If referred, the removal program determines if an emergency removal action should be taken.



Notes

- **Defining the "site":** An assessment must define a "site" for evaluating and scoring the threat that hazardous substances deposited at the site pose to human health or the environment.
- **Deciding whether the site is eligible for evaluation under CERCLA:** An assessment must decide whether the site is eligible for evaluation and response actions pursuant to CERCLA authorities.
- **Formulating a conceptual site model:** Creating a conceptual site model is an inherent part of evaluating actual or potential threats to human health or the environment posed by hazardous substances deposited at a site.
- **Evaluating whether a removal action is needed:** As noted in the previous slide, an assessment must evaluate the need for a removal response authorized under CERCLA.
- **Determining whether the site can be placed on the NPL:** An assessment must also collect information to evaluate whether the site is a potential candidate for the NPL (i.e., has an HRS score of 28.50 or greater).
  - » **Using HRS-based decision making to develop a preliminary HRS score for the site:** The HRS is a screening tool that is EPA's primary mechanism for including sites on the NPL. An assessment will need to collect information and analytical data to score the site based on the HRS rule.



Notes

- **Any area or areas where:** CERCLA does not define the term "site," but it does explain related terms such as "facility" and "release." According to CERCLA, there are two definitions of facility. The first definition is in broad terms of operable portions of properties (for example, building, structure, installation, equipment, lagoon, or landfill). The second defines a facility as "any site or area where a hazardous substance has been deposited, stored, disposed of, or placed, or otherwise come to be located …" The second CERCLA definition of facility is essentially synonymous with the definition of "site" as defined in the HRS. However, the CERCLA definition of "facility" is broader than the HRS definition of "site."

  The NCP (55 Federal Register [FR] 8845, March 8, 1990) specifies that the NPL is "the list of priority releases for long-term remedial evaluation and response." Thus, the emphasis is on determining the extent of contamination rather than on identifying strict boundaries.

  Based on these descriptions, a "site" is best defined as the portion of a facility that includes the location of a release (or releases) of hazardous substances and wherever hazardous substances have come to be located. As such, the extent of a site is not limited by property boundaries and does not include clean areas within a facility's property boundaries.

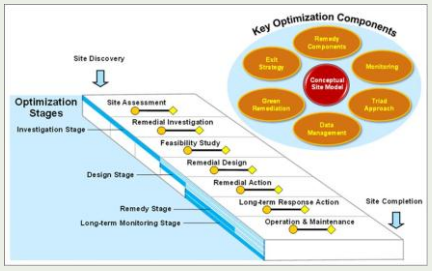
- **Includes multiple sources and the areas between sources:** A source is defined as an area where hazardous substances have been deposited, stored, disposed, or placed, plus those soils that have become contaminated through migration. The definition of "site" is broader than the definition of "source;" a site may include multiple sources and may include the area between the sources. When multiple sources are in an area, site investigators must decide whether to treat the area as one site or as several sites.

- **Uses all historical and current information:** Sites are defined based on evaluating all historical and current information available to the investigator.

- **May change as the cleanup process progresses:** As a cleanup progresses, the original site may change. For example, if part of a site is cleaned up and no longer contains hazardous substances, it would no longer qualify as being part of the site. Therefore, the extent of the site can always change.

Formulating a CSM

- **A CSM is a three-dimensional picture of site conditions that depicts:**
  - » Sources
  - » Release mechanisms
  - » Pathways
  - » Targets (receptors)
- **It is a planning tool that evolves and matures as work progresses**



EPA. 2012. Memorandum: Transmittal of the National Strategy to Expand Superfund Optimization Practices from Site Assessment to Site Completion. From: James. E. Woolford, Director Office of Superfund Remediation and Technology Innovation. To: Superfund National Policy Managers (Regions 1 – 10). Office of Solid Waste and Emergency Response (OSWER) 9200.3-75. September 28.

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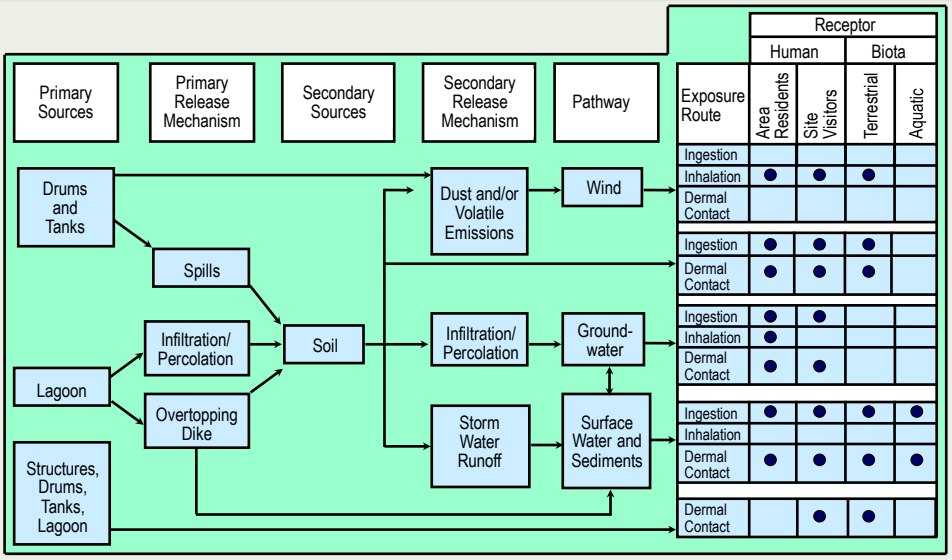
Notes

- **A CSM is a three-dimensional picture of site conditions that depicts:** A CSM is a description of the site and its environment based on existing knowledge. Formulating a CSM is an inherent part of a site assessment and is necessary to scoring the site using HRS rules. A CSM is prepared by gathering data needed to identify:
  - » **Sources:** Sources are waste management units or areas where hazardous substances are present or contaminated soils resulting from the release of hazardous substances from a unit (for example, a leaking tank).
  - » **Release mechanisms:** A release mechanism describes how hazardous substances have entered into the environment (for example, a spill or a breeched liner underlying a waste pile).
  - » **Pathways:** Pathways are routes in environmental media through which hazardous substances migrate or disperse.
  - » **Targets:** Targets or receptors are locations such as drinking water wells, fisheries, or nearby residents where hazardous substances have come to be located.. Targets may vary based on the type of environmental medium or pathway where hazardous substances are present.
- **It is a planning tool that evolves and matures as work progresses:** A CSM is used as a planning, interpretation and communication tool. It may be presented in various formats. A CSM reflects a current level of site understanding and therefore will evolve and change as work progresses and more information about the site is accumulated.

Internet

More information on optimization is available at *www.cluin.org/optimization* and *http://www.epa.gov/superfund/cleanup/postconstruction/optimize.htm*.

Tabular Presentation of CSM



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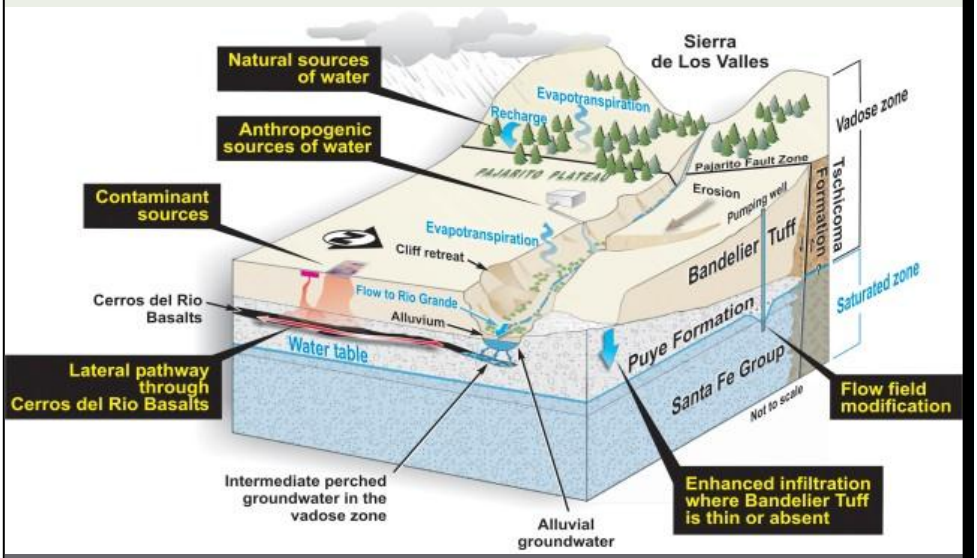
Pictorial Diagram of CSM



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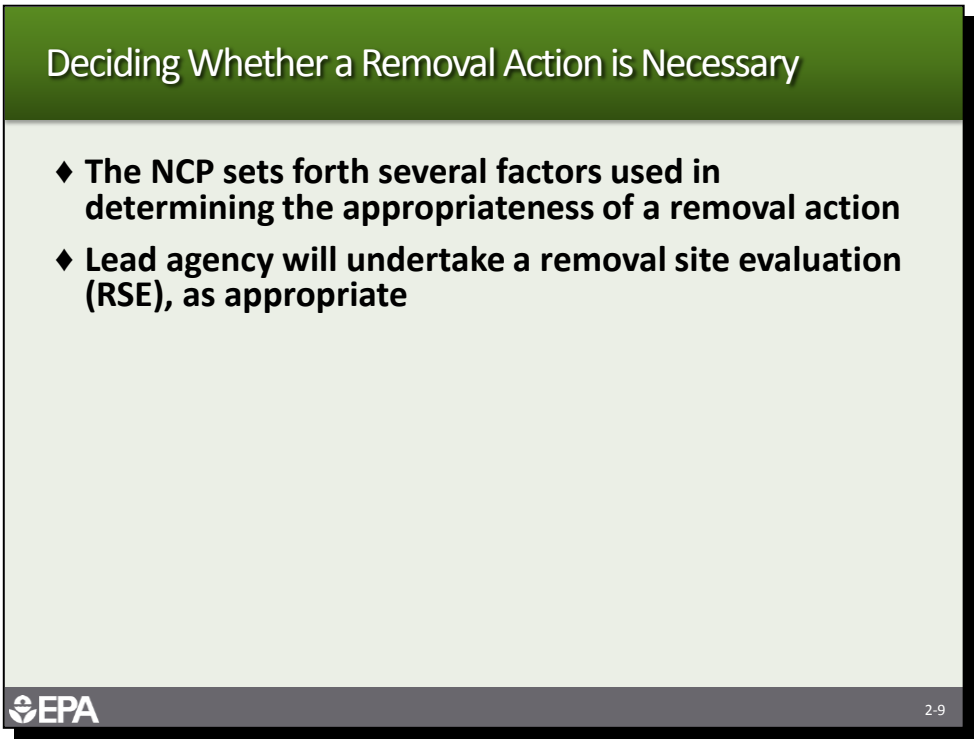
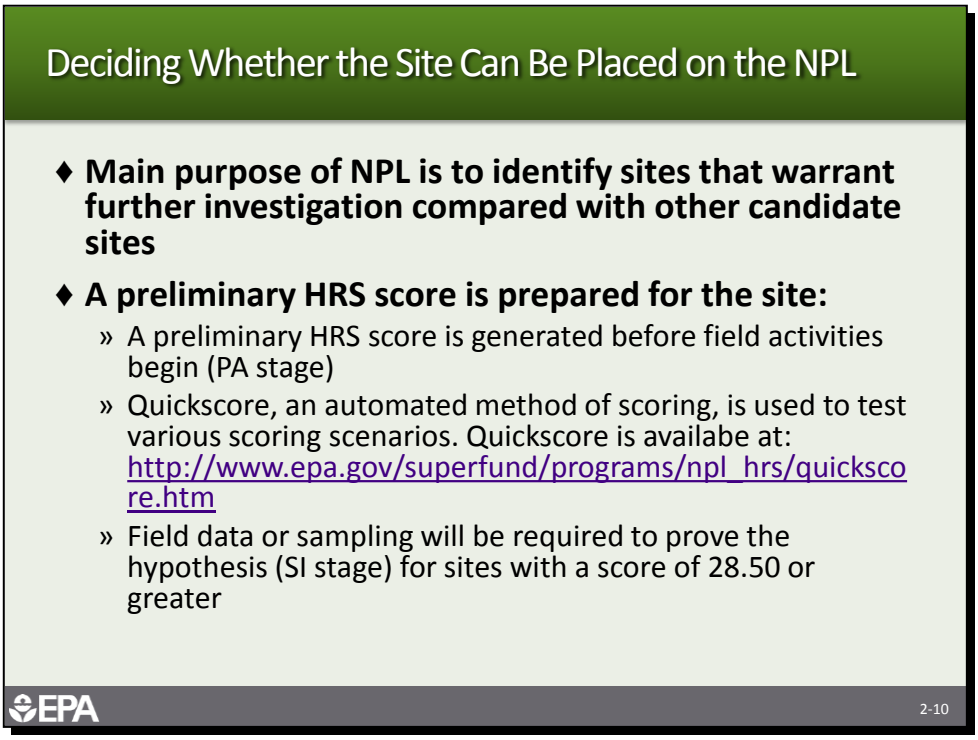


Notes

- **The NCP sets forth several factors used in determining the appropriateness of a removal action.** Section 300.415(b) of the NCP sets forth several factors that must be considered in determining the appropriateness of a removal action. Those factors include:
  - » Actual or potential exposure to human populations, animals, or the food chain
  - » Actual or potential contamination of drinking water supplies or sensitive ecosystems
  - » Drums or containers that are leaking or may leak
  - » High levels of contaminants in surface soils
  - » Weather conditions that may cause migration of contaminants
  - » Threat of fire or explosion
  - » Availability of other response mechanisms
- **Lead agency will undertake a removal site evaluation (RSE), as appropriate:** When a release is discovered that may warrant a removal action, the lead agency begins a RSE, as appropriate. A RSE is specified in the NCP at 40 CFR 300.410. In general, a RSE involves the review of existing information (such as a file search) and, if necessary, a site inspection and sampling. The purpose of the RSE is to:
  - » Identify the source and nature or threat of release

- » Evaluate the threat to human health
- » Evaluate the magnitude of the threat
- » Evaluate the factors specified in 40 CFR 300.415(b)
- » Determine whether a non-federal party is undertaking a proper response



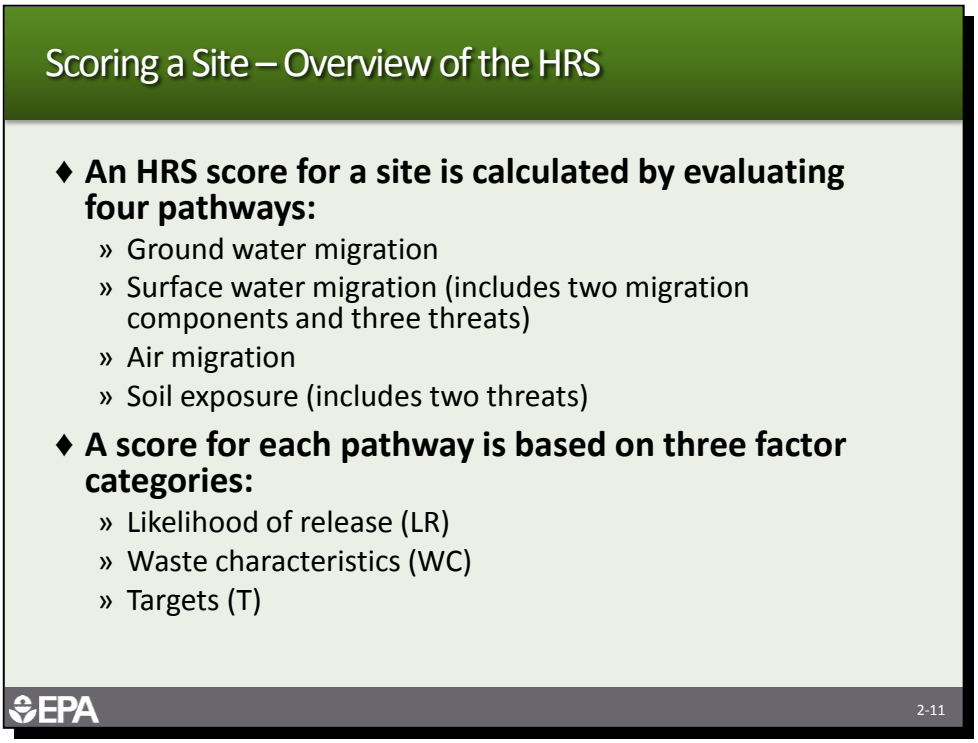
Notes

- **Main purpose of NPL is to identify sites that warrant further investigation compared with other candidate sites:** The NCP specifies that the NPL is "the list of priority releases for long-term remedial evaluation and response." The HRS screening tool is EPA's primary mechanism for placing sites on the NPL.

- **A preliminary HRS score is prepared for the site:** The site investigator will need to develop a preliminary HRS score for the site during the PA/SI.

  - **A preliminary HRS score is generated before field activities begin (PA stage):** Various tools are available to help site investigators develop a preliminary HRS score before site activities are initiated. As will be discussed in more detail in later modules, Quickscore, an automated method of scoring, is used to test various scoring scenarios. EPA's Quickscore web site address is: *http://www.epa.gov/superfund/programs/npl_hrs/quickscore.htm*.

  - **Field data or sampling will be required to prove the hypothesis (SI stage) for sites with a score of 28.50 or greater:** As noted previously, sites scoring 28.50 or greater in the HRS are candidates for the NPL. If a site score is 28.50 or greater at the PA stage, then field data collection and field sampling will be required at the SI stage to prove the hypothesis.



Notes

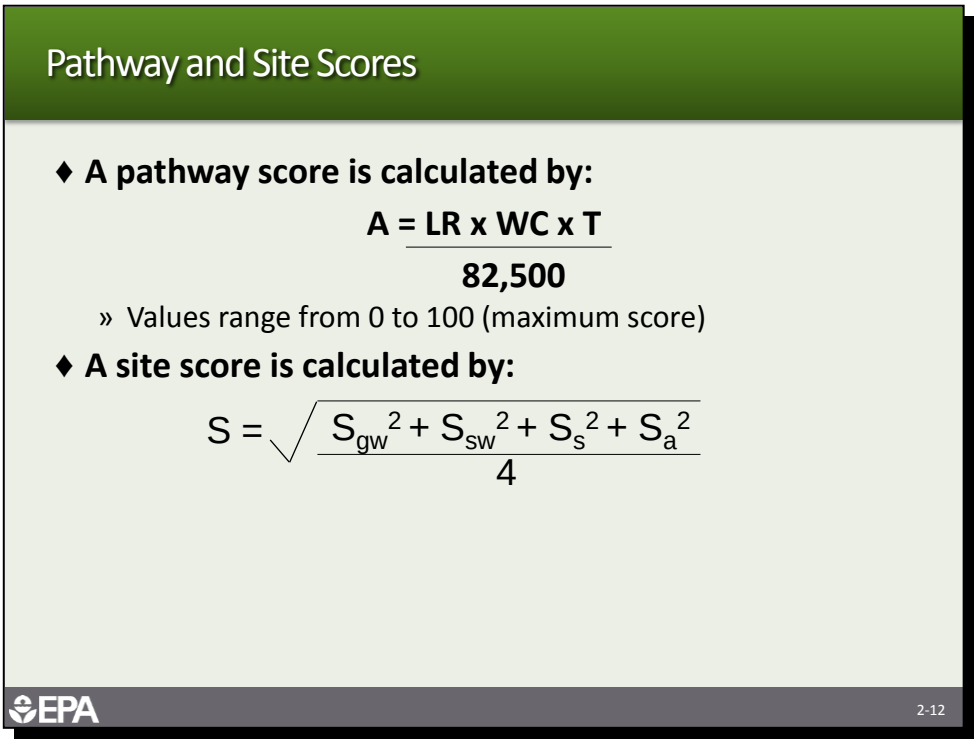
- **An HRS score for a site is calculated by evaluating four pathways:** Sites are investigated and scored using an approach based on the HRS model, also referred to as HRS-based decision making. The HRS is a scoring system to assess the relative threat associated with actual or potential releases of hazardous substances. An HRS score for a site is calculated by evaluating four pathways:
  - » Groundwater migration
  - » Surface water migration, composed of two migration components: overland/flood migration to surface water and groundwater to surface water migration. It also includes three threats: (drinking water, human food chain and environmental)
  - » Air migration
  - » Soil exposure, composed of two threats (resident population and nearby population)

    The groundwater, surface water and air pathways are referred to collectively as the migration pathways. The soil exposure pathway evaluates threats to targets based on current conditions and does not evaluate potential migration to additional targets.

- **A score for each pathway is based on three factor categories:** The scoring system for each pathway is based on a number of individual factors grouped into three factor categories:

  - » Likelihood of release
  - » Waste characteristics (e.g., toxicity and waste quantity)
  - » Targets

  A complete description of the HRS and definitions, rules and scoring is found in 40 CFR Part 300, Appendix A. Site assessment resources can be found at: *http://www.epa.gov/superfund/sites/npl/hrsres/#SI%20Guidance*.



Notes

- **A pathway score is calculated by:** Each HRS pathway score (A) is the product of the three factor category values (likelihood of release or likelihood of exposure, waste characteristics and targets) divided by a scaling factor:

  where: LR = likelihood of release
  WC = waste characteristics
  T = targets factor

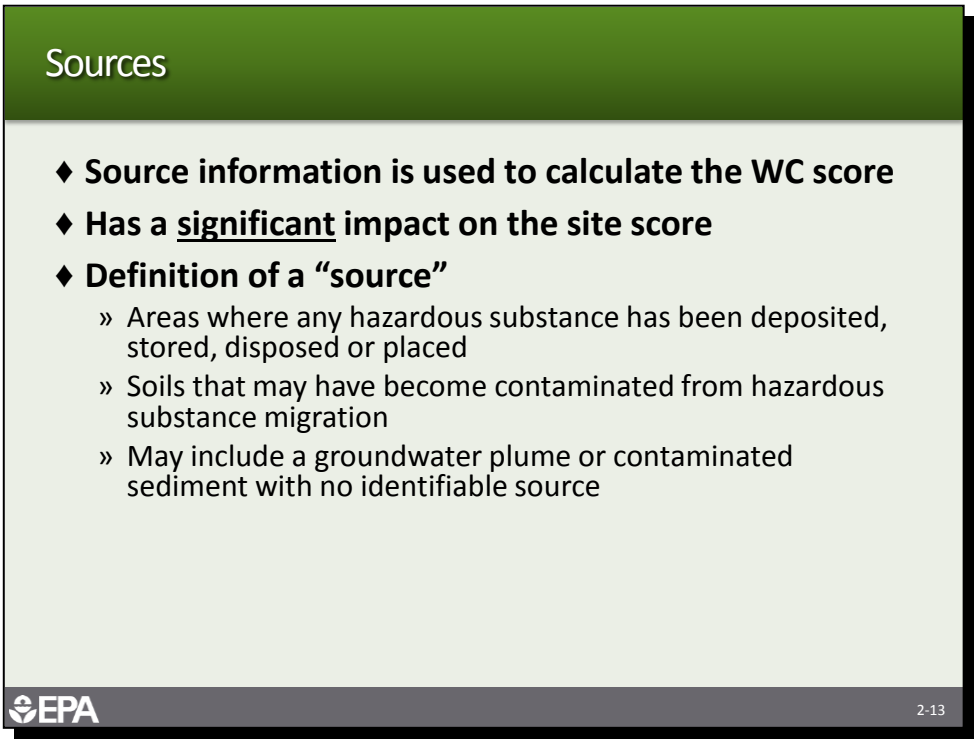
  In the case of the surface water migration and soil exposure pathways, scores are calculated for each threat and then added to yield the pathway score. However, for the surface water migration pathway, only the highest of the overland flood or groundwater to surface water scores is used to determine the site score.

- **Values range from 0 to 100 (maximum score):** The scaling factor of 82,500 is used to normalize a pathway score to 100 points (that is, to establish a minimum value of 0 and a maximum value of 100).

- **A site score is calculated by:** The HRS site score (S) is calculated by a root-mean-square formula:

  where: S_{gw} = groundwater migration pathway score
  S_{sw} = surface water migration pathway score
  S_s = soil exposure pathway score
  S_a = air migration pathway score

  The HRS site score also ranges from 0 to 100.



Notes

- **Source information is used to calculate the WC score:** Understanding the sources at a site is one of the keys to HRS scoring. Source information is used throughout the HRS scoring process.
- **Has a significant impact on the site score:** Deficiencies in source information or in its interpretation have a significant impact on the site score. Therefore, it is critical to correctly classify and characterize each source at a site.
- **Definition of a "source":** The HRS defines a source as:
  - **Areas where any hazardous substance has been deposited, stored, disposed, or placed:** As such, "source" is broadly defined by the HRS. However, the volumes of air, groundwater, surface water and surface water sediments that may have become contaminated through migration are not considered sources.
  - **May include a groundwater plume or contaminated sediment with no identifiable source:** When no source can be identified for groundwater plumes or contaminated sediments, then the groundwater plume or contaminated sediments are considered the source in accordance with the HRS rule.

Source Types

- Aboveground Tank
- Active Fire Area
- Underground Tank
- Buried/Backfilled Surface Impoundment
- Burn Pit
- Container or Tank
- Contaminated Soil
- Drum

(continued)

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Notes

- **Source types:** The HRS identifies a number of specific source types for evaluation. Individual HRS factors, such as containment, and the calculation of hazardous waste quantity may vary by source type. After sources have been identified at the site, investigators will need to classify each source in one of the HRS source type categories identified for the pathway.

Source Types

- **Landfarm/Land Treatment**
- **Landfill**
- **Other**
- **Piles:**
  - » Scrap Metal or Junk Pile
  - » Tailings Pile
  - » Trash Pile
  - » Other
- **Surface Impoundment**
- **Unallocated Sources**

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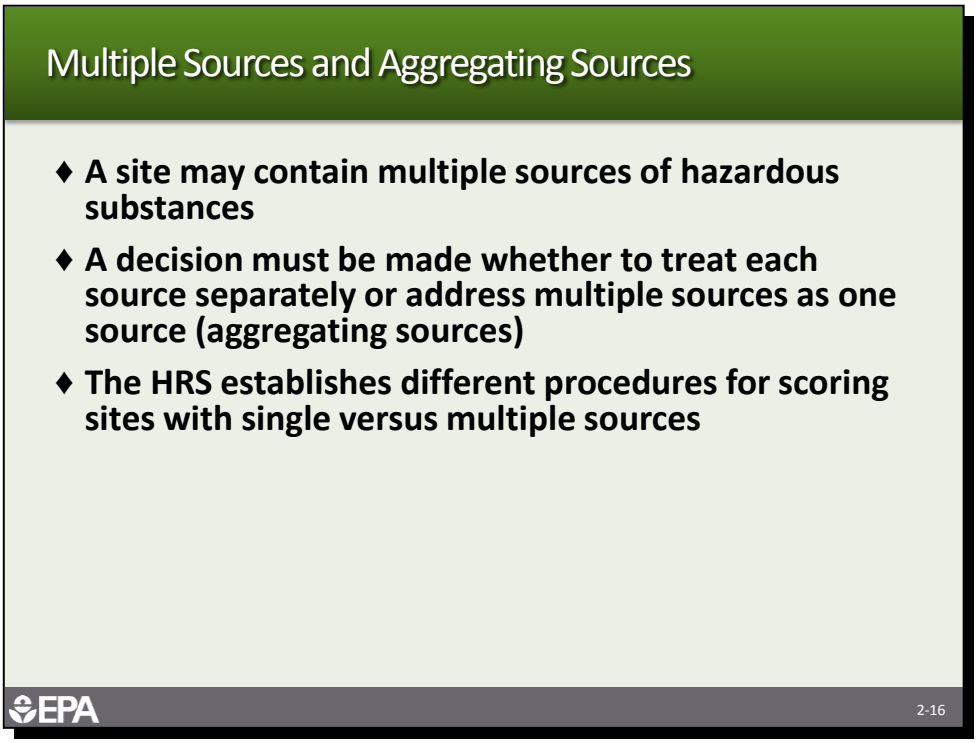
Notes

- **Characterizing unique sources:** Some sources do not easily fit into HRS source types, such as natural ponds or contaminated seeps or leachate. These sources will need to be evaluated on a case-by-case basis.



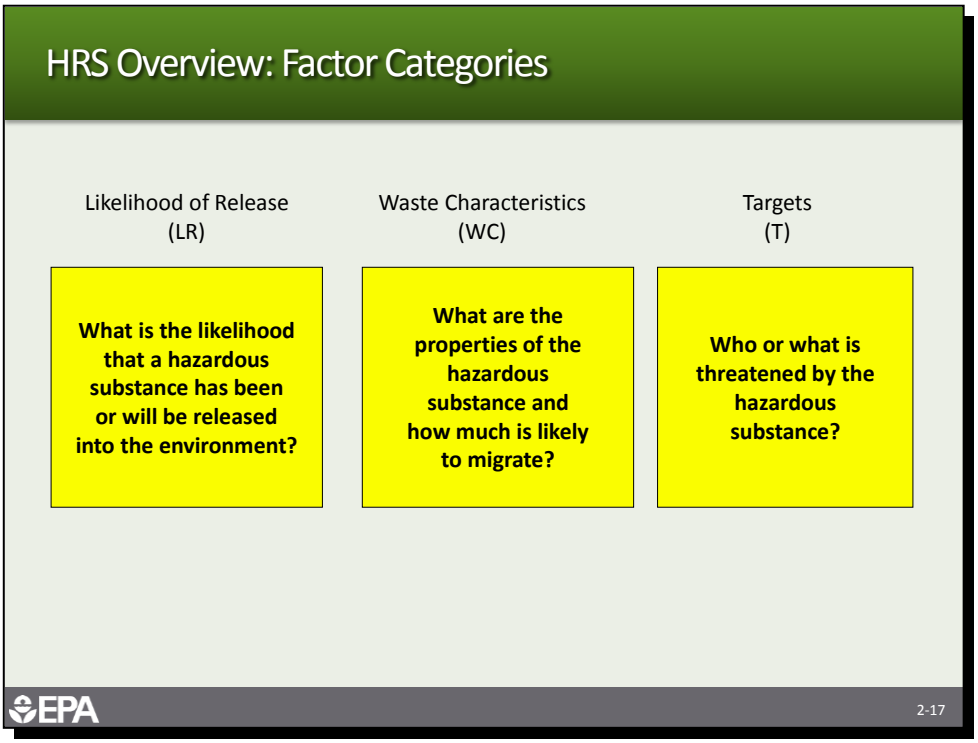
Notes

- **A site may contain multiple sources of hazardous substances:** Sites often contain multiple sources. For example, a site may include tanks, landfills, surface impoundments and contaminated soil that have released hazardous substances into the groundwater and surface water.

- **A decision must be made whether to treat each source separately or address multiple sources as one source (aggregating sources):** At sites with multiple sources, the site investigator must determine when to treat multiple areas that contain hazardous substances as one source and when to treat these areas separately. If sources are similar in type and the target populations are similar, the scorer should consider aggregating them into one source. Decisions to aggregate sources or treat them separately should be considered carefully because they may affect individual HRS factors, such as target distance limits (TDL).

- **The HRS establishes different procedures for scoring sites with single versus multiple sources:** Two types of HRS factors are affected when sites with single sources versus multiple sources are scored:

  - » Factors where the mechanism of scoring differs for single and multiple source sites (that is, factors that are summed to obtain the score for multiple sources and factors where the value is assigned to each source and the highest score for any one sources is used for scoring).
  - » Factors that involve sources that must meet specific criteria to be eligible for HRS scoring are affected.



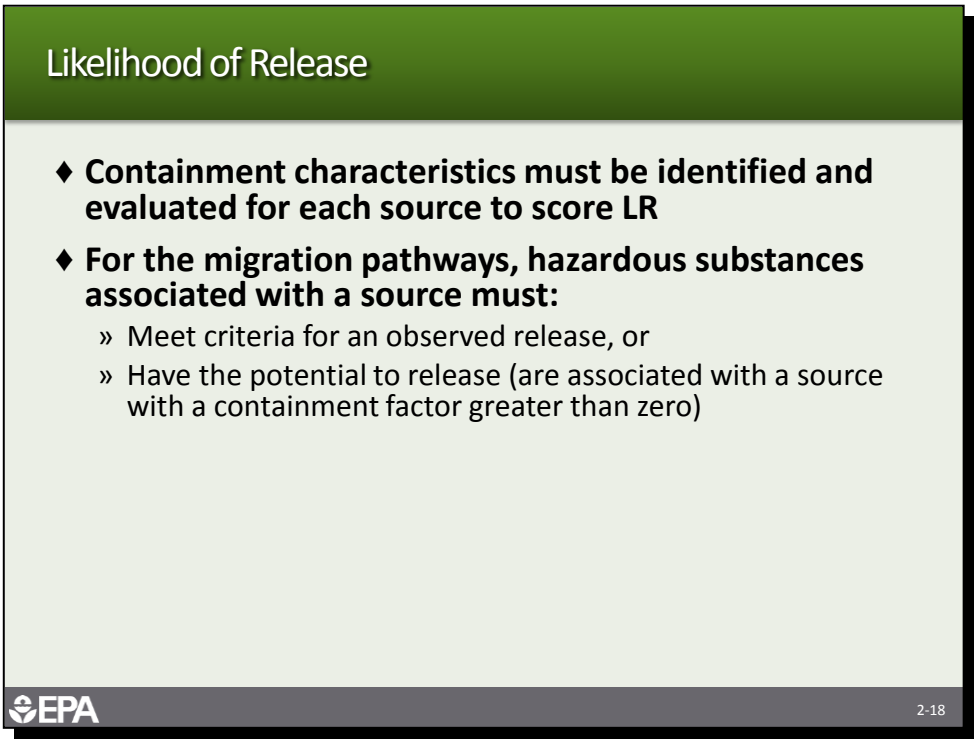
Notes

HRS Overview: Factor Categories: As noted previously, there are three factor categories in the HRS scoring system for each pathway.

- **Likelihood of Release:** Likelihood of release examines whether hazardous substances have been or will be released into the environment. There are two ways of scoring the likelihood of release factor category: (1) documenting an observed release for the migration pathways (groundwater, surface water and air) or observed contamination for the soil exposure pathway; or if an observed released cannot be documented; and (2) establishing that a source has potential to release hazardous substances to migration pathways.

- **Waste Characteristics:** The waste characteristics factor category is used to determine and score the quantity and characteristics (for example, toxicity, mobility and persistence) of hazardous substances at a site. The specific contaminant characteristic used by the HRS will vary based on the pathway and targets evaluated. For example, toxicity is the only contaminant characteristic included in the soil exposure pathway; other factors such as mobility and persistence are not considered. The Superfund Chemical Data Matrix (SCDM) provides information on toxicity, mobility, persistence and bioaccumulation potential for many different chemicals and is part of Quickscore.

- **Targets:** Targets consist of people (such as affected populations and nearby residents), sensitive environments, fisheries and resources that potentially can be affected by hazardous substances at a site. Targets vary by pathway.



Notes

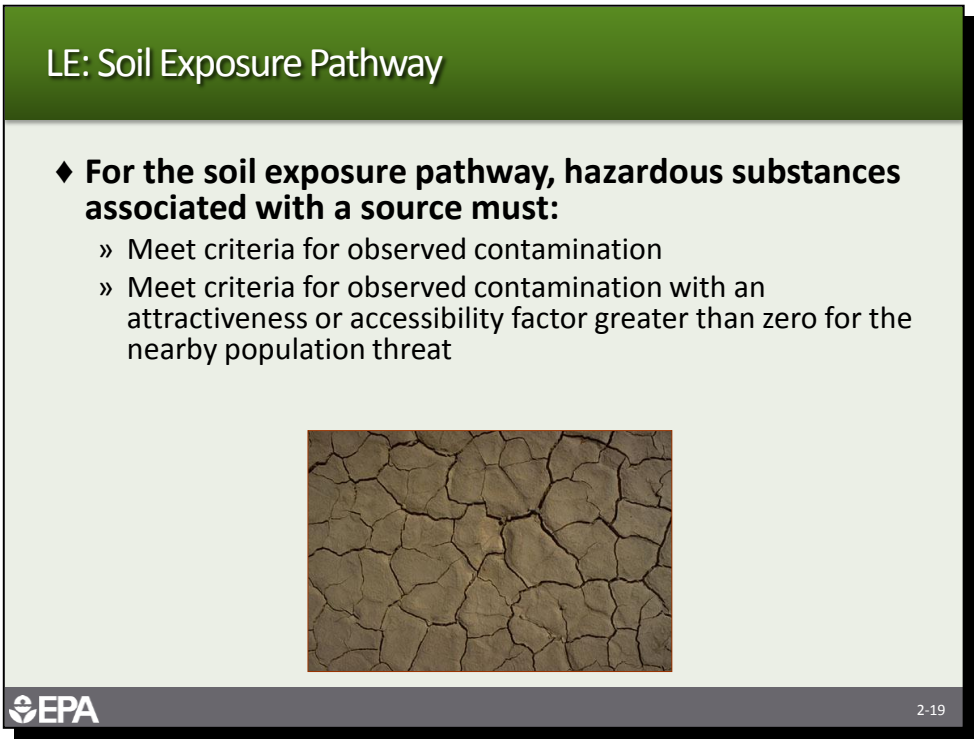
◆ **Containment characteristics must be identified and evaluated for each source to score LR:** A source must have released or have the potential to release hazardous substances into the environment for a pathway to score under the HRS.

◆ **For the migration pathways, hazardous substances associated with a source must:**

» Meet criteria for an observed release, or

» Have the potential to release (are associated with a source with a containment factor greater than zero)

For example, if an observed release to an aquifer cannot be established (for example, through evidence of hazardous substances in an aquifer attributed to a leaking impoundment), then the aquifer is evaluated based on the potential to release.



Notes

◆ **For the soil exposure pathway, hazardous substances associated with a source must:**

» Meet criteria for observed contamination

» Meet criteria for observed contamination with an attractiveness or accessibility factor greater than zero for the nearby population threat

The soil exposure pathway evaluates the threat to individuals and sensitive environments from exposure to surficial contamination. The pathway can be evaluated only if there are areas of observed contamination. Targets are scored based on their distance from areas of observed contamination and the accessibility of the contaminated area. The hazardous waste quantity is calculated based on areas of observed contamination. For the resident population threat, the contaminated soil must be located on the property and within 200 feet of a residence, school, day care center, work place, or resource (commercial agriculture, commercial silviculture, or commercial livestock production or grazing).

LR: Observed Release or Observed Contamination

- **Establishing an observed release (or observed contamination in the soil exposure pathway) is an important determinant of a pathway score**
- **An observed release can be established by direct observation or chemical analysis**
  - » Chemical analysis is required to establish observed contamination in the soil exposure pathway

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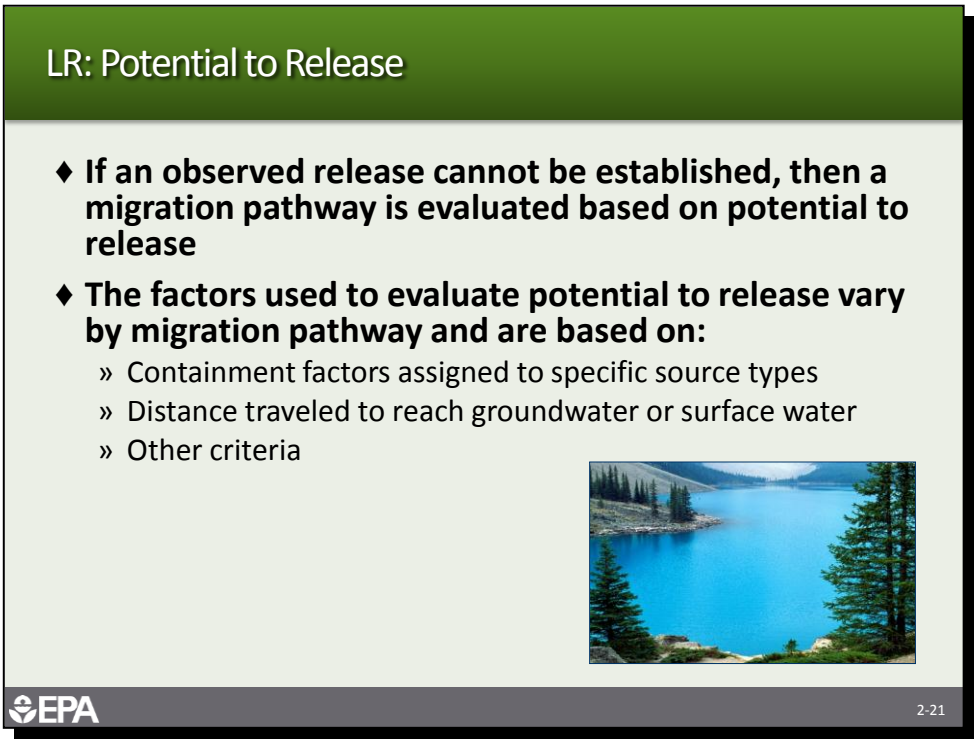
Notes

- **Establishing an observed release (or observed contamination in the soil exposure pathway) is an important determinant of a pathway score:** If an observed release is established for a migration pathway, the "likelihood of release" is automatically assigned its maximum value. As noted in the previous slide, establishing observed contamination is a necessary prerequisite for scoring the soil exposure pathway. In addition, an observed release is necessary for establishing and scoring actual contamination for targets.

- **An observed release can be established by direct observation or chemical analysis:** Establishing an observed release by direct observation generally requires information on material containing a hazardous substance that has been placed into or has been seen entering the medium of concern and attribution of the substance to the site. Establishing an observed release (or observed contamination) by chemical analysis generally requires attributing the hazardous substance to the site and also requires defining background, demonstrating that concentration of the hazardous substance in a release sample is significantly increased above background (3 times background), and attributing some portion of the significant increase to the site.

  - » **Chemical analysis is required to establish observed contamination in the soil exposure pathway:** Observed contamination can be established only by chemical analysis.



Notes

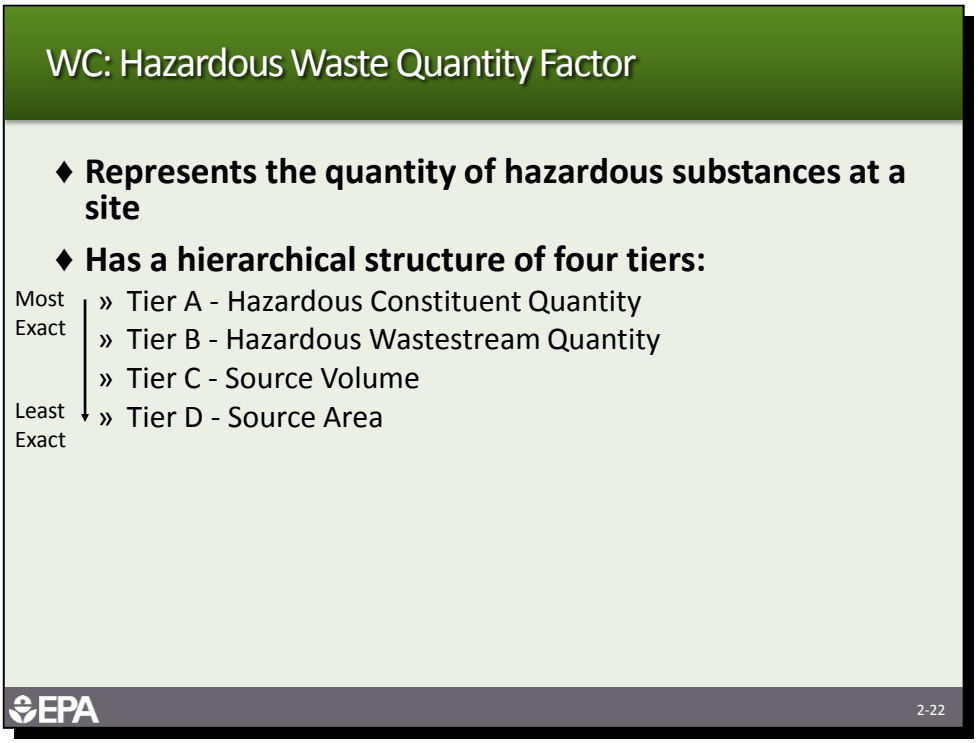
◆ **If an observed release cannot be established, then a migration pathway is evaluated based on potential to release:** If an observed release to a migration pathway cannot be established, then the aquifer (groundwater pathway), watershed (surface water pathway), or air (air pathway) is evaluated based on the capability of sources at the site to release hazardous substances into the environment.

◆ **The factors used to evaluate potential to release vary by migration pathway and are based on:** Each migration pathway establishes environmental criteria, contaminant characteristics and containment factors unique to concerns of the medium to evaluate and score "potential to release."

» **Containment factors assigned to specific source types:** The containment factor is a measure of the methods (either natural or engineered) that have been used to restrict the release of hazardous substances from a source into the environment. Containment criteria have been compiled for several types of sources (such as piles, surface impoundments, tanks, containers) on a numerical scale selected to provide a relative degree of discrimination among various levels of containment.

» **Distance traveled to reach groundwater or surface water:** Potential to release is evaluated for the groundwater pathway based on depth and travel time needed to reach the aquifer of concern. The surface water pathway evaluates potential to release based on overland flow and potential to flood. The distance to surface water must be evaluated when potential to release by overland flow is assessed.

» **Other criteria:** In addition, environmental criteria, such as net precipitation, and contaminant characteristics, such as whether hazardous substances would be released as particulates or gases, are considered in assessing the potential to release.



Notes

- **Represents the quantity of hazardous substances at a site:** The hazardous waste quantity factor is an assigned value for the pathway that is based on the sum of all source hazardous waste quantity values. Estimating the hazardous waste quantity is part of source characterization, and site investigators must evaluate the hazardous quantity for each source or aggregated source.

- **Has a hierarchical structure of four tiers:**

  - **Tier A – Hazardous Constituent Quantity:** Is used when data are available on the quantities of individual CERCLA hazardous substances. Tier A yields the most accurate measure of the mass of CERCLA hazardous substances in the source if complete data are available. The hazardous constituent quantity is evaluated based solely on the mass of CERCLA hazardous substances present in the source. The mass of CERCLA pollutants or contaminants, if any, is not included. The following conditions must be present to use Tier A data:

    - Volume and density of the source are known with reasonable confidence; and

    - Concentration data are representative of the source.

    Any data that provide quantities of CERCLA hazardous substances deposited into a particular source are ideal for evaluating Tier A. For example, RCRA hazardous waste manifests, permits, operating records and waste profile data may contain this information.

» **Tier B – Hazardous Wastestream Quantity:** Is used when Tier A data are not adequately determined and when wastestream data are available. Tier B is based on the actual contents of the source (wastes "as deposited" at the source), as does Tier A. The following conditions must be present to use Tier B data:

- The mass of any hazardous wastestream plus the mass of any additional CERCLA pollutants and contaminants allocated to the source is known; and

- Tier A was not adequately determined for that source. For purposes of Tier A only, the definition of adequately determined is: The total mass of all CERCLA hazardous substances in the source and releases from the source (or for the area of observed contamination) is known or is estimated with reasonable confidence. (For the site hazardous waste quantity factor value to be adequately determined for Tier A, this definition must apply for all sources.)

Site investigators should use data that support the most accurate estimate of hazardous waste quantity for each source. Data may be extrapolated provided there is documentation or rationale to support this approach. Permits, operating records, RCRA hazardous waste manifests, biennial and annual reports, and production reports are potential sources of data for estimating the hazardous wastestream quantity for a source.

» **Tier C – Source Volume:** Is used when the volume of the source can be measured. Tier C is based on capacity, and not the actual contents of the source. For example, Tier C uses the maximum volume of surface impoundments at the site and not the volume of waste actually disposed of in the impoundment.

Tier C cannot be used for an unallocated source (such as when hazardous substances are present at the site, but not allocated to any specific and HRS-defined source type). The following conditions must be present to calculate the volume of the source:

- The volume of the source can be estimated; and

- Tiers A and B could not be adequately determined for the source. For purposes of Tier B only, the definition of adequately determined is: The total mass of all hazardous waste streams and CERCLA pollutants and contaminants for the source and releases from the source (or for the area of observed contamination) is known or is estimated with reasonable confidence. (For the site hazardous waste quantity to be adequately determined for Tier B, this must apply for all sources.

Tier C is used for containerized source types (for example, drums and tanks) and for source types with reasonably well-defined horizontal and vertical boundaries (such as surface impoundments and waste piles). Permits and permit applications are good sources of information for estimating the volume of source types.

» **Tier D – Source Area:** Is used when data on the surface areas of the base of a source are available and the depth of the source cannot be determined. Tier D assumes a default depth for each source and thus provides a less reliable estimate than when the depth of a source can be estimated. Tier D is not used when Tier C can be used. Tier D is most often used with source types without well-defined boundaries, such as landfills and contaminated soil.

Similar to Tier C, Tier D cannot be used for unallocated sources. The following must be present to calculate the area of the source:

- The area of the source can be estimated
- The source was not assigned a value for volume
- Tiers A and B could not be adequately determined for the source

The HRS provides rules on calculating area based on the HRS-defined source type.

In general, Tier A is the most exact measure of hazardous quantity and also requires the highest level of data to score; successive tiers are less accurate, the data requirements are less rigorous. Accordingly, Tier A data will score higher than successive tiers. One approach is to start evaluating hazardous waste quantity at Tier D and work backward to Tier A.

According to the HRS Guidance Manual, all tiers should be evaluated for a source and the tier that provides the highest score should be selected. Therefore, if a source has data for both Tier C and Tier D, both tiers should be evaluated but only the tier with the larger score should be selected.

WC: Data Availability by Source Type

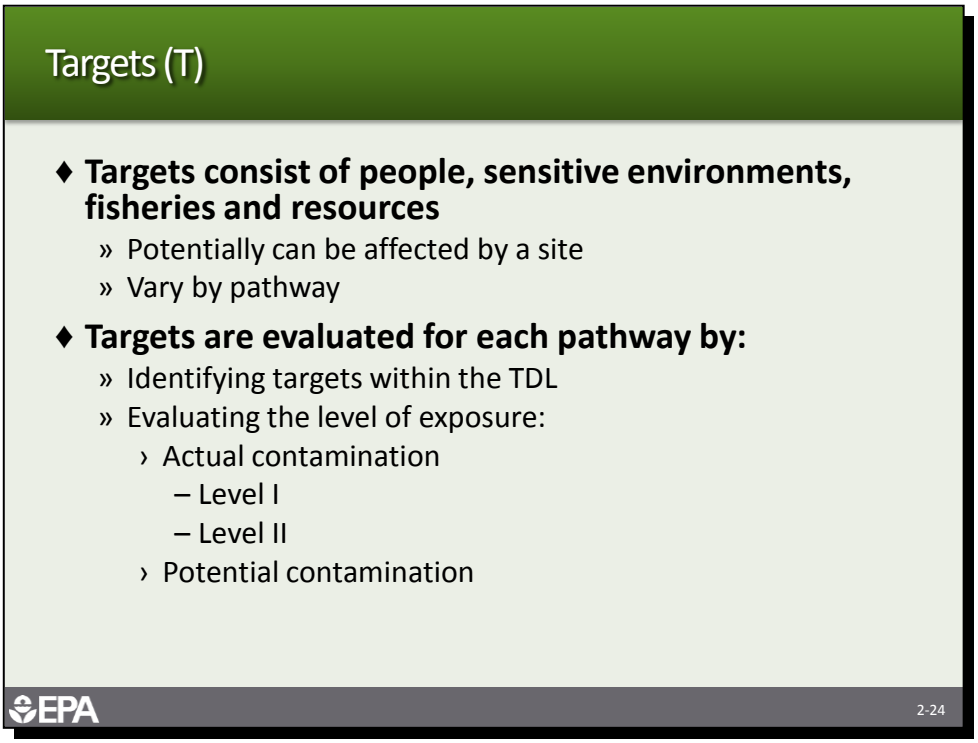
Source Type	Tier A	Tier B	Tier C	Tier D
Landfill	-	✓	✓	✓ ✓
Surface Impoundment	✓	✓	✓ ✓	✓ ✓
Surface Impoundment (buried/backfill)	-	✓	✓	✓ ✓
Drums	✓	✓ ✓	✓ ✓	-
Tanks/Containers	✓	✓ ✓	✓ ✓	-
Contaminated Soil	-	-	-	✓ ✓
Pile	-	✓	✓ ✓	✓
Land Treatment	✓	✓	✓	✓ ✓
Other	-	✓	✓	✓ ✓

EPA 2-23

Notes

- **Data availability by source type:** The table above is taken from Chapter 6 of the HRS Guidance Manual and indicates tiers for which hazardous waste quantity data are most likely to be available for each HRS source type. For example, when calculating the hazardous waste quantity for contaminated soil, it is most likely that data adequate for evaluating Tier D will be available rather than Tier A, B, or C data.

- **Key to Table**
  - » - Unlikely data on HWQ will be available
  - » ✓ Possible that data on HWQ will be available
  - » ✓✓ Likely that data on HWQ will be available



Notes

- **Targets consist of people, sensitive environments, fisheries and resources that potentially can be affected by a site and vary by pathway:** The HRS identifies targets to be evaluated for each pathway.
- **Targets are evaluated for each pathway by:** The HRS targets factor category is the only category that has no maximum value. The relative contribution of a particular target to the overall site score is calculated by assigned a point value and the level of contamination that can affect the target.
  - **Identifying targets within the TDL:** All targets must be identified within an established TDL for each pathway. For example, the TDL for the groundwater pathway is generally a 4-mile radius from sources at the site. For surface water, the TDL is 15 miles downstream of the probable point of entry (PPE).
  - **Evaluating the level of exposure:** A target is subject to actual contamination if it meets specific criteria that demonstrate it has been contaminated by hazardous substances attributable to the site (such as by establishing an observed release). For example, a drinking water well is subject to actual contamination if it can be documented through sampling or monitoring data that the well has been contaminated by hazardous substances attributable to the site (in that case, a source at the site must have an observed release). Targets subject to actual contamination receive higher scores than targets subject to potential contamination.

- **Actual contamination (Levels I or II):** Each pathway establishes criteria used to determine actual contamination, classified as Level I or Level II. The criteria include comparison of contamination to benchmarks, such as maximum contaminant levels (MCL). Level I contamination is assigned when the concentration of the target hazardous substance is greater than or equal to the applicable health-based benchmarks. Level II contamination is assigned when the concentration of the target hazardous substance is less than the applicable health-based benchmarks.

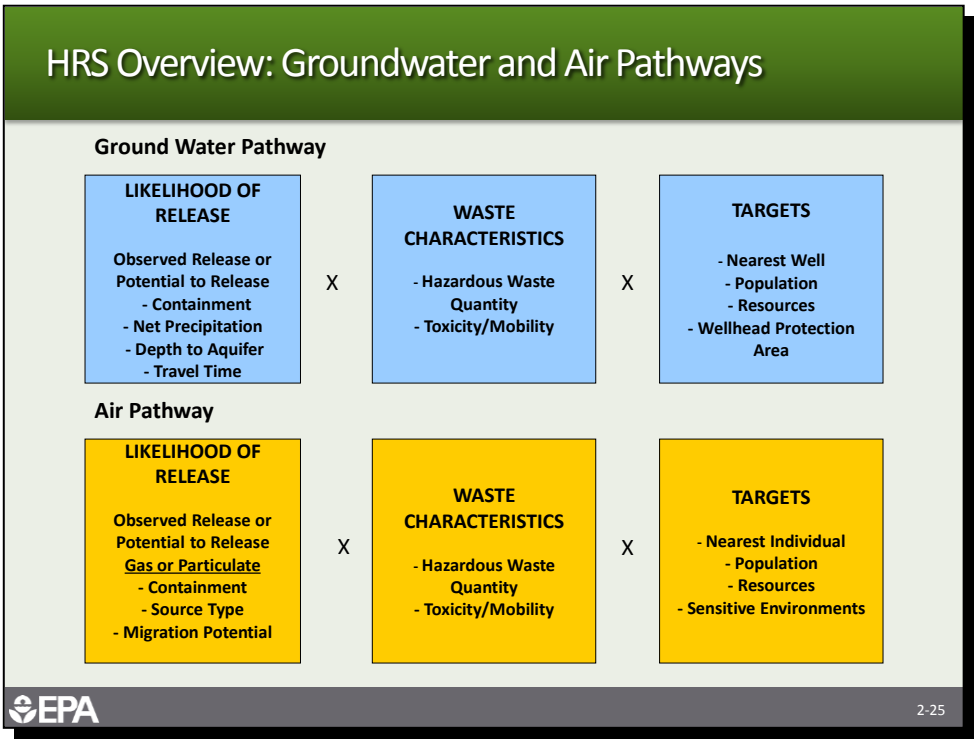
  - Level I: Level I contamination yields a higher score than Level II contamination. Actual contamination documented by direct observation cannot be Level I. Level I is also not used for sensitive environments in the soil exposure and air migration pathways. Section 2.5 of the HRS Rule states that Level I contamination exists when "media-specific concentrations for the target meet the criteria for an observed release (or observed contamination) for the pathway and are at or above media-specific benchmark values. These benchmark values include both screening concentrations and concentrations specified in regulatory limits such as Maximum Contaminant Level values."

  - Level II: Level II contamination yields a lower score than Level I contamination. Level II contamination is assigned to targets as specified in each pathway. Section 2.5 of the HRS Rule states that Level II contamination exists when "media-specific concentrations for the target meet the criteria for an observed release (or observed contamination) for the pathway, but are less than media-specific benchmarks. If none of the hazardous substances eligible to be evaluated for the sampling location has an applicable benchmark, assign Level II to the actual contamination at the sampling location."

  - According to the HRS Rule, if a target is subject to both Level I and Level II concentrations for a pathway (or threat), the target should be evaluated using Level I concentrations for that pathway or threat.

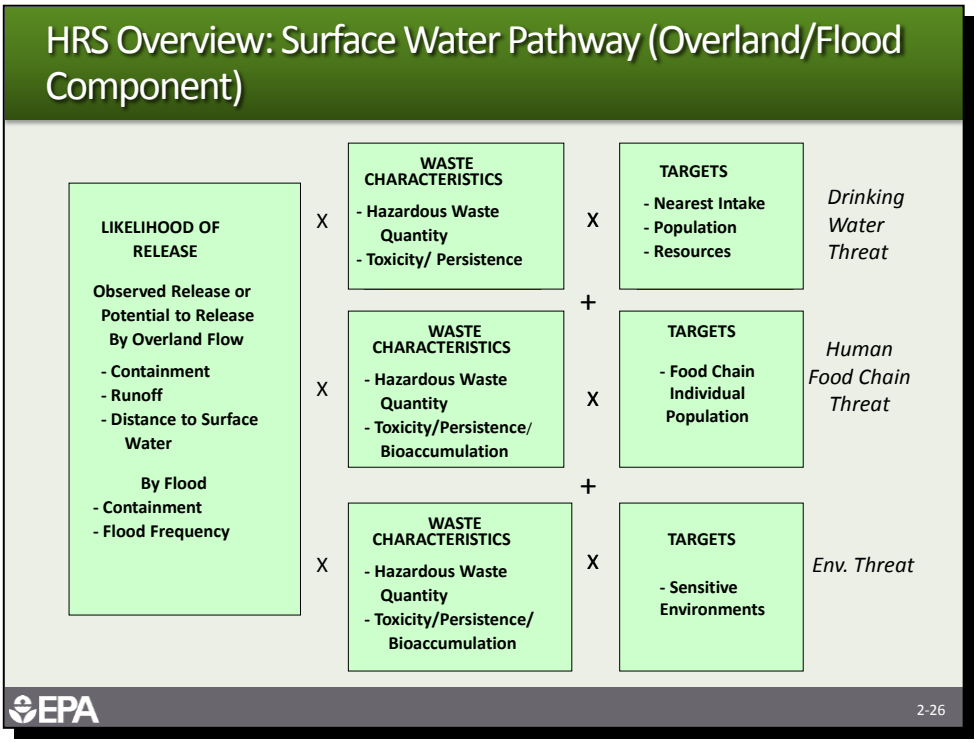
    For example, 10 people qualifying for Level I contamination would receive 100 points whereas 10 people qualifying for Level II contamination would yield 10 points.

- **Potential contamination:** Targets where actual contamination is not documented are evaluated based on potential contamination.



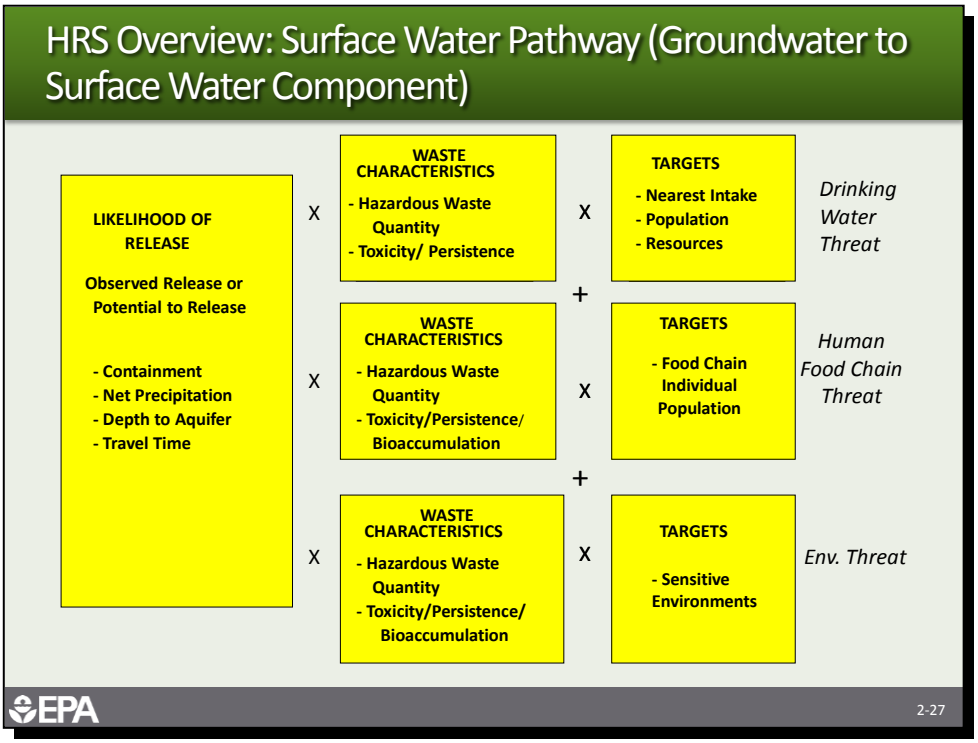
Notes

Groundwater and Air Pathways: *The graphics above illustrate the various individual factors included in the HRS that are used to score the groundwater and air pathways.*



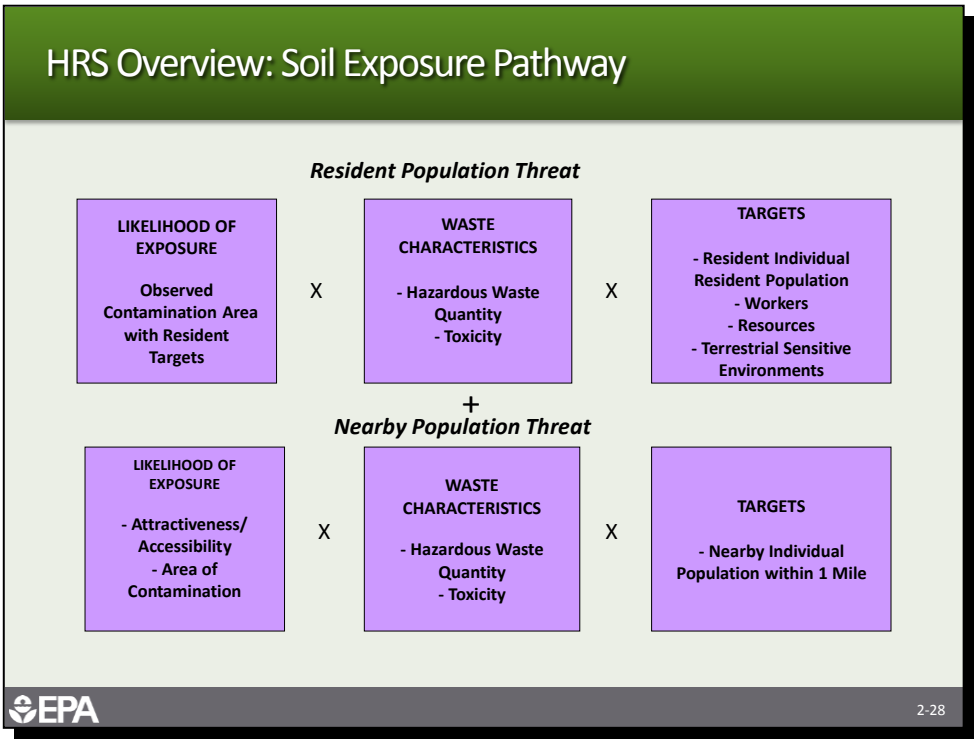
Notes

- **Surface Water Pathway:** The surface water pathway is evaluated based on two migration components: overland/flood and groundwater to surface water. Only the higher scoring component is used if both migration components are evaluated. The graphic above illustrates the various individual factors included in the HRS that are used to score the surface water pathway for the overland/flood migration component. Scores are calculated for each threat in the surface water pathway (drinking water, human food chain and environmental) and then added to yield the pathway score. One or both of the migration components may be scored.



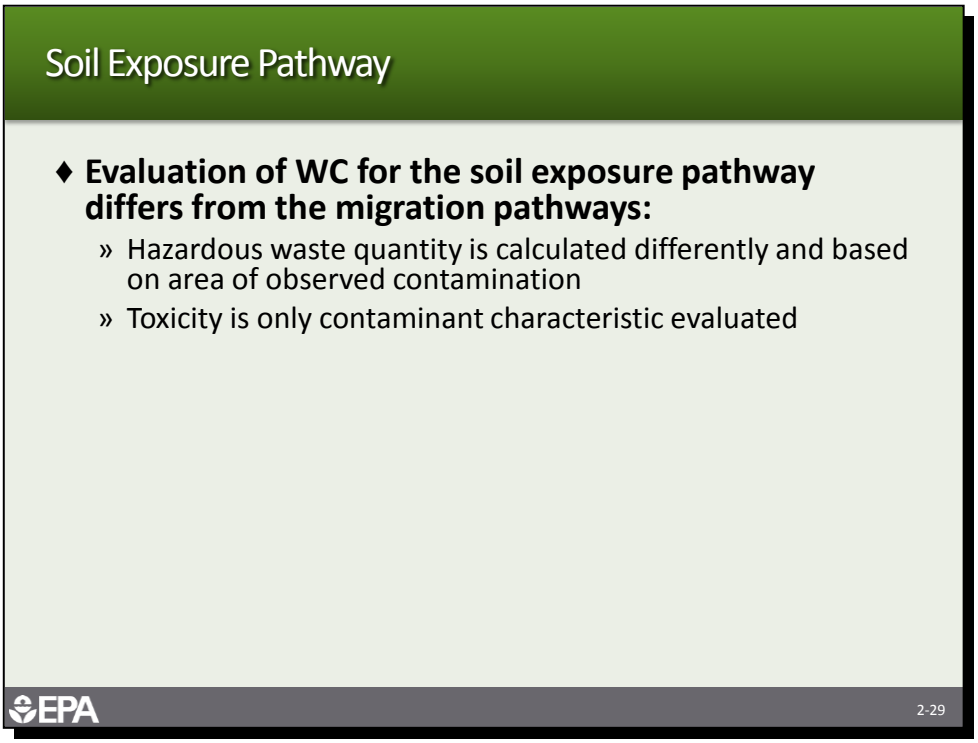
Notes

- **Surface Water Pathway:** The graphic above illustrates the various individual factors included in the HRS that are examined to score the groundwater to surface water migration component of the surface water pathway.



Notes

- **Soil Exposure Pathway:** The graphic above illustrates the various individual factors included in the HRS that are used to score the soil exposure pathway. Scores are calculated for each threat (resident population and nearby population) and then added to yield the pathway score.

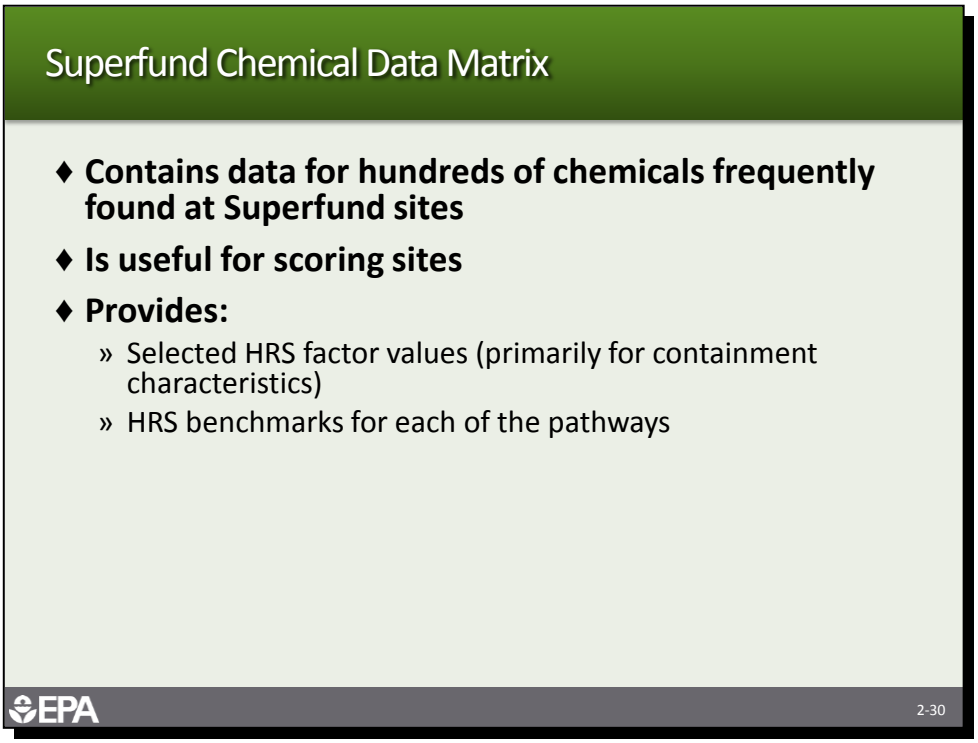


Notes

◆ **Evaluation of WC for the soil exposure pathway differs from the migration pathways:** The soil exposure pathway evaluates the threat to individuals and sensitive environments from exposure to surficial contamination. It is necessary to identify and delineate areas of observed contamination because the pathway can be evaluated only if there are areas of observed contamination.

» **Hazardous waste quantity is calculated differently and based on area of observed contamination:** The tiered approach (Tiers A-D) is used to evaluate hazardous waste quantity for the soil exposure pathway; the primary difference from the migration pathways is that the soil exposure pathway includes only hazardous waste present in the top 2 feet of surficial matter.

» **Toxicity is only contaminant characteristic evaluated:** Toxicity is the only contaminant characteristic evaluated under the pathway; other factors such as mobility and persistence are not considered.

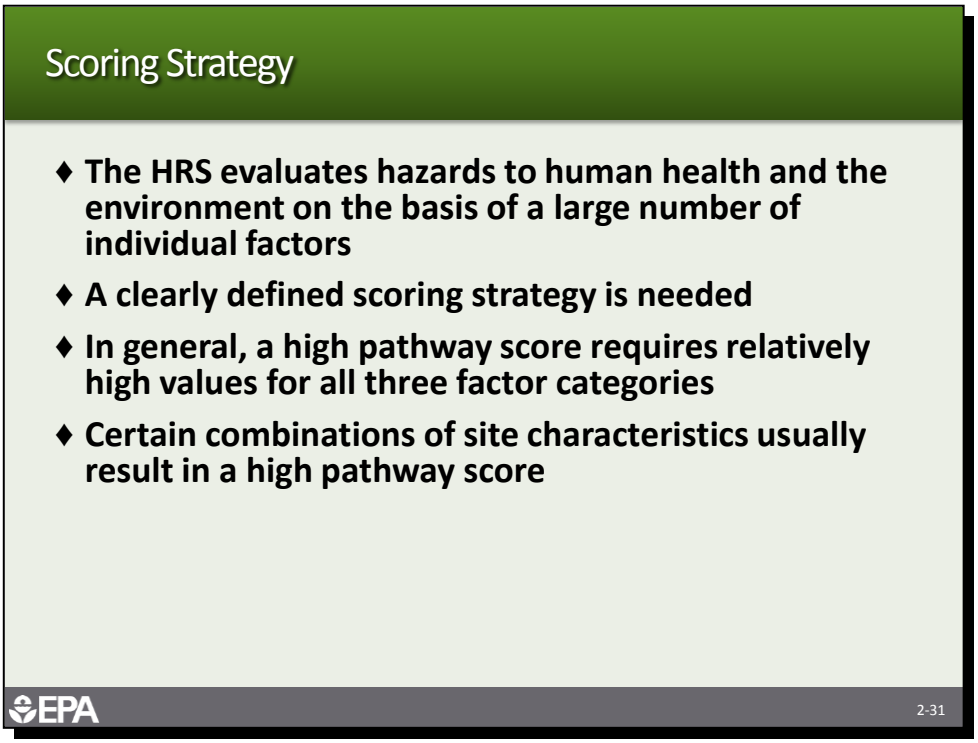


Notes

- **Contains data for hundreds of chemicals frequently found at Superfund sites:** The SCDM is published by the EPA and is updated periodically.
- **Is useful for scoring sites:** SCDM contains comprehensive data needed to score sites using the HRS.
- **Provides:** SCDM provides selected HRS factor values (primarily for contaminant characteristics) and HRS benchmarks for each of the four pathways.
  - **Selected HRS factor values (primarily for containment characteristics):** HRS factor values include toxicity, mobility in groundwater, persistence in surface water, bioaccumulation in the human food chain and the environment, toxicity to the ecosystem, potential for gas migration in air and mobility in air.
  - **HRS benchmarks for each of the pathways:** Available benchmarks include toxicity-based benchmarks (such as cancer risk and reference dose screening levels) and regulation-based benchmarks (such as MCLs).

Reference

The EPA will calculate chemical data for federal and state agencies. To have the EPA perform calculations please call the SCDM hot line at (703) 461-2019 or visit the SCDM website at *http://www.epa.gov/superfund/sites/npl/hrsres/tools/scdm.htm*.



Notes

- **The HRS evaluates hazards to human health and the environment on the basis of a large number of individual factors:** Under the HRS site scoring equation, higher scoring pathways have a greater relative impact on the overall site score than do lower scoring pathways. It is neither feasible nor productive for most sites to gather data for and score every factor in every pathway. Many sites pose threats primarily via only one or two pathways.

- **A clearly defined scoring strategy is needed:** Without a clearly defined scoring strategy, considerable resources may be expended in gathering data and scoring factors and pathways that will have little impact on the site score.

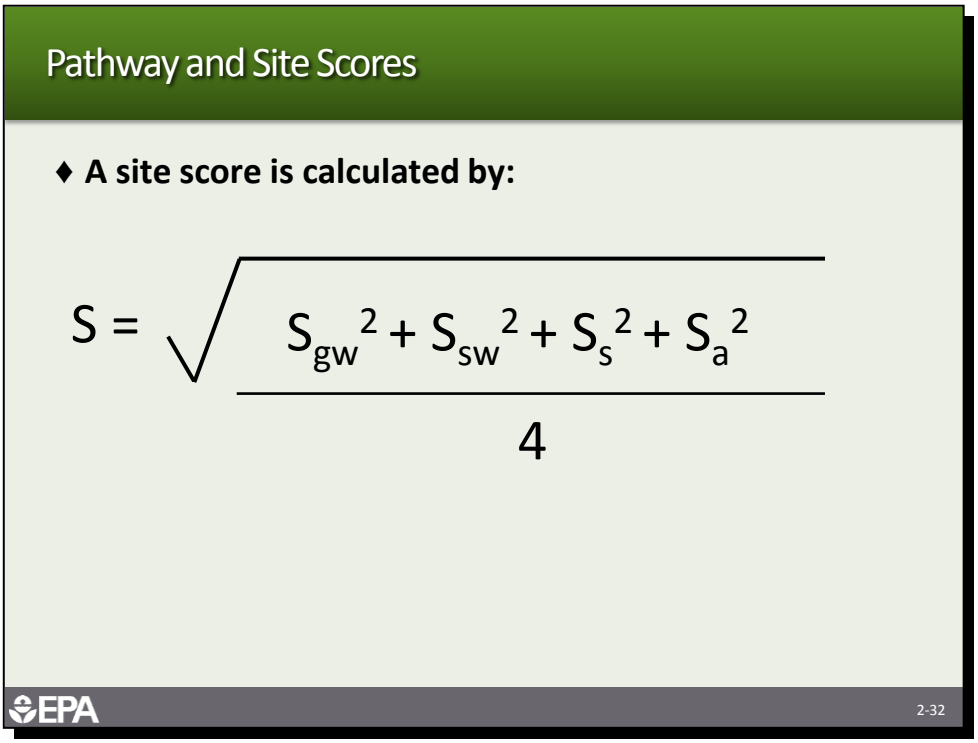
- **In general, a high pathway score requires relatively high values for all three factor categories:** A high pathway score requires relatively high values for all three factor categories, and with a few exceptions (for example, when the targets category value, which is not capped, is very high) a low value for any single factor category will limit the pathway score. This results partly from the multiplicative relationship among the three factor category values in the pathway score equation, and partly from how the values for each factor category are assigned in the HRS. For example, minimal waste quantity and a moderate or low likelihood of release are likely to result in a low pathway score unless a very high targets value is obtained.

- **Certain combinations of site characteristics usually result in a high pathway score:** The following generalizations may help identify potentially high-scoring pathways:

» Pathways with actual contamination of targets are likely to score higher than pathways where only potential contamination is established. Therefore, consider scoring all pathways with actual contamination of targets.

» The decrease in target values caused by distance-weighting of targets subject to potential contamination is less in the groundwater pathway than in the air and soil pathways.

» The surface water pathway is likely to receive a relatively high score if an observed release to a fishery or sensitive environment is established.

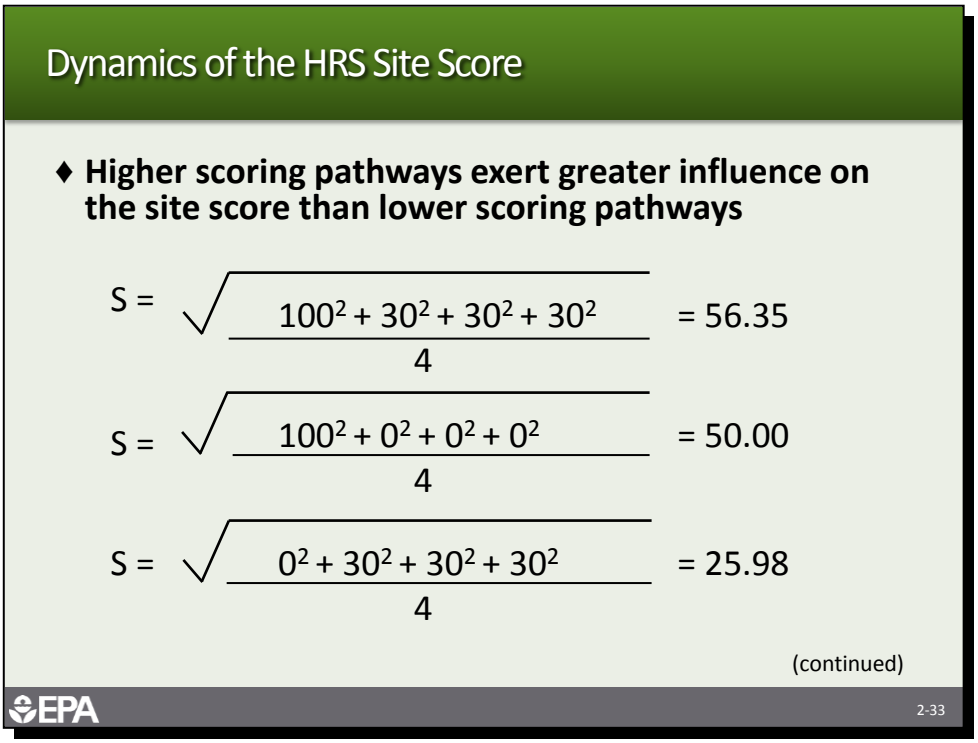


Notes

◆ **A site score is calculated by:** The HRS site score (S) is calculated by a root-mean-square formula:

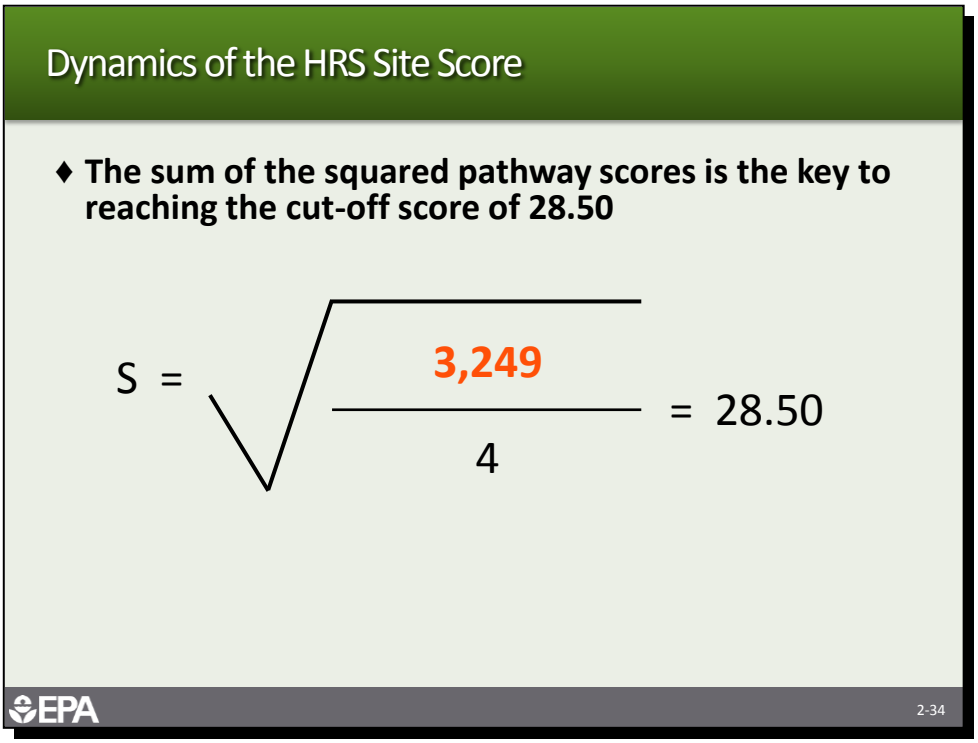
where:
- S_{gw} = Groundwater migration pathway score
- S_{sw} = Surface water migration pathway score
- S_s = Soil exposure pathway score
- S_a = Air migration pathway score

The HRS site score also ranges from 0 to 100.



Notes

◆ **Higher scoring pathways exert a greater influence on the site score than lower scoring pathways:** The mathematics of the root-mean-square equation is such that higher-scoring pathways exert a proportionately greater influence on the site score than lower-scoring pathways. As the example scores above show, the influence of the surface water, soil exposure and air pathways adds only 6.35 points to the site score, and by themselves would not result in a site score above 28.50.



Notes

◆ **The sum of the squared pathway scores is the key to reaching the cut-off score of 28.50:** The sum of the squared pathway scores must be 3,249 or greater in order to achieve a site score of 28.50 or greater.

Example Combinations of Pathway Scores that Yield Site Score of 28.50

Individual Pathway Scores				Sum of Squared Pathway Scores	Site Score
57.00	0.00	0.00	0.00	3,249	28.50
40.31	40.31	0.00	0.00	3,250	28.50
32.91	32.91	32.91	0.00	3,249	28.50
28.50	28.50	28.50	28.50	3,249	28.50

EPA 2-35

Maximum Values for Each Pathway
Ground Water and Air

- **Ground Water and Air Migration Pathways**
  - Likelihood of Release = maximum of 550
    - Observed Release = maximum of 550
    - Potential to Release = maximum of 500
  - Waste Characteristics = maximum of 100
  - Targets = no maximum
  - Maximum pathway scores = maximum of 100

EPA 2-36

Maximum Values for Each Pathway
Surface Water Overland/Flood Migration

- **Surface Water Overland/Flood Migration Pathway**
  - Drinking Water Threat = maximum of 100
    - Likelihood of Release = maximum of 550
    - Waste Characteristics = maximum of 100
    - Targets = no maximum
  - Human Food Chain Threat = maximum of 100
    - Likelihood of Release = maximum of 550
    - Waste Characteristics = maximum of 1,000
    - Targets = no maximum
  - Environmental Threat = maximum of 60
    - Likelihood of Release = maximum of 550
    - Waste Characteristics = maximum of 1,000
    - Targets = no maximum
  - Watershed Score = maximum of 100
  - Component Score = maximum of 100

EPA 2-37

Maximum Values for Each Pathway
Soil Exposure

- **Soil Exposure Pathway**
  - » Resident Population Threat
    - › Likelihood of Exposure = maximum of 550
    - › Waste Characteristics = maximum of 100
    - › Targets = no maximum
    - › Resident Population Threat score = no maximum
  - » Nearby Population Threat
    - › Likelihood of Exposure = maximum of 500
    - › Waste Characteristics = maximum of 100
    - › Targets = no maximum
    - › Nearby Population Threat score = no maximum
  - » Soil exposure pathway score = maximum of 100

EPA 2-38

Summary

- **An assessment must answer four major questions**
- **The "site" must be defined**
- **Formulating a CSM is an inherent part of the assessment process**
- **Sites are scored using HRS-based decision making**

EPA 2-39

Conducting the Preliminary Assessment

EPA
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Agency

2-40

PA Goals

- **Goals of the PA:**
  - Differentiate sites that pose no threat from sites that warrant further action
  - Support emergency response and removal actions
  - Fulfill public information needs
  - Furnish information about the site early in the process
  - Be low-cost and quick

EPA 2-41

Notes

- **Goals of the PA:** One goal of the PA is to differentiate sites that pose little or no potential threat to human health and the environment from sites that warrant further investigation. The PA also supports emergency response and removal activities, fulfills public information needs and furnishes appropriate information about the site early in the site assessment process. The PA is a relatively quick, low-cost compilation of existing information about the site and its surrounding area, with an emphasis on obtaining comprehensive information on targets.

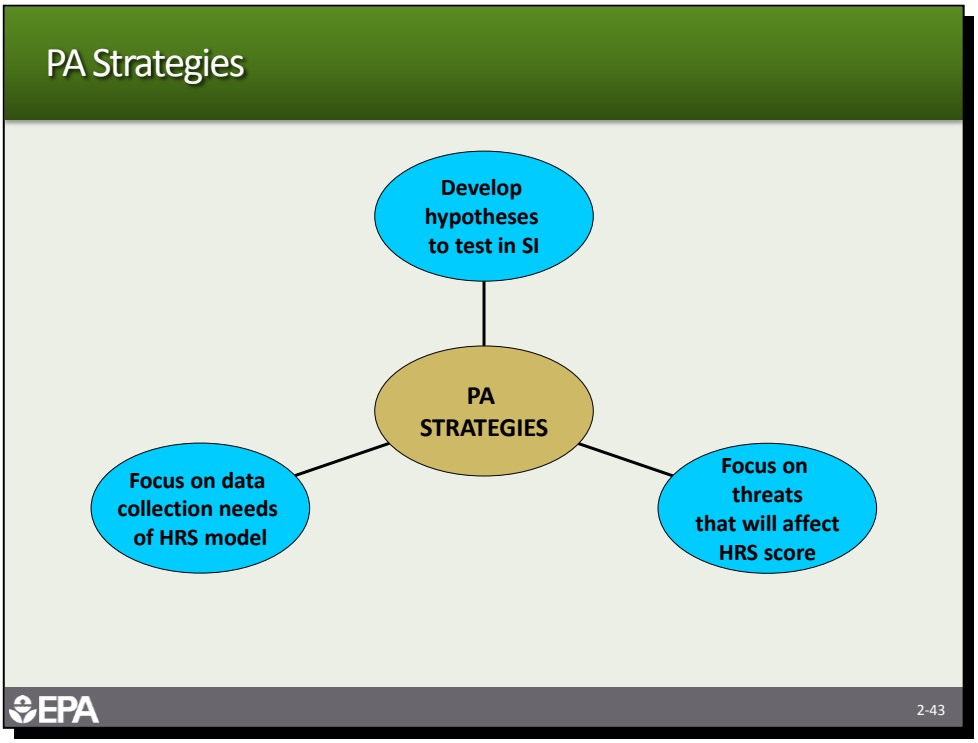
PA Activities and Scope

- **Activities and Scope of the PA**
  - » Compile and review existing information
  - » Minimal to no collection of samples
  - » Perform site reconnaissance
  - » Conduct preliminary scoring
  - » Report results

EPA 2-42

Notes

- **Activities and Scope of the PA:** The scope of the PA must be adequate to encompass a number of tasks. The tasks include reviewing existing information about the site, conducting a site and environs reconnaissance, collecting additional information about the site with an emphasis on targets, and preparing a brief site summary report and site characteristics form. Samples are generally not collected during the PA; however, samples can be collected and are based on regional approaches.



Notes

- **Develop hypotheses to test in SI:** The PA should formulate a CSM and develop hypotheses on sources, targets and pathways that can be tested during the SI. The PA hypotheses should fully explain what data are needed to evaluate whether the hypothesis is correct. For example, if the PA hypothesizes that a release to groundwater has occurred, then the PA should specify what data — such as groundwater samples from monitoring or drinking water wells — are necessary to prove or disprove this hypothesis.

- **Focus on threats that will affect HRS score:** The PA should begin to focus on the threats that may be affecting public health and the environment and those that will alter the HRS score. For example, if there are no groundwater targets near the site, for instance, then the PA should not focus on the likelihood of a release to groundwater.

- **Focus on data collection needs of HRS model:** Information for the HRS model should be collected during the PA. Different data are needed for each of the four pathways scored in the HRS. A good understanding of the HRS requirements is necessary to prepare a thorough PA that will support HRS scoring.

GENERAL SITE INFORMATION

- ☐ Site Name and Location
- ☐ CERCLIS ID Number
- ☐ Type of Facility
- ☐ Type of Ownership
- ☐ Site Status (active/inactive)
- ☐ Years of Operation
- ☐ Owner/Operator Information
- ☐ Operational History
- ☐ Environmental Setting
- ☐ Approximate Size of Site
- ☐ Latitude/Longitude
- ☐ Site Sketch

SOURCE AND WASTE CHARACTERISTICS

- ☐ Source Types and Locations
- ☐ Size of Sources (dimensions)
- ☐ Waste Types and Quantities
- ☐ Hazardous Substances Present

GROUND WATER USE AND CHARACTERISTICS

- ☐ General Stratigraphy and Hydrogeology
- ☐ Presence of Karst Terrain
- ☐ Depth to Shallowest Aquifer
- ☐ Private Wells Within 4 Miles (locations, populations served)
- ☐ Municipal Wells Within 4 Miles (locations, populations served, blended systems)
- ☐ Distance to Nearest Drinking Water Well
- ☐ Wellhead Protection Areas

SURFACE WATER USE AND CHARACTERISTICS

- ☐ Flood Frequency at Site
- ☐ Distance to Nearest Surface Water
- ☐ Surface Water Body Types Within 15 Downstream Miles
- ☐ Surface Water Flow Characteristics Within 15 Downstream Miles
- ☐ Drinking Water Intakes Within 15 Downstream Miles (locations, populations served, blended systems)
- ☐ Fisheries Within 15 Downstream Miles
- ☐ Sensitive Environments and Wetlands Within 15 Downstream Miles

SOIL EXPOSURE CHARACTERISTICS

- ☐ Number of People Living Within 200 Feet
- ☐ Schools or Day Care Within 200 Feet (enrollment)
- ☐ Populations Within 1 Mile
- ☐ Number of Workers at Facility
- ☐ Locations of Terrestrial Sensitive Environments

AIR PATHWAY CHARACTERISTICS

- ☐ Populations Within 4 Miles
- ☐ Distance to Nearest Individual
- ☐ Locations of Sensitive Environments Within 4 Miles
- ☐ Acreage of Wetlands Within 4 Miles

Collecting Readily Available Data

- **File searches**
  - » EPA regional files
  - » State environmental agency files
  - » In-house files

(continued)

EPA 2-44

Notes

- **File searches:** A great deal of information may be available from records of state and or local investigations. Information gathered through file searches can be useful in developing professional judgment hypotheses on the release of hazardous substances from the site and the exposure of targets to substances released.

  Site investigators should be sure to make logistical arrangements for copying file information at EPA, state and local offices. Logistical arrangements would include providing for a way to copy material if a copy machine is not available, and providing the paper on which to make the copies. Investigators may also want to arrange for the use of a conference room to review the files and make copies.

  Many EPA Regional and State offices have electronic files that can either be downloaded from the Internet or provided on a compact disc.

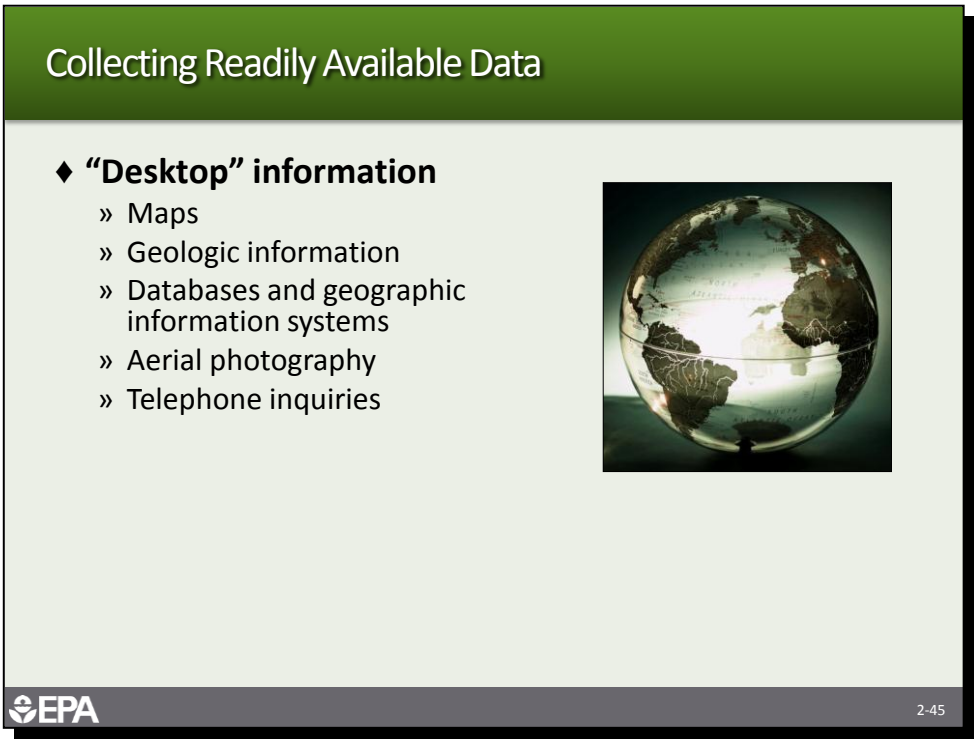
  Documents of particular interest include site sketches, inspection reports, aerial photographs, permit applications, hazardous waste handling notification forms, waste hauling manifests, analytical sampling results, records of citizen complaints, records of violations and court orders.

  - » **EPA regional files:** EPA regional files are usually the first files that will be accessed. Site investigators also might be initiating the PA process when no files exist. In general, investigators should first access regional site assessment files that would contain CERCLA 103(c) notification forms, PA petitions, or reports on previous site assessments at the site. If available, investigators should access other regional Superfund files, which might include removal program files. Investigators should also research EPA offices such as RCRA, EPCRA and National Pollutant Discharge Elimination System (NPDES) permits for relevant information, such as Notifications of Hazardous

Waste Activity, permit applications, RCRA facility assessments (RFA), monitoring and other reports.

» **State environmental agency files:** Files can be requested by phone and mailed to your office, or prior arrangements might need to be made to visit the office and make copies of the file information. While you are reviewing state files, gather information on the site's operating history, specifically regarding waste types, quantities and sources; types of site operations; ownership history; and historical waste handling and disposal practices.

» **In-house files:** These files will not provide information specific to the site. These records include files related to sites in the vicinity of the site. They can provide data on local geology, hydrology and other site environs information. Valuable information on targets can be obtained, such as the locations of public drinking water supply wells or surface water intakes.



Notes

- **"Desktop" information:** Sources can provide information on the geology underlying the site and in the immediate vicinity; the location of surface water bodies, fisheries, wetlands and sensitive environments; the location of public drinking water supply wells and surface water intakes; the populations served by public water supplies; and the residential populations in the vicinity of the site.
  - » **Maps:** Maps provide valuable information on the physical and environmental settings of the site and associated targets. Standard practice at the beginning of the PA is to obtain U.S. Geological Survey (USGS) 7.5-minute topographic quadrangle maps that cover the 4-mile radius around the site as well as the 15-mile surface water migration route.
    - -- USGS topographic maps display geographic features of the site and surrounding area. They can be used to identify surface water migration routes, nearby wetlands and sensitive environments, and the nearest residents.
    - -- National Wetlands Inventory Maps are available from the U.S. Fish and Wildlife Service (USFWS) and delineate the boundaries of wetlands. They can be used like topographic maps to specify wetland locations, acreage and frontage miles.
    - -- Other types of maps helpful include local city and county street maps, flood insurance rate maps and property maps.

» **Geologic information:** Includes information on stratigraphic columns, cross-sections, geologic strata, depth to shallowest aquifer, and nature and properties of geologic materials between the surface and underlying aquifers.

» **Databases and geographic information systems:** These tools provide information about targets, but investigators should not rely on this information exclusively because it could be incomplete.

-- Internet Geographical Exposure Modeling System (IGEMS) – Maintained by EPA's Office of Pollution Prevention and Toxics (OPPT) Chemical Safety Mapper (CSM) and provides population data for specified distances around a point location. The new IGEMS is a modernization of OPPT's older Graphical Exposure Modeling System and PCGEMS tools. IGEMS brings together in one system several EPA environmental fate and transport models and some of the environmental data needed to run them. IGEMS includes models and data for ambient air, surface water, soil and groundwater, and makes the models much easier to use than their stand-alone counterparts. IGEMS includes a new GIS module - CSM for displaying environmental modeling results and chemical monitoring information on various GIS layers.

-- WELLFAX – A water resource database maintained by the National Water Well Association (NWWA) that contains NWWA's inventory of municipal and community water supplies and lists the number of households served by public water systems, private wells and other water supply sources.

-- Envirofacts – Provides access to several EPA databases that provides information about environmental activities that may affect air, water and land anywhere in the U.S. Additional information about environmental activities in a specific area and the ability to create maps can be performed at the site.

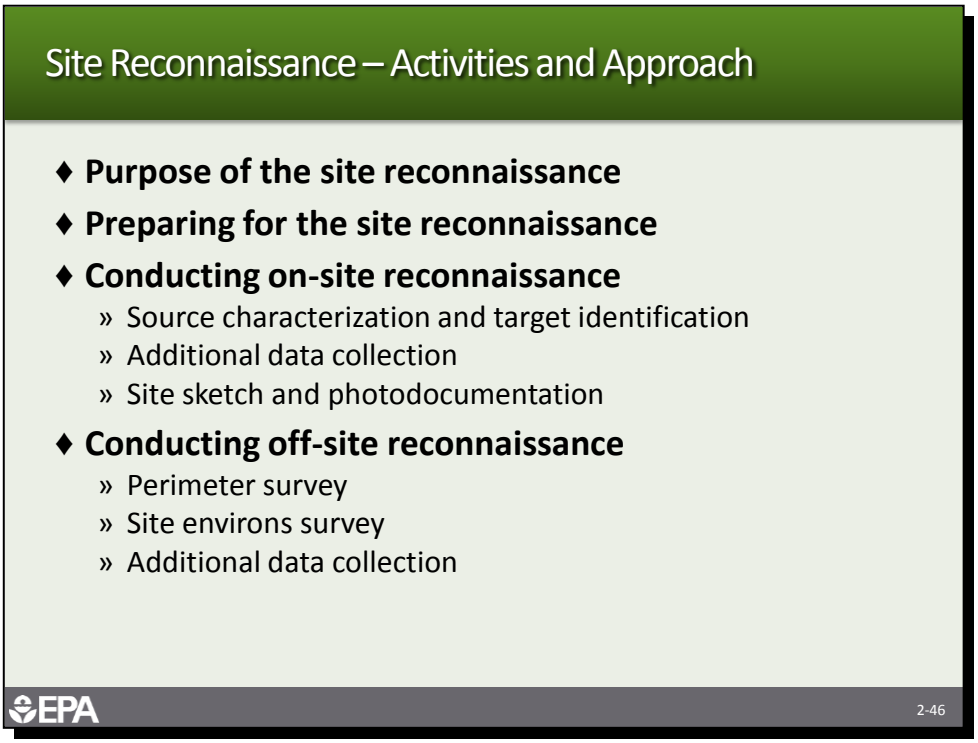
» **Aerial photography:** Can identify source areas that may not be visible during a routine reconnaissance as a result of physical changes to the site during years of operation. Current aerial photographs will provide an overall view of the site layout that may not be available from the ground. They are most useful in identifying and documenting the location and distance to various targets, identifying the surface water migration route, and identifying and quantifying source areas. EPA's National Exposure Research Laboratory through its Environmental Photographic Interpretation Center (EPIC) can provide historical and current aerial photographs and interpretation of most areas in the United States. In addition, Environmental Data Resources Inc. (EDR) provides current and historical aerial photographs, topographic maps, and Sanborn® maps for a fee.

» **Telephone inquiries:** Information obtained should be documented on paper and must include the following:

-- Date and time of conversation
-- Site name
-- Name, affiliation and telephone number of person contacted
-- Name and affiliation of person making the contact
-- Purpose of the call and questions asked
-- Summary of the conversation and pertinent information obtained
-- Action items or follow-up activities
-- Dated signature of the person making the contact and the person contacted

A memo is sufficient for site scoring, a formal letter or notice is not necessary.

Site investigators should be aware of confidentiality issues that may arise when collecting existing data. Most of these issues stem from homeland security and they may make it difficult for consultants to obtain what is now considered sensitive information, like the location of municipal wells.



Notes

- **Purpose of the site reconnaissance:** The purpose is to visually observe the site and its environs and to collect additional information to assist the PA evaluation.

  When the reconnaissance is conducted, pay particular attention to the physical features of the site and surrounding area. Record any observations that differ from descriptions gathered through previous data collection.

  Another important aspect of the site reconnaissance is to evaluate the need for a removal action.

- **Preparing for the site reconnaissance:** Review what is known about the site and what remains unknown after the file searches have been conducted. Prearrange site access and prepare the health and safety plan. Investigators should also develop a study plan that enumerates all reconnaissance activities and identifies the specific information to be gathered. Investigators will also need to gather necessary materials and equipment, such as camera, health and safety monitoring equipment, field logbooks and extra copies of maps to mark locations.

- **Conducting on-site reconnaissance:** The major advantage to on-site reconnaissance is the opportunity to visually observe the site and the sources, which is a critical task in the evaluation process.

- » **Source characterization and target identification:** Record detailed descriptions of each source, including source type, location, dimensions and evidence of containment. Look for signs of migration of hazardous substances from sources, and record descriptions of areas of stained soils or stressed vegetation observed. Also include and identify any wells on the site; the location of any residences, schools, or daycare facilities and populations associated with each; an estimate of the number of workers if the facility is active; and the presence of any on-site sensitive environments. The presence of any resources, such as commercial agriculture, livestock grazing, or silviculture should be noted and the investigator should note the distance to the resource and determine if the resource uses groundwater or surface water impacted by the site.

- » **Additional data collection:** This category includes any available facility records or interviews with site operators or workers. Focus on documents that provide information on the types and quantities of waste produced or deposited. During the interviews, try to obtain information on past and present disposal practices as well as any past environmental problems.

- » **Site sketch and photodocumentation:** Prepare a sketch of the site in the logbook noting important features. The sketch should include locations and dimensions of all sources, distances from sources to major site structures, locations and distances from sources to all targets, significant site features, and drainage patterns. All photographs should be documented in sequential order in the logbook.

◆ **Conducting off-site reconnaissance:** The off-site reconnaissance should be performed at all sites. The investigator must obtain written access from property owners before conducting off-site reconnaissance if the reconnaissance cannot be conducted using public areas. The main objectives are to verify target locations close to the site; gather additional information on the overland flow route to surface water; and identify land uses in the vicinity of the site.

- » **Perimeter survey:** Consists of walking or driving around the property but not actually entering it. Try to obtain a view of the site from public access areas and record observations. Do not trespass. The objectives of the survey are to concentrate on characterizing potential hazardous waste sources, including source types, dimensions, location and evidence of poor containment, and to estimate the area or volume of sources. Also look for possible migration from the site, including stressed vegetation, areas of visibly stained soils, or possible outfalls that discharge to surface water bodies.

- » **Site environs survey:** The purpose is to identify and verify the existence and locations of nearby targets. This information can be gathered by a windshield survey, which would include a house count to obtain population estimates; identify residential areas that rely on private wells; and verify the overland flow route to the nearest surface water body.

- » **Additional data collection:** This factor includes information obtained from interviews with local authorities, such as local health departments, water authorities, the tax assessor's office, or fire departments.

Site Reconnaissance – Logistics and Health and Safety Considerations

- **Health and safety concerns**
  - » Be aware
  - » Conduct appropriate monitoring
- **Health and safety plan**
  - » Develop site-specific plan
  - » Ensure all personnel read and understand plan

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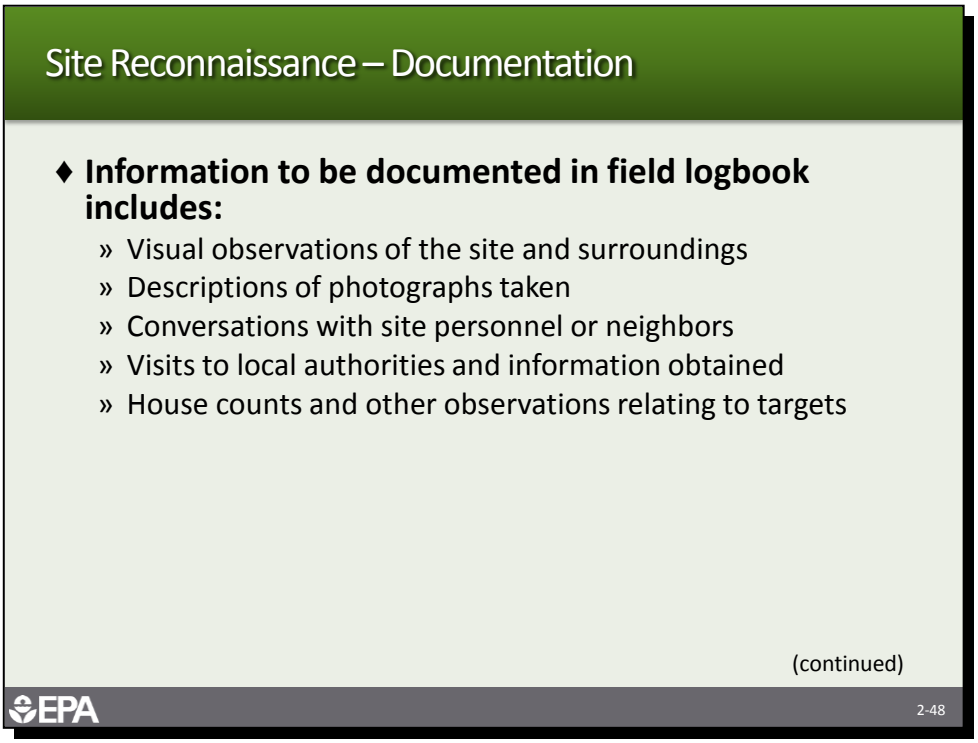
Notes

- **Health and safety concerns:** All personnel must be cognizant of health and safety at all times during the site reconnaissance. Any readings detected on monitoring equipment should be recorded in the logbook or monitoring log. If readings above background are obtained, it could mean hazardous substances are being released to the air. As a result, all personnel should be prepared to move to a higher level of personal protective equipment (PPE) or abandon the reconnaissance.

- **Health and safety plan:** A site-specific health and safety plan should be developed before the site reconnaissance. The health and safety plan should include site-specific hazards, hospital information, telephone numbers of personnel on site, as well as other related information. All personnel should read the health and safety plan before the site reconnaissance begins.



Notes

◆ **Information to be documented in field logbook includes:** Each PA investigation requires its own logbook. Activities and observations should be recorded in the logbook as they occur, rather than at the end of the day or back in the office. The time of day for each activity or observation should be recorded. The logbook must be completed in waterproof ink, preferably by a single person. Each page of the logbook must be signed and dated after the last entry on the page. Blank areas of pages should be crossed out and initialed. Never tear out the pages of a logbook. For mistaken entries, a single line should be drawn through the entry and initialed. The following information should be documented in the logbook:

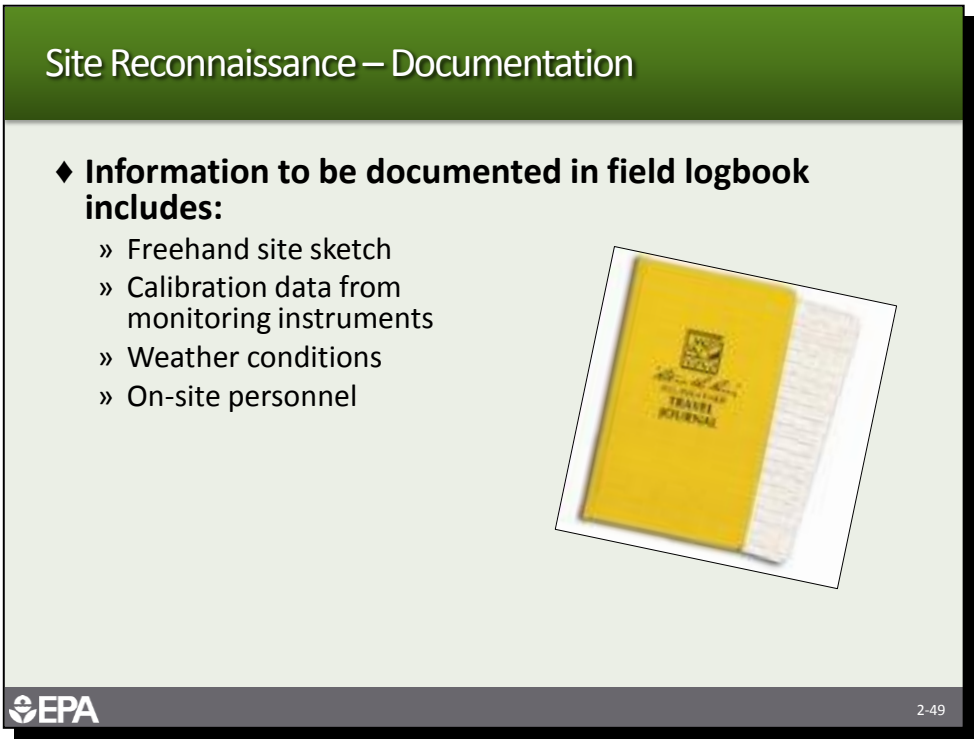
» Visual observations of the site and surroundings

» Descriptions of photographs taken

» Conversations with site personnel or neighbors

» Visits to local authorities and information obtained

» House counts and other observations relating to targets



Notes

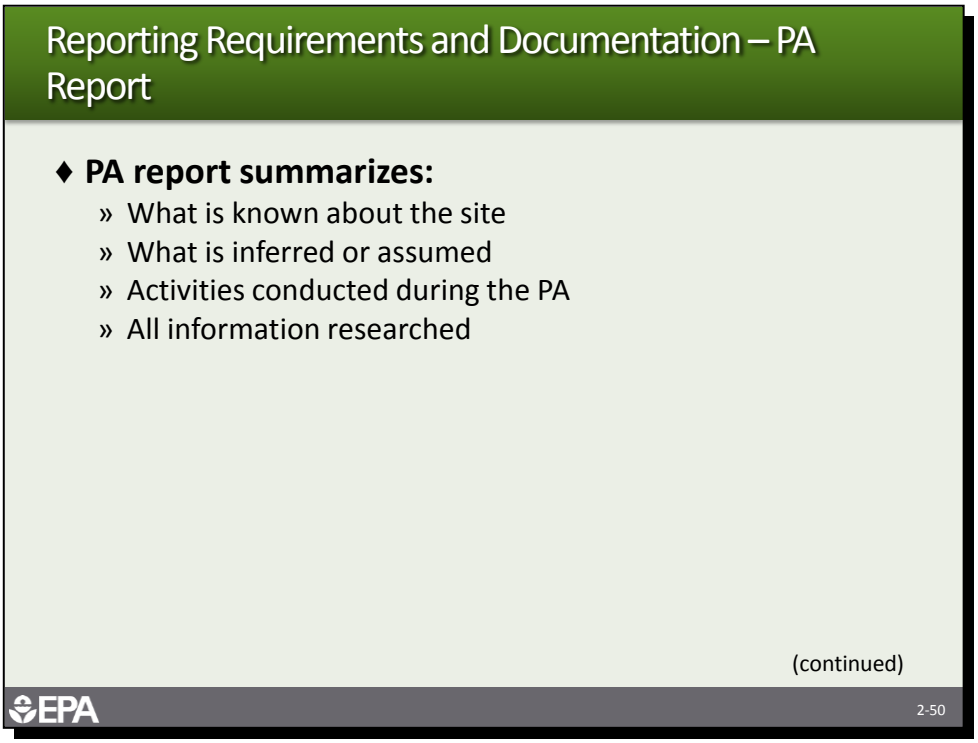
◆ **Information to be documented in field logbook includes:**

» Freehand site sketch

» Calibration data for monitoring instruments

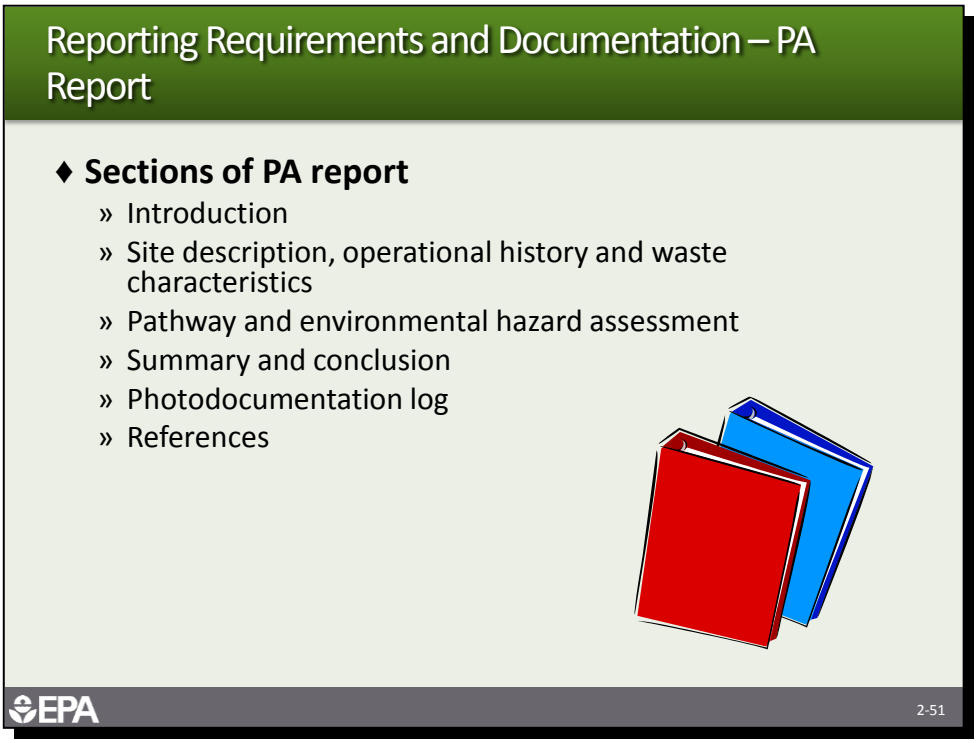
» Weather conditions

» On-site personnel



Notes

◆ **PA report summarizes:** The PA report summarizes what is known about the site as well as what is inferred or assumed about the site. In addition, the report discusses all the activities conducted during the PA and all of the information that was researched. A report is a standard product of every PA, and it plays an important role as a vehicle for public information about the site and about the PA that was conducted. The narrative portion of the PA report provides the basis for next-step planning and should be restricted to factual statements.



Notes

◆ **Sections of PA Report:**

» **Introduction:** Introduction includes the state where the PA was performed, the agency or organization that performed it, and the legal authority for the PA. Also include site name, CERCLIS identification number and location. In addition, the report should state the purpose of the PA and the scope of the investigation.

» **Site description, operational history and waste characteristics:** This section includes brief directions to the site; latitude and longitude coordinates; type of site; physical characteristics; and setting. It should provide an operational history and identify current and former owners and operators and describe site activities. It also should include wastes generated, quantities, disposal practices and source areas, and describe any removals. Lastly, it should describe past regulatory activities, including permits, violations, and inspections and present and discuss any available analytical data.

» **Pathway and environmental hazard assessment:** This section includes a description of each pathway, including groundwater, surface water, soil exposure and air.

-- Groundwater – This subsection describes the local geological and hydrogeological setting; states whether release of a hazardous substance from the site to groundwater is suspected; discusses groundwater use in a 4-mile radius of the site, including the distance to the nearest drinking water well.

-- Surface water – This subsection describes the local hydrologic setting, including site location with respect to floodplains, and overland and downstream portions of the surface water migration path; states whether release of hazardous substance from the site to surface water is suspected; indicates whether surface water within a 15-mile downstream distance supplies drinking water, supports fisheries, and whether sensitive environments are present in or adjacent to the surface water migration path.

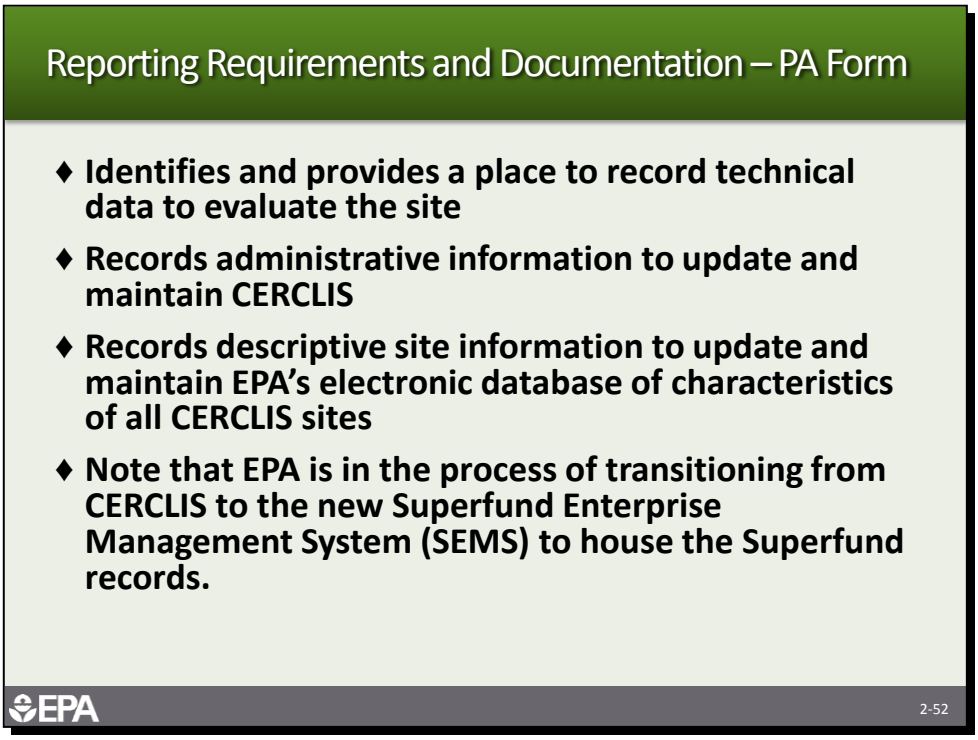
-- Soil exposure and air – This subsection indicates the number of on-site workers and the number of people who live on the site or within 200 feet of areas of known or suspected contamination; identifies schools and day care facilities on site or within 200 feet of known or suspected contamination; quantifies populations within 4 miles of site; and states the distance to the nearest regularly occupied on-site or off-site building. In addition, it should identify sensitive environments on and within 4 miles of the site and discuss the likelihood of a hazardous substance that could be released to the air.

» **Summary and conclusion:** In this section, the investigator should briefly summarize the major aspects of the site and its history that relate to the potential for releases of hazardous substances and the exposure of targets; identify principal pathways and targets of concern; and discuss additional qualitative considerations or unusual circumstances that should be brought to the attention of regional EPA site assessment personnel.

» **Photodocumentation log:** This log is provided as an attachment and includes all original photographs of the site and pertinent site features taken during the site reconnaissance, with a written description of each photograph in the photographic log. The photographic log is often prepared electronically.

» **References:** The section should be in the form of a numbered list, in bibliographic citation format, of all references cited in the PA report. Complete copies of site-specific references and title page and pertinent excerpts of general references should be attached. When organizing references, be mindful of the following:

- Internet web addresses should be provided for information obtained from the Internet.
- Letters of correspondence should be signed
- Use final reports should be provided, when available
- Project notes and records of telephone conversatosn should be signed by all parties
- A full copy of documents that are not publicly availale should be provided
- Documents should not have your hand written notes from your file review



Notes

- **Identifies and provides a place to record technical data to evaluate the site:** The PA form is also a standard product of every PA. The form serves as a data collection tool and identifies all of the basic raw data required to score a PA. The PA form is a 4-page summary of the PA scoresheets and narrative report. It is acceptable to use legible handwriting. A second option is to use Quickscore.

- **Records administrative information to update and maintain CERCLIS:** CERCLIS contains administrative information such as site name, address, zip code, county code, latitude and longitude coordinates, date discovered, and data and type of any previous site assessment activity. The CERCLIS information is updated regularly and is available from hardcopy printouts at EPA regional and state environmental agency offices.

- **Records descriptive site information to update and maintain EPA's electronic database of characteristics of all CERCLIS sites:** The PA form includes sections that describe site-specific information. This information includes a site description; operating history; a summary of waste treatment, storage, or disposal; probable source types; and prior spills. In addition, the form describes hazardous substances that have or may have been stored, handled, or disposed of at the site.

- **Note that EPA is in the process of transitioning from CERCLIS to the new Superfund Enterprise Management System (SEMS) to house the Superfund records.**

Reporting Requirements and Documentation – References

- **Format**
  - » Numbered list
  - » Bibliographic citation format
- **Content**
  - » Site-specific – Include complete copy of document
  - » General – Include title page and pertinent excerpts

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Notes

- **Format:** All references cited in the PA report should be included in the reference section of the PA report. The reference section should be a numbered list in bibliographic citation format. A copy of the reference should also be included in the section.
- **Content:** The reference section should contain both site-specific and general references used to prepare the PA report. If a site-specific reference was used to prepare the report, a complete copy of the reference should be attached to the report. If a general reference is used only the title page and the pertinent excerpts should be attached.

Reporting Requirements and Documentation – PA Score Sheets

- **Score sheets contain:**
  - Checklists
  - Worksheets
  - Factor value tables
  - Scoring forms
  - Brief instructions
- **Region-specific requirements**

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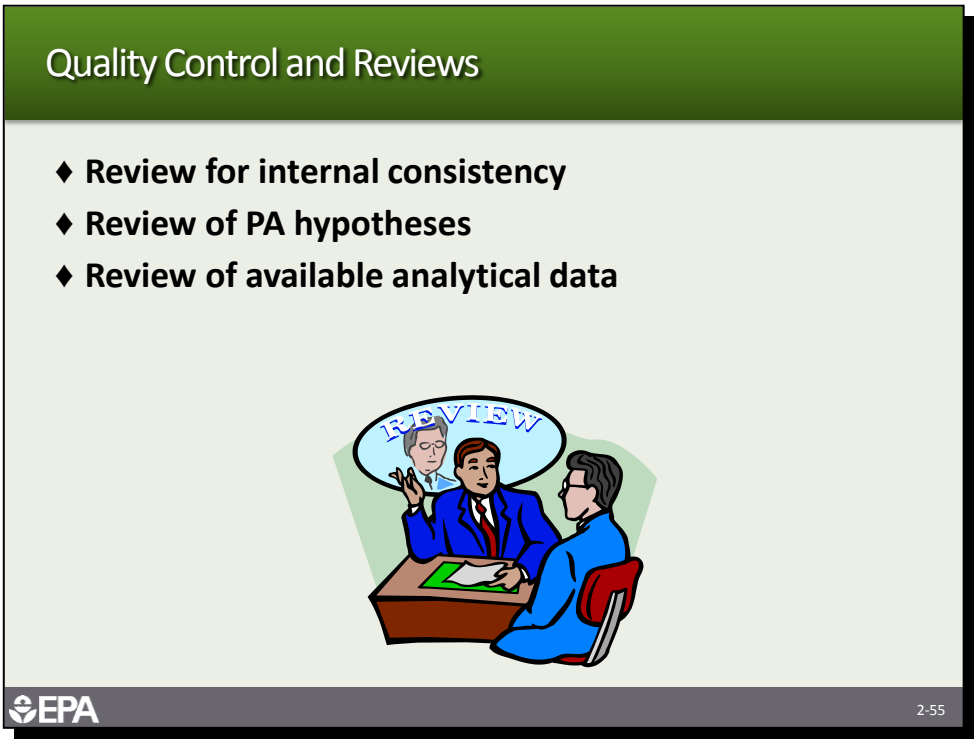
Notes

- **Contain checklists, worksheets, factor value tables, scoring forms and brief instructions:** If PA scoresheets are used, they should be included in the documentation. If Quickscore is used to calculate the preliminary HRS score, then it should also be included in the documentation.
- **Region-specific requirements:** Each region may have specific documentation requirements for the PA. Before a PA is conducted, the regional site assessment program should be consulted to identify the specific documentation requirements that will need to be met.



Notes

- **Review for internal consistency:** The PA report should be reviewed for internal consistency to ensure that the information and hypotheses recorded in the report and on the data summary form and scoresheets are consistent.
- **Review of PA hypotheses:** Each PA hypothesis should be reviewed to evaluate its validity. Investigators may have differing interpretations of site conditions and therefore offer differing hypotheses. Those differences should be resolved during the review.
- **Review of available analytical data:** All available analytical data should be reviewed to evaluate whether a more detailed approach can and should be employed.

Summary

- **An assessment must answer four major questions**
- **The "site" must be defined**
- **Formulating a CSM is an inherent part of the assessment process**
- **Sites are scored using HRS-based decision making**
- **Purpose of the PA:**
  - » Differentiate sites that pose little or no potential threat to human health and the environment from sites that pose potential threats
- **PA involves:**
  - » Information collection, reconnaissance, scoring and reporting

(continued)

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Summary

- **Must always consider health and safety during the reconnaissance**
- **Documentation is important**
- **All information gathered must be recorded properly in the logbook**
- **PA deliverables consist of three work products;**
  - » PA form
  - » Narrative report
  - » Scoresheets
- **Internal reviews are necessary for consistency and accuracy of information presented**

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Next Webinar – Monday, July 7, 2014

- **Module 3: Site Evaluation and Scoring Site Sources** will be held on Monday, July 7, 2014 from 1 p.m. to 3 p.m. Eastern

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