Module 7: Conducting the SI, Overview of SI Strategies and Site Sources

EPA United States Environmental Protection Agency

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Objectives

- **After this section has been completed, the participants will be able to:**
  - Define the goals and activities of a SI
  - Identify the steps in preparing and planning for the SI
  - Describe the components of the work plan, health and safety plan, and field sampling plan
  - Summarize management of investigation-derived wastes at the site
  - Describe the contents of the SI report and explain what each portion should contain

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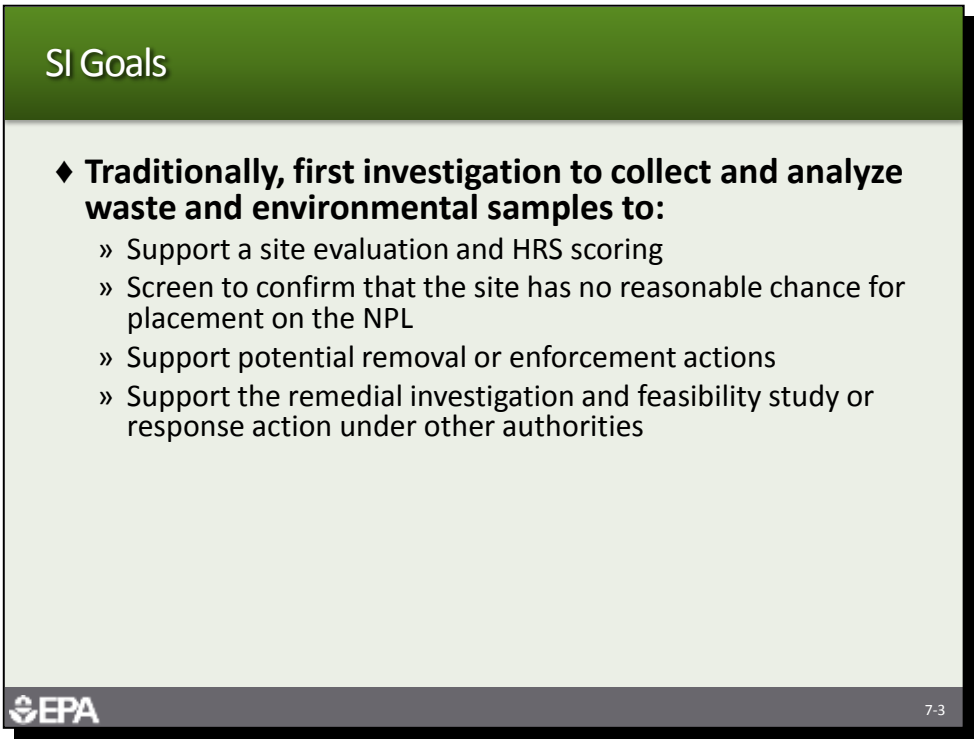
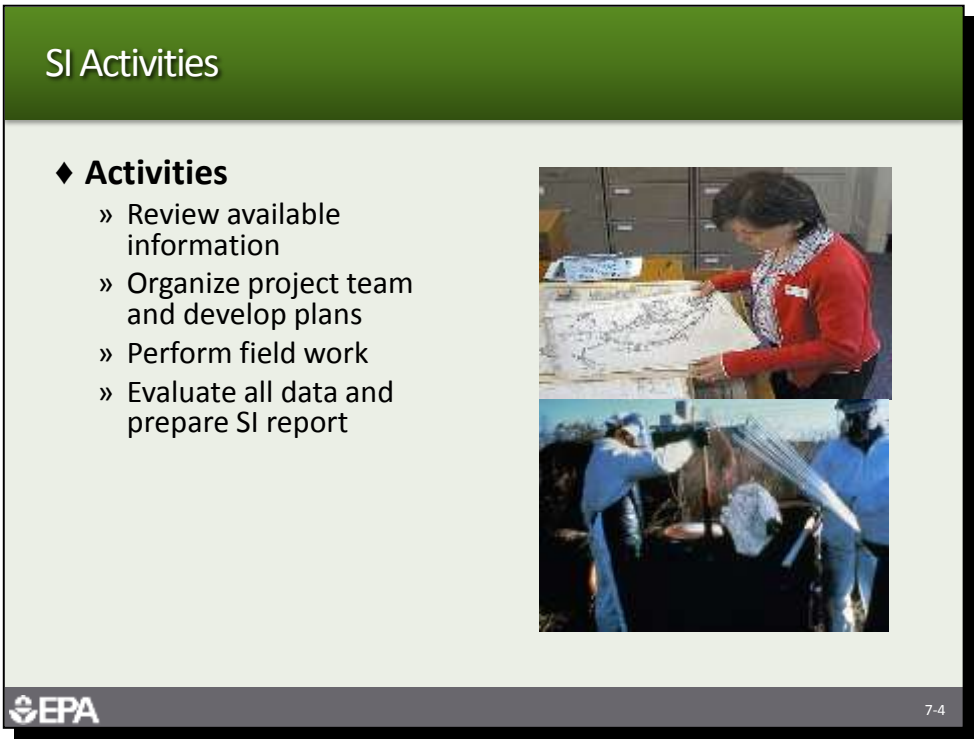


Notes

◆ **Traditionally, first investigation to collect and analyze waste and environmental samples to:** Often, the goal of the SI is limited to screening the site to confirm that it has no reasonable chance for inclusion on the NPL. The objective of the SI is to gather information to support a site decision on the need for further Superfund action. The SI is the first investigation to collect and analyze waste and environmental samples to support a site evaluation according to the HRS (for example, an ESI). Often the scope of an SI can be limited to screening the site (such as through a focused SI) to confirm that it has no reasonable chance for placement on the NPL.

Some regions may collect samples during the PA stage; therefore, the SI may not always be the first investigation to collect samples.



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◆ **Activities:** The SI consists of four basic tasks or activities. Some sites may require additional tasks to help meet the objectives of the SI and support HRS data requirements and emergency response and remedial efforts.

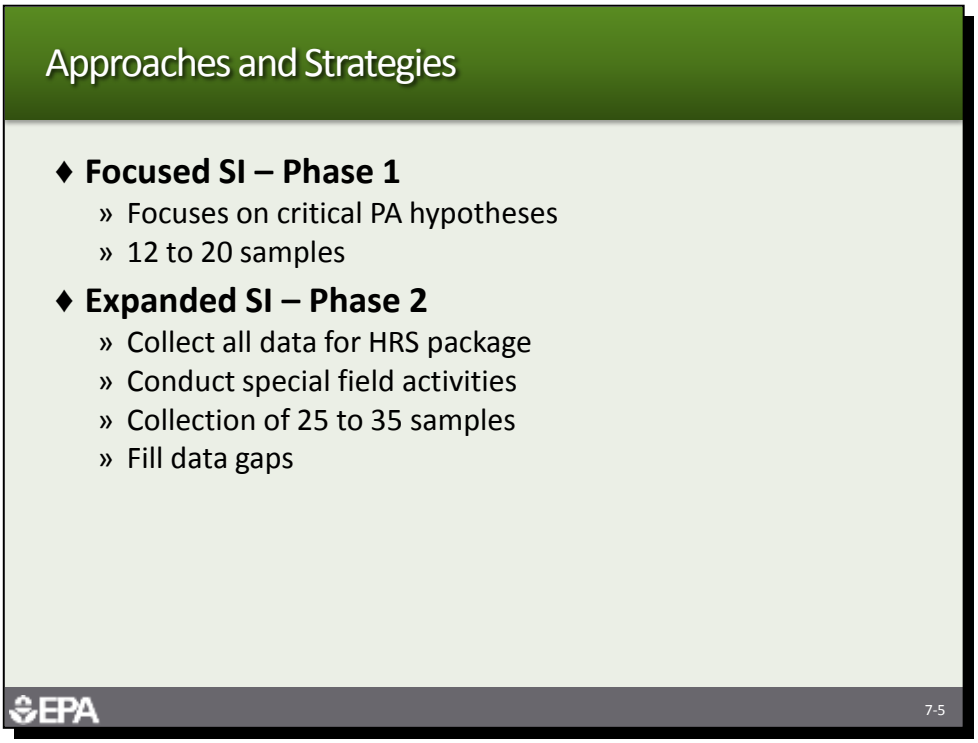
» **Reviewing available information:** This review can help guide further sampling, provide data to test site hypotheses and evaluate threats.

» **Organize project team and develop plans:** The project team consists of administrative, scientific, technical and field personnel with specific responsibilities. The team includes the project manager, field sampling personnel, health and safety officer, chemist, geologist and subcontract administrator. SI plans ensure thorough planning before field activities begin and that quality analytical data will be obtained and reliable conclusions can be made.

» **Perform field work:** SI field work involves a site reconnaissance, field observations and measurements, sampling, and health and safety monitoring. Typical field activities include completing field observations and site and pathway sketches that accurately identify sampling locations, locating and measuring distance to targets, evaluating populations near the site, and collecting samples of source materials at the site and environmental media that may affect human and environmental receptors. Additional activities include completing decontamination procedures and packaging and shipping samples to the laboratory for analysis.

» **Evaluate all data and prepare SI report:** Sample results should allow the investigator to evaluate site and source characteristics, the presence of contamination for specific HRS pathways, and targets actually or potentially exposed to contamination for specific HRS pathways.

The EPA makes one of the following site decisions based on the conclusions of the SI: further investigation; schedule preparation of the HRS package if all necessary data are available; NFRAP; defer to RCRA; defer to Nuclear Regulatory Commission; placement in a state cleanup program; or placement as a Superfund Alternative Agreement site.



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- **Focused SI:** The goal of the focused SI is to obtain and analyze environmental samples, to investigate human and environmental exposure to hazardous substances and to test the PA hypotheses that are the basis of the further action conclusion. The focused SI emphasizes obtaining critical analytical data for waste and environmental samples that are usually not available during the PA. The focused SI should reflect the HRS significance of hazardous substance migration from sources at the site and contamination of targets. The focused SI typically requires 12 to 20 samples. The scope of a focused SI is defined by the number of critical hypotheses and questions that remain after the PA and the number of pathways that contribute to the further action recommendation.

  In most cases, a focused SI site score greater than 28.50 will approximate or represent a complete HRS site score that will be high enough for NPL consideration.

- **Expanded SI:** The objective of the expanded SI is to collect all data necessary to prepare an HRS scoring package to propose the site to the NPL.

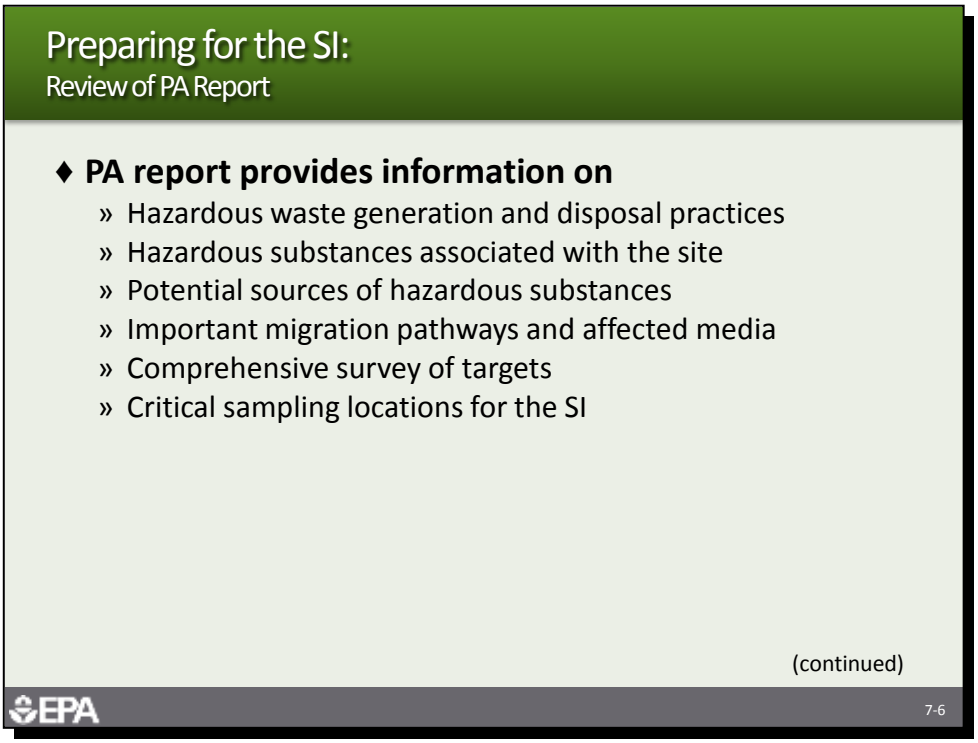
  To fully evaluate the site, the investigator should investigate and document critical hypotheses or assumptions that were not completely tested during the focused SI; collect samples to attribute hazardous substances to site operations and to establish representative background levels; and fill data gaps by collecting any other missing HRS data for pathways of concern.

  For sites that are evaluated as groundwater plumes and contaminated sediments, a minimum of an ESI is needed to ensure that attempts to identify the sources of contamination have been exhausted.

Special field activities may be required during an expanded SI. Special field activities include monitoring well installation, air sampling, geophysical studies, drum or tank sampling, borehole installation and complex background sampling studies. The expanded SI typically requires 25 to 35 samples.

Sampling during the expanded SI should be designed to support and document HRS requirements, including observed releases of hazardous substances relative to background, observed contamination and levels of contamination. A complete set of QA/QC and background samples should be collected to fully and confidently document releases to the site.

All data necessary to document an HRS score should be collected during the expanded SI.



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◆ **The PA report provides information on**: A thorough review of the PA report provides the following:

» **Hazardous waste generation and disposal practices:** The PA report includes information on any hazardous wastes that were generated at the site and how they were disposed of and could include copies of waste manifests.

» **Hazardous substances associated with the site:** This category includes any hazardous substances stored or used at the site, either in the past or currently.

» **Potential sources of hazardous substances:** This category includes any tanks, drums, vats or similar containers that might have been located on site and stored hazardous substances and could include process lines or piping systems.

» **Important migration pathways and affected media:** The PA report includes information on the groundwater, surface water, soil exposure and air pathways, and the type of media affected.

» **Comprehensive survey of targets:** The PA report includes a list of potential targets such as nearby schools, residential areas, drinking water wells, and wetlands.

» **Critical sampling locations for the SI:** The PA report can also help identify the areas that should be sampled during the SI. The PA report includes any previous analytical data and areas of suspected contamination or spills.

Preparing for the SI:
Review of PA Report

- **Helps to**
  - » Avoid duplicating previous efforts and save resources
  - » Establish scope of future sampling efforts
  - » Evaluate whether existing hypotheses are sound

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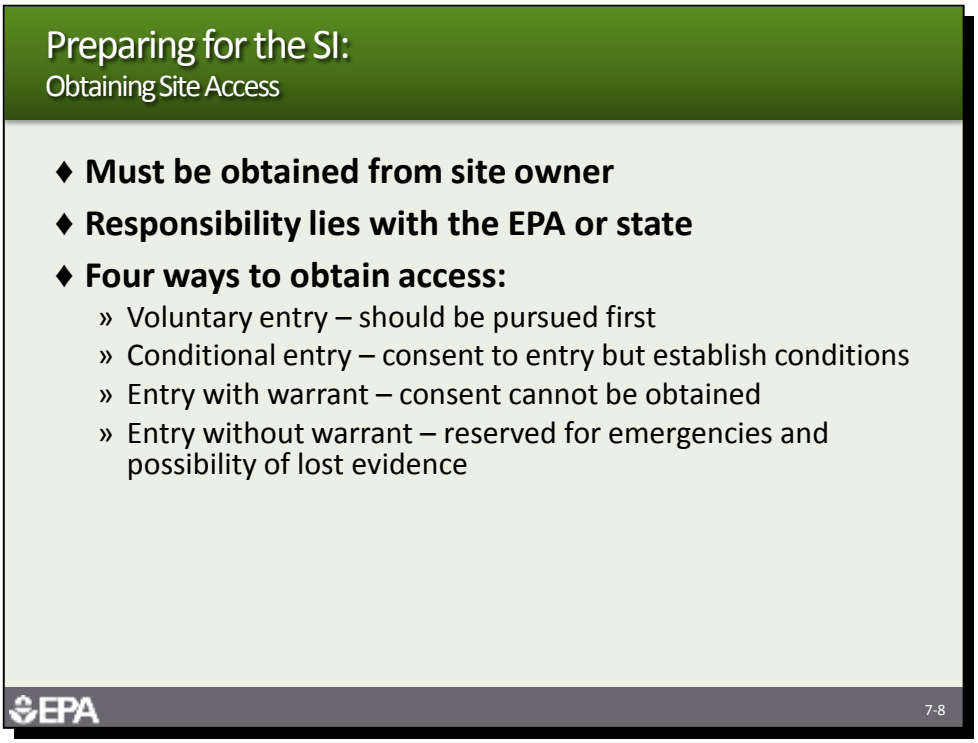
Notes

- **Helps to:** A review of the PA report also helps to avoid duplicating previous efforts and will save resources. The PA report can also help establish the scope of future sampling events and the type of SI that should be conducted. A critical review of the PA report can also help evaluate whether the PA hypotheses are accurate and sound and which of the hypotheses should be pursued in the SI.



Notes

- **Must be obtained from site owner:** The site owner must grant legal access to the site before a site reconnaissance can be conducted. The site owners, operators or persons in charge of a site cannot prevent the EPA from entering the property, but they can require a court order.

- **Responsibility lies with the EPA or state:** Obtaining legal access to the site property is the responsibility of the EPA or the state. In some regions, EPA personnel are responsible for obtaining access. In other regions, however, state or contractor personnel may make access arrangements. Finalizing site access can take considerable time and should be initiated early in the SI planning process. The state counsel should be consulted to ensure appropriate state requirements are met to ensure compliance with evidence collection procedures.

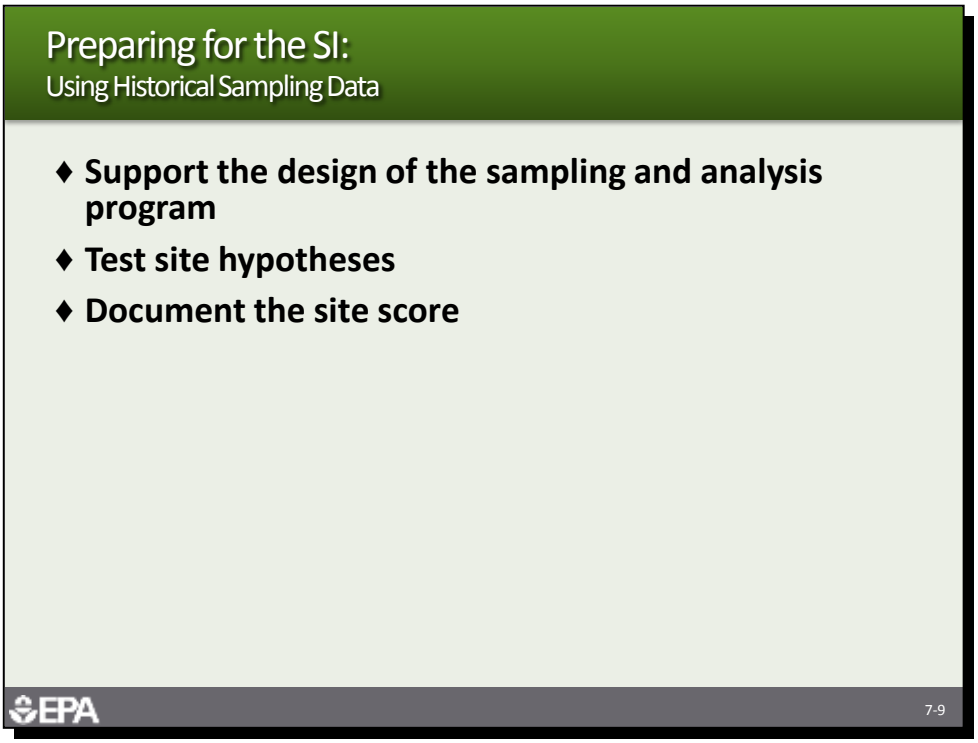
- **Four ways to obtain access:** There are four ways to obtain access, both voluntary and compelled:

  - **Voluntary entry:** An entry is considered voluntary as long as the owner agrees. No coercion by the entry team must be used to gain entry. A written access agreement should be obtained as soon as possible if verbal access is given initially. The SI investigator should confirm consent to entry by notifying the owner in writing of the activities that will be conducted. Credentials should be presented when the team arrives at the site, and team members should inform the site owner or representative of the nature of the work and the teams' authority to be on site to conduct the work. If the owner withdraws consent at any time, a warrant will be required to continue the additional work. Any information gathered before consent was withdrawn or was gathered in an area open to the public can be used in legal proceedings.

» **Conditional entry:** In this case, the owner gives consent to entry, but establishes conditions that could include limiting areas of the site reconnaissance, limiting employees to be interviewed or requiring confidentiality agreements. If only conditional entry can be obtained, accept only conditions that do not significantly interfere with the SI and note them in the logbook.

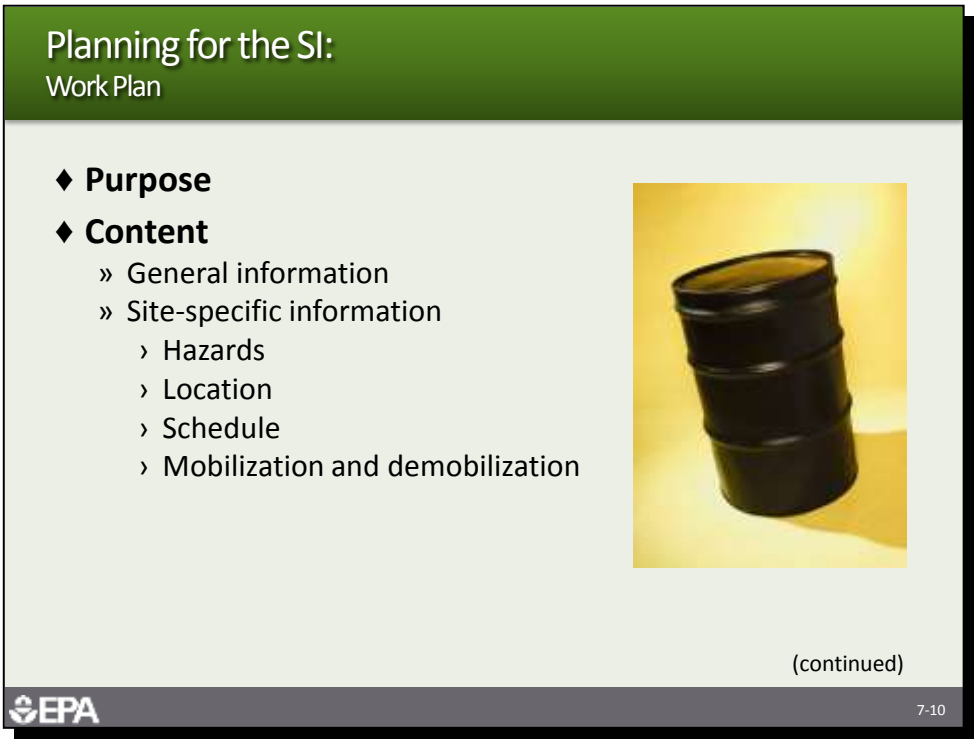
» **Entry with warrant:** A warrant must be obtained if consent cannot be obtained or is withdrawn. If entry with a warrant is required, the SI must be conducted strictly in accordance with the warrant. If entry is still refused, the investigator should note in the logbook at a minimum the person refusing entry, the date and time of refusal, and the reasons given for refusal, and then leave the premises.

» **Entry without a warrant:** This scenario is reserved for emergencies and instances where evidence might be lost if site entry is delayed. If a site is abandoned, the need for a warrant should be discussed with the EPA Office of Regional Counsel. If entry without a warrant is used, local representatives, including community and neighborhood contacts, as well as government officials, should be notified in advance.



Notes

- **Support the design of the sampling and analysis program:** Analytical data collected for other reasons may not meet SI objectives, but can help to clarify the nature of the problem at the site. Therefore, the data can guide the sampling during the SI. Reviewing historical data can also help identify the analytical methods used and help in obtaining compatible data.
- **Test site hypotheses:** The investigator should ensure that non-SI data accurately represent conditions at the site and that the samples were collected from the appropriate locations to test the hypotheses. The data should not be applied to override reasonable site hypotheses based on strong information on site characteristics unless the sampling results are reliable, of adequate quality, and representative of the site.
- **Document the site score:** It may not be appropriate to combine data sets from different sampling and analysis events when non SI-data are used to document the HRS evaluation. By reviewing historical data, the reviewer will know if the data are comparable and can be used in the HRS evaluation.



Notes

- **Purpose:** The work plan specifies the administrative and logistical requirements during the SI. In addition, the work plan is also used to efficiently schedule resources such as personnel, equipment and laboratory services. Clear and concise work plans are prerequisites for obtaining quality analytical data and making reliable site recommendations.

- **Content:** The work plan should contain both general and site-specific information.

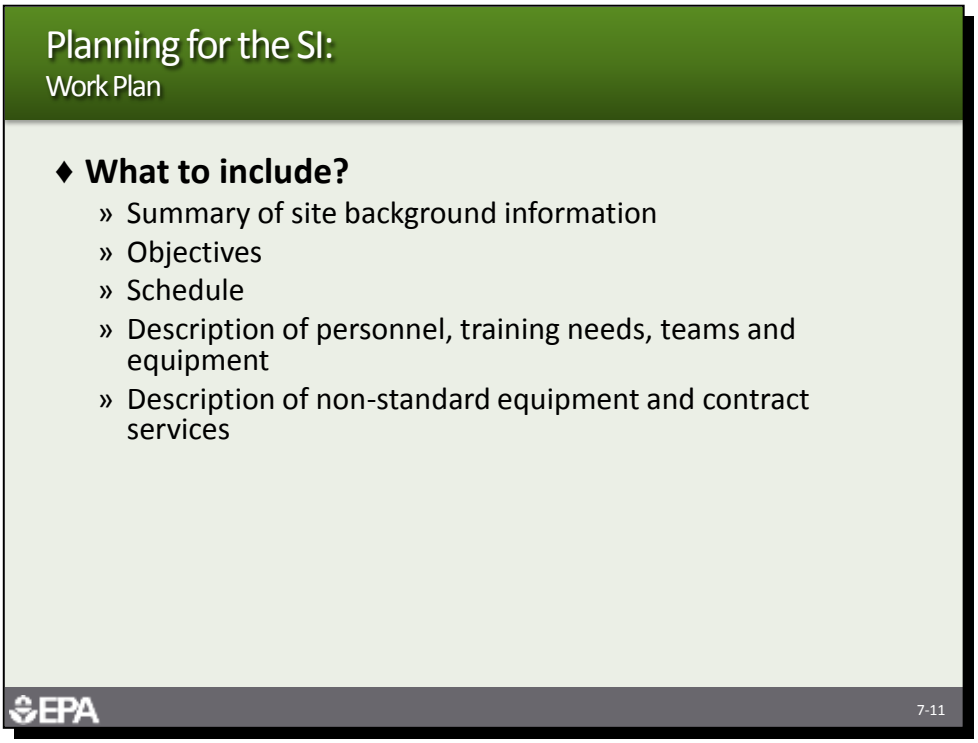
  - **General information:** In general, work plans should include a summary of background information on the site, emphasizing how this information can help identify SI objectives; schedule; a description of personnel, special training needs, organization of teams and equipment requirements; and a description of any non-standard equipment and contract services needed.

  - **Site-specific information:** The work plan should also contain information on conditions such as hazards, location, schedule and mobilization and demobilization that are specific to the site.

    - **Hazards:** The work plan should indicate the physical or chemical hazards that could be encountered and describe how they will affect time, expense, personnel and equipment requirements.

    - **Location:** Is the site accessible? How far is the laboratory? Will samples be shipped or hand-delivered to the laboratory?

- **Schedule:** Can the site be adequately sampled at this time of year? Have recent rains or dry periods affected water levels or created swampy conditions? Does the public frequent the site at certain times?
- **Mobilization and demobilization:** How much time and equipment are needed? Does anything have to be ordered?



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◆ **What to include:** The work plan should include a summary of site background information, objectives, schedule, a description of personnel, training needs, teams and equipment, and a description of non-standard equipment and contract services.

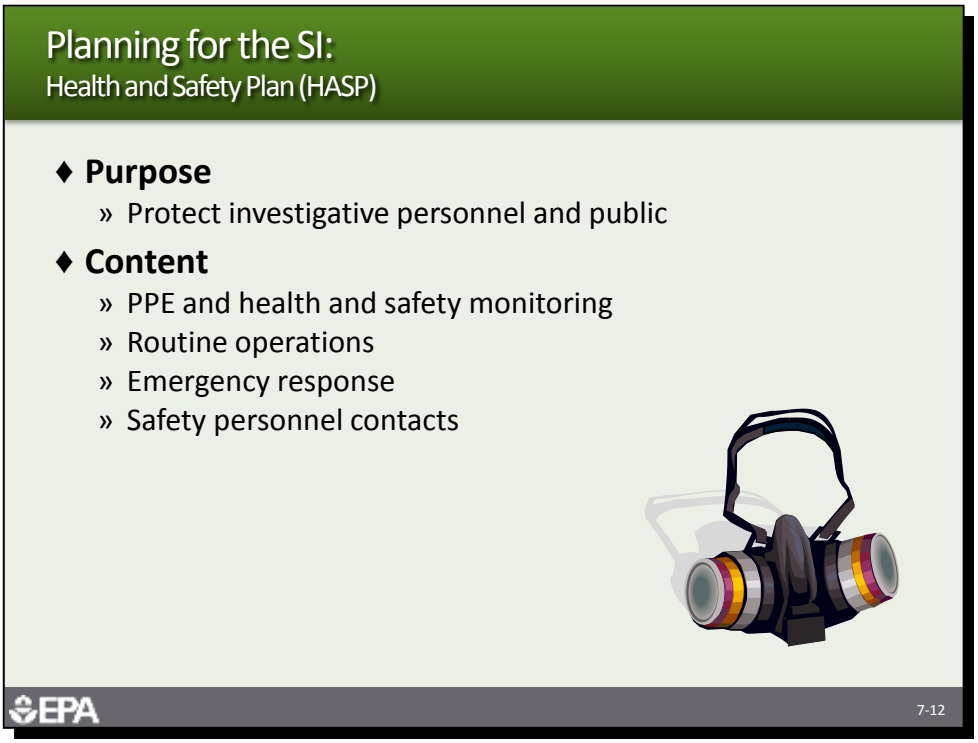
» **Summary of site background information:** This section of the work plan describes the site location, including the type of facility, status and years of operation. This section also describes the site's physical characteristics and setting, historical site operations, current and former owners and operators, the types of site activities, past regulatory activities and waste removal information.

» **Objectives:** This section should describe the objectives of all field activities planned, describing procedures and necessary resources as well as the rationale for these tasks.

» **Schedule:** The work plan should include a schedule of all field activities as well as any deliverables that are required during the project.

» **Description of personnel, training needs, teams and equipment:** This section should identify all persons who will be involved in the field activities and discuss their specific responsibilities. In addition, this section should describe any special training requirements for field personnel. The section should list the equipment that will be used during the SI, including sampling equipment and equipment that is required for health and safety.

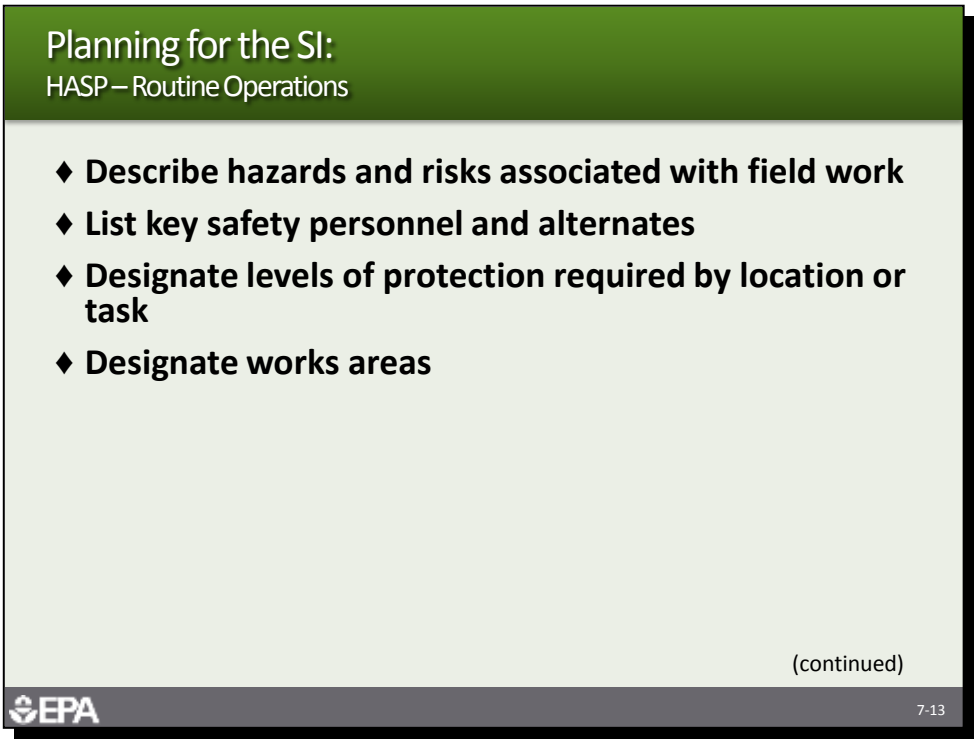
» **Description of non-standard equipment and contract services:** This section can include special requirements, such as special safety considerations, special analytical services or special equipment that is not typically used during an SI.



Notes

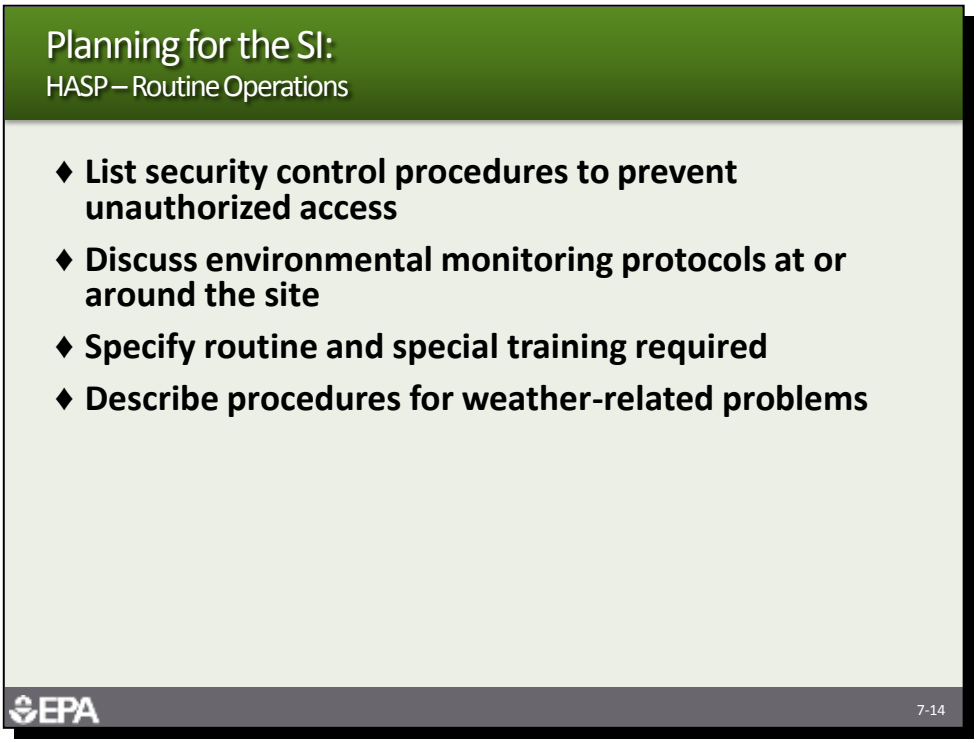
- **Purpose:** The HASP establishes requirements and procedures to protect the health and safety of investigative personnel and the nearby public. The health and safety plan is normally prepared after the sampling plan and is included as an appendix to the work plan. The plan must be distributed to all team members, discussed at a team meeting before site entry, and posted at a conspicuous location at the site before field activities begin.

- **Content:** The health and safety plan should include levels of protection necessary for each field activity, detailed instructions for routine operations and responses to emergencies, the location of the nearest hospital; a list of key safety personnel with corresponding contact information and a description of health and safety monitoring requirements.



Notes

- **Describe hazards and risks associated with field work:** This information must include all known or suspected physical, biological, chemical or radiological hazards.
- **List key safety personnel and alternates:** This list should also include other key personnel assigned to various site operations and indicate where telephone numbers, addresses and organizations of these people will be posted on site.
- **Designate levels of protection required by location or task:** This section includes specifying types of respirators and clothing to be worn for each level.
- **Designate works areas:** These areas include the exclusion zone, the contamination reduction zone and the support zone. Zones should be marked on the site map and should include boundaries and access control points for each zone. Should also indicate where the zone map will be posted on site.



Notes

- **List security control procedures to prevent unauthorized access:** List the type of security procedures in place including, but not limited to, fences, signs, security patrols and check-in procedures. This list should also identify procedures to ensure personnel wear the prescribed protective clothing.
- **Discuss environmental monitoring protocols at or around the site:** The discussion should include any chemicals present and their hazards, possible migration and associated safety requirements.
- **Specify routine and special training required:** The routine training required, such as Hazardous Waste Operations and Emergency Response (HAZWOPER) 40-hour training and 8-hour refresher training should be specified in the plan. In addition, any special training, such as confined space entry, that might be required should also be specified in the plan.
- **Describe procedures for weather-related problems:** Weather-related problems include temperature extremes, high winds, rain and snow. Shelters should be identified on site. Should also discuss procedures to minimize heat stress of field team members wearing protective clothes.

Planning for the SI:
HASP – Emergencies

- **Require immediate response**
- **Ensure injured workers are transported to the nearest medical facility**

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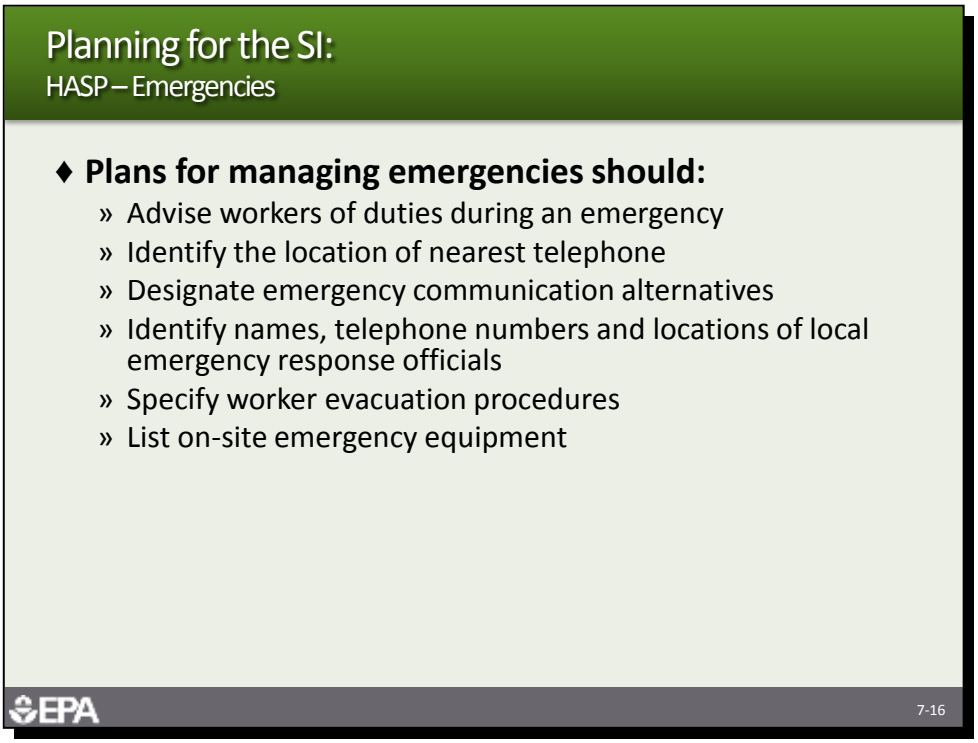
Notes

- **Require immediate response:** Emergencies can result from fire, chemical exposure, physical injury or other events. The response to the emergencies must be immediate to prevent harm to workers, the public, property or the environment.

- **Ensure injured workers are transported to the nearest medical facility by:**
  - » Identifying the nearest medical or emergency care facility that handles chemical exposure cases.
  - » Identifying the telephone number of nearest ambulance service.
  - » Maintaining accurate records on any exposure or potential exposure of site workers.
  - » Specifying decontamination procedures for injured workers, transport vehicles, medical facilities or medical personnel.



Notes

◆ **Plans for managing emergencies should:**

» Advise workers of duties during an emergency: Site workers should be designated as site safety officers, standby rescue personnel, decontamination personnel and emergency medical technicians (EMT).

» Identify the location of the nearest telephone.

» Designate emergency communication alternatives: Examples include cell phones, citizen band and hand-held radios and air horns.

» Identify names, telephone numbers and locations of local emergency response officials: Includes, but is not limited to fire, police, explosives experts and hazardous materials response units.

» Specify worker evacuation procedures.

» List on-site emergency equipment.

Planning for the SI:
Sample Collection

♦ **Sample types**
- » Biased (non-random or judgmental)
- » Unbiased (random or systematic grid)
- » Grab
- » Composite
- » Media
- » Waste
- » Filtered
- » Unfiltered

(continued)

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Notes

The SI collects selective samples to demonstrate that hazardous substances are present and to evaluate whether they have migrated from their original locations.

◆ **Sample types**

» **Biased (non-random or judgmental):** uses knowledge of the site and visual observations to propose sample types and locations.

» **Unbiased (random or systematic grid):** uses limited site knowledge and increases the cost and time required.

» **Grab:** represents chemical conditions at a specific location and offers the most information on variability in hazardous substances; are recommended to investigate observed releases and target exposure to contamination.

» **Composite:** consists of several grab samples and represent average concentration values and may be used to identify hazardous substances present in sources.

» **Media** samples support release and target contamination.

» **Waste** samples optimize contaminant identification and support attribution.

» **Filtered:** recommended to establish an observed release of metals in a drinking water supply.

» **Unfiltered:** allows comparison with surface water environmental benchmarks and is the type of water sample collected most often in an SI.

Planning for the SI:
Sample Collection

- **Sample variability**
  - » Sample collection and handling
  - » Spatial
  - » Temporal
  - » Media
    - › Surface water
    - › Groundwater
    - › Soil and sediment
    - › Air
    - › Tissue
    - › Containerized substances

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Notes

- **Sample variability:** The sample plan should minimize the potential for errors related to sampling procedures.
  - » **Sample collection and handling:** Collection and handling can change sample concentrations as a result of incorrect sampling procedures, cross-contamination and improper sample preservation. This variability can be reduced by training and adhering to standard operating procedures (SOP). Other issues include contamination from sampling devices and containers, substances leaching from sampling or monitoring equipment, the purity of preservatives and holding time.
  - » **Spatial:** Spatial describes how substances and their concentrations vary from one location to another and depends on the substance and site conditions. In general, variability increases as a source becomes less uniform. This source of variability can be significantly reduced by using previous site information and professional judgment in choosing sample locations.
  - » **Temporal:** Hazardous substance concentrations may depend on variables such as the time of day or season of the year. Often, the most important temporal variable is weather, such as temperature or rainfall. The investigator should identify the cyclical nature of the substance concentrations caused by temporal variability and sample when concentrations are expected to be highest. As an example, a volatile compound may be less readily released during cold weather than during warmer weather. Duration and frequency of sampling are normally not a consideration for SIs because one-time sampling usually accomplishes the objectives of the investigation. However, seasonal variations or weather patterns may require more than one sampling episode.

» **Media:** Sample concerns can vary by medium.

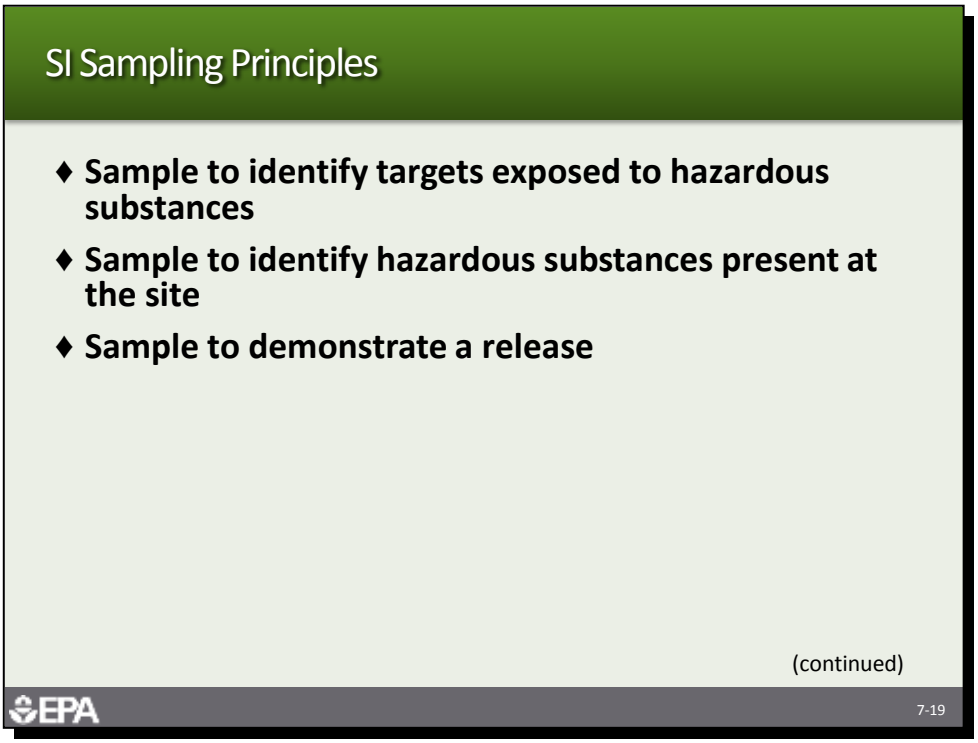
- **Surface water and groundwater** – Flow rates can be different, stratification can occur in lake and oceans, density and solubility can differ, and some compounds are heavier or lighter than water, and these factors should be considered.

- **Soil and sediment** – The investigator should document location, depth and description of the soil to evaluate the relationship of background to other samples.

- **Air** – Conditions that can influence air samples include wind speed and direction, temperature, relative humidity, terrain and atmospheric stability. If wind direction was not monitored, air sample results are not useable.

- **Tissue** – Factors that complicate tissue sampling are type of organism, age of individual, population size, availability and cost of sampling materials, migratory organisms, and seasonal feeding, spawning, or other periodic activities that influence the concentration or location of the substances within an organism.

- **Containerized substances** – These samples can be heterogeneous, and sampling should be designed to obtain a representative sample of the liquid at all depths.



Notes

- **Sample to identify targets exposed to hazardous substance:** This sampling is a critical early step in protecting public health and the environment. This type of sampling can accomplish two objectives: it may demonstrate a release, or a measurable concentration of a hazardous substance found at the target may be used to evaluate target exposure compared with medium-specific benchmarks. Samples should be attributable to the site.

- **Sample to identify hazardous substances present at the site:** The objective is to identify hazardous substances present and to support attributing them to the site.

- **Sample to demonstrate a release:** Analytical data must indicate that the hazardous substance is present at levels significantly above background and demonstrate that the significant increase is at least partially attributable to the site.

SI Sampling Principles

- **Sample to discriminate among alternative sources of contamination**
- **Sample to measure representative background concentrations**
- **Sample to verify field and laboratory practices**

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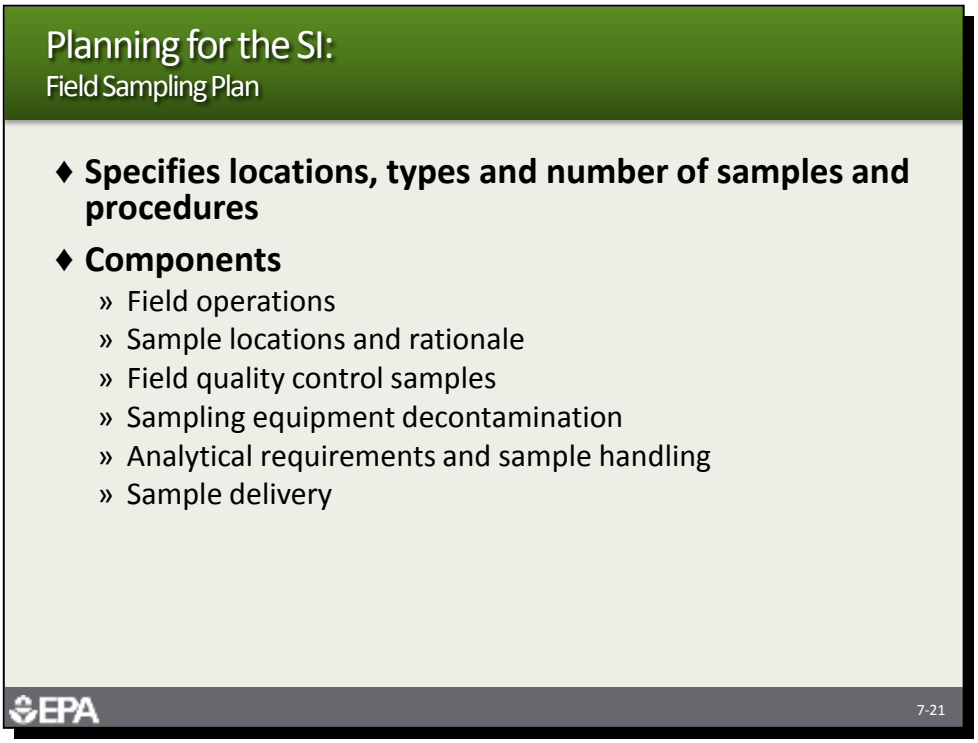
Notes

- **Sample to discriminate among alternative sources of contamination:** Sampling should be designed to determine whether the site is at least partially responsible for the contamination.
- **Sample to determine representative background concentrations:** Background samples are needed to assess whether the concentrations in the samples collected are above normal site conditions. The same methods should be used to collect background samples as are used for field samples.
- **Sample to verify field and laboratory practices:** These samples help to monitor any contamination introduced by field methods, evaluate laboratory analytical results and increase overall confidence in the results.



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- **Specifies locations, types and number of samples and procedures:** The field sampling plan (FSP) describes the sample locations, sample types and the number of samples to be collected. The FSP also specifies sampling protocols that field personnel will follow.

- **Components:** The FSP should include the following items.

  - **Field Operations:** discusses the sequence for conducting field activities, identifying the function of each individual worker who will collect samples, supervise chain-of-custody procedures, maintain the logbook and monitor for potential hazards.

  - **Sampling locations and rationale:** identifies the location of each sample on a site map and explains the rationale for each location. This component also specifies the type, volume and number of samples.

  - **Field quality control samples:** identifies the number, location and type of blank and duplicate samples.

  - **Sampling equipment decontamination:** identifies sample decontamination procedures, including decontamination solutions and any special handling.

  - **Analytical requirements and sample handling:** identifies the specific analytical parameters, preservation techniques and reagents for each sample, whether samples are to be filtered and why; and identifies the equipment, sampling devices and type of containers used for each sampling episode.

» **Sample delivery:** identifies where samples are to be delivered for shipment or analysis, whether split samples were collected and to whom they will be relinquished and any special storage or transport requirements.

Planning for the SI:
FSP Sample Analysis – Laboratories

- **Contract Laboratory Program**
  - » Provides analytical services including data management through a nationwide network of laboratories under contract to the EPA
  - » Uses CLP analytical methods for the isolation, detection and quantitation of specific target compounds and analytes
- **Non-Contract Laboratory Program**

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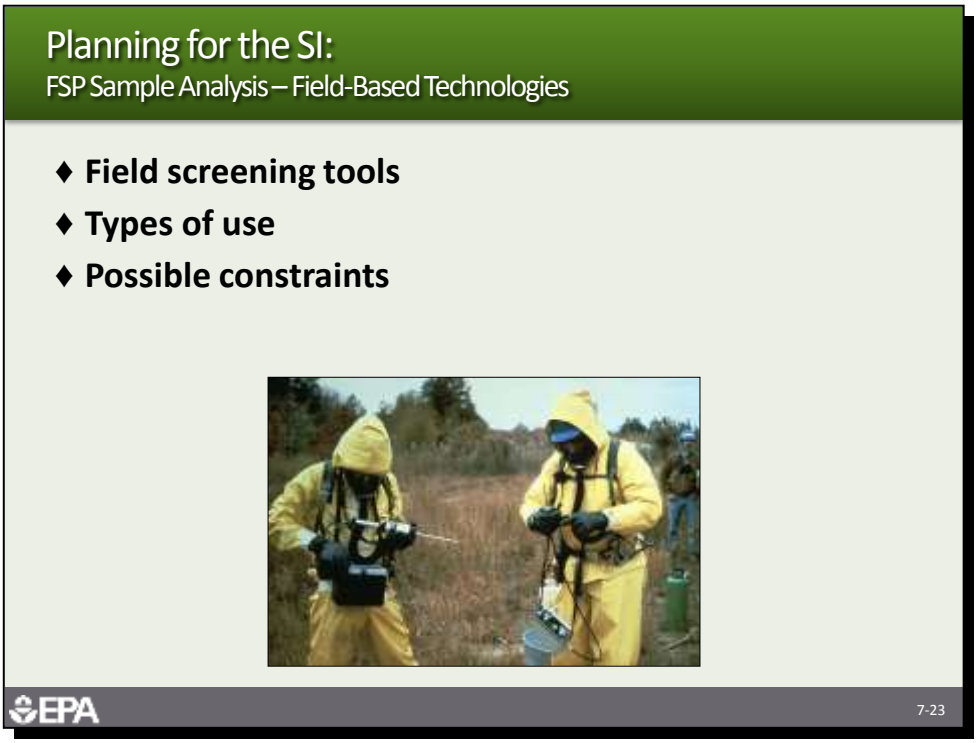
Notes

- **Contract Laboratory Program (CLP):** CLP acceptance criteria ensure data of known quality with a high degree of confidence. CLP data satisfy the highest data quality criteria that EPA has established for the HRS. CLP data can typically be used to evaluate all HRS factors that require analytical data. Under CLP, the majority of analytical needs are met through standardized laboratory services provided by Routine Analytical Services (RAS). RAS provides broad-spectrum analysis for Target Analyte List (TAL) metals and Target Compound List (TCL) organic hazardous substances. TAL and TCL constituents are recommended for SIs at CERCLIS sites where the composition of wastes is not known.

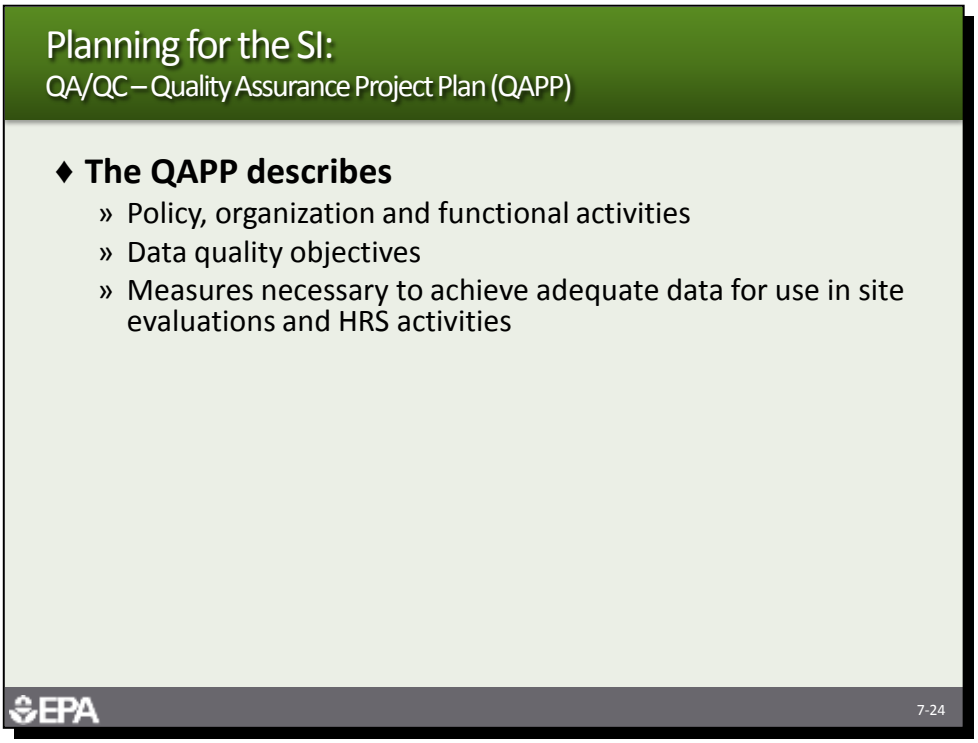
  More information about TALs and TCLs can be found at http://www.epa.gov/superfund/programs/clp/target.htm.

- **Non-Contract Laboratory Program:** Non-CLP services may provide data of quality similar to CLP. If non-CLP services are used, analytical protocols, data qualifier assignments and reporting parameters and requirements need to be specified in the packages sent to bidders. Non-CLP data packages can include results for the full suite of TAL and TCL constituents.



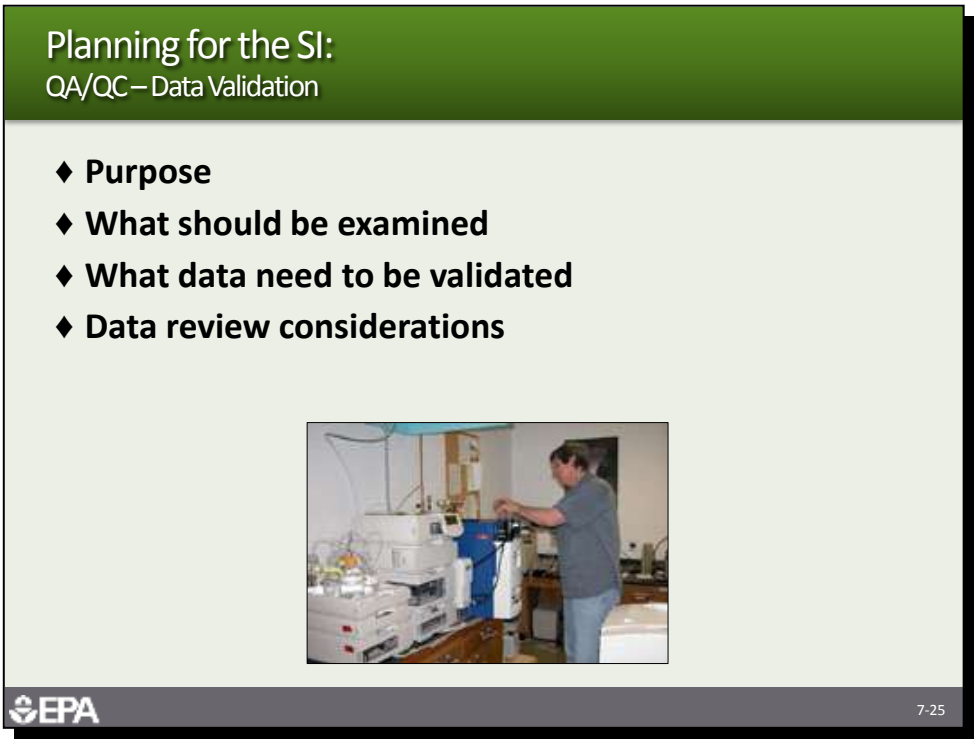
Notes

- **Field screening tools:** There are various types of field screening tools. Types include relatively simple instruments such as a hand-held organic vapor detector to a more sophisticated unit such as x-ray fluorescence (XRF) detectors and field gas chromatographs. Some field screening tools are typically calibrated to identify only selected substances.
- **Types of use:** Field screening can be used to design sampling grids, select well locations based on soil gas monitoring, select well screen depths, delineate the extent of hazardous substance migration and estimate hazardous waste quantities.
- **Possible constraints:** When field screening services will be used, the investigator should be aware of the following possible constraints:
  - » The hazardous substance must be confirmed by CLP-quality data
  - » Not all substances are amenable to field methods
  - » The sampling plan for field screening, like the CLP plan, must be reviewed by EPA regional management
  - » A QA/QC plan specific to sampling and analysis should be prepared, including a description of or reference to standard operating procedures and all analytical procedures, if any



Notes

- **The QAPP describes:** The QAPP describes the policy, organization and functional activities that will ensure that the data collected are of sufficient quantity and quality to support the decisions to be made. HRS scoring packages require data of the highest quality. The QAPP also describes the data quality objectives for the data collection effort. The data quality objectives for the SI are much more limited than any that will be developed later for any subsequent remedial investigation. The QAPP describes the measures that will be taken to ensure the data are of high quality and will specify parameters for accuracy, precision and acceptance of the data.



Notes

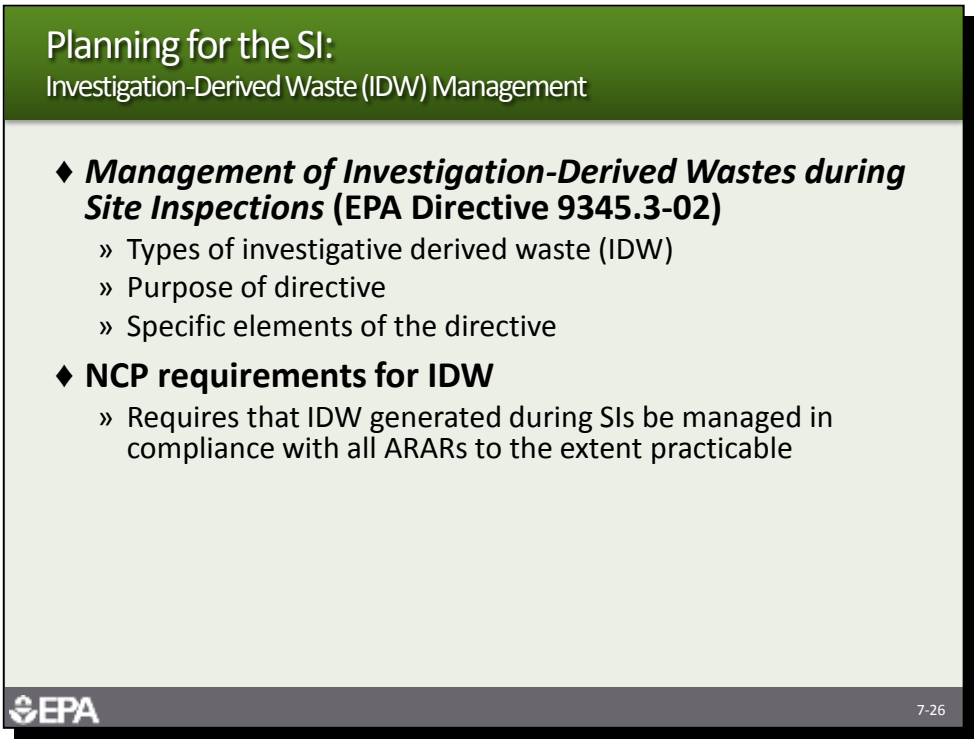
- **Purpose:** Data validation assesses overall analytical performance, considering both the laboratory and the methods. Data validation also helps to determine if further investigation is necessary at the site.

- **What should be examined:** The investigator or project chemist should evaluate analytical data and laboratory information to assess whether sampling protocols and procedures used regionally approved methods. The reviewer should examine sampling dates, locations, depths and descriptions, sample collection and preparation techniques, laboratory preparation techniques, analytical methods and analytical results, method detection limits or sample quantitation limits, QA/QC samples and documentation.

- **What data needs to be validated:** Laboratory data packages are validated according to the guidelines established in the SI work plan. Items reviewed during the data validation process depend on the QA objectives of the data user. Data that may need to be validated include sample holding times, initial and continuing calibration verification, interference check sample for inorganic compounds, determination of bias (percent recovery), precision, detection limits or confirmed identification data.

  Some EPA regions provide final validated CLP and regional laboratory data packages, while others provide data that require validation. Non-CLP data packages should be validated. The data validation report (or case narrative for some CLP data packages) provides a summary of the validation procedures, findings, and data qualifier assigned.

- **Data review considerations:** Professional judgment is used to validate the overall data package. Considerations during the data review include review of data report for transcription and typographical errors, a decision whether sampling protocols were appropriate, comparison of data against field and trip blanks to detect cross-contamination, a comparison of field replicates samples, a review of laboratory quality control (QC), a summary of detection limits for non-detectable results, a review of detection limits for positive but non-quantifiable data and a review of the sampling program design for assessing media variability. In addition, validation should include a review of background concentrations to help identify site-specific contamination and delete unusable data, assignment of quantifiers to useable data and an explanation of limitations of qualified data.



Notes

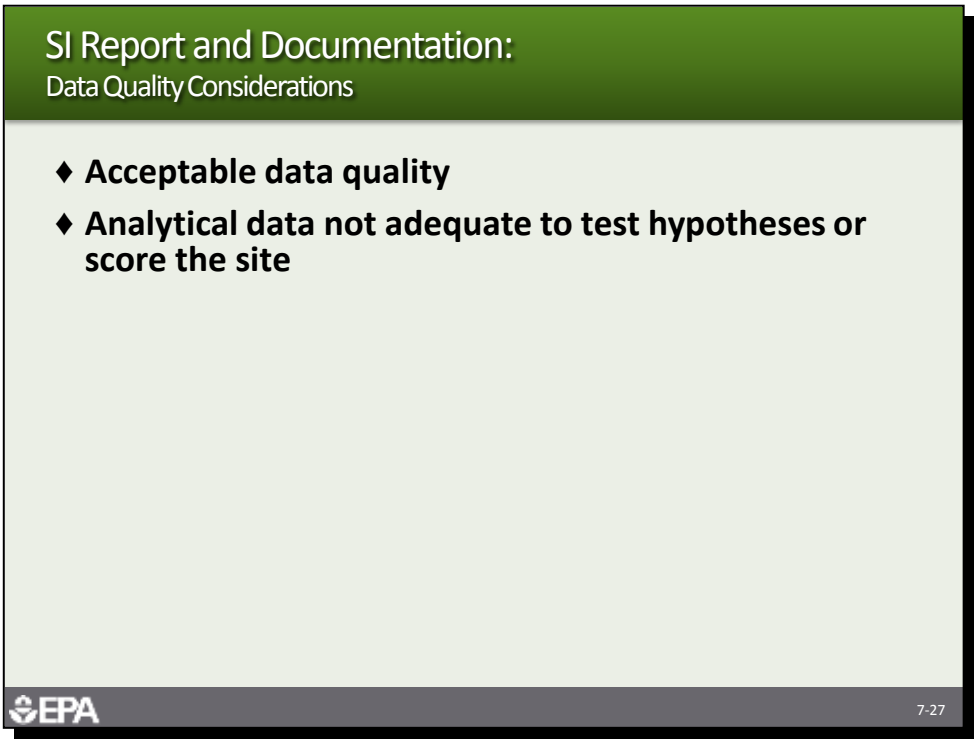
◆ ***Management of Investigation-Derived Wastes during Site Inspections (EPA Directive 9345.3-02):*** This directive presents a general regulatory background and options to manage IDW generated during SIs. The directive addresses typical IDW management scenarios and describes cost-efficient methods of handling hazardous and non-hazardous IDW. The EPA does not recommend removing wastes from all sites and in particular from those sites where IDW do not pose any immediate threat to human health or the environment and where removal would be expensive which, in turn, would impair EPA's ability to successfully meet the goals of the site assessment program.

» **Types of IDW:** Types of IDW include soil cuttings, drilling muds, purged groundwater, decontamination fluids (water and other fluids), disposable sampling equipment and disposable PPE.

» **Purpose of directive:** The purpose of the directive is to provide cost-efficient methods of handling wastes to minimize the quantity of wastes generated, leave a site in same condition as or at least not worse than it was prior to the investigation, remove wastes that pose an immediate threat to human health or the environment and comply with Federal and state ARARs to the extent possible.

- » **Specific elements of the directive:** Specific elements of the strategy of the directive are to characterize IDW by available information (such as manifests, material safety data sheets [MSDS], previous test results, knowledge of the waste generation process and other relevant records) rather than analyze IDW samples; delineate an area of contamination (AOC) unit for leaving RCRA hazardous soil cuttings; dispose of RCRA hazardous groundwater, decontamination fluids, and PPE and disposable equipment at RCRA Subtitle C facilities; and leave on site RCRA non-hazardous soil cuttings, groundwater and decontamination fluids, preferably without containerizing and testing.

◆ **NCP requirements for IDW:** The NCP requires that IDW generated during SIs be managed in compliance with all ARARs to the extent practicable. In addition, other legal and practical considerations may affect the handling of IDW; therefore, investigators should be familiar with OERR's IDW directive as well as the requirements of the NCP for identifying ARARs. IDW may contain hazardous substances as defined by CERCLA Section 101 (14) and listed at 40 CFR Part 302.4. Some CERCLA hazardous substances are RCRA Subtitle C hazardous wastes as defined under 40 CFR Part 261, while other substances may be regulated by other Federal laws, such as the SDWA, CAA, TSCA and CWA. The RCRA Land Disposal Restrictions (LDR) set forth in 40 CFR Part 286 are important as potential ARARs because they establish treatment standards for hazardous wastes, including hazardous contaminated soils that must be met before these wastes can be land disposed.

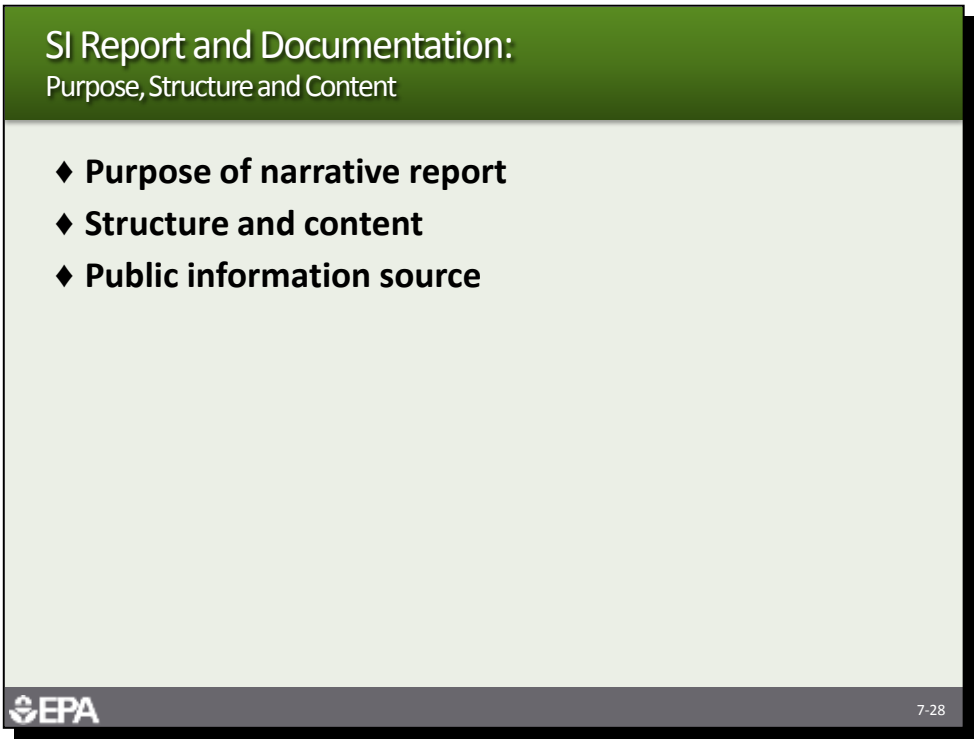


Notes

- **Acceptable data quality:** The minimum data quality acceptable for SI scoring depends on the intended use of the data (are the data being used to screen the site or list the site?); specific site hypotheses being tested (is there suspected surficial contamination?); and the specific HRS factor evaluated (hazardous waste constituent quantity). Investigators may use analytical data differently to screen a site than to list a site. For example, analytical data obtained from the site owner without accompanying QA/QC information may be used if the data are reasonable for their intended use and could be applied in a similar manner as SI analytical data. In addition, data supplied by local or state authorities that indicate high concentrations of a particular hazardous substance in surficial soils at the site may be used if the substance can be attributed to the site. Analytical data of unknown quality are generally not adequate to score a site; however, previous data that would meet minimum usability requirements may be combined with SI data to test site hypotheses. Data that would not meet minimum requirements may be used if subsequently confirmed by SI data.

  The website Agency-wide Quality System Documents is http://www.epa.gov/quality/qa_docs.html.

- **Analytical data not adequate to test hypotheses or to score:** The following types of analytical data are not adequate to test hypotheses or to score a site: background samples with higher concentrations of hazardous substances than on-site samples; groundwater samples where the matching blanks show contamination possibly caused by improper sampling procedures or laboratory contamination; and volatile organic analysis for aqueous surface water samples qualified because of excessive holding times.



Notes

- **Purpose of the narrative report:** The EPA will refer to the narrative report during future site evaluations. The report should summarize what is known about the site, the activities conducted and all information researched. The report should describe the history and nature of waste handling at the site; known hazardous substances; and pathways of concern for these substances; identify and describe human population and environmental targets; and present SI analytical results. The report could be a letter or a stand-alone document transmitted under separate cover.

- **Structure and content:** The SI report should follow the suggested format provided in the annotated outline or as recommended per regional guidelines. The body of the report begins with site and source characterization and moves logically through threats and targets associated with each pathway. The summary and conclusion section summarizes the most important characteristics of the site and identifies significant pathways and targets. All reports and scoresheets should include a numbered reference list and attached references.

- **Public information source:** The SI report should be restricted to factual statements. The narrative report is a public information resource that describes the steps taken to inspect the site and provides information on the site based on EPA's inspection. The report should contain sufficient information and documentation to support EPA's recommendation on site disposition. SI scores and site recommendations that the EPA considers deliberative and protected from disclosure should not be included or referred to in the report. The investigator should check with EPA regional officials to ensure that the SI report is consistent with current EPA policy on releasable information.

SI Report and Documentation:
Report Format

- **Introduction**
- **Site description and regulatory history**
- **Operational history and waste characteristics**
- **Groundwater pathway**
- **Surface water pathway**

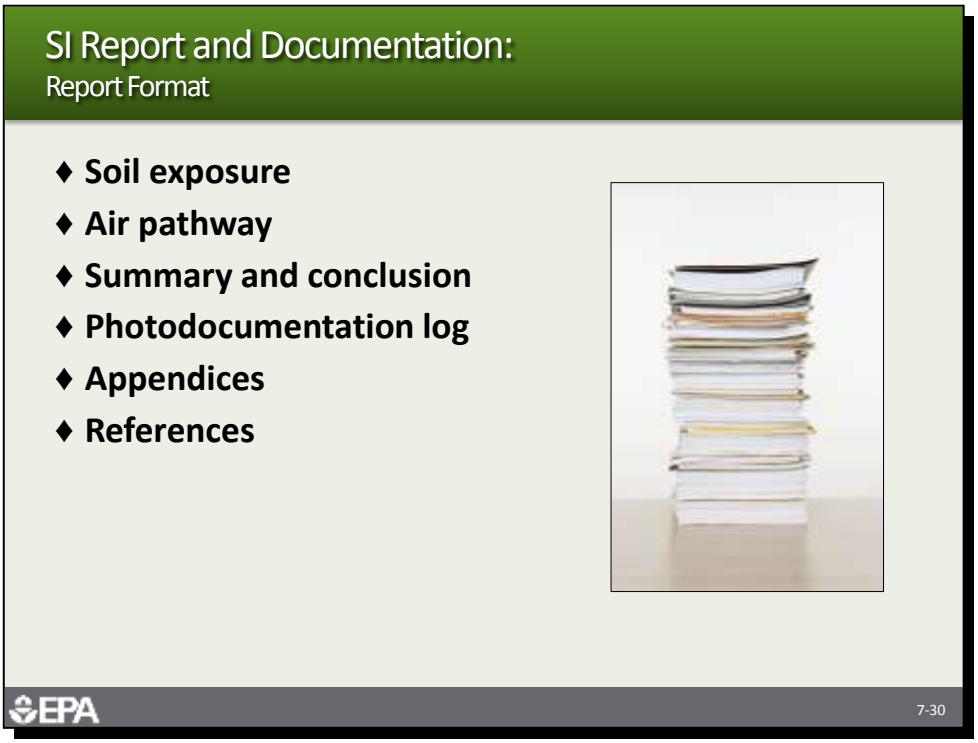
(continued)

EPA 7-29

Notes

- **Introduction:** This section states that the SI was performed, the name of agency performing it, the authority it was performed under, the site name and CERCLIS identification number and location. It also states the purpose, scope and objectives of the SI.
- **Site description and regulatory history:** This section identifies the type of site, status, years of operation, physical setting and summary of dates and scope of previous investigations, and describes prior land use and past regulatory activities.
- **Operations history and waste characteristics:** This section of the SI provides an operational history of the site that identifies past and current owners and operators and describes site activities. It also identifies and describes wastes generated, waste disposal practices, waste source areas, containment and quantities. Furthermore, it discusses any previous sampling results and identifies hazardous substances associated with sources and accessibility to source areas.
- **Groundwater pathway:** Describes the local geologic and hydrogeologic setting, groundwater use within a 4-mile radius, designated wellhead protection areas and their specific location, previous groundwater sampling results and a table that lists each well or spring sampled during the SI and the analytical results.

- **Surface water pathway:** Describes the local hydrologic setting, including site location with respect to floodplains and overland and in-water segments of the surface water migration path. It also indicates whether surface water within the target distance limit supplies drinking water, contains fisheries, or is within or adjacent to sensitive environments. Finally, it includes a discussion of any previous sampling and results and any SI sampling and results.



Notes

- **Soil exposure:** This section states the number of workers on properties with site-related contamination; the number of people who live on properties with site-related contamination and within 200 feet of an area of observed contamination (AOC); concentrations of hazardous substances in comparison to health-based benchmarks; identifies schools and daycare facilities within 200 feet from an AOC ; identifies terrestrial sensitive; identifies the number of people who live within a 1-mile travel distance of the site; discusses any previous sampling and results and any SI surficial source samples; and provides a summary of the SI analytical results.

- **Air pathway:** Identifies location of, and distance to, the nearest individual and states the population within 4 miles of the site, including students and workers, and identifies sensitive environments on sources within 4 miles; discusses previous air sampling results and SI air sampling procedures and results.

- **Summary and conclusion:** Summarizes the major aspects of the site and its history that relate to the release or threatened release of hazardous substances and the exposure of targets and summarizes principal pathways and targets of concern. Also summarizes sampling results.

- **Photodocumentation log:** Included as an attachment or appendix and includes pertinent photographs taken during the SI.

- **Appendices:** Should include analytical results reports, the QA report and other attachments.

- **References:** Includes all references cited in the SI report in bibliographic citation format. Complete copies of site-specific references and copies of title pages and pertinent excerpts of publicly available references should be attached.

Summary

- **The goal of the SI is to screen the site to confirm if it should be placed on the NPL**
- **The SI consists of the following basic tasks:**
  - Review available information
  - Organize project team and develop plans
  - Conduct field work
  - Evaluate all data
  - Prepare the SI report

(continued)

EPA 7-31

Summary

- **Preparing and planning for the SI includes:**
  - Reviewing the PA report
  - Obtaining site access
  - Using historical data
  - Preparing the proper plans
  - Establishing proper QA/QC objectives
- **The work plan, health and safety plan, field sampling plan and QAPP describe the site and field activities to take place during the SI**
- **Site plans are to be prepared prior to field activities**
- **It is important to properly manage IDW**

(continued)

EPA 7-32

Summary

- **The SI report summarizes:**
  - What is known about the site
  - Pathways of concern
  - Human populations and environmental targets
  - SI analytical results
- **All analytical data should be evaluated for validity and applicability**
- **The EPA will refer to the narrative report during future site evaluations**

EPA 7-33

Questions?

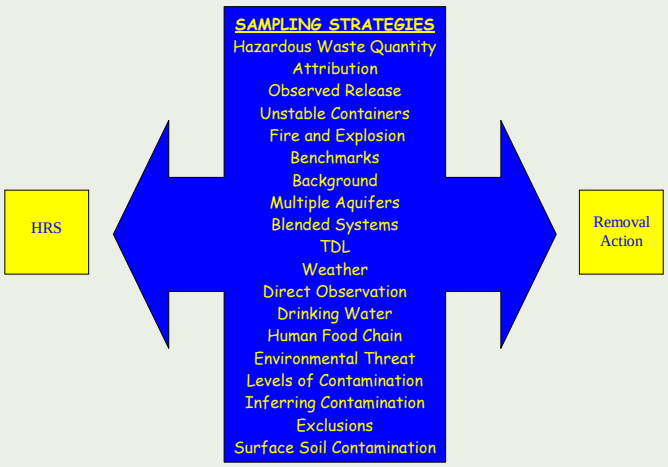
EPA 7-34

SI Strategies: Overview and Site Sources

EPA
United States Environmental Protection Agency

7-35

Overview of SI Strategies



EPA 7-36

Objectives for Source Sampling

- **Participants will be able to devise and evaluate source sampling strategies that:**
  - » Identify all types of potential sources, as defined by HRS
  - » Delineate the boundaries, quantity and containment for all sources
  - » Properly attribute contamination to site activities and operations
- **Case study example**

EPA 7-37

Objectives for Demonstrating a Release

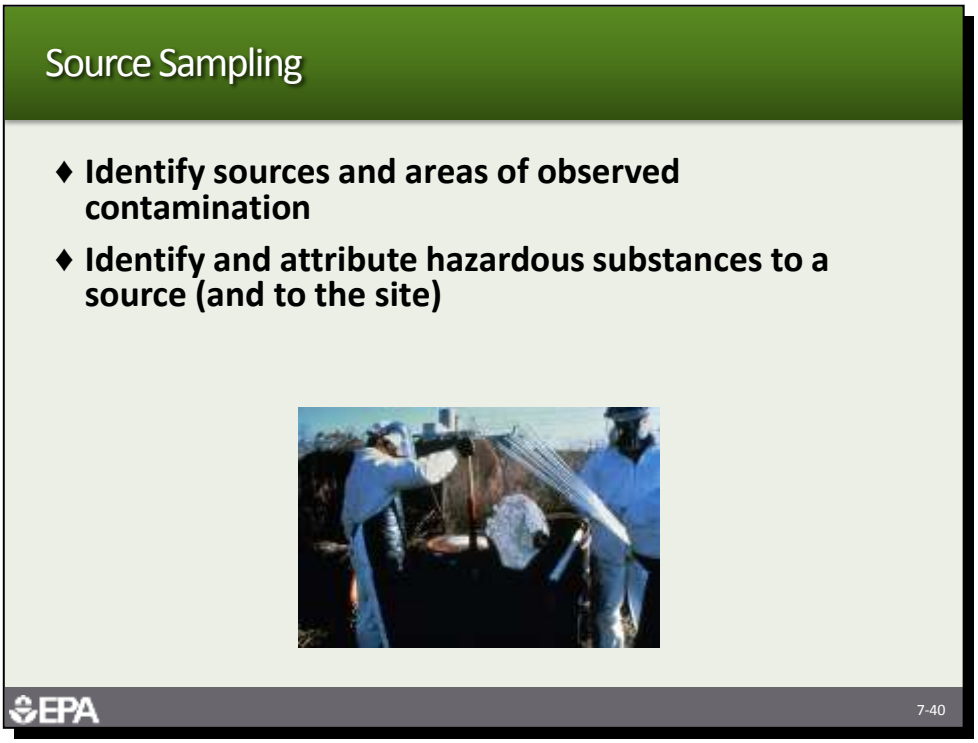
- **Participants will be able to devise and evaluate sampling strategies that:**
  - » Demonstrate an observed release by chemical analysis
  - » Help quantify actual contamination
  - » Establish background levels or ranges
  - » Consider attribution issues
  - » Distinguish degrees or levels of contamination at targets

EPA 7-38

Sources

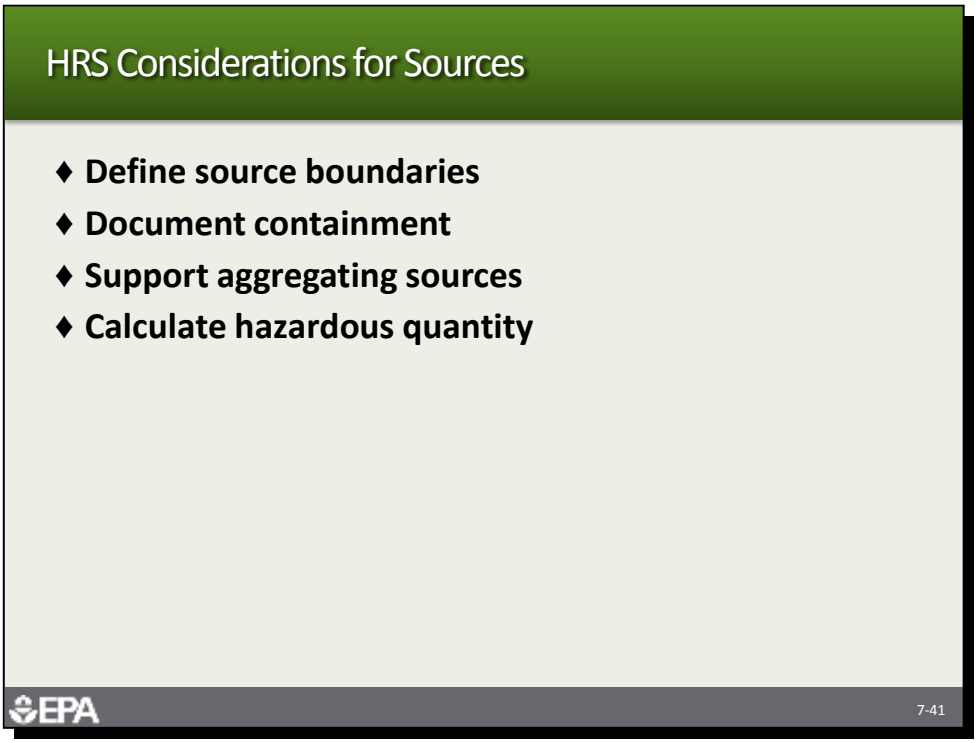
EPA

7-39



Notes

- **Identify sources and areas of observed contamination:** Characterizing sources generally requires collecting source samples to investigate the types of wastes deposited at the site and specifically to identify hazardous substances.
- **Identify and attribute hazardous substances to a source (and to the site):** Investigators should sample as many different types of sources as possible, assuming that different hazardous substances will be found in different sources. If multiple sources of hazardous substances are suspected at the site, sampling should focus on the contaminants and source types that will yield the highest combined values for hazardous waste quantity and waste characteristics (including values from SCDM such as toxicity, mobility, persistence, and bioaccumulation) scores. Source sampling may also be used to support attribution if the same hazardous substances or transformation products are detected in samples collected at release or target sample locations.



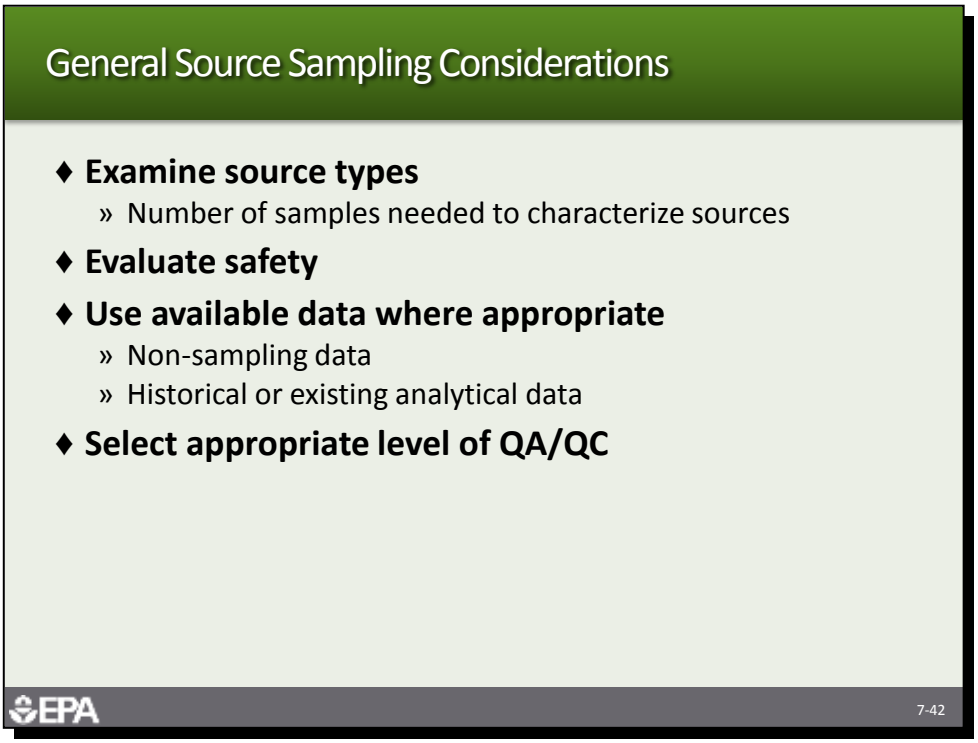
Notes

- **Define source boundaries:** Sampling may be needed to establish the boundaries of certain sources (for example, landfill or contaminated soil) and to establish and refine the TDL for a pathway. However, physical measurements and aerial photographs can be used to determine area and volume dimensions for source types with well-defined boundaries (such as impoundments and waste piles).

- **Document containment:** Source containment is based on the source's release potential and generally, can be evaluated accurately by field observations. Containment cannot be determined by field observation for underground sources. However, source sampling may be used to document containment for a source, to evaluate the degree of containment for a source or to determine whether the source is releasing gases.

- **Support aggregating sources:** Samples may be used to confirm the presence of similar hazardous substances at multiple sources at the site, enabling sources to be aggregated for HRS scoring.

- **Calculate hazardous quantity:** It is important to understand the HRS rules on calculating hazardous quantity when sources are sampled. Sampling to document hazardous waste quantity and obtaining higher-tier data (Tier A or B) may be appropriate for source types, such as containers or tanks with homogenous wastes. This level of sampling, however, is generally not cost-effective given the wider ranges for hazardous waste quantity factor values and values that can be obtained using other tiers. The ranges for hazardous waste quantity factor values are broad, and determining a small increase in quantity, unless near a breakpoint, may have no impact on the factor assigned.



Notes

Design considerations: When sampling locations and the number of samples needed for adequately characterizing sources are selected, consider the following:

- **Examine source types:** Examine the source types (drums, impoundments or landfills) at the facility to help establish the sampling design. Examine visibly contaminated soils or areas such as run-off ponds or ditches where hazardous substances are likely to be deposited. Only one sample is needed to characterize sources like drums, tanks, landfills and surface impoundments. However, a minimum of three samples are needed to delineate an area of contaminated soil.

- **Evaluate safety:** Collecting samples from sources, such as drums, impoundments and underground tanks, pose safety and technical concerns. In addition, sampling unknown contents in drums and other equipment is potentially hazardous. Sampling contaminated soils adjacent to waste management units, or where wastes are likely to collect (such as in drainage ditches), may be more useful to characterize the source.

- **Use available data where appropriate:** Use existing data to support design of the sampling and analysis program.

  - **Non-sampling data:** The number of samples needed to characterize sources may be greatly affected by the amount of non-sampling data readily available, such as waste profiles, operating records, hazardous waste manifests, MSDS's, permits, monitoring reports and aerial photographs.

» **Historical or existing analytical data:** Existing analytical data may be used as needed to support characterization of sources. Investigators will need to evaluate the quality of the analytical data (for example, is it CLP quality). In general, if data are of CLP quality, then they may be used as needed. If the data are non-CLP quality, then refer to Table 3-8: Review of Previous Analytical Data and Exhibit 3-1: Checklist for Usability of Previous Analytical Data, in the SI guidance. The SI guidance should be consulted while preparing the field sampling plan

◆ **Select appropriate level of QA/QC:** Decide on the number of QA/QC samples (for example, replicates/duplicates, field blanks and trip blanks) needed to confidently characterize sources. Table 4-6 of EPA's SI guidance provides guidelines for minimum QA/QC samples. In addition, EPA regional guidelines may suggest the number of QA/QC samples to collect.

TABLE 3-8: REVIEW OF PREVIOUS ANALYTICAL DATA

PROCEDURE	CONSIDERATIONS
Determine what data are available	What are the types of previous data: CLP, non-CLP, field screening, full TCL analysis, partial TCL analysis, owner/operator, State?
Evaluate purpose and scope of previous investigations	Why were data collected? What type of investigation: State or Federal Facility investigation, enforcement action, emergency response, RCRA facility inspection, general assessment of ground water quality, environmental property assessment, NPDES permit requirements?
Review sampling locations, dates, depths, and sample descriptions	Was the design of the sampling program similar to the SI sampling strategy? Did it include background samples and field QC samples? Are a sample plan and sample location map available? Is a field notebook available that describes all sampling activities?
Evaluate the sampling results and hazardous substance concentrations	What hazardous substances were detected? What are the range of concentrations, background levels, data qualifiers and codes attached to data, and detection limits?
Review field preparation and collection techniques for previous samples	Were appropriate SOPs used for sample collection and handling?
Review available laboratory documentation	Are QA/QC procedures or data validation procedures available? What are the name of the laboratory, the type of analyses performed, and the performance results?
Assess usability of previous data	What is the overall usability of the data set?

EXHIBIT 3-1: CHECKLIST FOR USABILITY OF PREVIOUS ANALYTICAL DATA

1. Have samples been taken at the appropriate location, depth, or stratum to confidently test site hypotheses?	☐ Yes ☐ No
If the answer is "no," additional sampling will likely be needed to fully test hypotheses and provide a basis for the site disposition decision. The data may nevertheless be useful in developing sampling and analysis plans and identifying hazardous substances of concern.	
2. Is documentation available to support the analytical procedures used to derive the data (e.g., laboratory QA/QC procedures, type of analyses, detection limits, and data review)?	☐ Yes ☐ No
3. Are representative background levels available for targets exposed to actual contamination and hazardous substances that may demonstrate releases?	☐ Yes ☐ No
4. If background samples are available, are they temporally and spatially comparable to samples indicating releases and exposure of targets to actual contamination?	☐ Yes ☐ No
If the answer to questions 2, 3, or 4 is "no," the data may not support HRS documentation requirements and further review is needed to determine usability. However, the data may support testing of site hypotheses and development of a sampling strategy.	
5. Do data provide evidence that attributes the hazardous substances detected in various media and waste samples to the site?	☐ Yes ☐ No
If the answer to question 5 is "no," additional samples will be needed to fully support releases and targets exposed to actual contamination.	
If the answers to questions 1 through 5 are all "yes," the previous analytical data may support testing PA hypotheses, identification of hazardous substances of concern, development of a sampling strategy, and HRS documentation requirements, including releases and targets exposed to actual contamination.	

TABLE 4-6: GUIDELINES FOR MINIMUM QA/QC SAMPLES EXPANDED SI OR SINGLE SI

MEDIUM	REPLICATES/ DUPLICATES	FIELD BLANKS	TRIP BLANKS
Aqueous	1 in 20	1 in 20	1/day of sampling
Soil and sediment	1 in 20	1 in 20	Usually not required
Air	1 in 20	Not applicable	1/day of sampling
Source material	1 in 20	Usually not required	Usually not required
Sample requirements should be developed on a site-specific basis. Laboratory blanks and spikes are method-specific and are not included in the table.			

Source Sampling Strategies

Criterion	SI Data Collection
Primary objective	To identify hazardous substances associated with site sources; to confirm substances known or suspected Help quantify hazardous waste quantity
Data Quality	Data Use Category (DUC)-I for hazardous constituent quantity DUC-I and II to establish hetero- or homogeneity of wastes
Sample to help demonstrate observed contamination	Samples used to test hypothesis regarding soil contamination within 2 feet of surface Samples to further delineate area of contamination and describe the areas of observed contamination in the direction of targets
Sample to help evaluate source containment or source type	Collected when the containment factor value for a migration pathway is not 10. Sometimes needed to demonstrate release for air pathway if significant
Samples to help describe boundaries and estimate hazardous waste quantity	Samples may be needed to estimate depth of a source of describe sources other than contaminated soil May include samples to help estimate hazardous constituent or waste volume quantity

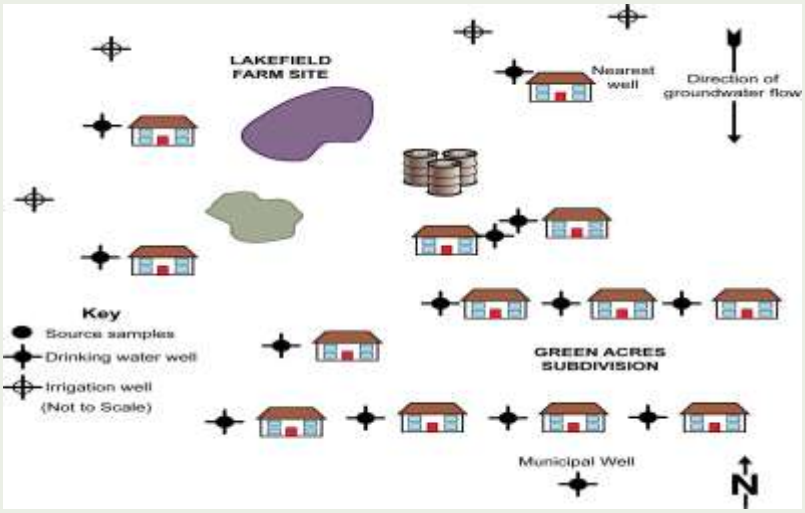
EPA 7-43

Case Study Example
Lakefield Farm Site – PA Findings

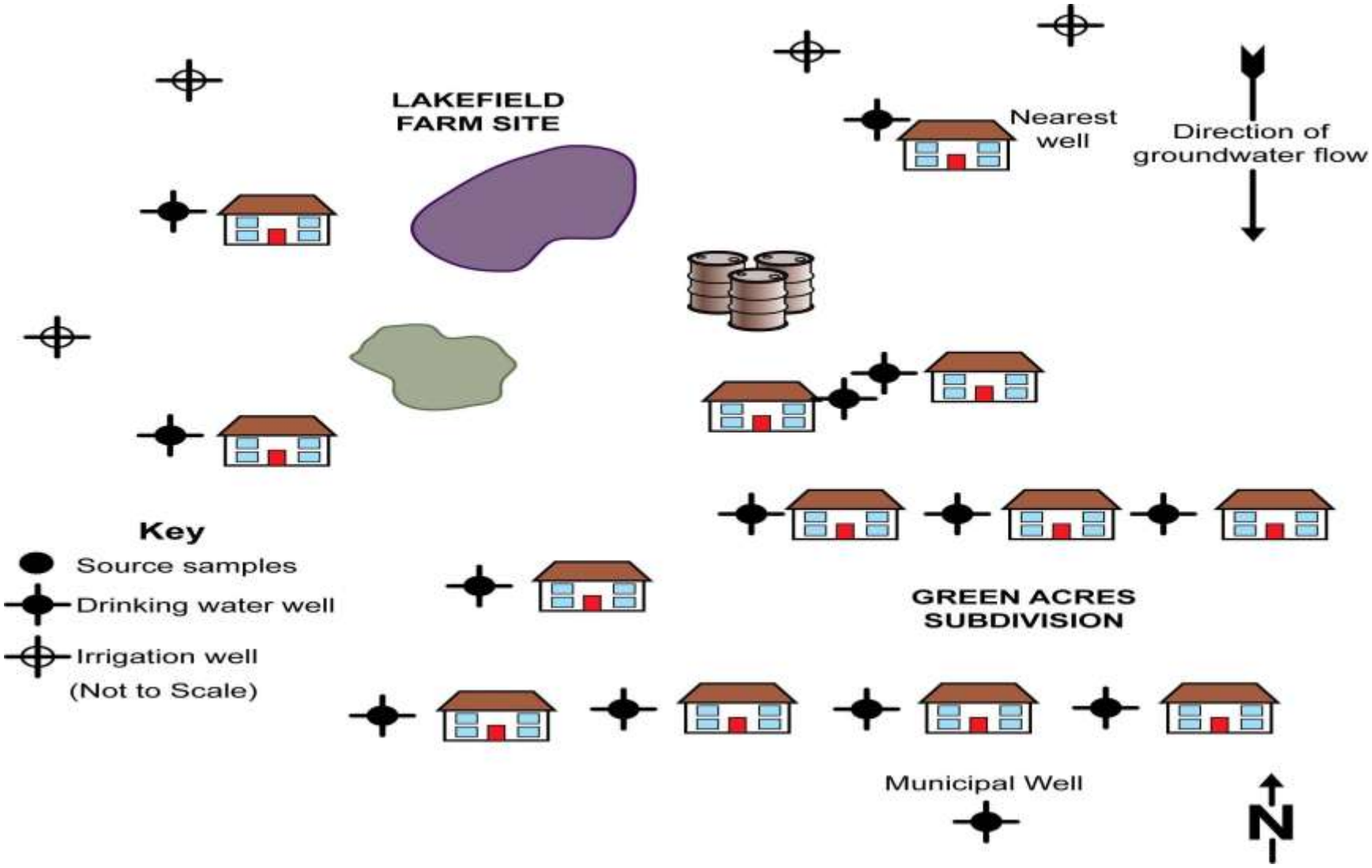
- **Abandoned strawberry farm located near a town of 10,000 people**
- **Three potential sources identified:**
  - 45,000 cubic feet (ft^3) surface impoundment containing electroplating sludge (wet)
  - Drum storage area (30 leaking drums – unknown contents)
  - Stained soil

EPA 7-44

Lakefield Farm Site – Map



EPA 7-45

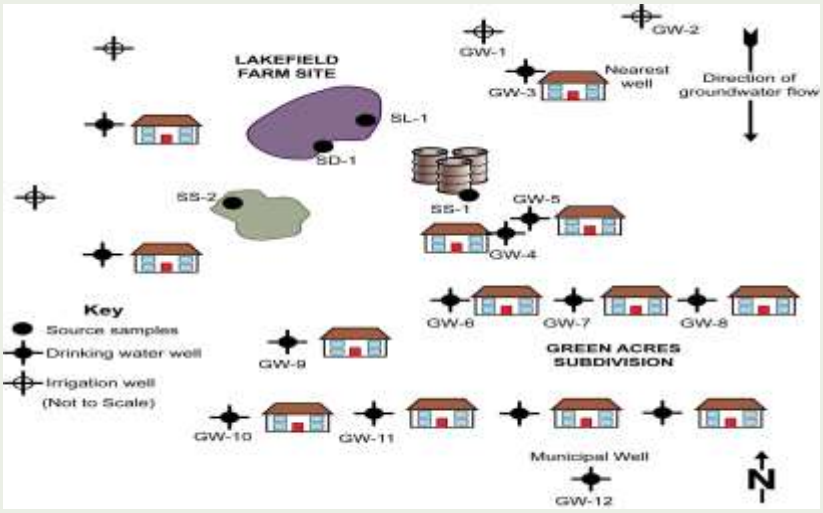

LAKEFIELD
FARM SITE
Nearest
well
Direction of
groundwater flow
Key
Source samples
Drinking water well
Irrigation well
(Not to Scale)
GREEN ACRES
SUBDIVISION
Municipal Well
N

Lakefield Farm Site
Source Sampling Strategy

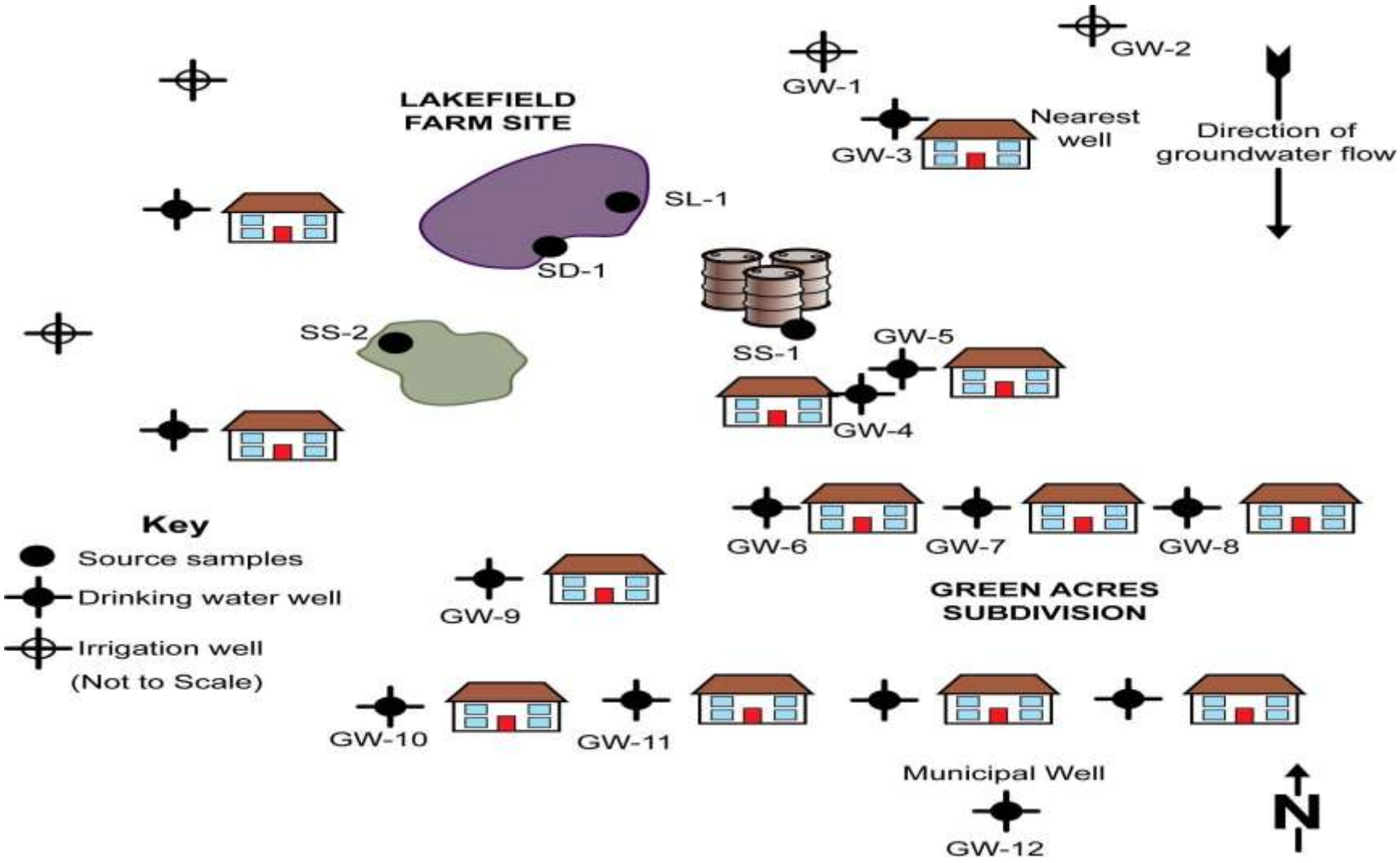
Potential Waste Source Area	SI Sampling Strategy	HRS Considerations	Non-Sampling Data Collection
Surface Impoundment	Collect 1 source sample of impoundment sediments plus one sludge sample to evaluate hazardous substances present	More than 675,000 ft^3 are needed to increase the hazardous waste quantity (HWQ) factor value to next category value	Obtain physical dimensions of source; evaluate containment. Consider use of aerial photographs
Drum Storage Area	Collect 1 surficial sample from beneath drums to identify hazardous substances present	More than 1,000 drums are needed to increase HWQ factor value to next category value	Verify number of drums; evaluate containment; look for container markings; examine area around drums
Stained Soil	Collect 1 surficial sample to determine if area is contaminated and to identify hazardous substances	More than 78 acres of contaminated soil are needed to increase HWQ factor value to next category value	Obtain physical dimensions of area; evaluate containment

EPA 7-46

Demonstrating a Release



EPA 7-47


LAKEFIELD
FARM SITE
SL-1
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GW-2
GW-3
Nearest
well
Direction of
groundwater flow
GW-4
GW-5
GW-6
GW-7
GW-8
GW-9
GREEN ACRES
SUBDIVISION
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Source samples
Drinking water well
Irrigation well
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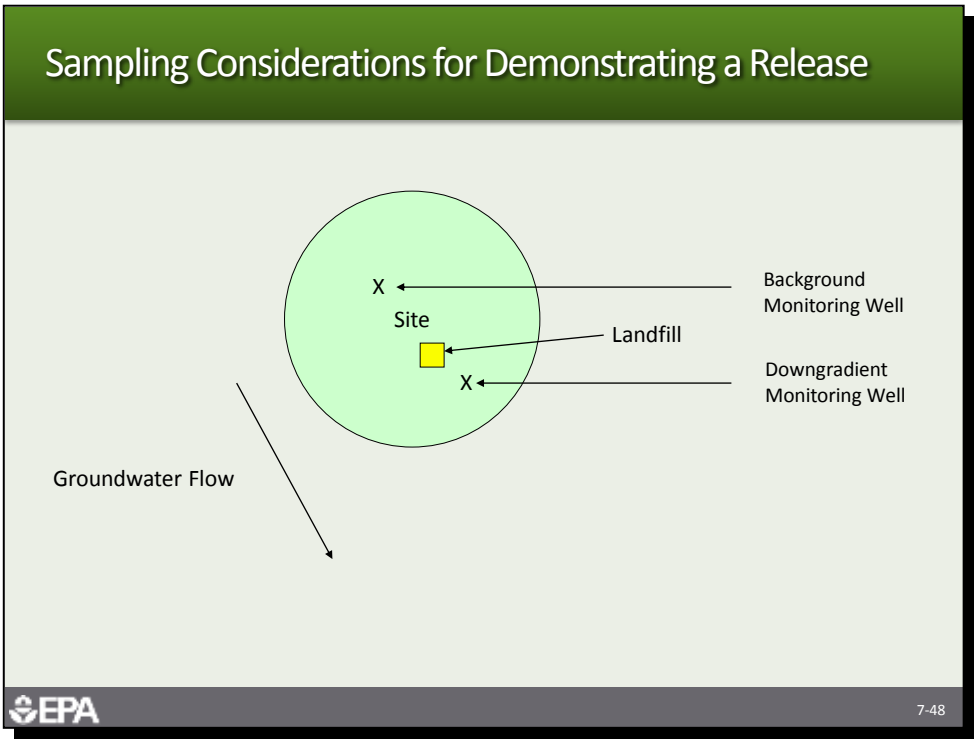
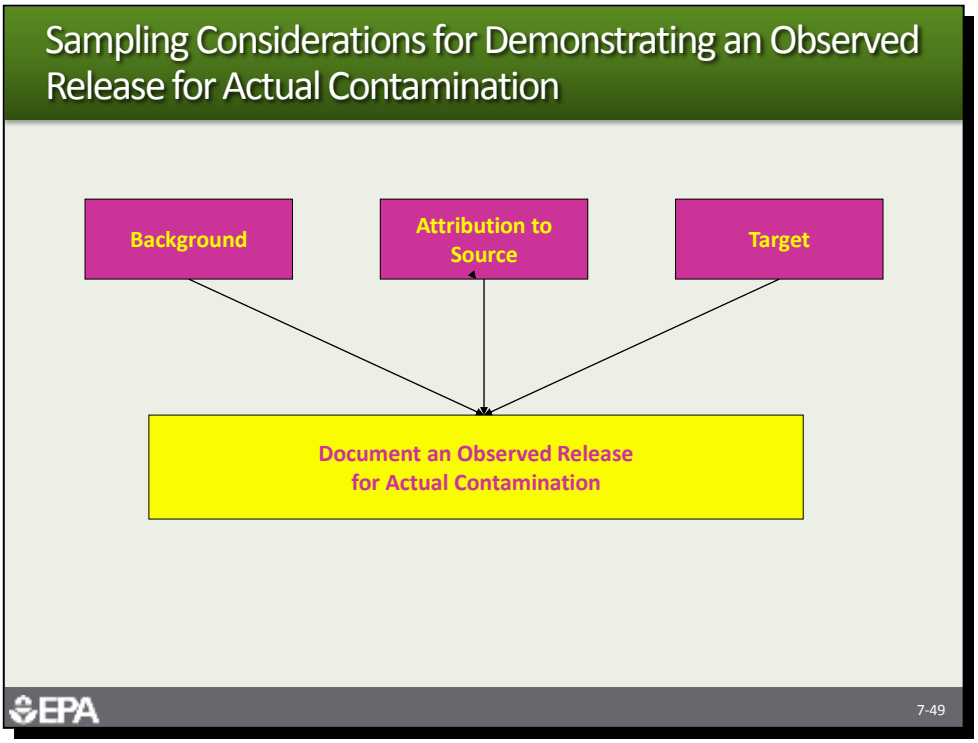


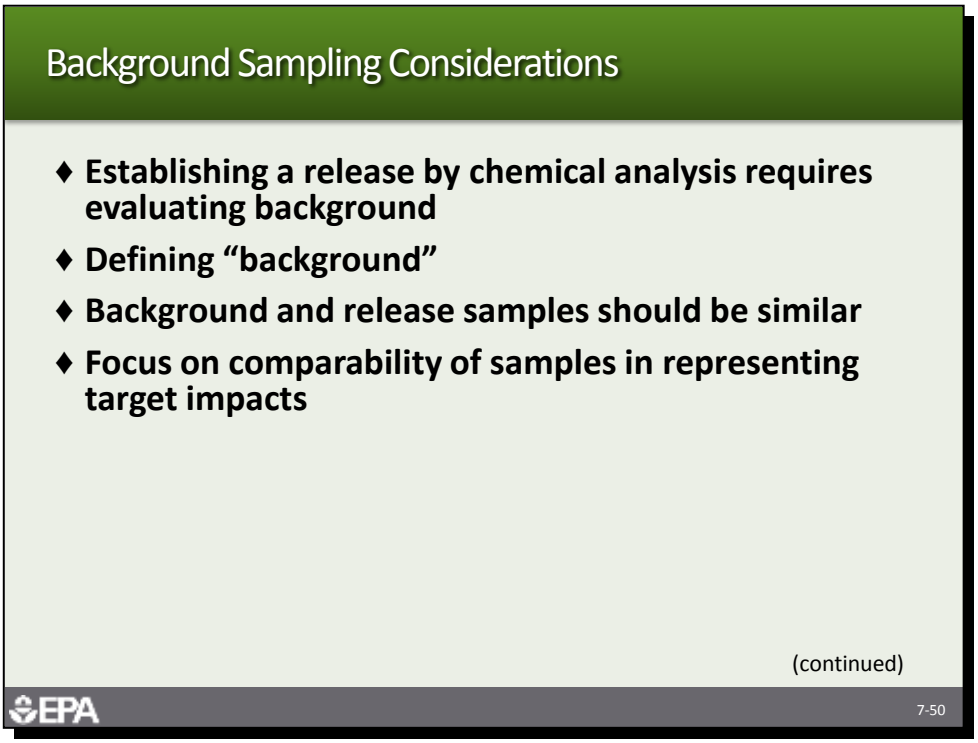
Notes

- **Sampling Considerations for Demonstrating a Release:** The HRS documents an observed release in one of two ways: direct observation or chemical analysis. At least one sample must show contamination significantly above the background level (3 times background) for a hazardous substance to demonstrate a release by chemical analysis for a pathway. In the absence of any other evidence, the sampling strategy should generally specify collecting at least two samples from each appropriate pathway to demonstrate a release:
  - » One sample representative of background levels
  - » One sample downgradient (or downslope, downstream or downwind) of the source of contamination



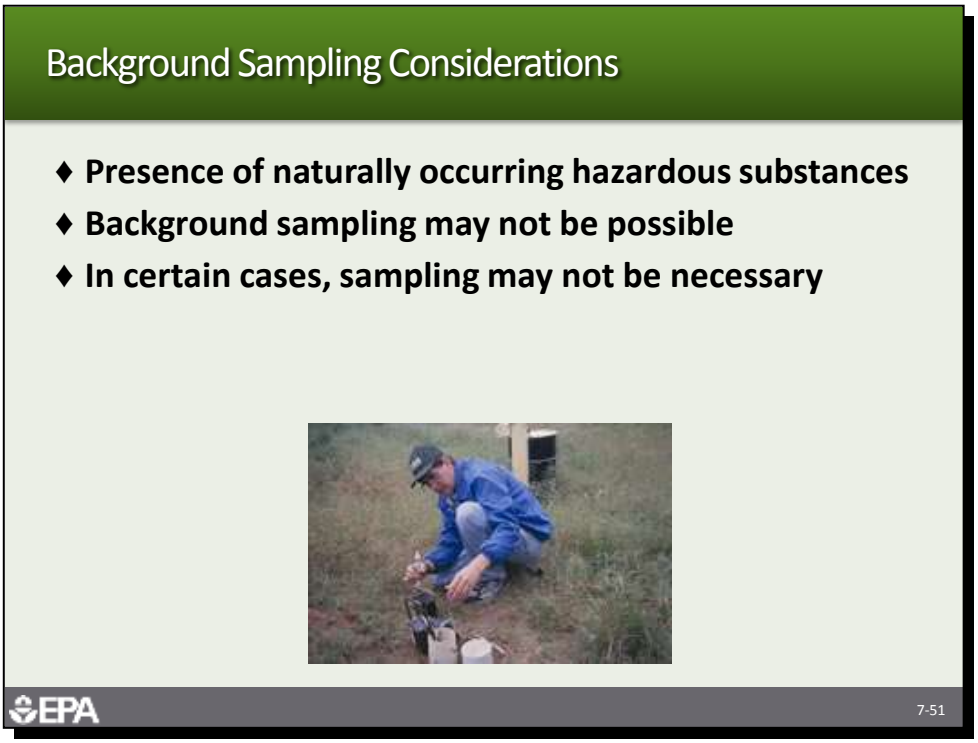
Notes

- **Sample Considerations for Demonstrating an Observed Release for Actual Contamination:** Under the HRS, an observed release with actual contamination will generally result in a significantly higher pathway score. There are three primary considerations for sampling if chemical analysis is used to document an observed release for actual contamination:
  - » Background
  - » Attribution
  - » Target



Notes

- **Establishing a release by chemical analysis requires evaluating background:** The HRS requires that analytical evidence of a hazardous substance in a medium at concentrations significantly above the background level where a portion of the significant increase is attributable to site sources to document a release by chemical analysis.
- **Defining "background":** Background is the ambient concentration of a hazardous substance and includes naturally occurring concentrations, concentrations from man-made sources other than the site evaluated and concentrations from the site. Generally, background levels are best supported by chemical analysis.
- **Background and release samples should be similar:** The location, number and type of background samples should correlate with the nature and type of hazardous substances found in source or contaminated samples. For example, background soil samples should be collected from soil of similar depth and composition.
- **Focus on comparability of samples in representing target impacts:** Background and source samples should be similar to those samples that document impacts to targets. For example, background, source and target groundwater wells should all be screened in the same aquifer and at similar depths based on the migration characteristics of the contaminants of concern.



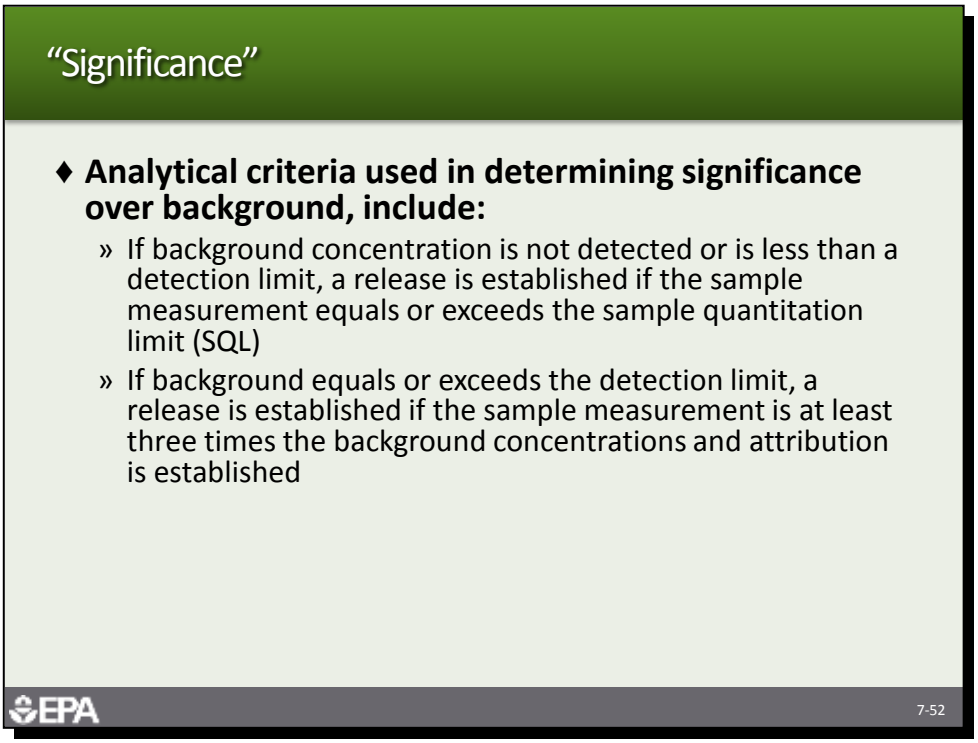
Notes

- **Presence of naturally occurring hazardous substances:** Some hazardous substances (such as lead, arsenic and copper) occur naturally in many areas. In general, background levels are best supported by samples of representative ambient conditions if these substances are used in scoring. Without site-specific levels, background levels may be based on other data, such as sampling data from other nearby CERCLA investigations, local surveys by other Federal or state agencies, or local universities. Published data may be used if they are comparable to site conditions and characteristics, but as a general rule, the investigator should use background concentration data from SI sampling.

- **Background sampling may not be possible:** For example, suppose that no sample could be collected that would represent surface water background levels for comparison with sample concentrations from an isolated pond adjacent to a site. If the site is the only source of these substances, the background levels are assumed to be zero (or below detection). In some cases, it may be possible to use unimpacted samples from within an isolated pond as background samples.

- **In certain cases, sampling may not be necessary:** Sampling may not be necessary if the following conditions are met:

  - The specific substance is known to be present at the site based on previous analytical data, historical records or written statements.
  - The specific substance is not known to be naturally occurring or ubiquitous.
  - No other sources of contamination for the substance are identified in the vicinity of the site (particularly for nonindustrial areas).



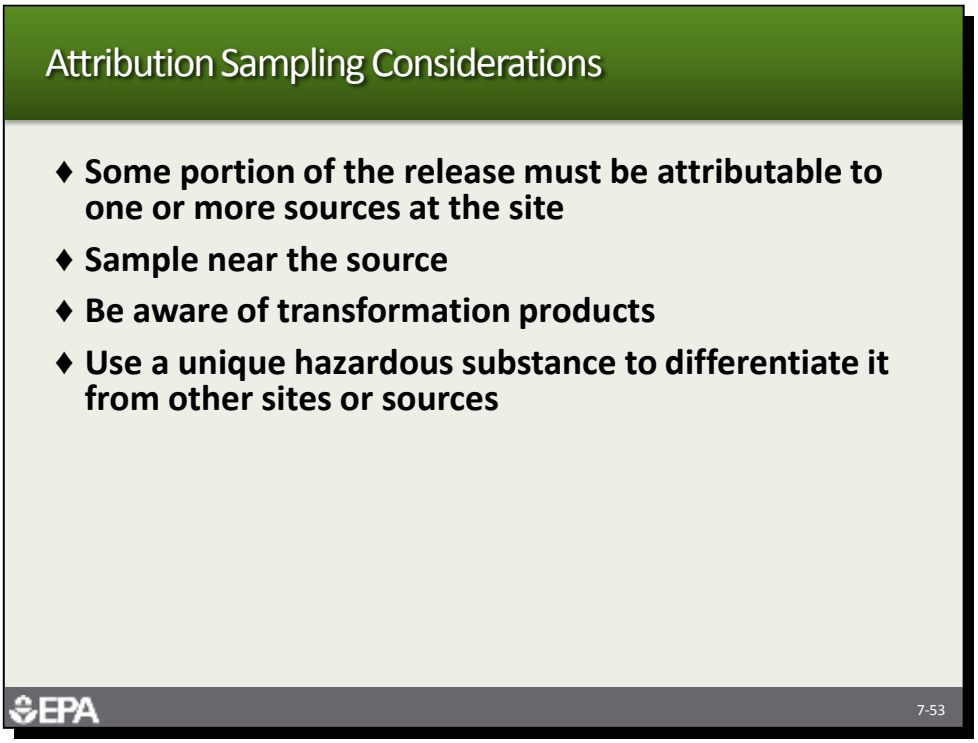
Notes

◆ **Analytical criteria used in determining significance over background, includes:** In the HRS, significance relates only to the concentration found in a pathway, and not to any health or environmental effects. However, a release may be below a regulatory action level and still qualify for an observed release. The criteria used to determine analytical significance include the following:

» If background concentration is not detected or is less than a detection limit, a release is established if the sample measurement equals or exceeds the SQL: The SQL is the amount of a hazardous substance that can be reasonably quantified, given the limits of detection for the methods of analysis and sample characteristics that may affect quantitation (such as dilution and concentration). For HRS purposes, the detection limit used is the method detection limit (MDL) or the instrument detection limit (IDL) for real-time field instruments.

» If background equals or exceeds the detection limit, a release is established if the sample measurement is at least three times the background concentrations and attribution is established.

Laboratory detection limits can vary from CLP and Non-CLP laboratories. Ensure that the detection limit is defined and is acceptable in accordance with the HRS Rule.



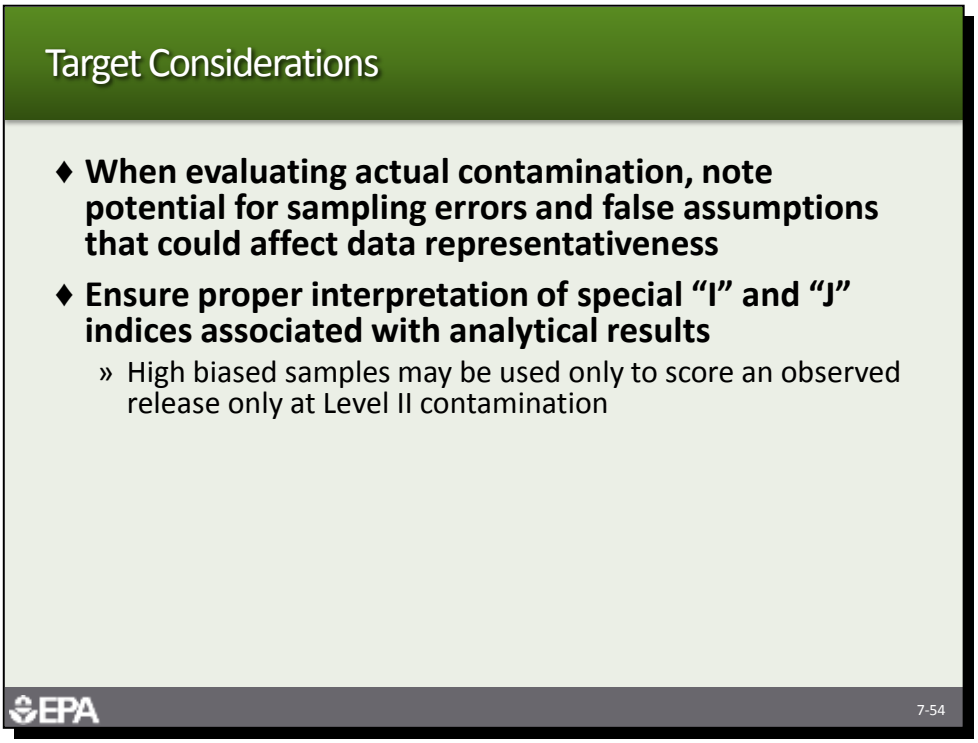
Notes

- **Some portion of the release must be attributable to one or more sources at the site:** Some portion of the release must be attributable to one or more sources at the site to demonstrate an observed release. Sampling may be needed to demonstrate the site is at least partially responsible for the contamination.

- **Sample near the source:** Attribution concerns may be addressed by characterizing sources for many sites. Since concentrations of hazardous substances usually decrease with distance from sources, sampling near sources may also help to distinguish among alternative sources of contamination in the vicinity of the site.

- **Be aware of transformation products:** Certain hazardous substances, such as tetratchloroethylene (PCE) and trinitrotoluene (TNT) degrade over time in media and transformation paths and products are well-established. Transformation products found in media or targets may be attributed to sources that contain the original hazardous substance at the site in these cases.

- **Use a unique hazardous substance to differentiate it from other sites or sources:** At complex sites, contributions from other sources of contamination may be differentiated by identifying a single hazardous substance that is unique to the site being evaluated (for example, through wastestream "fingerprinting"). Identification of this single substance may require specific analysis and review of the data.



Notes

- **When evaluating actual contamination, note potential for sampling errors and false assumptions that could affect data representativeness:** It is important to note any sampling errors or laboratory errors that could affect the quality of the data whenever actual contamination is being evaluated. Sampling errors could include improper sample collection, poor decontamination and improper sample packaging and handling. Laboratory errors could include exceeding holding times and problems with matrix spike and duplicate sample results.

- **Ensure proper interpretation of special "I" and "J" indices associated with analytical results:** Special "I" and "J" indices, based on screening concentrations, are calculated when no hazardous substance individually equals or exceeds its benchmark concentration, and when more than one hazardous substance meets the criteria for actual contamination for the sample. If either index exceeds 1, Level I concentrations apply for the sample location.

  - **High biased samples may be used only to score an observed release only at Level II contamination:** Under certain circumstances, sample data that are biased high may be used to score an observed release under the HRS. However, these data must be used only to establish Level II contamination and not hazardous waste quantity Tier A.

Observed Release Sampling Strategies

Criterion	SI Data Collection
Objective	To demonstrate a release based on HRS documentation requirements
Data quality	Rigorous (DUC-I)
Background samples	2 background to 3 release samples Published data are generally not used
Attribution samples	Those necessary to attribute portion of a release to the site being evaluated
QA/QC samples	Those needed to obtain precise and accurate data within the scope of the SI

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Summary

- **Primary objectives of source sampling are:**
  - » Identify sources and areas of observed contamination
  - » Identify and attribute hazardous substances to a source (and site)
- **To demonstrate a release by chemical analysis for a pathway, samples must show contamination significantly above background and be attributed to the site**

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Questions?

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Next Webinar – Monday, July 28, 2014

- **Module 8: SI Sampling Strategies for Groundwater and Surface Water will take place on Monday, July 28 from 1 p.m. to 3 p.m. Eastern**

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