Chapter 2 Presampling Activities

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- Classifying Areas of the Site
- Developing a Conceptual Site Model

2.0 Introduction

The principal objective of presampling is to evaluate available information to determine the presence of contamination at a site and its potential to result in increased risks to human health and the environment. Presampling activities also can focus resources in an effective and efficient manner to achieve the desired closure objective. Presampling is the identification, collection and review of available site information. The assessment of this information will direct the use of default or nondefault applications of RISC.

2.1 Applicability and Scope

If presampling identifies potential or actual increased risks from site contamination, the information obtained during the presampling phase may help determine what further action is necessary at the site. As the first stage of a RISC investigation, presampling is a relatively quick and low cost approach to obtaining information about the site and its surrounding area. Presampling activities should emphasize the comprehensive identification of chemical releases and relevant information on potential human and environment exposure pathways. Such information can usually be obtained by reviewing and compiling existing site-related information.

The following activities are typically included as part of the presampling effort:

- Gathering and reviewing existing site information
- Identifying acute hazards
- Identifying preliminary chemicals of concern
- Identifying potentially affected media
- Identifying potential exposure pathways
- Identifying potential susceptible areas
- Determining present and future land use
- Classifying areas of the site
- Developing a conceptual site model

Information obtained during presampling can then be compared to the RISC default exceptions (see Section 1.3). This comparison of site attributes and conditions with RISC default exceptions will help determine the steps necessary to achieve closure.

2.2 Gathering and Reviewing Existing Site Information

Gathering and reviewing site information typically involves an extensive record review, a site visit (sometimes referred to as a preliminary visual site inspection), and a summary and tabulation of all existing data related to site contamination. Gathering comprehensive site information before collecting any samples usually saves time and money by producing better initial site sampling plans.

Site information may be available from a variety of sources, including the remedial investigation and assessment reports associated with operations at the site (see the appropriate chapter of the User's Guide), regulatory agency files, operating records, or other documents. If the information available from these resources is not sufficient, a Phase I Environmental Site Assessment (ESA) in accordance with American Society of Testing and Materials (ASTM) guidelines (E1527-94 and E1528-93) may need to be performed. .

2.2.1 Record Review

This investigative procedure involves collecting and reviewing readily available information regarding the site and its surroundings. The following sources of information should be reviewed as applicable:

- Site records pertaining to operational processes and chemical and waste storage and disposal practices
- Site information available in regulatory agency databases, including information from the U.S. Environmental Protection Agency (EPA) Region 5, the Indiana Department of Environmental Management (IDEM), city and county health departments
- Historic aerial photographs, satellite imagery, and geographic information system (GIS) maps
- Geological site information presented on the U.S. Soil Conservation Service surface soil maps, U.S. Geological Service (USGS) subsoil bedrock maps, USGS topographical maps, and state soil surveys

- Current and historic demographic and land use information, such as that provided by Sanborn fire insurance maps
- Information on site utilities, storm and sanitary sewers, wastewater treatment plants and disposal/discharge areas, and electrical transformers
- Regional ground water and surface water records
- Interviews with current or past employees, local fire and police departments, county health officials, and site neighbors

The record review should include information on local and regional conditions relevant to COC migration and potential receptors, such as the following:

- Regional geology and hydrogeology
- Location of designated Wellhead Protection Areas for public water supplies
- Location of residential, municipal, and commercial drinking water wells
- Surface water systems near the site
- Background soil types
- Types of vegetation on site and in nearby areas
- Rare, threatened or endangered species, sensitive environmental areas, or critical habitats at the site vicinity

2.2.2 Site Visit

The purpose of a site visit is to obtain information based on visual observations of the site. Particular attention should be paid to the physical features of the site (such as the dimensions and locations of buildings, potential contamination sources, and former or current operational or disposal areas). The site visit should focus on identifying potential environmental impacts on the surrounding area and collecting any additional information to assist in the presampling evaluation of the site. Observations from the site visit should be recorded in a logbook for later compilation with any investigative field data collected.

The site visit should include observations that will help answer the following questions:

- Are oils, chemicals or wastes currently stored on the property?
- Is there visible evidence of spills or leaks?
- What conditions exist in areas and pathways where materials were treated, stored, transported, or disposed?
- What conditions exist at or near facility doors, bay exits, shipping docks, and pumping station areas?
- What underground piping and USTs are on the site?
- What is the surrounding land use – residential, recreational, agricultural, commercial, or industrial?
- Are ecological or surface water impacts from site releases evident or possible?
- What vegetation and habitat types are present or near the site?
- Is there evidence of unexplained stressed or dead vegetation or wildlife?

2.3 Identifying Acute Hazards

The preliminary site inspection should identify any acute hazards that may pose an immediate or imminent threat to human health or the environment. *If any acute hazards are identified, the risk of the hazard must be mitigated before resuming the RISC evaluation.* Examples of acute hazards include the following (see Figure 2-1):

- Presence of free product
- Recent or ongoing spills (regulated by Indiana spill rule 327 IAC 2-6.1)
- Corrosive, toxic or flammable vapors
- Acutely harmful human health exposures

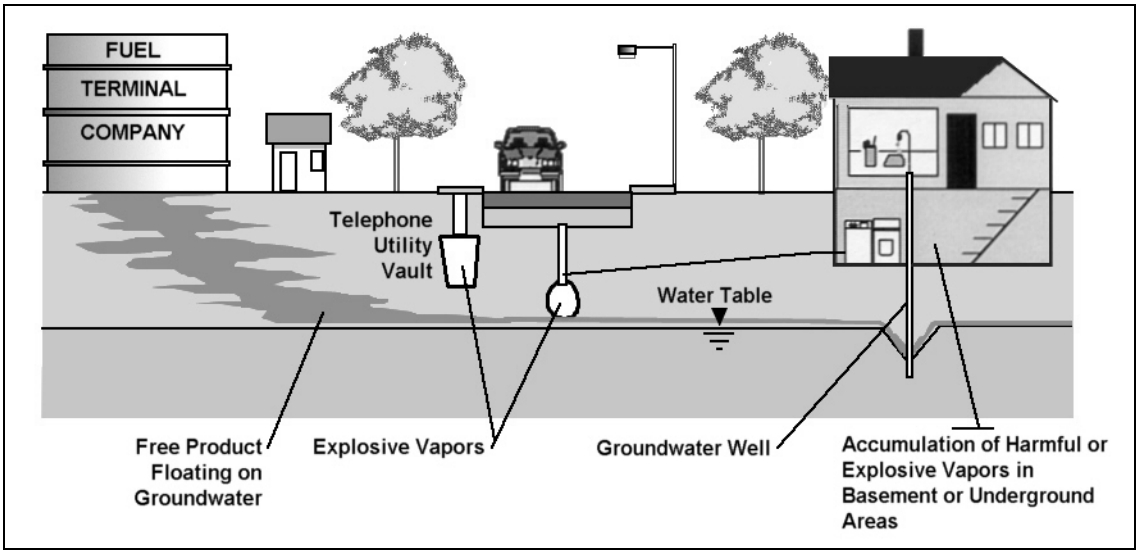


Figure 2-1. Acute Hazards

2.4 Identifying Preliminary Chemicals of Concern

Identifying chemicals of concern (COCs) at a site begins during the presampling investigation and continues throughout the site evaluation process. This COC list includes any regulated compound that has been used, treated, stored, or disposed of on site or any compound that may result from fate and transport mechanisms acting on the regulated compounds. An IDEM program may require a specific "COC scan" if site-specific operating information is incomplete or unreliable. In such cases, the COC list is developed based on the comprehensive program list. For Subtitle C sites, this comprehensive list may include the analyte list from Appendix VIII (Code of Federal Regulations [CFR], Title 40, Part 261) and Appendix IX (CFR, Title 40, Part 264).

A less comprehensive list, such as CERCLA's Target Compound List (TCL) or Target Analyte List (TAL) may be appropriate for sites if:

- the potential COCs for the site are included within the list, and
- the detection limits are appropriate.

EPA Contract Laboratory Program (CLP) analytical methods may utilize detection limits that are too high to quantify COC concentrations at the RISC closure levels.

As the investigation proceeds from presampling to screening and/or a determination of the nature and extent of contamination, the list of COCs may be modified. It may be necessary to reduce or expand the list of COCs as additional site information is acquired. Nevertheless, the list should be re-evaluated at each stage in the process.

The User Guide identifies COCs and their applicability under various programs, as summarized in the box below.

Program	**User's Guide**
RCRA Closure and Corrective Action, Subtitle C	Chapter 2
Leaking Underground Storage Tank (LUST) Program	Chapter 3
Voluntary Remediation Program (VRP)	Chapter 4
State Clean-Up Program (SCP)	Chapter 5

2.5 Identifying Potentially Affected Media

Figure 2-2 shows the six types of environmental media and how they may be affected by contamination: (1) air, (2) surface soil, (3) subsurface soil, (4) ground water, (5) surface water, and (6) sediment.

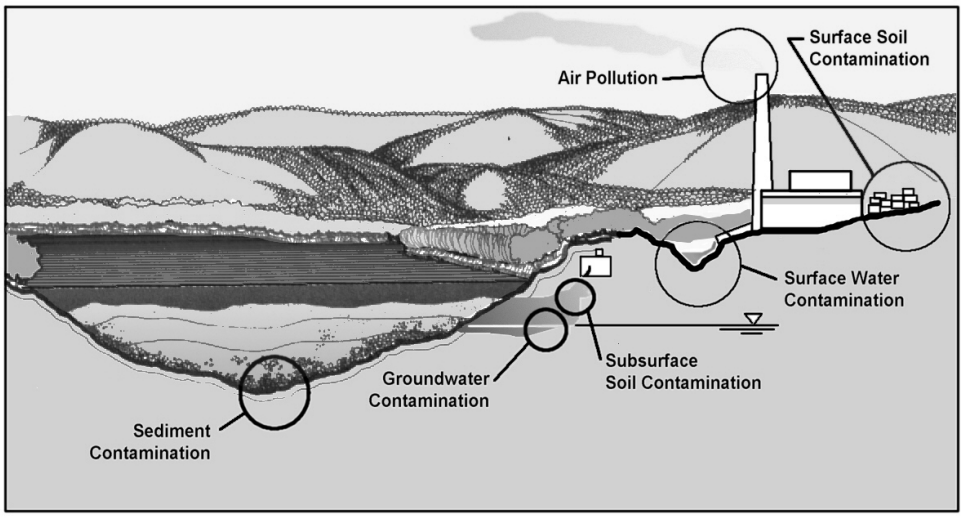


Figure 2-2. Potentially Affected Environmental Media

An IDEM program may require that all potential human or ecological exposures associated with each of the six media must be identified and assessed. RISC establishes default closure levels for surface soil, subsurface soil, and ground water. A nondefault closure process and a risk assessment are required if air, surface water, or sediments are contaminated.

2.6 Identifying Potential Exposure Pathways

RISC provides guidance for the default evaluation of contamination present in soil and ground water and the exposure pathways and routes by which an organism may be affected. To calculate closure levels, some assumptions must be made regarding exposure pathways and COC migration routes. Contaminated areas must be evaluated in a manner consistent with closure levels because the closure levels identify contaminant concentrations acceptable for human exposure.

Table 2-1 lists default exposure pathways by media and land use (see Figure 2-3).

Table 2-1. Default Exposure Pathways Listed by Media and Land Use

Exposure Pathway	Residential Land Use	Commercial or Industrial Land Use	Construction Worker Exposure
Direct Soil Contact	• Skin contact • Ingestion of soil • Inhalation of soil vapors and particulates		
Soil Leaching to Ground Water	• Ingestion of ground water contaminated by soil leachate		• Not evaluated
Ground Water	• Ingestion of ground water • Inhalation of vapors released from ground water	• Ingestion of ground water	• Not evaluated

Exposure pathways potentially associated with the particular COCs, media, and property uses at a site should be considered from the earliest stages of the RISC process.

Eliminating an **exposure pathway** from consideration requires professional judgment and a sound rational approach. All information describing COCs, known concentrations, migration pathways, and potential human and environmental receptors should be clearly understood before deciding to eliminate an exposure pathway. Such information should accompany the rationale for eliminating the pathway.

If exposure to a particular pathway is considered possible, but one or more of the **exposure routes** associated with that pathway is considered inapplicable, a nondefault assessment would be used to

eliminate that route from the exposure calculations (see Chapter 7).

2.7 Identifying Potential Susceptible Areas

RISC defines "susceptible areas" as areas where humans or ecologically sensitive species are more likely to be affected by contamination. RISC establishes three types of susceptible areas:

- Geologically susceptible areas
- Ecologically susceptible areas
- Wellhead Protection Areas

Each of these is discussed and defined in Chapter 5. Persons performing a site inspection and records review should be familiar with these classifications and should identify whether contamination at the site could potentially affect any of these types of areas.

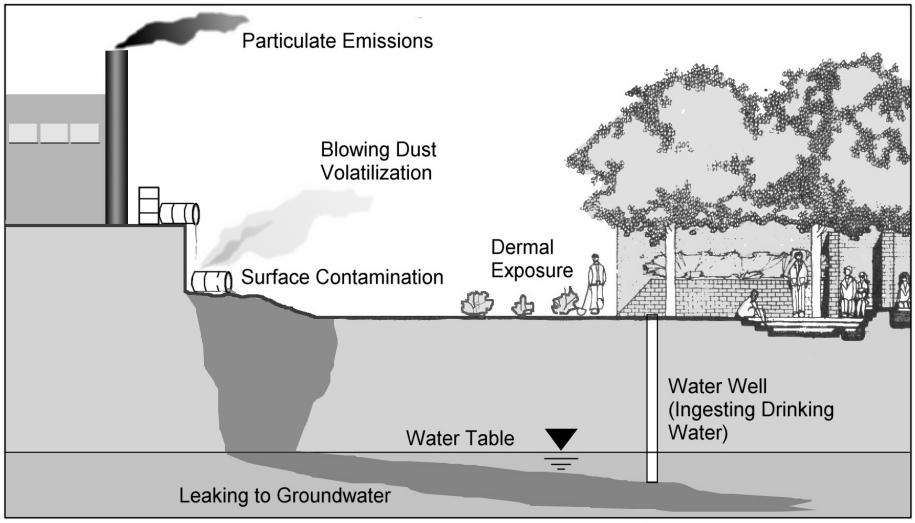


Figure 2-3. Examples of Exposure Pathways

2.8 Determining Present and Future Land Use

Present and future land use of the site must be determined because exposure assumptions are different for residential and commercial or industrial land uses. Current or future construction activities should also be determined for the site because the site-specific default closure levels apply to construction worker exposure scenarios.

The current land use should be apparent during the site inspection. The definitions in the box below should help determine whether the current land use is classified as commercial, industrial, or residential.

Commercial or Industrial Land Use	Residential Land Use
■ Defined as property where activities are being conducted that have the following primary Standard Industrial Classification (SIC) major group codes (SIC codes are defined and listed in Appendix 4): - 07 to 67 (except 4941) - 72 to 97 (except 8051, 8059, 8062, 8063, 8069, 8211, 8221, 8222, 8351, 8361, 8661,8811, and 9223) ■ Commercial or industrial land use includes all of the adjacent blocks and lots controlled by the same owner or operator that are used in conjunction with the business or that are vacant land not intended for future human habitation. For leased properties, commercial or industrial property includes the leasehold and any external tank, surface impoundment, septic system, or any other structure, vessel, contrivance, or unit that provides or is used to manage contaminants to or from the leasehold.	■ Includes any property used as a place of residence. Property defined as commercial or industrial may include residential activities or areas. For example, a day care center (SIC 8351) meets the definition of residential property because typical residential activities occur there. At a minimum, residential closure criteria must be applied to the residential portion of the property. ■ Includes land used for agriculture

Probable future uses of the site and adjacent property may influence the type of risk assessment and the remedy ultimately selected for the site. EPA guidance on how to consider future land use in the remedy selection process is provided in the memorandum, *Land Use in the CERCLA Remedy Selection Process* (OSWER Directive No. 9355.7-04). The memorandum (see Appendix 7) identifies the following activities as valuable in determining future land use:

- Communicating with site owners, local planners, officials, developers, and members of the community to evaluate the possible future uses of a given site. If no definite plan exists for future use, the most likely future use must be determined.

- Developing or modifying remedial objectives to reflect likely or known future land uses

- Evaluating the cost-effectiveness and practicability of remedial objectives based on site data and modifying potential future land uses, if necessary

The key step in determining future land use is to develop accurate assumptions about the long-term future of a site. If accurate assumptions can be made, remedial objectives can establish criteria that are only as restrictive as required for the intended land use. This approach allows site characterization and remedy selection to focus on practical and cost-effective remedial alternatives, rather than requiring cleanup to residential closure levels at all sites.

An essential relationship exists between identifying remedial objectives, characterizing the site, and selecting the appropriate remedy. Data from site studies may indicate that remediating a site to a certain concentration is neither practical nor cost-effective. This situation may require that the proposed land use and remedial objectives be reevaluated based on revised land use assumptions. As a result of this process, the future land use of all or part of a site may be more restricted than originally intended. When land use is restricted or when other activity or exposure restrictions are put in place, RISC requires that an Institutional Control be recorded on the property deed (see Section 6.2 and Appendix 5).

2.9 Classifying Areas of the Site

Based on the information gathered during the presampling investigation, the site may be subdivided into any of the following three classifications:

- Areas unlikely to be contaminated
- Areas known to be contaminated
- Areas that may be contaminated

Areas unlikely to be contaminated are portions of a site where there is no reason to suspect contamination. Available historical site data is used to make this determination. Closure documentation cannot include any portion of a site that has been classified in this category unless analytical information is available to verify that each area is unaffected by the targeted COCs.

Areas known to be contaminated are areas where COC releases are known to have occurred. Previous sampling data, records that document site contamination, visibly stained soils, soil odors, and other investigative data that indicate contamination can be used as a basis for this classification.

Areas that may be contaminated are areas that cannot be classified in either of the other two categories. Significant data gaps or ambiguous or inconclusive information exists for these areas.

Table 2-2 summarizes the information used to classify surface soils.

Table 2-2. Classifying Areas of the Site Prior to Surface Soil Sampling

Category	Definition	Basis for Classification
Unlikely to be Contaminated	An area where there is no reason to suspect contamination	Historical site data that is reasonably complete and accurate
Known to be Contaminated	An area where releases are known to have occurred	Previous sampling data, records that document contamination, visibly stained soils, soil odors, or other investigation data that indicate contamination is present
May be Contaminated	An area that cannot be classified in either of the other two categories	Ambiguous or incomplete information or a lack of data

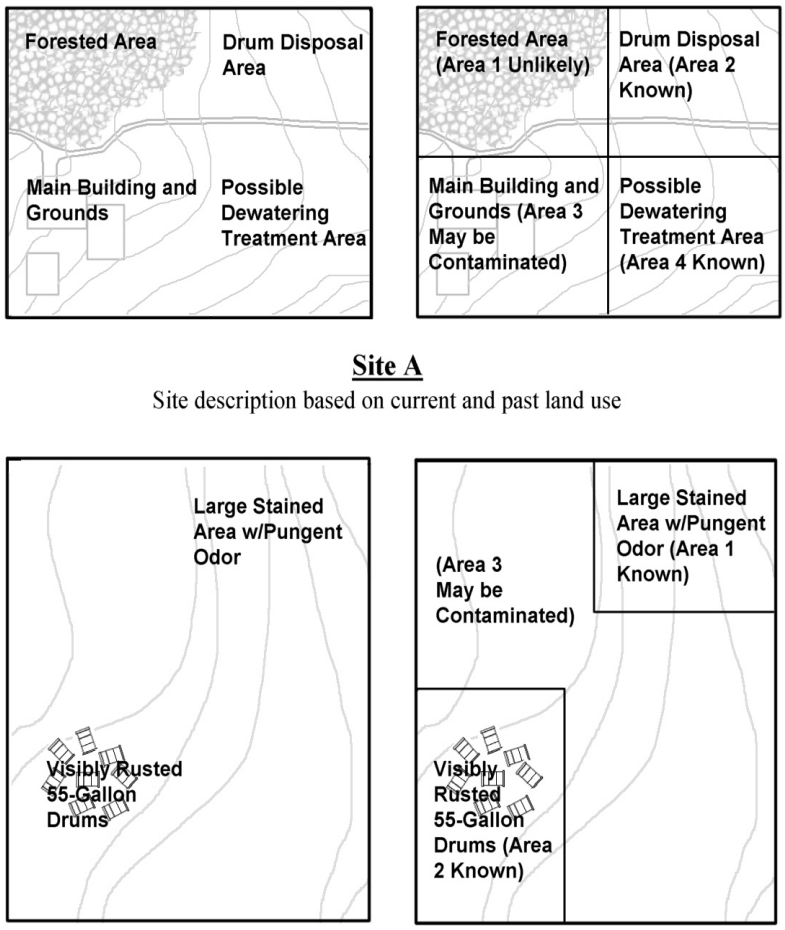
The classification of a site typically begins with surface soil classification because surface soil contamination may indicate contamination in subsurface soil and ground water. However, surface soil contamination is not the only indicator of subsurface contamination; all relevant information should be used to appropriately evaluate potential subsurface soil and ground water contamination.

The Default Closure Table assumes a source area of no more than ½ acre to ensure the statistical integrity of sampling results. If an area of surface soil contamination is larger than ½ acre, it may be characterized using different methodology, such as the "large site" methods detailed in Section 7.5.1.

2.10 Developing a Conceptual Site Model

Figure 2-4 (see 2-12) presents an example of a preliminary conceptual site model (CSM). The CSM is a map or diagram of the site that summarizes all of the information currently available concerning contaminated areas, contaminated media, types of contamination, and potential exposure pathways and receptors at the site. It combines written information and a map or diagram of the site. It may be depicted as a top-view site plan showing how source areas and potential human and ecological receptors are positioned relative to existing site features. Cross-sectional drawings may also be included

Figure 2-4. Conceptual Site Model Diagram



to show site geology and hydrology, as well as any available data on COC concentrations below the surface.

To the extent possible, the CSM should incorporate all the relevant information gathered during presampling activities. The CSM should include preliminary boundaries showing areas that are not likely to be contaminated, known to be contaminated, and may be contaminated (see Table 2-2). This exercise presents available information in a format that can be used for the rest of the RISC process, from the site screening evaluation through the determination of the extent of contamination and a possible nondefault assessment. The CSM begins to organize information in terms of the type and degree of risk that

may be posed to human health or the environment. The development of the CSM is an iterative and interactive process that can incorporate new information as it is available. The framework for developing a CSM is part of the RISC software available on the IDEM website: www.state.in.us/dem/olq/risc.