

## APPENDIX F

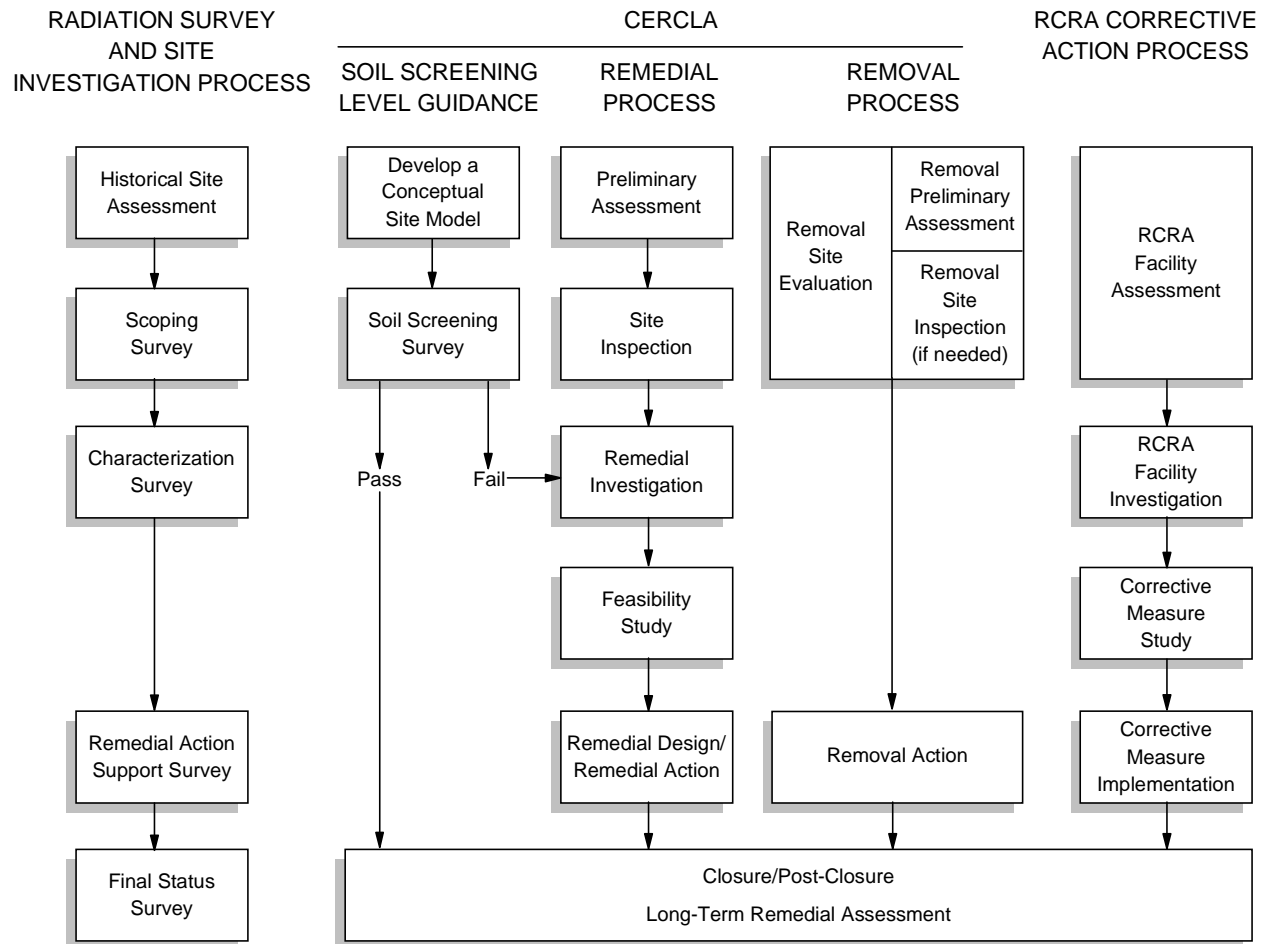
### THE RELATIONSHIP BETWEEN THE RADIATION SURVEY AND SITE INVESTIGATION PROCESS, THE CERCLA REMEDIAL OR REMOVAL PROCESS, AND THE RCRA CORRECTIVE ACTION PROCESS

This appendix presents a discussion of the relationship between the Radiation Survey and Site Investigation Process, the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) Remedial or Removal Process, and the Resource Conservation and Recovery Act (RCRA) Corrective Action Process. Each of these processes has been designed to incorporate survey planning using the Data Quality Objectives (DQO) Process and data interpretation using Data Quality Assessment (DQA) using a series of surveys to accomplish the project objectives. At this basic level, MARSSIM is consistent with the other processes.

Figure F.1 illustrates the relationship between the major steps in each of these processes. As shown in Figure F.1, the scope of MARSSIM (Section 1.1) results in steps in the CERCLA Remedial or Removal Process and the RCRA Process that are not directly addressed by MARSSIM (*e.g.*, Feasibility Study or Corrective Measure Study). MARSSIM's focus on the demonstration of compliance for sites with residual radioactivity using a final status survey integrates with the remedial design/remedial action (RD/RA) step of the CERCLA Remedial Process described in Sec. 300.435(b)(1) of Part 40 of the Code of Federal Regulations. However, MARSSIM's focus is not directly addressed by the major steps of the CERCLA Removal Process or the RCRA Corrective Action Process.

Much of the guidance presented in MARSSIM for designing surveys and assessing the survey results is taken directly from the corresponding CERCLA or RCRA guidance. MARSSIM users familiar with the Superfund Preliminary Assessment guidance (EPA 1991f) will recognize the guidance provided on performing the Historical Site Assessment (Chapter 3) for identifying potentially contaminated soil, water, or sediment. In addition, MARSSIM provides guidance for identifying potentially contaminated structures which is not covered in the original CERCLA guidance. The survey designs and statistical tests for relatively uniform distributions of residual radioactivity discussed in MARSSIM are also discussed in CERCLA guidance (EPA 1989a, EPA 1994b). However, MARSSIM includes scanning for radioactive materials which isn't discussed in the more general CERCLA guidance that doesn't specifically address radionuclides. MARSSIM is not designed to replace or conflict with existing CERCLA or RCRA guidance, it is designed to provide supplemental guidance for specific applications of the CERCLA Remedial or Removal Process or the RCRA Corrective Action Process.

Appendix F



**Figure F.1 Comparison of the Radiation Survey and Site Investigation Process with the CERCLA Superfund Process and the RCRA Corrective Action Process**

Table F.1 lists the major steps in MARSSIM and other CERCLA and RCRA processes and describes the objectives of each step. This table provides a direct comparison of these processes, and it shows the correlation between the processes. This correlation is the result of carefully integrating CERCLA and RCRA guidance with guidance from other agencies participating in the development of MARSSIM to produce a multi-agency consensus document.

The first step in the CERCLA Remedial Process is the preliminary assessment to obtain existing information about the site and determine if there is a threat to human health and the environment. The next step is the site inspection which includes risk prioritization using the Hazard Ranking System—sites with a score above a certain level are put on the National Priorities List (NPL). Following the site assessment, the remedial investigation (RI) is performed to characterize the

extent and type of release, and to evaluate the risk to human health and the environment. A Sampling and Analysis Plan is constructed as part of the remedial investigation which consists of a Quality Assurance Project Plan, a Field Sampling Plan, a Health and Safety Plan, and a Community Relations Plan. The site feasibility study (FS) is the next step in the CERCLA Remedial Process (although the RI and FS are intended to be done concurrently) which involves an evaluation of alternative remedial actions. For sites listed on the NPL the next action would be to obtain a Record of Decision (ROD) which provides the remedy selected for the site. The remedial design/remedial action (RD/RA), which includes the development of the selected remedy and its implementation, follows development of the ROD. After the RD/RA activities there is a period of operation and maintenance when the site is given a long term remedial assessment followed by closure/post-closure of the site (or removal from the NPL). A removal action may occur at any stage of the CERCLA Remedial Process.

The CERCLA Removal Process is similar to the Remedial Process for the first few steps. 40 CFR § 300.400 (NCP Subpart E—Hazardous Substance Response) establishes methods and criteria for determining the extent of response when there is a release into the environment of a hazardous substance or any pollutant or contaminant that may present an imminent and substantial danger to the public health or welfare of the United States. The first step in the Removal Process is a removal site evaluation which includes a removal preliminary assessment and, if warranted, a removal site inspection. A removal preliminary assessment may be based on available information and should include an evaluation of the factors necessary to make the determination of whether a removal is necessary. A removal site inspection is performed, if warranted, in a similar manner as in the CERCLA Remedial Process. If environmental samples are to be collected, a sampling and analysis plan should be developed which consists of a field sampling plan and a quality assurance project plan. Post-removal site controls are those activities necessary to sustain the effectiveness and integrity of the removal action. In the case of all CERCLA removal actions taken pursuant to § 300.415, a designated spokesperson will inform the community of actions taken, respond to inquiries, and provide information concerning the release—this may include a formal community relations plan specifying the community relations activities expected during the removal response.

Comparisons have been made between the CERCLA Remedial Process and CERCLA Removal Process (EPA, 1993c). Table F.2 presents the data elements that are common to both programs and those that are generally common to one program rather than the other. Table F.3 shows the emphasis placed on sampling for remedial site assessment versus removal site assessment.

Another guidance document that can be compared to MARSSIM is the Soil Screening Guidance (EPA 1996b, EPA 1996c), which facilitates removing sites from consideration early in the CERCLA Process. Although not written to specifically address radioactive contaminants, the Soil Screening Guidance leads the user from the initial site conceptualization and planning stages through data collection and evaluation to the final testing step. MARSSIM also leads the user through similar planning, evaluation, and testing stages, but the guidance focuses on the final compliance demonstration step.

## Appendix F

The Soil Screening Guidance provides a way to calculate risk-based, site-specific, soil screening levels (SSLs) for contaminants in soil. SSLs can be used as preliminary remediation goals (PRGs) if the conditions found at a specific site are similar to the conditions assumed in calculating the SSLs.

Both the Soil Screening Guidance and MARSSIM provide examples of acceptable sampling and analysis plans (SAP) for site contaminants. The Soil Screening Guidance recommended default survey design for surface soils is very specific—recommendations for the grid size for sampling, the number of soil samples collected from each subarea and composited, and data analysis and interpretation techniques are described in detail. MARSSIM provides guidance that is consistent and compatible with the Soil Screening Guidance with respect to the approaches, framework, tools, and overall objectives.

SSLs calculated using the CERCLA Soil Screening Guidance could also be used for RCRA Corrective Action sites as action levels. The RCRA Corrective Action program views action levels as generally fulfilling the same purpose as soil screening levels. Table F.1 shows other similarities between the RCRA Corrective Action Process, CERCLA Remedial or Removal Process, and MARSSIM.

The similarities between the CERCLA Remedial Process and Removal Process have led to a number of streamlined approaches to expedite site cleanups by reducing sampling and preventing duplication of effort. One example of these approaches is the Superfund Accelerated Cleanup Model (SACM) where the concept of integrating the removal and remedial site assessment was introduced (EPA, 1993c). A memorandum from EPA, DOE, and DOD (August 22, 1994) discusses guidance on accelerating and developing streamlined approaches for the cleanup of hazardous waste at federal facility sites.

Table F.1 Program Comparison

MARSSIM	CERCLA REMEDIAL PROCESS	CERCLA REMOVAL PROCESS	RCRA
<p><u>Historical Site Assessment</u></p> <p>Performed to gather existing information about radiation sites. Designed to distinguish between sites that possess no potential for residual radioactivity and those that require further investigation.</p> <p>Performed in three stages: 1) Site Identification 2) Preliminary Investigation 3) Site Reconnaissance</p>	<p><u>Preliminary Assessment</u></p> <p>Performed to gather existing information about the site and surrounding area. The emphasis is on obtaining comprehensive information on people and resources that might be threatened by a release from the site.</p> <p>Designed to distinguish between sites that pose little or no threat to human health and the environment and sites that require further investigation.</p>	<p><u>Preliminary Assessment</u></p> <p>Performed in a similar manner as in the CERCLA Remedial Process. The removal preliminary assessment may be based on available information.</p> <p>A removal preliminary assessment may include an identification of the source, nature and magnitude of the release, evaluation by ATSDR of the threat to public health, and evaluation of factors necessary to make the determination of whether a removal is necessary.</p>	<p><u>Facility Assessment</u></p> <p>Performed to identify and gather information at RCRA facilities, make preliminary determinations regarding releases of concern and identify the need for further actions and interim measures at the facility.</p> <p>Performed in three stages: 1) Preliminary Review 2) Visual Site Inspection 3) Sampling Visit (if necessary)</p> <p>The RCRA Facility Assessment accomplishes the same objectives as the Preliminary Assessment and Site Inspection under the Superfund Process.</p>
<p><u>Scoping Survey</u></p> <p>Performed to provide a preliminary assessment of the radiological hazards of the site. Supports classification of all or part of the site as Class 3 areas and identifying non-impacted areas of the site.</p> <p>Scoping surveys provide data to complete the site prioritization scoring process for CERCLA or RCRA sites.</p>	<p><u>Site Inspection</u></p> <p>Performed to identify the substances present, determine whether hazardous substances are being released to the environment, and determine whether hazardous substances have impacted specific targets.</p> <p>Designed to gather information on identified sites in order to complete the Hazard Ranking System to determine whether removal actions or further investigations are necessary.</p>	<p><u>Site Inspection</u></p> <p>Performed in a similar manner as in the Remedial Process. A removal site inspection may be performed as part of the removal site evaluation (§ 300.410) if warranted. A removal site inspection may include a perimeter or on-site inspection.</p> <p>If the removal site evaluation shows that removal is not required, but that remedial action under § 300.430 may be necessary, a remedial site evaluation pursuant to § 300.420 would be initiated.</p>	<p>The RCRA Facility Assessment often forms the basis for the first conceptual model of the site.</p>

Table F.1 Program Comparison

MARSSIM	CERCLA REMEDIAL PROCESS	CERCLA REMOVAL PROCESS	RCRA
<p><u>Characterization Survey</u></p> <p>Performed to support planning for final status surveys to demonstrate compliance with a dose- or risk-based regulation. Objectives include determining the nature and extent of contamination at the site, as well as meeting the requirements of RI/FS and FI/CMS.</p>	<p><u>Remedial Investigation</u></p> <p>Performed to characterize the extent and type of release of contaminants. The RI is the mechanism for collecting data to characterize site conditions, determine the nature of the waste, assess risk to human health and the environment, and conduct treatability testing as necessary to evaluate the potential performance and cost of the treatment technologies that are being considered.</p> <p>EPA guidance presents a combined RI/FS Model Statement of Work. The RI is generally performed in seven tasks:</p> <ol style="list-style-type: none"> <li>1) project planning (scoping): <ul style="list-style-type: none"> <li>- summary of site location</li> <li>- history and nature of problem</li> <li>- history of regulatory and response actions</li> <li>- preliminary site boundary</li> <li>- development of site operations plans</li> </ul> </li> <li>2) field investigations</li> <li>3) sample/analysis verification</li> <li>4) data evaluation</li> <li>5) assessment of risks</li> <li>6) treatability study/pilot testing</li> <li>7) RI reporting</li> </ol>	<p><u>Removal Action</u></p> <p>Performed once the decision has been made to conduct a removal action at the site (under § 300.415). Whenever a planning period of at least six months exists before on-site activities must be initiated, an engineering evaluation/cost analysis or its equivalent is conducted.</p> <p>If environmental samples are to be collected, a sampling and analysis plan is developed to provide a process for obtaining data of sufficient quality and quantity to satisfy data needs. The sampling and analysis plan consists of:</p> <ol style="list-style-type: none"> <li>1) The field sampling plan, which describes the number, type, and location of samples and the type of analysis</li> <li>2) The quality assurance project plan, which describes policy, organization, and functional activities and the data quality objectives and measures necessary to achieve adequate data for use in removal actions.</li> </ol>	<p><u>Facility Investigation</u></p> <p>Defines the presence, magnitude, extent, direction, and rate of movement of any hazardous wastes and hazardous constituents within and beyond the facility boundary.</p> <p>The scope is to :</p> <ol style="list-style-type: none"> <li>1) characterize the potential pathways of contaminant migration</li> <li>2) characterize the source(s) of contamination</li> <li>3) define the degree and extent of contamination</li> <li>4) identify actual or potential receptors</li> <li>5) support the development of alternatives from which a corrective measure will be selected by the EPA</li> </ol> <p>The Facility Investigation is performed in seven tasks:</p> <ol style="list-style-type: none"> <li>1) description of current conditions</li> <li>2) identification of preliminary remedial measures technologies</li> <li>3) FI work plan requirements <ul style="list-style-type: none"> <li>- project management plan</li> <li>- data collection QAPP</li> <li>- data management plan</li> <li>- health and safety plan</li> <li>- community relations plan</li> </ul> </li> <li>4) facility investigation</li> <li>5) investigation analysis</li> <li>6) laboratory and bench-scale studies</li> <li>7) reports</li> </ol>

**Table F.1 Program Comparison**

<b>MARSSIM</b>	<b>CERCLA REMEDIAL PROCESS</b>	<b>CERCLA REMOVAL PROCESS</b>	<b>RCRA</b>
<p><u>DCGLs</u> Residual levels of radioactive material that correspond to allowable radiation dose standards are calculated (derived concentration guideline levels) and provided to the user. The survey unit is then evaluated against this radionuclide-specific DCGL.</p> <p>The DCGLs in this manual are for structure surfaces and soil contamination. MARSSIM does not provide equations or guidance for calculating DCGLs.</p>	<p><u>PRGs</u> Preliminary remediation goals are developed early in the RI/FS process. PRGs may then be used as the basis for final cleanup levels based on the nine criteria in the National Contingency Plan. Soil Screening Levels (SSLs) can be used as PRGs provided conditions at a specific site are similar to those assumed in calculating the SSLs.</p> <p>SSLs are derived with exposure assumptions for suburban residential land use only. SSLs are based on a <math>10^{-6}</math> risk for carcinogens, a hazard index quotient of 1 for noncarcinogens (child ingestion assumptions), or MCLGs, MCLs, or HBLs for the migration to groundwater. The User's Guide provides equations and guidance for calculating site-specific SSLs.</p>	<p><u>Removal Levels</u> The removal level is established by identification of applicable or relevant and appropriate requirements (ARARs), or by health assessments. Concern is for protection of human health and the environment from the immediate hazard of a release rather than a permanent remedy.</p>	<p><u>Action Levels</u> At certain facilities subject to RCRA corrective action, contamination will be present at concentrations (action levels) that may not justify further study or remediation. Action levels are health- or environmental-based concentrations derived using chemical-specific toxicity information and standardized exposure assumptions. The SSLs developed under CERCLA guidance can be used as action levels since the RCRA corrective action program currently views them as serving the same purpose.</p>

**Table F.1 Program Comparison**

<b>MARSSIM</b>	<b>CERCLA REMEDIAL PROCESS</b>	<b>CERCLA REMOVAL PROCESS</b>	<b>RCRA</b>
<p>No Direct Correlation</p> <p>(MARSSIM characterization and remedial action support surveys may provide data to the Feasibility Study or the Corrective Measures Study)</p>	<p><u>Feasibility Study</u></p> <p>The FS serves as the mechanism for the development, screening, and detailed evaluation of alternative remedial actions. As noted above, the RI and the FS are intended to be performed concurrently. However, the FS is generally considered to be composed of four general tasks.</p> <p>These tasks are:</p> <ol style="list-style-type: none"> <li>1) development and screening of remedial alternatives</li> <li>2) detailed analysis of alternatives</li> <li>3) community relations</li> <li>4) FS reporting</li> </ol>	<p>No Direct Correlation</p>	<p><u>Corrective Measures Study</u></p> <p>The purpose of the CMS is to identify , develop, and evaluate potentially applicable corrective measures and to recommend the corrective measures to be taken.</p> <p>The CMS is performed following an FI and consists of the following four tasks:</p> <ol style="list-style-type: none"> <li>1) identification and development of the corrective measures alternatives</li> <li>2) evaluation of the corrective measures alternatives</li> <li>3) justification and recommendations of the corrective measures alternatives</li> <li>4) reports</li> </ol>



Table F.1 Program Comparison

MARSSIM	CERCLA REMEDIAL PROCESS	CERCLA REMOVAL PROCESS	RCRA
<p><u>Remedial Action Support Survey</u></p> <p>Performed to support remediation activities and determine when a site or survey unit is ready for the final status survey. These surveys monitor the effectiveness of decontamination efforts in reducing residual radioactivity to acceptable levels.</p> <p>Remedial action support surveys do not include routine operational surveys conducted to support remedial activities.</p>	<p><u>Remedial Design/Remedial Action</u></p> <p>This activity includes the development of the selected remedy and implementation of the remedy through construction. A period of operation and maintenance may follow the RD/RA activities.</p> <p>Generally, the RD/RA includes:</p> <ol style="list-style-type: none"> <li>1) plans and specifications <ul style="list-style-type: none"> <li>- preliminary design</li> <li>- intermediate design</li> <li>- prefinal/final design</li> <li>- estimated cost</li> <li>- correlation of plans and specifications</li> <li>- selection of appropriate RCRA facilities</li> <li>- compliance with requirements of other environmental laws</li> <li>- equipment startup and operator training</li> </ul> </li> <li>2) additional studies</li> <li>3) operation and maintenance plan</li> <li>4) QAPP</li> <li>5) site safety plan</li> </ol>	<p>No Direct Correlation</p>	<p><u>Corrective Measures Implementation</u></p> <p>The purpose of the CMI is to design, construct, operate, maintain, and monitor the performance of the corrective measures selected in the CMS.</p> <p>The CMI consists of four activities:</p> <ol style="list-style-type: none"> <li>1) Corrective Measure Implementation Program Plan</li> <li>2) corrective measure design <ul style="list-style-type: none"> <li>- design plans and specifications</li> <li>- operation and maintenance plan</li> <li>- cost estimate</li> <li>- schedule</li> <li>- construction QA objectives</li> <li>- health and safety plan</li> <li>- design phases</li> </ul> </li> <li>3) corrective measures construction (includes a construction QA program)</li> <li>4) reporting</li> </ol>
<p><u>Final Status Survey</u></p> <p>Performed to demonstrate that residual radioactivity in each survey unit satisfies the release criterion.</p>	<p><u>Long Term Remedial Assessment</u>  Closure/Post-Closure  NPL De-Listing</p>	<p><u>Post-Removal Site Control</u></p> <p>Those activities that are necessary to sustain the integrity of a removal action following its conclusion.</p>	<p><u>Closure/Post-Closure</u></p>

**Table F.2 Data Elements for Site Visits<sup>a</sup>**

<b>Data Elements Common to Both Remedial and Removal Assessment</b>	<b>Generally Remedial Site Assessment Only</b>	<b>Generally Removal Assessment Only</b>
<ul style="list-style-type: none"> <li>-Current human exposure identification</li> <li>-Sources identification, including locations, sizes, volumes</li> <li>-Information on substances present</li> <li>-Labels on drums and containers</li> <li>-Containment evaluation</li> <li>-Evidence of releases (<i>e.g.</i>, stained soils)</li> <li>-Locations of wells on site and in immediate vicinity</li> <li>-Nearby wetlands identification</li> <li>-Nearby land uses</li> <li>-Distance measurements or estimates for wells, land uses (residences and schools), surface waters, and wetlands</li> <li>-Public accessibility</li> <li>-Blowing soils and air contaminants</li> <li>-Photodocumentation</li> <li>-Site sketch</li> </ul>	<ul style="list-style-type: none"> <li>-Perimeter survey</li> <li>-Number of people within 200 feet</li> <li>-Some sensitive environments</li> <li>-Review all pathways</li> </ul>	<ul style="list-style-type: none"> <li>-Petroleum releases</li> <li>-Fire and explosion threat</li> <li>-Urgency of need for response</li> <li>-Response and treatment alternatives evaluation</li> <li>-Greater emphasis on specific pathways (<i>e.g.</i>, direct contact)</li> <li>-Sampling</li> </ul>

<sup>a</sup>From EPA, 1993c**Table F.3 Comparison of Sampling Emphasis Between Remedial Site Assessment and Removal Assessment<sup>a</sup>**

<b>Remedial Site Assessment Emphasis</b>	<b>Removal Assessment Emphasis</b>
<ul style="list-style-type: none"> <li>-Attribution to the site</li> <li>-Background samples</li> <li>-Ground water samples</li> <li>-Grab samples from residential soils</li> <li>-Surface water sediment samples</li> <li>-HRS factors related to surface water sample locations</li> <li>-Fewer samples on average (10-30) than removal assessment</li> <li>-Strategic sampling for HRS</li> <li>-Contract Laboratory Program usage</li> <li>-Full screening organics and inorganics analyses</li> <li>-Definitive analyses</li> <li>-Documentation, including targets and receptors</li> <li>-Computing HRS scores</li> <li>-Standardized reports</li> </ul>	<ul style="list-style-type: none"> <li>-Sampling from containers</li> <li>-Physical characteristics of wastes</li> <li>-Treatability and other engineering concerns</li> <li>-On-site contaminated soils</li> <li>-Composite and grid sampling</li> <li>-Rapid turnaround on analytical services</li> <li>-Field/screening analyses</li> <li>-PRP-lead removal actions</li> <li>-Goal of characterizing site</li> <li>-Focus on NCP removal action criteria</li> </ul>

<sup>a</sup>From EPA, 1993c