STREAMLINED SITE CHARACTERIZATION APPROACH FOR EARLY ACTIONS: IMPACT ON RISK ASSESSMENT DATA REQUIREMENTS

BACKGROUND:	**The U.S. Environmental Protection Agency (EPA) has developed the Superfund Accelerated Cleanup Model (SACM) under the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) to promote increased efficiency and shorter response times in remediating contaminated sites. The SACM approach requires a prompt reduction of risk through removal actions or presumptive remedies. Under the Resource Conservation and Recovery Act (RCRA) corrective action program, EPA also has developed the Stabilization Initiative to reduce site risk, i.e., risk from solid waste management units (SWMUs) or Areas of Concern (AOCs), by early implementation of institutional control or interim measures. Since actions undertaken by CERCLA and RCRA are risk driven, risk assessments also need to be streamlined to support early response actions (Figure 1). The Streamlined Risk Evaluation (SRE) serves this purpose by assessing risk qualitatively; utilizing site-specific hazard and exposure information, incident reports, and health advisory data; and/or comparing available chemical data to published risk-based concern levels such as preliminary remediation goals (PRGs). A quantitative SRE, similar to a screening baseline risk assessment under RCRA and/or CERCLA, may be used to determine the need for further remedial action after an early action is completed. This Information Brief presents the concepts and data requirements for SREs and explains how the SRE may be used to support a baseline risk assessment (if required) to be performed in the CERCLA remedial or RCRA facility investigation project phase. Data needs for SREs should consider time and cost, data useability, and the potential of overestimating risk by the use of assumed data.**
STATUTES:	**CERCLA Section 104 (Response Authorities), Section 120 (Federal Facilities), and Section 121 (Cleanup Standards); RCRA Corrective Action Authorities, i.e., Sections 3004(u), 3004(v), 3013, 3005(c)(3), 3008(h) and 7003; and Section 6001 as amended by the Federal Facility Compliance Act (FFCA).**
REGULATIONS:	**40 CFR 300.430(d), 40 CFR 300.430(e); 40 CFR 264.101, 264 Subpart F, and 40 CFR 264 Subpart S proposed rule (55 FR 30798, July 27, 1990)**
REFERENCES:	**1. "Guidance on Implementation of the Superfund Accelerated Cleanup Model (SACM) under CERCLA and the NCP," OSWER Dir. 9203.1-03, EPA (7/92)** **2. "Presumptive Remedies: Policy and Procedures," OSWER Dir. 9355.0-47FS, EPA (9/93a)** **3. "Presumptive Remedies: Site Characterization and Technology Selection for CERCLA Sites with Volatile Organic Compounds in Soils," OSWER Dir. 9355.0-48FS, EPA (9/93b)** **4. "Presumptive Remedy for CERCLA Municipal Landfill Sites," OSWER Dir. 9355.0-49FS, EPA, (9/93c)** **5. "RCRA Corrective Action Stabilization Technologies Proceedings," EPA/625/R-92/014 (10/92)** **6. "Remedial Investigation/Feasibility Study (RI/FS) Process, Elements, and Techniques," Module 7 Streamlined Approach for Environmental Restoration (SAFER), DOE EH-94007658 (12/93)**

Why streamline site characterization?

The benefit of streamlining site characterization is that the process facilitates early actions. Based on lessons learned from over ten years of cleaning up Superfund sites, EPA has found that common remedial actions (presumptive remedies) often can be selected for certain types of sites (EPA 1993a, 1993b, and 1993c). For these site types, or sites where remedial actions are anticipated, characterization and feasibility studies may be streamlined to result in early actions, i.e., implementation of either interim or final remedial actions including the use of presumptive remedies.

Under SACM, presumptive remedies have been identified or are being considered for these site types: municipal landfills, wood treatment facilities, facilities with volatile organic compounds (VOCs) in groundwater, soil contaminated with VOCs, grain storage facilities, coal gasification plants, and sites contaminated with polychlorinated biphenyls (PCBs). Early actions are not limited to sites on the National Priorities List (NPL). EPA has been emphasizing the use of removal authority under CERCLA Section 104 to require potentially responsible parties to perform early actions even before the sites are listed on the NPL.

For hazardous waste treatment, storage and disposal facilities undergoing RCRA corrective action, EPA is also encouraging the facility owner/operator to conduct focused site characterizations and implement interim measures early in the site investigative phase. Early actions or interim

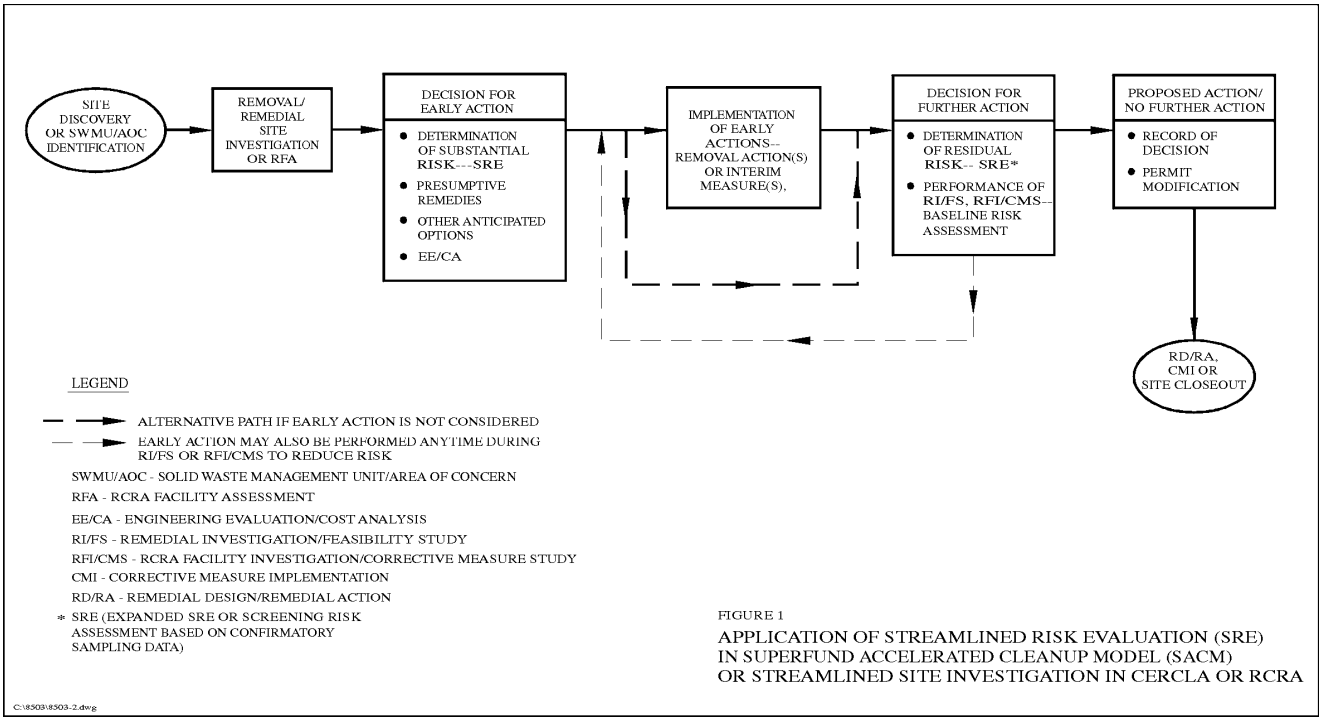

FIGURE 1
APPLICATION OF STREAMLINED RISK EVALUATION (SRE) IN SUPERFUND ACCELERATED CLEANUP MODEL (SACM) OR STREAMLINED SITE INVESTIGATION IN CERCLA OR RCRA

measures are selective in nature, i.e., they are selectively applied to presumptive remedy "candidate" sites and/or high priority sites or SWMUs which pose the most serious site risk or represent the principal threat posed by the facility.

DOE has developed the Streamlined Approach for Environmental Restoration (SAFER)(DOE 1993), which provides explicit recognition and management of uncertainty, and early selection or decision on the need for remedy or corrective measure. Under SAFER, data quality objectives (DQOs) are used to collect the appropriate data to support a site decision. As the remedial project progresses, previously and newly collected data are continuously being evaluated for uncertainty and adequacy to support making site decision or additional information needs. Implementation of SAFER streamlines the traditional site characterization approach, and allows early implementation of the remedy to address probable site conditions and monitoring of remedy performance to meet remedial action objectives (RAOs).

What are the objectives of an early action?

CERCLA and RCRA response actions are driven by the protection of human health and the environment (Figure 1). When a response action is determined to be necessary, early actions can provide a substantial risk reduction. Early actions are implemented with the following primary objectives:

- Rapid reduction of risks;
- Control of current or future release and migration of contaminants;
- Consistency of early action with the anticipated final remedy;
- Cost and time savings related to site characterization;
- Early return of the contaminated property to current or reasonably anticipated future uses; and
- Compliance with regulatory requirements and/or community's concern to result in stakeholders' acceptance.

Early actions provide the opportunity for the environmental project team members and the stakeholders to have an early agreement on the likely final remedies or anticipated site options. Therefore, the uncertainty with respect to site closeout or permit compliance is likely to be minimized through communications and consensus building among all parties in deciding the need for and/or types of early actions to be conducted.

What are examples of early actions or interim measures, and how do they streamline site characterization?

An early action can be taken to prevent the release and migration of contaminants. The following examples on early action illustrate the need for a streamlined site characterization approach which could also satisfy risk assessment data needs.

Example: To prevent release and migration of hazardous wastes or constituents from an uncontrolled landfill, a cover or cap of low permeability and run-on diversion would reduce water infiltration into the wastes and the potential for contaminant leaching from the waste into groundwater (perched groundwater). A leachate collection/removal system would prevent or substantially

reduce migration of contaminants away from the landfill, mitigating potential off-site threats to human health and the environment. The site characterization can be streamlined to support early actions by defining the boundary of the cap, locating on-site borrow areas of clean soils for use as capping materials, and establishing the direction of flow of the contaminated perched groundwater or leachate for the placement of an interceptor trench, e.g., French Drain. These data allow the risk assessor to evaluate if all potential releases are controlled and the exposure pathways are incomplete.

An early action can be taken to prevent direct exposures that may pose a public health concern.

Example: For waste piles and highly contaminated soils, actions such as waste removal and placement of a temporary cap and fencing may be taken to prevent direct exposure by humans or ecological receptors. Implementation of these actions would reduce the opportunity for exposure, therefore significantly mitigating the acute (short-term) risks. The site characterization could be streamlined by eliminating the need for extensive characterization of known areas with high contamination ("hot spots"). Resources can be selectively applied to characterize moderate to low contamination areas in order to provide the chemical data for hazard assessment and for comparison with PRGs to determine the need for remediation/corrective measure.

What kind of risk assessment or risk analysis is relevant to streamlined site characterization to facilitate early actions?

Streamlined Risk Evaluation (SRE) may be used to identify whether early actions or interim measures are warranted for an individual site or SWMU. The SRE is primarily qualitative, and is used to:

- evaluate whether a site or SWMU poses a substantial (principal) threat to human health and the environment or, if appropriate,
- prioritize sites or SWMUs as candidates for early actions.

Comparison of contaminant concentration levels with available risk-based and chemical-specific standards, e.g., applicable or relevant and appropriate requirements (ARARs) under CERCLA, is considered to be an SRE. Other example SREs and their specific applications are:

- A Site Conceptual Exposure Model (SCEM) is used to determine if a source of contamination could pose a substantial threat to human health and the environment because the exposure pathways are complete. A SCEM is developed based on a review of relevant site or SWMU-specific information which may include human activity patterns or usage of the contaminated media, topographic, geologic, hydrogeological and meteorological studies in the site area.

- Risk-based action levels or preliminary remediation goals (PRGs) are used to determine if the source(s) of contamination is (are) of concern (hazard evaluation) based on a comparison of contaminant concentrations (if available) with the risk-based action levels or PRGs.

- Qualitative or semi-quantitative analysis of alternatives is used to help select an early action/interim measure or a combination of actions or different approaches to the presumptive remedy (e.g., landfill cap designs). The analysis determines the risk reduction capabilities of each approach or alternatives examined.

- Any combination of the above may be used to evaluate if further remedial actions are needed for a site or SWMU after implementation of an early action or interim measure.

Although not explicitly identified in the SACM guidance, a quantitative SRE (screening risk assessment) may be conducted, based on default exposure assumptions, for the current or reasonably anticipated future land use (whichever is more conservative) and the most sensitive receptor. The above SRE procedure in reverse can be used to derive PRGs for the site for comparison with site data if published PRGs are not available for the contaminants.

What types of data are required for the SRE?

In order for a streamlined risk assessment to integrate information on hazard (toxicity) and exposure (intake), the data requirements are as follows:

- Hazard - Data that provide information about the identity and concentration of contaminants, as well as historical information concerning spills, releases or hazardous substances or wastes treated, stored or disposed on-site.
- Exposure - Data that support the existence of complete exposure pathways. Examples would include the following: well surveys (number and depths of well); site or regional hydrology, geology and hydrogeology; meteorological data (wind speed and direction, precipitation types and rates, etc.); and distances from the site to potential human and ecological receptors and sensitive environments.
- Incident Report or Health Advisory (optional supporting data): Injury or damage report of humans, domestic animals and other biological species; health assessment or well designed epidemiological studies based on definitive data or data highly suggestive of a cause-effect relationship; and local or state fish/game advisories.

What are the data quality and quantity requirements for the SRE?

Since most SREs are performed early, the data available to perform the evaluation may be limited. The SRE should be

completed quickly to allow timely input into the early action decision. Therefore, the SRE is generally performed with a minimum amount of data or selected data that represent the worst case, based on a current understanding of the site.

Whenever a sampling plan is limited in scope, as in streamlined site investigations, the sampling strategy should be biased toward locations where contaminants are likely to be found and where there is potential for exposure to humans or ecological receptors. For example, sampling should focus on the immediate area of a spill as visually identified by stressed vegetation, staining or aerial photographs.

The desire to do quick, inexpensive, conservative sampling should be balanced with the costs of grossly overestimating risks and overestimating the requirements of the remedy. Therefore, the appropriateness and the uncertainty associated with the use of limited data to represent site risk in the SRE should be clearly explained to the decision-makers.

For a controlled landfill with an existing cover and leachate collection system, leachate recovery wells which capture contaminants from a broad area are the preferred sampling locations. This is a more effective use of project resources than sampling the "worst case" locations, (i.e., wells with highest concentrations in limited sampling rounds). Similarly, the soil samples may be systematically collected at the existing cover within the defined cap boundary. The selection of sampling locations may also be based on subsurface field screening techniques, such as soil gas probe, groundwater probe, and organic vapor analyzer.

The data from a streamlined site characterization study should, at a minimum, meet the requirements of QA2 (QA2 is a verification objective which requires a minimum of 10% verification of chemical identity (by an analyte-specific method) of the field or laboratory results, and a minimum of 10% verification of quantitation (accuracy of measured concentration)). QA3 may be required per EPA's "*Quality Assurance/Quality Control Guidance for Removal Activities: Sampling QA/QC Plan and Data Validation Procedures*", Office of Emergency and Remedial Response, April 1990, if a quantitative SRE is anticipated. QA3 assesses the analytical error of the concentration level as well the chemical identity by using vigorous analytical methods and quality assurance.

Background data are highly desirable if available. To determine if the detected contaminant is site related or related to SWMUs/AOCs under consideration, either the maximum detected or the mean contaminant concentration (if 3 or more data points are available, preferably 8 to 10 samples as a rule of thumb) is compared with background concentrations. This should be performed for metals and any anthropogenic compounds (e.g., polycyclic aromatic hydrocarbons) of concern. If background data are not available, the site data should be compared with literature values (e.g., "*Element Concentrations in Soils, Conterminous United States*", U.S. Geologic Survey Professional Paper 1270 by HT Shacklette and JG Boerngen, 1984)

How does project planning help meet the SRE data needs?

Given an understanding of other stakeholders' concerns or expectations, the environmental restoration program manager (ERPM) should identify the goals and objectives (relating to early actions and streamlined site characterization approach) for the project team members (including the risk assessor). Based on the ERPM's goals and objectives, the risk assessor can identify the features or types of deliverables and the level of effort associated with the SRE.

By interacting with other project team members (geologist, hydrogeologist, design engineer, chemist, air quality specialist, etc.), a defensible SCEM can be developed by the risk assessor to identify data types, sample locations, and sampling strategy/design for the SRE.

Clarification of the project objectives in the scoping or project planning phase of a streamlined site characterization study will help focus the SRE data needs. The project objectives relating to presumptive remedy or early action implementation may include:

- site prioritization for early action;
- determining if the proposed early action is warranted or is able to substantially reduce risk for a specific site or SWMU;
- justification of action in Engineering Evaluation/Cost Analysis (EE/CA); and
- the potential short-term risk associated with the early action and the proposed control measures, etc.

After completion of a removal action or interim measure, an expanded or more quantitative SRE can be performed (in lieu of a baseline risk assessment, if necessary) to determine the residual risk for any complete exposure pathways and the need for further remedial action. To integrate data between project phases properly, the data collection option and QA/QC requirements for the SRE should be consistent with those needed for the remedial investigation or RCRA facility investigation project phase. To facilitate the data integration, QA3 or higher data quality assurance will be required

Questions of policy or questions regarding policy decisions are not addressed in EH-231 Information Briefs unless that policy has already been established through appropriate documentation. Please refer any questions concerning the subject material covered in this Information Brief to John Bascietto, RCRA/CERCLA Division, EH-231, (202) 586-7917.