Planning Risk Assessments

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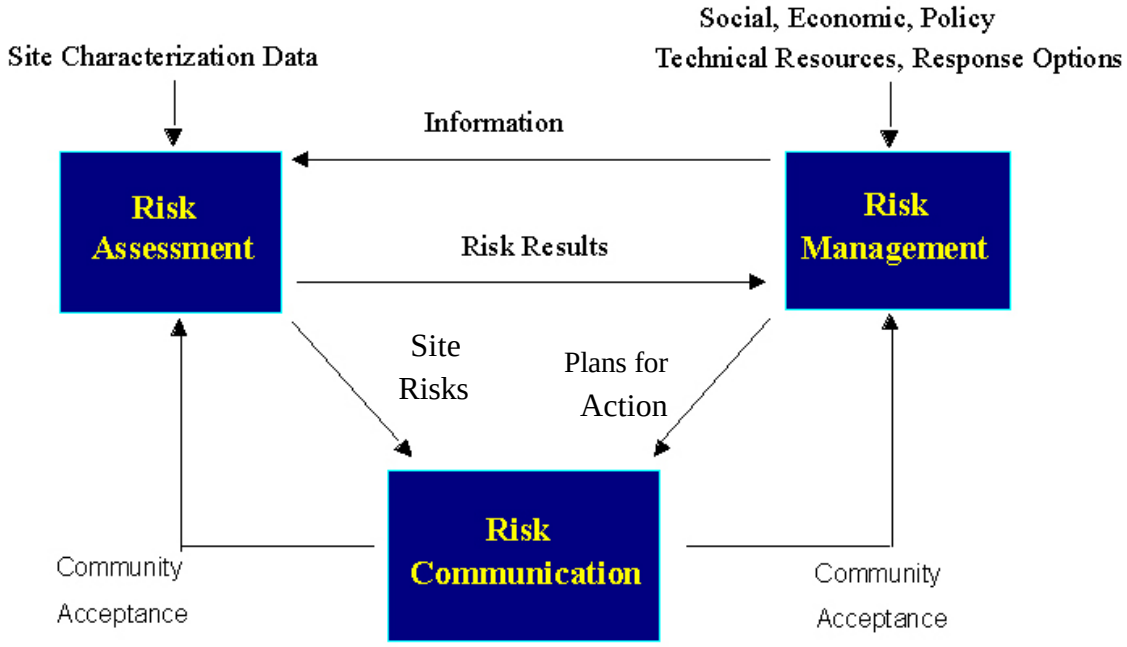
Background

The primary goal for environmental sites is to achieve environmentally protective site closeouts that meet applicable or relevant and appropriate requirements. Risk assessment, required under CERCLA, assesses if remediation is warranted and determines appropriate management of the hazard. These goals require the Air Force team to conduct and review risk assessments that are scientifically valid, legally defensible and consistent with reasonable future use. The risk assessment supports risk management decisions that must be health protective and cost effective. This presentation focuses on critical aspects of planning that are essential for taking control of the risk assessment process. It will describe risk assessment and risk management, illustrating the underlying concepts and the role of risk assessment and risk management in environmental site closeout. Risk assessment is a specific process, but its practice requires use of information provided by other professional disciplines. You can have a lot of control with regulations on how to conduct your risk assessment. This process is about a team approach for doing the right things, the right way, in the right amount.

Risk analysis includes three interrelated components. This figure shows the interrelationship in a more structured format. The point is that each feeds off another.

Risk Analysis Components and
How They are Interrelated



We will discuss the knowledge and skills to effectively manage the assessment of human health risk, by yourself or others, in a manner that is based on sound science and is defensible. We will also cover: how to utilize a tiered approach; when to conduct risk-based screening; how to improve oversight of human health and ecological risk assessments; and how to use the results of the assessment.

Risk analysis includes three components: risk assessment, risk management, and risk communication. Risk assessment produces numerical computations to assess health protection. Risk management decides the response to the results of the risk assessment. Risk communication is the transfer of information for decision-making.

Discussion

The distinction between risk assessment and risk management is fundamental to cleaning and closing sites. The National Academy of Sciences (NAS, 1983) supported a clear distinction between risk assessment and risk management in order to preclude any social, economic, or political factors from biasing the assessment of risk. The Baseline Risk Assessment is to be conducted in the absence of any remedial actions.

Risk management includes an evaluation of whether the assessed risk is acceptable and what, if any, remedial alternative is best to reduce the risk to acceptable levels. Passive or administrative actions are legally considered to be "remedial actions." Risk management actions can be described as either active (engineered actions) or passive (attenuation and institutional controls) natural. Land use is an important aspect for both risk assessment and risk management. OSWER Directive 9355.7-04, May 25, 1995 contains information on land use as it pertains to the community, what is reasonably anticipated land use, and focuses on cost effective alternatives.

As will be elaborated on later, the collection of data for a risk assessment has management implications. The purpose and objective for taking samples needs to be considered. The Data Quality Objectives (DQO) process is designed to ensure the right amount and type of samples are obtained.

The conceptual site model (CSM) is an important tool in both risk assessment and risk management. As you will see later, there is no risk if there is no exposure. The conceptual site model illustrates the exposure pathways. Risk can be managed by knowing what pathways exist and how to eliminate a risk by eliminating a pathway.

Good risk assessments are: representative of site conditions; relevant to current and future land use; based on realistic and relevant exposure routes; and reasonable exposure parameters and exposure point concentrations representative of exposure domain. Good planning that determines data quality objectives (DQOs) and develops a conceptual site model (CSM) consistent with current and reasonable future land use is critical to exercising project control. Consult you risk assessor early and often during your site cleanup.

Risk Assessment

Risk is the possibility of suffering harm or loss of that which we value from a hazard. Risk is inherent in any action. Risk assessment is the scientific process of investigation to estimate the level of risk. The risk assessment, required under CERCLA, is the basis for determining if remediation is warranted due to unacceptable risk, and how to manage the hazard that poses the risk.
We quantify risk be using two formulas, one for estimating the probability of cancer and the other for estimating the risk of non-cancer health effects.

- $Risk_C$ = Conc. x Exposure x Toxicity
- $Risk_{NC}$ = Conc. x Exposure

Risk Assessment is mathematically simple. However, the simple linear mathematics mean that each input is important, and could have a significant impact on the result. If concentration, exposure, or toxicity is over stated, then the estimated risk is over stated.
Risk assessment supports risk management by assessing:

- Which contaminants pose the greatest risk
- Which exposure pathways are most important
- Which receptors face significant risks, and describing
- What is the range of risks that can be attributed to the site

Additional objectives are to: establish health protective remediation goals (risk-based cleanup goals), determine appropriateness of ARARs, provide consistent evaluation of remedial alternatives, and assist in decision-making. Risk assessment should not be viewed as solely a box to check off on the Road to ROD.
Instead, properly conducted risk assessments provide:

- Greater insight and understanding of site problems for planning
- A primary decision tool for establishing a defensible basis for action (or no action)
- A more objective and quantitative methodology for comparing options
- Financial savings by focusing resources and efforts on real problems (optimize use of limited funds)
- Better communication among all parties

Risk Management

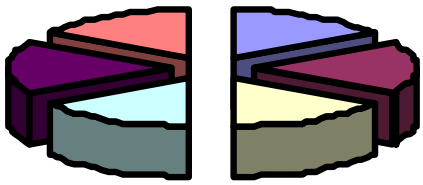
Risk management is an effort to reduce risk to human health and the environment by active or passive actions. Determining the best means to reduce or eliminate a risk requires the information from risk assessment, in addition to other technical resources, social, economic, and political information. EPA, 1995 Guidance for Risk Characterization states economic, social and legal aspects (policy) have a legitimate place in risk management, but no place in the scientific process of risk assessment. Risk assessment is mostly aligned with the remedial investigation (RI), while risk management is typically done under the FS. The RPM's job is to manage the risk.

Making Risk-Based Decisions

Since risk involves uncertainty, risks are often managed by being conservative. Regulations are intended to be protective of the most sensitive population. The policy of risk assessment can produce unrealistic results that in turn require costly remedial action. The policy is intentionally written to be conservative; however, the key is using guidance judiciously based on relevant current and future land use, realistic exposure parameters, and exposure point concentrations. In addition to the actual numerical assessment of risk, other issues are employed in risk management that are often qualitative issues that make risk management an art as much as a science.

Pieces of the Risk Management Pie

- Risk Information
- Economic Information
- Social Issues
- Political Issues
- Policy Issues
- Regulatory Issues



Risk Communication

The third main component of risk analysis is risk communication. This is addressed briefly to show the need for communication and its importance in the risk analysis process to stakeholders. A stakeholder is any party that has an interest in or can be affected in any manner by risk management decisions at a site. This can include the local community, other public groups and individuals, and regulatory interests. Stakeholder involvement is a crucial task that has important ramifications in risk communication and ultimate decision-making.

Tiered Approach for Risk Assessment and Management

You can manage your risk assessment, risk communication and risk management effort most effectively by using the Tiered Approach. The EPA, State and DOD agencies have developed a tiered risk assessment process for assessing both human and ecological risks. It provides a structure to risk management consistent with EPA Risk Assessment Guidance for Superfund (RAGS) that is cost effective and health protective.

- Tier I: demonstrates whether the site is below a health protective level by comparing a risk-based concentration back calculated from a prescribed risk level to the concentration of a particular constituent of concern.Tier II: is the site-specific assessment of the risk at the siteTier III Assesses the risk of the remedial action(s)

The tiered approach allows you to match the level of complexity of your risk assessment to the level of complexity at you site. For example, a Tier I screening risk assessment involves use of conservative default exposure assumptions consistent with selected future land use. At sites where default assumptions are representative of site conditions and both contaminate and effected medium are well understood, the tiered approach can streamline the assessment process. However, if site conditions are complex or potential remedial approaches are high cost, a site-specific assessment is generally warranted to achieve appropriately reasonable and representative assessment of risk and remedial objectives where warranted. Risk management actions relative to conduct of risk assessments often have long-term impacts.

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