Site Cleanup Using Risk-Based Decision Making

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This document provides information about the steps involved in risk-based decision making utilized by the Oklahoma Department of Environmental Quality (DEQ) to determine cleanup requirements for contaminated sites. Risk-based decision making means evaluating real and potential risk to both human health and the environment posed by a contaminated site and making responsible and practical decisions to mitigate those risks in a timely fashion. Risk cannot be properly evaluated without adequate site characterization.

Risk-based decision making allows the DEQ and the party responsible for the cleanup to determine whether a contaminated site poses a risk or potential risk to both human health and the environment. Screening contaminants against published screening levels and cleanup to generally recognized safe levels provides a basis for determining how clean is clean enough, and provides information needed to determine the most efficient cleanup alternatives. By policy, the DEQ uses a risk level of 1×10^{-5}. Under limited circumstances, the allowable risk may be higher (1×10^{-4}) or lower (1×10^{-6}), depending upon site-specific mitigating factors.

The DEQ uses a tiered approach to establish cleanup levels. This includes cleanup to:

- Generally recognized screening levels, or
- Site specific cleanup levels developed for individual sites, or
- Cleanup levels established by a formal risk assessment.

Cleanups need to be prompt to protect human health and the environment. The DEQ strongly encourages interim actions to reduce risks as they are recognized.

Risk-based decisions are used in a variety of circumstances including cleanups that are performed under the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA), Resource Conservation and Recovery Act (RCRA), Oklahoma Voluntary Cleanup Program (VCP), and the Oklahoma Voluntary Brownfields Redevelopment Act. The Department of Environmental Quality is committed to the application of consistent decision making tools to determine the level of cleanup that needs to occur at a site.

WHEN IS RISK-BASED DECISION MAKING NEEDED?

Risk-Based Decision Making is needed in virtually all cases where contamination is not cleaned up to background levels. Examples could include circumstances where there are contaminants from:

- Spills/Emergency Responses
- Historical contamination
- Current releases that result in contamination

The DEQ typically gets involved through programs like:

- RCRA (solid waste and hazardous waste)
- CERCLA
- VCP and Brownfields program including property transfers

STEPS IN RISK-BASED DECISION MAKING:

When a release of contaminants is known or suspected, the DEQ staff in the appropriate program should be contacted to arrange a meeting. If the appropriate program is not known, call (405) 702-5100 for assistance.

- Meet with the appropriate program manager to determine if existing site characterization is adequate or if a work plan for additional site characterization is needed. Potential risk can often be determined with very limited information; however, the nature and extent of contamination must be known before all aspects of risk can be fully evaluated.

- Identify chemicals of potential concern for all routes of exposure for human health and ecological risk by comparing the contaminants in all media (groundwater, surface water, soil, sediment, etc.) to the following:

    - **Human Health and Groundwater Protection:**

        - The Soil Screening Level Guidance document published by the Environmental Protection Agency (EPA) Office of Solid Waste and Emergency Response.
        - The EPA Region VI Medium Specific Screening Levels (MSSL)
        - The Maximum Contaminant Levels (MCLs) promulgated by the EPA under the Safe Drinking Water Act.

- **Ecological**

  - EPA Ecological Soils Screening level or ECO SSLs guidance document, November 2003 at *http://www.epa.gov/ecotox/ecoss*.

  - The Oak Ridge National Laboratory (ORNL) toxicity benchmarks, NTIS U.S. Dept of Commerce, 5285 Port Royal Road, Springfield, VA 22161, Tel No: 1 800 553-6847.

  - The Screening Quick Reference Tables (SQuiRTs), developed by National Oceanographic & Atmospheric Administration (NOAA) at http://response.restoration.noaa.gov/cpr/sediment/squirt/squirt.html.

  - **Applicable State and Federal law, regulations, guidances and policies** including, but not limited to The Safe Drinking Water Act, The Clean Water Act, and Oklahoma's Water Quality Standards, etc., should be used when making risk management decisions.

  The DEQ will generally use the most stringent level for screening purposes. If a chemical does not have a screening level in the cited documents, a site specific screening level can be provided by the DEQ when adequate information is available.

- If chemicals of potential concern exceed a screening level, remedial action or additional investigation may be required. Screening levels are not necessarily cleanup levels. Cleanup to screening levels is generally acceptable; however, other policy documents or regulations may apply.

  Site specific soil cleanup levels can be developed using the following methodologies:

  - For soil cleanup levels protective of groundwater the DEQ uses the methodology found in the USEPA Soil Screening Guidance.

  - For soil cleanup levels to be protective of human health, the DEQ uses USEPA Risk Assessment Guidance for Superfund (RAGs).

  Prior to developing cleanup levels, you will need to visit with the DEQ's risk assessment team. A written approval from DEQ on all input values to be used in the methodologies should be obtained. Other policy documents or regulations may also apply. Site specific soil cleanup levels can be calculated for surface water protection. The preliminary cleanup levels to be used at a site should be developed early in a project and used to guide site activities. Site specific cleanup levels can be refined as more information becomes available. Please note that screening levels or cleanup levels apply to contaminated media such as soil or water. If an obvious waste source is found, or is known to exist from

historical records, efforts should be taken to remove, treat or mitigate the source of contamination.

- As previously stated, exceeding a human health or ecological screening level indicates the need to remediate or conduct further investigation, which may include a formal risk assessment.

RISK ASSESSMENT:

A formal risk assessment can be an expensive, detailed process, that requires an extensive amount of information. All data and information used for the assessment must be of high quality and appropriate to the parameters being measured. Each step in a risk assessment should include review and approval by DEQ prior to moving to the next step. This ensures that the responsible party's efforts are consistent with DEQ policy and avoids time consuming and costly delays in the development of a meaningful risk assessment.

- When a risk assessment **is** needed or requested, the DEQ uses the EPA Risk Assessment Guidance for Superfund (RAGS). This guidance and related materials can be downloaded from the EPA Superfund webpage: www.epa.gov/superfund/health/index.htm. Any deviations from the RAGS should have a written approval from the DEQ. If a qualitative ecological assessment is not adequate for a site, the DEQ risk assessor must approve the assumptions and parameters to be used in a quantitative ecological assessment.

- ASTM Risk-Based Corrective Action (RBCA) methodology may in limited cases be allowed for simple gasoline and/or diesel contamination. Due to some of the assumptions in this approach, a written approval from the DEQ should be obtained before using this methodology. (Also see our fact sheet on gasoline and diesel spills located on our web page at *www.deq.state.ok.us*.)

- Use the Integrated Risk Information System (IRIS) for toxicity information regarding chemicals of potential concern. The DEQ toxicologist should be consulted when chemicals do not have a toxicity factor or when a reference dose for an exposure pathway needs to be calculated. Please contact the LPD toxicologist at 405-702-5100 for assistance.

- A Risk Assessment report should be written following the suggested outline from RAGS to ensure ease and consistency in the review. Any statement regarding risks should be supported by calculations, documentation, and references.

The report should be a stand alone document and be able to serve as a risk communication tool so a community can use it for information and as the basis of its involvement in the cleanup decision making.

COMMON ELEMENTS IN RISK-BASED DECISION MAKING:

- Data Quality Objectives

  Suitable and acceptable data should be available to perform a risk assessment. If available data is more than 2 years old, further sampling and analysis of the complete suite of suspect chemicals is usually necessary. Detection limits should be lower than the screening levels. Degradation products of contaminants (such as chlorinated solvents) should be included in the analysis even if the original chemical spilled did not include the degradation products.

- Site Conceptual Model

  This should include:

  - Maps showing the geographic and physical characteristics of the site, adjacent property owners, creeks, ponds, and other ecological habitat
  - Lateral and vertical concentrations of the contaminants
  - Hydrogeology of the site
  - Potential current and future receptors, pathways for the contaminants to reach receptors, and exposure scenarios
  - Human and ecological receptors must be considered
  - Future use of the affected property, whether residential, commercial or industrial, should be established
  - Current and future use of groundwater and surface water both on and off site

- Community Involvement

  Affected property owners and community members should be involved in cleanup decision making. Public comment, advice, and concerns should be considered in the planning and implementation of risk-based decision making. Public meetings are one method to involve the public. Some programs require specific public comment periods. Consideration should also be given to involving the local land use authorities (zoning, planning, engineering, etc) and preservation groups.

- Risk Management

  Risk assessment is a tool used to establish the existing or potential hazards at a site. Using this information, decisions can be made on how that risk is managed. When making risk management decisions, practicality, avoidance/creation of other risk, institutional controls, requirements of other laws and regulations, and

other factors are considered in the final decision. If risk-based cleanup is chosen with institutional controls, then a mechanism must be in place to ensure that institutional controls are being followed. The DEQ cannot impose institutional controls on offsite properties. Institutional controls would need to be in place and effective for all properties potentially affected by the contamination, including offsite areas.

SUMMARY:

Although a risk assessment can be performed on any site, not all sites need a formal risk assessment. Cleanup levels are developed in a tiered approach:

1. Compare contaminants to screening levels. If contaminants exceed screening levels you should evaluate all potential pathways, and

2. Cleanup to generally accepted screening levels, or

3. Develop site specific cleanup levels using methodologies described above and then cleanup to those levels, or

4. Develop site specific cleanup levels by performing a formal risk assessment, and then cleanup to those levels.

The role of the DEQ staff is to ensure that human health and the environment are protected, applicable laws and regulations are followed, and site remediations are accomplished in a practical and effective manner. Risk-based decision making is a tool that serves the community and responsible parties in developing acceptable cleanups so that sites do not present a risk to the community and are, ideally, safe for productive use both now and in the future.

The DEQ's statutory authority in these matters is established in 27 A O.S. Section 2-6-105 A. "It shall be unlawful for any person to cause pollution of any waters of the state or to place or cause to be placed any wastes in a location where they are likely to cause pollution of any air, land or waters of the state. Any such action is hereby declared to be a public nuisance." Also 27 A O.S. Section 2-6-105 B "If the Executive Director finds that any of the air, land or waters of the state have been, or are being, polluted, the Executive Director shall make an order requiring such pollution to cease within a reasonable time, or requiring such manner of treatment or of disposition of the sewage or other polluting material as may in his judgment be necessary to prevent further pollution."