



# Interstate Technology & Regulatory Council

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## Project Risk Management for Site Remediation (RRM-1)

### EXECUTIVE SUMMARY

#### What is remediation risk management, and why is it important?

This document addresses project risk management for site remediation projects. It applies generally accepted risk management industry approaches to project risks encountered during site remediation and uses the term “remediation risk management” (RRM) to describe this approach. Site project managers are the primary audience for this document, prepared by the Interstate Technical & Regulatory Council (ITRC) RRM Team, but other environmental practitioners will be interested as well, including state and federal regulators, consultants, and responsible parties—any stakeholders in remediation project risks.

RRM addresses project risks or constraints to achieving ultimate goal of remediation: protection of human health and the environment. Investigation and remediation activities have their own set of risks, apart from the risks associated with chemical contamination. This document focuses on the management of project risks associated with investigation and remedial activities. Examples include inadequate remedy performance, risks to ecological habitats resulting from remediation activities, health and safety concerns, greenhouse gas (GHG) emissions caused by remediation, consumption of energy and other resources needed to perform remediation, the risks of traffic accidents, and other unintended adverse impacts.

The purpose of RRM is to significantly improve the quality of remedial decision making throughout a project life cycle regardless of the site size and complexity, type of cleanup program, or stage in the cleanup process. RRM prompts careful consideration of a variety of potential project risks and helps project managers identify and address the most significant risks to their project. RRM uses a broad perspective and provides general tools to allow project managers to execute risk mitigation plans to improve the likelihood of achieving project objectives to remove contamination, restore resources, and close sites.

#### What is RRM not?

RRM is not a way to rationalize doing less work on environmental cleanup projects or compromising the quality of restoration efforts. All remedies must be protective of human health and the environment and must meet regulatory requirements. Through RRM, site managers consider and appropriately act on project risks that are site specific; therefore, the outcome is also site specific. For example, RRM may favor an active remedy at a site where cleanup timeframe overruns would pose a significant project risk. RRM might favor a passive remedy at a site with sensitive ecological habitats or similar long-term timeframes/outcomes for both passive and active remedies.

RRM is not more “red tape” for project managers or additional paperwork requirements with no change in site activities. The objective of RRM is to benefit the project through optimization. RRM is a thought process to improve the quality of environmental decision making to benefit the project. The approach is scalable for site circumstances to avoid being a cumbersome, time-consuming process that could delay project implementation. It is not a regulatory requirement and therefore does not require any additional reviews.

### **What resources are available to better understand RRM?**

This document is the primary resource for understanding RRM. Detailed information, references to useful tools, case studies, and points of contact are provided in the appendices. Similar documents have been published on risk management for specific cleanup programs, including the following:

- “Restoration Performance Risk Management—RPRM” (AFCEE 2010a)
- *Risk Management Guide* (DOE 2008)
- *Groundwater Risk Management Handbook* (NAVFAC 2008)
- *Improving Environmental Site Remediation Through Performance-Based Environmental Management* (ITRC 2007)
- *A Guide to the Project Management Body of Knowledge* (PMI 2008)

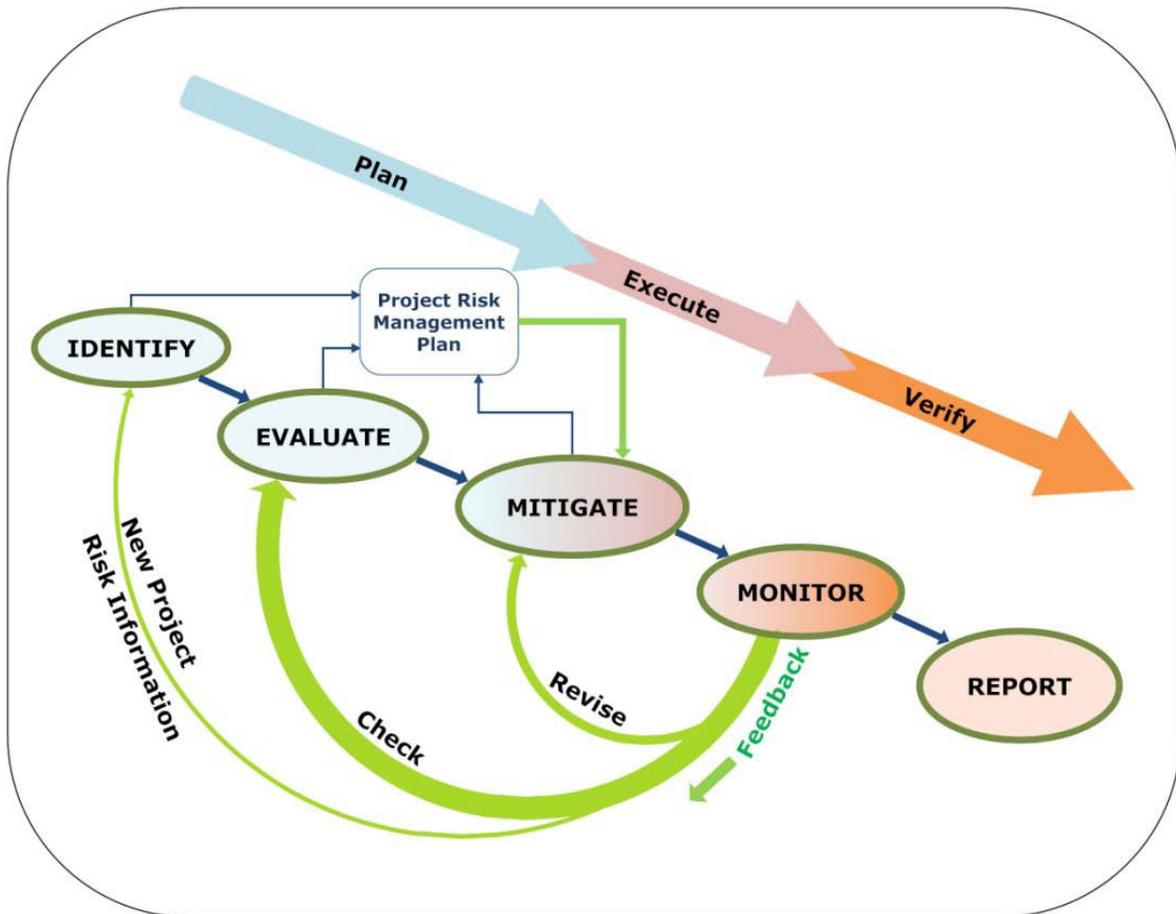
This document is different from other guidance in that it is not specific to a particular regulatory framework or cleanup program. It builds on previous ITRC publications (e.g., ITRC 2004, 2007) and customizes general project management principles on risk management for application to remediation projects.

### **When is RRM most applicable in the site remediation process?**

RRM can be used in support of environmental decision making during any stage of the cleanup process (e.g., investigation, remedy selection, implementation, operation and maintenance, optimization, and site closeout). Major decisions that can benefit substantially from RRM include the selection of a remedy and remedy implementation.

### **What does RRM entail?**

When considering project risks, RRM elements fit into a sequence of planning, execution, and verification. Project risk management elements include project risk identification, evaluation, mitigation, monitoring, and reporting. Appendix D illustrates the application of RRM at a site. As shown in Figure ES-1, RRM consists of the following five elements to address project risks.



**Figure ES-1. Elements of remediation risk management.**

1. Project Risk Identification

During this step, which is part of the planning stage of RRM, identify a variety of potential project risks. Consider the categories of project risks shown in Table ES-1.

**Table ES-1. Categories and examples of project risks**

Category of project risks	Examples of project risks
Remedy performance	<ul style="list-style-type: none"> <li>• Selection of inappropriate remedy</li> <li>• Technology feasibility</li> <li>• Inappropriate objectives</li> <li>• System failure</li> </ul>
Human health	<ul style="list-style-type: none"> <li>• Changes to human health risk assessment</li> <li>• Accidents (travel, transportation)</li> </ul>
Environmental/ecological	<ul style="list-style-type: none"> <li>• Greenhouse gas emissions</li> <li>• Energy consumption</li> <li>• Risk to ecosystems, endangered species</li> </ul>
Regulatory	<ul style="list-style-type: none"> <li>• Changing regulations</li> <li>• Emerging contaminants</li> </ul>

Category of project risks	Examples of project risks
Economic	<ul style="list-style-type: none"> <li>• Value of land use after remediation</li> <li>• Economic consequences of delayed site closure</li> <li>• Cost of delayed redevelopment</li> </ul>
Project schedule, staffing, financials	<ul style="list-style-type: none"> <li>• Schedule</li> <li>• Scope management</li> <li>• Cost</li> <li>• Quality</li> <li>• Communications</li> <li>• Contracting</li> </ul>
Legal	<ul style="list-style-type: none"> <li>• Litigation</li> <li>• Natural resource damage claims</li> </ul>
Political, geographic, and social	<ul style="list-style-type: none"> <li>• Preservation of historic landmarks</li> <li>• Long-term land-use plans</li> <li>• Community perceptions</li> </ul>

Figure ES-2 shows project risks in graphical form.

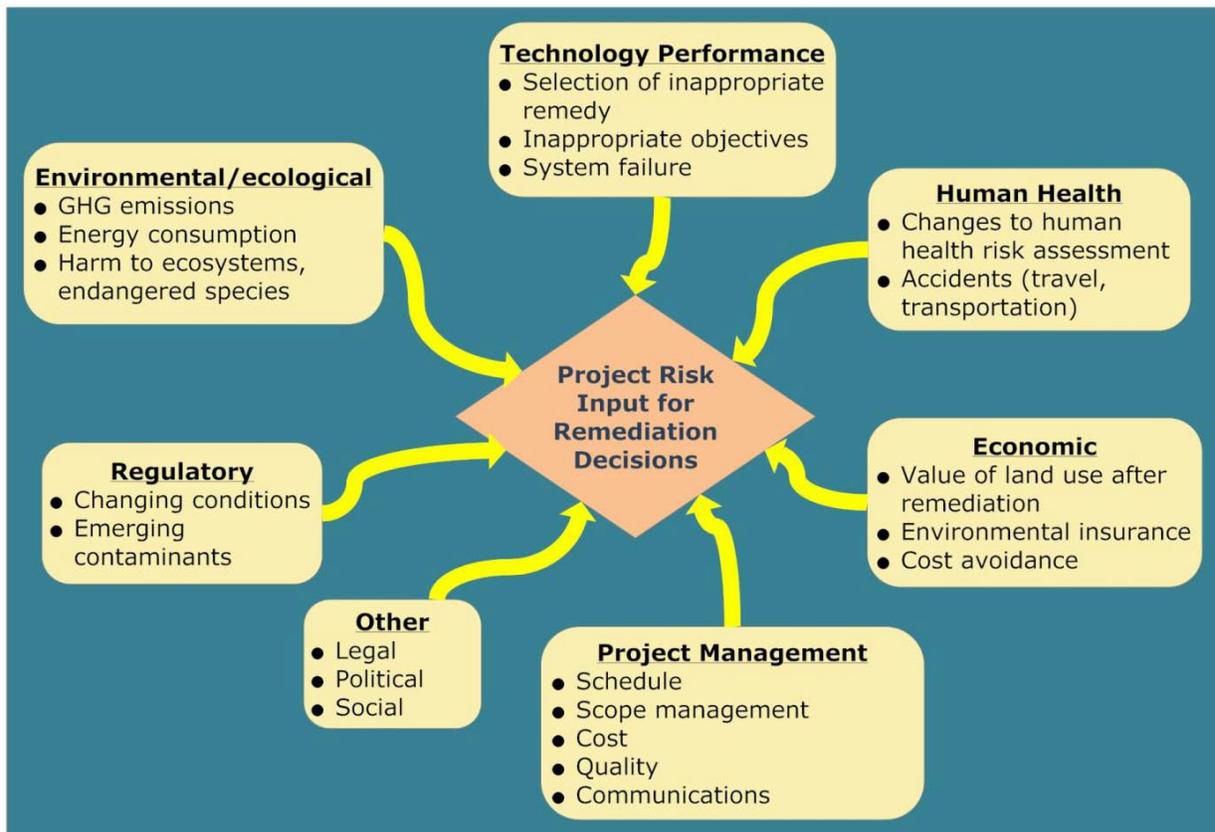


Figure ES-2. Risks associated with RRM.

## 2. Project Risk Evaluation

Project risk evaluation addresses both the probability that each project risk event may occur and the magnitude of adverse impacts or consequences that could result. Qualitative and quantitative tools can be used to evaluate project risks, including risk registers, computer modeling, consultation with knowledgeable or expert professionals, and project team discussion. The evaluation process classifies project risks ranging from low to very high risk.

## 3. Project Risk Mitigation

Strategies to mitigate high-risk potential risk events are developed and implemented during this stage of RRM. Mitigation methods might include eliminating, reducing, transferring liability for, or accepting the potential project risk. For example, one mitigation approach to addressing a project risk of remedy failure might be to develop and position a contingency remedy and decision logic for implementing the contingency approach.

## 4. Project Risk Monitoring

This step specifies the way in which a project will be tracked over time to make sure that the project risk mitigation strategies have been effectively and successfully implemented. Project risk monitoring also seeks new information that may change the nature, likelihood, or severity of potential project risks.

## 5. Project Risk Reporting

In this final step, key findings from project risk monitoring are summarized and communicated to other stakeholders for use in decision making. For example, project risks from different sites might be compiled and assessed at the program level to decide how to better manage similar sites or identify priority topics for research and development efforts. On a site-specific level, project risks might be discussed at a stakeholder meeting or communicated to the site owner.

### **Which sites will benefit from using RRM?**

All sites benefit from using RRM to identify, consider, and appropriately address project risks. RRM is applicable to sites in all types of programs and is not targeted at sites in a particular regulatory framework. The principles apply at Comprehensive Environmental Response, Compensation and Liability Act; Resource Conservation and Recovery Act; underground storage tank; voluntary cleanup; and brownfields program projects. In a survey of state cleanup programs conducted by ITRC, no states reported any regulatory barriers to implementing RRM concepts at state-lead sites. The thought process reflected by RRM (identify, evaluate, mitigate, monitor, and report) is general enough to be used as the basis for state cleanup programs or other agencies to develop a process to address remediation project risks.

RRM can be used at relatively simple or small sites as well as at large, complex sites. Some project managers are already conducting much of the RRM analyses. For example, the potential impact of construction activities on workers and nearby residents is routinely addressed as part of

remedial action plans. It is important to apply RRM in ways that support the project. Therefore, the level of efforts associated with RRM should be scaled appropriately (e.g., using simple qualitative assessments and simple documentation at sites where the project risks are relatively low). Extensive RRM assessments are called for at sites where project risks are relatively high.

### **What are the costs and benefits of RRM?**

The benefits of RRM include improved likelihood of project success, reduction of adverse secondary impacts on the environment (such as the depletion of natural resources or ecological habitat), and, in some cases, reduced time and cost to achieve site closure and post-closure goals. The cost and effort associated with RRM is scalable—a basic RRM project risk analysis could be completed in one or two days; more complex analyses might take hundreds of hours (e.g., stakeholder meetings, modeling under different scenarios, optimization efforts). However, the costs of RRM are relatively low, even at complex sites, because many mitigation activities would be occurring anyway, such as the preparation of health and safety plans or groundwater modeling in support of remedy selection or remedy evaluation. RRM produces better planning that can be communicated to stakeholders to emphasize high-priority issues and concerns at the site (e.g., sustainability, long-term liability, accelerated schedule). This process reassures stakeholders that their concerns are being taken seriously and that steps are being taken to mitigate the potential effects of these project risks.

### **How is RRM used in practice?**

This document provides project managers and others who are interested in RRM with a roadmap for systematically thinking about and addressing project risks. Reading this document is the first step toward putting RRM concepts into practice. Other risk management documents that are applicable to the site regulatory program should also be reviewed. Detailed examples are provided in this document to illustrate how project risks can be addressed through RRM. Because of the site-specific nature of project risks, not all types of project risks are identified in this document. Each project team should identify site-specific project risks and use the tools described in this document to qualitatively/quantitatively evaluate each project risk. Project managers can then plan mitigation strategies for significant high-risk events, implement these strategies, and monitor the outcomes. Monitoring results are used to help make quality decisions regarding environmental remediation optimization, identify new potential high-risk events, and help keep stakeholders up to date on remediation progress.

### **Summary**

RRM is a course of action to holistically address a broad set of remediation project risks related to site investigation, remedy selection, implementation, and site closure. RRM encourages project managers to proactively address project risks through project risk identification, evaluation, mitigation, monitoring, and reporting, thus making decisions that balance various project considerations to better meet all project objectives to remove contamination, restore resources, and close sites.