PROJECT MANGEMENT PLAN EXAMPLES

Prepare Project Support Plans and Documentation - Project Risk Assessment Examples

Example 54

10.0 PROJECT RISK

This section outlines a methodology which will be used to qualitatively/subjectively assess the project risk. The approach is modeled after project risk assessment processes outlined in standard project management texts and training courses but tailored to the unique risks encountered in the DOE projects.

In the context of this section, project risk means risk to one of the project baselines (technical, cost, or schedule) and should not be confused with health and safety risks. However, health and safety issues are considered to the extent that they impact the risk to the project baselines.

10.1 RISK ASSESSMENT TOOLS

The two primary tools that will be used to conduct the risk assessment are listed below.

- The Risk Assessment Matrix given in Table 10-1 -- The Risk Assessment Matrix consists of two elements: risk factors and risk ranking guidelines. The risk factors represent the topics that are considered to have the most influence on project risk. The risk ranking guidelines are qualitative statements assigned to low, medium, and high-risk categories. The risk ranking guidelines are used to determine the risk impact of each of the risk factors to the project baseline.
- The Risk Assessment Data Sheet shown in Figure 10-1 -- The Risk Assessment Data Sheet is the tool that is used to document the results of the risk assessment session. The data sheet is designed to be used in conjunction with the Risk Assessment Matrix to obtain a structured, consistent, and rigorous assessment of risk.

The two tools discussed above can be used to manage the project risks by identifying the risks, assessing the risks, and reducing the risks through mitigation and contingency planning.

10.2 RISK ASSESSMENT PROCESS

The risk assessment tools (Risk Assessment Matrix and Risk Assessment Data Sheet) discussed in Section 10.1 may be applied at the project level, the sub-project level, or the task level, as appropriate. Risk assessments will typically be performed by an assessment team comprised of project managers, technical staff, operating/field staff, customers (RL, DOE-HQ, and FDH), and selected stakeholders as appropriate based upon the project element and its position in the baseline hierarchy (i.e., project level, sub-project level, or task/activity level). A team leader will be assigned or selected to schedule, lead, and document the results of the risk assessment session. The results of all project risk assessments will be maintained in an appendix to this IPMP. An initial assessment will be performed at the project level with follow-on assessments performed at other levels of the project baseline hierarchy, based on the results of the initial assessment. Assessments will then be performed throughout the life of the project. Typically, risk assessments will be performed to support the change request process, when baseline adjustments are necessary, or to support the decision process for selection and implementation of technical alternatives.

10.3 SUMMARY OF SIGNIFICANT PROJECT RISKS

A formal assessment of project risk has not been completed at this point in the project. This section will be developed as more comprehensive project planning is completed using the Risk Assessment Process.

Figure 10-1. Risk Assessment Data Sheet.					
RISK ASSESSMENT AREA (Cost, Schedule, Scope, Etc.)					
RISK FACTOR RISK RISK MITIGATION & RANK CONTRIBUTORS CONTINGENCIES					
Technology					
Interfaces					

Safety		
Political Visibility and Stakeholder Involvement		
Funding		
Time/Schedule		
Site Characteristics		
Labor		
Quality Requirements		
Number of Key Participants		
Contractor Capabilities		
Regulatory Involvement		
Magnitude and Complexity of Contamination		

Table 10-1. Risk Assessment Matrix. (3 Sheets)

(6 Griddle)			
QUALITATIVE RISK RANKING GUIDELINES			
LOW	MEDIUM	HIGH	
- Conventional/off-the- shelf	- Proven state of the art	- Unproven/new	
- Extensive previous facility application	- Some previous facility or site application	- Little or no previous facility or site application	
- Little or no testing required	- Some proof of application testing	- Extensive proof of principle testing required	
	requirea	- Complex/highly engineered	
- Little or no impact from other site programs	- Potential impact from other site operations, programs or contractors	- Potential MAJOR impact from other site operations, or contractors	
operations or contractors	- Some new interfaces must be established and	- Multiple and/or complex interfaces required which	
- Established and mature interfaces and working relationships used	managed	may include competing objectives	
- Small project (fewer than 50 FTEs)	- Moderate sized projects (50-150 FTEs)	- Large projects (more than 150 FTEs)	
- Little or no construction	- Most elements of an " integrated " worker	- Multiple hazards - some of which are not well understood or there is a lack	
- Contractor experienced on same	approach exist but may not be fully mature	of experience in dealing with	
	- Contractor/facility has	- Significant construction required	
	LOW - Conventional/off-the-shelf - Extensive previous facility application - Little or no testing required - Little or no impact from other site programs operations or contractors - Established and mature interfaces and working relationships used - Small project (fewer than 50 FTEs) - Little or no construction - Contractor	LOW - Conventional/off-the-shelf - Extensive previous facility application - Little or no testing required - Little or no impact from other site programs operations or contractors - Established and mature interfaces and working relationships used - Small project (fewer than 50 FTEs) - Little or no construction - Contractor experienced on same type of project - Extensive previous facility or site application - Some previous facility or site application - Some proof of application testing required - Potential impact from other site operations, programs or contractors - Some new interfaces must be established and managed - Moderate sized projects (50-150 FTEs) - Most elements of an "integrated " worker health and safety approach exist but may not be fully mature - Contractor/facility has	

safety " integrated " with job planning. Integrated approach is fully implemented and mature - Facility/contractor has exemplary safety record - Little or no stakeholder interest	 excellent safety record Existing hazards are well understood Some information sharing and communication 	- Contractor/facility does not have strong safety record or a mature safety program - " integrated " worker health and safety approach not implemented - Potentially sensitive to stakeholders
- Little or no	sharing and	- Potentially sensitive to
	sharing and	
	 outreach required Stakeholders neutral but interested in progress updates 	 Independent oversight or significant outreach/input required Involvement/coordination with multiple regulatory agencies
- Less than one year duration	- Two to three year duration	- Three or more years duration
- Detailed and validated estimate exists	- Detailed estimate but not yet validated	- Conceptual level estimate
 No known schedule constraints Predecessor and successor actions are simple and clearly identified and understood. Demonstrated ability to perform activities No assumptions with regard to performance Resources identified, committed and under facility control 1 site or facility 	 Some schedule constraints exist by won't affect completion date Assumptions have been validated Some resources required outside of facility but high confidence in availability based on past performance 	- Multiple schedule constraints/compressed schedule - Activities developed only to conceptual level (multiple invalidated assumptions) - Resources uncommitted or not identified - 4 or more sites or
- DOE property	- Government property	facilities - Private property
AccessibleNo required infrastructure	- Accessible - Minor infrastructure	- Restricted Access - Major Infrastructure
	Modorato/bish skill	
- Readily available	- Restricted availability	- Moderate/high skill -Severely restricted availability
	duration - Detailed and validated estimate exists - No known schedule constraints - Predecessor and successor actions are simple and clearly identified and understood. - Demonstrated ability to perform activities - No assumptions with regard to performance - Resources identified, committed and under facility control - 1 site or facility - DOE property - Accessible - No required infrastructure - Low to moderate skill	duration - Detailed and validated estimate exists - No known schedule constraints - Predecessor and successor actions are simple and clearly identified and understood. - Demonstrated ability to perform activities - No assumptions with regard to performance - Resources identified, committed and under facility control - 1 site or facility - DOE property - Accessible - No required infrastructure - Low to moderate skill - Readily available - Detailed estimate but not yet validated - Some schedule constraints exist by won't affect completion date - Some resources required outside of facility but high confidence in availability based on past performance - Covernment property - Accessible - Minor infrastructure - Moderate/high skill - Restricted availability

	- Low productivity requirement	- Moderate productivity required	- Rapid build-up
			- High Productivity required
QUALITY REQUIREMENTS	Large tolerancesLow QC requirements	- Average QC requirements	- High QC requirements
NUMBER OF KEY PARTICIPANTS (Internal and external)	- 1	- 2-3	- 3 or more
CONTRACTOR CAPABILITIES	- Proven track record and resources immediately available	- Limited experience or resource availability	- Newly acquired capabilities or resources committed to other projects
REGULATORY INVOLVEMENT	 Minimal permit requirements (e.g. NEPA CX) No compliance issues 	- Routine permit requirements with multiple agencies (e.g. NEPA EA) - Compliance issues have precedent or defined path forward. Little negotiation required	- Complex permit requirements with multiple agencies or branches of government (e.g., NEPA EIS) - Precedent setting compliance paths requires. Significant negotiation
MAGNITUDE AND COMPLEXITY OF CONTAMINATION	- No potential for chronic or acute exposure to chemical or radiological hazards - High confidence in the characterization of industrial, chemical and radiological hazards - Exemplary ALARA/HAZCOM/Rad Con and Industrial safety program performance record	- Potential for chronic or acute exposure to well defined chemical or radiological hazards - Excellent ALARA/HAZCOM/Rad Con and Industrial safety program performance record	 Potential for overexposure to chemical or radiological hazards Industrial, chemical and radiological hazards not well characterized/defined Less than excellent ALARA/HAZCOM/Rad Con and Industrial Safety program performance record

Example 55

13.0 PROJECT RISK

The project risk is defined here as those conditions that will adversely impact the schedule and cost baseline of the 9206 Phase Out/Deactivation Project. The conditions include organizational functional and resource dependencies. The 9206 Complex is not a stand-alone facility. The inter- and intra- dependencies of greatest impact are described below:

13.1 INTERDEPENDENCIES

Readiness of 9212 HEU Chemical Recovery Operations
The "building 9212 transition plan in support of 9206 phase out ", Appendix A, describes the initial projected schedule for HEU processing capability at Building 9212, which will occur in phases as individual 9212 chemical recovery operations are restarted under PBR. Changes and/or delays to this schedule will significantly alter the schedule and cost baseline for 9206 deactivation. Alternative material disposition paths are be identified and investigated to minimize this task.

9206 and 9212 Subprojects - Cost Relations

Appendix C, Integrated Funding Needs, includes subproject activities for 9212 that are necessary for movement and disposition of material from 9206. As funding priorities change at the site level, this subproject dependency and integration will need to be maintained and evaluated as a package for schedule and cost.

Training of Additional Deactivation Work Force

It is anticipated that at a minimum, an additional operating staff composed of a supervisor, STA, and IP operators, will be needed to accomplish the deactivation project work. If trained and qualified staff cannot be found, then a six to nine month period will be needed to train and qualify a new crew.

Availability: of SNM Material Storage Space, Sitewide

The Y-12 Plant is the primary DOE site for the processing and storage of HEU. It is anticipated that surplus inventories of HEU at other DOE sites which will be shipped to the Y-12 Plant for processing and storing. Many of the 9206 HEU materials which require interim or long-term storage while awaiting processing and/or off-site shipment will need to be given priority.

9206 Decontamination Pad

It is anticipated that the 9206 Decontamination Operations will be needed during the deactivation phase Clip as materials are removed. It is important to preserve the decontamination operating crew capability at 9206 until deactivation is complete.

9212/9206 Recovery Furnace(s)

The DOE and LMES are currently reviewing options for the reduction of site HEU contaminated combustibles, including the future scope of need for the 9206 and 9212 recovery furnace(s) operations and potential off-site shipment of a portion of the drums. The ultimate decision will impact the IMP disposition schedule, 9206 staff resources, and deactivation schedule.

ENS Audibility Zone

Other facilities surrounding 9206 Complex, including Building 9710-2, are affected by power outages in Building 9206 as it applies to the 200 ft. CAAS covered zone and the ENS audibility zone. The impact will be evaluated as a part of deactivation.

Y-12 and LMES Organization Support

The 9206 Complex will be dependent upon many other Y-12 organizations for the development and approval of its integrated safety authorization basis.

Fire Protection Systems

It is anticipated that once deactivation is complete and the hazardous SNM and combustible materials have been removed, the need for fire safety sprinkler systems will diminish and/or be eliminated. A dry system for S&M mode will be evaluated. Impact to surrounding buildings will be evaluated as well as interdependent water feed systems that support sprinkler systems. The Plant Fire Alarm System that supports facilities exterior to Building 9206 is expected to remain fully operational during the post deactivation phase. Peripheral facilities such as 9767-2, 9720-17, 9409-17 and others must be maintained, with working fire alarm communications. The fire alarm cable currently passes through or along the exterior surface of Building 9206. The rerouting of fire alarm system cabling and the maintenance of fire alarms will be evaluated to determine the extent of operability during deactivation and post deactivation. Specific fire alarm components that must be maintained after shut down will be defined.

Earthquake Monitors

The Y-12 Plant has two earthquake monitors installed inside Building 9206. They are active systems for which emergency access must be maintained. The post deactivation access and location will need to be evaluated.

13.2 INTRA DEPENDENCIES

9206 Process Knowledge and Experience

The current 9206 operations crew collectively has many years of knowledge and experience regarding 9206 HEU chemical recovery operations, known and potential hazards, and unique building processes. Several senior operators and supervisors have specific system knowledge. The availability of funding to perform deactivation needs to be prioritized to capture this capability.

9206 MAA

Performing deactivation within an MAA requires careful planning of all resources, e.g. equipment and personnel, to maximize working time and minimize additional security needs.

Internal Storage Space

The ability of 9206 to remove a significant portion of their chemical recovery process equipment is dependent upon available storage space for nuclear material within the building and the Y-12 Plant. Interim measures are currently under consideration.

Diked Areas

The material will need to be removed from the tanks and associated lines within the diked areas before the diked areas can be deactivated.

Chapter 12.0 outlines a methodology that will be used to qualitatively or subjectively assess project risk. The approach is modeled after project risk assessment processes outlined in standard project management texts and training courses but tailored to the unique risks encountered in DOE projects. An initial evaluation of project risk was prepared during the development of the BOE sheets, and is provided as Appendix J.

In the context of this chapter, project risk means risk to one of the project baselines (technical, cost, or schedule) and should not be confused with health and safety risks. However, health and safety issues are considered to the extent that they affect the risk to the project baselines.

12.1 Risk Assessment Tools

The following two primary tools will be used to conduct risk assessments:

- The Risk Assessment Matrix (Table 12-1). The Risk Assessment Matrix consists of two elements: risk factors and risk ranking guidelines. The risk factors represent the topics considered to have the most influence on project risk. The risk ranking guidelines are qualitative statements assigned to a low-, medium-, and high-risk category. The risk ranking guidelines are used to determine the risk impact of each of the risk factors to the project baseline.
- The Risk Assessment Data Sheet (Figure 12-1). The Risk Assessment Data Sheet is the tool used to document the results of the risk assessment session, and is designed to be used in conjunction with the Risk Assessment Matrix to obtain a structured, consistent, and rigorous assessment of risk.

The two tools can be used to manage the project risks by identifying, assessing, and reducing the risks through mitigation and contingency planning.

12.2 Risk Assessment Process

The risk assessment tools (Risk Assessment Matrix and Risk Assessment Data Sheet), may be applied at the project level, the subproject level, or the task level, as appropriate.

Risk assessments typically will be performed by an assessment team made up of project managers, technical staff, operating and field staff members, customers (RL, DOE-HQ, and FDH) and selected stakeholders as appropriate. The make-up of the team will vary, based on the project element and its position in the baseline hierarchy (i.e., project level, subproject level, or task/activity level). A team leader may be assigned or selected to schedule, lead, and document the results of the risk assessment session. The results of all project risk assessments will be maintained in project files. Assessments may be performed throughout the life of the project. Typically, risk assessments will be performed to support the change request process, when baseline adjustments are necessary, or to support the decision process for selection and implementation of technical alternatives.

The principles of this risk assessment guidance were used throughout the PMP development phase by the project management team, enhanced with contractor technical support. The prescriptive assessment tool is to be used during the intensive risk reduction and deactivation activities, when dedicated project management technical support is not readily available.

12.3 Issue Resolution and Decision Making

This section provides guidelines for the resolution of significant technical and program issues encountered during the project involving risk assessments. A systematic issue resolution and decision making process provides an approach to resolving project issues that is visible to internal and external stakeholders and enhances the confidence that decisions will be upheld.

Issue resolution and decision making will occur at all levels of the project organization, at all times, and with varying impact to the project. Many technical issues are resolved at the work planning level and usually have low impact to the project direction. Other major technical or program issues require resolution at a higher organizational level (project management and above) because of their potential for significant project impact. The issue resolution and decision-making process outlined in subsequent sections is intended to address the project decisions that significantly affect the project.

12.3.1 Issue Resolution Process

The issue resolution and decision-making process is summarized in Figure 12-1. The process begins when an issue is raised for resolution within a subproject. The project manager or designated staff identifies a set of alternative solutions. If several likely alternatives exist, the alternatives are systematically evaluated against a set of discriminating criteria (Section 12.3.2) used to identify a preferred alternative. This evaluation is documented in an appropriate format before the results are presented to the Project management team.

If applicable (major project impact to scope, schedule, or estimate), the Project Direction Foursome will review the results of the evaluation and either confirm or reject the recommended course of action. If the recommendation is rejected, additional analysis will be performed with the results presented back to the Project Direction Foursome. If the recommendation is accepted, the Project Direction Foursome must determine if the recommendation requires confirmation by the project board of directors. If confirmation by the board of directors is not required, the recommendation is finalized, documented, communicated and implemented. If the board of directors must confirm the decision, the recommendation is presented and acted on in the same manner as with the Project Direction Foursome (refer to Chapter 4.0, Sections 4.2.1 and 4.2.2).

12.3.2 Decision Criteria

The following nine performance measures have been identified that can be used to evaluate alternatives in support of the issue resolution and decision-making process:

- Safety
- Cost
- Schedule
- Operability
- Maintainability
- Environmental
- Technical maturity
- Complexity of interfaces
- Risk

The project values need to be considered while evaluating alternatives, but do not necessarily directly relate to technical evaluation of the alternatives. The recommended alternative should support the various values.

The performance measures represent a mixture of quantitative and qualitative factors. Some of the performance measures, such as cost, directly represent measurable variables that qualitative factors influence because some assumptions are used to develop the costs. Other performance measures, such as operability, depend much more on the experience and values of evaluators. Although some decision makers tend to focus on tangible and immediately visible performance measures, such as cost and schedule, some of the less tangible performance measures such as operability and safety, can carry heavy hidden cost penalties. These hidden costs should be identified by means of sensitivity analyses. The performance measures are as follows:

- Schedule. Implementing schedules and associated schedule risk will be assessed relative to implementation of a given alternative. Schedule interface with Tri-Party Agreement and other internal (BWHC) or external (DOE, regulatory, stakeholder) schedule requirements will be considered.
- Cost. The equipment, system or component will be evaluated with respect to capital, operating (including waste handling, analytical and preparatory paperwork), and life-cycle costs.
- **Operability**. This criterion is used for equipment and systems to be used during deactivation or installed for long-term S&M (i.e., emergency lighting). Operability of a system is mostly a qualitative measure of the inherent complexity of a system that influences other aspects of operability, such as the following:
- Startup and shutdown of the system
- Process control
- Troubleshooting and response to off-normal conditions
- Operator interface.
 - Maintainability. This criterion is used for equipment and systems to be used during deactivation or installed
 for long-term S&M (i.e., emergency lighting). Evaluating the complexity, reliability, and repair-ability can
 determine the maintainability of a system of the associated equipment and components.
 - **Safety**. Alternatives should be compared on the bases of associated hazards and implications for onsite and offsite safety, worker safety, and property protection.
 - Environmental. The environmental (regulatory) impacts of a system can be assessed by evaluating the
 following factors: liquid effluent generation, gaseous effluent generation, secondary dangerous waste
 generation, and permitting requirements.
 - **Technical Maturity**. The technical maturity of a deactivated process, system, or piece of equipment can be assessed by direct application or demonstration in the DOE complex or nuclear industry. Other factors that influence technical maturity or technology assurance include maximizing adaptability for new technologies or mission change, design flexibility or adaptability for incorporating improved technology, and avoiding regulatory uncertainty.
 - Complexity of Interfaces. The complexity of building and functional interfaces is assessed by evaluating compatibility with existing systems and complexity introduced by needed changes, requirements for support functions and facilities, and the number and diversity of organizations that must be involved in implementation.
 - Risk. The risk associated with a particular alternative can be examined by its sensitivity to cost and schedule changes and the capability of the alternative to uphold project values.

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Table 12-1. Risk Assessment Matrix.			
RISK FACTOR	QUALITATIVE RISK RANKING GUIDELINES		
	LOW	MEDIUM	HIGH
TECHNOLOGY	- Conventional/off-the- shelf	- Proven state of the art	- Unproven/new
	- Extensive previous building application	- Some previous building or site application	- Little or no previous building or site application.
	- Little or no testing required	- Some proof of application testing required	- Extensive proof of principle testing required.

			- Complex/highly engineered
INTERFACES	- Little or no impact from other site programs, operations or contractors	- Potential impact from other site operations, programs or contractors	- Potential MAJOR impact from other site operations, or contractors
	- Established and mature interfaces and working relationships used	- Some new interfaces must be established and managed	- Multiple and/or complex interfaces required which may include competing objectives
SAFETY	- Small project (fewer than 50 FTE)	- Moderate sized projects (50-150 FTE)	- Large projects (more than 150 FTE)
	- Little or no construction - Contractor experienced on same type of project	- Most elements of an " integrated " worker health and safety approach exist but may not be fully mature	- Multiple hazards - some of which are not well understood or there is a lack of experience in dealing with
	- Worker health and safety " integrated " with job planning. Integrated approach is fully	- Contractor/building has excellent safety record	- Significant construction required
	- Building/contractor has exemplary safety record	- Existing hazards are well understood	- Contractor/building does not have strong safety record or a mature safety program
			- " integrated " worker health and safety approach not implemented
POLITICAL VISIBILITY AND STAKEHOLDER	- Little or no stakeholder interest	- Some information sharing and communication outreach	- Potentially sensitive to stakeholders
INVOLVEMENT		- Stakeholders neutral but interested in progress updates	- Independent oversight or significant outreach/input required
			Involvement/coordinatio n with multiple regulatory agencies
FUNDING	- Less than one year duration	- Two to three year duration	- Three or more years duration
	- Detailed and validated estimate exists	- Detailed estimate but not yet validated	- Conceptual level estimate
TIME/SCHEDULE	- No known schedule constraints	- Some schedule constraints exist by won't affect completion date	- Multiple schedule constraints/compressed schedule
	- Predecessor and successor actions are simple and clearly identified and understood.	- Assumptions have been validated	- Activities developed only to conceptual level (multiple invalidated
	- Demonstrated ability to	required outside of	assumptions)

	perform activities - No assumptions with regard to performance - Resources identified, committed and under building control	building but high confidence in availability based on past performance	- Resources uncommitted or not identified
SITE CHARACTERISTIC S	1 site or buildingDOE propertyAccessibleNo required infrastructure	2-3 sites or facilitiesGovernment propertyAccessibleMinor infrastructure	4 or more sites or facilitiesPrivate propertyRestricted AccessMajor Infrastructure
LABOR	Low to moderate skillReadily availableGradual buildupLow productivity requirement	 Moderate/high skill Restricted availability Phased buildup Moderate productivity required 	 Moderate/high skill Severely restricted availability Rapid build-up High Productivity required
QUALITY REQUIREMENTS	- Large tolerances - Low QC requirements	- Average QC requirements	- High QC requirements
NUMBER OF KEY PARTICIPANTS (Internal and external)	- 1	- 2-3	- 3 or more
CONTRACTOR CAPABILITIES	- Proven track record and resources immediately available	- Limited experience or resource availability	- Newly acquired capabilities or resources committed to other projects
REGULATORY INVOLVEMENT	 Minimal permit requirements (e.g., NEPA CX) No compliance issues 	 Routine permit requirements with multiple agencies (e.g., NEPA EA) Compliance issues have precedent or defined path forward. Little negotiation required Complex permit requirements with multiple agencies or branches of government (e.g., NEPA EIS) Precedent setting compliance paths requires. Significant negotiation 	
MAGNITUDE AND COMPLEXITY OF CONTAMINATION	No potential for chronic or acute exposure to chemical or radiological hazards High confidence in the characterization of	Potential for chronic or acute exposure to well defined chemical or radiological hazards Excellent ALARA/HAZCOM/RadCo	 Potential for overexposure to chemical or radiological hazards Industrial, chemical and radiological hazards not

	strial, chemical and logical hazards	n and Industrial safety program performance	well characterized/defined
 - Fx	emplary	record	- Less than excellent ALARA/HAZCOM/RadCo
ALAF	RA/HAZCOM/RadCo		n and Industrial Safety
	d Industrial safety ram performance		program performance record
recor	d		

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Figure 12-1. Risk Assessment Data Sheet

RISK ASSESSMENT AREA (Cost, Schedule, Scope, Etc.) **RISK FACTOR** RISK RISK **MITIGATION & CONTRIBUTORS RANK CONTINGENCIES** Technology Interfaces Safety Political Visibility & Stakeholder Involvement Funding Time/Schedule Site Characteristics Labor **Quality Requirements** Number of Key Participants **Contractor Capabilities** Regulatory Involvement Magnitude and Complexity of Contamination