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TANK WASTE REMEDIATION SYSTEM CHARACTERIZATION PROJECT PROGRAMMATIC RISK MANAGEMENT PLAN

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Abstract: The TWRS Characterization Project has developed a process and plan in order to identify, manage and control the risks associated with tank waste characterization activities. The result of implementing this process is a defined list of programmatic risks (i.e. a risk management list) that are used by the Project as a management tool. This concept of a risk management process is a commonly used systems engineering approach which is being applied to all TWRS program and project elements. The Characterization Project risk management plan and list are subset of the overall TWRS risk management plan and list.

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Tank Waste Remediation System Characterization Project Programmatic Risk Management Plan

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LIST OF TERMS

AAS	Alternative Acquisition Strategy
CRML	Critical Risk Management List
DQO	data quality objective(s)
ES&H	Environmental, Safety and Health
RML	Risk Management List
RMP	Risk Management Plan
TWRS	Tank Waste Remediation System

TANK WASTE REMEDIAITON SYSTEM CHARACTERIZATION PROJECT PROGRAMMATIC RISK MANAGEMENT PLAN

1.0 INTRODUCTION

1.1 PURPOSE

This Risk Management Plan (RMP) supplements the *TWRS Programmatic Risk Management Plan* (WHC 1995g). It defines the approach for managing risks and includes a schedule for completing the activities necessary for implementing risk management in the Characterization Project. It defines actions to be taken at the overall project level and requirements for lower-level activities. The primary focus is on programmatic risks, that is, risks related to the cost, schedule, and technical performance of the Characterization Project. Environmental, Safety and Health (ES&H) risks are managed primarily through the definition of requirements for TWRS characterization functions and the use of ES&H risk criteria in the evaluation and selection of specific architectures for performing the functions. Therefore, unless otherwise noted, "risk" as used in this document refers to programmatic risk.

1.2 IMPLEMENTATION

Risk management, within the Characterization Project, will be performed from the bottom up to supplement the existing top down risk management work at the TWRS program level. The *TWRS Programmatic Risk List* (WHC 1995f) was developed by collecting programmatic (cost, schedule, and technical performance) risk information from source documents, computer model results, questionnaires, and interviews with TWRS staff members. The TWRS Programmatic Risk List is made up of two lists: a Risk Management List (RML) and a Critical Risk Management List (CRML). The CRML is a subset of the RML. It requires the highest priority of TWRS Level 1 and Level 2 management.

A single Characterization Project RML will be based on inputs from each organization within the project. In addition, the most critical items from the RML will make up the CRML so that increased management efforts can be placed on those items. Each organization within the Characterization Project may develop its own RML as a tool to assist managers in accomplishing day-to-day responsibilities.

1.3 SCOPE

The focus of the TWRS RMP is on risk management at the program level starting with the *TWRS Mission Analysis* (WHC 1995e), that is, the highest level of TWRS management.

This RMP focuses on the Characterization Project, one level below the TWRS program. The specific approach to managing risk, as outlined by this RMP, is in accordance with the *Risk Management (Interim)* procedure (WHC 1995b).

Of special note is the Alternative Acquisition Strategy (AAS) that will implement parts of TWRS retrieval, processing, and storage (that is, System Engineering Functions 4.2.2, 4.2.3, and 4.2.4). Because the Characterization Project has numerous interfaces with Alternative Acquisition Strategy functions, items from the Characterization Project RML will be selected for inclusion in the Alternative Acquisition Strategy RML.

For the purpose of this RMP and characterization risk management activities and responsibilities, the following definitions apply:

Program - The entire TWRS activity including all functions and Work Breakdown Structure elements comprising the Remediate Tank Waste Function 4.2.

Project - Each Work Breakdown Structure Level 4 element. Specific TWRS projects include the following:

- Safety Issue Resolution
- Waste Characterization
- Tank Farm Operations
- Waste Retrieval
- Low-Level Waste
- High-Level Waste
- Storage and Disposal.

Organizations - Specific organizations, defined by the Work Breakdown Structure as part of the Characterization Project, include the following:

- Technical Basis - Develops technical bases and manages information in support of the Characterization Project. The work scope includes managing technical basis and reports, determining systems engineering and data quality objective (DQO) requirements, evaluating data, coordinating plans and reports, managing data, and integrating technical baselines.

- Program Office - Manages the activities supporting the Characterization Project to ensure continued safe storage and disposal of tank wastes. The work scope includes program management, planning and integration, and characterization program oversight.

- Equipment Engineering - Analyzes equipment and operational techniques and implements improvements. The work scope includes managing sampling equipment, improving equipment availability and effectiveness, and deploying new equipment.

- Operations - Performs specific sampling methodologies. The work scope includes managing samples and measurements and obtaining physical samples through rotary-mode, push-mode, grab, auger, and vapor sampling.

- Laboratory - Perform sample analyses. The work scope includes managing rotary sample, push sample, grab sample, auger sample, and vapor sample analyses; laboratory upgrades; and technology applications.

1.4 RESPONSIBILITIES

All line management is responsible for implementing risk management within the Characterization Project. Ownership and use by line managers will ensure effective risk management. The responsibilities for overall Characterization Project risk management are assigned as follows.

- The lead manager is the Director of the TWRS Characterization Project.

- The lead engineer is the risk management team leader of the TWRS Characterization Program Office.

- The risk management team includes representatives from each Characterization Project organization to serve as points-of-contact.

Additional specific responsibilities include the following:

<u>TWRS Characterization Program Office</u>

- Updates this RMP

- Prepares the RML and CRML based on inputs from each organization

- Supports management in using the RML for the overall Characterization Project

- Mentors and consults with other TWRS projects and activities on risk management

- Provides inputs to the AAS RML

- Represents the Characterization Project on the Alternative Acquisition Strategy risk management team

- Provides a single point-of-contact for information on risk management.

Characterization Organizations

- Provide inputs to the Characterization Project RMP and RML.
- Provide a risk management team member as a point-of-contact.

1.5 PROJECT DESCRIPTION

Characterization is a tool or set of tools for obtaining information on the chemical and/or physical characteristics of a material.

- In most cases, required information can be found in existing documents and records, and, if the information meets quality standards, it can be applied directly to decision-making.
- In complex situations, information may be available, but it may require evaluating, analyzing, and qualifying prior to being applied.
- In more complex situations, new information will be needed, and a process to obtain it will need to be developed.
- New information leads to issue resolution; and is continuously fed back into the characterization process to verify and/or validate work previously accomplished and thereby reducing uncertainty.
- Where characterization is not feasible, options to mitigate or control hazards must be developed and evaluated.

Characterization is accomplished on a tank-by-tank basis until retrieval operations begin. A specific tank characterization effort is considered complete only when all currently identified information needs have been met with the required degrees of confidence, or when agreement that needs cannot be met is documented. Alternatives are then considered as described in *Alternative Generation and Selection (Interim)* (WHC 1995a). Because of the complexity of tank wastes, characterization is an iterative process. To resolve safety issues and support safe interim storage and disposal, needs will have to be redefined as progress is made, and new information may have to be obtained.

Information needs are identified by applying the DQO process. This process provides a systematic planning tool for determining the type, quantity, and quality of data to support a decision. All TWRS organizations use the DQO process to identify and document information and data collection needs including such issues as safety, process development and viability, regulatory, historical information, models, and scientific inquiry.

Within TWRS, the Characterization Project provides tank waste characterization information for Hanford Site double-shell, single-shell, and miscellaneous underground storage tanks. The physical and chemical characteristics of the different tank wastes are obtained by reviewing historical processing data, *in situ* analysis, and/or physical sampling and analysis. The information is used to identify and resolve safety issues, establish the safety basis for the tank farms, determine the operating conditions, design waste retrieval systems, develop and test flowsheets for pretreatment, and identify high- and low-level waste immobilization processes. A more complete description of how the Characterization Project supports the TWRS Program is contained in the *TWRS Baseline System Description* (WHC 1995c).

2.0 APPROACH TO RISK MANAGEMENT

The general technical approach to risk management being used by the Characterization Project is found in Section 2.0 of the *TWRS Programmatic Risk Management Plan* (WHC 1995g). It is based primarily on the approach used by the Department of Defense in system development and acquisition (DSMC 1989).

3.0 IMPLEMENTATION

The Characterization Project risk management philosophy is based on making risk management a useful tool for all managers in their day-to-day responsibilities. Managers need to have the flexibility to tailor risk management to their specific needs. The needs must be balanced with consistency and efficiency that can be achieved by a common approach throughout the Project. Organizations are encouraged to use the tools considered most appropriate by project management within the framework defined in this RMP. For the RML, common structure and software are encouraged but will not be required if other approaches are preferred, and project-level risk management needs can still be met. The lead manager, the lead engineer, and the risk management team will jointly determine common structure, procedures, and software for the RML.

3.1 SPECIFIC ACTIVITIES

This section identifies specific activities and products and a schedule associated with Characterization Project risk management activities.

3.1.1 Project

At the overall Characterization Project level, risk management will focus primarily on high-level risks, that is, risks that affect multiple high-level functions and require senior management attention. The following is included:

- The RMP will be revised to reflect experience with risk management, changing program needs, and scheduled activities. The revised RMP will provide guidance for risk management activities that need to be included in future program planning.

- The CRML will be prepared based on inputs from the respective organizational points-of-contact. It will be a subset of the RML. The RML and the CRML will be reviewed by senior managers and managers responsible for the respective risks. If details are requested, backup plans for risk mitigation action will be provided by the responsible manager at the monthly meeting. Both lists will be updated and maintained by the lead engineer immediately prior and after the review.

- Risk Management Coordination - The lead engineer will be the risk management point-of-contact and will inform TWRS Technical Integration about Characterization Project risk management activities; in turn, TWRS Technical Integration will inform the point-of-contact about program risk management activities and requirements.

3.1.2 Organization

Each characterization organization (see Section 1.3) will be responsible for managing risks that affect that organization. Each organization point-of-contact will provide input for the RML.

Activity managers will use the RML to identify the risks for which they are responsible and for the risks which are the responsibility of others but which may impact their own activities.

3.2 SCHEDULE

The schedule for accomplishing the activities defined in Section 3.1 is as follows:

Risk Management Coordination	ongoing
Initial Characterization RMP	December 1995
Initial Characterization RML	December 1995
Characterization RML Update	ongoing
Training	April 1996
Mentoring	ongoing
Measurement and Improvement	July

APPENDIX A

PROCEDURES FOR CHARACTERIZATION RML AND CRML

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APPENDIX A

PROCEDURES FOR CHARACTERIZATION RML AND CRML

Appendix A provides procedures for developing and implementing the characterization RML and CRML. Figure A-1 is a functional flow diagram showing procedures that need to be performed. A description of each procedure is given below.

1. Identify Risks - Each point-of-contact will compile a list of risks for their organization as potential input to the Characterization Project RML. Data for the lists may be collected through interviews, document reviews, analysis of computer output, and/or questionnaires. Top-level managers and technical representatives can be interviewed or given questionnaires. Documents containing key assumptions, issues, systems engineering information, or previous programmatic risk analysis may be reviewed.

2. Determine Consequences - The contact should obtain a description of impacts or consequences if the event occurs. This information can be obtained directly by interview or questionnaire. The consequences of risks from other sources will be the responsibility of the contact.

3. Determine Risk Likelihood - Determines the likelihood (probability) for a risk to occur. Define likelihood as the probability that a specified undesirable event will occur over the lifetime of the Characterization Project if no new action is taken to prevent its occurrence. Low, medium, or high likelihood ratings are established using the following probability ranges: low = < 0.25, medium = 0.25 to 0.75, high = > 0.75.

4. Determine Consequence Severity - Consequence is defined as the estimated magnitude of the negative effect (severity) should a specified undesirable event occur if no new mitigation action is taken. It is recognized that risk consequences may vary depending on the phase of the Characterization Project. Low, medium, and high consequence ratings are established using the following impact descriptions.

   - A low rating requires minor reallocation of resources or a schedule slippage that does not compromise a critical milestone or budget goal.

   - A medium rating requires significant reallocation of resources or a schedule slippage that may jeopardize at least one critical milestone or budget goal.

   - A high rating indicates that critical milestones will not be met or the allocated budget will be exceeded by an unacceptable amount.

Steps 2, 3, and 4 are subjective. Their importance has to do with the relative difference between risk items.

Figure A-1. Characterization Risk Management Functional Flow Block Diagram.

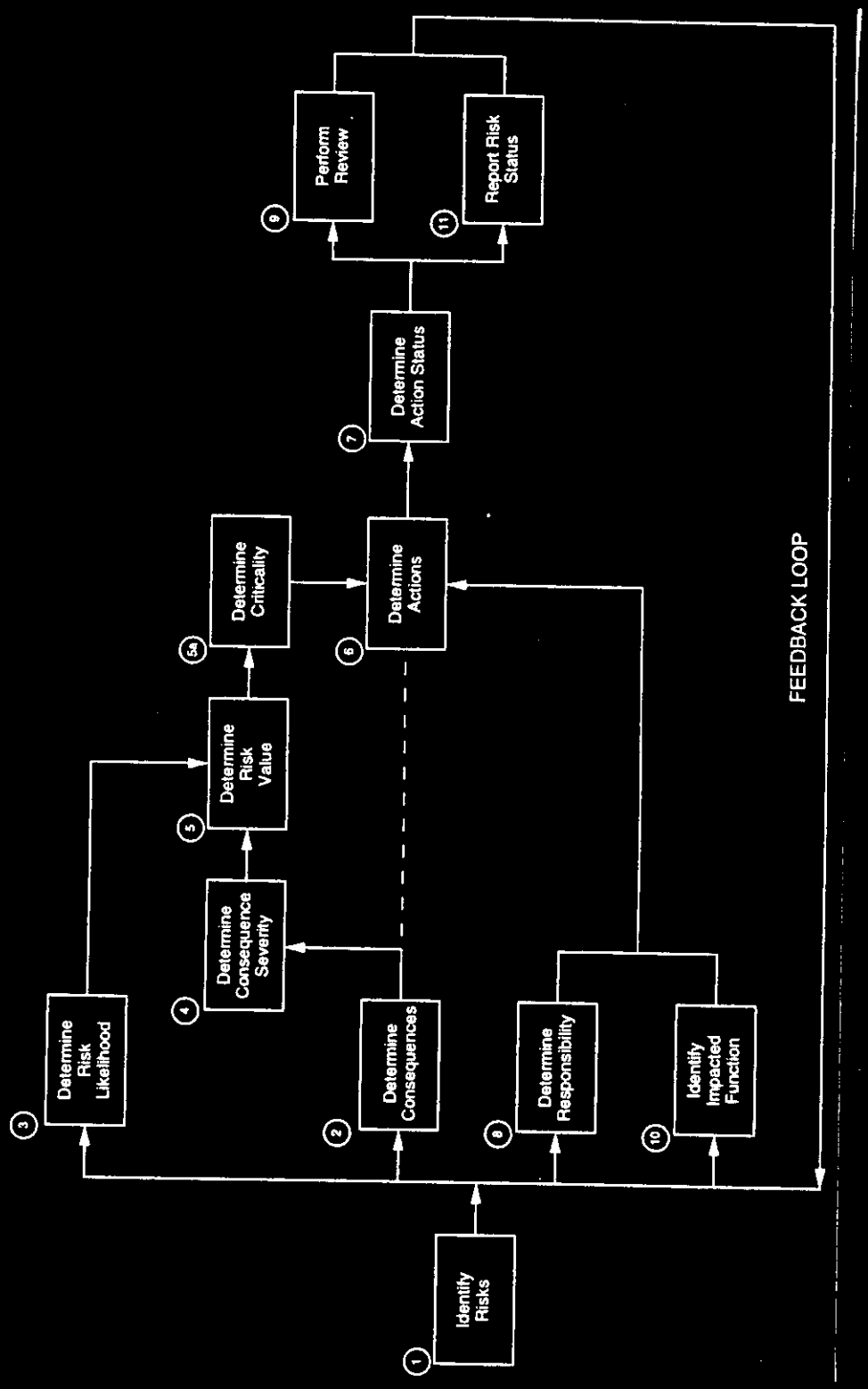

Table A-1. Risk Value Matrix.

		Consequences		
		Low	Medium	High
Likelihood	Low	Very low	Low	Medium
	Medium	Low	Medium	High
	High	Medium	High	Very high

5. Determine Risk Value - Risk values are magnitude guidelines determined at the intersection between risk likelihood and consequence. They are an interpretive measure of the likelihood of failure. Because the primary responsibility of risk management is to identify and quantify programmatic risk and to formulate mitigation strategies, using risk values are a useful measuring tool quantification. For this reason, a set of risk values were developed and placed in a matrix (see Table A-1) from which intersection values could be selected. The underlined values in Table A-1 are the risk values.

5a. Determine Criticality - In Table A-1, the magnitude of an event with a low likelihood and a low consequence is very low, which means the event should not require intensive management effort. However, if the magnitude of an event is very high (a high likelihood and a high consequence) the event should be considered for placement on the CRML for senior management attention and control. A risk that has been rated as very high does not automatically appear on the CRML. For example, if the event cannot occur for several years and an inexpensive mitigating action can easily be taken at any time, management may decide that the risk belongs only on the RML at this time.

Example conditions for placing a medium to high risk on the CRML include the following.

- The consequences of failure are very serious.
- Immediate action is required to preclude the event from happening.
- The event/situation is a top priority for stakeholders.
- A high performance-based initiative is associated with the event/condition.
- The required actions are difficult to coordinate.
- Senior management decision making is required.

6. Determine Actions - Risk mitigation is an essential aspect of risk management. It comes after identifying the likelihood and consequences of risk events. Risk mitigation categories (risk handling strategies) are developed to categorize what could

be done to eliminate or reduce risk. Risk mitigation categories include avoidance, control, assumption, and transfer. Each risk mitigation category is described as follows:

Avoidance means to reject an option because of potentially unfavorable results. Actions may be possible that completely eliminate a risk.

Control means to continually monitor and correct the condition. The likelihood of occurrence and the potential consequences are candidates for reduction.

Assumption is the conscious decision to accept the consequences if a risk occurs.

Transfer means to share the risk through contractual agreements such as performance incentives, warranties, and insurance.

7. Determine Action Status - The status of the mitigative action (pending, ongoing, completed).

8. Determine Responsibility - Identify the managers in the U.S. Department of Energy and Westinghouse Hanford Company responsible for managing and controlling the risk.

9. Perform Review - The date on which the next review will be held.

10. Identify Impacted Function - Identify the functions affected by the risk from *TWRS Functions and Requirements Document* (WHC 1995e).

11. Report Risk Status - The risk status indicates the attention required as shown by the quick reference traffic light chart (green, amber, or red).

Each point-of-contact will input into the RML using the above procedure. The lead engineer will oversee the task of putting together the RML and identifying risks to be placed on the CRML.

A standard format (see Table A-2) was developed for collecting, evaluating, and reporting risk information for the TWRS RML and CRML. The Characterization Project RML will use the same format with 11 information elements The number of each element corresponds to a step described in Figure A-1.

1. Event/Situation
2. Impacts
3. L: Likelihood
4. C: Consequence
5. RV: Risk Value
6. Mitigating Actions

7. Action Status
8. Responsible DOE/WHC
9. Review Date
10. Function
11. Risk Status.

The following six information elements can be collected by the points-of-contact during interviews and document reviews: event/situation, impact, likelihood, consequences, mitigation action, and responsible party. Risk value is computed by determining the appropriate intersection between likelihood and consequence. The function element is determined by reviewing the issues and affected functions presented in Appendix G of, *TWRS Functions and Requirements Document* WHC 1995e. The remaining three elements (action status, next review date, and risk status) can be entered when the responsible party is finalized and status tracking begins.

Table A-2. TWRS RML Example.

What can go wrong ... Event/situation	If it happens ... impacts	L	C	RV	What can be done ... Mitigation Actions	Action status	Responsible DOE/WHC	Review date	Func.	Risk status
1) DST capacity is not sufficient - cannot accept new waste New waste incompatibilities with waste in storage tank Volume: acceleration or increase of waste from generators above planned amounts, delays in other TWRS activities, e.g., evaporator failure Leak in receptor DST Cannot fully use tank because of equipment or component failure (e.g., transfer lines)	Reduced ability to safely manage waste and avoid environmental insult Unable to accept new waste from generators, from retrieval, or interim stabilization wastes Unable to provide space for emergency pumping Other TWRS activities are unable to move forward (e.g., disposal)	H	H	VH	Use the MWTF Path Forward Plan to plan for adequate DST space Track available and needed waste volume Use a dynamic model to analyze alternatives and support decision making Accept increased future operational risk of using evaporator operating tanks as spares Obtain permission to use SSTs for emergency pumping destination Build new DSTS		Sidpara/ Wicks			C-9

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