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RISK ASSESSMENT REPORT:

SALT PROCESSING PROGRAM

JANUARY 2004

Westinghouse Savannah River Company
Savannah River Site
Aiken, SC 29808

Prepared for the U.S. Department of Energy Under Contract Number DE-AC09-96SR18500

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LIST OF ACRONYMS

AB	Authorization Basis
AMHLW	Assistant Manager for High Level Waste
ARP	Actinide Removal Process
CBU	Closure Business Unit
CSSX	Caustic Side Solvent Extraction
CST	Crystalline Silicotitanate
DSS	Decontaminated Salt Solution
DF	Decontamination Factor
DNFSB	Defense Nuclear Facilities Safety Board
DOE-HQ	Department of Energy, Headquarters
DOE-SR	Department of Energy, Savannah River
DOJ	Department of Justice
DWPF	Defense Waste Processing Facility
EIS	Environmental Impact Statement
EM-42	Office of Project Completion, Savannah River Office
EPC	Engineer, Procure, Construct
FFA	Federal Facility Agreement
HLW	High Level Waste
HS	Handling Strategy
LCS	Low Curie Salt
LWD	Liquid Waste Disposition
MST	Monosodium Titanate
OD	Operating Division
PD	Programs Division
PNNL	Pacific Northwest National Laboratory
PMP	Performance Management Plan
R&D	Research and Development
ROD	Record of Decision
RAR	Risk assessment Report
RHS	Risk Handling Strategy
RMP	Risk Management Plan
SME	Subject Matter Expert
SPD	Salt Processing Division
SPF	Saltstone Processing Facility
SPP	Salt Processing Program
SRS	Savannah River Site
SS	Saltstone
SWPF	Salt Waste Processing Facility
TBD	To Be Determined
TFA	Tank Focus Area
TPB	Tetraphenylborate
WAC	Waste Acceptance Criteria
WIR	Waste Incidental to Reprocessing
WSRC	Westinghouse Savannah River Company

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REVISION HISTORY

Rev.	Date	Description
0	6/2003	Initial Issue
1	11/2003	Incorporate DOE comments as per correspondence, Hansen to DeVine, dated 11/04/2003
1.1	01/2004	Incorporate editorial comments from DOE

EXECUTIVE SUMMARY

This report documents the results of a programmatic risk assessment conducted on the Savannah River Site's Salt Waste Treatment and Disposal Program. It provides the U.S. Department of Energy and Westinghouse Savannah River Company a management tool to identify and manage risks associated with the safe and economical treatment and disposal of salt waste at SRS. This report will be submitted in response to Corrective Action 2.12 of DOE's implementation plan for the Defense Nuclear Facility Safety Board Recommendation 2001-1.

Salt waste makes up 34 million gallons of the 37 million gallons total in the high level waste system at the Savannah River Site. Under the Site's Accelerated Cleanup Plan, a three-pronged strategy to treat and dispose of salt waste has been proposed and is being implemented. Analyses have shown that salt waste treatment and disposal are on the critical path to the completion of cleanup activities for the SRS high level waste system. Success in the Salt Processing Program is vital to the overall success of the Site's accelerated cleanup plan.

Salt waste can be segregated into three general categories – low curie salt, low curie with higher actinide salt, and high curie with high actinide salt. Processes to treat each of these categories of waste have been identified and make up the three-pronged strategy. The low curie salt treatment process will treat and dispose of the approximately two-thirds of the salt waste that is low in cesium. One-half of the low curie volume (one-third of the total waste volume), which is low in cesium and low in actinides, will be processed at Saltstone after verification that the waste meets the facility waste acceptance criteria. The remaining volume of low curie salt (one-third of the total waste volume), low in cesium but high in actinides, will be pre-treated using the Actinide Removal Process prior to final disposition at Saltstone. The planned Salt Waste Processing Facility will treat the remaining one third of the salt waste by removing both cesium and actinides prior to disposal.

A team made up of experienced, senior-level personnel from within DOE-SR and WSRC was chartered to develop the programmatic risk assessment. A subteam prepared the risk assessment plan and the core team, with input from subject matter experts, conducted the risk assessment during a focused two-week period. The Risk Assessment looked at the following assessable units of the salt waste treatment and disposal program.

- Feed Management
- Actinide Removal Process
- Salt Waste Processing Facility
- Low Curie Salt Processing
- Saltstone
- Saltstone Alternative Technology
- Defense Waste Processing Facility
- Support Functions

Previously completed risk assessments were reviewed for applicability. The focus was placed on identifying risks that were programmatic in nature or in consequence.

The core team identified 28 risks that were applicable to the salt program. The team assigned a probability of occurrence, a severity of consequence, and a level of risk for each of 28 risk events identified, based on the criteria developed in the planning for the risk analysis. Seven (7) of the risks were rated as **High**, six (6) were rated as **Moderate**, 14 were rated as **Low**, and one (1) was rated **Uncertain**. The High risks identified were as follows, in order of probability, and within order of probability, by magnitude of consequence, where it was possible to estimate a consequence. The Uncertain risk is also listed below.

Risk Number	Risk Title	Probability	Worst Consequence
SWPF-00-055	High Curie Salt Treatment Capacity and Schedule Exceeded	Very Likely	>$6.1B
SWPF-00-046	High Feed Cesium and Actinide Concentrations to SWPF	Very Likely	>$640M
SPP-00-048	MST Loading Impacts Ti Loading in DWPF Glass	Very Likely	$500M
SPP-00-043	Material and Chemical Balances Not Accommodated for the DWPF Interfaces	Very Likely	$500M
LCS-00-002	Cesium or Actinides Exceed LCS Limits	Likely	$810M
SPP-00-039	Equipment Failure Halts SPP Processing	Likely	$540M
SPP-00-021	Funding Competition Impacts SPP	Very Likely	$6.1B
SPP-00-006	Regulators, Stakeholder Concerns - WIR	Uncertain	Unknown

After the application of proposed handling strategies, two risks would remain ranked as High: Equipment Failure Halts SPP Processing; and Funding Competition Impacts SPP. One risk would remain ranked as uncertain: Regulators, stakeholder concern – WIR (Waste Incidental to Reprocessing. Of the remaining risks, eleven (11) would be reduced to or accepted as Low; three (3) would be mitigated to, reduced to, or accepted as Moderate; and eleven (11) risks would be avoided. Potential for second order impacts remains, which may increase the total impact of multiple risks.

Reductions in risk level depend on successful implementation of the recommended risk handling strategies. The strategies identified in this assessment are not fully funded at this time. This assessment did not attempt to quantify program contingencies to cover all cost and schedule impacts of identified risks. Rather, the descriptions of the risks identified and risk handling strategies are presented to WSRC Management and the DOE for consideration in making decisions which affect the risks and vulnerabilities in order to promote maximum success for the implementation of accelerated cleanup activities.

On July 3, 2003, parts of DOE Order 435.1 dealing with the authority for determining waste incidental to reprocessing were declared invalid by the U.S. District Court for the District of Idaho in the case of Natural Resources Defense Council v. DOE, Case No. 01-413-S-BLW. The District Court's ruling is currently on appeal to the U.S. Court of Appeals for the Ninth Circuit. Accordingly, it is not appropriate to address these types of probabilities or consequences, nor to undertake a probability or consequence analysis of the litigation's outcome in this document at this time.

WSRC has initiated action on many of the risk handling strategies identified, and recommends that the future overall risk mitigation strategy be focused in the following areas:

1 Risk-handling strategies for risks identified as High should be immediately implemented to minimize program impact.

2 To ensure that the capacity of the HLW system can meet the performance expectations of the PMP, SPP should perform an attainment study to determine the quantitative maximum potential process capability of the integrated HLW system, including the existing and proposed process facilities. This should include an analysis of the secondary impacts from the interaction between coupled facilities (e.g., statistical analysis of the ARP schedule risks). Results of this study need to be available prior to the start of final design for the SWPF in order to enable the design team to accurately size the processing capacity of the facility, including buffer storage capacity.

3 In order to reduce the probability that an interruption could occur in operation of any individual facility or the system resulting from inadequate blending strategies, or use of feed batches which require multiple process cycles, or acceptance of a non-compliant feed batch, SPP should initiate further refinement of the HLW system planning tools to include a comprehensive material balance flowsheet integrating all HLW facilities and modeling the performance of the processing facilities. This material balance flowsheet would be at the level of detail necessary to identify potentially non-compliant waste streams with sufficient lead time to preclude system interruptions.

4 In order to minimize the risk associated with the limited experience using CSSX technology for high level waste processing on a production basis, DOE should continue to provide funding for ongoing technology development activities which reduce risk. Priority should be placed on those activities that have the greatest potential of reducing high risks and multiple risks of a lower ranking.

5 Responsibility for coordination of risk analyses performed on projects or operational initiatives required to meet the expectations of the PMP should be assigned to a single manager responsible to the Salt Processing Program Manager. All risk analyses performed on projects or operational initiatives required to meet the expectations of the PMP should be reviewed and evaluated by that manager to ensure that:

- emergent risks in any individual project or initiative that could impact any other project or the overall Program would be identified
- risk-handling strategies are being implemented by the responsible project owner or facility manager
- the status of risks affecting the program are monitored and communicated to senior program management in timely manner

Risk status will be monitored and reported to the Manager, SPP, and the Director, SPD, on a periodic basis. This analysis will be reviewed and updated periodically to capture the latest developments that may impact accelerated cleanup.

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1.0 SALT PROCESSING PROGRAM INFORMATION

1.1 PROGRAM BACKGROUND

Since the early 1950s, the Savannah River Site has produced approximately 100 million gallons of high level waste. Through evaporation and treatment approximately 37 million gallons of high level waste containing approximately 426 million curies of radioactivity remain today. Of this quantity, salt makes up approximately 34 million gallons and contains 207 million curies of radioactivity. Sludge, which will be vitrified and shipped to Yucca Mountain for disposal, makes up the remaining inventory. The salt inventory includes solidified salt, called saltcake, and liquid salt solution, called supernate.

SRS developed a three-pronged, tailored approach to treat and dispose of the salt waste. (Figure 1) The salt inventory can be segregated by radionuclide content into three general categories: 1) salt which is low in cesium and low in actinides, 2) salt which is low in cesium but contains higher levels of actinides, and 3) salt which contains high levels of cesium and high levels of actinides. Each of these categories of material have a process by which the salt can be treated and made acceptable for disposal as low level waste in SRS's Saltstone Facility.

Approximately one third of the current inventory of salt is low in cesium and low in actinides. This material (referred to as low curie salt) is treated by the removal of the cesium-bearing interstitial liquid, followed by dissolution of the hard saltcake and transfer to the Saltstone Facility for disposal. An additional one third of the salt is low in cesium but contains actinides. This material can be treated by removing interstitial liquid (as with low curie salt) followed by dissolution and transfer to a staging tank. It can then be treated with monosodium titanate and filtered to remove the actinides. The remaining one third of the salt inventory contains significantly higher levels of cesium and actinides. The Salt Processing Environmental Impact Statement and Record of Decision were issued in late 2001 to document DOE's proposed path forward for treating and disposing of this salt waste. The technology to be used for treating this waste is the caustic side solvent extraction process. The Salt Waste Processing Facility is currently in the design phase and will incorporate this technology to treat the remaining salt waste and send the decontaminated salt solution to the Saltstone Facility for disposal. This strategy tailors the treatment of each of the salt waste fractions to the risk and hazards involved

This approach focuses on implementing expedited treatment methods that ensure the fastest risk reduction, while meeting the performance requirements and protecting human health and the environment. The implementation of this strategy will help meet the present SRS Environmental Management Program Performance Management Plan (WSRC-RP-2002-00245, Rev. 3) commitment to process all HLW (salt and sludge) by 2019. (Reference 1.)

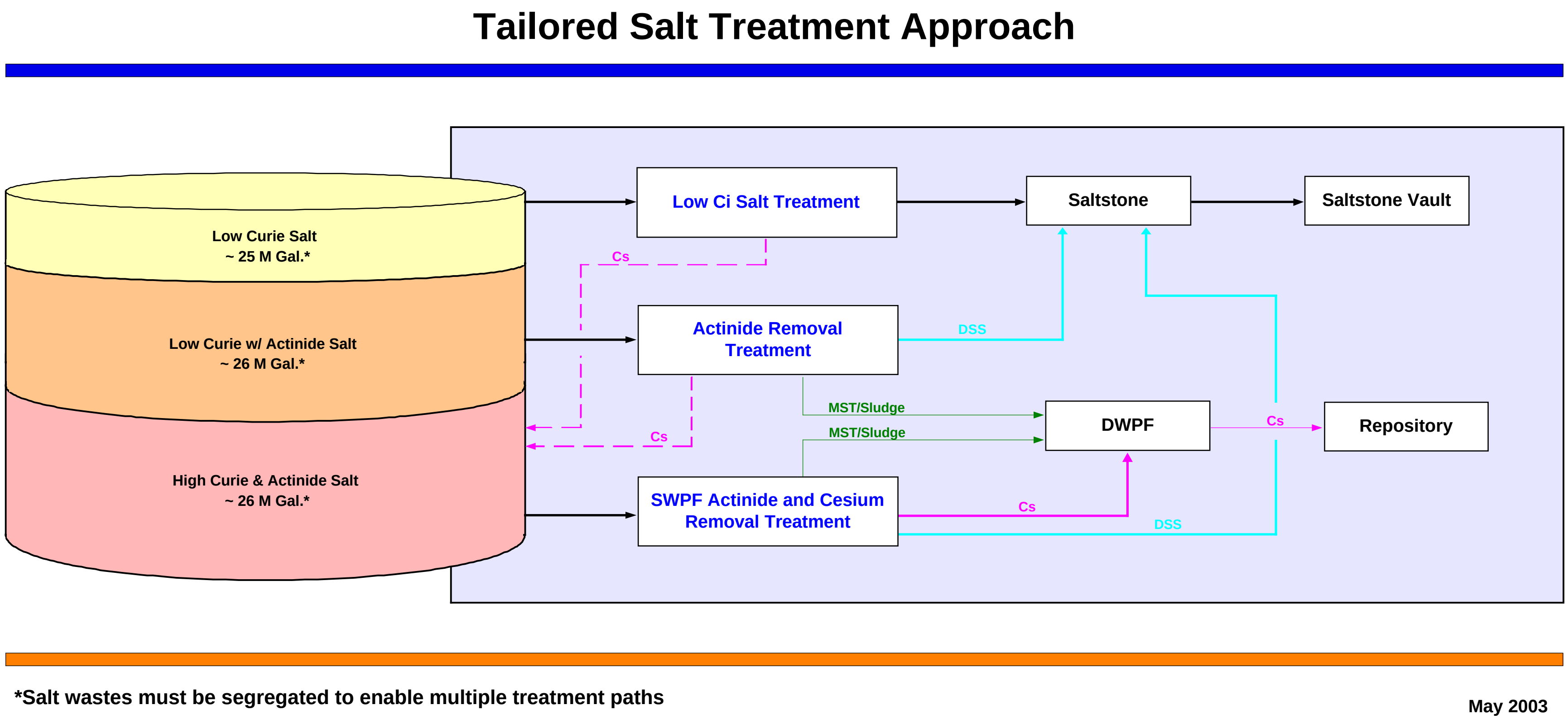

Figure 1. Tailored Salt Treatment Approach

Note: Volumes represented based on adjustment to 6.4 M sodium.

The low curie salt program was initiated in 2002 and was projected to result in the treatment and disposal of the initial batch of low curie salt waste by late 2003. The actinide removal process is currently being implemented via an existing site facility (512-S, the former Late Wash Facility) that is being restored and modified. It will be operational in early 2004 to provide an initial actinide removal capability. In 2005, another existing facility, 241-96H (Filter Stripper Building) will be tied into 512-S to provide significantly more actinide removal process throughput. The Salt Waste Processing Facility (SWPF), which will treat the remaining one third of the salt waste inventory, is currently in the design phase with two engineering, procurement, and construction contractors competing for the design/build contract. The capacity for this facility was determined in mid-2003 and the down-select to a single contractor occurred in early 2004. Construction is scheduled to begin in 2005 and initial operation is planned for the 2009-2010 timeframe.

This Risk Assessment Report assesses programmatic risks associated with the SPP as implemented to support the Performance Management Plan (PMP) commitments. (Reference 2.) By implementing the PMP strategy, the overall HLW system lifecycle may be expedited by eight years (from 2027 to 2019).

1.2 PROGRAM AREAS AND FUNCTIONS

The SPP, for the purpose of this Risk Assessment Report, is divided into the following program and upper-level functions. These were the areas defined as Assessable Elements for the SPP risk assessment. These assessable elements separate the High Level Waste system into smaller manageable elements that facilitate the identification of risks by areas of unique process function or support (e.g., feed management or other support functions). These closely align with processes or support functions for which risk analysis had been completed previously at the project level.

Feed Management

- Characterize Waste
- Determine Path
- Prepare Feed
- Transfer Feed

Actinide Removal Process

- Receive Salt Solution
- Store Salt Solution
- Transfer Dissolved Salt Solution to Feed Tank (Tank 48 or 49)
- Process Salt Solution
- Separate Actinides
- Transfer Filtrate to Tank 50, then to Saltstone
- Store Filtrate
- Transfer MST/Sludge as Feed to DWPF
- Provide Infrastructure
- Monitor Process
- Control Process
- Increase Throughput of Facility/Process

SWPF

- Receive Feed
- Process Salt Solution
- Separate Actinides
- Remove Cesium
- Transfer Decontaminated Salt Stream as Feed to Saltstone
- Transfer MST/Sludge Stream as Feed to DWPF
- Transfer Acidified Cesium Stream as Feed to DWPF
- Provide Infrastructure
- Monitor Process
- Control Process
- Increase Throughput

Low Curie Salt Processing

- Remove Interstitial Liquid from Salt Tanks
- Dissolve Salt Solution
- Transfer Salt Solution to Tank 50
- Transfer Salt Solution as Feed to Saltstone Processing Facility
- Monitor Process
- Control Process

Saltstone

- Receive Low Curie Salt Solution as Feed for processing into Saltstone
- Store Low Curie Salt Solution
- Process Low Curie Salt Solution into Saltstone
- Construct New Vaults
- Manage Existing Vaults
- Provide Infrastructure
- Monitor Process
- Control Process

Saltstone Alternative Technology

- Develop Alternative - Introduction of new technologies that will improve group processing capability (i.e., higher curie content, process improvements, reliability, throughput)
- Implement Alternative

DWPF

- Receive MST/Sludge Slurry as Feed
- Receive Acidified Cesium Stream as Feed
- Process MST/Sludge Slurry and Cesium into Glass
- Store Vitrified Cesium Waste

Support Functions

- Develop AB Documentation

2.0 RISK ASSESSMENT

2.1 INTRODUCTION

DOE's revised Implementation Plan in response to the Defense Nuclear Facilities Safety Board's Recommendation 2001-1, High-Level Waste Management at the Savannah River Site was issued May 10, 2002 (2002-004978) (Reference 3). This Risk Assessment Report will be submitted to satisfy Implementation Plan Commitment 2.12, which states, "Prepare a programmatic risk assessment with mitigation strategies for the salt processing program."

2.2 RISK ASSESSMENT PROCESS

The initial planning for this assessment is documented in the Risk Management Plan for the Salt Processing Program (Y-RMP-H-00009) (Reference 4). This plan was reviewed and implemented by the risk assessment team, with minor modifications, as described by the following activities:

1. Identification of risks, via team expert elicitation and examination of previously identified risks, combined with a team review of other risks associated with the SPP.
2. Calibration of risk probability, into categories of Non-Credible, Very Unlikely, Unlikely, Likely, and Very Likely, based upon the timing of/impact on the SPP.
3. Calibration of the risk consequences associated with cost overrun and schedule delay into categories of Negligible, Marginal, Significant, Critical, and Crisis, based upon the severity of impact on the SPP.
4. Assignment of probability and consequence levels to the identified risks, per Tables 1 and 2.
5. Determination of the Risk Level of each risk, based upon the combination of the risk probability and consequence, as identified by the matrix shown in Table 3.
6. Selection of a handling strategy for each risk, consistent with the handling strategy guidance provided in WSRC-IM-98-00033: Systems Engineering Methodology Guidance Manual, Appendix B: Risk (and Opportunity) Analysis and Management.
7. Determination of the potential impact of implementing the handling strategy, with respect to additional cost to the program to do so, as well as additional project time which may be required. The handling strategy would need to meet applicable legal requirements including NEPA. A manager will be assigned and accept responsibility for each handling strategy.
8. Identification of residual risk level, based upon implementation of the selected handling strategy, including the revised cost and schedule impact, as applicable.
9. Documentation of the above on Risk Assessment Forms. The complete Risk Assessment Forms are found in Appendix A.

The risk assessment was conducted consistent with the WSRC risk assessment methodology defined in WSRC E7, Procedure 2.16, *Technical Risk Analysis* (Reference 5). This procedure was specifically developed for the analysis of technical risk associated with the engineering and design process for plant modifications and projects. The process was modified to accommodate the analysis of risk from the perspective of a program which spans multiple, functionally related projects, facilities, and proposed initiatives. Participants in the risk assessment were given a one-day training session on the risk assessment process and its application to the Salt Processing Program. An initial calibration for activities 2 and 3 above was included as part of the training process.

Process steps performed during the risk assessment included activities 1 through 9, above.

For activity 7, in some instances, the Team did not quantify implementation cost or schedule requirements to conduct handling strategies. Accurate quantification was not considered feasible by the team given the absence of sufficient detail for the cost or schedule of certain assessable elements (e. g., Saltstone alternative technology, actinide removal capacity improvements to 6 gpm, etc.). Actions identified were being addressed where possible within currently scheduled operations activities and funding.

For activity 8, although residual cost and schedule impacts were documented in some instances, residual cost impacts were not analyzed to determine the risk or cost contingency. Many risk handling strategies identified for various risks are funded and addressed by ongoing projects, high level waste operational initiatives, or FY03 technology development activities as referenced in the Risk Summary Table, Appendix B, and individual Risk and Opportunity Assessment Forms, Appendix A.

Two other risk assessment outputs specified by Reference 5 were not quantified. Specifically, due to lack of sufficient detail for major program elements, the Team chose not to determine the risk-based cost contingency required to minimize the possibility that program risk will result in excess cost to the program. Nor did the Team attempt to quantify a schedule contingency. Quantification of SPP contingency at this early stage of PMP implementation is not considered meaningful. The PMP reflects an aggressive and visionary plan for accelerated disposition of salt waste. By its nature, such a plan is expected to entail significant risk. As projects and initiatives required for implementation of the SPP mature, technical and programmatic risk analyses conducted at the project level should enable better and more meaningful cost and contingency estimates.

2.3 TEAM MEMBERS

The Risk Assessment Team is composed of individuals from both DOE and WSRC selected to participate based upon their diverse knowledge and expertise. Core Team members for this risk assessment were:

WSRC Core Team Members	**DOE Members**
Tom Lex-WSRC/CBU/LWD	Terrel Spears –DOE-SR/AMHLW/SPD
Bill Tucker-WSRC/CBU/SPP	Carl Everatt–DOE-SR/AMHLW/OD
Ginger Dickert-WSRC/CBU/LWD	Doug Hintze–DOE-SR/AMHLW/PD
Mark Mahoney-WSRC/CBU	Kurt Fisher-DOE-HQ/HLWOD

Bob Hinds-WSRC/CBU/SPP - **WSRC Lead**

Biographical information of the Team Members is found in Appendix C. Other subject matter experts were made available to provide detailed operational, project, and program information. Representatives of the two EPC Contractors currently engaged in developing conceptual designs for the SWPF were present, as were observers from a risk consulting firm who were evaluating and monitoring the risk assessment methodology and implementation for the DOE. The list of attendance for each day is found in Appendix C.

2.4 RISK IDENTIFICATION AND ANALYSIS

This risk assessment was conducted in workshops held on February 20, and on March 3, 4, 5, 6, 7, 10, and 11 of 2003. The program was divided into assessable elements, shown in Section 1.2 of this report. During the risk assessment process, the Risk assessment Team evaluated each of the assessable elements, and reviewed previously identified risks documented in References 6, 7, 8, 9, 10, and 11 based on current status and programmatic relevance. Subject matter experts for each of the assessable elements and/or individual risks met with the team and assisted in identification of additional risks. Project level risks were included only if the risk or if a combination of risks rose to the program level; duplicate risks were deleted.

For the purpose of this assessment, programmatic risks represent those existing or potential conditions (including the political, regulatory, and program management decisions which establish those conditions) that could interfere with the achievement of the accelerated closure of the High Level Waste system as described in the Savannah River Site Environmental Performance Management Plan. It is assumed that the project and operations management of the facilities will meet current requirements for the safe execution of their responsibilities with respect to environmental and health risks. Facility-specific health and environmental safety risks are addressed in each referenced project and facility-specific risk analyses, vulnerability analyses, and safety analyses. Facility and project risks that are technical in nature are assumed to be managed by the individual owner, except where a risk has been identified which has a system-wide impact. System-wide impacts will require the development of a common risk handling strategy that includes funding, setting priorities, and controls outside of the project or facility owner's span of control for resolution.

The team then assigned a probability of occurrence and a severity of consequence grade for each of the risks identified. These estimates of probability and consequence grades were based upon a combination of management experience and technical judgment using the criteria in Table 1 and Table 2. Details of each risk appear on Risk Identification and Assessment Forms in Appendix A.

Table 3 provides the Probability-Consequence Matrix used to grade risks as **High, Moderate,** or **Low** based on risk probability and consequence. The team used Table 3 to determine the Risk Level of each risk identified during the analysis process, based upon the probability and consequence information obtained from Table 1 and Table 2.

2.5 COST DETERMINATION

Refer to Table 4 for the PMP Budget Authority in Escalated Dollars as reproduced from the PMP Supplement. The escalated dollar value is a provision in the cost estimate to reflect increases in the cost of equipment, material, labor, etc., due to continuing price changes over time. Escalation is used to estimate the future cost of a project or to bring historical costs to the present. For additional information, refer to DOE Order 5700.2, Cost Estimating, Analysis, and Standardization.

Using historical information and the information provided in the PMP Supplement (Reference 2), the cost of SPP program delay was determined to be $270M per year (in FY03 dollars) for the purposes of this risk evaluation. This number was derived based on continued operation of the SPP, DWPF, and one Tank Farm. The Team assumed that in the latter years of the SPP, only H-Tank Farm would continue in operation. Because of close coupling between various SPP operations, only the ARP was found to have schedule float. Therefore, additional ARP operations could continue for a maximum of 2 years, without resulting in an overall delay of the SPP program. Additional expenses associated with individual risks are identified on the Risk Identification and Assessment Forms found in Appendix A. For most SRS risk assessments, schedule delays are evaluated separately. For this risk assessment, since schedule delays largely drove costs associated with each risk, the cost of schedule delay is included along with other costs shown as a total estimated cost on the Risk Identification and Assessment Forms. Additional expenses associated with individual risks are also identified on the Risk Identification and Assessment Forms.

The operational costs for the various facilities associated with the SPP were derived from the funding schedule in the PMP Supplement (Reference 2). The dollar values allocated for operations in the latter years of the SPP are used for estimation purposes. These costs are as follows:

Facility	Impact ($ Millions)	Basis
ARP Operation	25	Cost of extended operation per year
SWPF Operation	75	Cost of extended operation per year
SS Operation	20	Cost of extended operation per year
H Tank Farm East	50	Cost of extended operation per year
DWPF Fixed Operational Cost	100	Cost of extended operation per year
DWPF Variable	1	Per additional can (includes production and disposal)

2.6 RISK HANDLING STRATEGY IDENTIFICATION

Having graded the risks, the team established handling strategies for each risk, based on guidance provided in Reference 12. After each risk was validated and assigned a risk level, using their subject matter expertise and knowledge of current Salt Processing Program work scope and plans, the team identified existing or proposed projects, operational activities, and technology development tasks as risk handling strategies which could be effective in reducing, mitigating, or avoiding the various risks. Ongoing activities identified as risk-handling strategies (e.g., current FY03 technology development activities referenced in Appendix B, Risk Summary Table) can be verified by various current program performance monitoring reports.

Table 1. Guidelines for Assigning Risk Probabilities

Probability of Occurrence (P_R)		**Criteria**
Descriptive	**Numerical**	
Non-Credible	N/A	• Determined to have a probability of occurrence of • 10^{-6} (or other non-credible probability defined for the activity)
Very Unlikely	> 0 but < 0.15	• Will not occur anytime within multiple SPP life cycles; or • Development is at least at the stage of a system prototype demonstration in an operational environment up to an actual system in service proven through successful mission operations; or • Estimated recurrence interval > 50 years; or • Estimated recurrence frequency < 1 (i.e., event not expected to recur); or • 0 < Probability of single event occurrence < 0.15.
Unlikely	≥ 0.15 but < 0.45	• Will not occur in the SPP life cycle; or • Development is between the stages of component and/or breadboard validation in a laboratory environment and system/subsystem model or prototype demonstration in a relevant environment; or • 25 years < Estimated recurrence interval ≤ 50 years; or • 1 ≤ Estimated recurrence frequency < 2 (i.e., event expected to recur, but not more than once); or • 0.15 • Probability of single event occurrence < 0.45.
Likely	≥ 0.45 but < 0.75	• May occur sometime during the life cycle of the SPP; or • Development is between the stage of technology concept and/or application formulation and the stage of analytical and experimental critical function and/or characteristic proof of concept; or • 10 years < Estimated recurrence interval ≤ 25 years; or • 2 ≤ Estimated recurrence frequency < 5 (i.e., event expected to recur from 2 to 4 times); or • 0.45 • Probability of single event occurrence < 0.75.
Very Likely	≥ 0.75 but < 1	• Very likely to occur sometime during the life cycle of the SPP; or • Only basic principles (or less) are observed and reported; or • Estimated recurrence interval ≤ 10 years; or • Estimated recurrence frequency ≥ 5 (i.e., event expected to recur more than five times); or • 0.75 ≤ Probability of single event occurrence <1.

Table 2. Guidelines for Assigning Risk Consequences

Consequence of Occurrence	Criteria
Negligible	• Minimal or no consequences. • Negligible impact on program; slight potential for PMP schedule change; compensated by available schedule float. • Cost estimates exceed budget by ≤ $68M (the approximate equivalent cost of extending the overall HLW system lifecycle by ¼ of 1 year) • Slip in schedule of ≤ 3 months.
Marginal	• Moderate threats to program mission; may require minor facility redesign or repair. • Cost estimates exceed budget by > $68M to < $270M. • Slip in PMP schedule of >3 months to < 1 year.
Significant	• Significant threat to program mission; requires some facility redesign or repair. • Cost estimates exceed budget by more than ≥ $270M to < $540M. • Significant slip in PMP schedule of ≥ 1 year to < 2 years.
Critical	• Serious threat to program mission; possibly completing only portions of the mission or requiring major facility redesign or rebuilding. • Cost estimates exceed budget by ≥ $540M. • Excessive PMP schedule slip of ≥ 2 years.
Crisis	• Catastrophic impact to PMP mission completion. • Requires instant response with low chance of success.

Special attention must be given to First-of-a-Kind Risks because they are often associated with project failure. First-of-a-Kind risks should receive a Critical or Crisis consequence estimate unless there is a compelling argument for a lesser consequence value determination.

First-of-a-kind risks are those associated with projects or modifications that are unique in their design, purpose, and/or application of technology. Typically, no other similar project or application of the technology in full-scale operation is available from which to obtain historical information with respect to risk.

Any one or more of the criteria in the five levels of consequence may apply to a single risk. The consequence level for the risk being evaluated must be based upon the highest level for which a criterion applies.

Table 3. Risk Matrix - Probabilities vs. Consequences

		RISK LEVEL				
PROBABILITY	Very Likely	**Low**	**Moderate**	**High**	**High**	**High**
	Likely	**Low**	**Moderate**	**Moderate**	**High**	**High**
	Unlikely	**Low**	**Low**	**Moderate**	**Moderate**	**High**
	Very Unlikely	**Low**	**Low**	**Low**	**Low**	**High**
	Non-Credible	**Low**	**Low**	**Low**	**Low**	**Low**
		Negligible	Marginal	Significant	Critical	Crisis
		CONSEQUENCES				

Table 4. Funding (from HLW-2002-00161)

PMP Budget Authority in Escalated Dollars

Project Title		FY03	FY04	FY05	FY06	FY07	FY08	FY09	FY10	FY11	FY12	FY13
HL-01 H Tank Farm West		89,611	94,076	96,503	97,215	100,892	104,537	109,695	112,657	115,698	118,822	122,030
HL-04 H Tank Farm East & Sludge Operations		64,203	65,382	69,689	68,530	71,180	73,746	77,085	79,166	81,303	83,499	85,753
HL-01 Total		**153,813**	**159,458**	**166,191**	**165,746**	**172,072**	**178,282**	**186,780**	**191,823**	**197,002**	**202,321**	**207,784**
Move Support to Melter Outage												
HL-02 F Tank Farm		**68,167**	**69,394**	**70,995**	**72,908**	**75,142**	**78,326**	**73,657**	**69,085**	**64,698**	**66,444**	**61,594**
Move Support to Melter Outage												
HL-03 Waste Removal & Tank Closures												
WR Ops w/ Demo Projects		3,971	9,773	12,265	12,770	13,227	13,721	14,091	14,472	14,862	15,264	15,676
Am/Cm		1,745	-									
LI: Salt Tanks	Tk 31	1,445	35,421	36,201	59,107	22,724	16,711	17,502	43,772	35,778	14,075	6,446
Low Curie		5,914	4,171	3,692	4,327	4,397	4,474	5,074	5,211	5,352	5,496	5,644
Actinide		5,282	19,088	18,947	20,283	20,645	21,005	21,572	22,155	22,753	23,367	23,998
Salt Alternatives (512-S, Tk 48, etc)		7,439	288	-	-	(0)	(0)	(0)	(0)	(0)	(0)	(0)
LI: Water Wash & Isolation	Tks 18, 19	5,893	2,772	-	-	22,130	11,964	15,392	-	31,802	45,055	19,006
WR: Tank Closure	Tks 18, 19	5,288	13,051	4,357	8,396	9,202	26,758	20,861	32,121	790	68,953	89,283
HL-03 Total		**36,977**	**84,564**	**75,461**	**104,883**	**92,325**	**94,633**	**94,492**	**117,730**	**111,336**	**172,209**	**160,053**
HL-12 LI: Waste Removal												
LI: WR from Sludge Tanks	Tk 11	13,805	42,725	58,234	34,421	29,842	27,827	34,892	35,512	30,269	28,083	18,582
LI: Infrastructure Upgrades		9,338	15,458	12,139	14,577	5,605	18,671	32,344	33,217	35,979	26,393	28,552
LI: Acid Front End		-	-				-	23,754	27,255	27,728	-	-
LI: Acid Evap & Space Management	Tk 18, 37	-	-	-	-	-	0	-	-	-	-	-
LI: Piping, Evaps & Infrastructure		-	-	-	-	-	-		-	-	-	-
HL-12 Total		**23,143**	**58,183**	**70,373**	**48,998**	**35,447**	**46,498**	**90,990**	**95,985**	**93,976**	**54,476**	**47,133**
										205,313		
HL-11 LI: Tk Fm Services Upgrade II		**571**	-	-	-	-	-	-	-	-	-	-
HL-05 Vitrification		**127,918**	**124,487**	**132,768**	**137,360**	**136,924**	**145,613**	**152,360**	**157,690**	**156,036**	**163,778**	**171,262**
Melter Outage												
HL-06 Glass Waste Storage		**5,451**	**48,122**	**39,608**	**1,399**	**5,249**	**19,057**	**19,580**	**6,653**	**1,908**	**1,960**	**2,265**
HL-13 Salt Disposition												
Salt EPC Support		2,000	3,600	2,100	2,100	2,201	18,200	61,822	63,486	64,976	66,730	68,532
LI: Salt Alternative		28,000	58,400	107,900	107,900	107,799	91,800	-	-	-	-	-
HL-13 Total		**30,000**	**62,000**	**110.000**	**110.000**	**110,000**	**110,000**	**61,822**	**63,486**	**64,976**	**66,730**	**68,532**
FA-24 Facility Decontamination/Decommissioning		-	-	-	-	-	-	-	-	-	-	-
HLW TOTAL		**446,040**	**606,209**	**665,397**	**641,294**	**627,159**	**672,409**	**679,681**	**702,451**	**689,933**	**727,919**	**718,623**
HLW w/o Salt Total		**416,040**	**544,209**	**555,397**	**531,294**	**517,159**	**562,409**	**617,859**	**638,965**	**624,957**	**661,189**	**650,091**
6,340		417,349	544,212	555,404	531,266	517,172	562,272					
		6,911										
		(1,309)	(3)	(7)	28	(13)	137					
Solid Waste Facilities												
ETF		**16,735**	**18,708**	**20,677**	**22,431**	**23,404**	**23,575**	**18,687**	**19,568**	**19,710**	**22,195**	**27,090**
SS		**13,101**	**23,437**	**24,462**	**26,382**	**25,030**	**28,853**	**36,079**	**34,249**	**34,718**	**45,332**	**49,123**
SW TOTAL		**29,835**	**42,146**	**45,139**	**48,813**	**48,433**	**52,428**	**54,766**	**53,818**	**54,428**	**67,528**	**76,213**
Life Cycle Cost		**475,876**	**648,354**	**710,536**	**690,107**	**675,592**	**724,837**	**734,447**	**756,268**	**744,361**	**795,447**	**794,836**

On July 3, 2003, parts of DOE Order 435.1 dealing with the authority for determining waste incidental to reprocessing were declared invalid by the U.S. District Court for the District of Idaho in the case of Natural Resources Defense Council v. DOE, Case No. 01-413-S-BLW. The District Court's ruling is currently on appeal to the U.S. Court of Appeals for the Ninth Circuit. Accordingly, it is not appropriate to address these types of probabilities or consequences, nor to undertake a probability or consequence analysis of the litigation's outcome in this document at this time.

Table 4. Funding (from HLW-2002-00161) - continued

PMP Budget Authority in Escalated Dollars

Project Title	FY14	FY15	FY16	FY17	FY18	FY19	FY20	FY21	FY22	FY23	IBS BA Cumulative FY03-End
HL-01 H Tank Farm West	112,793	105,812	97,802	100,443	-	-	-	-			1,578,586
HL-04 H Tank Farm East & Sludge Operat	88,068	90,446	92,888	95,396	97,972	50,309	-	-			1,334,615
HL-01 Total	**200,861**	**196,258**	**190,691**	**195,839**	**97,972**	**50,309**	-	-			**2,913,201**
Move Support to Melter Outage											
HL-02 F Tank Farm	**57,762**	-	-	-	-	-	-	-			**828,172**
Move Support to Melter Outage											
HL-03 Waste Removal & Tank Closures											
WR Ops w/ Demo Projects	16,099	8,267	8,490	8,719	8,955	-	-	-			190,621
Am/Cm											1,745
LI: Salt Tanks	14,353	4,057	-	-	-	-	-	-			307,592
Low Curie	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)			53,751
Actinide	24,646	25,312	25,995	26,697	-	-	-	-			321,746
Salt Alternatives (512-S, Tk 48, etc)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)			7,725
LI: Water Wash & Isolation	27,547	2,161	21,355	25,230	26,532	3,170	-	-			260,007
WR: Tank Closure	77,964	60,699	42,823	66,359	90,147	89,823	18,088	-			724,963
HL-03 Total	**160,609**	**100,496**	**98,662**	**127,005**	**125,634**	**92,993**	**18,088**	**(0)**	-	-	**1,868,149**
HL-12 LI: Waste Removal											
LI: WR from Sludge Tanks	3,849	-	-	-	-	-	-	-			358,041
LI: Infrastructure Upgrades	29,322	28,589	-	-	-	-	-	-			290,186
LI: Acid Front End	-	-	-	-	-	-	-	-			78,737
LI: Acid Evap & Space Management	-	-	-	-	-	-	-	-			0
LI: Piping, Evaps & Infrastructure	-	-	-	-	-	-	-	-			-
HL-12 Total	**33,171**	**28,589**	-	-	-	-	-	-			**726,964**
HL-11 LI: Tk Fm Services Upgrade II	-	-	-	-	-	-	-	-			**571**
HL-05 Vitrification	**168,339**	**177,466**	**184,640**	**188,211**	**181,927**	**92,494**	-	-			**2,599,274**
Melter Outage											
HL-06 Glass Waste Storage	**2,326**	**2,388**	**2,453**	**2,519**	**2,587**	**2,657**	**2,729**	**(0)**			**168,912**
HL-13 Salt Disposition											
Salt EPC Support	70,383	72,283	74,235	76,239	78,297	40,206	-	-			767,389
LI: Salt Alternative	-	-	-	-	-	-	-	-			501,800
HL-13 Total	**70,383**	**72,283**	**74,235**	**76,239**	**78,297**	**40,206**	-	-			**1,269,189**
FA-24 Facility Decontamination/Decommissi	-	-	-	7,501	-	94,284	111,972	-			**213,757**
HLW TOTAL	**693,451**	**577,481**	**550,681**	**597,313**	**486,417**	**372,942**	**132,789**	**(0)**	-	-	**10,588,189**
HLW w/o Salt Total	**623,069**	**505,198**	**476,446**	**521,074**	**408,120**	**332,736**	**132,789**	**(0)**	-	-	**9,319,000**
6,340											
Solid Waste Facilities											
ETF	**22,201**	**22,477**	**25,624**	**23,126**	**23,751**	**12,196**	-	-	-	-	**362,155**
SS	**41,433**	**49,034**	**44,012**	**26,329**	**26,636**	**14,154**	-	-	-	-	**542,364**
SW TOTAL	**63,634**	**71,511**	**69,636**	**49,455**	**50,387**	**26,350**	-	-	-	-	**904,519**
Life Cycle Cost	**757,086**	**648,993**	**620,317**	**646,768**	**536,804**	**399,292**	**132,789**	**(0)**	-	-	**11,492,708**

On July 3, 2003, parts of DOE Order 435.1 dealing with the authority for determining waste incidental to reprocessing were declared invalid by the U.S. District Court for the District of Idaho in the case of Natural Resources Defense Council v. DOE, Case No. 01-413-S-BLW. The District Court's ruling is currently on appeal to the U.S. Court of Appeals for the Ninth Circuit. Accordingly, it is not appropriate to address these types of probabilities or consequences, nor to undertake a probability or consequence analysis of the litigation's outcome in this document at this time.

3.0 RESULTS OF THE ANALYSIS

3.1 IDENTIFIED RISKS

The Risk Assessment Team identified 28 risks, including seven (7) **High**, six (6) **Moderate**, fourteen (14) **Low** risks, and one (1) **Uncertain** risk.

These risks are described below and summarized in Appendix B.

Each of these risks was identified and evaluated with consideration of the following assumptions:

- The schedule and cost baseline is that as represented by the PMP Supplement to Rev. 13 of the HLW System Plan.
- Any risk that creates an impact at the upstream side of the HLW system also affects the downstream process or facility, (e.g., throughput limitations at SWPF would delay closure of Saltstone and DWPF) with the additional costs for continuing operation beyond the target closure date for those two facilities to be included as part of the cost of the unmitigated risk.
- Much of the science and technology on which the aggressive production rates proposed by the PMP Supplement are based is still under development: e.g., determination of the rate and efficiency at which Cesium rich interstitial supernate can be drained out of the solid salt in the waste tanks; the rate and concentration levels at which the remaining solid low curie salt can be dissolved; the method by which the actinide removal rate will be improved to the 6 gpm target; etc.

3.1.1 LCS-002 Cesium or Actinides Exceed LCS Limits

This risk represents the possibility that the low curie salt solutions which are produced by dissolving the drained salt cake will still be too rich in Cesium concentration to meet the limits for disposal in Saltstone for at least 1M gallons of saltcake. This is a **High** risk as a result of having a likely probability, and a critical consequence based on a worst-case schedule impact of 3 years.

The current plan assumes that our understanding of the physical and chemical characteristics of the salt is adequate to be able to design a process to drain off high curie interstitial liquid before the salt is dissolved. Currently, it is assumed that the interstitial liquid consists mostly of residual supernate containing the majority of the Cesium. This Cesium bearing liquid is trapped in microscopic-sized spaces between the surfaces of adjacent salt crystals, representing 20% or more of the volume appearing to be solid salt. If efforts to drain this interstitial liquid does not reduce the level of residual radioactivity in the salt to allow disposal in Saltstone, the PMP schedule will not be met and cost savings will not be achieved. If additional processing (e.g., adding DWPF recycle to flush more Cesium out of the salt bed followed by additional draining) is required, then some cost savings may still be achieved, but savings will be less than projected in the PMP Supplement by an amount yet-to-be determined.

The risk handling strategy approach is to avoid this risk by implementing a more comprehensive waste sampling and characterization for saltcake, and implementing the best solution to come from analyzing the potential of blending with recycle, adding additional capacity to the design of SWPF, and investigating alternatives to provide improved cesium removal capacity and/or interstitial liquid removal for near term application to low curie salt processing.

3.1.2 SPP-00-003 Environmental Permitting

This risk represents the possibility that the South Carolina Department of Health and Environmental Control (SC DHEC) will not approve regulatory permits as a result of stakeholder objections to the new facilities or revised operating limits.
Any potential delays due to Federal court litigation in Idaho, appeal filed, concerning the WIR provisions of DOE Order 435.1, are not directly included as part of this risk, although by its terms the Idaho decision affects activities at SRS and the SC DHEC has suspended action on permits pending resolution of the legal questions. This is a **Low** risk as a result of having a very unlikely probability, with a significant consequence based on a $270 million worst case cost impact, and a worst-case schedule impact of 1 year.

Three major permitting actions for key facilities (Saltstone, ARP, and SWPF) are necessary to implement the Program. The program baseline assumes general stakeholder and regulator support with no time-delay roadblocks. Failure to receive permits in a timely fashion delays the program. In the worst case (assumed to be 1-year delay in SWPF permit issuance), the schedule objectives for the PMP cannot be realized and additional HLW system life cycle costs will be incurred.

The risk-handling strategy is to implement a comprehensive communications strategy for the Program, which is ongoing and included in the current budget. This includes the effort to educate and inform the public through the Citizens Advisory Board and related committee meetings.

3.1.3 LCS-00-005, Cesium Exceeds 0.1 Ci/gal and/or Actinides Exceed 99nCi/g

This risk represents the possibility that the low curie salt solutions produced by dissolving the drained salt cake will contain too much residual Cesium or actinides and not meet the Saltstone limits of 0.1 Ci/gal Cs and 99 nCi/g actinides. This is a **Low** risk, although having a very unlikely probability, but with a negligible consequence based on a $25 million worst case cost impact with no overall HLW system lifecycle schedule impact expected. This risk is accepted.

Because of the increase in radiation levels which would complicate operations and maintenance activities, this would cause a delay in LCS operations at Saltstone until modifications for 0.378 Ci/gal salt solution are complete in October 2004. If actinide levels were greater than 99 nCi/g, the material would have to be processed through ARP first. Saltstone capacity is available in the later years of the program (after 2014) which provides an opportunity to make up the LCS production. If ARP processing was required for LCS with actinide levels greater than 99nCi/g, it could require one additional year of processing at ARP (at $25 million/yr).

3.1.4 SPP-00-006 Regulators and/or Stakeholder Concerns – WIR

This risk represents potential delays which may result due to Federal court litigation in Idaho, appeal filed, concerning the WIR provisions of DOE Order 435.1. Those risks will exist until the legal uncertainty is resolved.

On July 3, 2003, parts of DOE Order 435.1 dealing with the authority for determining waste incidental to reprocessing were declared invalid by the U.S. District Court for the District of Idaho in the case of Natural Resources Defense Council v. DOE, Case No. 01-413-S-BLW. The District Court's ruling is currently on appeal to the U.S. Court of Appeals for the Ninth Circuit. Accordingly, it is not appropriate to address these types of probabilities or consequences, nor to undertake a probability or consequence analysis of the litigation's outcome in this document at this time.

3.1.5 ARP-00-008 Recovey of Tank 48 as a Feed Tank for ARP is Delayed

This risk represents the potential impact of not having Tank 48 returned to HLW use as a feed tank for ARP prior to October 2006. This could result because of delays in the final disposition of the organic residual wastes remaining in Tank 48. These organic wastes are a result of research and operations to support previous salt waste processing efforts between 1985 and 1998. This is a **Moderate** risk, with a likely probability, and a marginal consequence resulting from a worst case cost impact of $150 million with no schedule impact expected.

The PMP schedule requires that tank 48 be recovered for use as the feed tank for the ARP before the need date for the 241-96H Facility (October 2006). Tank 48 currently contains organic residual wastes that preclude its use for receipt of other waste material. If Tank 48 is not available as a Feed Tank for ARP on October 2006, a schedule slip of up to 2 years for the ARP occurs, which uses up 2 years of float in the ARP program schedule (at $25M/yr), subsequently slowing down tank closure in F Tank Farm for 2 years (at $50M/yr).

The risk handling approach is to avoid this risk. An ongoing R&D effort is underway to identify and demonstrate an effective method to treat the organic wastes and ensure that Tank 48 will be made available for use at the necessary point in the schedule.

3.1.6 ARP-00-009 Reassignment of Tank 49 as Initial Feed Tank for 512-S ARP

This risk represents the possibility that Tank 49 will not be available as a feed tank for the ARP by the required date of April 2004 as a result of tank space management issues in the balance of the tank farm. This is a **Low** risk, with a likely probability, and a negligible worst-case, unmitigated cost impact of $13 million. No schedule impact is predicted.

Tank 49 currently holds concentrated supernate and saltcake heel. The PMP assumes the reassignment of Tank 49 from its existing HLW storage function by April 2004 for use as the initial feed tank for the 512-S ARP. Delays in this reassignment would delay startup of the 512-S ARP. Tank Farm space management may be affected by an evaporator problem. Space for the current contents of Tank 49 must be made available in the tank farm through evaporation. Evaporator problems have been experienced recently. Integration of complex, multiple transfers of material is required to gain space.

The risk handling approach is to reduce this risk by developing an integrated transfer and evaporator plan to support Tank 49 reassignment as the ARP feed tank. A schedule slip of up to 6 months could occur in the ARP program schedule (at $25M/yr). This is based on the assumption that emergent evaporator operational issues or transfer priority issues can be resolved within 6 months.

3.1.7 ARP-00-010 Delays to 241-96H Actinide Removal Process Startup

This risk represents the possibility that, as a result of resource conflicts with other projects, actinide removal capacity necessary to process the Low Curie, High Actinide volume of waste (assumed to be approximately one-third of the total salt waste volume) will not be achieved according to the schedule proposed in the PMP. This is a **Low** risk with a likely probability and a negligible consequence resulting from a $38 million worst case cost impact (unmitigated) associated with a six-month delay.

The actinide removal capability in the modified 512-S facility is limited to approximately 1 gpm by the capacity of the available vessel volume and cycle time required for effective sorption of actinides using MST. The PMP target requires that the total actinide removal process capabilities of the 512-S and the 241-96H facilities provide a throughput of 3 gpm beginning in October 2006. In order to achieve the 3 gpm capacity, the SPP proposes to modify the Filter-Stripper Building (241-96H) components and beneficially reuse this existing facility to provide additional vessel volume for the sorption of actinides, which will then be sent to the 512-S facility for further processing.

The Risk Handling Strategy is to reduce this risk by obtaining resources to start design of the 241-96H facility early, and to accelerate the 512-S startup. A schedule slip of up to 6 months uses up 6 months of float in the ARP program schedule (at $25M/yr), subsequently slowing down tank closure in F Tank Farm for 6 months (at $50M/yr).

3.1.8 ARP-00-011 ARP Capacity Ramp-Up to 6 gpm Not Successful

This risk represents the possibility that the actinide removal capacity (6 gpm) required to meet the PMP objectives may not be achieved as a result of delays in the anticipated development of more effective filtration technology and/or chemical engineering process improvements. This is a **Moderate** risk with an unlikely probability but a critical consequence, based on a worst case cost impact of $810 million resulting from a 3-year schedule delay in the processing of waste to remove actinides.

The PMP assumes ramping up ARP capacity from 3 gpm (refer also to ARP-00-010) to 6 gpm (in April 2007). The improvement to 6 gpm throughput capacity is based on both the need for increased throughput in vessel volume for sorption by MST (refer also to ARP-00-010) in conjunction with improvements in the mechanical and/or chemical engineering process associated with the removal of the actinides from the waste (i.e., installation of improved filtration technology from the current cross-flow filter utilized in Bldg. 512-S).

If the ARP capacity does not increase to 6 gpm, 3 gpm would be the maximum throughput. This would double the ARP lifecycle from April 2007, potentially extending the overall HLW program by 11 years. However, in the PMP, ARP is not fully loaded in its latter years. Also, in FY2019, it would be possible to run waste through SWPF. Fully loading the ARP in the latter years and utilization of SWPF actinide removal capabilities reduce the program impact to a net of 3 years.

This improved technology may not be available to support the required April 2007 capacity increase. A rotary micro-filter is available which is likely to be appropriate to this use. Although results to date have been promising, R&D on the filter is not complete. The filter is at the prototype demonstration stage in a laboratory environment using real waste.

3.1.9 ARP-00-012, Equipment Not Available for 241-96H ARP Process

This risk represents the possibility that the 3 gpm actinide removal capacity required to meet the PMP objectives may not be achieved as a result of delays in the acquisition of equipment, e.g., tanks, currently available as spares (but originally obtained for other facilities). This is a **Low** risk with an unlikely probability and a negligible consequence, resulting from a $38 million worse case cost impact and no overall HLW system schedule impact.

Equipment (primarily process vessels) to be used in 241-96H ARP is assumed to be acquired from the Tank Farms and/or DWPF spares. If major equipment failures in the Tank Farm or DWPF require the use of spares earmarked for 241-96H ARP, startup of that facility will be delayed, and the increase in ARP throughput not achieved. Worst case is based on the18-month delay in 241-96H startup that could result while waiting for a new process vessel to be manufactured and delivered. This consumes ARP float, but does not impact overall SPP completion.

The risk handling strategy is to avoid this risk, by procuring spares at the initiation of the 2½ year long 241-96H ARP project. The use of common spares among four salt processing facilities provides enhanced resource management.

3.1.10 ARP-00-016 Actinide and Strontium Concentration High or Low MST DF

This risk represents the possibility that the 6 gpm actinide removal capacity required to meet the PMP objectives may not be achieved because the chemical process that forms the basis of the actinide removal capability of the ARP may not remove actinides with the efficiency forecast based on lab scale testing with small volumes of real waste from a few select tanks. This is a **Moderate** risk with a very likely probability and a marginal consequence resulting from a worst case cost impact estimated at $150 million, but no overall HLW system schedule impact.

The ARP is based on having an MST decontamination factor (DF) of 6 to 12 in order to meet the Saltstone WAC. The potential exists that the actual decontamination factor (DF) of the ARP is less than that anticipated and that actual waste concentrations result in a need for additional ARP processing. Actinides are not well characterized in the saltcake. Therefore dissolved salt may contain actinide levels higher than currently expected. It was estimated that an ARP schedule slip of up to 2 years could occur and thus use 2 years of float (due to longer processing times required) in the ARP program schedule (at $25M/yr), also delaying tank closure in F Tank Farm for 2 years (at $50M/yr).

The risk handling strategy is to mitigate this risk by: 1) exploring the potential for sending higher activity concentrations to Saltstone, and 2) verifying strontium and actinide removal decontamination factors for ARP feed composition through R&D. The projected actinide concentrations for the waste in two tanks are already near the regulatory limits for Class C waste, limiting the potential of that alternative. R&D to validate decontamination factors is ongoing. This risk will remain **Moderate**.

3.1.11 ARP-00-018 241-96H ARP Funding Strategy

This risk represents the possibility that the modifications to the existing Filter-Stripper building, 241-96H, to improve the actinide removal capacity to 3 gpm will not be achieved as a result of delayed action on facility modifications not initiated because of the competition for funding with other Salt Processing Program projects or initiatives. This is a **Low** risk, with a probability of very unlikely and a marginal consequence resulting from a worst case cost impact of $150 million (unmitigated), but no overall HLW system closure impact.

ARP plans currently assume that 241-96H modifications will be implemented using operating funds. If this funding source is unacceptable, waiting for line item project funding will delay modifications at 241-96H.

This risk is accepted, as the two-year delay is within the float of the project. A schedule slip of up to 2 years for ARP occurs which uses up 2 years of float (due to longer processing times required) in the ARP program schedule (at $25M/yr), also delaying tank closure in F Tank Farm for 2 years (at $50M/yr).

3.1.12 SPP-00-021 Funding Competition Impacts SPP

This risk represents the possibility that the SPP objectives may not be achieved as a result of the competition for funding with other DOE-SR projects or initiatives. Delayed action on facility modifications and/or research to develop required process improvements (e.g., increase in ARP throughput from 3 to 6 gpm) will result in delayed closure of overall HLW system. This is considered a **High** risk, based on a very high probability and a critical consequence resulting from the conclusion that this would be an unquantified “serious threat to program mission.”

The PMP schedule is based on having the funding available for implementing the operations, projects, and initiatives at the time and in the sequence specified. Funding may not be available due to funding competition among many projects within the high level waste program over a long period. Further, funding authorization may not be obtained when required. Either of these cases results in delay to the program.

The risk handling strategy is to mitigate by: 1) requesting funding to support the program, and 2) participating in site budget prioritization, planning, and change control.

3.1.13 FM-00-022 Unavailability of Low Activity Feed for ARP

This risk represents the possibility that the 512-S ARP will be delayed due to the lack of feed caused by delays in tank closure activities in F Tank Farm. This is a **Moderate** risk, with a very likely probability and a marginal consequence, resulting from a worst-case unmitigated cost impact of $75 million.

The PMP assumes that salt solution is available in Tank 49 as feed for transfer to ARP by July 2004. Tank 7 is required for transfers of sludge and salt from F Tank Farm to Tank 49. If schedule conflicts in priorities for use of Tank 7 are not resolved, these may prevent or interrupt the transfer of salt solution from F Tank farm to the feed tank for ARP. If operation of 512-S ARP is delayed due to lack of feed, and/or sustained feed is not available this could result in a one-year delay to the program. This uses up one year of float in the ARP program schedule (at $25 million/yr), subsequently slowing down tank closure in F Tank Farm for one year (at $50 million/yr).

The risk handling approach is to avoid this risk by modifying the HLW transfer plan to resolve priority conflicts. This planning is an element of ongoing program management and should not have a schedule impact.

3.1.14 SS-00-024 Saltstone Vault Unavailability

This risk represents the possibility that the Saltstone facility will not have the vault capacity required to receive low-curie salt grout at the rate planned in the PMP Supplement. This would result if Saltstone vault construction were delayed due to funding issues in FY2003. This is a **Low** risk, with a very unlikely probability and a marginal consequence, resulting from a worst case cost impact of $135 million with a related 6-month extension in the overall HLW system lifecycle.

The SPP plan identifies the need for 8 additional saltstone vaults, the first of which must be available in 2006. A two-year period is required to provide a vault. This facility is in the budget request for FY04. A related request has been made that future funding for vault construction to be made with operating funds rather than project funds. If funding for the design of the vaults were not provided in FY03, processing would be delayed for at least 6 months while emergency reprogramming is pursued.

This risk is accepted. These modifications are in the FY04 proposed budget and approval for permission to allow future funding for these to be made from the operations budget is expected.

3.1.15 SS-00-025 Saltstone Modifications not Complete for 0.1 Ci/gal LCS

This risk represents the possibility that the modifications to the SPF to allow processing of low curie salt (LCS) with a maximum of .1 Ci/gal Cs will not be achieved as a result of delays in the completion of cleanout work on Tank 50. Modifications at SPF cannot be initiated until the removal and processing of solid material found in Tank 50 are completed.

This is a **Low** risk with a very likely probability but negligible consequence resulting from a worst case cost impact of $45 million with a related HLW system schedule impact of 2 months.

In the past year, unidentified solids were observed on the bottom of Tank 50 as fluid levels dropped and legacy salt solution was processed to the SPF. Processing was halted while efforts were underway to analyze the condition for impact on safety, and determine a method to remove the solids. The effort to restore Tank 50 to service is underway concurrent with modifications to the SPF. Physical plant modifications required at SPF to accommodate 0.1 Ci/gal processing are funded and are scheduled to be complete by September 2003.

The risk handling strategy is to avoid this risk by optimizing the schedule for implementing the required modifications. Currently, the Tank 50 work is on schedule to complete in late September 2003.

3.1.16 SS-00-027 Saltstone Modifications not Complete for 0.378 Ci/gal LCS

This risk represents the possibility that the modifications to the Saltstone Processing Facility to allow processing of low curie salt with the maximum of .378 Ci/gal Cs concentration will not be achieved as required by October 2004 to meet the schedule requirements of the PMP Supplement. This is a **Low** risk with an unlikely probability and a negligible consequence resulting from a worst case cost impact of $68 million and a related HLW system schedule impact of 2 months. Given the eighteen months allowed for the design and physical plant modifications, it may be possible to recover these two months. This risk assumes that the modifications to Saltstone for 0.1 Ci/gal operation are completed on schedule.

Modifications in addition to those required for 0.1 Ci/gal operation (see also SS-00-025) are required to reduce radiation exposure levels to operations and maintenance personnel when processing waste at the 0.378 Ci/gal concentration. These are necessary because the original Saltstone Processing Facility was not designed to operate with the concentration of Cs required to implement the PMP strategy.

This risk is accepted. Part of the modifications to Saltstone Facility for 0.378 Ci/gal operation (i.e., shielding, equipment qualification to withstand higher radiation, etc.) will be completed when required modifications are performed to Saltstone Facility for operation of 0.1 Ci/gal Cs concentration.

3.1.17 SPP-00-039 Equipment Failure Halts SPP Processing

This risk represents the possibility that the 75% attainment required for the HLW system to meet the planned processing schedule of the PMP supplement will not be achieved as a result of the cumulative impact of unscheduled outages resulting at each of the facilities in the process. This is a **High** risk, with a likely probability and a critical consequence of a worst case cost impact of $540 million with a related 2-year HLW system lifecycle extension.

The PMP assumes 75% attainment for the individual facilities associated with the salt processing program and up to 75% attainment for the total system. Without improvement in the attainment performance of the individual facilities in the HLW system (including the new projects and initiatives to create increased throughput capacity), the 75% attainment rate cannot be met. The worst case impact is based on the infant mortality of a newly installed melter at DWPF without a spare backup, requiring up to 18 months for procurement and an additional 4 months for replacement.

The risk handling approaching is to mitigate this risk by including ARP and SWPF in the integrated outage planning for the HLW system; identifying and procuring critical spare parts; and performing an integrated SPP attainment study with a focus on defining inter-facility needs. This risk will remain **High**.

3.1.18 SPP-00-043 Material and Chemical Balances Not Accommodated for the DWPF Interfaces

This risk represents the possibility that waste will not be processed to meet the schedule forecast in the PMP because of emergent process engineering issues resulting from differences in the predicted chemistry and characterization of the waste versus the actual chemistry of the waste and dissolved salt solution as it is discovered to be during future operations. The impact of this risk is evaluated to be a serious threat to the DWPF mission. This is a **High** risk with a very likely probability, with a critical consequence resulting from the Team's judgement that this risk is a significant threat to the program mission, and that should it occur, would result in SPP possibly completing only portions of the mission or requiring major facility redesign or rebuilding.

The PMP assumes that the concentrated cesium and actinide streams from SWPF and ARP are processed into glass by DWPF. However, the material and chemical balances are not yet fully developed for the DWPF interfaces with SWPF and ARP. Rheological and other fluid and mechanical properties of MST-bearing waste may result in process upsets (e.g., melt rate, pour rates) and reduced DWPF attainment. Reduced attainment of DWPF would result in extension of the Salt Program. A material balance flowsheet for the entire program has not been developed at this time.

The risk handling approach is to avoid this risk by 1) developing an integrated HLW system material balance flowsheet for salt processing, which includes DWPF; 2) evaluating the flowsheet for impact on the system plan; and 3) making appropriate design adjustments and/or glass formulation adjustments to accommodate the requirements of the new flowsheet. Note that there are constraints on changes which can be made to glass formulation because of the qualification of the waste form.

3.1.19 SWPF00-044 SWPF Potassium Impact to Solvent Extraction

This risk represents the possibility that performance requirements at SWPF cannot be met due to high potassium feed impacting Cs removal by solvent extraction. This would require additional processing, e.g., requiring recycling through the SWPF one or more times, or additional blending, which would increase the Cs removal cycle time, delay feed to DWPF, possibly extending the HLW life cycle. This is a **Low** risk with a very likely probability but a negligible consequence resulting from a worst case cost impact of $68 million and a related overall HLW schedule extension of 3 months.

The PMP assumes that feed to SWPF can be processed in one pass to remove Cs to specified limits. It is judged that less than 10% of SWPF feed batches will have concentrations of potassium and cesium that are above what has been demonstrated for once through SWPF processing in laboratory testing. These potential high concentrations will be overcome through process optimization and/or a combination of molarity adjustments and blending. Less than 20% of the high potassium batches (approximately 2% of total SWPF feed volume) may have to be recycled through solvent extraction to meet minimum Cs removal requirements. Development of an integrated HLW system material balance flowsheet for salt processing will help to address this issue (see also SPP-00-043).

This risk is accepted. The total fraction of potential problem feed is low. The worst-case cost of the impact of the residual risk is low compared to the total SPP budget. SWPF is still in conceptual design, and ongoing technology development is in progress that provides a potential for eliminating this risk before SWPF becomes operational.

3.1.20 SPP-00-045 Chemical Constituents Exceed Saltstone WAC

This risk represents the possibility that the Waste Acceptance Criteria (WAC) at Saltstone will not be met because of high potassium, nitrates, or other chemical constituents. Other risks associated with radiological content are documented in SPP-00-25 and SPP-00-27. This is a **Low** risk with a very likely probability but a negligible consequence resulting from a worst case cost impact of $200,000.

A material balance flowsheet integrating all HLW operations and SPP life cycles at the appropriate level of detail has not been developed at this time. The present material balance indicates that the current WAC at Saltstone cannot be met for specific tanks due to high potassium, nitrates, and other chemical constituents that would be present in the DSS.

The risk handling approach is to avoid this risk by including Saltstone in the integrated HLW system material balance flow sheet for salt processing (see also SPP-00-043), by testing grout formulations and, if required, revising grout formulations and/or the saltstone WAC.

3.1.21 SWPF-00-046 High Feed Cesium and Actinide Concentrations to SWPF

This risk represents the possibility that the SPWF cycle time will be longer than currently forecast because of the time required for decontaminating the salt solution. This is a **High** risk with a very likely probability and a critical consequence resulting from a worst case cost impact greater than $640 million and a related overall HLW schedule impact of 2 or more years. Additional capital costs may be incurred in further optimizing the SWPF actinide or Cs removal capability.

The PMP processing schedule is based on feed concentrations that can be processed through SWPF and meet the Saltstone WAC. Based on the current level of knowledge of waste characterization, it is predicted that some of the high curie waste streams to be provided to SWPF will exceed the Cs and actinide concentrations that can be processed efficiently and still meet the current Saltstone WAC (Class A actinide and cesium limits) as specified in the EPC contracts. These waste volumes would require additional processing time at SWPF for actinide removal (possibly requiring higher MST concentrations) and/or re-cycling the waste for additional Cs removal.

The risk handling approach is to avoid this risk by 1) verifying strontium and actinide concentrations in SWPF feed tanks; 2) establishing an integrated SWPF feed strategy as input to the HLW system material balance flowsheet; 3) verifying strontium and actinide removal DF values for SWPF feed compositions through additional technology development effort; and 4) optimizing SWPF design to maximize actinide removal capability. In FY03, a sampling program has been funded and is ongoing, which will better define the strontium and actinide concentrations in anticipated high curie waste feed.

3.1.22 SPP-00-048 MST Loading Impacts Ti Loading in DWPF Glass

This risk represents the possibility that some future batches of waste would require quantities of MST for actinide removal that would create a sludge that exceeds the Titanium Dioxide (TiO_2) limits of the waste acceptance criteria (WAC) for making glass at DWPF. This is a **High** risk with a very likely probability and a significant consequence resulting from a worst case cost impact of $500 million for the cost of production and final disposition of an additional 230 canisters of vitrified waste.

The DWPF WAC limits were established to ensure that criteria for glass formulation are met. MST concentrations used at SWPF and/or ARP could result in TiO_2 concentrations in excess of DWPF WAC limits if actinide concentrations in SWPF feed are sufficiently high. Higher TiO_2 concentration will result in increased canister production if the anticipated TiO_2 concentrations cannot be shown to be acceptable. Information available today indicates that the TiO_2 concentration for some batches may exceed the DWPF WAC limits. An additional 230 canisters (rate per year) would be produced at a cost of $500k for canister production cost, with an associated $500k cost for canister disposition/repository, for each canister, and the HLW lifecycle would be extended by one year (at $270 million).

The risk handling approach for this risk is to avoid it by taking action now to possibly enable a higher limit for titanium in the glass and exploring alternative actinide removal agents that could eliminate the need for MST, before the design is complete. Ongoing research is funded for FY03 (refer to Appendix B, Risk Summary Table, Remarks) to contribute to these risk handling strategies, as well as a contractual requirement for the EPC vendors to optimize the process capabilities of the SWPF.

3.1.23 SWPF-00-050 Rogue Constituents in SWPF Feed

This risk represents the possibility that a currently unidentified chemical constituent in the waste (e.g., some process component or constituent currently trapped in the interstitial volume of salt) could negatively impact the efficiency (or viability) of the CSSX process. This is a **Low** risk with a very unlikely probability and a marginal impact resulting from a worst case cost impact of $135 million and related overall HLW system schedule impact of six months.

The CSSX process has been demonstrated through real waste laboratory testing and analysis using the known and expected worst-case waste constituents. In addition, salt waste supernates have been thoroughly characterized based upon process history, samples taken specifically for Salt Program technology development, and other samples taken to support operations over the past 40 years. Some eight to ten tanks have been tested for Cs batch distribution using the optimized solvent composition coefficients and found to be acceptable, and several lab scale CSSX process system tests using real waste have been conducted. Based on CSSX testing and waste characterization, the potential for rogue constituents significantly affecting SWPF persists. There is a possible six-month delay resulting from additional time needed to reprocess or blend feed if a small number of batches is found to contain rogue constituents.

The risk handling approach is to reduce this risk by creating an interface control agreement addressing feed management and verifying waste treatability by sampling and analysis of feed staged for SWPF.

3.1.24 SWPF-00-051 Requirements and Standards Change

This risk represents the possibility that Federal, State, and/or local standards to which the existing HLW system the other required projects and initiatives are designed and built, will change (after the start of design and before hot operations) in a way which will impose different and/or more stringent requirements. This is a **Moderate** risk with an unlikely possibility but a significant consequence resulting from a worst case cost impact of $415 million and related impact on the overall HLW system schedule of 18 months (at $270/year).

A change in standards prior to the startup of the SWPF would cause delays while changes are made to the existing specifications and design documents, delaying the acquisition of critical, long lead-time component parts. Depending on the timing, rework may be required. The estimated impact on the SWPF is a 9-month delay to final design, 9-month delay to construction, which could extend the HLW lifecycle by 18 months (at $270 million/yr).

Additional overhead costs would be incurred as a result of the changes required to related operations support, including procedures, training, safety analysis, etc., depending on the time and scope of the changes.

Given that these changes would be driven by changes federal, state, or local standards, this risk is accepted.

3.1.25 SWPF-00-052 Failed Equipment and Organic Waste Disposition

This risk represents the possibility that delays will occur in identification of a final disposition path for failed large, highly contaminated equipment which cannot be decontaminated (e.g., cross-flow filters) and/or organic waste from SWPF. This is a **Low** risk, with a very unlikely probability and a negligible consequence that is not quantified.

It is assumed by the PMP that a disposal path for failed equipment and organic waste will exist; however, no disposal path has yet been identified for organic waste. The project is still in the conceptual design stage and will be developing a method to deal with this material. This is considered a project issue, but it would be a major impact if this issue does not allow the solvent extraction process to move forward. This will require major programmatic changes if this risk is realized.

The risk handling approach is to accept this risk.

3.1.26 SWPF-00-055 High-Curie Salt Treatment Capacity and Schedule Exceeded

This risk represents the possibility that the SWPF will not have adequate throughput capacity to meet the objectives of the PMP. Given the criteria specified in the EPC contracts for design of the SWPF (1.2 million gal/yr design target versus 2.8 million gal/yr required for the PMP), this will occur unless action is taken to modify the contract specifications to which the EPC contractors are currently working. This is a **High** risk with a very likely probability and a crisis consequence resulting from the potential lifecycle extension beyond the PMP target date. This would result in added cost to the program of more than $6.1 billion, with a related lifecycle extension of more than 10 years.

The design baseline for the SWPF conceptual design is a process capability of 1.2 million gal/yr of high curie salt solution. The PMP assumes an SWPF throughput of 2.8 million gal/year and the assumed startup date is one year earlier in the PMP than specified in the DOE Project Execution Plan.

The risk handling approach is to avoid this risk using multiple strategies, including analyzing the potential for expanding the SWPF capability to 2.8 M gal/year, evaluating technologies to provide additional actinide and Cs removal capability, and expediting the schedule for SWPF. The contract for the EPC vendors working on the conceptual design was recently revised to require a sensitivity analysis of a 50% scale facility. This will be followed by a throughput capacity design decision prior to the project's Critical Decision 1 (CD-1). Technology Development is currently in progress to evaluate opportunities for actinide and Cs removal capacity enhancement (refer to Appendix B, Risk Summary Report, Remarks).

3.1.27 FM-00-058 Salt/Sludge Tank Utilization Conflicts

This risk represents the possibility that certain key tanks required for accelerated sludge processing (Tanks 41,42,48,49, and 50) will not be available for use in implementing the PMP due to tank farm space management issues. This is a **Low** risk with a very unlikely probability, but a significant impact resulting from a worst case cost impact of $270 million and a related HLW system impact of one year.

The SRS WSRC Closure Business Unit has dedicated a system-planning manager responsible for monitoring the status of system with respect to its effect on the assumptions required to implement the PMP. A business (management) review team is in place to control changes to the system plan. The plan is revised annually to accommodate the changing volumes of the waste, using knowledge gained from evaporator operations, sampling, and other program inputs. The integrated HLW system material balance flowsheet (see also SPP-00-043) will also help reduce this risk.

This risk handling approach is to reduce the probability that this risk will occur by maintaining the HLW system plan to continue to identify and resolve the conflicting tank usage. This may reduce probability of this risk occurring, but probability is still in the very unlikely range and the risk remains **Low**.

3.1.28 SWPF-00-059 SWPF Safety Analysis Impacted

This risk represents the possibility that changes to the safety strategy and/or analysis of the SWPF during final stages of design could cause delays in construction and subsequent hot operations. This is a **Moderate** risk with a likely possibility and a significant consequence resulting from worst case cost impact of $270 million and a related 1-year extension in the HLW overall schedule.

Existing facilities supporting the SPP have the required safety analysis documents but the SWPF is in the early stages of design. If SWPF design changes are required to meet Documented Safety Analysis (DSA) controls and are made late in the project, there will be cost impacts and schedule delays to the SWPF, extending the overall HLW system lifecycle. The contractor designing the SWPF is required to conduct Hazards Analysis/Safety Analysis early in the SWPF design schedule. While the design and related controls will be established prior to SWPF construction, final regulator/oversight approval of the controls will occur in the later stages of design and into the construction phase.

The risk handling approach is to reduce the probability that this risk will impact the project is to conduct early and frequent reviews of SWPF safety strategy and safety analysis hazards controls with stakeholders and the DNFSB.

3.2 RISK HANDLING

Risk handling strategies have been identified such that successful implementation of these strategies will result in reduction, mitigation, or avoidance of risk. These strategies and the residual risks are described by risk number in Section 3.1, Identified Risks, documented on the individual Risk and Opportunity Assessment forms in Appendix A, captured in the configuration controlled Risk Database application software that creates the forms, and summarized on the Risk Summary Table (Appendix B). The individual risk strategies are being implemented by the owners of the individual projects, and programs that comprise the Salt Processing Program. These owners are accountable to the Director, High Level Waste Salt Processing Division, for implementing the identified risk handling strategies, and are required to monitor and report status and trends in risk levels on a periodic basis. The implementation of risk management at SRS, as required by DOE Order 413.3, Program and Project Management for the Acquisition of Capital Assets, is described in WSRC SRS policies and procedures, project management plans, and very specifically in the Disciplined Conduct of Projects (DCOP), Roles, Responsibilities, Accountabilities, and Authorities (R2A2) Manual, Rev. 1, dated October 2002 (Reference 13). The R2A2 manual includes a description of the risk management responsibilities of all SRS management involved in projects and programs, including the Federal Project Manager.

One (1) Uncertain Risk

One (1) Uncertain Risk #6)	Risk remains uncertain due to litigation in Idaho concerning the WIR provisions of DOE Order 435.1.

Seven (7) High Risks

Two (2) **High** risk (Risk #39, 21)	Being mitigated, but the risk level remains **High**.
Five (5) **High** risks (Risk #2, 43, 46, 48 and 55)	Being avoided

Six (6) Moderate Risks

One (1) **Moderate** risk (Risk #51)	Being accepted, and remains **Moderate**
One (1) **Moderate** risk (Risk #59)	Being reduced, but the new risk level remains **Moderate**
One (1) **Moderate** risk (Risk #16)	Being mitigated, but the new risk level remains **Moderate**.
Three (3) **Moderate** risks (Risk #8, 11 and 22)	Being avoided

Fourteen (14) Low Risks

Six (6) **Low** risks (Risk #5, 18, 24, 27, 44, and 52)	Being accepted, and remain **Low**
Five (5) **Low** risks (Risk #3, 9, 10, 50, and 58)	Being reduced to decrease probability and remain **Low**
Three (3) **Low** risks (Risk #12, 25 and 45)	Being avoided

3.3 SECONDARY IMPACTS

The team evaluated the impact of individual risks and considered the results of multiple-risk events. The team determined a potential for second order impacts exists, and therefore, the full impact combinations of the identified risks may not be captured by the Risk Identification and Assessment Forms. For example, the following three events may all occur:

- Recovery of Tank 48 as a Feed Tank for ARP Is Delayed
- Equipment Not Available for 241-96H
- ARP Capacity Ramp Up to 6 gpm Not Successful

With the occurrence of all three events, a much greater impact could result, with impact to the program for all assessable areas, which are interdependent with the operating success of ARP. Such secondary impacts, while possible, are exceedingly difficult to quantify at this time. In addition, recognition of the primary risk events and implementation of appropriate risk handling strategies for these will also serve to reduce the potential for secondary impacts.

3.4 TRACKING AND TRENDING

A comparison was made between the risks identified on the Risk Identification and Assessment Forms and the risks identified with the PMP to ensure that this Risk assessment Report did not overlook these Risks. It was established that no conflict exists between the PMP and this risk assessment. Also, emerging risks identified in this Risk assessment Report will be considered in subsequent issues of the HLW System Plan.

These risk-handling strategies will be tracked and trended to ensure that they are either implemented or otherwise dispositioned, and to ensure that the costs, schedules and impacts of risk handling strategies are understood and progressing as planned. To provide a single source for tracking and trending data, a risk-action database will be maintained. An appropriate project owner will be identified for each risk that is responsible for monitoring and communicating risk status to the Risk Manager. The Risk Manager will ensure that the database is updated and, as necessary, recommend additional actions. Additional Risk Analyses will be performed, as they are required to support individual SPP projects and to provide information to SPP management.

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4.0 CONCLUSIONS AND RECOMMENDATIONS

The Salt Processing Program at SRS is essential to the success of the accelerated cleanup strategy. The program that has been laid out is aggressive and has significant levels of risk that will require implementation of risk-handling strategies. Active management and mitigation of risk is necessary to minimizing impacts to the program.

This risk assessment has determined a significant level of risk is associated with the Salt Processing Program as defined in the PMP. The cost and schedule associated with some of the risks, if realized, may be measured in billions of dollars and years of schedule delays. Risk-handling strategies have been identified along with the projected funding and schedules for the Salt Program. Many technology development activities, as identified in this report, are already in progress.

The risks identified as the result of this process fall into one of four general categories.

Project Management: Those risks associated the completion of the individual projects or initiatives necessary to provide the system through-put required to meet the expectations of the PMP. This includes the operation of existing facilities, and the projects which provide facilities or modifications that enable the required process capabilities for the system (e.g., saltstone modifications, facility outage management).

System Planning: Those risks associated with the ability of the M& O contractor to optimize the sequence of processing waste volumes to minimize the HLW life cycle, including the ability to accurately predict the makeup of future feed streams to the processing facilities.

Technology Development: Those risks associated with gaps in knowledge resulting from the limited application of the technology used to process high level waste (e.g., effectiveness of MST).

External Influences: Those risks associated with events or decisions outside the direct control of WSRC or DOE-SR management.

Those risks related to external influences are outside the control of WSRC or DOE-SR management. WSRC has initiated action on many of the risk handling strategies identified, and recommends that the future overall risk mitigation strategy be focused in the following areas:

1. Risk handling strategies for risk identified as High should be immediately implemented to minimize program impact. Appendix - B, Risk Summary Table, summarizes risk-handling strategies for corresponding risks.

2. To ensure that the capacity of the HLW system can meet the performance expectations of the PMP, SPP should perform an attainment study to determine the quantitative maximum potential process capability of the integrated HLW system, including the existing and proposed process facilities. This should include an analysis of the secondary impacts from the interaction between coupled facilities (e.g., statistical analysis of the ARP schedule risks). Results of this study need to be available prior to the start of final design for the SWPF in order to enable the design team to accurately size the processing capacity of the facility, including buffer storage capacity.

3. To reduce the probability that an interruption in operation occurs in any individual facility or the system resulting from inadequate blending strategies, or use of feed batches which require multiple process cycles, or acceptance of a non-compliant feed batch, SPP should initiate further refinement of the HLW system planning tools to include a comprehensive material balance flowsheet integrating all HLW facilities and modeling the performance of the processing facilities. This material balance flowsheet would be at the level of detail necessary to identify potentially non-compliant waste streams with sufficient lead time to preclude system interruptions.

4. To minimize the risk associated with the limited experience using CSSX technology for high level waste processing on a production basis, DOE should continue to provide funding for ongoing technology development activities which reduce risk. Priority should be placed on those activities that have the greatest potential of reducing high risks and multiple risks of a lower ranking.

5. Responsibility for coordination of all risk analyses performed on projects or operational initiatives required to meet the expectations of the PMP should be assigned to a single manager responsible to the Salt Processing Program Manager. All risk analyses performed on projects or operational initiatives required to meet the expectations of the PMP should be reviewed and evaluated by that manager to ensure that emergent risks in any individual project or initiative that could impact any other project or the overall Program would be identified; that risk handling strategies are being implemented by the responsible project owner or facility manager; and that the status of risks affecting the program are monitored and communicated to senior program management in timely manner.

Risk status will be monitored and reported to the Manager, SPP, and the Director, SPD, on a periodic basis. This analysis will be reviewed and updated periodically to capture the latest developments that may affect achieving the PMP scheduled goals.

5.0 REFERENCES

1. WSRC-RP-2002-00245, SRS Environmental Management Program Performance Management Plan, Revision 3.

2. HLW-2002-00161, High Level Waste Division PMP Supplement to HLW System Plan, Revision 13.

3. DOE's Plan of Action to Re-Assess Savannah River Site's High Level Waste Management Strategy - DNFSB Recommendation 2001-1 Implementation Plan, Revision 2, April 2002, cover letter dated May 10, 2002 from Spencer Abraham.

4. Y-RMP-H-00009, Risk Management Plan for the Salt Processing Program, Revision 0, 2/13/03.

5. WSRC E7, Conduct of Engineering and Technical Support

6. HLW-SDT-2001-00180, Salt Waste Processing Program Risk Analysis Report, Revision 0, June 7, 2001.

7. M-RAR-S-00002, Caustic Side Solvent Extraction Pilot Risk Analysis Report, Revision 0, 8/22/01.

8. Y-RAR-S-00009, Actinide Removal Process Risk Analysis Report, Revision 0, 12/19/02.

9. Y-RAR-S-00006, Low Curie Salt Risk analysis Report, Revision 0, 9/18/02

10. G-ESR-Z-00002, Saltstone Restart and LCS Processing, Vulnerability Assessment Report, Revision 0, 8/8/02.

11. G-ESR-S-00012, Defense Waste Processing Facility Vulnerability Assessment Report, Revision 0, 1/24/2003.

12. WSRC-IM-98-00033: Systems Engineering Methodology Guidance Manual, Appendix B: Risk (and Opportunity) Analysis and Management.

13. Disciplined Conduct of Projects, Roles, Responsibilities, Accountabilities, and Authorities (R2A2), Revision 1, October 2002

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APPENDIX A - RISK IDENTIFICATION AND ASSESSMENT FORMS

This Appendix contains a copy of Risk Assessment Forms completed during the risk assessment process. In addition to providing information summarized elsewhere in this report, these forms provide statements and bases for the probability and consequence values selected by the Risk Assessment Team. Handling strategies to mitigate the associated risk, residual risk impact, and other information are also provided.

Document Name: Document No.:
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Document Date

Risk & Opportunity Assessment Form

Identification No.: *LCS-00-002*
KASE #:

Assessed Element: Low Curie Salt
Title: **Cesium or Actinides Exceed LCS Limits**
Category (Optional):
Risk/Opportunity Type: LCS - Low Curie Salt **BDER Level:** N/A

Date: 03/04/2003 **Responsibility:** DOE SPD

A. Statement of Event: *(State Event and Risk/Opportunity)*

The current plan assumes that our understanding of the hydrogeological properties and physical and chemical characteristics of the salt is adequate to permit the drainoff of high curie interstitial liquid to meet LCS requirements within the current schedule. If interstitial liquid canno be drained sufficiently to meet program requirements (.378 Ci/gal and 20M Ci at Saltstone) or the actinide levels exceed Saltstone limits, the schedule cannot be met and cost savings will not be achieved.

B. Probability: *(State the probability and basis that the risk/opportunity will come true without credit for HS)* P= ______

The program is only in the proof of concept stage. Atleast some of the tanks have the potential for higher than .378 Ci/gal Cs levels or greater than 99 nCi/g actinides. (Note: From the program level, this information may be acquired later and time made up if an appropriate handling strategy is identified and implemented).

○ Noncredible ● Very Unlikely(VU) (P < 0.15) ○ Unlikely(U) (.15 ≤ P < 0.45) ○ Likely(L) (.45 ≤ P < 0.75) ○ Very Likely(VL) (P ≥ .75)

C. Consequence: *(State the consequences and quantify basis if that risk comes true without credit for RHS. For opportunities, document the benefit/cost ratio comparison between the original scope and proposed opportunity)* C= ______

A higher throughput required and longer life for SWPF. Worst case estimate is 1M gal of saltcake exceeds the .378 Ci/gal Cs limits or 99 nCi/g actinides (at 3 year schedule extension per million gallons of saltcake.) DWPF, Tank Farm operations will be extended as well. Additional canister and disposal cost. ($1.0M/can.)

Worst Case Cost Impact: $810M Worst Case Schedule Impact: 3 Yr(s)

○ Negligible(N) (C ≤ 0.1) ○ Marginal(M) (.2 ≤ C ≤ 0.4) ○ Significant(S) (.5 ≤ C ≤ 0.7) ● Critical(C) (.8 ≤ C ≤ 0.9) ○ Crisis(Cr) (C > 0.9)

D. Risk Level: ○ Low(L) ○ Moderate(M) ● High(H) Probability x Consequence = Risk Factor (optional): ______

E. Risk Handling Strategies:

Risk Handling Approach	Risk Handling Strategy (RHS) Description and Bases	Reduced Prob	Reduced Cons.	Reduced Risk	Implementation Cost	Implementation Schedule	Tracking# (Optional)
Avoid	Perform saltcake waste characterization samplng and analysis for Cs and actinides, as required, and update WAC.				TBD		
	Implement the best solution(s) from the following:				TBD		
	Investigate blending with DWPF recycle. (Addressed in other Risk Handling Strategies)				--		
	Consider additional capacity for the SWPF. (Addressed in other Risk Handling Strategies)				--		
	Investigate at-tank Cesium removal and/or interstitial liquid removal technologies.				TBD		

F. Residual Risk Impact:

	Best	Most Likely	Worst
Cost Consequence:	$0	$0	$0
Schedule Consequence:	0 Day(	0 Day(	0 Day(

Distribution Selection:

G. Description of Residual Risk:

H. Triggers: Tank 41 and/or other subsequent tanks (expect to be LCS) do not meet .378 Ci/gal Cs or 99 nCi/g actinides.

I. Affected Work Scope: LCS

J. Additional Comments (optional):
28M gal of LCS salt solution is assumed to meet .378 Ci/gal (program limit at 6.4 molar Na), or up to 3M gal of the 28M gal must be sent to SWPF because it does not meet the .378 Ci/gal. These 3M gallons of salt solution are from 1M gallons of saltcake from multiple tanks that do not meet the program limit. Total Ci limit to Saltstone is 20 million Ci.

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Document Date

Risk & Opportunity Assessment Form

Identification No.: *SPP-00-003*
KASE #:

Assessed Element: Salt Processing Program
Title: **Environmental Permitting**
Category (Optional):
Risk/Opportunity Type: SPP-Salt Processing **BDER Level:** N/A

Date: 03/04/2003 **Responsibility:** WSRC Salt Processing Program and DOE SPD

A. Statement of Event: *(State Event and Risk/Opportunity)*
Three major permitting actions are necessary to support the SPP (ARP, SWPF, and Saltstone). The program baseline assumes general stakeholder and regulator support with no time delay roadblocks. Failure to receive permits in a timely fashion delays the program. Any potential delays due to ongoing Federal court litigation in Idaho concerning the WIR provisions of DOE Order 435.1, are not directly included as part of this risk.

B. Probability: *(State the probability and basis that the risk/opportunity will come true without credit for HS)* P= ______
SR and SCDHEC continue to work cooperatively on permitting actions.
○ Noncredible ● Very Unlikely(VU) (P < 0.15) ○ Unlikely(U) (.15 ≤ P < 0.45) ○ Likely(L) (.45 ≤ P < 0.75) ○ Very Likely(VL) (P ≥ .75)

C. Consequence: *(State the consequences and quantify basis if that risk comes true without credit for RHS. For opportunities, document the benefit/cost ratio comparison between the original scope and proposed opportunity)* C= ______
Major program elements will be delayed if permits are not received in a timely fashion. In the worst case (assumed to be 1 year delay in SWPF permit issuance), the schedule objectives for PMP cannot be realized and additional life cycle costs will be incurred.
Worst Case Cost Impact: $270M Worst Case Schedule Impact: 1 Yr(s)
○ Negligible(N) (C ≤ 0.1) ○ Marginal(M) (.2 ≤ C ≤ 0.4) ● Significant(S) (.5 ≤ C ≤ 0.7) ○ Critical(C) (.8 ≤ C ≤ 0.9) ○ Crisis(Cr) (C > 0.9)

D. Risk Level: ● Low(L) ○ Moderate(M) ○ High(H) Probability x Consequence = Risk Factor (optional): ______

E. Risk Handling Strategies:

Risk Handling Approach	Risk Handling Strategy (RHS) Description and Bases	Reduced Prob.	Reduced Cons.	Reduced Risk	Implementation Cost	Implementation Schedule	Tracking# (Optional)
Reduce	Implement a comprehensive communications strategy for the SPP.				$0		

F. Residual Risk Impact:

	Best	Most Likely	Worst
Cost Consequence:	$0	$135,000,000	$270,000,000
Schedule Consequence:	0 Day(	6 Mo(s)	1 Yr(s)

Distribution Selection:

G. Description of Residual Risk:
H. Triggers: Stakeholder concerns or technical issues resulting in permit delays.
I. Affected Work Scope:
J. Additional Comments (optional):

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Document Date

Risk & Opportunity Assessment Form

Identification No.: *LCS-00-005*
KASE #:

Assessed Element: Low Curie Salt
Title: **Cesium Exceeds 0.1 Ci/gal and/or Actinides Exceed 99 nCi/g**
Category (Optional):
Risk/Opportunity Type: LCS- Low Curie Salt **BDER Level:**

Date: 03/04/2003 **Responsibility:** WSRC Salt Processing Program Manager

A. Statement of Event: *(State Event and Risk/Opportunity)*
The current plan assumes that our understanding of the hydrogeological properties, physical and chemical characteristics of the salt is adequate to permit the drainoff of high curie interstitial liquid to meet Saltstone Processing Facility requirements (0.1 Ci/gal Cs and 99 nCi/g actinides) within the current schedule. Interstitial liquid cannot be drained sufficiently to meet a final 0.1 Ci/gal.

B. Probability: *(State the probability and basis that the risk/opportunity will come true without credit for HS)* P= ______
The program is in the proof of concept stage. At least some of the tanks have the potential for higher than 0.1 Ci/gal Cs or 99 nCi/g actinide levels. (Note: From the program level, this information may be acquired later and LCS schedule made up if an appropriate handling strategy is identified and implemented.)

○ Noncredible ○ Very Unlikely(VU) $(P < 0.15)$ ○ Unlikely(U) $(.15 \le P < 0.45)$ ○ Likely(L) $(.45 \le P < 0.75)$ ● Very Likely(VL) $(P \ge .75)$

C. Consequence: *(State the consequences and quantify basis if that risk comes true without credit for RHS. For opportunities, document the benefit/cost ratio comparison between the original scope and proposed opportunity)* C= ______
LCS schedule will be delayed until 10/04 when Saltstone mods are complete to handle 0.378 Ci/gal Cs (See Risk #027.) or until material is processed through ARP if it exceeds 99 nCi/g. At worst, ARP would be in operation for one additional year.

Worst Case Cost Impact: $25M Worst Case Schedule Impact: 0 Day(s)

● Negligible(N) $(C \le 0.1)$ ○ Marginal(M) $(.2 \le C \le 0.4)$ ○ Significant(S) $(.5 \le C \le 0.7)$ ○ Critical(C) $(.8 \le C \le 0.9)$ ○ Crisis(Cr) $(C > 0.9)$

D. Risk Level: ● Low(L) ○ Moderate(M) ○ High(H) Probability x Consequence = Risk Factor (optional): ______

E. Risk Handling Strategies:

Risk Handling Approach	Risk Handling Strategy (RHS) Description and Bases	Reduced Prob.	Reduced Cons.	Reduced Risk	Implementation Cost	Implementation Schedule	Tracking# (Optional)
Accept							

F. Residual Risk Impact: Distribution Selection:

	Best	Most Likely	Worst
Cost Consequence:	$0	$0	$25,000,000
Schedule Consequence:	0 Day(	0 Day(	0 Day(

G. Description of Residual Risk:

H. Triggers: Tank 41 and/or other subsequent tanks (expect to be LCS) does not meet 0.1 Ci/gal.

I. Affected Work Scope: LCS

J. Additional Comments (optional):
The 0.1 Ci/gal limit is based on Saltstone Processing Facility shielding capabilities. Saltstone capacity is available in the later years of the program (after 2014).

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Risk & Opportunity Assessment Form

Identification No.: *SPP-00-006*
KASE #:

Assessed Element: Salt Processing Program
Title: **Regulators, Stakeholder Concerns - WIR**
Category (Optional):
Risk/Opportunity Type: SPP-Salt Processing **BDER Level:** N/A

Date: 03/05/2003 **Responsibility:**

A. Statement of Event: *(State Event and Risk/Opportunity)*
This risk represents potential delays which may result due to ongoing Federal court litigation in Idaho concerning the WIR provisions of DOE Order 435.1.

B. Probability: *(State the probability and basis that the risk/opportunity will come true without credit for HS)* P= ______

○ Noncredible ○ Very Unlikely(VU) (P < 0.15) ○ Unlikely(U) (.15 ≤ P < 0.45) ○ Likely(L) (.45 ≤ P < 0.75) ○ Very Likely(VL) (P ≥ .75)

C. Consequence: *(State the consequences and quantify basis if that risk comes true without credit for RHS. For opportunities, document the benefit/cost ratio comparison between the original scope and proposed opportunity)* C= ______

Worst Case Cost Impact: ______ Worst Case Schedule Impact: ______

○ Negligible(N) (C ≤ 0.1) ○ Marginal(M) (.2 ≤ C ≤ 0.4) ○ Significant(S) (.5 ≤ C ≤ 0.7) ○ Critical(C) (.8 ≤ C ≤ 0.9) ○ Crisis(Cr) (C > 0.9)

D. Risk Level: ○ Low(L) ○ Moderate(M) ○ High(H) Probability x Consequence = Risk Factor (optional): ______

E. Risk Handling Strategies:

Risk Handling Approach	Risk Handling Strategy (RHS) Description and Bases	Reduced			Implementation		Tracking# (Optional)
		Prob.	Cons.	Risk	Cost	Schedule	

F. Residual Risk Impact: Cost Consequence: ______ ______ ______ Distribution Selection:
Schedule Consequence: ______ ______ ______
Best Most Likely Worst

G. Description of Residual Risk: The best outcome is a ruling in our favor, with 3 months for ruling and 3 months for public comment. The most likely result would be a loss of a year to work through the process.

H. Triggers:

I. Affected Work Scope:

J. Additional Comments (optional):
On July 3, 2003, parts of DOE Order 435.1 dealing with the waste incidental to reprocessing determination process under that Order were called into question by the U.S. District Court for the district of Idaho in the case of Natural Resources Defense Counsel v. DOE, Case No. 01-413-S-BLW. The Department of Justic has filed a notice of appeal to the U.S. Court of Appeals for the Ninth Circuit. Accordingly, it is not appropriate to address these types of probabilities, consequences or mitigations in this document at this time.

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Risk & Opportunity Assessment Form

Identification No.: *ARP-00-008*
KASE #:

Assessed Element: Actinide Removal Process

Title: **Recovery of Tank 48 as a Feed Tank for ARP is Delayed**

Category (Optional):

Risk/Opportunity Type: ARP- Actinide Removal **BDER Level:** N/A

Date: 03/05/2003 **Responsibility:** WSRC Salt Processing Program and DOE SPD

A. Statement of Event: *(State Event and Risk/Opportunity)*

The program basis includes a requirement that tank 48 be recovered for use as a feed tank prior to the need date for the 241-96H Facility, which is being modified for use in the ARP process (10/06). Tank 48 currently contains organic residual wastes that preclude its use for receipt of other waste material. Technology issues could delay recovery of Tank 48.

B. Probability: *(State the probability and basis that the risk/opportunity will come true without credit for HS)* P= ______

The PMP currently assumes that Tank 48 material will be transferred to Tank 49. A technology alternative (Fenton's reagent) is being investigated for eventual depletion of the organic residual waste. There are no implementation plans in place.

○ Noncredible ○ Very Unlikely(VU) (P < 0.15) ○ Unlikely(U) (.15 ≤ P < 0.45) ● Likely(L) (.45 ≤ P < 0.75) ○ Very Likely(VL) (P ≥ .75)

C. Consequence: *(State the consequences and quantify basis if that risk comes true without credit for RHS. For opportunities, document the benefit/cost ratio comparison between the original scope and proposed opportunity)* C= ______

Tank 48 is not available as a Feed Tank on 10/06. A schedule slip of up to 2 years for the ARP occurs which uses up 2 years of float in the ARP program schedule (at $25M/yr), subsequently slowing down tank closure in F Tank Farm for 2 years(at $50M/yr).

Worst Case Cost Impact: $150M Worst Case Schedule Impact: 0 Day(s)

○ Negligible(N) (C ≤ 0.1) ● Marginal(M) (.2 ≤ C ≤ 0.4) ○ Significant(S) (.5 ≤ C ≤ 0.7) ○ Critical(C) (.8 ≤ C ≤ 0.9) ○ Crisis(Cr) (C > 0.9)

D. Risk Level: ○ Low(L) ● Moderate(M) ○ High(H) Probability x Consequence = Risk Factor (optional): ______

E. Risk Handling Strategies:

Risk Handling Approach	Risk Handling Strategy (RHS) Description and Bases	Reduced Prob.	Reduced Cons.	Reduced Risk	Implementation Cost	Implementation Schedule	Tracking# (Optional)
Avoid	Accelerate development and implementation of technologies for treating at Tank 48.				TBD		

F. Residual Risk Impact:

	Best	Most Likely	Worst
Cost Consequence:	$0	$0	$0
Schedule Consequence:	0 Day(	0 Day(	0 Day(

Distribution Selection:

G. Description of Residual Risk:

H. Triggers:

I. Affected Work Scope:

J. Additional Comments (optional):
If a treatment scheme for Tank 48 is not available in a timely manner, transfer Tank 48 Contents to Tank 49. Clean Tank 48. Treat the contents in Tank 49, applying the new technology prior to startup of the SWPF.

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Risk & Opportunity Assessment Form

Identification No.: *ARP-00-009*
KASE #:
Date: 03/05/2003

Assessed Element: Actinide Removal Process
Title: **Reassignment of Tank 49 as Initial Feed Tank for the 512-S ARP**
Category (Optional):
Risk/Opportunity Type: ARP- Actinide Removal **BDER Level:** N/A
Responsibility:

A. Statement of Event: *(State Event and Risk/Opportunity)*
Tank 49 currently holds concentrated supernate and saltcake heel. Per the PMP, reassignment of Tank 49 from its existing HLW storage function is assumed by 4/04 for the initial feed tank for the 512-S ARP. Delays in the reassignment of Tank 49 prevent ARP processing from starting.

B. Probability: *(State the probability and basis that the risk/opportunity will come true without credit for HS)* P=
Tank Farm space management may be affected by an evaporator problem. Space for the contents of Tank 49 must be made available in the Tank Farm through evaporation. Evaporator problems have been experienced recently. Also, integration of complex, multiple transfers of material is required to gain space.

○ Noncredible ○ Very Unlikely(VU) $(P < 0.15)$ ○ Unlikely(U) $(.15 \le P < 0.45)$ ● Likely(L) $(.45 \le P < 0.75)$ ○ Very Likely(VL) $(P \ge .75)$

C. Consequence: *(State the consequences and quantify basis if that risk comes true without credit for RHS. For opportunities, document the benefit/cost ratio comparison between the original scope and proposed opportunity)* C=
The 512-S ARP startup will be delayed until Tank 49 is available. A schedule slip of up to 0.5 years occurs in the ARP program schedule (at $25M/yr).
Worst Case Cost Impact: $13M Worst Case Schedule Impact: 0 Day(s)

● Negligible(N) $(C \le 0.1)$ ○ Marginal(M) $(.2 \le C \le 0.4)$ ○ Significant(S) $(.5 \le C \le 0.7)$ ○ Critical(C) $(.8 \le C \le 0.9)$ ○ Crisis(Cr) $(C > 0.9)$

D. Risk Level: ● Low(L) ○ Moderate(M) ○ High(H) Probability x Consequence = Risk Factor (optional):

E. Risk Handling Strategies:

Risk Handling Approach	Risk Handling Strategy (RHS) Description and Bases	Reduced Prob.	Reduced Cons.	Reduced Risk	Implementation Cost	Implementation Schedule	Tracking# (Optional)
Reduce	Develop the integrated transfer and evaporator plan to support Tank 49 reassignment as the 512-S ARP Feed Tank.						

F. Residual Risk Impact:

	Best	Most Likely	Worst
Cost Consequence:	$0	$0	$13,000,000
Schedule Consequence:	0 Mo(s)	0 Mo(s)	6 Mo(s)

Distribution Selection:

G. Description of Residual Risk:
H. Triggers:
I. Affected Work Scope:
J. Additional Comments (optional):
Emergent evaporator operational issues or transfer priority issues can be resolved within 6 months.

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Risk & Opportunity Assessment Form

Identification No.: *ARP-00-010*
KASE #:

Assessed Element: Actinide Removal Process
Title: **Delays to 241-96H ARP Start Up**
Category (Optional):
Risk/Opportunity Type: ARP- Actinide Removal **BDER Level:** N/A

Date: 03/05/2003 **Responsibility:** WSRC Salt Processing Program Manager

A. Statement of Event: *(State Event and Risk/Opportunity)*
The PMP assumes that 241-96H ARP will be operational by 10/06. The schedule for 241-96H ARP is anticipated to spend 2.5 years (6 mo. design and 2 year construction). Prior operational experience in 512-S is desired. If schedu delays, personnel, and equipment availability are encountered, then 241-96H ARP will not be ready for start up as needed to support the program schedule.

B. Probability: *(State the probability and basis that the risk/opportunity will come true without credit for HS)* P= ___
Only the two shielded cells, a cold feed tank, and the ventilation system will be used in the original building. A 3-D model has been ensure architectural fit. 512-S ARP will provide a demonstration project for 241-96H ARP; therefore, construction on 241-96H w ill ARP operations, but the design must be ready for construction by 10/04.

○ Noncredible ○ Very Unlikely(VU) (P < 0.15) ○ Unlikely(U) (.15 ≤ P < 0.45) ● Likely(L) (.45 ≤ P < 0.75) ○ Very Likely(VL) (P ≥ .75)

C. Consequence: *(State the consequences and quantify basis if that risk comes true without credit for RHS. For opportunities, document the benefit/cost ratio comparison between the original scope and proposed opportunity)* C= ___
241-96H ARP is not available on 10/06. A schedule slip of up to 0.5 years occurs which uses up 0.5 years of float in the ARP program schedule (at $25M/yr), subsequently slowing down tank closure in F Tank Farm for 0.5 years (at $50M/yr).

Worst Case Cost Impact: $38M Worst Case Schedule Impact: 0 Day(s)

● Negligible(N) (C ≤ 0.1) ○ Marginal(M) (.2 ≤ C ≤ 0.4) ○ Significant(S) (.5 ≤ C ≤ 0.7) ○ Critical(C) (.8 ≤ C ≤ 0.9) ○ Crisis(Cr) (C > 0.9)

D. Risk Level: ● Low(L) ○ Moderate(M) ○ High(H) Probability x Consequence = Risk Factor (optional): ___

E. Risk Handling Strategies:

Risk Handling Approach	Risk Handling Strategy (RHS) Description and Bases	Reduced Prob.	Reduced Cons.	Reduced Risk	Implementation Cost	Implementation Schedule	Tra (Op
Reduce	Obtain resources to begin design of 241-96H facility early. Accelerate 512-S ARP startup.						

F. Residual Risk Impact:

	Best	Most Likely	Worst
Cost Consequence:	$0	$19,000,000	$38,000,000
Schedule Consequence:	0 Mo(s)	3 Mo(s)	6 Mo(s)

Distribution Selectio

G. Description of Residual Risk:

H. Triggers:

I. Affected Work Scope:

J. Additional Comments (optional):
Funding strategy issues are not included in this risk. See Risk #018. Design must be complete and construction started by 10/04 in order to complete by 10 as required. Due to the aggressive design, construction and startup schedule, some delay is probable due to lack of resources, interferences, lack of sch float, and other factors that may be encountered. With a 2 1/2 year project schedule, any potential delays due to project issues would not be anticipated to 6 months (20% negative variance) as a worst case.

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Risk & Opportunity Assessment Form

Identification No.: *ARP-00-011*
KASE #:

Assessed Element: Actinide Removal Process
Title: **ARP Capacity Ramp Up to 6 gpm not Successful**
Category (Optional):
Risk/Opportunity Type: ARP- Actinide Removal **BDER Level:** N/A

Date: 03/05/2003 **Responsibility:** WSRC Salt Processing Program Manager

A. Statement of Event: *(State Event and Risk/Opportunity)*
The PMP assumes ramping up ARP capacity from 3 gpm (in 10/06) to 6 gpm (in 4/07). The 4/07 capacity increase is based on the need date for installation of improved filtration technology from the current cross-flow filter utilized in Bldg. 512-S. This improved technology may not be available to support the required 4/07 capacity increase.

B. Probability: *(State the probability and basis that the risk/opportunity will come true without credit for HS)* P=
A rotary micro-filter is available which is likely to be appropriate to this use. Although results to date have been promising, R&D on the filter is not complete. The filter is at the prototype demonstration in a laboratory environment stage using real waste.

○ Noncredible ○ Very Unlikely(VU) (P < 0.15) ● Unlikely(U) (.15 ≤ P < 0.45) ○ Likely(L) (.45 ≤ P < 0.75) ○ Very Likely(VL) (P ≥ .75)

C. Consequence: *(State the consequences and quantify basis if that risk comes true without credit for RHS. For opportunities, document the benefit/cost ratio comparison between the original scope and proposed opportunity)* C=
Capacity does not increase to 6 gpm by 4/07. In the worst case, 3 gpm would be the maximum throughput. This would double the ARP lifecycle from 4/07, potentially extending the program by 11 years. However ARP is not fully loaded in its latter years, and could be run until FY2022. Also, in FY2019, it would be possible to run through SWPF until FY2022. These factors reduce the program impact to 3 years.

Worst Case Cost Impact: $810M Worst Case Schedule Impact: 3 Yr(s)

○ Negligible(N) (C ≤ 0.1) ○ Marginal(M) (.2 ≤ C ≤ 0.4) ○ Significant(S) (.5 ≤ C ≤ 0.7) ● Critical(C) (.8 ≤ C ≤ 0.9) ○ Crisis(Cr) (C > 0.9)

D. Risk Level: ○ Low(L) ● Moderate(M) ○ High(H) Probability x Consequence = Risk Factor (optional):

E. Risk Handling Strategies:

Risk Handling Approach	Risk Handling Strategy (RHS) Description and Bases	Reduced Prob.	Reduced Cons.	Reduced Risk	Implementation Cost	Implementation Schedule		Tracking# (Optional)
Avoid	Continue R&D of the rotary microfilter. Investigate other alternatives, such as 241-96 H equipment arrangements or processing improvements to achieve 6 gpm by 4/07. Develop and implement a contingency plan to achieve the needed 6 gpm.				TBD			

F. Residual Risk Impact:

	Best	Most Likely	Worst
Cost Consequence:	$0	$0	$0
Schedule Consequence:	0 Yr(s)	0 Yr(s)	0 Yr(s)

Distribution Selection:

G. Description of Residual Risk:

H. Triggers: Implementation of the Contingency Plan is determined to be cost prohibitive. Alternative technology development succeeds (or fails).

I. Affected Work Scope:

J. Additional Comments (optional):
An opportunity may exist to install the new filters at an earlier date.

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Risk & Opportunity Assessment Form

Identification No.: *ARP-00-012*
KASE #:

Assessed Element: Actinide Removal Process
Title: **Equipment Not Available for 241-96H ARP Process**
Category (Optional):
Risk/Opportunity Type: ARP- Actinide Removal **BDER Level:**

Date: 03/07/0003 **Responsibility:** WSRC Salt Processing Program Manager

A. Statement of Event: *(State Event and Risk/Opportunity)*
Equipment used in 241-96H ARP will be acquired from the Tank Farms and/or DWPF spares. If major equipment failures in the Tank Farm or DWPF require the use of spares earmarked for 241-96H ARP, start up of the facility will be delayed.

B. Probability: *(State the probability and basis that the risk/opportunity will come true without credit for HS)* P= ______
The critical components are the pump tanks, pumps, and agitators. Operating experience has demonstrated that the recurrence interval of failure is >25 years.
○ Noncredible ○ Very Unlikely(VU) (P < 0.15) ● Unlikely(U) (.15 ≤ P < 0.45) ○ Likely(L) (.45 ≤ P < 0.75) ○ Very Likely(VL) (P ≥ .75)

C. Consequence: *(State the consequences and quantify basis if that risk comes true without credit for RHS. For opportunities, document the benefit/cost ratio comparison between the original scope and proposed opportunity)* C= ______
18 months is required for procurement of a tank which uses up ARP float but does not impact SPP completion.
Worst Case Cost Impact: $38M Worst Case Schedule Impact: 0 Mo(s)
● Negligible(N) (C ≤ 0.1) ○ Marginal(M) (.2 ≤ C ≤ 0.4) ○ Significant(S) (.5 ≤ C ≤ 0.7) ○ Critical(C) (.8 ≤ C ≤ 0.9) ○ Crisis(Cr) (C > 0.9)

D. Risk Level: ● Low(L) ○ Moderate(M) ○ High(H) Probability x Consequence = Risk Factor (optional): ______

E. Risk Handling Strategies:

Risk Handling Approach	Risk Handling Strategy (RHS) Description and Bases	Reduced Prob.	Reduced Cons.	Reduced Risk	Implementation Cost	Implementation Schedule	Tracking# (Optional)
Avoid	Procure spares at the initiation of the 2.5 year 241-96H ARP project.				**TBD**		

F. Residual Risk Impact:

	Best	Most Likely	Worst
Cost Consequence:	$0	$0	$0
Schedule Consequence:	0 Mo(s)	0 Mo(s)	0 Mo(s)

Distribution Selection:

G. Description of Residual Risk:
H. Triggers:
I. Affected Work Scope:
J. Additional Comments (optional):
The use of common spares among four facilities provides enhances resource management.

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Risk & Opportunity Assessment Form

Identification No.: *ARP-00-016*
KASE #:

Assessed Element: Actinide Removal Process

Title: **Actinide and Strontium Concentration High or Low MST DF**

Category (Optional):

Risk/Opportunity Type: ARP- Actinide Removal **BDER Level:** N/A

Date: 03/05/2003 **Responsibility:**

A. Statement of Event: *(State Event and Risk/Opportunity)*

The ARP is based on having an MST DF of 6 to 12 in order to meet the Saltstone WAC. There is a potential that the experienced DF is less than that anticipated and that actual waste concentrations result in a need for additional ARP processing.

B. Probability: *(State the probability and basis that the risk/opportunity will come true without credit for HS)* P= ___

Actinides are not well characterized in the salt cake. Therefore dissolved salt may contain actinide levels higher than identified in the BAR.

○ Noncredible ○ Very Unlikely(VU) (P < 0.15) ○ Unlikely(U) (.15 ≤ P < 0.45) ○ Likely(L) (.45 ≤ P < 0.75) ● Very Likely(VL) (P ≥ .75)

C. Consequence: *(State the consequences and quantify basis if that risk comes true without credit for RHS. For opportunities, document the benefit/cost ratio comparison between the original scope and proposed opportunity)* C= ___

Additional processing time will be required (for an estimated 20% batches of total batches to be processed). Higher MST concent
be required (see risk SWPF-048). A schedule slip of up to 2 years for ARP occurs which uses up 2 years of float in the ARP prog
$25M/yr), subsequently slowing down tank closure in F Tank Farmfor 2 yrs. (at $50M/yr).

Worst Case Cost Impact: $150M Worst Case Schedule Impact: 0 Yr(s)

○ Negligible(N) (C ≤ 0.1) ● Marginal(M) (.2 ≤ C ≤ 0.4) ○ Significant(S) (.5 ≤ C ≤ 0.7) ○ Critical(C) (.8 ≤ C ≤ 0.9) ○ Crisis(Cr) (C > 0.9)

D. Risk Level: ○ Low(L) ● Moderate(M) ○ High(H) Probability x Consequence = Risk Factor (optional): ___

E. Risk Handling Strategies:

Risk Handling Approach	Risk Handling Strategy (RHS) Description and Bases	Reduced Prob.	Reduced Cons.	Reduced Risk	Implementation Cost	Implementation Schedule	Tra (Op
Mitigate	Explore potential for sending higher actinide concentrations to Saltstone. Verify strontium and actinide removal DF values for ARP feed compositions through R&D.						

F. Residual Risk Impact:

	Best	Most Likely	Worst	
Cost Consequence:	$0	$0	$150,000,000	Distribution Selectic
Schedule Consequence:	0	0	2 Yr(s)	

G. Description of Residual Risk: RHS will help understand the problem, but residual risk will remain Moderate.

H. Triggers:

I. Affected Work Scope:

J. Additional Comments (optional):

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Risk & Opportunity Assessment Form

Identification No.: *ARP-00-018*
KASE #:

Assessed Element: Actinide Removal Process
Title: **241-96H ARP Funding Strategy**
Category (Optional):
Risk/Opportunity Type: ARP- Actinide Removal **BDER Level:** N/A

Date: 03/10/2003 **Responsibility:** WSRC Salt Processing Program Manager

A. Statement of Event: *(State Event and Risk/Opportunity)*
ARP plans currently assume that 241-96H modifications will be implemented using operating funds. If this funding source is unacceptable, a line item project funding will delay modifications of 241-96H. There will be a delay to completion of ARP project.

B. Probability: *(State the probability and basis that the risk/opportunity will come true without credit for HS)* P= ______
A request has been submitted in FY03 to fund projects like 241-96H ARP as operating expenses.
○ Noncredible ● Very Unlikely(VU) (P < 0.15) ○ Unlikely(U) (.15 ≤ P < 0.45) ○ Likely(L) (.45 ≤ P < 0.75) ○ Very Likely(VL) (P ≥ .75)

C. Consequence: *(State the consequences and quantify basis if that risk comes true without credit for RHS. For opportunities, document the benefit/cost ratio comparison between the original scope and proposed opportunity)* C= ______
The ARP 241-96H modification completion will be delayed from FY07 to completion in FY09, (2 year delay based on the assumed time to receive approval of a line item project), which is within the float for the SPP.
Worst Case Cost Impact: $150M Worst Case Schedule Impact: 0 Yr(s)
○ Negligible(N) (C ≤ 0.1) ● Marginal(M) (.2 ≤ C ≤ 0.4) ○ Significant(S) (.5 ≤ C ≤ 0.7) ○ Critical(C) (.8 ≤ C ≤ 0.9) ○ Crisis(Cr) (C > 0.9)

D. Risk Level: ● Low(L) ○ Moderate(M) ○ High(H) Probability x Consequence = Risk Factor (optional): ______

E. Risk Handling Strategies:

Risk Handling Approach	Risk Handling Strategy (RHS) Description and Bases	Reduced Prob.	Reduced Cons.	Reduced Risk	Implementation Cost	Implementation Schedule		Tracking# (Optional)
Accept								

F. Residual Risk Impact: Cost Consequence: ______ ______ ______ Distribution Selection:
Schedule Consequence: ______ ______ ______
Best Most Likely Worst

G. Description of Residual Risk:
H. Triggers:
I. Affected Work Scope:
J. Additional Comments (optional):

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Risk & Opportunity Assessment Form

Identification No.: *SPP-00-021*
KASE #:

Assessed Element: Salt Processing Program
Title: **Funding Competition Impacts SPP**
Category (Optional):
Risk/Opportunity Type: SPP-Salt Processing **BDER Level:** N/A

Date: 03/10/2003 **Responsibility:** WSRC Salt Processing Program and DOE SPD

A. Statement of Event: *(State Event and Risk/Opportunity)*
The SPP schedule is based on having the funding available when needed. This funding may not be available due to funding competition among many projects within the program over a long period. Further, funding authorization may not be obtained when required. Either of these cases results in delay to the program.

B. Probability: *(State the probability and basis that the risk/opportunity will come true without credit for HS)* P=
Given that the HLW program spans 20 years and has a cumulative cost of over $11B, it is very likely that this risk will be realized.

○ Noncredible ○ Very Unlikely(VU) (P < 0.15) ○ Unlikely(U) (.15 ≤ P < 0.45) ○ Likely(L) (.45 ≤ P < 0.75) ● Very Likely(VL) (P ≥ .75)

C. Consequence: *(State the consequences and quantify basis if that risk comes true without credit for RHS. For opportunities, document the benefit/cost ratio comparison between the original scope and proposed opportunity)* C=
Underfunding and/ or untimely funding of the SPP results in delays to program completion, resulting in additional environmental and programmatic risks and lifecycle costs.

Worst Case Cost Impact: 6.1B Worst Case Schedule Impact:

○ Negligible(N) (C ≤ 0.1) ○ Marginal(M) (.2 ≤ C ≤ 0.4) ○ Significant(S) (.5 ≤ C ≤ 0.7) ● Critical(C) (.8 ≤ C ≤ 0.9) ○ Crisis(Cr) (C > 0.9)

D. Risk Level: ○ Low(L) ○ Moderate(M) ● High(H) Probability x Consequence = Risk Factor (optional):

E. Risk Handling Strategies:

Risk Handling Approach	Risk Handling Strategy (RHS) Description and Bases	Reduced Prob.	Reduced Cons.	Reduced Risk	Implementation Cost	Implementation Schedule		Tracking # (Optional)
Mitigate	Request funding to support the program. Participate in site budget prioritization, planning and change control.				$0			

F. Residual Risk Impact: Cost Consequence: Schedule Consequence: (Best / Most Likely / Worst) Distribution Selection:

G. Description of Residual Risk:

H. Triggers: The budget shortfall in any fiscal year which is determined by project managementto impact the capacity oroperating schedule of the facilities required to implement the plan (RHS).

I. Affected Work Scope:

J. Additional Comments (optional):
It is assumed that the project will be adequately funded throughout the life of the program. The residual risk would be $0. There is no credible, feasible way to determine the impact this could have on the program without know when the funding shortfall may occur, how long it will last, and/or how big it will be.

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Risk & Opportunity Assessment Form

Identification No.: *FM- 00-022*

KASE #:

Assessed Element: Feed Management

Title: **Unavailability of Low Activity Feed for ARP**

Category (Optional): Construction Strategy: Direct Hire/Subcontract

Risk/Opportunity Type: FM- Feed Management **BDER Level:** N/A

Date: 03/10/2003

Responsibility: Liquid Waste Disposition Area Project Manager

A. Statement of Event: *(State Event and Risk/Opportunity)*

The PMP assumes that salt solution is available in Tank 49 as feed for transfer to ARP by 7/04. There are conflicts in priorities for use of Tank 7 for transfers of sludge and salt that may prevent feed of salt solution to the feed tank for ARP or interfere with Tank 3 transfers. Tank 7 may not be available for ARP salt transfers by 7/04 and to support sustained feed.

B. Probability: *(State the probability and basis that the risk/opportunity will come true without credit for HS)* P= ______

A complex series of transfers involve Tank 7. Disposition of material in Tanks 1-3 and Tank 18 all must be transferred through Tank 7, resulting in logistical interference. Salt and sludge removal from Tanks 1-8 is all planned between now and year 2009. A high level of planning integration is required.

○ Noncredible ○ Very Unlikely(VU) $(P < 0.15)$ ○ Unlikely(U) $(.15 \le P < 0.45)$ ○ Likely(L) $(.45 \le P < 0.75)$ ● Very Likely(VL) $(P \ge .75)$

C. Consequence: *(State the consequences and quantify basis if that risk comes true without credit for RHS. For opportunities, document the benefit/cost ratio comparison between the original scope and proposed opportunity)* C= ______

Operation of 512-S ARP is delayed due to lack of feed, and/or sustained feed is not available resulting in up to a one year delay to the program.

Worst Case Cost Impact: $75M Worst Case Schedule Impact: 0 Day(s)

○ Negligible(N) $(C \le 0.1)$ ● Marginal(M) $(.2 \le C \le 0.4)$ ○ Significant(S) $(.5 \le C \le 0.7)$ ○ Critical(C) $(.8 \le C \le 0.9)$ ○ Crisis(Cr) $(C > 0.9)$

D. Risk Level: ○ Low(L) ● Moderate(M) ○ High(H) Probability x Consequence = Risk Factor (optional): ______

E. Risk Handling Strategies:

Risk Handling Approach	Risk Handling Strategy (RHS) Description and Bases	Reduced Prob.	Reduced Cons.	Reduced Risk	Implementation Cost	Implementation Schedule		Tracking# (Optional)
Avoid	Modify HLW transfer plan to resolve the priority conflicts.				TBD	6	Mo(s)	

F. Residual Risk Impact: Distribution Selection:

	Best	Most Likely	Worst
Cost Consequence:	$0	$0	$0
Schedule Consequence:	0 Mo(s)	0 Mo(s)	0 Mo(s)

G. Description of Residual Risk:

H. Triggers:

I. Affected Work Scope:

J. Additional Comments (optional):

A schedule slip of up to 1 year occurs, which uses up 1 year of float in the ARP program schedule (at $25M/yr), subsequently slowing down tank closure in F Tank Farm for 1 year (at $50M/yr).

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Risk & Opportunity Assessment Form

Identification No.: *SS- 00-024*
KASE #:

Assessed Element: Saltstone
Title: **Saltstone Vault Unavailability**
Category (Optional):
Risk/Opportunity Type: SS- Saltstone **BDER Level:**

Date: 03/06/2003 **Responsibility:** WSRC Salt Processing Program and DOE SPD

A. Statement of Event: *(State Event and Risk/Opportunity)*
The SPP plan identifies the need for 8 additional saltstone vaults, the first of which will be available in 2006. Saltstone vault availability is delayed due to funding issues in FY2003.

B. Probability: *(State the probability and basis that the risk/opportunity will come true without credit for HS)* P=
There is a two year period required to provide a vault. This facility is in the budget request for FY04 and requests have been made for future funding to be from operating funds not project funds.

○ Noncredible ◉ Very Unlikely(VU) (P < 0.15) ○ Unlikely(U) (.15 ≤ P < 0.45) ○ Likely(L) (.45 ≤ P < 0.75) ○ Very Likely(VL) (P ≥ .75)

C. Consequence: *(State the consequences and quantify basis if that risk comes true without credit for RHS. For opportunities, document the benefit/cost ratio comparison between the original scope and proposed opportunity)* C=
Funding for the vaults is not provided in FY03 and saltstone processing is delayed for at least 6 months while emergency reprogramming is pursued.

Worst Case Cost Impact: $135M Worst Case Schedule Impact: 6 Mo(s)

○ Negligible(N) (C ≤ 0.1) ◉ Marginal(M) (.2 ≤ C ≤ 0.4) ○ Significant(S) (.5 ≤ C ≤ 0.7) ○ Critical(C) (.8 ≤ C ≤ 0.9) ○ Crisis(Cr) (C > 0.9)

D. Risk Level: ◉ Low(L) ○ Moderate(M) ○ High(H) Probability x Consequence = Risk Factor (optional):

E. Risk Handling Strategies:

Risk Handling Approach	Risk Handling Strategy (RHS) Description and Bases	Reduced Prob.	Reduced Cons.	Reduced Risk	Implementation Cost	Implementation Schedule	Tracking# (Optional)
Accept							

F. Residual Risk Impact:

	Best	Most Likely	Worst
Cost Consequence:			$135,000,000
Schedule Consequence:			6 Mo(s)

Distribution Selection:

G. Description of Residual Risk:

H. Triggers:

I. Affected Work Scope:

J. Additional Comments (optional):

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Risk & Opportunity Assessment Form

Identification No.: *SS- 00-025*
KASE #:

Assessed Element:
Title: **Saltstone Mod not Complete for 0.1 Ci/gal LCS**
Category (Optional): Construction Strategy: Construction/Maintenance Testing
Risk/Opportunity Type: SS- Saltstone **BDER Level:**

Date: 03/06/2003
Responsibility: Saltstone Project Manager

A. Statement of Event: *(State Event and Risk/Opportunity)*
Saltstone Mods are required to process LCS at 0.1 Ci/gal. Saltstone Mods are not complete by July 03 as required by the PMP.

B. Probability: *(State the probability and basis that the risk/opportunity will come true without credit for HS)* P=
The current schedule reflects August 03 for Mod Completion to process LCS at 0.1 Ci/gal. Mods cannot be initiated until processing of existing Tank 50 solids is completed and the waste water permit change is approved.
○ Noncredible ○ Very Unlikely(VU) (P < 0.15) ○ Unlikely(U) (.15 ≤ P < 0.45) ○ Likely(L) (.45 ≤ P < 0.75) ◉ Very Likely(VL) (P ≥ .75)

C. Consequence: *(State the consequences and quantify basis if that risk comes true without credit for RHS. For opportunities, document the benefit/cost ratio comparison between the original scope and proposed opportunity)* C=
The schedule will be delayed by less than 3 months.
Worst Case Cost Impact: $45M Worst Case Schedule Impact: 2 Mo(s)
◉ Negligible(N) (C ≤ 0.1) ○ Marginal(M) (.2 ≤ C ≤ 0.4) ○ Significant(S) (.5 ≤ C ≤ 0.7) ○ Critical(C) (.8 ≤ C ≤ 0.9) ○ Crisis(Cr) (C > 0.9)

D. Risk Level: ◉ Low(L) ○ Moderate(M) ○ High(H) Probability x Consequence = Risk Factor (optional):

E. Risk Handling Strategies:

Risk Handling Approach	Risk Handling Strategy (RHS) Description and Bases	Reduced Prob.	Reduced Cons.	Reduced Risk	Implementation Cost	Implementation Schedule		Tracking# (Optional)
Avoid	Optimize the schedule to meet the need date. Work with SCDHEC to expedite permit change.				$0	0	Mo(s)	

F. Residual Risk Impact:

	Best	Most Likely	Worst
Cost Consequence:	$0	$0	$0
Schedule Consequence:	0 Mo(s)	0 Mo(s)	0 Mo(s)

Distribution Selection:

G. Description of Residual Risk:
H. Triggers:
I. Affected Work Scope:
J. Additional Comments (optional):

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Risk & Opportunity Assessment Form

Identification No.: *SS- 00-027*
KASE #:

Assessed Element: Saltstone
Title: **Saltstone Mod not Complete for 0.378 Ci/gal LCS**
Category (Optional):
Risk/Opportunity Type: SS- Saltstone **BDER Level:**

Date: 03/06/2003 **Responsibility:** Saltstone Project Manager

A. Statement of Event: *(State Event and Risk/Opportunity)*

Saltstone Mods are required to process LCS at 0.378 Ci/gal. Saltstone Mods are not complete by October 04 as required by the PMP. Modifications to the current Saltstone Processing Facility will be required.

B. Probability: *(State the probability and basis that the risk/opportunity will come true without credit for HS)* P=

The technical approach and schedule for Mod Completion to process LCS at 0.378 Ci/gal are being developed. The technical approach will be validated based on the operating experience at 0.1 Ci/gal. The control room and the process room are already shielded to 0.378 Ci/gal. The receipt tank will also be shielded to 0.378 Ci/gal.

○ Noncredible ○ Very Unlikely(VU) $(P < 0.15)$ ● Unlikely(U) $(.15 \le P < 0.45)$ ○ Likely(L) $(.45 \le P < 0.75)$ ○ Very Likely(VL) $(P \ge .75)$

C. Consequence: *(State the consequences and quantify basis if that risk comes true without credit for RHS. For opportunities, document the benefit/cost ratio comparison between the original scope and proposed opportunity)* C=

Schedule delay of approximately two months for Mods after October 04.

Worst Case Cost Impact: $68M Worst Case Schedule Impact: 2 Mo(s)

● Negligible(N) $(C \le 0.1)$ ○ Marginal(M) $(.2 \le C \le 0.4)$ ○ Significant(S) $(.5 \le C \le 0.7)$ ○ Critical(C) $(.8 \le C \le 0.9)$ ○ Crisis(Cr) $(C > 0.9)$

D. Risk Level: ● Low(L) ○ Moderate(M) ○ High(H) Probability x Consequence = Risk Factor (optional):

E. Risk Handling Strategies:

Risk Handling Approach	Risk Handling Strategy (RHS) Description and Bases	Reduced Prob.	Reduced Cons.	Reduced Risk	Implementation Cost	Implementation Schedule	Tracking# (Optional)
Accept							

F. Residual Risk Impact:

	Best	Most Likely	Worst
Cost Consequence:	$0	$0	$68,000,000
Schedule Consequence:	0 Mo(s)	0 Mo(s)	2 Mo(s)

Distribution Selection:

G. Description of Residual Risk:

H. Triggers:

I. Affected Work Scope:

J. Additional Comments (optional):
Given the factors stated above and the 18 months allowed for the design and construction process, this low risk is accepted.

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Risk & Opportunity Assessment Form

Identification No.: *SPP-00-039*
KASE #:

Assessed Element: Salt Processing Program
Title: **Equipment Failure Halts SPP Processing**
Category (Optional):
Risk/Opportunity Type: SPP-Salt Processing **BDER Level:** N/A

Date: 03/07/2003
Responsibility: WSRC Salt Processing Program and DOE SPD

A. Statement of Event: *(State Event and Risk/Opportunity)*
The PMP assumes 75% attainment for the facilities associated with the salt processing program and assumes up to 75% attainment for the total system. Equipment failures result in a reduction to <75% in total system attainment from the basis assumed in the PMP.

B. Probability: *(State the probability and basis that the risk/opportunity will come true without credit for HS)* P= ___
75% attainment for facilities in series does not typically result in a 75% total system attainment unless the outages can be scheduled.

○ Noncredible ○ Very Unlikely(VU) (P < 0.15) ○ Unlikely(U) (.15 ≤ P < 0.45) ● Likely(L) (.45 ≤ P < 0.75) ○ Very Likely(VL) (P ≥ .75)

C. Consequence: *(State the consequences and quantify basis if that risk comes true without credit for RHS. For opportunities, document the benefit/cost ratio comparison between the original scope and proposed opportunity)* C= ___
The DWPF melter is judged to be the most limiting case, but this would apply to all critical system components. Infant mortality of the melter could result in an almost 2 year delay (18 months preparation for melter #3, + 4 months melter replacement installation).

Worst Case Cost Impact: $540M Worst Case Schedule Impact: 2 Yr(s)

○ Negligible(N) (C ≤ 0.1) ○ Marginal(M) (.2 ≤ C ≤ 0.4) ○ Significant(S) (.5 ≤ C ≤ 0.7) ● Critical(C) (.8 ≤ C ≤ 0.9) ○ Crisis(Cr) (C > 0.9)

D. Risk Level: ○ Low(L) ○ Moderate(M) ● High(H) Probability x Consequence = Risk Factor (optional): ___

E. Risk Handling Strategies:

Risk Handling Approach	Risk Handling Strategy (RHS) Description and Bases	Reduced Prob.	Reduced Cons.	Reduced Risk	Implementation Cost	Implementation Schedule	Tra (Op
Mitigate	Perform integrated outage planning for the Salt Processing Program.				$0		
	Evaluate the need for an integrated Salt Processing attainment study with a focus on defining interfacility storage needs.				$10K		
	Identify and procure critical spares, as required.				TBD		

F. Residual Risk Impact:

	Best	Most Likely	Worst
Cost Consequence:	$0	$0	$540,000,000
Schedule Consequence:	0	0	2 Yr(s)

Distribution Selectio

G. Description of Residual Risk: RHS will help understand the magnitude of problem, but residual risk will remain High.

H. Triggers:

I. Affected Work Scope:

J. Additional Comments (optional):

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Risk & Opportunity Assessment Form

Identification No.: *SPP-00-043*
KASE #:

Assessed Element: Salt Processing Program
Title: **Material and Chemical Balances Not Accommodated for the DWPF Interfaces**
Category (Optional):
Risk/Opportunity Type: SPP-Salt Processing **BDER Level:** N/A

Date: 03/07/2003 **Responsibility:** WSRC Salt Processing Program Manager

A. Statement of Event: *(State Event and Risk/Opportunity)*

The PMP assumes that the concentrated cesium and actinide streams from SWPF and ARP are processed into gla by DWPF. However, the material and chemical balances are not fully developed for the DWPF interfaces with SWPF and ARP. Attainment of DWPF will be reduced and the Salt Program is extended due to a reduced processin rate at DWPF.

B. Probability: *(State the probability and basis that the risk/opportunity will come true without credit for HS)* P= ___

A flow sheet for the entire program has not been developed at this time.

○ Noncredible ○ Very Unlikely(VU) (P < 0.15) ○ Unlikely(U) (.15≤ P < 0.45) ○ Likely(L) (.45≤ P < 0.75) ● Very Likely(VL) (P ≥ .75)

C. Consequence: *(State the consequences and quantify basis if that risk comes true without credit for RHS. For opportunities, document the benefit/cost ratio comparison between the original scope and proposed opportunity)* C= ___

The cesium strip effluent may exceed DWPF shielding limits, required additional canisters, increase offgas cesium releases, requir canister storage capacity, result in salt only canisters, and extend the program. Furthermore, the actinide stream containing MST c throughput to DWPF (e. g. reduced melt and pour rates, and reduced attainment.) The impact of this risk is evaluated to be a seriou DWPF mission.

Worst Case Cost Impact: 500M Worst Case Schedule Impact: ___

○ Negligible(N) (C ≤ 0.1) ○ Marginal(M) (.2 ≤ C ≤ 0.4) ○ Significant(S) (.5 ≤ C ≤ 0.7) ● Critical(C) (.8 ≤ C ≤ 0.9) ○ Crisis(Cr) (C > 0.9)

D. Risk Level: ○ Low(L) ○ Moderate(M) ● High(H) Probability x Consequence = Risk Factor (optional): ___

E. Risk Handling Strategies:

Risk Handling Approach	Risk Handling Strategy (RHS) Description and Bases	Reduced Prob.	Reduced Cons.	Reduced Risk	Implementation Cost	Implementation Schedule	Tra (Op
Avoid	Develop an integrated HLW system material balance flow sheet for salt processing (SWPF and ARP), which includes DWPF.				$500K		
	Evaluate the flow sheet for impact on the System Plan.				$0		
	Propose appropriate facility design adjustments.				$0		

F. Residual Risk Impact:

	Best	Most Likely	Worst
Cost Consequence:	$0	$0	$500,000,000
Schedule Consequence:	0 Mo(s)	0 Mo(s)	1 Yr(s)

Distribution Selectic

G. Description of Residual Risk: Estimated residual risk at 1 year extention in SPP life cycle ($270M) and 1 year of canister production ($230M), for a total of $500M.

H. Triggers:

I. Affected Work Scope:

J. Additional Comments (optional):

The CSSX process involves extraction of Cs using BOB Calix solvent and then stripping the Cs from the solvent using dilute Nitric Acid. The dilute nitric acid stream carries the concentrated cesium stream to DWPF. The liquid nitric acid stream must be boiled off in DWPF. Rheological and other fluid and mechanical properties of MST bearing waste result in process upsets (e.g. melt rate, pour rates) and reduces DWPF attainment.

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Risk & Opportunity Assessment Form

Identification No.: *SWPF00-044*
KASE #:

Assessed Element: Salt Waste Processing Facility
Title: **SWPF Potassium Impact to Solvent Extraction**
Category (Optional):
Risk/Opportunity Type: SWPF- Salt Waste **BDER Level:** N/A

Date: 03/10/2003 **Responsibility:** EPC Contractor and WSRC Salt Processing Program

A. Statement of Event: *(State Event and Risk/Opportunity)*
The PMP assumes that feed to SWPF can be processed to remove Cs to specified limits. Performance requirements at SWPF cannot be met due to high potassium feed impacting Cs removal by solvent extraction and requiring recycling through solvent extraction, additional blending may be required and the program delayed.

B. Probability: *(State the probability and basis that the risk/opportunity will come true without credit for HS)* P= ______
Less than 10% of PMP batches will have concentrations of potassium and cesium that are above what has been demonstrated for once through processing in laboratory testing. These potential high concentrations will be overcome through process optimization and/or a combination of molarity adjustments and blending.

○ Noncredible ○ Very Unlikely(VU) (P < 0.15) ○ Unlikely(U) (.15 ≤ P < 0.45) ○ Likely(L) (.45 ≤ P < 0.75) ● Very Likely(VL) (P ≥ .75)

C. Consequence: *(State the consequences and quantify basis if that risk comes true without credit for RHS. For opportunities, document the benefit/cost ratio comparison between the original scope and proposed opportunity)* C= ______
Less than 20% of the high potassium batches will have to be recycled through solvent extraction to meet minimum Cs removal requirements. The potassium values are only marginally higher than have been demonstrated. The program will be delayed up to 3 months for recycling.

Worst Case Cost Impact: $68M Worst Case Schedule Impact: 3 Mo(s)

● Negligible(N) (C ≤ 0.1) ○ Marginal(M) (.2 ≤ C ≤ 0.4) ○ Significant(S) (.5 ≤ C ≤ 0.7) ○ Critical(C) (.8 ≤ C ≤ 0.9) ○ Crisis(Cr) (C > 0.9)

D. Risk Level: ● Low(L) ○ Moderate(M) ○ High(H) Probability x Consequence = Risk Factor (optional): ______

E. Risk Handling Strategies:

Risk Handling Approach	Risk Handling Strategy (RHS) Description and Bases	Reduced Prob.	Reduced Cons.	Reduced Risk	Implementation Cost	Implementation Schedule		Tracking# (Optional)
Accept					$0			

F. Residual Risk Impact: Cost Consequence: ______ ______ ______ Distribution Selection:
Schedule Consequence: ______ ______ ______
Best Most Likely Worst

G. Description of Residual Risk: Integrated system planning can mitigate delay of the Salt Processing Program to less than 3 months.

H. Triggers:

I. Affected Work Scope:

J. Additional Comments (optional):
Development of an integrated HLW system material balance flowsheet for salt processing will help to address this issue. See Risk #43.

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Risk & Opportunity Assessment Form

Identification No.: *SPP-00-045*
KASE #:

Assessed Element: Salt Processing Program
Title: **Chemical Constituents Exceed Saltstone WAC**
Category (Optional):
Risk/Opportunity Type: SPP-Salt Processing **BDER Level:** N/A

Date: 03/07/2003
Responsibility: WSRC Salt Processing Program Manager

A. Statement of Event: *(State Event and Risk/Opportunity)*

The PMP assumes that DSS from SWPF is processed into grout by Saltstone. However, the present material balance indicates that the current WAC at Saltstone cannot be met due to high potassium, nitrates and other chemical constituents in the DSS. Consequently, the DSS cannot be accepted at Saltstone under the current WAC and the WAC requires revision.

B. Probability: *(State the probability and basis that the risk/opportunity will come true without credit for HS)* P= ______

A flow sheet for the entire program has not been developed at this time. A flowsheet for SWPF processing indicates that the current WAC is exceeded.

○ Noncredible ○ Very Unlikely(VU) $(P < 0.15)$ ○ Unlikely(U) $(.15 \le P < 0.45)$ ○ Likely(L) $(.45 \le P < 0.75)$ ● Very Likely(VL) $(P \ge .75)$

C. Consequence: *(State the consequences and quantify basis if that risk comes true without credit for RHS. For opportunities, document the benefit/cost ratio comparison between the original scope and proposed opportunity)* C= ______

Grout formulation and qualification may be required to support WAC revision.

Worst Case Cost Impact: $200K Worst Case Schedule Impact: ______

● Negligible(N) $(C \le 0.1)$ ○ Marginal(M) $(.2 \le C \le 0.4)$ ○ Significant(S) $(.5 \le C \le 0.7)$ ○ Critical(C) $(.8 \le C \le 0.9)$ ○ Crisis(Cr) $(C > 0.9)$

D. Risk Level: ● Low(L) ○ Moderate(M) ○ High(H) Probability x Consequence = Risk Factor (optional): ______

E. Risk Handling Strategies:

Risk Handling Approach	Risk Handling Strategy (RHS) Description and Bases	Reduced Prob.	Reduced Cons.	Reduced Risk	Implementation Cost	Implementation Schedule		Tracking# (Optional)
Avoid	Include Saltstone in the integrated HLW system material balance flow sheet for salt processing. (See Risk # 43) Test grout formulations, if required, and revise the Saltstone WAC.				$200K			

F. Residual Risk Impact:

	Best	Most Likely	Worst
Cost Consequence:	$0	$0	$0
Schedule Consequence:	0 Mo(s)	0 Wk(s)	0 Mo(s)

Distribution Selection:

G. Description of Residual Risk:

H. Triggers:

I. Affected Work Scope:

J. Additional Comments (optional):
The EPC Contractor provides supporting responsibility for this Risk.
The Saltstone Manager is responsible for WAC revision.

Document Name: Document No.:
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Document Date

Risk & Opportunity Assessment Form

Identification No.: *SWPF00-046*
KASE #:

Assessed Element: Salt Waste Processing Facility
Title: **High Feed Cesium and Actinide Concentrations to SWPF**
Category (Optional):
Risk/Opportunity Type: SWPF- Salt Waste **BDER Level:** N/A

Date: 03/07/2003 **Responsibility:** WSRC Salt Processing Program and DOE SPD

A. Statement of Event: *(State Event and Risk/Opportunity)*
The PMP is based on feed concentrations that can be processed via SWPF to meet the Saltstone WAC. Some of the waste strear
SWPF exceeds the concentrations that can be processed to meet the current Saltstone WAC (class A actinide and limits) as speci
contract and can not be dispositioned, resulting in a need for additional processing time and/or higher MST concentrations.

B. Probability: *(State the probability and basis that the risk/opportunity will come true without credit for HS)* P= ___
Current feed batches include some streams that exceed the design basis for SWPF.
○ Noncredible ○ Very Unlikely(VU) (P < 0.15) ○ Unlikely(U) (.15≤ P < 0.45) ○ Likely(L) (.45≤ P < 0.75) ● Very Likely(VL) (P ≥ .75)

C. Consequence: *(State the consequences and quantify basis if that risk comes true without credit for RHS. For opportunities, document the benefit/cost ratio comparison between the original scope and proposed opportunity)* C= ___
Additional processing time (for an estimated 20% batches of total batches to be processed). This could extend HLW life cycle by 2 years. Higher MST concentrations may also be required (see risk SWPF-048), and increased capital costs incurred for engineered solution to improve Cs removal capacity.
Worst Case Cost Impact: >$540M Worst Case Schedule Impact: >2 Yr(s)
○ Negligible(N) (C ≤ 0.1) ○ Marginal(M) (.2 ≤ C ≤ 0.4) ○ Significant(S) (.5 ≤ C ≤ 0.7) ● Critical(C) (.8 ≤ C ≤ 0.9) ○ Crisis(Cr) (C > 0.9)

D. Risk Level: ○ Low(L) ○ Moderate(M) ● High(H) Probability x Consequence = Risk Factor (optional): ___

E. Risk Handling Strategies:

Risk Handling Approach	Risk Handling Strategy (RHS) Description and Bases	Reduced Prob.	Reduced Cons.	Reduced Risk	Implementation Cost	Implementation Schedule	Tra (Op
Avoid	Verify strontium and actinide concentrations in SWPF feed. (Sampling at $50K per sample, three sampling and analysis of seven tanks are planned for in FY-03 and into early FY-04)				$1M		
	Establish an integrated SWPF feed strategy as input to the integrated HLW system flow sheet (see Risk SWPF-043).				--		
	Explore potential for sending higher actinide concentrations to Saltstone.				TBD		
	Verify strontium and actinide removal DF values for SWPF feed compositions through R&D. Optimize SWPF design to maximize actinide removal capability.				TBD		

F. Residual Risk Impact:

	Best	Most Likely	Worst
Cost Consequence:	$0	$0	$0
Schedule Consequence:	0 Mo(s)	0 Mo(s)	0 Mo(s)

Distribution Selectic

G. Description of Residual Risk:

H. Triggers: High Sr and actinide concentrations are verified by characterization.

I. Affected Work Scope:

J. Additional Comments (optional):

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Document Date

Risk & Opportunity Assessment Form

Identification No.: *SPP-00-048*
KASE #:

Assessed Element: Salt Processing Program
Title: **MST Loading Impacts Ti Loading in DWPF Glass**
Category (Optional):
Risk/Opportunity Type: SPP-Salt Processing **BDER Level:** N/A

Date: 03/07/2003 **Responsibility:** EPC Contractor and WSRC Salt Processing Program

A. Statement of Event: *(State Event and Risk/Opportunity)*
MST concentrations used at SWPF and/or ARP result in TiO2 concentrations in excess of DWPF WAC limits. DWPF cannot produce qualified glass at the PMP production levels with these anticipated TiO2 concentrations. The higher concentration will result in increased canister production if the anticipated TiO2 concentrations cannot be shown to be acceptable.

B. Probability: *(State the probability and basis that the risk/opportunity will come true without credit for HS)* P= ______
Information available today indicates that the TiO2 concentration will exceed the DWPF WAC limits.
○ Noncredible ○ Very Unlikely(VU) (P < 0.15) ○ Unlikely(U) (.15 ≤ P < 0.45) ○ Likely(L) (.45 ≤ P < 0.75) ● Very Likely(VL) (P ≥ .75)

C. Consequence: *(State the consequences and quantify basis if that risk comes true without credit for RHS. For opportunities, document the benefit/cost ratio comparison between the original scope and proposed opportunity)* C= ______
230 additional canisters must be produced (per canister, 0.5M for canister production + 0.5M for repository storage). $270M/yr for extended program time.
Worst Case Cost Impact: $500M Worst Case Schedule Impact: 1 Yr(s)
○ Negligible(N) (C ≤ 0.1) ○ Marginal(M) (.2 ≤ C ≤ 0.4) ● Significant(S) (.5 ≤ C ≤ 0.7) ○ Critical(C) (.8 ≤ C ≤ 0.9) ○ Crisis(Cr) (C > 0.9)

D. Risk Level: ○ Low(L) ○ Moderate(M) ● High(H) Probability x Consequence = Risk Factor (optional): ______

E. Risk Handling Strategies:

Risk Handling Approach	Risk Handling Strategy (RHS) Description and Bases	Reduced Prob.	Reduced Cons.	Reduced Risk	Implementation Cost	Implementation Schedule		Tracking# (Optional)
Avoid	Establish a higher limit for TiO2 based on the integrated HLW system flow sheet (See Risk # SWPF43) Establish an acceptable glass formulation based on higher TiO2.. Qualify the glass formulation. Revise the WAC. Explore alternative alpha removal agents to eliminate the need for MST.				$7.5M	0	Day(s	

F. Residual Risk Impact:

	Best	Most Likely	Worst
Cost Consequence:	$0	$0	$0
Schedule Consequence:	0 Mo(s)	0 Mo(s)	0 Mo(s)

Distribution Selection:

G. Description of Residual Risk:
H. Triggers:
I. Affected Work Scope:
J. Additional Comments (optional):
The risk handling strategy above envelopes the issue for ARP.

Document Name: Document No.:
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Document Date

Risk & Opportunity Assessment Form

Identification No.: *SWPF00-050*
KASE #:

Assessed Element: Salt Waste Processing Facility
Title: **Rogue Constituents in SWPF Feed**
Category (Optional):
Risk/Opportunity Type: SWPF- Salt Waste **BDER Level:**

Date: 03/07/2003 **Responsibility:** EPC Contractor and WSRC Salt Processing Program

A. Statement of Event: *(State Event and Risk/Opportunity)*
The solvent extraction process is assumed to be successful given the expected waste constituents. Unexpected constituents may affect SWPF processing.

B. Probability: *(State the probability and basis that the risk/opportunity will come true without credit for HS)* P= ______
Some eight to 10 tanks have been tested for Cs batch distribution using the optimized solvent composition coefficients and found to be acceptable. Two additional real waste flowsheet tests have been completed successfully.

○ Noncredible ◉ Very Unlikely(VU) (P < 0.15) ○ Unlikely(U) (.15 ≤ P < 0.45) ○ Likely(L) (.45 ≤ P < 0.75) ○ Very Likely(VL) (P ≥ .75)

C. Consequence: *(State the consequences and quantify basis if that risk comes true without credit for RHS. For opportunities, document the benefit/cost ratio comparison between the original scope and proposed opportunity)* C= ______
Maximum life cycle impact is currently estimated at 6 months program delay at $270/yr.
Worst Case Cost Impact: $135M Worst Case Schedule Impact: 6 Mo(s)

○ Negligible(N) (C ≤ 0.1) ◉ Marginal(M) (.2 ≤ C ≤ 0.4) ○ Significant(S) (.5 ≤ C ≤ 0.7) ○ Critical(C) (.8 ≤ C ≤ 0.9) ○ Crisis(Cr) (C > 0.9)

D. Risk Level: ◉ Low(L) ○ Moderate(M) ○ High(H) Probability x Consequence = Risk Factor (optional): ______

E. Risk Handling Strategies:

Risk Handling Approach	Risk Handling Strategy (RHS) Description and Bases	Reduced Prob.	Reduced Cons.	Reduced Risk	Implementation Cost	Implementation Schedule	Tracking# (Optional)
Reduce	Create an interface control agreement addressing feed management. Verify waste treatability by sampling and analysis of feed staging tank for SWPF.						

F. Residual Risk Impact:

	Best	Most Likely	Worst
Cost Consequence:	$0	$66,500,000	$135,000,000
Schedule Consequence:	0 Mo(s)	3 Mo(s)	6 Mo(s)

Distribution Selection:

G. Description of Residual Risk:
H. Triggers:
I. Affected Work Scope:
J. Additional Comments (optional):

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Risk & Opportunity Assessment Form

Identification No.: *SWPF00-051*
KASE #:

Assessed Element: Salt Waste Processing Facility
Title: **Requirements and Standards Change**
Category (Optional):
Risk/Opportunity Type: SWPF- Salt Waste **BDER Level:**

Date: 03/07/2003 **Responsibility:**

A. Statement of Event: *(State Event and Risk/Opportunity)*
The current plan is based on requirements and standards as they are today. These requirements and standards may change, causing redesign and additional program impacts.

B. Probability: *(State the probability and basis that the risk/opportunity will come true without credit for HS)* P=
NRC Licensing of DOE facilities is no longer an issue. However, changes in requirements and standards often occur.

○ Noncredible ○ Very Unlikely(VU) (P < 0.15) ◉ Unlikely(U) (.15 ≤ P < 0.45) ○ Likely(L) (.45 ≤ P < 0.75) ○ Very Likely(VL) (P ≥ .75)

C. Consequence: *(State the consequences and quantify basis if that risk comes true without credit for RHS. For opportunities, document the benefit/cost ratio comparison between the original scope and proposed opportunity)* C=
9 month delay to final design, 9 month delay to construction.($270M/yr program cost) Additional $10 million cost.

Worst Case Cost Impact: $415M Worst Case Schedule Impact: 18 Mo(s)

○ Negligible(N) (C ≤ 0.1) ○ Marginal(M) (.2 ≤ C ≤ 0.4) ◉ Significant(S) (.5 ≤ C ≤ 0.7) ○ Critical(C) (.8 ≤ C ≤ 0.9) ○ Crisis(Cr) (C > 0.9)

D. Risk Level: ○ Low(L) ◉ Moderate(M) ○ High(H) Probability x Consequence = Risk Factor (optional):

E. Risk Handling Strategies:

Risk Handling Approach	Risk Handling Strategy (RHS) Description and Bases	Reduced Prob.	Reduced Cons.	Reduced Risk	Implementation Cost	Implementation Schedule		Tracking# (Optional)
Accept								

F. Residual Risk Impact:

	Best	Most Likely	Worst
Cost Consequence:	$0	$0	$415,000,000
Schedule Consequence:	0 Mo(s)	0 Mo(s)	18 Mo(s)

Distribution Selection:

G. Description of Residual Risk:

H. Triggers:

I. Affected Work Scope:

J. Additional Comments (optional):

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Risk & Opportunity Assessment Form

Identification No.: *SWPF00-052*
KASE #:

Assessed Element: Salt Waste Processing Facility
Title: **Failed Equipment and Organic Waste Disposition**
Category (Optional):
Risk/Opportunity Type: SWPF- Salt Waste **BDER Level:** N/A

Date: 03/07/2003
Responsibility: EPC Contractor and WSRC Salt Processing Program

A. Statement of Event: *(State Event and Risk/Opportunity)*

It is assumed by the PMP that a disposal path for failed equipment and organic waste will exist; however, no disposal path has been identified.

B. Probability: *(State the probability and basis that the risk/opportunity will come true without credit for HS)* P= ___

The project does not have an organic waste disposition solution. However, the project is still in the preconceptual stage and will be developing a method to deal with this material.

○ Noncredible ● Very Unlikely(VU) $(P < 0.15)$ ○ Unlikely(U) $(.15 \le P < 0.45)$ ○ Likely(L) $(.45 \le P < 0.75)$ ○ Very Likely(VL) $(P \ge .75)$

C. Consequence: *(State the consequences and quantify basis if that risk comes true without credit for RHS. For opportunities, document the benefit/cost ratio comparison between the original scope and proposed opportunity)* C= ___

This is a project issue with negligible impact at the program level.

Worst Case Cost Impact: ___ Worst Case Schedule Impact: ___

● Negligible(N) $(C \le 0.1)$ ○ Marginal(M) $(.2 \le C \le 0.4)$ ○ Significant(S) $(.5 \le C \le 0.7)$ ○ Critical(C) $(.8 \le C \le 0.9)$ ○ Crisis(Cr) $(C > 0.9)$

D. Risk Level: ● Low(L) ○ Moderate(M) ○ High(H) Probability x Consequence = Risk Factor (optional): ___

E. Risk Handling Strategies:

Risk Handling Approach	Risk Handling Strategy (RHS) Description and Bases	Reduced Prob.	Reduced Cons.	Reduced Risk	Implementation Cost	Implementation Schedule	Tra (Op
Accept							

F. Residual Risk Impact: Cost Consequence: ___ ___ ___ Distribution Selectio
Schedule Consequence: ___ ___ ___
Best | Most Likely | Worst

G. Description of Residual Risk:

H. Triggers:

I. Affected Work Scope:

J. Additional Comments (optional):

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Risk & Opportunity Assessment Form

Identification No.: SWPF00-055
KASE #:

Assessed Element: Salt Waste Processing Facility
Title: **High Curie Salt Treatment Capacity and Schedule Exceeded**
Category (Optional):
Risk/Opportunity Type: SWPF- Salt Waste **BDER Level:** N/A

Date: 03/07/2003 **Responsibility:**

A. Statement of Event: *(State Event and Risk/Opportunity)*
The design baseline for the SWPF conceptual design is to process up to 1.2Mgal per year of high Ci salt solution. The PMP assumes processing of 2.8M gal per year of high Ci salt solution. In addition the assumed startup date is one year earlier in the PMP than the DOE Project Execution Plan. It will not be possible to complete Salt Processing per the PMP.

B. Probability: *(State the probability and basis that the risk/opportunity will come true without credit for HS)* P= ___
Unless action is taken this will occur.
○ Noncredible ○ Very Unlikely(VU) (P < 0.15) ○ Unlikely(U) (.15 ≤ P < 0.45) ○ Likely(L) (.45 ≤ P < 0.75) ● Very Likely(VL) (P ≥ .75)

C. Consequence: *(State the consequences and quantify basis if that risk comes true without credit for RHS. For opportunities, document the benefit/cost ratio comparison between the original scope and proposed opportunity)* C= ___
At worst the program will be extended by greater than 10 years and the planned PMP savings will not be realized ($6.1B).
Worst Case Cost Impact: >$6.1B Worst Case Schedule Impact: >10 Yr(s)
○ Negligible(N) (C ≤ 0.1) ○ Marginal(M) (.2 ≤ C ≤ 0.4) ○ Significant(S) (.5 ≤ C ≤ 0.7) ○ Critical(C) (.8 ≤ C ≤ 0.9) ● Crisis(Cr) (C > 0.9)

D. Risk Level: ○ Low(L) ○ Moderate(M) ● High(H) Probability x Consequence = Risk Factor (optional): ___

E. Risk Handling Strategies:

Risk Handling Approach	Risk Handling Strategy (RHS) Description and Bases	Reduced Prob.	Reduced Cons.	Reduced Risk	Implementation Cost	Implementation Schedule	Tra (O
Avoid	Expand the SWPF capabilty to 2.8Mgal/year. Evaluate technologies to provide additional alpha and high Cs removal capacity. Expedite the schedule for startup for SWPF.				TBD		

F. Residual Risk Impact: Cost Consequence: ___ ___ ___ Distribution Selectic
Schedule Consequence: ___ ___ ___
Best Most Likely Worst

G. Description of Residual Risk:

H. Triggers: CD-2 approved for SWPF design with a capacity less than required to meet PMP capacity baseline for SWPF.

I. Affected Work Scope:

J. Additional Comments (optional):

Document Name:

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Risk & Opportunity Assessment Form

Identification No.: *FM- 00-058*
KASE #:

Assessed Element: Feed Management
Title: **Salt/Sludge Tank Utilization Conflicts**
Category (Optional):
Risk/Opportunity Type: FM- Feed Management **BDER Level:**

Date: 03/10/2003 **Responsibility:** Liquid Waste Disposition Area Project Manager

A. Statement of Event: *(State Event and Risk/Opportunity)*

The PMP assumes uses of certain key tanks for SPP. However, those same tanks are critical for accelerated sludge processing. Use of an SPP tank for purposes other than designated inadvertently results in a long term delay of the SPP.

B. Probability: *(State the probability and basis that the risk/opportunity will come true without credit for HS)* P= ______

The current process has the system planning manager maintaining the agreed to assumptions of the PMP. There is a business review team in place to control change.

○ Noncredible ● Very Unlikely(VU) (P < 0.15) ○ Unlikely(U) (.15 ≤ P < 0.45) ○ Likely(L) (.45 ≤ P < 0.75) ○ Very Likely(VL) (P ≥ .75)

C. Consequence: *(State the consequences and quantify basis if that risk comes true without credit for RHS. For opportunities, document the benefit/cost ratio comparison between the original scope and proposed opportunity)* C= ______

The SPP mission is significantly extended. A delay for ARP is based on a cost of $75M/yr, a delay for the SPP as a whole is based on a cost of $270M/yr.

Worst Case Cost Impact: $270M Worst Case Schedule Impact: 1 Yr(s)

○ Negligible(N) (C ≤ 0.1) ○ Marginal(M) (.2 ≤ C ≤ 0.4) ● Significant(S) (.5 ≤ C ≤ 0.7) ○ Critical(C) (.8 ≤ C ≤ 0.9) ○ Crisis(Cr) (C > 0.9)

D. Risk Level: ● Low(L) ○ Moderate(M) ○ High(H) Probability x Consequence = Risk Factor (optional): ______

E. Risk Handling Strategies:

Risk Handling Approach	Risk Handling Strategy (RHS) Description and Bases	Reduced Prob	Reduced Cons.	Reduced Risk	Implementation Cost	Implementation Schedule		Tracking# (Optional)
Reduce	Maintain the HLW system plan to continue to identify and resolve the conflicting tank uses. The probability has been reduced, but is still in the very unlikely range.							

F. Residual Risk Impact: Cost Consequence: ______ ______ ______ Distribution Selection:
Schedule Consequence: ______ ______ ______
Best Most Likely Worst

G. Description of Residual Risk:

H. Triggers:

I. Affected Work Scope:

J. Additional Comments (optional):
This risk statement addresses the planned SPP use of Tanks 41,42,48,49, and 50.

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Risk & Opportunity Assessment Form

Identification No.: *SWPF00-059*
KASE #:

Assessed Element: Salt Waste Processing Facility
Title: **SWPF Safety Analysis Impacted**
Category (Optional):
Risk/Opportunity Type: SWPF- Salt Waste **BDER Level:** N/A

Date: 03/11/2003
Responsibility: EPC Contractor and DOE

A. Statement of Event: *(State Event and Risk/Opportunity)*
It is assumed that SPP facilities have the required Documented Safety Analysis (DSA). Existing facilities supporting the SPP have the required safetyanalysis documents but the SWPF is in the early stages of design and does not have a DSA. If SWPF design changes that incorporate DSA controls are made late in the project, there will be cost impacts and schedule delays to the SWPF and the SPP.

B. Probability: *(State the probability and basis that the risk/opportunity will come true without credit for HS)* P= ______
The EPC is required to conduct Hazards Analysis/Safety Analysis early in the SWPF schedule. While controls selection and design will be completed prior to SWPF construction, final regulator/oversight approval of the controls is likely to occur late in the project.

○ Noncredible ○ Very Unlikely(VU) (P < 0.15) ○ Unlikely(U) (.15 ≤ P < 0.45) ● Likely(L) (.45 ≤ P < 0.75) ○ Very Likely(VL) (P ≥ .75)

C. Consequence: *(State the consequences and quantify basis if that risk comes true without credit for RHS. For opportunities, document the benefit/cost ratio comparison between the original scope and proposed opportunity)* C= ______
Late facility design changes resulting from changes to controls in the SWPF DSA could result in a one year schedule delay for SWPF and SPP and a program cost increase of up to $270M.
Worst Case Cost Impact: $270M Worst Case Schedule Impact: 1 Yr(s)

○ Negligible(N) (C ≤ 0.1) ○ Marginal(M) (.2 ≤ C ≤ 0.4) ● Significant(S) (.5 ≤ C ≤ 0.7) ○ Critical(C) (.8 ≤ C ≤ 0.9) ○ Crisis(Cr) (C > 0.9)

D. Risk Level: ○ Low(L) ● Moderate(M) ○ High(H) Probability x Consequence = Risk Factor (optional): ______

E. Risk Handling Strategies:

Risk Handling Approach	Risk Handling Strategy (RHS) Description and Bases	Reduced Prob.	Reduced Cons.	Reduced Risk	Implementation Cost	Implementation Schedule	Tracking# (Optional)
Reduce	Conduct early and frequent reviews of SWPF Safety Strategy and Safety Analysis hazards and controls with DOE and DNFSB.	U	S	M	$0		

F. Residual Risk Impact:

	Best	Most Likely	Worst
Cost Consequence:	$0	$68,000,000	$270,000,000
Schedule Consequence:	0 Mo(s)	3 Mo(s)	1 Yr(s)

Distribution Selection:

G. Description of Residual Risk: Up to a one year delay is possible but the probability is reduced.
H. Triggers: Significant safety analysis issues are raised during design of the SWPF.
I. Affected Work Scope:
J. Additional Comments (optional):

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APPENDIX B - RISK SUMMARY TABLE

NOTE: The following Risk Handling Summary Table contains information current as of May 2003. This table will be used as a tool to monitor and report the progress of risk handling strategy implementation, trends in risk status, and changes in risk level for periodic for Salt Processing Program project management. To facilitate future status and trends, the two columns identified for Risk Level Previous (Mo/Yr) are left blank. The risk level as of May 2003 is replicated (from the Risk and Opportunity Assessment Form) in the Risk Level Column.

Risk Number	Risk Title	Worst Conse-quence	Risk Level	Owner	Risk Level Previous (Mo/Yr)	Risk Level Present (Mo/Yr)	Risk Handling Approach / Risk Handling Strategy (RHS)	Remarks
LCS-00-002	Cesium or Actinides Exceed LCS Limits	$810M	High	DOE SPD			**Avoid** • Perform saltcake waste characterization sampling and analysis for Cs and actinides, as required, and update WAC. Implement the best solution(s) from the following: • Investigate blending with DWPF recycle. (Addressed in other Risk Handling Strategies) • Consider additional capacity for the SWPF. (Addressed in other Risk Handling Strategies) • Investigate at-tank Cesium removal and/or interstitial liquid removal technologies.	FY03 funded technology development: • Saltcake Interstitial Fluid Pumping Tests • Improved, Selective Saltcake Dissolution Technologies • Evaluate Downstream Processing Impacts of Sodium Aluminosilicate (NAS) and Solids Formation • Gibbsite Layer Formation during Saltcake Dissolution • Skid-Mounted Simplified System (CSSX) for Cesium Removal from Low-Activity Salt Waste • Small Column Ion Exchange System Utilizing Crystalline Silicotitanate (CST) for Cesium Removal from Low-Curie Salt Waste • Modular Treatment of Low-Curie Salt Waste to Remove Cesium, Strontium, and Actinides • Engineered Monosodium Titanate (MST) for Accelerated Nuclear Waste Cleanup

Appendix B - continued

Risk Number	Risk Title	Worst Conse-quence	Risk Level	Owner	Risk Level Previous (Mo/Yr)	Risk Level Present (Mo/Yr)	Risk Handling Approach / Risk Handling Strategy (RHS)	Remarks
SPP-00-003	Environmental Permitting	$270M	Low	SPP			**Reduce** • Implement a comprehensive communications strategy for the SPP.	Action required by owner (Develop communication plan).
LCS-00-005	Cesium Exceeds 0.1 Ci/gal and/or Actinides Exceed 99 nCi/g	$25M	Low	LCS			**Accept**	
SPP-00-006	Regulators, Stakeholder Concerns - WIR							On July 3, 2003, parts of DOE Order 435.1 dealing with the authority for determining waste incidental to reprocessing were declared invalid by the U.S. District Court for the District of Idaho in the case of Natural Resources Defense Council v. DOE, Case No. 01-413-S-BLW. The District Court's ruling is currently on appeal to the U.S. Court of Appeals for the Ninth Circuit. Accordingly, it is not appropriate to address these types of probabilities or consequences, nor to undertake a probability or consequence analysis of the litigation's outcome in this document at this time.
ARP-00-008	Recovery of Tank 48 as a Feed Tank for ARP Is Delayed	$150M	Mode rate	ARP			**Avoid** • Accelerate development and implementation of technologies for treating at Tank 48.	FY03 funded technology development: • Fenton Destruction of Tetraphenylborate in SRS Tank 48H • Retrieval and Treatment of Waste from Tank 48 at SRS

Appendix B - continued

Risk Number	Risk Title	Worst Conse-quence	Risk Level	Owner	Risk Level Previous (Mo/Yr)	Risk Level Present (Mo/Yr)	Risk Handling Approach / Risk Handling Strategy (RHS)	Remarks
ARP-00-009	Reassignment of Tank 49 as Initial Feed Tank for the 512-S ARP	$13M	Low	ARP			**Reduce** • Develop the integrated HLW material balance flow sheet and revise system plan to support Tank 49 reassignment as the 512-S ARP Feed Tank.	Action required by owner. HLW System planning group has a dedicated staff which continuously monitors and updates status, forecast, and reports at least annually. Direct DOE-SR involvement and approval of HLW system plan.
ARP-00-010	Delays to 241-96 H ARP Startup	$38M	Low	ARP			**Reduce** • Obtain resources to begin design early. • Accelerate 512-S ARP startup.	Action required by owner
ARP-00-011	ARP Capacity Ramp Up to 6 gpm Not Successful	$810M	Mode rate	ARP			**Avoid** • Continue R&D of the rotary microfilter. • Investigate other alternatives, such as 241-96 H equipment arrangements or processing improvements to achieve 6 gpm by 4/07. • Develop and implement a contingency plan to achieve the needed 6 gpm.	FY03 funded technology development: • Rotary Microfilter Test at Pilot Scale with Simulated Waste (Complete) • Actual Waste Filtration Test Using SpinTek Rotary Microfilter (Complete) • Development of Rotary Microfilter to Increase Filtration Throughput • Alternative Ultrafiltration Membranes for the SRS Baseline Process • Develop and Demonstrate an On-Line Alpha/Neutron Monitor for Process Application (FY-04) • Complete Final Design Specifications for On-line Alpha/Neutron Monitor Deployment in ARP or SWPF (FY-04) • Fabricate and Deploy Alpha/Neutron Monitor at ARP or SWPF (FY-04)

Appendix B - continued

Risk Number	Risk Title	Worst Conse-quence	Risk Level	Owner	Risk Level Previous (Mo/Yr)	Risk Level Present (Mo/Yr)	Risk Handling Approach / Risk Handling Strategy (RHS)	Remarks
ARP-00-012	Equipment Not Available for 241-96H ARP Process	$38M	Low	ARP			**Avoid** • Procure spares at the initiation of the 2.5 year 241-96H ARP project.	Action required by owner
ARP-00-016	Actinide and Strontium Concentration High or Low MST DF	$150M	Moderate	ARP			**Mitigate** • Explore potential for sending higher actinide concentrations to Saltstone. • Verify strontium and actinide removal DF values for ARP feed compositions through R&D.	FY03 funded technology development: • Perform MST Test on "Bounding Waste" (Complete) • Larger-Scale (100-L) MST Test with Actual Waste (Complete) • Equilibrium and Dynamic Model Development for MST (MST Performance Studies) (Complete) • Determine Optimum Reductant and Concentrations of Permanganate Process (Complete) • Ammonium Molybdophosphate (AMP) Method Development • Supernate Sample Analyses • Monosodium Titanate (MST) Multi-strike Demonstration • MST Agitation Studies • Saltcake Sample Analyses (FY-04)
ARP-00-018	241-96H ARP Funding Strategy	$150M	Low	ARP			**Accept**	
SPP-00-021	Funding Competition Impacts SPP	$6.1B	High	ARP			**Mitigate** • Request funding to support the program • Participate in site budget prioritization, planning and change control.	HLW System planning group has a dedicated staff which continuously monitors and updates status, forecast, and reports at least annually. Direct DOE-SR involvement and approval of HLW system plan.

Appendix B - continued

Risk Number	Risk Title	Worst Conse-quence	Risk Level	Owner	Risk Level Previous (Mo/Yr)	Risk Level Present (Mo/Yr)	Risk Handling Approach / Risk Handling Strategy (RHS)	Remarks
FM-00-022	Unavailability of Low Activity Feed for ARP	$75M	Moderate	FM			**Avoid** • Modify HLW transfer plan to resolve the priority conflicts.	HLW System planning group has a dedicated staff which continuously monitors and updates status, forecast, and reports at least annually. Direct DOE-SR involvement and approval of HLW system plan.
SS-00-024	Saltstone Vault Unavailability	$135M	Low	SS			**Accept**	
SS-00-025	Saltstone Mod Not Complete for 0.1 Ci/gal LCS	$45	Low	SS			**Avoid** • Optimize the schedule to meet the need date. • Work with SCDHEC to expedite permit change.	Schedule on track for September 2003. Construction permit approved May 2003. FY03 funded technology development: • Characterize Tank 50 Solids and Develop Dissolution/Slurry Removal Procedure (Complete) • Test grouting of Tank 50 Solids in Saltstone (Complete)
SS-00-027	Saltstone Mod Not Complete for 0.378 Ci/gal LCS	$68M	Low	SS			**Accept**	

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Risk Number	Risk Title	Worst Conse-quence	Risk Level	Owner	Risk Level Previous (Mo/Yr)	Risk Level Present (Mo/Yr)	Risk Handling Approach / Risk Handling Strategy (RHS)	Remarks
SPP-00-039	Equipment Failure Halts SPP Processing	$540M	High	SPP			**Mitigate** • Perform integrated outage planning for the Salt Processing Program. • Evaluate the need for an integrated Salt Processing attainment study with a focus on defining inter-facility storage needs. • Identify and procure critical spares, as required.	Action required by owner
SPP-00-043	Material and Chemical Balances Not Accommodated for the DWPF Interfaces	$500M	High	SPP			**Avoid** • Develop an integrated HLW system material balance flow sheet for salt processing (SWPF and ARP), which includes DWPF. • Evaluate the flowsheet for impact on the System Plan. • Make appropriate facility design adjustments and/or glass formulation adjustments to accommodate the requirements of the flow sheet.	Action required by owner. Integrated material balance flow sheet recommended in report. FY03 funded technology development: • Evaluate Permanganate Loading in DWPF Glass – Phase I: PCCS Model Predictions (FY-04) • Evaluate Permanganate Loading in DWPF Glass – Phase II: Experimental Assessment of Predicted Properties (FY-04) • Evaluate Permanganate Loading in DWPF Glass – Phase III: Waste Throughput (FY-04)
SWPF-00-044	SWPF Potassium Impact to Solvent Extraction	$68M	Low	EPC & SPP			**Accept**	FY03 funded technology development: • Expand ORNL's D-Value Model to Incorporate Optimized Solvent and Waste Compositions (Complete)

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Risk Number	Risk Title	Worst Conse-quence	Risk Level	Owner	Risk Level Previous (Mo/Yr)	Risk Level Present (Mo/Yr)	Risk Handling Approach / Risk Handling Strategy (RHS)	Remarks
SPP-00-045	Chemical Constituents Exceed Saltstone WAC	$200K	Low	SPP			**Avoid** • Include Saltstone in the integrated HLW system material balance flowsheet for salt processing. (See Risk # 43) • Test grout formulations, if required, and revise the Saltstone WAC.	Action required by owner
SWPF-00-046	High Feed Cesium and Actinide Concentrations to SWPF	>$540M	High	SWPF			**Avoid** • Verify strontium and actinide concentrations in SWPF feed. (Sampling at $50K per sample, three sampling and analysis of seven tanks are planned for in FY-03 and into early FY-04) • Establish an integrated SWPF feed strategy as input to the integrated HLW system flow sheet (see Risk SWPF-043). • Explore potential for sending higher actinide concentrations to Saltstone. • Verify strontium and actinide removal DF values for SWPF feed compositions through R&D. • Optimize SWPF design to maximize actinide removal capability.	SWPF EPC contractors required to assess and propose process optimization opportunities in SWPF design competition FY03 funded technology development: • Perform MST Test on "Bounding Waste" (Complete) • Equilibrium and Dynamic Model Development for MST (MST Performance Studies) (Complete) • Determine Optimum Reductant and Concentrations of Permanganate Process (Complete) • Ammonium Molybdophosphate (AMP) Method Development • Supernate Sample Analyses • Monosodium Titanate (MST) Multi-strike Demonstration • Saltcake Sample Analyses (FY-04)

Appendix B - continued

Risk Number	Risk Title	Worst Conse-quence	Risk Level	Owner	Risk Level Previous (Mo/Yr)	Risk Level Present (Mo/Yr)	Risk Handling Approach / Risk Handling Strategy (RHS)	Remarks
SPP-00-048	MST Loading Impacts Ti Loading in DWPF Glass	$500M	High	SPP			**Avoid** • Establish a higher limit for TiO_2 based on the integrated HLW system flowsheet (See Risk # SWPF-43) • Establish an acceptable glass formulation based on higher TiO_2.. • Qualify the glass formulation. • Revise the WAC. • Explore alternative alpha removal agents to eliminate the need for MST	FY03 funded technology development: • MST Glass Loading Studies • Tailoring Inorganic Sorbents for SRS Strontium and Actinide Separations: Optimized Monosodium Titanate and Pharmacosiderite • Alternative Technology for the Removal of Sr and Actinides from SRS Low Curie Salt Waste Using In-Situ Formed Mixed Iron Oxides (IS-MIO)
SWPF-00-050	Rogue Constituents in SWPF Feed	$135M	Low	SWPF			**Reduce** • Create an interface control agreement addressing feed management. • Verify waste treatability by sampling and analysis of feed staging tank for SWPF.	Interface control documents with SWPF EPC Contractors in review for approval May 2003. FY03 funded technology development: • Identification of Organic Compounds in SRS HLW (Complete)
SWPF-00-051	Requirements and Standards Change	$415M	Mode rate	SWPF			**Accept**	
SWPF-00-052	Failed Equipment and Organic Waste Disposition	Negli-gible/ $Not Deter-mined	Low	SWPF			**Accept**	

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Risk Number	Risk Title	Worst Conse-quence	Risk Level	Owner	Risk Level Previous (Mo/Yr)	Risk Level Present (Mo/Yr)	Risk Handling Approach / Risk Handling Strategy (RHS)	Remarks
SWPF-00-055	High Curie Salt Treatment Capacity and Schedule Exceeded	>$6.1B	High	SWPF			**Avoid** • Expand the SWPF capability to 2.8M gal/year. • Evaluate technologies to provide additional alpha and high Cs removal capacity. • Expedite the schedule for startup for SWPF.	SWPF capability and schedule to be addressed through pending changes to EPC contract. FY03 funded technology development: • Perform 0.1 micron Cross-flow Filtration Testing at FRED • Up-flow Moving Bed Crystalline Silicotitinate Ion-Exchange Column • Develop and Demonstrate an On-Line Alpha/Neutron Monitor for Process Application (FY-04) • Complete Final Design Specifications for On-line Alpha/Neutron Monitor Deployment in ARP or SWPF (FY-04) • Fabricate and Deploy Alpha/Neutron Monitor at ARP or SWPF (FY-04)
FM-00-058	Salt/Sludge Tank Utilization Conflicts	$270M	Low	SPP			**Reduce** • Maintain the HLW system plan to continue to identify and resolve the conflicting tank uses. • The probability has been reduced, but is still in the very unlikely range.	HLW System planning group has a dedicated staff which continuously monitors and updates status, forecast, and reports at least annually. Direct DOE-SR involvement and approval of HLW system plan. HLW System planning group has a dedicated staff which continuously monitors and updates status, forecast, and reports at least annually. Direct DOE-SR involvement and approval of HLW system plan. Plan revised annually.

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Risk Number	Risk Title	Worst Conse-quence	Risk Level	Owner	Risk Level Previous (Mo/Yr)	Risk Level Present (Mo/Yr)	Risk Handling Approach / Risk Handling Strategy (RHS)	Remarks
SWPF-00-059	SWPF Safety Analysis Impacted	$270M	Moderate	EPC & DOE			**Reduce** • Conduct early and frequent reviews of SWPF Safety Strategy and Safety Analysis hazards and controls with DOE and DNFSB.	Action required by owner. Review of documented safety analysis required by DOE 413.3 and project management plan for SWPF.

NOTE: Worst consequence values are rough order of magnitude estimates based on potential PMP schedule delays associated with the worst consequence event for each risk item.

LEGEND: (D)↓ Decreasing Risk (S)| Stable Risk (I)↑ Increasing Risk

Note that risk numbers are not sequential. In the risk identification process, potential risks are initially identified by review of related project specific risk analysis (see Section 5, References) and by subject matter expertise. Risks which were not validated and were assessed by team members as not being a program level risk were then deleted. The risk identification numbers are issued automatically by the risk form application software so as to avoid inadvertent duplication of risk identification numbers.

APPENDIX C - TEAM MEMBER BIOGRAPHIES AND MEETING ATTENDANCE

Thomas J. Lex

Mr. Lex has more than 30 years experience in Naval, commercial, and DOE Complex nuclear and non-nuclear operations, engineering, and project management. Most recently, and prior to being assigned as a Liquid Waste Disposition Project Owner in January of 2003, Mr. Lex served as the Chief Engineer for the Savannah River Site's High Level Waste Division from January 1994 to January 2003, reporting to the Vice President and General Manager of the High Level Waste Division. Position required management and leadership for a department of over 300 engineers with design authority responsibility for all division operations. This includes the Defense Waste Processing Facility, Salt Processing and High Level Waste Concentration, Storage and Transfer. As design authority for the High Level Waste Division, he was responsible for technical direction for all facility operations, maintenance, and capital upgrade projects. Significant accomplishments included startup and operation of the largest high-level waste glass vitrification facility in the DOE Complex, and closure of the first two 1.0 million gallon high level waste storage tanks in the DOE Complex. Mr. Lex is a registered Professional Engineer (Mechanical), has a B.S. Degree in Engineering and an MBA. He has extensive experience in taking projects from the design phase through startup and into the operations.

W. R. Tucker

Mr. Tucker is the WSRC manager for SWPF support to the DOE with 35 years of leadership in advanced nuclear programs. He has performed and managed basic research, development, electrical engineering, computer systems engineering, mechanical engineering, facilities engineering, security systems engineering, and test engineering. Management roles in these diverse areas included project management, program management, laboratory operation, Fast Flux Test Facility Reactor design and engineering support of operations, and process development and improvement. He hold degrees in engineering and physics.

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Virginia G. Dickert	Ms. Dickert is the WSRC Closure Business Unit Salt Processing Program Manager. She has more than twenty-five years experience at the Savannah River Site in operations, program, and engineering management at production facilities and high level waste processing facilities, with increasing levels of responsibility for all aspects of nuclear facility operations and support. From February 2000 until recently, she was the Deputy Program Manager for the High Level Waste Division Tank Farms. Ms. Dickert managed preparations for waste removal from waste tanks for final disposition including installation and startup of major facility upgrades. She was responsible for implementing integrated facility scheduling managing interfaces across four facilities within the Division as well as interfaces with three other Site Divisions to enable integration of all facility operating and outage planning. She led all technical aspects of the closure of two high level radioactive waste tanks, the first closures completed throughout the DOE complex. Ms. Dickert also served as the Project Engineering Manager for the Replacement High level Waste Evaporator. Prior to her assignment in the High Level Waste Division, she managed operations, maintenance, engineering, and training for a chemical separations processing facility for recovery of nuclear radioisotopes from spent reactor fuel. Ms. Dickert has a Bachelor of Science degree (Summa Cum Laude) in Electrical and Computer Engineering.
Mark J. Mahoney	Mr. Mahoney, a Program Manager, Closure Business Unit, WSRC, is a senior-level manager with over 22 years experience in nuclear facilities. Twenty years have been associated with Liquid Waste and Waste Solidification Facilities. His career includes positions in operations, engineering, project management, and planning and scheduling. For the last 4 years, he has been responsible for the development and maintenance of a consolidated planning document (High Level Waste System Plan) to ensure an efficient and integrated planning approach for a $400 million a year program involving six operating plants. The High Level Waste System Plan is recognized as the model planning document for other SRS and DOE Complex programs.

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Robert N. Hinds

Mr. Hinds has over thirty years experience in operations and operations support in U.S. Navy, commercial, and U.S. Department of Energy (DOE) nuclear facilities. He has experience in operations, training, health physics, quality assurance, and project / program management. He has more than 11 years experience in DOE Nuclear and non-nuclear facility startup, operations, and operations support, including 4 years as Quality Assurance program manager during waste qualification for the SRS Defense Waste Processing Facility and QA Manager of Tank Farms for the High Level Waste Division; 3 years establishing the operations unit of the Environmental Restoration Operations Dept., and 4 years with the HLW Salt Processing Project as the Operations Director. He served as Risk Manager for the SWPF technology selection process. He holds degrees in Quality Assurance and Technical Education, and certifications in boiler and pressure vessel inspection and testing, and emergency response operations and management.

T. J. Spears

Mr. Spears is the Director, High Level Waste Salt Processing Division, Responsible for leadership, direction, contract management and oversight for all aspects of the SRS HLW salt processing program. He is also the Federal Project Manager for the Salt Waste Processing Facility Project. Mr. Spears has over 12 years progressive DOE experience in a variety of program areas, including: nuclear and industrial safety, conduct of operations, project management, technical assessment, laboratory institutional management, infrastructure, financial management, and technology development and transfer. He has nine years progressive naval nuclear propulsion related engineering, project management and nuclear systems/facility design, development and startup experience in naval shipyards and ship repair facilities. Mr. Spears is a registered Professional Engineer, has earned an undergraduate engineering degree (High Honors) from the University of Florida and a Master of Engineering degree from the University of South Carolina. He is a qualified Engineering Duty Officer in the U.S. Navy Reserves.

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Carl A. Everatt	Mr. Everatt, is the Director, High Level Waste Operations Division. As Director of HLW Operations supervised the Facility Representative (FR) oversight of DWPF, Tank Farm, ETF, Saltstone, and CIF operations. As Director of the Reactor and Spent Fuel program he supervised the initial FRR fuel receipts into the US as part of the non-proliferation objectives and the deactivation of the SRS Reactors. As Deputy Director of Reactor Operations supervised the FR oversight of the K-Reactor Restart with primary responsibility for the Peer Evaluation process utilized to certify reactor operators and supervisors. As a Nuclear Safety Engineer he was responsible for evaluation of Safety Analysis reports and proposed changes, field oversight of L-Reactor renovation and restart, and performance reviews of all 4 operating production reactors. As a field engineer for CE was responsible to review system readiness for turnover to FP&L. He is a graduate of the University of Florida, with a BS degree in Nuclear Engineering.
Douglas E. Hintze	Mr. Douglas Hintze, the Director, High Level Waste Program Division, is responsible for overall planning and program management for HLW programs including tank farms, tank closure, and other waste management facilities; project management of HLW projects with the exception of the Salt Waste Processing Facility Project, and; resource management for HLW programs including budget and contract performance. Previous responsibilities included overseeing project engineering (design, construction and start-up) activities for waste management facilities, including a hazardous waste incinerator, nuclear waste evaporator and waste pumping transfer stations. He also served as Technical Advisor to the Savannah River Operations Office Manager providing independent assessment, advice, and solutions relative to complex operating problems and issues associated with SRS operating facilities and programs.
Kurt Fisher	Mr. Fisher is the headquarters program manager within the Office of Project Completion for the Savannah River High-level Waste Program. He has over 20 years experience in contracting, project management, and construction management in various positions including project engineer, project manager and program manager. Mr. Fisher joined the Environmental Management Program in March, 1992, and held program manager positions within the Office of Waste Management Projects until 1995 when he joined the Office of Eastern Operations to work with the Savannah River High-level Waste Program. He is a graduate of the University of Pittsburgh, with a degree in Engineering.

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Meeting Attendance

Name	Organization	3/3/02	3/4/02	3/5/02	3/6/02	3/7/02	3/10/02	3/11/02
Robert N. Hinds	WSRC/CBU/SPP	X	X	X	X	X	X	X
Douglas E. Hintze	DOE-SR/AMHLW/PD	X	X	-	-	X	X	-
Thomas J. Lex	WSRC/CBU/LWD	X	X	X	X	X	X	X
Virginia G. Dickert	WSRC/CBU/LWD	X	-	X	-	-	-	-
W. R. Tucker	WSRC/CBU/SPP	X	X	X	X	X	X	X
T. J. Spears	DOE-SR/AMHLW/SPD	X	X	X	X	X	X	X
Carl A. Everatt	DOE-SR/AMHLW/OD	X	X	X	X	X	X	X
Mark J. Mahoney	WSRC/BCU	X	X	X	-	-	X	X
Vickie B. Wheeler	DOE-SR/AMHLW/SPD	X	X	-	-	-	-	-
Eric Runnerstrom	MPR	X	X	X	-	-	-	-
Paul Moore	MPR	X	X	X	-	-	-	-
Wayne E. Koszegi	BNFL	X	X	X	X	X	X	X
Harish S. Amin	WSRC/CBU/SPP	X	X	X	X	X	X	X
Mary Alice Nadeau	WSRC/CBU/SPP	X	X	X	X	X	X	X
Valerie F. Perella	WSRC/System Eng.	X	X	X	X	X	X	X
Renee H. Spires	WSTC/CBU/SPP	X	X					
Kurt Fisher	DOE/HLWOD	X	X	X	X	X	X	X
Harry Harmon	PNNL	-	X	-	X	X	-	-
Joe Carter	WSRC/BCU	-	-	X	X	-	-	-
George Matis	WSRC/CBU/LWD	-	-	X	X	X	-	-
Stephen G. Phillips	WSRC	-	-	X	-	-	-	-
Jack Kasper	PARSONS	-	-	X	X	-	-	-
Richard C. Smalley	PARSONS	-	-	X	-	-	-	-
Larry Ling	DOE-SR/AMHLW/PD	-	-	X	-	-	-	-
Gary Howard	PARSONS	-	-	X	X	X	-	-
Bill D. Pearson	DOE-SR/AMHLW/SPD	-	-	-	X	-	-	-
J. F. Ortaldo	WSRC/WD Engrg	-	-	-	X	-	-	-
Seth Campbell	CBU/SPP	-	-	-	X	-	-	-
Samuel Fink	SRTC	-	-	-	X	-	-	-
Dennis G. Thompson	WSRC/CBU	-	-	-	X	-	-	-
Hank Elder	WSRC/BCU	-	-	-	-	-	X	-

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