# SRS Risk Summary and Integrated Contingency Estimates

**Document No. Y-RAR-B-00003 Revision 0**

**UNCLASSIFIED**

**DOES NOT CONTAIN UNCLASSIFIED CONTROLLED NUCLEAR INFORMATION**

ADC/Reviewing Official: John J. Monahan, WSRC-CO

Date: 10/6/06

**Savannah River Operations Office**
**Washington Savannah River Company**
**Savannah River Site**
**Aiken, South Carolina 29808**

This report was prepared by Washington Savannah River Company (WSRC) for the United States Department of Energy under Contract No. DEA-AC09-96SR18500 and is an account of work performed under that contract. Neither the United States Department of Energy, nor WSRC, nor any of their employees makes any warranty, expressed or implied, or assumes any legal liability or responsibility for the accuracy, completeness, or usefulness of any information, apparatus, or product or process disclosed herein or represents that its use will not infringe privately owned rights. Reference herein to any specific commercial product, process, or service by trademark, name, manufacturer, or otherwise does not necessarily constitute or imply endorsement, recommendation, or favoring of same by WSRC or by the United States Government or any agency thereof. The views and opinions or the authors expressed herein do not necessarily state or reflect those of the United States Government or any agency thereof.

**Concurrences and Approval**

Washington Savannah River Company

Prepared by: _____ 10/6/06
Joseph F. Krupa, Principal Technical Advisor — Date
Systems Engineering

Reviewed by: _____ 10/6/06
Michael J. Cercy, Manager — Date
Systems Engineering

Concurrence: _____ 10/6/06
Clay B. Jones, Manager — Date
Business Integration and Planning

Savannah River Operations Office

Prepared by: Donna Page Ridgely 10/6/06
Donna Page Ridgely, Lead Project Control Specialist — Date
Office of Cleanup Projects Management

Reviewed by: _____ 10.6.2006
Michael C. Sellers, Director — Date
Office of Cleanup Projects Management

RWM 10/13/06

Concurrence: _____ 10/18/06
Kevin W. Smith, Federal Project Director — Date
PBS SR-0011, Nuclear Materials Stabilization and Disposition
PBS SR-0012, Spent Nuclear Fuels Stabilization and Disposition

Concurrence: _____ for 10/12/06
Douglas E. Hintze, Federal Project Director — Date
PBS SR-0013, Solid Waste Stabilization and Disposition

Concurrence: _____ for 10/12/06
Douglas E. Hintze, Federal Project Director — Date
High Level Waste System Including Waste Removal

**Concurrences and Approval (cont'd)**

Concurrence: _____ 10/12/06
Terrel J. Spears, Federal Project Director
Salt Processing Program and Salt Waste Processing Facility
Date

Concurrence: _____ 10/12/06
Terrel J. Spears, Federal Project Director
PBS SR-0014C, Radioactive Liquid Tank Waste Stabilization and Disposition
Date

Concurrence: Wade C. Whitaker _____ 10/10/06
Wade C. Whitaker, Federal Project Director
PBS SR-0030, Soil and Water Remediation
Date

Concurrence: Helen L. Belencan _____ 10.6.06
Helen L. Belencan, Federal Project Director
PBS SR-0040, Nuclear Facility Deactivation and Decommissioning
Date

Concurrence: _____ 10/18/06
Howard B. Gnann, Senior Technical Advisor
Office of the Manager, DOE-SR
Date

Approval: William F. Spader _____ 10/18/06
William F. Spader
DOE-SR Deputy Manager for Cleanup
Date

## Table of Contents

Executive Summary ..... 7
1.0 Background ..... 9
2.0 Risk Management Approach ..... 9
3.0 Risk Management Process ..... 10
Project Assumptions 10
Risk Management Workshop for Project Assumptions 10
Risk and Opportunity Assessment Process 10
Tailoring 10
Risk Documentation 10
Risk Monitoring and Lessons Learned 11
Benchmarking 11
4.0 Risks Summary and Contingency Estimate ..... 11
Contingency Estimate Methodology 12
Integrated Analysis and Modeling 13
Summary of Integrated Analysis Results 14
PBS SR-0011, Nuclear Materials Stabilization and Disposition 14
PBS SR-0012, Spent Nuclear Fuels Stabilization and Disposition 17
PBS SR-0013, Solid Waste Stabilization and Disposition 19
PBS SR-0014, Radioactive Liquid Tank Waste Stabilization and Disposition 20
PBS SR-0030, Soils and Water Remediation 25
PBS SR-0040, Nuclear Facilities Deactivation and Decommissioning 27
Crosscutting Risks 27
Risk Comparisons 28
5.0 References ..... 30
Attachment A, 2006 Project Execution Plan / EM Lifecycle Baseline
Cost Estimate Development 31
Attachment B, Crosscutting Risks 33
Attachment C, Risk Model 38
Attachment D, Risk Model Iteration 40

## List of Tables

**Page**

Table ES-1, 80% Confidence Level Contingency Estimates ..... 8
Table ES-2, Highest Contributor Risks to Contingency Estimate ..... 8
Table ES-1, 80% Confidence Level Contingency Estimates ..... 12
Table ES-2, Highest Contributor Risks to Contingency Estimate ..... 12
Table 1, PBS 11 Near Term (2007-2012) Risks Contingency Summary ..... 16
Table 2, PBS 11 Outyear Risks Contingency Summary ..... 16
Table 3, PBS 12 Near Term (2007-2012) Risks Contingency Summary ..... 17
Table 4, PBS 12 Outyear (2013-2019) Risks Contingency Summary ..... 18
Table 5, PBS 13 Near Term (2007-2012) Risks Contingency Summary ..... 19
Table 6, PBS 13 Outyear (2013-2031) Risks Contingency Summary ..... 20
Table 7, PBS 14 Near Term Risks Contingency Summary ..... 21
Table 8, PBS 14 Outyear Risks Contingency Summary ..... 25
Table 9, PBS 30 Near Term Risks Contingency Summary ..... 25
Table 10, PBS 30 Outyear Risks Contingency Summary ..... 26
Table 11, PBS 40 Risks Contingency Summary ..... 27
Table 12, PBS Crosscutting Risks Near Term Contingency Summary ..... 27
Table 13, PBS Crosscutting Risks Outyear Contingency Summary ..... 28

## List of Figures

Figure 1, Near Term PBS Mean Value Percentages ..... 28
Figure 2, Mean Values of PBS Near and OutYear Risks as a Percentage of Total Risk ..... 29
Figure A-1, Project Execution Plan / EM Lifecycle Baseline Process ..... 32
Figure C-1, Risk Model Key ..... 38
Figure C-2, Model Logic ..... 39

# Executive Summary

## Background

As part of the effort to projectize the Savannah River Site (SRS) environmental management cleanup, several steps have been taken to align cleanup work with project management requirements as contained in Department of Energy (DOE) Order 413.3A, *Project Management for the Acquisition of Capital Assets*. A project execution plan, the *Savannah River Site Environmental Management Program Project Execution Plan (PEP)*, has been prepared for the Environmental Management (EM) Cleanup Project at SRS. Contained within the PEP is project documentation for each of the Project Baseline Summaries (PBS), i.e., PBS projects, that compose the EM Cleanup Project. The PBS project documentation in the PEP augmented with the PBS risk management plans provide the equivalent of a project execution plan as identified in DOE Order 413.3A, *Project Management for the Acquisition of Capital Assets.*

## Risk Management Process and Documentation

SRS uses an integrated approach to achieve risk management objectives thus ensuring that both project team and management—contractor and federal—are involved in the risk management process. Each PBS project uses a formalized risk assessment process to identify, assess, handle, and monitor risks. Risks are classified as near term (Fiscal Year (FY) 2007-2012), approximately the next contract period, outyear (FY 2013-2031), i.e., the balance of the lifecycle, or in some cases both. Results of the risk assessment processes are documented in PBS Risk Management Plans.

## Contingency Estimate and the Federal Lifecycle Baseline

The *SRS Risk Summary and Integrated Contingency Estimates* (this document) examines the risks identified for each PBS project and provides contingency estimates for that PBS using standard project estimating techniques. It also develops contingency estimates for the crosscutting risks identified in the 2006 PEP. Data are integrated, analyzed, and contingency estimates developed to support the establishment the Federal Lifecycle Baseline.

## Risks Summary

The contingency cost estimates at the 80% confidence level for each PBS and the crosscutting risks identified in the 2006 PEP are presented in Table ES-1. The SRS contingency estimate for the EM Cleanup Project is $16.3 Billion (B).

**Table ES-1, 80% Confidence Level Contingency Estimates**

| PBS | 80% Contingency Estimate ($K) |
|---|---|
| SR-0011 | $722,000 |
| SR-0012 | $29,000 |
| SR-0013 | $725,000 |
| SR-0014 | $13,623,000 |
| SR-0030 | $123,000 |
| SR-0040 | $137,000 |
| Crosscutting Risks | $1,996,000 |
| SRS | $16,321,000 |

Disposition of waste presents the most significant risk to the EM Cleanup Project with PBS SR-0014, Radioactive Liquid Waste Tank Stabilization and Disposition, and PBS SR-0013, Solid Waste Stabilization and Disposition, ranked as the highest and second highest risk contributors to the overall total risk. PBS SR-0013 is the largest contributor for the near term risk profile (FY 2006 – FY 2012), and PBS SR-0014 is the largest contributor for the outyear risk profile (FY 2013 – FY 2031).

The highest six risks in priority order that contribute to the SRS contingency are presented in Table ES-2. All these risks are outyear risks. Contributions are dominated by PBS SR-0014, Radioactive Liquid Waste Tank Stabilization and Disposition.

**Table ES-2, Highest Contributor Risks to Contingency Estimate**

| PBS Element | Risk Identifier and Risk Title | % of Total* |
|---|---|---|
| 14 | ID-119-Additional Sludge Mass Results in Higher than expected Canister Production | 18.66% |
| 14 | ID-100-Waste Tank Utilization Conflict | 6.43% |
| XC | ID-005-Funding Does Not Support PBS Baseline | 5.29% |
| 14 | ID-091-Close coupling between SWPF and other facilities limits SWPF throughput rates | 4.84% |
| 14 | ID-010-Stakeholders do not Agree with Technical basis for tank closure (PA & Class C) | 3.42% |
| 14 | ID-149-HLW Tank Leak Requires the Use of Contingency Space | 2.78% |

*Mean risk values as a percentage of the mean total risk.

Further analysis is planned of the risk data, the contingency model, and the contingency estimates to determine how the results may best be used to enhance decision-making processes, mitigate risk, and improve project performance.

## 1.0 Background

As part of the effort to projectize the Savannah River Site (SRS) environmental management cleanup, several steps have been taken to align cleanup work with project management requirements as contained in DOE Order 413.3A, *Project Management for the Acquisition of Capital Assets*. A project execution plan, the *Savannah River Site Environmental Management Program Project Execution Plan (PEP)*, has been prepared for the EM Cleanup Project at SRS. Contained within the PEP is project documentation for the PBS that compose the EM Cleanup Project. In addition to the project documentation contained within the PEP, risk management plans have been developed for the following PBS:

PBS SR-0011, Nuclear Materials Stabilization and Disposition

PBS SR-0012, Spent Nuclear Fuels Stabilization and Disposition

PBS SR-0013, Solid Waste Stabilization and Disposition

PBS SR-0014, Radioactive Liquid Tank Waste Stabilization and Disposition,
also referred to as the Waste Stabilization and Disposition Project (WSDP)

PBS SR-0030, Soil and Water Remediation,
also referred to as the Soil and Groundwater Project (SGP)

PBS SR-0040, Nuclear Facility Deactivation and Decommissioning

The PBS project documentation in the PEP augmented with the PBS risk management plan provides the equivalent of a project execution plan as identified in DOE Order 413.3A, *Project Management for the Acquisition of Capital Assets.* Attachment A gives a brief summary of the PEP and EM lifecycle baseline cost estimate process. Cross-cutting risks developed in the PEP are detailed in attachment B and discussed later in this document.

## 2.0 Risk Management Approach

The approach taken at SRS to manage risk for the PBS projects is consistent with risk management guidance contained in DOE Order 413.3A, *Project Management for the Acquisition of Capital Assets* and DOE Manual 413.3-1, *Project Management for the Acquisition of Capital Assets*, and the EM policy set forth in the *Policies for Environmental Management Operating Project Performance Baselines, Contingency and Federal Risk Management Plans, and Configuration Control* (memorandum, Anderson to Distribution, dated July 10, 2006).

SRS uses an integrated approach to achieve risk management objectives thus ensuring that both project team and management—contractor and federal—are involved in the risk management process, from risk identification, assessment, and ranking, through development of risk handling strategies and identification of residual risk, to preparation of the PBS Risk Management Plan and contingency estimates contained in the *SRS Risk Summary and Integrated Contingency Estimates*. Each PBS Risk Management Plan provides a summary description of the integrated approach employed in the development of that PBS risk plan.

The PBS Federal Project Director (FPD) is responsible for assessing risk and opportunities, developing risk handling strategies, preparing the PBS Risk Management Plan, and implementing risk management throughout the life of the project. The contractor is responsible for managing risks identified as being within the contractor's performance baseline (i.e., PBS work scope, management reserve, and contractor profit or fee). The FPD is responsible for the identification of Government Furnished Services and Items required for project success and the identification of PBS residual risk values used in the integrated contingency analysis. PBS risk data is integrated, analyzed, and contingency estimates prepared to establish the Federal Lifecycle Baseline.

## 3.0 Risk Management Process

A summary description of the risk management process employed at SRS is provided in this section. References are provided for more detailed descriptions.

**Project Assumptions**

Project assumptions are developed for each PBS and are updated annually to reflect strategic planning or programmatic changes. The annual update of project assumptions is part of the process to update the PEP and EM lifecycle baseline. The process to update the PEP and EM lifecycle baseline is depicted in Attachment A, Figure A-1.

**Risk Management Workshop for Project Assumptions**

A Risk Management Workshop is held annually in the Spring (March/April timeframe) to communicate updated project assumptions. These assumptions provide the basis of the lifecycle baseline reflected in the 2006 PEP. The Workshop initiates an annual review of the PBS risk plans to assess the adequacy of risk evaluations as compared with revised project assumptions. Revision of the PBS Risk Management Plan is at the discretion of the PBS Federal Project Director.

**Risk and Opportunity Assessment Process**

A risk and opportunity assessment process is used to identify the risks and opportunities associated with each PBS. The risks and opportunities are analyzed and handling strategies developed to ensure risks are managed to acceptable levels and opportunities are availed to improve the probability of successful completion of the PBS work scope. A detailed description of the methodology employed for the risk and opportunity assessment conducted by each of the PBS Integrated Project Risk Teams is documented in the *Systems Engineering Methodology Guidance Manual*, Appendix B, Risk and Opportunity Management (reference: WSRC-IM-98-00033, Revision 6, September 29, 2005) and is consistent with guidance provided in the *SR Project Management Manual* (reference: SRM 410.1.1D).

**Tailoring**

Risk Consequence Criteria were tailored for PBS projects. Specifically, the criteria thresholds to define the category of “Crisis” were modified from those typically utilized in the assessment of a construction project to thresholds deemed more appropriate for an operating project.

**Risk Documentation**

Risks identified by the PBS Integrated Risk Team during the risk and opportunity assessment are assessed, graded, and risk handling strategies developed. Accepted risk and risk remaining after application of risk handling strategies are classified as residual risk and a residual cost impact assessed. Risks, risk grading classifications, risk handling strategies, and impact and residual risk value assignments are documented on Risk and Opportunity Assessment Forms. A PBS Risk Management Plan is prepared to document results of the risk and opportunity assessment, with the Risk and Opportunity Assessment Forms as an attachment.

The PBS Risk Management Plan provides a description of the PBS work scope and identifies the project and programmatic risk for the entire project (both near term baseline—FY 2007 through FY 2012—and the balance of the lifecycle baseline—FY 2013 through FY 2031). Data from the PBS Risk Management Plans are used to calculate the contingency estimate for the Federal Lifecycle Baseline and to establish the SRS portion of the DOE Environmental Management unfunded contingency. Contingency estimates and a summary of the risk contributors are documented herein.

**Risk Monitoring and Lessons Learned**

Contractor Project Managers and Federal Project Directors routinely review project risks at scheduled project meetings. Washington Savannah River Company (WSRC) conducts bi-weekly Senior Management Project Review Briefings at which summary-level data is reviewed and specific issues identified for discussion. Savannah River Operations Office (SR) reviews risks in Monthly Performance Review Meetings (review of PBS performance), Senior Management Quarterly Project Reviews (review of PBS subprojects), and EM Quarterly Project Reviews (PBS and line item projects).

Monitoring and trending activities are well established for line item and capital projects that are subprojects to the PBS. Efforts are underway to appropriately tailor processes to establish effective monitoring and trending programs for the PBS.

Two workshops are planned each year as part of the risk monitoring process (one in the Spring and a second in the Fall. The Spring workshop focuses on communicating to PBS Integrated Project Teams the revised/updated strategic planning assumptions for the EM Cleanup Project Execution Plan and identifying crosscutting risks. An opportunity is provided for each of the PBS Risk Teams to share lessons learned. The focus of the Fall workshop is reviewing risk trends, sharing lessons learned, and identifying opportunities of improvement for risk management.

**Benchmarking**

The FY 2006 Organizational Project Management Maturity Model (OPM3) review of WSRC identified the risk management process at SRS as mature. External Independent Reviews (EIR) of SRS projects using the risk management process were identified as a model for other programs. The Energy Facility Contractors Operating Group (EFCOG) Project Management Risk Management Focus Group has recommended the WSRC Risk Management Guide as a Best Practice.

Benchmarking is planned to assess the SRS practices employed for risk management and contingency analysis of PBS against the practices employed at other large DOE sites.

## 4.0 Risks Summary and Contingency Estimate

The *SRS Risk Summary and Integrated Contingency Estimates* examines the risks identified for each PBS projects and provides contingency estimates for that PBS using standard project estimating techniques. It also develops contingency estimates for cross-cutting risks identified in the 2006 PEP and provides the overall contingency estimate for the EM Cleanup Project at SRS. For simplicity, PBS identification has been abbreviated to a two digit identifier throughout the document, e.g., PBS SR-0011 is PBS 11, PBS SR-0012 is PBS 12, etc.

The impact of under-funding of the baseline was based on an average of the first five years of the baseline, i.e., the near term baseline. This risk (XC05) is the source of most of the crosscutting risk.

The contingency cost estimates at the 80% confidence level for each PBS and the crosscutting risks identified in the 2006 PEP are presented in Table ES-1. The SRS contingency estimate for the EM Cleanup Project is $16.3 Billion.

**Table ES-1, 80% Confidence Level Contingency Estimates**

| PBS | 80% Contingency Estimate ($K) |
|---|---|
| SR-0011 | $722,000 |
| SR-0012 | $29,000 |
| SR-0013 | $725,000 |
| SR-0014 | $13,623,000 |
| SR-0030 | $123,000 |
| SR-0040 | $137,000 |
| Crosscutting Risks | $1,996,000 |
| SRS | $16,321,000 |

The highest six risks in priority order that contribute to the contingency are presented in Table ES-2. All are outyear risks. Five of six are in PBS 14.

**Table ES-2, Highest Contributor Risks to Contingency Estimate**

| PBS Element | Risk Identifier and Risk Title | % of Total* |
|---|---|---|
| 14 | ID-119-Additional Sludge Mass Results in Higher than expected Canister Production | 18.66% |
| 14 | ID-100-Waste Tank Utilization Conflict | 6.43% |
| XC | ID-005-Funding Does Not Support PBS Baseline | 5.29% |
| 14 | ID-091-Close coupling between SWPF and other facilities limits SWPF throughput rates | 4.84% |
| 14 | ID-010-Stakeholders do not Agree with Technical basis for tank closure (PA & Class C) | 3.42% |
| 14 | ID-149-HLW Tank Leak Requires the Use of Contingency Space | 2.78% |

*Mean risk values as a percentage of the mean total risk.

**Contingency Estimate Methodology**

DOE-SR requested WSRC to develop a contingency estimate for the PBS projects at SRS (i.e., PBS 11, 12, 13, 14, 30, and 40) to establish an 80% confidence level estimate. The contingency estimate is based on project residual risk data documented on Risk / Opportunity Assessment Forms and included in PBS Risk Management Plans completed in July 2006 (References 1-6) and the crosscutting risks identified in the 2006 PEP (reference 7). Crosscutting risk assessment results are included in Attachment B. The contingency analysis is performed using Crystal Ball™ Software. Attachment C provides a description of the Risk Model. Risks are identified as near term (FY 2007-2012), approximately the next contract period, outyear (FY 2013-2031), i.e., balance of the lifecycle, or in some cases both. If a risk is considered applicable for the entire period, the likelihood is split between near term and outyear. To develop the contingency estimate, risk data are input to the risk model and

iterations run. Attachment D illustrates modeling results from a single iteration of the risk model. 10,000 iterations are run and data results are used to identify a mean value for each risk, establish risk correlations within and among PBS, and plot a distribution curve to determine confidence-levels. The ranking and correlation process follows the guidance of *Systems Engineering Methodology Manual, Appendix B* (Reference 8). PBS risk ranking and correlation results are summarized in PBS Contingency Summary Tables in Section 4.0, Risk Summary and Contingency Estimate. The distribution curve data is used to identify an 80% confidence-level estimate for each PBS, the crosscutting risks, and an SRS total (PBS plus crosscutting risks). The 80% confidence-level estimate results are in Table ES-1 of the Executive Summary. PBS mean values are used to compare risk among the PBS for near term or over the entire baseline. Results of comparisons may be seen in Figures 1 and 2 at the end of Section 4.0.

**Integrated Analysis and Modeling**

Each PBS Risk Management Plan identifies risks associated with the complete implementation of its scope, provides a plan for managing those risks, and gives an accurate measure of the short-term contingency necessary to establish an 80% confidence level of near term PBS execution. The *SRS Risk Summary and Integrated Contingency Estimates* provides a reasonable measure of long-term contingency necessary to establish an 80% confidence level to execute all current PBS work scope.

Application of modeling techniques consistent with those used for standard construction projects is appropriate for developing a model for PBS near term risk data. However, some complications are realized when using the same modeling technique for PBS outyear risk data. There are several factors which complicate the effectiveness of the application of a standard approach:

- Concurrently Scheduled Activities - Although activities are individual and risk consequences are independent, the realization of risk events may result in a concurrent schedule delay which when converted to cost is additive. Take, for example, two separate risk events of feed availability for SWPF and the startup of SWPF, both having six-month delay consequences. Provided both activities were scheduled for the same completion date, the net effect to the program should both risks be realized is a six-month delay. By using the conversion of program extension to cost and performing a standard analysis, the impact is counted twice in the model: once for feed delay and once for startup delay. This complication could be eliminated if a detailed lifecycle schedule were available. Each PBS risk would be linked to a specific schedule activity enabling a Primavera Monte-Carlo analysis to be performed for the specific risk event. The current EM lifecycle baseline schedule provides adequate detail for analysis of the near term; however, because only summary-level detail is available for the outyears, the model is limited by the available data. A more detailed outyear schedule is being developed; however, contingency results reported herein are limited by the model.

- Common Consequences - Where realized risks result in common consequences, e.g. two risks result in the consequence of building additional storage and do not increase the number of canisters being produced, the cost of the facility may be counted twice if both of the risks occur during the modeling run.

- Overlapping Consequences - The consequences of risks being realized may also overlap. This would be similar to concurrent consequences e.g., two overlapping six-month delays may effectively result in a nine-month delay.

- Model Response – Modeling results are representative of static conditions. The current lifecycle baseline is assumed an accurate depiction of future events, and PBS risk assessment results based on the current baseline constitute the basis of the data feed for the model run. Consequently, contingency estimates contained herein are restricted to outcomes as predicted by the current baseline. In actual execution of the program or project, flexibilities may be exercised

to minimize risk impacts thus resulting in deviations from the modeled risk profiles representative of a static condition.

The model produced by the integration of all PBS risk data and the application of standard modeling techniques is conservative and represents worst case scenario, i.e., no concurrent activities, common consequences, or overlapping consequences, and no benefit from model response are assumed. The resulting contingency is therefore a "bounding contingency" and should be viewed as reasonably accurate only in its order of magnitude. It would not be unreasonable to assume a reduction of up to 50% could be achieved should a model be developed assigning individual risks to specific activities in the lifecycle schedule. A more detailed schedule would alleviate, although not entirely eliminate, some of the obstacles currently encountered. To improve the process, DOE-SR is developing an integrated summary schedule that will provide increased detail for outyear and critical path related activities. The schedule will be resource loaded to facilitate generation of the following: (1) "what-if" scenarios, (2) funding profiles, and (3) impact analyses—risk, escalation, etc. Future risk and contingency assessments will have the benefit of the more detailed schedule; however, for this particular assessment, the PBS Teams focused their resources on identification of risk consistent with the approach selected by the PBS Federal Project Director and the development of strategies to handle those risks.

**Summary of Integrated Analysis Results**

Near term risk had a $0.9B mean value and $1.0B at the 80% confidence level. Outyear risk, much of which is not yet well defined, had a mean value of $14.6B, and an 80% value of $15.5B. Total mean risk was $14.5B, with an 80% value of $16.3B.

The Tables below indicate the results of this analysis. Highlighted risks have the highest correlation with near term or outyear risks, and their means are the highest percentage of the mean near term or outyear risks. This convention is used throughout the tables.

**PBS SR-0011, Nuclear Materials Stabilization and Disposition**

Table 1 shows the results for PBS 11 near term (2007-2012). Correlations represent the Spearman rank correlation between a risk and the near or outyear total risk. Spearman rank correlation measures the relationship between variables when the data is not normally distributed, i.e., is not linear. The mean value of the sum of near term PBS 11 risks is about $197M, about 1.4% of the total mean SRS PBS risk. The largest near term risks are Risk ID-019-*3013 CSSC Lack of Resources*, Risk ID-028-*F-Canyon Mission Change from Deactivation* and Risk ID-029-*Tank Farm Waste Storage Limit Bound*. These three risks are 51% of the PBS 11B near term risk.

Table 2 shows the results for PBS 11 out years (2013-2031). Nearly 90% of the PBS 11 outyear risk is provided by Risks ID-003-*Additional Processing Needs Extend H-Canyon Operation*, ID-031-*Pu Vit/Pu Alt Disposition Requirement Change Impact to Operations Phase* and ID-033-*Pu Vit/Pu Alt Disposition Funding Delay that impacts Operations Phase*. PBS 11 represents about 2.8% of the total SRS risk.

**Table 1—PBS 11 Near Term (2007-2012) Risks Contingency Summary (Means in $K)**

| PBS Element | Risk Identifier and Risk Title | Spearman Rank Correlation | Rank | | Mean | %11N | Rank |
|---|---|---|---|---|---|---|---|
| 11B.2 | ID-004-Major Facility Failure resulting in loss of H-Canyon capability (physical or passive systems) | 0.067 | 16 | | $1,283 | 0.65% | 19 |
| 11B.2 | ID-005-Programmatic Issues | -- | -- | | $65 | 0.03% | 30 |
| 11B.2 | ID-006-Process Performance | -- | -- | | $62 | 0.03% | 31 |
| 11B.2 | ID-007-S&S Requirement Changes | 0.114 | 5 | | $2,142 | 1.09% | 17 |
| 11B.2 | ID-009-Availability of External Interfaces | -- | -- | | $73 | 0.04% | 29 |
| 11B.5 | ID-010-Pu Vit/Pu Alt Disposition Materials of Construction | 0.103 | 8 | | $8,979 | 4.56% | 6 |
| 11B.5 | ID-012-Pu Vit/Pu Alt Dispostion Product Acceptibility | 0.070 | 15 | | $1,172 | 0.59% | 20 |
| 11B.5 | ID-013-Pu Vit/Pu Alt Disposition Requirements changes | 0.159 | 4 | | $9,032 | 4.59% | 5 |
| 11B.5 | ID-015-Pu Vit/Pu Alt Disposition Funding Delay | -- | -- | | $13,069 | 6.63% | 3 |
| 11B.5 | ID-016-Pu Vit/Pu Al Discosition Feed Material | 0.093 | 10 | | $4,515 | 2.29% | 14 |
| 11B.2 | ID-018-3013 CSSC Requirement Changes | 0.108 | 6 | | $8,914 | 4.53% | 7 |
| 11B.4 | ID-019-3013 CSSC Lack of Resources | 0.291 | 3 | | $26,980 | 13.70% | 2 |
| 11B.4 | ID-020-3013 CSSC Project Funding Delay | 0.059 | 17 | | $8,913 | 4.52% | 8 |
| 11B.4 | ID-022-KIS Estended Life | -- | -- | | $2,431 | 1.23% | 16 |
| 11B.4 | ID-023-KIS Surveillance Requirement Changes | -- | -- | | $3,068 | 1.56% | 15 |
| 11B.4 | ID-024-H-Area Impact on KIS | -- | -- | | $367 | 0.19% | 23 |
| 11B.4 | ID-026 3013 CSSC Requirement Changes Prior to CD-2 | -- | -- | | $97 | 0.05% | 27 |
| 11B.5 | ID-027 Pu Vitrification/Pu Alternate Disposition Requirement Changes (Design/Construction) prior to CD-2 | -- | -- | | $287 | 0.15% | 25 |
| 11B.1 | ID-028-F-Canyon Mission Change from Deactivation | 0.710 | 1 | | $61,551 | 31.25% | 1 |
| 11B.2 | ID-029-Tank Farm Waste Storage Limit Bound | 0.422 | 2 | | $11,502 | 5.84% | 4 |
| 11C.1 | ID-030-KIS Delays Impacts FAMS | 0.076 | 13 | | $5,225 | 2.65% | 13 |
| 11C.1 | ID-035-Complete K-Area Facility Mods to support strage of misc. Pu from FAMS | 0.084 | 12 | | $334 | 0.17% | 24 |
| 11C.1 | ID-036-MC&A Requirements may dictate need for Cf shuffler | 0.071 | 14 | | $548 | 0.28% | 21 |
| 11C.1 | ID-037-Deinventory HEU from Assembly Area | -- | -- | | $82 | 0.04% | 28 |
| 11C.1 | ID-038-Capability to respond to significant 3013 surveilllance issues | -- | -- | | $501 | 0.25% | 22 |
| 11C.1 | ID-039-Delay of FAMS D&D | 0.089 | 11 | | $5,881 | 2.99% | 10 |

**Table 1—PBS 11 Near Term (2007-2012) Risks Contingency Summary (continued)**

**(Means in $K)**

| PBS Element | Risk Identifier and Risk Title | Spearman Rank Correlation | Rank | | Mean | %11N | Rank |
|---|---|---|---|---|---|---|---|
| 11C.1 | ID-040-Materials schedule for H-Area disposition requres alternate lag storage in K-Area | -- | -- | | $7 | 0.00% | 32 |
| 11C.1 | ID-041-K-Area Fire Protection Upgrades | -- | -- | | $7,038 | 3.57% | 9 |
| 11C.1 | ID-042-H Completion Schedule Impacts on K-Area Material Receipts | -- | -- | | $2,111 | 1.07% | 18 |
| 11B.1 | ID-043 F Canyon Not Funded for Loading, Shipment and Disposal of 25,000 depleted uranium oxide (DUO) drums. | 0.107 | 7 | | $5,357 | 2.72% | 11 |
| 11C.1 | ID-044-EM Pu Consolidation Impact of new containers | 0.100 | 9 | | $5,322 | 2.70% | 12 |
| 11B.4 | ID-045-Potential Chllenge to Storage of NNSA Materials | -- | -- | | $110 | 0.06% | 26 |

**Table 2 – PBS 11 Outyear Risks Contingency Summary**

**(Means in $K)**

| PBS Element | Risk Identifier and Risk Title | Spearman Rank Correlation | Rank | | Mean | %11BOut | Rank |
|---|---|---|---|---|---|---|---|
| 11B.2 | ID-003-Addditional Processing Needs Extend H-Canyon Operation | 0.449 | 3 | | $182,108 | 46.15% | 1 |
| 11B.2 | ID-004-Major Facility Failure resulting in loss of H-Canyon capability (physical or passive systems) | -- | -- | | $1,774 | 0.45% | 7 |
| 11B.2 | ID-005-Programmatic Issues | -- | -- | | $88 | 0.02% | 10 |
| 11B.1 | ID-025-Requirement Changes affecting Deactivation Endpoints and S&M | 0.087 | 6 | | $8,894 | 2.25% | 6 |
| 11B.2 | ID-029-Tank Farm Waste Storage Limit Bound | 0.276 | 4 | | $15,283 | 3.87% | 4 |
| 11C.1 | ID-031-Pu Vit/Pu Alt Disposition Requirement Change Impact to Operations Phase | 0.505 | 1 | | $87,006 | 22.05% | 3 |
| 11C.1 | ID-033-Pu Vit/Pu Alt Disposition Funding Delay that impacts Operations Phase | 0.504 | 2 | | $87,235 | 22.11% | 2 |
| 11C.1 | ID-034-Additional Pu Vit/Pu Alt Disposition Feed Material that Impacts Operations | 0.271 | 5 | | $11,395 | 2.89% | 5 |
| 11C.1 | ID-038-Capability to respond to significant 3013 surveilllance issues | -- | -- | | $654 | 0.17% | 8 |
| 11B.4 | ID-045-Potential Chllenge to Storage of NNSA Materials | -- | -- | | $158 | 0.04% | 9 |

**PBS SR-0012, Spent Nuclear Fuels Stabilization and Disposition**

Table 3 shows correlations and mean risk values for PBS 12 Near term Risks. It represents 0.04% of the total SRS PBS risk.

**Table 3—PBS 12 Near Term (2007-2012) Risks Contingency Summary**

**(Means in $K)**

| PBS Element | Risk Identifier and Risk Title | Spearman Rank Correlation | Rank | | Mean | %12N | Rank |
|---|---|---|---|---|---|---|---|
| 12.1 | ID-002-New materials Received at L-Basin--GTRI SNF | 0.061 | 9 | | $110 | 1.75% | 10 |
| 12.1 | ID-003-Increased S&S Requirements (DBT) for L-Area Operations | 0.360 | 2 | | $736 | 11.77% | 3 |
| 12.1 | ID-004-TRIGA receipts at L Basin | -- | -- | | $14 | 0.23% | 11 |
| 12.1 | ID-005-SNF received exceed Category II Facility for L-Area Operations | 0.164 | 8 | | $121 | 1.94% | 8 |
| 12.1 | ID-006-Facilty condition -L-Area Basin Structure | 0.209 | 4 | | $1,073 | 17.14% | 2 |
| 12.1 | ID-007-New Disposition - Heavy Water is declared Waste | 0.187 | 6 | | $297 | 4.74% | 6 |
| 12.1 | ID-012-Utility Service Changes | 0.175 | 7 | | $154 | 2.46% | 7 |
| 12.1 | ID-013-INL/SRS SNF Swap | 0.193 | 5 | | $442 | 7.07% | 5 |
| 12.1 | ID-014-DNFSB Recommendation 2004-2 Confinement System Impacts | 0.338 | 3 | | $637 | 10.18% | 4 |
| 12.2 | ID-015-INL/SRS SNF SWAP Cask Availability | 0.708 | 1 | | $2,561 | 40.93% | 1 |
| 12.2 | ID-016-INL/SRS SNF Swap Damaged Fuel Shipping Requirements | 0.052 | 10 | | $113 | 1.80% | 9 |

Table 4 shows the correlations and mean values for PBS 12 outyear risks. It represents 0.09% of the total SRS PBS risk.

**Table 4—PBS 12 Outyear (2013-2019) Risks Contingency Summary**

**(Means In $K)**

| PBS Element | Risk Identifier and Risk Title | Spearman Rank Correlation | Rank | | Mean | %12Out | Rank |
|---|---|---|---|---|---|---|---|
| 12.1 | ID-002-New materials Received at L-Basin--GTRI SNF | 0.086 | 8 | | $157 | 1.24% | 9 |
| 12.1 | ID-003-Increased S&S Requirements (DBT) for L-Area Operations | 0.268 | 3 | | $1,066 | 8.42% | 3 |
| 12.1 | ID-004-TRIGA receipts at L Basin | -- | -- | | $21 | 0.17% | 11 |
| 12.1 | ID-005-SNF received exceed Category II Facility for L-Area Operations | 0.104 | 7 | | $190 | 1.50% | 8 |
| 12.1 | ID-012-Utility Service Changes | 0.125 | 5 | | $217 | 1.72% | 7 |
| 12.1 | ID-013-INL/SRS SNF Swap | 0.112 | 6 | | $628 | 4.96% | 5 |
| 12.1 | ID-014-DNFSB Recommendation 2004-2 Confinement System Impacts | 0.214 | 4 | | $893 | 7.05% | 4 |
| 12.2 | ID-015-INL/SRS SNF SWAP Cask Availability | 0.452 | 2 | | $3,639 | 28.73% | 2 |
| 12.2 | ID-016-INL/SRS SNF Swap Damaged Fuel Shipping Requirements | -- | -- | | $154 | 1.22% | 10 |
| 12.2 | ID-017-L Basin Receives Fuel After H-Canyon Shutdown | 0.753 | 1 | | $5,431 | 42.88% | 1 |
| 12.2 | ID-018-L Area Receives Late FRR Shipments | -- | -- | | $268 | 2.12% | 6 |

**PBS SR-0013, Solid Waste Stabilization and Disposition**

Tables 5 and 6 provide the near term and outyear risks for PBS 13.

**Table 5—PBS 13 Near Term (2007-2012) Risks Contingency Summary**

**(Means in $K)**

| PBS Element | Risk Identifier and Risk Title | Spearman Rank Correlation | Rank | | Mean | %13N | Rank |
|---|---|---|---|---|---|---|---|
| 13 | ID-001-No Path to Disposal | -- | -- | | $391 | 0.14% | 20 |
| 13 | ID-002-Waste Mischaracterized | -- | -- | | $2,698 | 0.97% | 11 |
| 13 | ID-003 Poor Waste Forecasts (Volume, Ci, Category) | 0.059 | 8 | | $13,050 | 4.70% | 5 |
| 13 | ID-004-Process/Operating Upsets | -- | -- | | $6,473 | 2.33% | 9 |
| 13 | ID-005-SRS Funding Impacts Outside of this PBS | 0.653 | 1 | | $70,547 | 25.39% | 2 |
| 13 | ID-006-Regulatory Impacts | 0.068 | 7 | | $2,365 | 0.85% | 12 |
| 13 | ID-007-Closure of Solid Waste Facilities to Meet End State | -- | -- | | $714 | 0.26% | 17 |
| 13 | ID-008-Remediation Performance Does Not Meet Execution Schedule | 0.059 | 8 | | $8,957 | 3.22% | 7 |
| 13 | ID-009-High Activity TRU Waste Processing Throughput Does Not Meet Execution Schedule | 0.431 | 3 | | $79,844 | 28.74% | 1 |
| 13 | ID-010-Remote-Handled TRU Waste | -- | -- | | $1,315 | 0.47% | 16 |
| 13 | ID-011-No Defined Certification Program for New TRU Waste Post FY 2012 | -- | -- | | $2,039 | 0.73% | 13 |
| 13 | ID-012-Fragmented Safety Basis | -- | -- | | $73 | 0.03% | 21 |
| 13 | ID-013-Vent and Purge Operations Do Not Meet Throughput Requirements | -- | -- | | $1,794 | 0.65% | 14 |
| 13 | ID-014-Culvert Retrieval Operations Do Not Meet Throughput Requirements | -- | -- | | $3,995 | 1.44% | 10 |
| 13 | ID-015-Technical Performance of NDA/NDE/HSG Does Not Meet Requirements | -- | -- | | $10,627 | 3.82% | 6 |
| 13 | ID-016-Availability of a Certified Large Box Characterization System | 0.223 | 4 | | $21,138 | 7.61% | 4 |
| 13 | ID-017- Availability of TRUPACT III Shipping Container | 0.434 | 2 | | $42,293 | 15.22% | 3 |
| 13 | ID-018-Safety Analysis (DSA) Is Not All Encompassing | 0.072 | 6 | | $1,706 | 0.61% | 15 |
| 13 | ID-019-CCP Resources Are Redeployed due to DOE Complex Priorities | 0.149 | 5 | | $6,880 | 2.48% | 8 |
| 13 | ID-023-Transportation Issues | -- | -- | | $524 | 0.19% | 18 |
| 13 | ID-025-External Vendor Liability | -- | -- | | $414 | 0.15% | 19 |

PBS 13 near term risk represents 2.6% of the total mean PBS risk. Table 5 shows correlations and near term mean risk values for PBS 13.Two risks make up 68% of near term risk, Risk ID-005-*SRS Funding Impacts Outside of this PBS,* Risk ID-009-*High Activity TRU Waste Processing Throughput Does Not Meet Execution Schedule, and Risk ID-017- Availability of TRUPACT III Shipping Container.*

Table 6 shows correlations and outyear mean risk values for PBS 13. It is dominated by one risk, Risk ID-005-SRS, *Funding Impacts Outside of this PBS*. It represents ~98% of PBS 13 outyear risk. PBS 13 outyear risks are 2.9% of the total mean SRS PBS risk.

**Table 6—PBS 13 Outyear (2013-2031) Risks Contingency Summary**

**(Means in $K)**

| PBS Element | Risk Identifier and Risk Title | Spearman Rank Correlation | Rank | | Mean | %13Out | Rank |
|---|---|---|---|---|---|---|---|
| 13 | ID-001-No Path to Disposal | -- | -- | | $1,503 | 0.53% | 4 |
| 13 | ID-005-SRS Funding Impacts Outside of this PBS | 0.984 | 1 | | $270,047 | 95.62% | 1 |
| 13 | ID-007-Closure of Solid Waste Facilities to Meet End State | -- | -- | | $2,691 | 0.95% | 3 |
| 13 | ID-011-No Defined Certification Program for New TRU Waste Post FY 2012 | 0.118 | 2 | | $7,909 | 2.80% | 2 |
| 13 | ID-012-Fragmented Safety Basis | -- | -- | | $260 | 0.09% | 5 |

**PBS SR-0014, Radioactive Liquid Tank Waste Stabilization and Disposition**

Table 7 shows the PBS 14 near term risks. Two risks represent ~46% of PBS 14 near term risks, Risk ID-042-*Salt Waste Heel or Tank Annuli Waste Cannot be Processed Through SWPF* and Risk ID-116-*2H Evaporator Material and Chemical Balance* issues. PBS 14 near term risks represent 0.07% of SRS PBS total mean risk.

Table 8 shows the PBS 14 outyear risk correlations and mean values. Five risks represent 43% of PBS outyear risks:

- ID-010-Stakeholders do not Agree with Technical basis for tank closure (PA & Class C)
- ID-091-Close coupling between SWPF and other facilities limits SWPF throughput rates
- ID-100-Waste Tank Utilization Conflict
- ID-119-Additional Sludge Mass Result in Higher than expected Canister Production
- ID-149-HLW Tank Leak Requires the Use of Contingency Space

PBS 14 outyear risks represent 83 % of the total mean SRS PBS risk.

**Table 7—PBS 14 Near Term Risks Contingency Summary**

**(Means in $K)**

| PBS Element | Risk Identifier and Risk Title | Spearman Rank Correlation | Rank | | Mean | %14N | Rank |
|---|---|---|---|---|---|---|---|
| 14 | ID-010-Stakeholders do not Agree with Technical basis for tank closure (PA & Class C) | -- | -- | | $1,485 | 1.47% | 11 |
| 14 | ID-017-MCU Catastrophic Tank Failure | -- | -- | | $19 | 0.02% | 20 |
| 14 | ID-018-Saltstone Processing Facility (SPF) Encounters a Major Equipment Failure | -- | -- | | $292 | 0.29% | 15 |
| 14 | ID-021-DWPF Melter Failure | 0.256 | 5 | | $9,600 | 9.53% | 5 |
| 14 | ID-022-Spare Melter Material/Vendor Unavailable | 0.308 | 3 | | $12,023 | 11.94% | 4 |
| 14 | ID-029-Stakeholders Require Additional Cleaning in Tanks (MEP) | 0.467 | 2 | | $12,052 | 11.97% | 3 |
| 14 | ID-038-MCU Operations Impacted by Higher Than Expected Rad Rates | 0.135 | 6 | | $3,037 | 3.02% | 8 |
| 14 | ID-039-MCU Cannot Achieve DWPF/Tank 50/SDF Limits for solvent carryover | -- | -- | | $505 | 0.50% | 13 |
| 14 | ID-042-Salt Waste Heel or Tank Annuli Waste Cannot be Processed Through SWPF | 0.271 | 4 | | $14,687 | 14.59% | 2 |
| 14 | ID-053-Grout Encapsulation of TPB bearing Waste Creates Handling Problems at Saltstone | -- | -- | | $2,907 | 2.89% | 10 |
| 14 | ID-071-Unknown Physical or Chemical Properties in Heel Material. | -- | -- | | $5,809 | 5.77% | 6 |
| 14 | ID-072-Simulant and Waste Differences Impact Commissioning of SWPF | -- | -- | | $192 | 0.19% | 17 |
| 14 | ID-074-MCU Feed Requirements not met by ARP (512-S) “Sample and Send” Strategy. | -- | -- | | $120 | 0.12% | 19 |
| 14 | ID-116-2H Evaporator Material and Chemical Balance issues | 0.700 | 1 | | $29,849 | 29.64% | 1 |
| 14 | ID-117-Oxalates from Tank Cleaning Cause Processing Problems | 0.055 | 8 | | $503 | 0.50% | 14 |
| 14 | ID-128-CSSX Technology Does not Scale-up as Expected from Lab Scale to Production Scale | -- | -- | | $630 | 0.63% | 12 |
| 14 | ID-130-Problems Encountered During Implementation of New Technologies for SWPF | -- | -- | | $288 | 0.29% | 16 |
| 14 | ID-133-Heel Removal (HR) Technology Does Not Meet Program Requirements | 0.130 | 7 | | $2,982 | 2.96% | 9 |
| 14 | ID-142-SWPF Confinement Criteria Changes | 0.051 | 9 | | $3,559 | 3.53% | 7 |
| 14 | ID-169-SWPF Solvent Loss | -- | -- | | $152 | 0.15% | 18 |

**Table 8—PBS 14 Outyear Risks Contingency Summary (Means in $K)**

| PBS Element | Risk Identifier and Risk Title | Spearman Rank Correlation | Rank | | Mean | %14Out | Rank |
|---|---|---|---|---|---|---|---|
| 14 | ID-001-Shipment of HLW Canisters to the Federal Repository | -- | -- | | $8,710 | 0.07% | 59 |
| 14 | ID-003-Environmental Permitting of Salt Processing Encounters Problems | 0.120 | 14 | | $233,507 | 1.97% | 17 |
| 14 | ID-004-Stakeholders Delay Disposition of Tank 48 Waste | 0.120 | 14 | | $214,576 | 1.81% | 18 |
| 14 | ID-007-NRC 3116 Determination Consultation Process Delays | -- | -- | | $40,892 | 0.35% | 40 |
| 14 | ID-008-NRC Scope of 3116 Monitoring Requirements Not Well Defined | 0.084 | 23 | | $13,215 | 0.11% | 56 |
| 14 | ID-010-Stakeholders do not Agree with Technical basis for tank closure (PA & Class C) | 0.202 | 6 | | $495,480 | 4.18% | 4 |
| 14 | ID-011-Tank Farm Equipment Failure | 0.050 | 34 | | $39,758 | 0.34% | 41 |
| 14 | ID-012-DWPF Equipment Failure (Excluding Melter) | 0.070 | 27 | | $110,809 | 0.94% | 28 |
| 14 | ID-017-MCU Catastrophic Tank Failure | -- | -- | | $2,506 | 0.02% | 71 |
| 14 | ID-018-Saltstone Processing Facility (SPF) Encounters a Major Equipment Failure | -- | -- | | $58,274 | 0.49% | 38 |
| 14 | ID-021-DWPF Melter Failure | -- | -- | | $46,013 | 0.39% | 39 |
| 14 | ID-022-Spare Melter Material/Vendor Unavailable | 0.066 | 28 | | $80,135 | 0.68% | 30 |
| 14 | ID-024-Stakeholder Impacts. | 0.201 | 7 | | $363,241 | 3.07% | 6 |
| 14 | ID-027-Project (PBS-SR-0014C) other than Line Item Funding Impacted by Competing Priorities | 0.114 | 17 | | $350,329 | 2.96% | 8 |
| 14 | ID-028-Project (PBS-SR-0014C) Line Item Funding Impacted by Competing Priorities | 0.123 | 12 | | $349,538 | 2.95% | 10 |
| 14 | ID-029-Stakeholders Require Additional Cleaning in Tanks (MEP) | -- | -- | | $60,276 | 0.51% | 34 |
| 14 | ID-030-2F and 3H Evaporators Material and Chemical Balance issues | -- | -- | | $99,966 | 0.84% | 29 |
| 14 | ID-034-DWPF Impacted by Chemistry/Rheology of Sludge Waste Feed | 0.083 | 24 | | $241,439 | 2.04% | 16 |
| 14 | ID-038-MCU Operations Impacted by Higher Than Expected Rad Rates | -- | -- | | $9,994 | 0.08% | 58 |
| 14 | ID-039-MCU Cannot Achieve DWPF/Tank 50/SDF Limits for solvent carryover | -- | -- | | $13,533 | 0.11% | 55 |
| 14 | ID-041-Formation of Sodium Aluminosilicate in a Salt Tank | 0.085 | 22 | | $59,040 | 0.50% | 37 |
| 14 | ID-042-Salt Waste Heel or Tank Annuli Waste Cannot be Processed Through SWPF | 0.106 | 18 | | $351,693 | 2.97% | 7 |
| 14 | ID-046-Enrichment Control Reduces Throughput for Salt Disposition | -- | -- | | $3,295 | 0.03% | 67 |
| 14 | ID-048-Waste Physical Properties cause delays in Meeting Bulk Waste Removal Objectives | -- | -- | | $2,580 | 0.02% | 70 |

**Table 8—PBS 14 Outyear Risks Contingency Summary (continued)**
**(Means in $K)**

| PBS Element | Risk Identifier and Risk Title | Spearman Rank Correlation | Rank | | Mean | %14Out | Rank |
|---|---|---|---|---|---|---|---|
| 14 | ID-053-Grout Encapsulation of TPB bearing Waste Creates Handling Problems at Saltstone | -- | -- | | $116,563 | 0.98% | 27 |
| 14 | ID-069-Higher Than Expected Cs Levels in Salt Solution | 0.079 | 25 | | $23,636 | 0.20% | 48 |
| 14 | ID-070-Rogue constituents in SWPF feed. | -- | -- | | $29,455 | 0.25% | 45 |
| 14 | ID-071-Unknown Physical or Chemical Properties in Heel Material. | 0.115 | 16 | | $350,163 | 2.96% | 9 |
| 14 | ID-072-Simulant and Waste Differences Impact Commissioning of SWPF | -- | -- | | $3,208 | 0.03% | 69 |
| 14 | ID-075-Tank 25 Core Sample results unacceptable for processing ARP/MCU Salt Solution | -- | -- | | $6,872 | 0.06% | 61 |
| 14 | ID-077-SWPF Feed Chemical, or Radiological Composition Changes | -- | -- | | $13,538 | 0.11% | 54 |
| 14 | ID-078-Dissolved Salt does not Reflect Waste Characterization Data | -- | -- | | $79,025 | 0.67% | 31 |
| 14 | ID-079-Sludge and Heel compositions (including annulus) do not Reflect Waste Characterization Data | -- | -- | | $3,335 | 0.03% | 66 |
| 14 | ID-083-Non-routine Constituents in Sludge Impact Canister Production Rate | 0.089 | 21 | | $349,078 | 2.95% | 13 |
| 14 | ID-086-ARP/MCU does not Start up when Required. | -- | -- | | $4,989 | 0.04% | 65 |
| 14 | ID-090-Tank Farm Tank Availability and Infrastructure does not Support SWPF Operations at high capacity | 0.266 | 3 | | $282,759 | 2.39% | 14 |
| 14 | ID-091-Close coupling between SWPF and other facilities limits SWPF throughput rates | 0.230 | 5 | | $701,433 | 5.92% | 3 |
| 14 | ID-092-DWPF Operations limited by ability of Tank Farm to receive and process DWPF recycle stream | 0.163 | 9 | | $349,439 | 2.95% | 11 |
| 14 | ID-093-Coordination Impacts on Project Implementation | 0.167 | 8 | | $349,163 | 2.95% | 12 |
| 14 | ID-094-Available Tank Farm Space Cannot Support LWDPP | 0.145 | 10 | | $241,577 | 2.04% | 15 |
| 14 | ID-099-More drainable interstitial liquid from interim salt processing than expected | -- | -- | | $13,633 | 0.12% | 53 |
| 14 | ID-100-Waste Tank Utilization Conflict | 0.255 | 4 | | $930,865 | 7.86% | 2 |
| 14 | ID-101-Criticality Concerns Reduce Salt Processing Throughput | 0.121 | 13 | | $120,102 | 1.01% | 25 |
| 14 | ID-102-2H Evaporator Impacted by DWPF Recycle Enrichment | -- | -- | | $6,180 | 0.05% | 63 |
| 14 | ID-107-Federal Repository Receipt Capacity Lower than Expected | -- | -- | | $10,192 | 0.09% | 57 |
| 14 | ID-108-Federal Repository Reaches Heavy Metal Limits due to Conflict in Priorities | -- | -- | | $59,247 | 0.50% | 36 |

**Table 8—PBS 14 Outyear Risks Contingency Summary (continued)**
**(Means in $K)**

| PBS Element | Risk Identifier and Risk Title | Spearman Rank Correlation | Rank | | Mean | %14Out | Rank |
|---|---|---|---|---|---|---|---|
| 14 | ID-110-Tank 48 Return to Service Project Delayed | -- | -- | | $26,864 | 0.23% | 47 |
| 14 | ID-116-2H Evaporator Material and Chemical Balance issues | -- | -- | | $120,158 | 1.01% | 23 |
| 14 | ID-117-Oxalates from Tank Cleaning Cause Processing Problems | -- | -- | | $20,346 | 0.17% | 50 |
| 14 | ID-119-Additional Sludge Mass Result in Higher than expected Canister Production | 0.564 | 1 | | $2,703,892 | 22.83% | 1 |
| 14 | ID-120-Sludge Batch Preparation Impacted by Slow Settling Rate | 0.060 | 30 | | $60,520 | 0.51% | 33 |
| 14 | ID-121-Salt Dissolution Creates Greater Than Expected Volume of Salt Solution | 0.074 | 26 | | $23,110 | 0.20% | 49 |
| 14 | ID-122-Tank 48 Return to Service Technology Does not Perform as Planned | 0.101 | 19 | | $178,526 | 1.51% | 19 |
| 14 | ID-123-Federal Facility Agreement Not Met | 0.133 | 11 | | $173,874 | 1.47% | 20 |
| 14 | ID-125-HLLCP Impacts on Available Tank Space | -- | -- | | $20,229 | 0.17% | 51 |
| 14 | ID-126-Accuracy of WCS Data Impacts Tank Farm Evaporator Modeling. | -- | -- | | $39,644 | 0.33% | 42 |
| 14 | ID-128-CSSX Technology Does not Scale-up as Expected from Lab Scale to Production Scale | -- | -- | | $1,768 | 0.01% | 73 |
| 14 | ID-129-Slower Salt Dissolution Rates Force Schedule Delays. | -- | -- | | $3,287 | 0.03% | 68 |
| 14 | ID-130-Problems Encountered During Implementation of New Technologies for SWPF | -- | -- | | $2,503 | 0.02% | 72 |
| 14 | ID-133-Heel Removal (HR) Technology Does Not Meet Program Requirements | 0.092 | 20 | | $118,852 | 1.00% | 26 |
| 14 | ID-134-Heel Removal Technology Does not Meet Requirements | 0.058 | 32 | | $61,945 | 0.52% | 32 |
| 14 | ID-136-Pump Does Not Remove Sufficient Waste to Enter Heel Removal Phase | 0.060 | 30 | | $156,030 | 1.32% | 21 |
| 14 | ID-139-Requirements and Standards Change | 0.053 | 33 | | $7,897 | 0.07% | 60 |
| 14 | ID-142-SWPF Confinement Criteria Changes | -- | -- | | $29,738 | 0.25% | 44 |
| 14 | ID-145-Limited DWPF Laboratory Capabilities Challenged by New Constituents | -- | -- | | $27,143 | 0.23% | 46 |
| 14 | ID-149-HLW Tank Leak Requires the Use of Contingency Space | 0.311 | 2 | | $402,845 | 3.40% | 5 |
| 14 | ID-162-High Level Shielded Cells Sampling Capability | -- | -- | | $19,988 | 0.17% | 52 |
| 14 | ID-164-SRNL Sample Analysis Unavailable | -- | -- | | $29,905 | 0.25% | 43 |
| 14 | ID-165-SWPF Startup Delayed Thereby Extending LWO lifecycle | -- | -- | | $5,812 | 0.05% | 64 |

**Table 8—PBS 14 Outyear Risks Contingency Summary (continued)**
**(Means in $K)**

| PBS Element | Risk Identifier and Risk Title | Spearman Rank Correlation | Rank | | Mean | %14Out | Rank |
|---|---|---|---|---|---|---|---|
| 14 | ID-166-SWPF Throughput Reduced to Maintain Ti Limits Within DWPF WAC | -- | -- | | $120,133 | 1.01% | 24 |
| 14 | ID-167-Geotechnical Data is Faulty | -- | -- | | $6,828 | 0.06% | 62 |
| 14 | ID-168-SWPF Continued Operational Risks | -- | -- | | $59,486 | 0.50% | 35 |
| 14 | ID-169-SWPF Solvent Loss | -- | -- | | $1,333 | 0.01% | 74 |
| 14 | ID-171-Total Volume of Salt Waste More Than Planned | 0.063 | 29 | | $120,516 | 1.02% | 22 |

**PBS SR-0030, Soil and Water Remediation Project (also referred to as the Soils and Groundwater Project)**

Tables 9 and 10 show results of the PBS 30 near term and outyear risk contingency analyses. There were no large near term risks. PBS 30 total represents about 0.06% of the total SRS PBS risk.

**Table 9 — PBS 30 Near Term Risks Contingency Summary**
**(Means in $K)**

| PBS Element | Risk Identifier and Risk Title | Spearman Rank Correlation | Rank | | Mean | %30N | Rank |
|---|---|---|---|---|---|---|---|
| 30 | ID-001-Funding Delays Impact Regulatory Commitments | 0.6736942 | 1 | | $4,871 | 41.65% | 2 |
| 30 | ID-003-Additional Environmental Media Remediation Required Post D&D | 0.6616835 | 2 | | $6,824 | 58.35% | 1 |

**Table 10 — PBS 30 Outyear Risks Contingency Summary**

**(Means in $K)**

| PBS Element | Risk Identifier and Risk Title | Spearman Rank Correlation | Rank | | Mean | %30Out | Rank |
|---|---|---|---|---|---|---|---|
| 30 | ID-001-Funding Delays Impact Regulatory Commitments | 0.356 | 2 | | $18,651 | 26.33% | 2 |
| 30 | ID-002-Site Evaluation NFAs Not Acccepted by Regulatory Agencies | -- | -- | | $100 | 0.14% | 6 |
| 30 | ID-004-Additioanal and/or mor Extensive Releases Identified | 0.076 | 4 | | $4,927 | 6.96% | 4 |
| 30 | ID-005-Remedial Action Duration Differs from Baseline Assumptions | -- | -- | | $1,051 | 1.48% | 5 |
| 30 | ID-006-Additonal Groundwater Remediation Beyond Passive Technologies | 0.907 | 1 | | $40,005 | 56.47% | 1 |
| 30 | ID-007-IOU Final Action Uncertainty | 0.180 | 3 | | $6,075 | 8.58% | 3 |
| 30 | ID-008-Delay in D&D Project Execution | -- | -- | | $29 | 0.04% | 7 |

**PBS SR-0040, Nuclear Facility Deactivation and Decommissioning**

Table 11 shows the contingency analysis results for PBS 40. There are no large risks, and PBS 40 represents less than 0.03% of the total SRS PBS risk.

**Table 11 – PBS 40 Risks Contingency Summary**

**(Means in $K)**

| PBS Element | Risk Identifier and Risk Title | Mean |
|---|---|---|
| 40 | ID-002-Additional and/or more extensive contamination within facilities | $1,664 |
| 40 | ID-009-Interpretation of "In-situ Decommissioning Endpoint" | $44,224 |

**Crosscutting Risks**

Four additional risks were developed from descriptions in the 2006 PEP. They were:

- Changes in cost estimate prices
- Inability to adjust workforce for full service employees
- Unplanned loss of a major process facility for an extended period of time
- Funding allocations are inconsistent with planned baseline

These risks are included as Attachment A. Contingency analysis results are shown below in Tables 12 and 13. They represent approximately 8.8% of the mean total SRS PBS risk. The largest risk is Risk ID-005, *Funding below Baseline*, and it represents about 80% of the near term and outyear risks.

**Table 12 – PBS Crosscutting Risks Near Term Contingency Summary**

**(Means in $K)**

| PBS Element | Risk Identifier and Risk Title | Spearman Rank Correlation | Rank | | Mean | %XCOut | Rank |
|---|---|---|---|---|---|---|---|
| XC | ID-002-Changes in Cost Estimate Prices | 0.375 | 3 | | $15,306 | 5.96% | 3 |
| XC | ID-003-Inability to Adjust Workforce for Full-Service Employees | 0.282 | 4 | | $4,446 | 1.73% | 4 |
| XC | ID-004-Unplanned Loss of a Major Facility for an Extended Period of Time | 0.475 | 2 | | $34,117 | 13.28% | 2 |
| XC | ID-005-Funding Does Not Support PBS Baseline | 0.644 | 1 | | $202,966 | 79.03% | 1 |

**Table 13 – PBS Crosscutting Risks OutYear Contingency Summary**

**(Means in $K)**

| PBS Element | Risk Identifier and Risk Title | Spearman Rank Correlation | Rank | | Mean | %XCOut | Rank |
|---|---|---|---|---|---|---|---|
| XC | ID-002-Changes in Cost Estimate Prices | 0.185 | 3 | | $60,275 | 6.20% | 3 |
| XC | ID-003-Inability to Adjust Workforce for Full-Service Employees | 0.046 | 4 | | $17,167 | 1.77% | 4 |
| XC | ID-004-Unplanned Loss of a Major Facility for an Extended Period of Time | 0.401 | 2 | | $128,345 | 13.20% | 2 |
| XC | ID-005-Funding Does Not Support PBS Baseline | 0.883 | 1 | | $766,437 | 78.83% | 1 |

**Risk Comparisons**

Near term risk had a $0.9B mean value and $1.0B at the 80% confidence level. Outyear risk, much of which is not yet well defined, had a mean value of $13.2B, and an 80% value of $14.9B. Total mean risk was $14.0B, with an 80% value of $16.3B. The mean values of PBS Near Term risks as a percentage of total near term risk is shown in Figure 1 below:

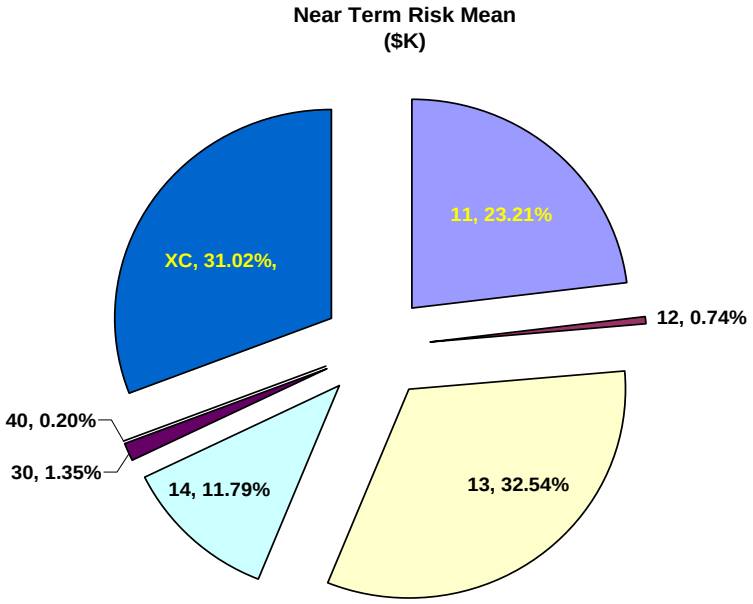


**Figure 1 Near Term PBS Mean Value Percentages**

Near Term risk is dominated by Solid Waste (32.54%), Crosscutting risks (31.02%), and Nuclear Materials Storage and Disposition (23.21%). The mean value of near term and outyear risks for each PBS as a percentage of the mean total risk are also shown in the pie chart, Figure 2, below. Total risk is dominated by PBS 14, Radioactive Liquid Waste, for Out Year (81.78%).

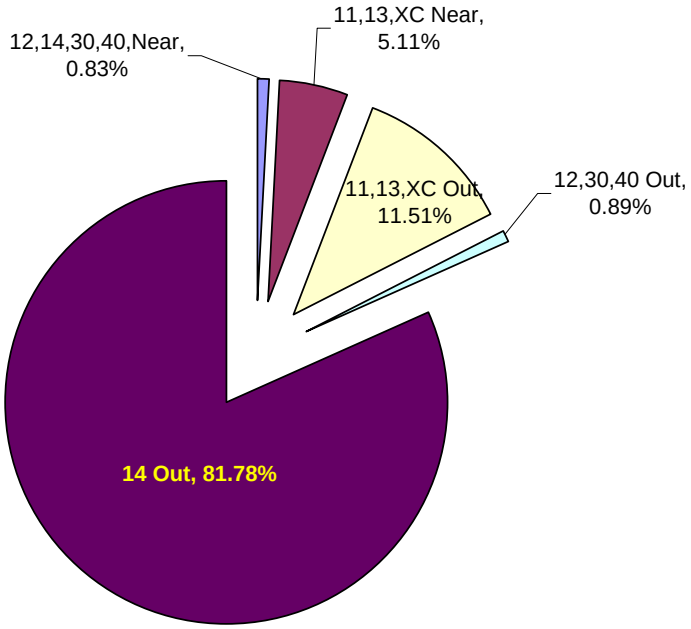


**Figure 2 Mean Values of PBS Near and OutYear Risks as a Percentage of Total Risk**

## 5.0 References

1. *PBS-SR-0011 Nuclear Materials Stabilization and Disposition Risk Management Plan,*Y-RAR-G-0023, Rev.0, July 2006.
2. *PBS-SR-0012 Spent Nuclear Fuel Stabilization and Disposition/Storage Operations Awaiting Geologic Repository,* Y-RAR-L-0008, Rev. 0, July 2006.
3. *Solid Waste Stabilization & Disposition Project (PBS-SR-0013) Risk Management Plan (U),* Y-RMP-E-00005, Rev. 0, July 2006.
4. *PBS-SR-0014 Radioactive Liquid Tank Waste Stabilization and Disposition Risk Management Plan (U),* Y-RAR-G-00022, Rev. 0., July, 2006.
5. *PBS-SR-0030 Soils and Groundwater Project Risk Management Plan, Y-RAR-B_00002*, Rev. 1, July 2006.
6. *PBS-SR-0040 Nuclear Facility Deactivation and Decommissioning Risk Management Plan*, WSRC-RP-2005-4525 Rev. 1, June 2006.
7. *2006 Savannah River Site Environmental Management Program Project Execution Plan,* July 3, 2006.
8. *Systems Engineering Methodology Guidance Manual* Appendix B Risk and Opportunity Management, WSRC-IM-98-00033, Revision 6, September 29, 2005.

## Attachment A, 2006 Project Execution Plan / EM Lifecycle Baseline Cost Estimate Development

PBS project assumptions are updated annually to reflect the latest strategic planning assumptions or programmatic changes. The annual update of project assumptions is part of the process to update the PEP and EM lifecycle baseline. The process to update the PEP and EM lifecycle baseline is depicted in Attachment A, Figure A-1.

Costs included in the lifecycle baseline estimate are:

- Direct Cost
- Essential Site Services Cost
- General and Administrative Cost
- Fee based on contract fee structure (projected to outyears)
- Contractor Management Reserves and Contingency (capital and capital-like projects

For routine operations, direct costs were estimated from FY 2005 actual cost and FY 2006 first quarter forecasts. Standard cost data and formats were used. Contract efficiencies to date were integrated into the direct cost (FY 2003-1st quarter 2006) adjusted for mission changes. Site overhead cost was estimated from site overhead scope. It was then distributed based on fiscal year objectives.

For non-routine operations (particularly PBS 30 and 40) direct cost was estimated using bottoms up and parametric techniques. Undefined efficiencies were not applied. Overhead was treated as for routine operations.

Some previously identified (in 2004 and 2005) high risks with a high certainty of happening were selected and approved by the SR Operations Manager for inclusion in the Contractor risk-based baseline. They were not considered in this contingency analysis.

Savannah River Operations Office

**Development of the EM Cleanup Project Life Cycle Baseline and 2006 SRS Environmental Management Program/Project Execution Plan (PEP)**

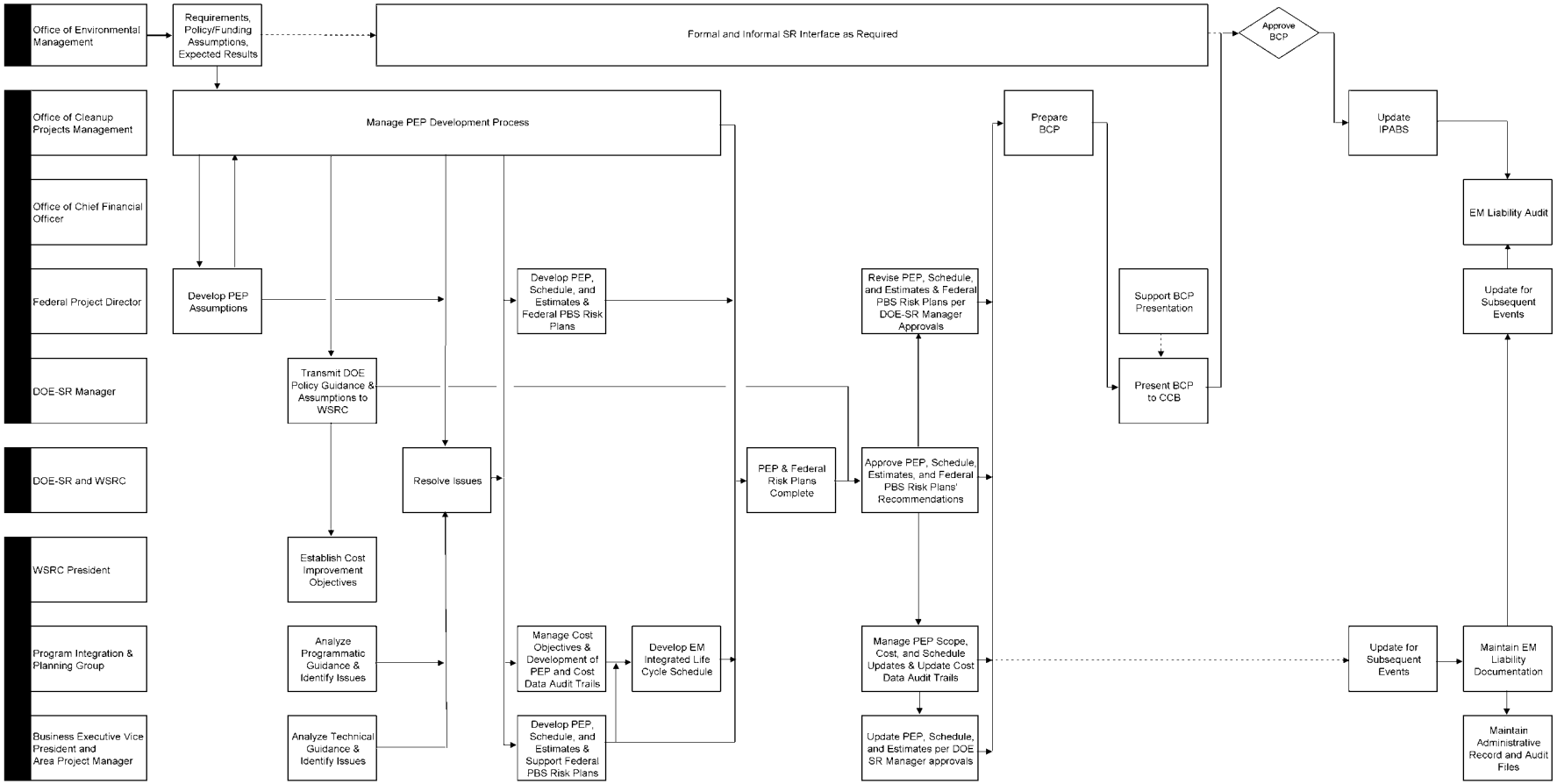


**Figure A-1 Project Execution Plan / EM Lifecycle Baseline Process**

## Attachment B, Crosscutting Risks

- Changes in cost estimate prices (ID 002)
- Inability to adjust workforce for full service employees (ID 003)
- Unplanned loss of a major process facility for an extended period of time (ID 004)
- Funding allocations are inconsistent with planned baseline (ID 005)

**See Risk / Opportunity Assessment Forms on pages 34 – 37**

# Risk / Opportunity Assessment Form

ID Number: 002 Revision: 00 Last Date Evaluated: Jul-06 Status: Active

| | | | |
|---|---|---|---|
| Event Title: Changes in Cost Estimate Prices | | | |
| Type: **Risk** External Programmatic | Category: | | |
| Assess. Element: 01 | Title: Crosscutting Risks | | |
| Responsible Org: - | Contact: | Date Identified: 15-Jan-06 | |
| Statement of Event: Changes in escalation rates, cost of subcontract services, contractor pension plans result in funding being inadequate to achieve program objectives, impacting our ability to achieve schedule acceleration and EM cost baseline reductions | | | |
| Likelihood: | Likely | Basis: Current escalation rates are at historically low levels. The site has an aging workforce. | |
| Consequence / Benefit: | Significant | Basis: | |
| Most Significant Cost Impact ($k): $200,000 | | Most Significant Schedule Impact (MOS): | |
| Level: | **Moderate** | Event Trigger: | |
| Handling Strategy: | Mitigate | Description: Use the contingency fund to offset changes. | |
| HS Implementation Cost ($K): | | Basis: | |
| HS Implementation Schedule (MOS): | | Basis: | |
| Other Handling Strategies: | | | |
| Statement of Residual Risk: Some level of change may be more than the planned contingency. | | | |
| Residual Likelihood: | Likely | Basis: | |
| Residual Consequence: | Marginal | Basis: | |
| Residual Risk Level: | **Moderate** | | Residual Impact Basis: |
| Residual Cost Impact ($K): | Best Case $100,000 | Most Likely $125,000 | Worst Case $150,000 |
| Residual Schedule Impact (MOS): | | | |
| Impacted Scope of Work: | | | |
| Evaluation Comments: | | | |
| Event Comments: | | | |

# Risk / Opportunity Assessment Form

ID Number: 003 Revision: 00 Last Date Evaluated: Jul-06 Status: Active

| | | | | |
|---|---|---|---|---|
| Event Title: Inability to adjust workforce for full service employees | | | | |
| Type: **Risk** Internal | | Category: | | |
| Assess. Element: 01 | Title: Crosscutting Risks | | | |
| Responsible Org: - | | Contact: | Date Identified: 15-Jan-06 | |
| Statement of Event: SR is unable to facilitate timely adjustments in full-service workforce. | | | | |
| Likelihood: | Very Likely | Basis: Past history and political sensitivity to aging workforce. | | |
| Consequence / Benefit: | Significant | Basis: Workforce restructuring requires two years to reduce costs. | | |
| Most Significant Cost Impact ($k): $125,000 | | Most Significant Schedule Impact (MOS): 24 | | |
| Level: | **High** | Event Trigger: | | |
| Handling Strategy: | Mitigate | Description: Maximize cost effective re-assignmnent, re-training,and other workforce managemet options. Leverage use of subcontract options to minimize skill mix issues. Develop multi-year staffing plans to anticipate workforce transitios and facilitate stakeholder communications. | | |
| HS Implementation Cost ($K): | | Basis: | | |
| HS Implementation Schedule (MOS): | | Basis: | | |
| Other Handling Strategies: | | | | |
| Statement of Residual Risk: Some delays occur in workforce transitions. | | | | |
| Residual Likelihood: | Likely | Basis: Past history | | |
| Residual Consequence: | Negligible | Basis: | | |
| Residual Risk Level: | **Low** | | | Residual Impact Basis: |
| Residual Cost Impact ($K): | Best Case $20,000 | Most Likely $40,000 | Worst Case $50,000 | |
| Residual Schedule Impact (MOS): | | | | |
| Impacted Scope of Work: | | | | |
| Evaluation Comments: | | | | |
| Event Comments: | | | | |

# Risk / Opportunity Assessment Form

ID Number: 004 Revision: 00 Last Date Evaluated: Jul-06 Status: Active

| | | | | |
|---|---|---|---|---|
| Event Title: Unplanned Loss of a major process facility for an extended period of time | | | | |
| Type: **Risk** Internal | | Category: | | |
| Assess. Element: 01 | Title: Crosscutting Risks | | | |
| Responsible Org: - | | Contact: | | Date Identified: 15-Jan-06 |
| Statement of Event: Major process upsets or problems could result in an extended loss of unique facilities (H Canyon, DWPF, KAMS, Tank Farms) | | | | |
| Likelihood: | Likely | Basis: Past history | | |
| Consequence / Benefit: | Crisis | Basis: Two year loss of DWPF. | | |
| Most Significant Cost Impact ($k): $540,000 | | | Most Significant Schedule Impact (MOS): 24 | |
| Level: | **High** | Event Trigger: | | |
| Handling Strategy: | Accept | Description: | | |
| HS Implementation Cost ($K): | | Basis: | | |
| HS Implementation Schedule (MOS): | | Basis: | | |
| Other Handling Strategies: | | | | |
| Statement of Residual Risk: | | | | |
| Residual Likelihood: | Unlikely | Basis: | | |
| Residual Consequence: | Critical | Basis: | | |
| Residual Risk Level: | **Moderate** | | | Residual Impact Basis: |
| Residual Cost Impact ($K): | Best Case $80,000 | Most Likely $200,000 | Worst Case $540,000 | |
| Residual Schedule Impact (MOS): | | | | |
| Impacted Scope of Work: | | | | |
| Evaluation Comments: | | | | |
| Event Comments: | | | | |

# Risk / Opportunity Assessment Form

ID Number: 005 Revision: 00 Last Date Evaluated: Jul-06 Status: Active

| | | | | |
|---|---|---|---|---|
| Event Title: Funding Does Not Support PBS Baseline | | | | |
| Type: **Risk** External Programmatic | | Category: | | |
| Assess. Element: | Title: Crosscutting Risk | | | |
| Responsible Org: - | | Contact: | | Date Identified: 21-Feb-06 |
| Statement of Event: Basis: SRS receives full baseline funding<br>Event: Funding provided is significantly less than projected by current baseline<br>Risk: PBS scopes will need to be changed, extending programs and increasing overall program cost. | | | | |
| Likelihood: | Likely | Basis: Stability of baseline commitments is historically not firm | | |
| Consequence / Benefit: | Critical | Basis: | | |
| Most Significant Cost Impact ($k): 2,000,000 | | | Most Significant Schedule Impact (Mos): 24 | |
| Level: | **High** | Event Trigger: | | |
| Handling Strategy: | | Description: | | |
| HS Implementation Cost ($K): | | Basis: | | |
| HS Implementation Schedule (Mos): | | Basis: | | |
| Other Handling Strategies: | | | | |
| Statement of Residual Risk: | | | | |
| Residual Likelihood: | | Basis: | | |
| Residual Consequence: | | Basis: | | |
| Residual Risk Level: | | | | Residual Impact Basis:<br>Update from 2006 PEP |
| Residual Cost Impact ($K): | Best Case<br>1,290,323 | Most Likely<br>1,600,000 | Worst Case<br>2,000,000 | |
| Residual Schedule Impact (Mos): | | | | |
| Impacted Scope of Work: | | | | |
| Evaluation Comments: | | | | |
| Event Comments: | | | | |

## Attachment C, Risk Model

The Key is shown below in Figure C-1.

Crystal Ball Forecast
(collect Risk Data)

N = Near Term (2007-2012)
O = Outyear (2012-2031)
B = Both (2007-2031)

Crystal Ball Assumption for Risk

Risk Logic

Residual Risk Triangular Distribution Parameters

Crystal Ball Assumption for Likelihood

| Risk Identifier | | Probability Assessment | | | | Consequence Assessment | | | | | Risk Logic | | | Contingency Estimate | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| PBS Element | Risk Identifier and Risk Title | Likelihood | Probability Range | | Assump-tion | Risk Level | Best | Most Likely | Worst | Impact | Impact Value | Random# | TIME | Near | Outyear | Both |
| 11B.2 | ID-003-Addditional Processing Needs Extend H-Canyon Operation | Very Likely | 0.75 | 1 | 0.875 | High | $166,667 | $200,000 | $258,333 | $208,333 | $208,333 | 0.468882 | O | $0 | $208,333 | |
| 11B.1 | ID-025-Requirement Changes affecting Deactivation Endpoints and S&M | Likely | 0.45 | 0.75 | 0.6 | Moderate | $10,000 | $15,000 | $20,000 | $15,000 | $15,000 | 0.099797 | O | $0 | $15,000 | |
| 11B.2 | ID-004-Major Facility Failure resulting in loss of H-Canyon capability (physical or passive systems) | Likely | 0.45 | 0.75 | 0.6 | Moderate | $4,587 | $5,000 | $5,688 | $5,092 | $5,092 | 0.321764 | B | $2,122 | $2,970 | 0.416666667 |

Crystal Ball Assumption
(time frame selector for “Both”

**Figure C-1 Risk Model Key**

The Monte-Carlo analysis follows the structure laid out in the Systems Engineering Methodology Manual for Risk Management. The process is shown below in Figure C-2.

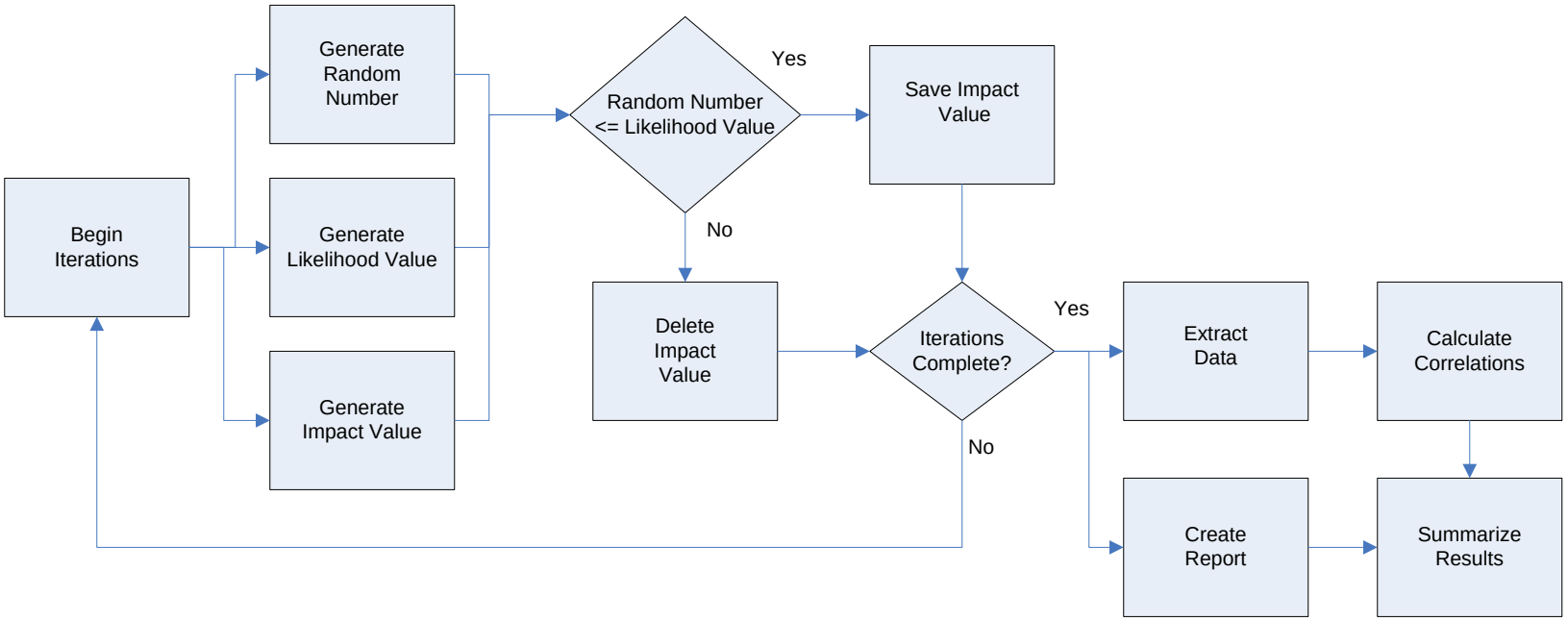


**Figure C-2 Model Logic**

The model is run for 10,000 iterations. Crystal Ball generates a likelihood value and an impact value based on model parameters. If the spreadsheet generated random number is less than or equal to the likelihood value, the impact value is saved, otherwise it is discarded, representing a risk that does not occur. Spreadsheet logic determines whether a near term or outyear risk has occurred. The model also sums risks by near term and outyear, by PBS and totals The blue cells in Figure C-1 indicate a Crystal Ball forecast whose data can be reported to determine run statistics (mean and 80% values for instance), and exported to determine correlations for each risk or risk sum. Mean values are also used to determine % contribution.

A screenshot of the risk model is shown below. Data would change with each iteration depending on the Crystal Ball macros and Excel cell definitions.

# Attachment D Risk Model Iteration

| Risk Identifier | | Probability Assessment | | | | Consequence Assessment | | | | | Risk Logic | | | Contingency Estimate | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| PBS Element | Risk Identifier and Risk Title | Likelihood | Probability Range | | Assump-tion | Risk Level | Best | Most Likely | Worst | Impact | Impact Value | Random# | TIME | Near | Outyear | Both |
| 11B.2 | ID-003-Addditional Processing Needs Extend H-Canyon Operation | Very Likely | 0.75 | 1 | 0.875 | High | $166,667 | $200,000 | $258,333 | $208,333 | $208,333 | 0.517915 | O | $0 | $208,333 | |
| 11B.1 | ID-025-Requirement Changes affecting Deactivation Endpoints and S&M | Likely | 0.45 | 0.75 | 0.6 | Moderate | $10,000 | $15,000 | $20,000 | $15,000 | $0 | 0.65321 | O | $0 | $0 | |
| 11B.2 | ID-004-Major Facility Failure resulting in loss of H-Canyon capability (physical or passive systems) | Likely | 0.45 | 0.75 | 0.6 | Moderate | $4,587 | $5,000 | $5,688 | $5,092 | $5,092 | 0.38602 | B | $2,122 | $2,970 | 0.416666667 |
| 11B.2 | ID-007-S&S Requirement Changes | Very Unlikely | 0 | 0.15 | 0.075 | Moderate | $10,000 | $30,000 | $50,000 | $30,000 | $0 | 0.318094 | N | $0 | $0 | |
| 11B.2 | ID-018-3013 CSSC Requirement Changes | Likely | 0.45 | 0.75 | 0.6 | Moderate | $10,000 | $15,000 | $20,000 | $15,000 | $15,000 | 0.212146 | N | $15,000 | $0 | |
| 11B.4 | ID-019-3013 CSSC Lack of Resources | Likely | 0.45 | 0.75 | 0.6 | Moderate | $40,323 | $43,952 | $50,000 | $44,758 | $0 | 0.701535 | N | $0 | $0 | |
| 11B.4 | ID-020-3013 CSSC Project Funding Delay | Likely | 0.45 | 0.75 | 0.6 | Moderate | $10,000 | $15,000 | $20,000 | $15,000 | $0 | 0.981998 | N | $0 | $0 | |
| 11B.4 | ID-022-KIS Estended Life | Likely | 0.45 | 0.75 | 0.6 | Moderate | $3,670 | $4,000 | $4,550 | $4,073 | $4,073 | 0.413523 | N | $4,073 | $0 | |
| 11B.4 | ID-023-KIS Surveillance Requirement Changes | Likely | 0.45 | 0.75 | 0.6 | Moderate | $4,587 | $5,000 | $5,688 | $5,092 | $5,092 | 0.419779 | N | $5,092 | $0 | |
| 11B.5 | ID-010-Pu Vit/Pu Alt Disposition Materials of Construction | Likely | 0.45 | 0.75 | 0.6 | Moderate | $10,000 | $15,000 | $20,000 | $15,000 | $0 | 0.860241 | N | $0 | $0 | |
| 11B.5 | ID-013-Pu Vit/Pu Alt Disposition Requirements changes | Likely | 0.45 | 0.75 | 0.6 | Moderate | $10,000 | $15,000 | $20,000 | $15,000 | $0 | 0.637326 | N | $0 | $0 | |
| 11B.5 | ID-015-Pu Vit/Pu Alt Disposition Funding Delay | Very Likely | 0.75 | 1 | 0.875 | Moderate | $10,000 | $15,000 | $20,000 | $15,000 | $15,000 | 0.38646 | N | $15,000 | $0 | |
| 11B.5 | ID-016-Pu Vit/Pu Al Disposition Feed Material | Unlikely | 0.15 | 0.45 | 0.3 | Moderate | $10,000 | $15,000 | $20,000 | $15,000 | $0 | 0.631192 | N | $0 | $0 | |
| 11B.2 | ID-005-Programmatic Issues | Unlikely | 0.15 | 0.45 | 0.3 | Low | $481 | $500 | $529 | $503 | $503 | 0.143331 | B | $210 | $294 | 0.416666667 |
| 11B.2 | ID-006-Process Performance | Likely | 0.45 | 0.75 | 0.6 | Moderate | $92 | $100 | $114 | $102 | $0 | 0.867297 | N | $0 | $0 | |
| 11B.2 | ID-009-Availability of External Interfaces | Very Unlikely | 0 | 0.15 | 0.075 | Low | $962 | $1,000 | $1,058 | $1,006 | $0 | 0.930688 | N | $0 | $0 | |
| 11B.4 | ID-024-H-Area Impact on KIS | Very Unlikely | 0 | 0.15 | 0.075 | Low | $4,808 | $5,000 | $5,688 | $5,165 | $0 | 0.495269 | N | $0 | $0 | |
| 11B.5 | ID-012-Pu Vit/Pu Alt Dispostion Product Acceptibility | Very Unlikely | 0 | 0.15 | 0.075 | Low | $10,000 | $15,000 | $20,000 | $15,000 | $0 | 0.246584 | N | $0 | $0 | |
| 11B.5 | ID-027 Pu Vitrification/Pu Alternate Disposition Requirement Changes (Design/Construction) prior to CD-2 | Likely | 0.45 | 0.75 | 0.6 | Low | $455 | $473 | $500 | $476 | $0 | 0.916737 | N | $0 | $0 | |
| 11B.1 | ID-028-F-Canyon Mission Change from Deactivation | Likely | 0.45 | 0.75 | 0.6 | High | $83,333 | $100,000 | $125,000 | $102,778 | $102,778 | 0.485304 | N | $102,778 | $0 | |
| 11B.2 | ID-029-Tank Farm Waste Storage Limit Bound | Unlikely | 0.15 | 0.45 | 0.3 | Moderate | $80,645 | $87,903 | $100,000 | $89,516 | $0 | 0.383008 | B | $0 | $0 | 0.416666667 |
| 11B.4 | ID-026 3013 CSSC Requirement Changes Prior to CD-2 | Likely | 0.45 | 0.75 | 0.6 | Low | $92 | $100 | $114 | $102 | $0 | 0.73508 | N | $0 | $0 | |
| 11C.1 | ID-031-Pu Vit/Pu Alt Disposition Requirement Change Impact to Operations Phase | Likely | 0.45 | 0.75 | 0.6 | High | $116,667 | $140,000 | $180,833 | $145,833 | $145,833 | 0.427984 | O | $0 | $145,833 | |
| 11C.1 | ID-033-Pu Vit/Pu Alt Disposition Funding Delay that impacts Operations Phase | Likely | 0.45 | 0.75 | 0.6 | High | $116,667 | $140,000 | $180,833 | $145,833 | $145,833 | 0.437874 | O | $0 | $145,833 | |
| 11C.1 | ID-034-Additional Pu Vit/Pu Alt Disposition Feed Material that Impacts Operations | Very Unlikely | 0 | 0.15 | 0.075 | High | $116,667 | $140,000 | $180,833 | $145,833 | $0 | 0.567763 | O | $0 | $0 | |

| Risk Identifier | | Probability Assessment | | | | Consequence Assessment | | | | | Risk Logic | | | Contingency Estimate | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| PBS Element | Risk Identifier and Risk Title | Likelihood | Probability Range | | Assump-tion | Risk Level | Best | Most Likely | Worst | Impact | Impact Value | Random# | TIME | Near | Outyear | Both |
| 11C.1 | ID-038-Capability to respond to significant 3013 surveilllance issues | Very Unlikely | 0 | 0.15 | 0.075 | Low | $10,000 | $15,000 | $20,000 | $15,000 | $0 | 0.209267 | B | $0 | $0 | 0.416666667 |
| 11C.1 | ID-041-K-Area Fire Protection Upgrades | Very Likely | 0.75 | 1 | 0.875 | Moderate | $6,451 | $7,741 | $10,000 | $8,064 | $8,064 | 0.42436 | N | $8,064 | $0 | |
| 11C.1 | ID-030-KIS Delays Impacts FAMS | Unlikely | 0.15 | 0.45 | 0.3 | High | $14,167 | $17,000 | $21,958 | $17,708 | $0 | 0.854778 | N | $0 | $0 | |
| 11C.1 | ID-039-Delay of FAMS D&D | Unlikely | 0.15 | 0.45 | 0.3 | Low | $15,833 | $19,000 | $24,542 | $19,792 | $0 | 0.986052 | N | $0 | $0 | |
| 11C.1 | ID-036-MC&A Requirements may dictate need for Cf shuffler | Very Unlikely | 0 | 0.15 | 0.075 | Moderate | $6,422 | $7,000 | $9,954 | $7,792 | $0 | 0.227417 | N | $0 | $0 | |
| 11C.1 | ID-037-Deinventory HEU from Assembly Area | Very Unlikely | 0 | 0.15 | 0.075 | Low | $917 | $1,000 | $1,422 | $1,113 | $0 | 0.673579 | N | $0 | $0 | |
| 11C.1 | ID-035-Complete K-Area Facility Mods to support strage of misc. Pu from FAMS | Unlikely | 0.15 | 0.45 | 0.3 | Moderate | $917 | $1,000 | $1,422 | $1,113 | $0 | 0.432505 | N | $0 | $0 | |
| 11C.1 | ID-040-Materials schedule for H-Area disposition requres alternate lag storage in K-Area | Very Unlikely | 0 | 0.15 | 0.075 | Low | $96 | $100 | $106 | $101 | $0 | 0.839838 | N | $0 | $0 | |
| 11C.1 | ID-042-H Completion Schedule Impacts on K-Area Material Receipts | Likely | 0.45 | 0.75 | 0.6 | Moderate | $3,225 | $3,516 | $4,000 | $3,580 | $3,580 | 0.258134 | N | $3,580 | $0 | |
| 11B.1 | ID-043 F Canyon Not Funded for Loading, Shipment and Disposal of 25,000 depleted uranium oxide (DUO) drums. | Likely | 0.45 | 0.75 | 0.6 | Moderate | $8,064 | $8,790 | $10,000 | $8,951 | $8,951 | 0.34505 | N | $8,951 | $0 | 3 |
| 11C.1 | ID-044-EM Pu Consolidation Impact of new containers | Likely | 0.45 | 0.75 | 0.6 | Moderate | $8,064 | $8,790 | $10,000 | $8,951 | $0 | 0.943381 | N | $0 | $0 | |
| 11B.4 | ID-045-Potential Chllenge to Storage of NNSA Materials | Unlikely | 0.15 | 0.45 | 0.3 | Low | $806 | $879 | $1,000 | $895 | $895 | 0.160735 | B | $373 | $522 | 0.416666667 |
| | 11 Total | | | | | | | | | | | | | $165,243 | $503,786 | $669,028 |
| 12.1 | ID-003-Increased S&S Requirements (DBT) for L-Area Operations | Unlikely | 0.15 | 0.45 | 0.3 | High | $4,000 | $6,000 | $8,000 | $6,000 | $0 | 0.789943 | B | $0 | $0 | 0.416666667 |
| 12.1 | ID-005-SNF received exceed Category II Facility for L-Area Operations | Very Unlikely | 0 | 0.15 | 0.075 | Moderate | $3,690 | $4,000 | $4,670 | $4,120 | $0 | 0.239221 | B | $0 | $0 | 0.416666667 |
| 12.1 | ID-007-New Disposition - Heavy Water is declared Waste | Very Unlikely | 0 | 0.15 | 0.075 | Moderate | $3,670 | $4,000 | $4,550 | $4,073 | $0 | 0.600727 | N | $0 | $0 | |
| 12.1 | ID-002-New materials Received at L-Basin--GTRI SNF | Likely | 0.45 | 0.75 | 0.6 | Moderate | $403 | $440 | $500 | $448 | $0 | 0.951065 | B | $0 | $0 | 0.416666667 |
| 12.1 | ID-006-Facilty condition -L-Area Basin Structure | Likely | 0.45 | 0.75 | 0.6 | Moderate | $1,613 | $1,758 | $2,000 | $1,790 | $0 | 0.618946 | N | $0 | $0 | |
| 12.1 | ID-012-Utility Service Changes | Very Unlikely | 0 | 0.15 | 0.075 | Low | $4,808 | $5,000 | $5,288 | $5,032 | $0 | 0.882038 | B | $0 | $0 | 0.416666667 |
| 12.1 | ID-004-TRIGA receipts at L Basin | Very Unlikely | 0 | 0.15 | 0.075 | Low | $455 | $473 | $500 | $476 | $0 | 0.704708 | B | $0 | $0 | 0.416666667 |
| 12.1 | ID-013-INL/SRS SNF Swap | Likely | 0.45 | 0.75 | 0.6 | Moderate | $1,613 | $1,753 | $2,000 | $1,789 | $1,789 | 0.144909 | B | $745 | $1,043 | 0.416666667 |
| 12.1 | ID-014-DNFSB Recommendation 2004-2 Confinement System Impacts | Unlikely | 0.15 | 0.45 | 0.3 | Moderate | $4,587 | $5,000 | $5,688 | $5,092 | $0 | 0.363018 | B | $0 | $0 | 0.416666667 |
| 12.2 | ID-015-INL/SRS SNF SWAP Cask Availability | Likely | 0.45 | 0.75 | 0.6 | High | $8,333 | $10,000 | $12,917 | $10,417 | $10,417 | 0.412026 | B | $4,340 | $6,076 | 0.416666667 |
| 12.2 | ID-016-INL/SRS SNF Swap Damaged Fuel Shipping Requirements | Likely | 0.45 | 0.75 | 0.6 | Moderate | $403 | $440 | $500 | $448 | $0 | 0.722423 | B | $0 | $0 | 0.416666667 |
| 12.2 | ID-017-L Basin Receives Fuel After H-Canyon Shutdown | Unlikely | 0.15 | 0.45 | 0.3 | Moderate | $16,260 | $17,774 | $20,000 | $18,011 | $18,011 | 0.128347 | O | $0 | $18,011 | |
| 12.2 | ID-018-L Area Receives Late FRR Shipments | Unlikely | 0.15 | 0.45 | 0.3 | Moderate | $806 | $879 | $1,000 | $895 | $0 | 0.706737 | O | $0 | $0 | |

| Risk Identifier | | Probability Assessment | | | | Consequence Assessment | | | | | Risk Logic | | | Contingency Estimate | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| PBS Element | Risk Identifier and Risk Title | Likelihood | Probability Range | | Assump-tion | Risk Level | Best | Most Likely | Worst | Impact | Impact Value | Random# | TIME | Near | Outyear | Both |
| | | | | | | | | | | | | | | $5,086 | $25,131 | $30,217 |
| 13 | ID-001-No Path to Disposal | Very Likely | 0.75 | 1 | 0.875 | Moderate | $500 | $1,000 | $5,000 | $2,167 | $2,167 | 0.072871 | B | $451 | $1,715 | 0.208333333 |
| 13 | ID-002-Waste Mischaracterized | Unlikely | 0.15 | 0.45 | 0.3 | Moderate | $100 | $2,500 | $24,000 | $8,867 | $0 | 0.879024 | N | $0 | $0 | |
| 13 | ID-003 Poor Waste Forecasts (Volume, Ci, Category) | Likely | 0.45 | 0.75 | 0.6 | Moderate | $10,000 | $15,000 | $40,000 | $21,667 | $21,667 | 0.103794 | N | $21,667 | $0 | |
| 13 | ID-004-Process/Operating Upsets | Unlikely | 0.15 | 0.45 | 0.3 | Moderate | $5,000 | $20,000 | $40,000 | $21,667 | $0 | 0.572299 | N | $0 | $0 | |
| 13 | ID-005-SRS Funding Impacts Outside of this PBS | Very Likely | 0.75 | 1 | 0.875 | High | $130,000 | $390,000 | $650,000 | $390,000 | $390,000 | 0.761019 | B | $81,250 | $308,750 | 0.208333333 |
| 13 | ID-006-Regulatory Impacts | Unlikely | 0.15 | 0.45 | 0.3 | Low | $6,000 | $8,000 | $10,000 | $8,000 | $8,000 | 0.179694 | N | $8,000 | $0 | |
| 13 | ID-007-Closure of Solid Waste Facilities to Meet End State | Unlikely | 0.15 | 0.45 | 0.3 | Moderate | $6,000 | $8,000 | $20,000 | $11,333 | $0 | 0.989058 | B | $0 | $0 | 0.208333333 |
| 13 | ID-008-Remediation Performance Does Not Meet Execution Schedule | Likely | 0.45 | 0.75 | 0.6 | High | $10,000 | $15,000 | $20,000 | $15,000 | $0 | 0.753391 | N | $0 | $0 | |
| 13 | ID-009-High Activity TRU Waste Processing Throughput Does Not Meet Execution Schedule | Likely | 0.45 | 0.75 | 0.6 | High | $50,000 | $100,000 | $250,000 | $133,333 | $133,333 | 0.262209 | N | $133,333 | $0 | |
| 13 | ID-010-Remote-Handled TRU Waste | Very Likely | 0.75 | 1 | 0.875 | High | $1,000 | $1,500 | $2,000 | $1,500 | $1,500 | 0.364211 | N | $1,500 | $0 | |
| 13 | ID-011-No Defined Certification Program for New TRU Waste Post FY 2012 | Likely | 0.45 | 0.75 | 0.6 | High | $14,000 | $16,000 | $20,000 | $16,667 | $16,667 | 0.128573 | B | $3,472 | $13,194 | 0.208333333 |
| 13 | ID-012-Fragmented Safety Basis | Very Unlikely | 0 | 0.15 | 0.075 | Low | $3,000 | $4,000 | $6,000 | $4,333 | $0 | 0.922845 | B | $0 | $0 | 0.208333333 |
| 13 | ID-013-Vent and Purge Operations Do Not Meet Throughput Requirements | Unlikely | 0.15 | 0.45 | 0.3 | Moderate | $3,000 | $6,000 | $9,000 | $6,000 | $0 | 0.476688 | N | $0 | $0 | |
| 13 | ID-014-Culvert Retrieval Operations Do Not Meet Throughput Requirements | Unlikely | 0.15 | 0.45 | 0.3 | Moderate | $5,000 | $15,000 | $20,000 | $13,333 | $0 | 0.761078 | N | $0 | $0 | |
| 13 | ID-015-Technical Performance of NDA/NDE/HSG Does Not Meet Requirements | Likely | 0.45 | 0.75 | 0.6 | High | $15,000 | $18,000 | $20,000 | $17,667 | $0 | 0.759617 | N | $0 | $0 | |
| 13 | ID-016-Availability of a Certified Large Box Characterization System | Unlikely | 0.15 | 0.45 | 0.3 | Moderate | $5,000 | $10,000 | $200,000 | $71,667 | $0 | 0.407837 | N | $0 | $0 | |
| 13 | ID-017- Availability of TRUPACT III Shipping Container | Unlikely | 0.15 | 0.45 | 0.3 | Moderate | $80,000 | $100,000 | $250,000 | $143,333 | $0 | 0.576159 | N | $0 | $0 | |
| 13 | ID-018-Safety Analysis (DSA) Is Not All Encompassing Unlikely | | 0.15 | 0.45 | 0.3 | Moderate | $2,000 | $5,000 | $10,000 | $5,667 | $0 | 0.671359 | N | $0 | $0 | |
| 13 | ID-019-CCP Resources Are Redeployed due to DOE Complex Priorities | Very Unlikely | 0 | 0.15 | 0.075 | Moderate | $1,000 | $120,000 | $150,000 | $90,333 | $0 | 0.626824 | N | $0 | $0 | |
| 13 | ID-023-Transportation Issues | Very Unlikely | 0 | 0.15 | 0.075 | Low | $1,000 | $5,000 | $15,000 | $7,000 | $0 | 0.251959 | N | $0 | $0 | |
| 13 | ID-025-External Vendor Liability | Very Unlikely | 0 | 0.15 | 0.075 | Low | $1,000 | $5,000 | $10,000 | $5,333 | $0 | 0.703717 | N | $0 | $0 | |
| | | | | | | | | | | | | | | $249,674 | $323,660 | $573,333 |
| 14 | ID-001-Shipment of HLW Canisters to the Federal Repository | Very Likely | 0.75 | 1 | 0.875 | High | $0 | $10,000 | $20,000 | $10,000 | $10,000 | 0.417266 | O | $0 | $10,000 | 0.208333333 |
| 14 | ID-003-Environmental Permitting of Salt Processing Encounters Problems | Very Likely | 0.75 | 1 | 0.875 | High | $0 | $400,000 | $400,000 | $266,667 | $266,667 | 0.176561 | O | $0 | $266,667 | |
| 14 | ID-004-Stakeholders Delay Disposition of Tank 48 Waste | Likely | 0.45 | 0.75 | 0.6 | Moderate | $0 | $200,000 | $875,000 | $358,333 | $358,333 | 0.215811 | O | $0 | $358,333 | |
| 14 | ID-007-NRC 3116 Determination Consultation Process Delays | Unlikely | 0.15 | 0.45 | 0.3 | Low | $0 | $100,000 | $300,000 | $133,333 | $0 | 0.691011 | O | $0 | $0 | |

| Risk Identifier | | Probability Assessment | | | | Consequence Assessment | | | | | Risk Logic | | | Contingency Estimate | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| PBS Element | Risk Identifier and Risk Title | Likelihood | Probability Range | | Assump-tion | Risk Level | Best | Most Likely | Worst | Impact | Impact Value | Random# | TIME | Near | Outyear | Both |
| 14 | ID-008-NRC Scope of 3116 Monitoring Requirements Not Well Defined | Unlikely | 0.15 | 0.45 | 0.3 | Low | $0 | $34,000 | $100,000 | $44,667 | $0 | 0.627458 | O | $0 | $0 | |
| 14 | ID-010-Stakeholders do not Agree with Technical basis for tank closure (PA & Class C) | Likely | 0.45 | 0.75 | 0.6 | High | $600,000 | $800,000 | $1,100,000 | $835,833 | $835,833 | 0.472329 | O | $0 | $835,833 | |
| | | | | | | | $500 | $2,000 | $5,000 | $2,500 | $2,500 | | N | $2,500 | $0 | |
| 14 | ID-011-Tank Farm Equipment Failure | Likely | 0.45 | 0.75 | 0.6 | Low | $33,000 | $66,000 | $100,000 | $66,333 | $0 | 0.950241 | O | $0 | $0 | |
| 14 | ID-012-DWPF Equipment Failure (Excluding Melter) | Likely | 0.45 | 0.75 | 0.6 | Moderate | $0 | $200,000 | $400,000 | $200 | $200 | 0.525262 | O | $0 | $200 | |
| 14 | ID-017-MCU Catastrophic Tank Failure | Very Unlikely | 0 | 0.15 | 0.075 | Low | $0 | $34,000 | $68,000 | $34,250 | $0 | 0.808366 | O | $0 | $0 | |
| | | | | | | Low | $0 | $250 | $500 | $250 | $0 | | N | $0 | $0 | |
| 14 | ID-018-Saltstone Processing Facility (SPF) Encounters a Major Equipment Failure | Very Likely | 0.75 | 1 | 0.875 | Low | $0 | $0 | $200,000 | $67,000 | $67,000 | 0.17713 | O | $0 | $67,000 | |
| | | | | | | | $0 | $500 | $500 | $333 | $333 | | N | $333 | $0 | |
| 14 | ID-021-DWPF Melter Failure | Likely | 0.45 | 0.75 | 0.6 | Low | $0 | $99,000 | $131,000 | $92,667 | $0 | 0.803413 | O | $0 | $0 | |
| | | | | | | | $0 | $1,000 | $47,000 | $16,000 | $0 | | N | $0 | $0 | |
| 14 | ID-022-Spare Melter Material/Vendor Unavailable | Likely | 0.45 | 0.75 | 0.6 | High | $0 | $0 | $400,000 | $153,333 | $153,333 | 0.535021 | O | $0 | $153,333 | |
| | | | | | | | $0 | $20,000 | $40,000 | $14,000 | $14,000 | | N | $14,000 | $0 | |
| 14 | ID-024-Stakeholder Impacts. | Likely | 0.45 | 0.75 | 0.6 | Moderate | $0 | $600,000 | $1,200,000 | $600,000 | $0 | 0.650401 | O | $0 | $0 | |
| 14 | ID-027-Project (PBS-SR-0014C) other than Line Item Funding Impacted by Competing Priorities | Very Likely | 0.75 | 1 | 0.875 | Moderate | $0 | $400,000 | $800,000 | $400,000 | $400,000 | 0.795174 | O | $0 | $400,000 | |
| 14 | ID-028-Project (PBS-SR-0014C) Line Item Funding Impacted by Competing Priorities | Very Likely | 0.75 | 1 | 0.875 | Moderate | $0 | $400,000 | $800,000 | $400,000 | $400,000 | 0.610856 | O | $0 | $400,000 | |
| 14 | ID-029-Stakeholders Require Additional Cleaning in Tanks (MEP) | Unlikely | 0.15 | 0.45 | 0.3 | Low | $0 | $200,000 | $400,000 | $240,000 | $0 | 0.42413 | O | $0 | $0 | |
| | | | | | | | $0 | $60,000 | $60,000 | $40,000 | $0 | | N | $0 | $0 | |
| 14 | ID-030-2F and 3H Evaporators Material and Chemical Balance issues | Likely | 0.45 | 0.75 | 0.6 | Moderate | $0 | $100,000 | $400,000 | $166,667 | $166,667 | 0.592062 | O | $0 | $166,667 | |
| 14 | ID-034-DWPF Impacted by Chemistry/Rheology of Sludge Waste Feed | Likely | 0.45 | 0.75 | 0.6 | Moderate | $0 | $400,000 | $800,000 | $400,000 | $0 | 0.855923 | O | $0 | $0 | |
| 14 | ID-038-MCU Operations Impacted by Higher Than Expected Rad Rates | Likely | 0.45 | 0.75 | 0.6 | Low | $0 | $17,000 | $33,000 | $21,733 | $21,733 | 0.23348 | O | $0 | $21,733 | |
| | | | | | | | $0 | $200 | $15,000 | $5,067 | $5,067 | | N | $5,067 | 0 | |
| 14 | ID-039-MCU Cannot Achieve DWPF/Tank 50/SDF Limits for solvent carryover | Unlikely | 0.15 | 0.45 | 0.3 | Low | $0 | $0 | $133,000 | $46,000 | $46,000 | 0.223215 | O | $46,000 | $0 | |
| | | | | | | | $0 | $0 | $5,000 | $1,667 | $1,667 | | N | $0 | $1,667 | |
| 14 | ID-041-Formation of Sodium Aluminosilicate in a Salt Tank | Unlikely | 0.15 | 0.45 | 0.3 | Low | $0 | $200,000 | $400,000 | $200,000 | $0 | 0.405122 | O | $0 | $0 | |
| 14 | ID-042-Salt Waste Heel or Tank Annuli Waste Cannot be Processed Through SWPF | Very Likely | 0.75 | 1 | 0.875 | Moderate | $0 | $400,000 | $800,000 | $416,667 | $0 | 0.912814 | O | $0 | $0 | |
| | | | | | | | $0 | $0 | $50,000 | 16666.667 | $0 | | N | $0 | $0 | |

| Risk Identifier | | Probability Assessment | | | | Consequence Assessment | | | | | Risk Logic | | | Contingency Estimate | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| PBS Element | Risk Identifier and Risk Title | Likelihood | Probability Range | | Assump-tion | Risk Level | Best | Most Likely | Worst | Impact | Impact Value | Random# | TIME | Near | Outyear | Both |
| 14 | ID-046-Enrichment Control Reduces Throughput for Salt Disposition | Very Unlikely | 0 | 0.15 | 0.075 | Low | $0 | $33,000 | $100,000 | $44,333 | $0 | 0.961781 | O | $0 | $0 | |
| 14 | ID-048-Waste Physical Properties cause delays in Meeting Bulk Waste Removal Objectives | Very Unlikely | 0 | 0.15 | 0.075 | Low | $0 | $0 | $100,000 | $33,333 | $0 | 0.861958 | O | $0 | $0 | |
| 14 | ID-053-Grout Encapsulation of TPB bearing Waste Creates Handling Problems at Saltstone | Very Likely | 0.75 | 1 | 0.875 | Moderate | $0 | $200,000 | $200,000 | $136,667 | $136,667 | 0.498386 | O | $0 | $136,667 | |
| | | | | | | | $0 | $5,000 | $5,000 | $3,333 | $3,333 | | N | $3,333 | $0 | |
| 14 | ID-069-Higher Than Expected Cs Levels in Salt Solution | Unlikely | 0.15 | 0.45 | 0.3 | Low | $0 | $33,000 | $200,000 | $77,667 | $0 | 0.862265 | O | $0 | $0 | |
| 14 | ID-070-Rogue constituents in SWPF feed. | Unlikely | 0.15 | 0.45 | 0.3 | Low | $0 | $100,000 | $200,000 | $100,000 | $0 | 0.513512 | O | $0 | $0 | |
| 14 | ID-071-Unknown Physical or Chemical Properties in Heel Material. | Very Likely | 0.75 | 1 | 0.875 | High | $0 | $400,000 | $800,000 | $406,667 | $406,667 | 0.410532 | O | $0 | $406,667 | |
| | | | | | | | $0 | $10,000 | $10,000 | $6,667 | $6,667 | | N | $6,667 | $0 | |
| 14 | ID-072-Simulant and Waste Differences Impact Commissioning of SWPF | Very Unlikely | 0 | 0.15 | 0.075 | Low | $0 | $33,000 | $100,000 | $47,000 | $47,000 | 0.04608 | O | $0 | $47,000 | |
| | | | | | | | $0 | $3,000 | $5,000 | $2,667 | $2,667 | | N | $2,667 | $0 | |
| 14 | ID-074-MCU Feed Requirements not met by ARP (512-S) "Sample and Send" Strategy. | Unlikely | 0.15 | 0.45 | 0.3 | Low | $0 | $600 | $600 | $400 | $0 | 0.761809 | N | $0 | $0 | |
| 14 | ID-075-Tank 25 Core Sample results unacceptable for processing ARP/MCU Salt Solution | Unlikely | 0.15 | 0.45 | 0.3 | Low | $0 | $0 | $67,000 | $22,333 | $0 | 0.93661 | O | $0 | $0 | |
| 14 | ID-077-SWPF Feed Chemical, or Radiological Composition Changes | Unlikely | 0.15 | 0.45 | 0.3 | Low | $0 | $33,000 | $100,000 | $44,333 | $0 | 0.656988 | O | $0 | $0 | |
| 14 | ID-078-Dissolved Salt does not Reflect Waste Characterization Data | Likely | 0.45 | 0.75 | 0.6 | Low | $0 | $0 | $400,000 | $133,333 | $133,333 | 0.490899 | O | $0 | $133,333 | |
| 14 | ID-079-Sludge and Heel compositions (including annulus) do not Reflect Waste Characterization Data | Very Unlikely | 0 | 0.15 | 0.075 | Low | $0 | $33,000 | $100,000 | $44,333 | $0 | 0.334207 | O | $0 | $0 | |
| 14 | ID-083-Non-routine Constituents in Sludge Impact Canister Production Rate | Very Likely | 0.75 | 1 | 0.875 | High | $0 | $400,000 | $800,000 | $400,000 | $400,000 | 0.461521 | O | $0 | $400,000 | |
| 14 | ID-086-ARP/MCU does not Start up when Required. | Unlikely | 0.15 | 0.45 | 0.3 | Low | $0 | $17,000 | $34,000 | $17,000 | $0 | 0.809691 | O | $0 | $0 | |
| 14 | ID-090-Tank Farm Tank Availability and Infrastructure does not Support SWPF Operations at high capacity | Unlikely | 0.15 | 0.45 | 0.3 | Moderate | $0 | $1,200,000 | $1,600,000 | $933,333 | $933,333 | 0.184178 | O | $0 | $933,333 | |
| 14 | ID-091-Close coupling between SWPF and other facilities limits SWPF throughput rates | Very Likely | 0.75 | 1 | 0.875 | High | $0 | $800,000 | $1,600,000 | $800,000 | $800,000 | 0.019446 | O | $0 | $800,000 | |
| 14 | ID-092-DWPF Operations limited by ability of Tank Farm to receive and process DWPF recycle stream | Very Likely | 0.75 | 1 | 0.875 | High | $0 | $400,000 | $800,000 | $400,000 | $400,000 | 0.190461 | O | $0 | $400,000 | |
| 14 | ID-093-Coordination Impacts on Project Implementation | Very Likely | 0.75 | 1 | 0.875 | High | $0 | $400,000 | $800,000 | $400,000 | $400,000 | 0.729889 | O | $0 | $400,000 | |
| 14 | ID-094-Available Tank Farm Space Cannot Support LWDPP | Likely | 0.45 | 0.75 | 0.6 | Moderate | $0 | $400,000 | $800,000 | $400,000 | $400,000 | 0.446642 | O | $0 | $400,000 | |

| Risk Identifier | | Probability Assessment | | | | Consequence Assessment | | | | | Risk Logic | | | Contingency Estimate | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| PBS Element | Risk Identifier and Risk Title | Likelihood | Probability Range | | Assump-tion | Risk Level | Best | Most Likely | Worst | Impact | Impact Value | Random# | TIME | Near | Outyear | Both |
| 14 | ID-099-More drainable interstitial liquid from interim salt processing than expected | Likely | 0.45 | 0.75 | 0.6 | Low | $0 | $0 | $67,000 | $22,333 | $0 | 0.685941 | O | $0 | $0 | |
| 14 | ID-100-Waste Tank Utilization Conflict | Very Likely | 0.75 | 1 | 0.875 | High | $0 | $1,200,000 | $2,000,000 | $1,066,667 | $1,066,667 | 0.840325 | O | $0 | $1,066,667 | |
| 14 | ID-101-Criticality Concerns Reduce Salt Processing Throughput | Likely | 0.45 | 0.75 | 0.6 | Moderate | $0 | $200,000 | $400,000 | $200,000 | $200,000 | 0.047864 | O | $0 | $200,000 | |
| 14 | ID-102-2H Evaporator Impacted by DWPF Recycle Enrichment | Likely | 0.45 | 0.75 | 0.6 | Low | $0 | $10,000 | $21,000 | $10,333 | $10,333 | 0.287922 | O | $0 | $10,333 | |
| 14 | ID-107-Federal Repository Receipt Capacity Lower than Expected | Unlikely | 0.15 | 0.45 | 0.3 | Low | $0 | $35,000 | $70,000 | $35,000 | $0 | 0.89383 | O | $0 | $0 | |
| 14 | ID-108-Federal Repository Reaches Heavy Metal Limits due to Conflict in Priorities | Very Likely | 0.75 | 1 | 0.875 | High | $0 | $67,000 | $135,000 | $67,333 | $67,333 | 0.516123 | O | $0 | $67,333 | |
| 14 | ID-110-Tank 48 Return to Service Project Delayed | Likely | 0.45 | 0.75 | 0.6 | Low | $0 | $33,000 | $100,000 | $44,333 | $44,333 | 0.054794 | O | $0 | $44,333 | |
| 14 | ID-116-2H Evaporator Material and Chemical Balance issues | Likely | 0.45 | 0.75 | 0.6 | Moderate | $0 | $200,000 | $400,000 | $250,000 | $250,000 | 0.346356 | O | $0 | $250,000 | |
| | | | | | | | $0 | $50,000 | $100,000 | $53,333 | $53,333 | | N | $53,333 | $0 | |
| 14 | ID-117-Oxalates from Tank Cleaning Cause Processing Problems | Unlikely | 0.15 | 0.45 | 0.3 | Low | $0 | $1,000 | $200,000 | $68,667 | $0 | 0.774358 | O | $0 | $0 | |
| | | | | | | | $0 | $0 | $5,000 | $1,667 | $0 | | N | $0 | $0 | |
| 14 | ID-119-Additional Sludge Mass Result in Higher than expected Canister Production | Very Likely | 0.75 | 1 | 0.875 | High | $1,200,000 | $2,800,000 | $5,200,000 | $2,700,000 | $2,700,000 | 0.182966 | O | $0 | $2,700,000 | |
| 14 | ID-120-Sludge Batch Preparation Impacted by Slow Settling Rate | Likely | 0.45 | 0.75 | 0.6 | Low | $0 | $100,000 | $200,000 | $100,000 | $100,000 | 0.11822 | O | $0 | $100,000 | |
| 14 | ID-121-Salt Dissolution Creates Greater Than Expected Volume of Salt Solution | Unlikely | 0.15 | 0.45 | 0.3 | Low | $0 | $30,000 | $200,000 | $76,667 | $76,667 | 0.253991 | O | $0 | $76,667 | |
| 14 | ID-122-Tank 48 Return to Service Technology Does not Perform as Planned | Likely | 0.45 | 0.75 | 0.6 | Moderate | $0 | $100,000 | $800,000 | $300,000 | $0 | 0.661474 | O | $0 | $0 | |
| 14 | ID-123-Federal Facility Agreement Not Met | Likely | 0.45 | 0.75 | 0.6 | Moderate | $0 | $105,200 | $765,000 | $290,067 | $290,067 | 0.547607 | O | $0 | $290,067 | |
| 14 | ID-125-HLLCP Impacts on Available Tank Space | Likely | 0.45 | 0.75 | 0.6 | Low | $0 | $0 | $100,000 | $33,333 | $33,333 | 0.264555 | O | $0 | $33,333 | |
| 14 | ID-126-Accuracy of WCS Data Impacts Tank Farm Evaporator Modeling. | Unlikely | 0.15 | 0.45 | 0.3 | Low | $0 | $0 | $400,000 | $133,333 | $0 | 0.408183 | O | $0 | $0 | |
| 14 | ID-128-CSSX Technology Does not Scale up as Expected from Lab Scale to Production Scale | Very Unlikely | 0 | 0.15 | 0.075 | Low | $0 | $0 | $66,000 | $30,333 | $0 | 0.975422 | O | $0 | $0 | |
| | | | | | | | $0 | $0 | $25,000 | $8,333 | $0 | | N | $0 | $0 | |
| 14 | ID-129-Slower Salt Dissolution Rates Force Schedule Delays. | Very Unlikely | 0 | 0.15 | 0.075 | Low | $0 | $33,000 | $100,000 | $44,333 | $0 | 0.826192 | O | $0 | $0 | |
| 14 | ID-130-Problems Encountered During Implementation of New Technologies for SWPF | Very Unlikely | 0 | 0.15 | 0.075 | Low | $0 | $33,500 | $67,000 | $37,500 | $0 | 0.244122 | O | $0 | $0 | |
| | | | | | | | $0 | $4,000 | $8,000 | $0 | $0 | | N | $0 | $0 | |

| Risk Identifier | | Probability Assessment | | | | Consequence Assessment | | | | | Risk Logic | | | Contingency Estimate | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| PBS Element | Risk Identifier and Risk Title | Likelihood | Probability Range | | Assump-tion | Risk Level | Best | Most Likely | Worst | Impact | Impact Value | Random# | TIME | Near | Outyear | Both |
| 14 | ID-133-Heel Removal (HR) Technology Does Not Meet Program Requirements | Unlikely | 0.15 | 0.45 | 0.3 | Moderate | $0 | $390,000 | $780,000 | $400,000 | $0 | 0.735778 | O | $0 | $0 | |
| | | | | | | | $0 | $10,000 | $20,000 | $0 | $0 | | N | $0 | $0 | |
| 14 | ID-134-Heel Removal Technology Does not Meet Requirements | Unlikely | 0.15 | 0.45 | 0.3 | Low | $0 | $200,000 | $400,000 | $200,000 | $200,000 | 0.290646 | O | $0 | $200,000 | |
| 14 | ID-136-Pump Does Not Remove Sufficient Waste to Enter Heel Removal Phase | Very Likely | 0.75 | 1 | 0.875 | Moderate | $67,000 | $200,000 | $266,000 | $177,667 | $177,667 | 0.643268 | O | $0 | $177,667 | |
| 14 | ID-139-Requirements and Standards Change | Unlikely | 0.15 | 0.45 | 0.3 | Low | $0 | $26,500 | $53,000 | $26,500 | $0 | 0.7461 | O | $0 | $0 | |
| 14 | ID-142-SWPF Confinement Criteria Changes | Likely | 0.45 | 0.75 | 0.6 | Low | $0 | $49,000 | $100,000 | $55,667 | $0 | 0.65777 | O | $0 | $0 | |
| | | | | | | | $0 | $6,000 | $12,000 | $90,333 | $0 | | N | $0 | $0 | |
| 14 | ID-145-Limited DWPF Laboratory Capabilities Challenged by New Constituents | Likely | 0.45 | 0.75 | 0.6 | Low | $0 | $33,000 | $100,000 | $44,333 | $44,333 | 0.168002 | O | $0 | $44,333 | |
| 14 | ID-149-HLW Tank Leak Requires the Use of Contingency Space | Unlikely | 0.15 | 0.45 | 0.3 | High | $0 | $2,000,000 | $2,000,000 | $1,333,333 | $1,333,333 | 0.157228 | O | $0 | $1,333,333 | |
| 14 | ID-162-High Level Shielded Cells Sampling Capability | Likely | 0.45 | 0.75 | 0.6 | Low | $0 | $0 | $100,000 | $33,333 | $33,333 | 0.34308 | O | $0 | $33,333 | |
| 14 | ID-164-SRNL Sample Analysis Unavailable | Unlikely | 0.15 | 0.45 | 0.3 | Low | $0 | $100,000 | $200,000 | $100,000 | $0 | 0.600142 | O | $0 | $0 | |
| 14 | ID-165-SWPF Startup Delayed Thereby Extending LWO lifecycle | Very Unlikely | 0 | 0.15 | 0.075 | Low | $0 | $83,000 | $166,000 | $83,000 | $0 | 0.2074 | O | $0 | $0 | |
| 14 | ID-166-SWPF Throughput Reduced to Maintain Ti Limits Within DWPF WAC | Unlikely | 0.15 | 0.45 | 0.3 | Moderate | $0 | $400,000 | $800,000 | $400,000 | $400,000 | 0.090127 | O | $0 | $400,000 | |
| 14 | ID-167-Geotechnical Data is Faulty | Very Unlikely | 0 | 0.15 | 0.075 | Low | $0 | $66,000 | $200,000 | $88,667 | $0 | 0.349212 | O | $0 | $0 | |
| 14 | ID-168-SWPF Continued Operational Risks | Unlikely | 0.15 | 0.45 | 0.3 | Low | $0 | $200,000 | $400,000 | $200,000 | $0 | 0.825082 | O | $0 | $0 | |
| 14 | ID-169-SWPF Solvent Loss | Very Unlikely | 0 | 0.15 | 0.075 | Low | $0 | $9,000 | $45,000 | $20,000 | $0 | 0.342176 | O | $0 | $0 | |
| | | | | | | | $0 | $1,000 | $5,000 | $6,000 | $0 | | N | $0 | $0 | |
| 14 | ID-171-Total Volume of Salt Waste More Than Planned | Likely | 0.45 | 0.75 | 0.6 | Moderate | $0 | $200,000 | $400,000 | $200,000 | $0 | 0.722877 | O | $0 | $0 | |
| | | | | | | | | | | | | | | $133,900 | $13,765,833 | $13,899,733 |
| 30 | ID-001-Funding Delays Impact Regulatory Commitments | Very Likely | 0.75 | 1 | 0.875 | High | 10000 | 20000 | 50000 | $26,667 | 26666.6667 | 0.58326 | B | $5,556 | $21,111 | 0.208333333 |
| 30 | ID-003-Additional Environmental Media Remediation Required Post D&D | Likely | 0.45 | 0.75 | 0.6 | Moderate | 0 | 13000 | 20800 | $11,267 | 11266.6667 | 0.411814 | N | $11,267 | $0 | |
| 30 | ID-004-Additioanal and/or mor Extensive Releases Identified | Likely | 0.45 | 0.75 | 0.6 | Moderate | 2600 | 9100 | 13000 | $8,233 | 0 | 0.634898 | O | $0 | $0 | |
| 30 | Remediation Beyond Passive Technologies | Likely | 0.45 | 0.75 | 0.6 | Moderate | $0 | $60,000 | $140,000 | $66,667 | 66666.6667 | 0.541017 | O | $0 | $66,667 | |
| 30 | ID-007-IOU Final Action Uncertainty | Likely | 0.45 | 0.75 | 0.6 | High | $0 | $10,000 | $20,000 | $10,000 | 10000 | 0.535227 | O | $0 | $10,000 | |
| 30 | ID-008-Delay in D&D Project Execution | Very Likely | 0.75 | 1 | 0.875 | Moderate | $0 | $0 | $100 | $33 | 33.3333333 | 0.678746 | O | $0 | $33 | |
| 30 | ID-002-Site Evaluation NFAs Not Acccepted by Regulatory Agencies | Very Unlikely | 0 | 0.15 | 0.075 | Low | $0 | $10 | $4,000 | $1,337 | 0 | 0.172723 | O | $0 | $0 | |

| Risk Identifier | | Probability Assessment | | | | Consequence Assessment | | | | | Risk Logic | | | Contingency Estimate | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| PBS Element | Risk Identifier and Risk Title | Likelihood | Probability Range | | Assump-tion | Risk Level | Best | Most Likely | Worst | Impact | Impact Value | Random# | TIME | Near | Outyear | Both |
| 30 | ID-005-Remedial Action Duration Differs from Baseline Assumptions | Unlikely | 0.15 | 0.45 | 0.3 | Low | $600 | $600 | $9,000 | $3,400 | 0 | 0.525718 | O | $0 | $0 | |
| | | | | | | | | | | | | | | $16,822 | $97,811 | $114,633 |
| 40 | ID-002-Additonal and/or more extensive contamination within facilities | Very Likely | 0.75 | 1 | 0.875 | Moderate | $0 | $1,900 | $3,800 | $1,900 | 1900 | 0.28705 | N | $1,900 | $0 | |
| 40 | ID-009-Interpretation of "in Situ Decommisioning Endpoint" | Unlikely | 0.15 | 0.45 | 0.3 | Low | $75,000 | $150,000 | $225,000 | $150,000 | 0 | 0.332607 | O | $0 | $0 | |
| | | | | | | | | | | | | | | 1900 | 0 | 1900 |
| XC | ID-002-Changes in Cost Estimate Prices | Likely | 0.45 | 0.75 | 0.6 | Moderate | $100,000 | $125,000 | $150,000 | $125,000 | 0 | 0.746993 | B | $0 | $0 | 0.208333333 |
| XC | ID-003-Inability to Adjust Workforce for Full-Service Employees | Likely | 0.45 | 0.75 | 0.6 | Low | $20,000 | $40,000 | $50,000 | $36,667 | 36666.6667 | 0.430798 | B | $7,639 | $29,028 | 0.208333333 |
| XC | ID-004-Unplanned Loss of a Major Facility for an Extended Period of Time | Likely | 0.45 | 0.75 | 0.6 | Moderate | $80,000 | $200,000 | $540,000 | $273,333 | 273333.333 | 0.076748 | B | $56,944 | $216,389 | 0.208333333 |
| XC | ID-005-Funding Does Not Support PBS Baseline | Likely | 0.45 | 0.75 | 0.6 | High | $1,290,323 | $1,600,000 | $2,000,000 | $1,630,108 | 0 | 0.954486 | B | $0 | $0 | 0.208333333 |
| | | | | | | | | | | | | | | $64,583 | $245,417 | $310,000 |
| | | | | | | | | | | | | | | $637,207 | $14,961,638 | $15,598,845 |