CLOSURE BUSINESS UNIT
LIQUID WASTE DISPOSITION PROJECTS

SALT PROCESSING PROJECTS

Tank 48 Disposition Project
Risk Analysis Report
DISCLAIMER

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## SUMMARY OF REVISIONS

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<td>9/14/05</td>
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<td>General revision to include division of project scope (Phase I / Phase II) and update to risk data and T&amp;PRA contingency analysis. No Revision bars.</td>
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<td>3/13/06</td>
<td>2</td>
<td>General revision to update risk baseline and T&amp;PRA to support 30% design estimate. No Revision bars.</td>
</tr>
</tbody>
</table>
# TABLE OF CONTENTS

EXECUTIVE SUMMARY...........................................................................................................................6

ABBREVIATIONS and ACRONYMS.........................................................................................................7

1.0  OVERVIEW ....................................................................................................................................8

1.1 Project Description ..........................................................................................................................8

2.0  RISK MANAGEMENT PROCESS.................................................................................................8

2.1 Background .....................................................................................................................................8

2.2 Team Members ...............................................................................................................................9

2.3 Risk Assessment Process and Methodology ..................................................................................9

2.4 Assumptions and Issues .................................................................................................................12

3.0  RESULTS .....................................................................................................................................12

4.0  CONCLUSIONS ...............................................................................................................................15

5.0  REFERENCES .................................................................................................................................15

6.0  APPENDICES .................................................................................................................................16

6.1: Risk Topics .................................................................................................................................17

6.2: Risk Probabilities ..........................................................................................................................19

6.3: Risk Consequences .......................................................................................................................20

6.4: Risk Level Matrix ........................................................................................................................21

6.5: Risk Summary and Assessment Forms .........................................................................................22

6.6: Crystal Ball Report .......................................................................................................................100

6.7: Risk-O-Meter ..............................................................................................................................107
EXECUTIVE SUMMARY

The Salt Processing Program (SPP) is tasked with the removal and disposition of Salt currently stored within High Level Waste (HLW) tanks at SRS. To accomplish this task the SPP has been divided into several projects. A Program Risk Assessment (Reference 1) was prepared to address the overall SPP risks.

This risk assessment addresses risks associated with one of the SPP projects, namely the Tank 48 Project. This risk assessment presents the risks and levels of risk associated with this Project, the risk handling strategies (RHSs) to be employed, the residual risk remaining and provides a basis for a Technical and Programmatic Risk Assessment (T&PRA) contingency estimate. The primary driver for this update was the decision to split the Tank 48 Project into two Phases:

Phase I: Design and installation of modifications necessary to perform the removal of Tank 48 contents.

Phase II: Removal of Tank 48 contents, achieving intermediate end state, and Tank 48 return to service.

The Team reviewed, updated and added to the existing risk data and allocated risks to either Phase I or Phase II. This risk analysis focused on Phase I, however the Project Team may implement risk handling strategies designed to manage Phase II risks during the execution of Phase I where a significant advantage can be gained for the overall project.

A total of 1 risk was close, and 1 new risk identified. Of the remaining 57 open risks, 30 were Phase I risks and 27 were Phase II risks. The Phase I risks comprised of 11 high risks, 14 moderate risks, and 5 low risks. The Phase II risks comprised of 18 high risks, 8 moderate risks, and 1 low risk. Risk handling strategies were developed for all risks.

After application of the RHSs, 26 Phase I risks will be reduced or mitigated and 4 risks will be accepted. The resulting handled risks that would remain open with the potential to impact the project, based on the most likely impact assessed by the Team comprised of 5 high risks, 10 moderate risks and 15 low risks.

The Phase I residual risk levels were analyzed using Crystal Ball® software to perform a Monte Carlo analysis. Based upon the results of this analysis it was concluded that an 80% probability of project success would require a T&PRA contingency of approximately 1.23 million dollars.

After application of the RHSs, 24 Phase II risks will be reduced or mitigated and 3 risks will be accepted. The resulting handled risks that would remain open with the potential to impact the project, based on the most likely impact assessed by the Team comprised of 5 high risks, 7 moderate risks and 15 low risks. This report will be updated to include additional analysis of the Phase II risks, prior to the commencement of Phase II.
ABBREVIATIONS and ACRONYMS

AB – Authorization Basis
BCP – Baseline Change Proposal
CAB – Citizens Advisory Board
DOE – Department of Energy
DOE – HQ – Department of Energy Headquarters
DNSFB – Defense Nuclear Facilities Safety Board
DSA - Documented Safety Analysis
DWPF – Defense Waste Processing Facility
HLW – High Level Waste
HTF – H-Area Tank Farm
ITP – In-Tank Precipitation
NCSE – Nuclear Criticality Safety Evaluation
PA – Performance Assessment
RHS – Risk Handling Strategy
SCDHEC – South Carolina Department of Health and Environmental Control
SPP – Salt Processing Program
SRS – Savannah River Site
SRNL – Savannah River National Laboratories
SSF – Saltstone Facility
T&PRA – Technical and Programmatic Risk Assessment
TPB – Tetraphenylborate
TSR – Technical Safety Requirement
TF – Tank Farm
WAC – Waste Acceptance Criteria
WIR – Waste Incidental to Reprocessing
WSMS – Washington Safety Management Solutions
WSRC – Washington Savannah River Company
1.0 OVERVIEW

The SPP is tasked with the removal and disposition of salt currently stored within HLW tanks at SRS. Successful disposal of salt waste will support a significant reduction in lifecycle cost while allowing accelerated waste tank closure and providing space gain in the Tank Farms to support operational flexibility. A program risk assessment (Reference 1) addresses the overall SPP risks, while risks specific to the Tank 48 Project will be addressed within this risk analysis report.

This risk analysis identifies risks and handling strategies (RHSs) that will be used to tailor an integrated risk handling strategy for the Tank 48 Project. The RHSs align with the current LWDP risk management strategy outlined in Reference 6.

1.1 Project Description

Tank 48H currently contains approximately 250,000 gallons of salt solution containing 19,000 kilograms of potassium and cesium tetraphenylborate (TPB) salts generated during the 1983 In-Tank Precipitation (ITP) Process demonstration and the subsequent operation of the ITP facility in 1995/1996. The organic nature of TPB salts makes the Tank 48H waste incompatible with the existing HLW Treatment and Disposition facilities. In order to meet organic requirements in the current Documented Safety Analysis (DSA), which limit the amount of TPB that can remain in the tank when returned to service and due to the need for additional HLW storage, successful disposition of the material in Tank 48H is essential.

Evaluation of alternative methods for disposition of the TPB in consideration with the salt strategy resulted in the selection of an aggregation process, using available recycle material within the tank farms to aggregate the contents of Tank 48 for disposition through the Saltstone Facility. A detailed description of the conceptual scope of the Tank 48 Project is contained within Reference 2.

The Tank 48 Project has been divided into two Phases:

- Phase I: Design and installation of modifications necessary to perform the removal of Tank 48 contents.
- Phase II: Removal of Tank 48 contents, achieving intermediate end state, and Tank 48 return to service.

2.0 RISK MANAGEMENT PROCESS

2.1 Background

A program risk assessment is maintained for the SPP. The Program risk assessment was conducted at a higher level and addressed the risks within the SPP program in terms of their consequences to the implementation of the current HLW System Plan (Reference 4) and the Interim Salt Processing Strategy Planning Baseline (Reference 6). This risk assessment is documented in Reference 1.

The SPP conducts risk assessments on each of the SPP projects. This risk report provides the results of the Tank 48 Project assessment and will be periodically updated to incorporate updated information. The Project Team may add additional risks to the matrix prior to any re-issuance of a report. This will allow timely evaluation of the risk and ensure risk handling strategies are developed as needed.
2.2 Team Members

As a minimum the Tank 48 Team consists of the following personnel:

<table>
<thead>
<tr>
<th>Name</th>
<th>Role</th>
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<tr>
<td>Renee Spires</td>
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<tr>
<td>Pen Mayson</td>
<td>Project Manager</td>
</tr>
<tr>
<td>Gavin Winship</td>
<td>SPP Engineering</td>
</tr>
<tr>
<td>Larry Romanowski</td>
<td>PIT Team</td>
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<tr>
<td>Bill Wilmarth</td>
<td>SRNL</td>
</tr>
<tr>
<td>Dennis Conrad</td>
<td>Design Authority</td>
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<tr>
<td>Delane Maxwell</td>
<td>PIT</td>
</tr>
<tr>
<td>Chris Cope</td>
<td>WSMS</td>
</tr>
<tr>
<td>Gerald Eide</td>
<td>LWD Engineering</td>
</tr>
<tr>
<td>Lee Carey</td>
<td>DS</td>
</tr>
</tbody>
</table>

During the course of the risk assessment representatives from other contributing organizations were requested to provide input for a specific set of risks or requested to sit on the team during the assessment meeting.

2.3 Risk Assessment Process and Methodology

The risk assessments are conducted by formal meetings using a structured format to implement the risk assessment methodologies outlined in Reference 5. The major steps of the process are assessment, analysis and tracking which are shown in steps 1 through 7.

Assessment

1. Identification of risks

The risk identification process is performed in a brainstorming session with the team or by developing functions of the process and identifying the risks associated with each function. To assist risk identification a Risk Topics sheet (Appendix 6.1) that identifies risk typical types by area can be used. Each identified risk is documented on a Risk Assessment Form (Appendix 6.5). Each has a documented basis, event and risk description to allow a full understanding of the risk.

2. Assignment of Probability, Consequences and Determination of the Risk Level

The probability of risk occurrence is selected from the Risk Probabilities Table (Appendix 6.2) and a basis for the probability documented on the Risk Assessment Form. The consequences (schedule impact and cost impact) of the risk occurring is then determined by the Team and the corresponding consequence identifier assigned from the Risk Consequences Table (Appendix 6.3) and a basis for the consequences documented on the Risk Assessment Form. The probability and consequences are used in conjunction with Risk Level Matrix (Appendix 6.4) to determine the risk level.

3. Identification of risk handling strategy

A risk handling strategy (RHS) will normally be developed for all moderate and high level risks, and may be developed for other risks at the discretion of the Project Team. The risk handling strategy will be documented on the Risk Assessment Form along with the person responsible for execution of the RHS and where required by the Project Owner, the cost and schedule to implement the RHS. The following RHSs types may be employed:

Avoid – This strategy focuses on totally eliminating the specific risk-driving event. Once the RHS is implemented the risk will be reduced to zero, no residual risk remains with this strategy.
Reduce – This strategy identifies specific steps or actions to reduce the probability of the occurrence of the risk. There will be residual risk after the implementation of this RHS.

Mitigate – This strategy identifies specific steps or actions to reduce the consequence of the risk. There will be residual risk after the implementation of this RHS.

Reduce/Mitigate – A combination of Reduce and Mitigate. There will be residual risk after the implementation of this RHS.

Accept – Accepting a risk is essentially a “no action” strategy. Selection of this strategy is based upon the decision that it is more cost effective to continue the activity as planned with no resources specifically dedicated to addressing the risk. The residual risk is equal to the initial risk with this RHS.

4. Determination of residual risk

If a reduce, mitigate or reduce/mitigate RHS is employed, there will be residual risk remaining after the RHS is complete. This residual risk is estimated and entered on the Risk Assessment Form as quantified cost and/or schedule impact with an associated probability of occurrence. This residual risk can be used to calculate the total risk abated by a particular RHS.

Analysis

5. Developing risk handling priorities

Based on individual Project needs, RHS priorities may be required to allow selection of RHSs for implementation. This may occur when or constrained by resources. RHSs may be prioritized based on cost or risk abated. The total cost of all RHSs is used as a baseline to normalize each RHS cost. Similarly the total risk abated (the sum of initial risk minus the residual risk for all RHSs) is used as a baseline to normalize each RHS risk abated.

The risk abated per unit cost can be calculated from the normalized risk abated and cost data. Risk adverse and cost adverse models and RHS cost and risk adverse priority lists may also be created. At the Project Owner’s discretion, risk may also be assigned a “type” and the risk type weighted and used to create a weighted RHS priority list. Prioritized RHSs listings and model tools may be used by the Project Owner to assist in the scheduling and reporting of RHS implementation and the alignment of risk trigger points for schedule activities. (Risk trigger points define points at which RHS must begin to allow successful risk mitigation or points at which risk may no longer be realized.)

6. Developing T&PRA contingency estimate

Based on the residual risk impacts identified by the Team, a cost probability distribution is developed for each risk using Crystal Ball® software. The software can then be used to statistically combine the distributions through a Monte Carlo process (random sampling methodology) to produce the (T&PRA) cost contingency estimate. The intent of the T&PRA cost contingency estimate is to identify the amount of contingency funding for the Project to ensure that, at an 80% confidence level, the Project is adequately funded and can survive the consequences of realized residual risk. Appendix 6.6 shows the probability distribution models for each of the risks, the frequency-probability profile for the combination of models and the percentiles within the output as they relate to the estimated contingency dollars (the percentile of interest being 80%).

Tracking

7. Risk Tracking

Risk tracking will be performed using risk trigger points and scheduled RHSs. Risk trigger points define the earliest point in the project life that the risk could be realized and the latest point at which the risk no longer can be realized. Risk triggers may be entered into the project schedule at the Project Owners discretion. As a minimum they will be used to update project risk status. Project risk status is depicted on a “risk-o-meter,” (Appendix 6.7). The Project status of each risk is expressed as a “level of concern” which reflects a
combination of the Project Team’s confidence of handling and perceived severity level of the risk at the time of the “risk-o-meter” update. As new risks are identified and existing risks change, the Risk Assessment Forms and analysis
(from items 5 and 6 above) will be updated prior to reporting project risk trends. Periodically the updated Risk Assessment Forms will be issued in a revision to this report.


### 2.4 Assumptions and Issues

Assumptions for the Tank 48 Project are listed and discussed in detail within Sections 5 and 6 of Reference 2. These assumptions were reviewed as part of this risk assessment and any risks associated with those assumptions identified and included in the risk data for the Tank 48 Project. The following assumption was identified in addition to those discussed above:

1. SPF operational costs of processing Tank 48 aggregated material will be funded by others and not be funded as part of the Tank 48 Project.

No issues were identified during this risk assessment.

### 3.0 RESULTS

The risk assessment Team updated the risk population for the project with the following results:

- **Risks Closed** (1)
  - T48-61 Recycle Not Available

- **New Risks** (1)
  - T48-65 Processing Window Unavailable

- **Previously Identified Risks Remaining** (56)
  - T48-01 Funding Availability
  - T48-02 Interfaces with Other Facilities and Projects
  - T48-03 Lost or Spilled Sample in SRNL
  - T48-04 Laboratory Capability - Tank Farm
  - T48-05 Accessibility to Perform Work
  - T48-06 Field materials are not available
  - T48-08 Requirements for Construction Change
  - T48-09 Availability of Construction Equipment
  - T48-10 Readiness Assessment More Than a WSRC RA
  - T48-11 Readiness Assessment Findings
  - T48-12 Support Services Availability
  - T48-13 Tank 48 Equipment Failure
  - T48-14 Loss of Utilities
  - T48-15 Unsafe Conditions Discovered at Turnover
  - T48-16 Equipment Failure (Recycle Transfers)
  - T48-17 Tie-ins to Existing Facility
  - T48-18 Cooling Coils Fail Test
  - T48-19 Existing equipment cannot meet seismic qualification requirements
  - T48-20 Tank 48 Transfer Pump Fails Tests During Startup Testing
| T48-21 | Modifications are determined to be required for the Transfer line/LPDT and Tank 48 to 50. |
| T48-22 | Stakeholder Participation |
| T48-23 | Regulatory Concerns (3116 implementation) |
| T48-24 | Regulatory Concerns (Class C permit not granted) |
| T48-25 | Equipment Fails Surveillance |
| T48-26 | Safety Basis Impacts Design - Tank Farm |
| T48-27 | Safety Basis Strategy not Accepted By DOE |
| T48-28 | Insufficient recycle available for aggregation |
| T48-29 | Chemical Spills (Caustic) |
| T48-31 | Decomposition Products Generated By Additions to Tank |
| T48-32 | Analytical Detection Limit |
| T48-34 | Inadequate Suspension of Material |
| T48-35 | Increased Sampling and Analysis |
| T48-36 | Benzene Generation Rate - Tank Farm (Safety Basis) |
| T48-37 | Inability to Meet End State |
| T48-40 | Tank Film Cannot be Removed |
| T48-41 | Equipment Failure (Tank 50) |
| T48-42 | Transfer Pump Suction or Discharge Line Plugs |
| T48-43 | Permitting Delay - Saltstone |
| T48-44 | Inadequate Tank Space |
| T48-45 | Tank 50 Cooling (Saltstone Transfer) Inadequate |
| T48-46 | Saltstone 0.2 Ci/gal Cs Modifications Not Ready in Time to Support Strategy |
| T48-47 | Tank 50 residual TPB level |
| T48-48 | Saltstone Na limit (1M) cannot be met |
| T48-49 | Effect of Raw Material Impurities - Saltstone |
| T48-50 | TPB Decomposition Temperature – Saltstone (Safety Basis) |
| T48-51 | Benzene Released in Saltstone (Safety Basis) |
| T48-54 | Volume of Grout is Unacceptable |
| T48-55 | Greater Than Assumed Number of Analyzed Samples Required - Saltstone |
| T48-56 | Saltstone Facility Benzene Generation Requires Equipment Modification |
| T48-57 | Process Material Fails TCLP - Saltstone |
| T48-58 | Inadequate scale up from R&D - Saltstone |
| T48-59 | Saltstone Facility production rate less than 83K gals/week |
| T48-60 | Laboratory Capability - Saltstone |
| T48-62 | ARP Equip. Instal. Interferes with Installation of Above Ground Transfer Line |
| T48-63 | Fast-Track Schedule Requires Rework |
| T48-64 | Tank 50 Equipment Installation Impacted by Ongoing Transfers |

The 57 open risks were allocated to Phase I and Phase II as follows:

Phase I Risks (30):

| T48-01 | Funding Availability |
| T48-02 | Interfaces with Other Facilities and Projects |
| T48-03 | Lost or Spilled Sample in SRNL |
| T48-04 | Laboratory Capability - Tank Farm |
| T48-05 | Accessibility to Perform Work |
| T48-06 | Field materials are not available |
| T48-08 | Requirements for Construction Change |
| T48-09 | Availability of Construction Equipment |
T48-10 Readiness Assessment More Than a WSRC RA
T48-11 Readiness Assessment Findings
T48-12 Support Services Availability
T48-14 Loss of Utilities
T48-15 Unsafe Conditions Discovered at Turnover
T48-16 Equipment Failure (Recycle Transfers)
T48-17 Tie-ins to Existing Facility
T48-18 Cooling Coils Fail Test
T48-19 Existing equipment cannot meet seismic qualification requirements
T48-21 Modifications are determined to be required for the Transfer line/LPDT and Tank 48 to 50.
T48-22 Stakeholder Participation
T48-23 Regulatory Concerns (3116 implementation)
T48-24 Regulatory Concerns (Class C permit not granted)
T48-25 Equipment Fails Surveillance
T48-26 Safety Basis Impacts Design - Tank Farm
T48-27 Safety Basis Strategy not Accepted by DOE
T48-36 Benzene Generation Rate - Tank Farm (Safety Basis)
T48-50 TPB Decomposition Temperature - Saltstone (Safety Basis)
T48-51 Benzene Released in Saltstone (Safety Basis)
T48-62 ARP Equip. Instal. Interferes With Installation of Above Ground Transfer Line
T48-63 Fast-Track Schedule Requires Rework
T48-64 Tank 50 Equipment Installation Impacted by Ongoing Transfers

Phase II Risks (27):

T48-13 Tank 48 Equipment Failure
T48-20 Tank 48 Transfer Pump Fails Tests During Startup Testing
T48-28 Insufficient recycle available for aggregation
T48-29 Chemical Spills (Caustic)
T48-31 Decomposition Products Generated By Additions to Tank
T48-32 Analytical Detection Limit
T48-34 Inadequate Suspension of Material
T48-35 Increased Sampling and Analysis
T48-37 Inability to Meet End State
T48-40 Tank Film Cannot be Removed
T48-41 Equipment Failure (Tank 50)
T48-42 Transfer Pump Suction or Discharge Line Plugs
T48-43 Permitting Delay - Saltstone
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T48-46 Saltstone 0.2 Ci/gal Cs Modifications Not Ready in Time to Support Strategy
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T48-58 Inadequate scale up from R&D - Saltstone
T48-59 Saltstone Facility production rate less than 83K gals/week
T48-60 Laboratory Capability - Saltstone
T48-65 Processing Window Unavailable
The 30 Phase I risks comprised of 11 high risks, 14 moderate risks and 5 low risks. Risk handling strategies were developed for the new risks and existing RHSs updated or modified as appropriate:

- Risks Reduced or Mitigated (26)
- Risks Accepted (4)

The resulting handled risks that would remain open with the potential to impact the Phase I of the project, based on the most likely impact assessed by the Team comprised of 5 high risks, 10 moderate risks and 15 low risks. Three of these high risks are programmatic and external to the project. If these risks were realized a BCP would be initiated, therefore, they were omitted from the T&PRA contingency calculation. See Table in Appendix 6.5 for a summary of results.

The residual risk levels were analyzed using Crystal Ball® software to perform a Monte Carlo analysis. Based upon the results of this analysis it was concluded that an 80% probability of project success would require a T&PRA contingency of approximately 1.23 million dollars. Appendix 6.6 documents the results of the T&PRA contingency analysis.

The 27 Phase II risks comprised of 18 high risks, 8 moderate risks and 1 low risk. Risk handling strategies were developed for the new risks and existing RHSs updated or modified as appropriate:

- Risks Reduced or Mitigated (24)
- Risks Accepted (3)

The resulting handled risks that would remain open with the potential to impact Phase II of the project, based on the most likely impact assessed by the Team comprised of 5 high risks, 7 moderate risks and 15 low risks. See Table in Appendix 6.5 for a summary of results. The Phase II risks will be updated and analyzed further prior to the commencement of Phase II

4.0 CONCLUSIONS

As part of the ongoing project activities, risk statusing and tracking will be performed on the Tank 48 Project. RHSs will be included in the Project schedule and within the Project action item database. As new risks are identified by the Project Team they will be assessed and RHSs developed and implemented. Periodically these risks and updates to existing risks will be issued in a revision to this report. This process will continue for the life of the Project.

The Phase I risks that remain open after the application of handling strategies are comprised of 5 high risks, 10 moderate risks and 15 low risks and the Phase II risks that remain open after the application of handling strategies are comprised of 5 high risks, 7 moderate risks and 15 low risks.

5.0 REFERENCES

2. CBU-PIT-2004-00034, Planning Baseline for Tank 48 Aggregation to Saltstone @ 0.2 Ci/gal Cesium, Revision 0, January 12, 2005.


6.0 APPENDICES

6.1 – Risk Topics
6.2 – Risk Probabilities
6.3 – Risk Consequences
6.4 – Risk Level Matrix
6.5 – Risk Summary and Assessment Forms
6.6 – Crystal Ball Report
6.7 – Risk-o-Meter
6.1: Risk Topics

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<th><strong>Design</strong></th>
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<td>• Numerous or Unclear Assumptions or Bases</td>
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<td>• Reliability</td>
<td>• Support Utilities Availability</td>
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<td>• Inspectability</td>
<td>• Geophysical Conditions</td>
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<td>• Maintainability</td>
<td>• Temporary Resources (Power, Lights, Water, etc.)</td>
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<td>• Resources Not Available</td>
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<td>• Construction Complexities</td>
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<td>• Maintenance</td>
<td>- Funding uncertainties</td>
</tr>
<tr>
<td>• Operability</td>
<td>- Stakeholders Program Strategy Changes</td>
</tr>
<tr>
<td>• Facility Startup</td>
<td>- Errors and Omissions in Estimates</td>
</tr>
<tr>
<td>• System Startup (Subcontractor or PE&amp;CD)</td>
<td>- Fast track/critical need</td>
</tr>
<tr>
<td></td>
<td>- Infrastructure influence</td>
</tr>
<tr>
<td><strong>Safety/ISMS</strong></td>
<td><strong>Interfaces</strong></td>
</tr>
<tr>
<td>-------------------------</td>
<td>------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>• Established operating practices</td>
<td>• Multiple Agencies, Contractors</td>
</tr>
<tr>
<td>• Established, proven operating procedures</td>
<td>• Special Work Control/Work Auth. Procedures</td>
</tr>
<tr>
<td>• Requires changes to AB documents or new USQ</td>
<td>• Operating SSCs Including Testing</td>
</tr>
<tr>
<td>• Unique operating logistics required</td>
<td>• Multiple Customers</td>
</tr>
<tr>
<td>• Additional operations personnel required</td>
<td>• Co-Occupancy</td>
</tr>
<tr>
<td>• New TSR) limits or surveillance’s</td>
<td>• Outage Requirements</td>
</tr>
<tr>
<td>• Limited access/egress</td>
<td>• Multiple systems</td>
</tr>
<tr>
<td>• Complex emergency/off-normal operational steps</td>
<td>• Radiological Conditions (Current and Future)</td>
</tr>
<tr>
<td>• Equipment reliability</td>
<td>- Contamination</td>
</tr>
<tr>
<td></td>
<td>- Radiation</td>
</tr>
<tr>
<td><strong>Security</strong></td>
<td>• Multiple Projects</td>
</tr>
<tr>
<td></td>
<td>• Proximity to Safety Class Systems</td>
</tr>
<tr>
<td>• New security systems required</td>
<td>• Non-routine and/or complex operation</td>
</tr>
<tr>
<td>• New security practices required</td>
<td>• Routine operational stoppages required</td>
</tr>
<tr>
<td>• Additional security personnel required</td>
<td>• Analytical sampling required during operations</td>
</tr>
<tr>
<td>• Revised MC&amp;A requirements</td>
<td>• Engineering/R&amp;D</td>
</tr>
<tr>
<td></td>
<td>• Newly deployed technology</td>
</tr>
<tr>
<td></td>
<td>• Transient technology, replacement component differ</td>
</tr>
<tr>
<td><strong>Mission</strong></td>
<td>• Operation</td>
</tr>
<tr>
<td></td>
<td>• Routine operational stoppages required</td>
</tr>
<tr>
<td>• Affect other facility/site missions</td>
<td>• Analytical sampling required during operations</td>
</tr>
<tr>
<td>• Interfacing with off-site organizations required</td>
<td>• Engineering/R&amp;D</td>
</tr>
<tr>
<td>• Shipment to off-site locations required</td>
<td>• Newly deployed technology</td>
</tr>
<tr>
<td>• Operation susceptibility to external intervention</td>
<td>• Transient technology, replacement component differ</td>
</tr>
<tr>
<td><strong>Integration</strong></td>
<td>• Infrastructure</td>
</tr>
<tr>
<td>• Work included in division/area/facility master schedule</td>
<td>• Equipment operating beyond intended/useful life</td>
</tr>
<tr>
<td>• Design/construction schedule conflicts</td>
<td>• Support facility reliability (steam, waste, etc.)</td>
</tr>
<tr>
<td>• Other site division involvement</td>
<td>• Spare parts availability</td>
</tr>
<tr>
<td><strong>Waste Management</strong></td>
<td>• Facility Capability</td>
</tr>
<tr>
<td>• New waste streams generated</td>
<td>• Additional capital funded/project requirements</td>
</tr>
<tr>
<td>• New waste management practices being implemented</td>
<td>• Modification to existing project scope</td>
</tr>
<tr>
<td>• Additional quantities of waste being generated</td>
<td>• Facility Capability</td>
</tr>
</tbody>
</table>
### 6.2: Risk Probabilities

<table>
<thead>
<tr>
<th>Probability of Occurrence</th>
<th>Criteria</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.1 or less</td>
<td>Chance of occurrence is less than or equal to 10%</td>
</tr>
<tr>
<td>Very Unlikely</td>
<td></td>
</tr>
<tr>
<td>0.2, 0.3, 0.4</td>
<td>Chance of occurrence is between 10% and 40%</td>
</tr>
<tr>
<td>Unlikely</td>
<td></td>
</tr>
<tr>
<td>0.5, 0.6, 0.7</td>
<td>Chance of occurrence is between 40% and 80%</td>
</tr>
<tr>
<td>Likely</td>
<td></td>
</tr>
<tr>
<td>0.8, 0.9, &gt;0.9</td>
<td>Chance of occurrence is 80% or greater</td>
</tr>
<tr>
<td>Very Likely</td>
<td></td>
</tr>
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</table>
6.3: Risk Consequences

<table>
<thead>
<tr>
<th>Consequence of Occurrence</th>
<th>Criteria</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.1 (Negligible)</td>
<td>Minimal or no consequences, unimportant.</td>
</tr>
<tr>
<td></td>
<td>Some potential transfer of money, but budget estimates not exceeded, less than $10K.</td>
</tr>
<tr>
<td></td>
<td>Negligible impact on project, slight potential development schedule change (&lt; 1 week), compensated by available schedule slack.</td>
</tr>
<tr>
<td>0.2, 0.3, 0.4 (Marginal)</td>
<td>Small, acceptable, reduction in modification technical performance.</td>
</tr>
<tr>
<td></td>
<td>Moderate threat to project mission, environment or people; possibly requires minor facility operations or maintenance changes, very minor rework or redesign; routine cleanup.</td>
</tr>
<tr>
<td></td>
<td>Cost estimates exceed budget $10K- less than $50K.</td>
</tr>
<tr>
<td></td>
<td>Minor slip in schedule (&lt; 1 week).</td>
</tr>
<tr>
<td>0.5, 0.6, 0.7 (Significant)</td>
<td>Significant degradation in modification/project technical performance.</td>
</tr>
<tr>
<td></td>
<td>Significant threat to project mission: requires some redesign or repair, significant environmental remediation.</td>
</tr>
<tr>
<td></td>
<td>Cost estimates exceed budget by $50K - less than $150K.</td>
</tr>
<tr>
<td></td>
<td>Significant slip in schedule (1 week – 4 weeks).</td>
</tr>
<tr>
<td>0.8, 0.9 (Critical)</td>
<td>Technical goals of modification/process cannot be achieved.</td>
</tr>
<tr>
<td></td>
<td>Serious threat to project; possible threat to program or requiring major facility redesign or repair, extensive environmental remediation.</td>
</tr>
<tr>
<td></td>
<td>Cost estimates exceed budget by $150K- less than $500K.</td>
</tr>
<tr>
<td></td>
<td>Excessive schedule slip (1 month – less than 3 months) possibly affecting overall program mission.</td>
</tr>
<tr>
<td>&gt; 0.9 (Crisis)</td>
<td>Processing cannot be completed.</td>
</tr>
<tr>
<td></td>
<td>Cost estimates unacceptably exceed budget, $500K or more.</td>
</tr>
<tr>
<td></td>
<td>Catastrophic threat to program (&gt; 3 months); possibly causing loss of mission.</td>
</tr>
</tbody>
</table>
### 6.4: Risk Level Matrix

<table>
<thead>
<tr>
<th>PROBABILITY</th>
<th>Very Likely</th>
<th>Likely</th>
<th>Unlikely</th>
<th>Very Unlikely</th>
<th>Non-Credible</th>
</tr>
</thead>
<tbody>
<tr>
<td>RISK LEVEL</td>
<td>Low</td>
<td>Moderate</td>
<td>High</td>
<td>Moderate</td>
<td>Low</td>
</tr>
<tr>
<td>CONSEQUENCES</td>
<td>Negligible</td>
<td>Marginal</td>
<td>Significant</td>
<td>Critical</td>
<td>Crisis</td>
</tr>
</tbody>
</table>
### Phase I Project Risks

<table>
<thead>
<tr>
<th>Risk Number</th>
<th>Risk Title</th>
<th>Risk Level</th>
<th>Probability</th>
<th>Consequence</th>
<th>Approach</th>
<th>Description</th>
<th>Projected Residual Risk Level</th>
</tr>
</thead>
<tbody>
<tr>
<td>T48-02</td>
<td>Interfaces with Other Facilities and Projects</td>
<td>Moderate</td>
<td>Likely</td>
<td>Significant</td>
<td>Reduce</td>
<td>Keep H-Tank Farm Facility and Saltstone/Project Owners &amp; Managers informed about project needs/progress. (T48-RHS-16)</td>
<td>Moderate</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
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<td></td>
<td>Prepare a plan showing NaOH additions and transfers of recycle from Type IV tanks and receive concurrence from Facility and Transfer Planning Group. (T48-RHS-17)</td>
<td></td>
</tr>
<tr>
<td>Risk Number</td>
<td>Risk Title</td>
<td>Risk Level</td>
<td>Probability</td>
<td>Consequence</td>
<td>Approach</td>
<td>Description</td>
<td></td>
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<td>-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------</td>
<td></td>
</tr>
<tr>
<td>T48-03</td>
<td>Lost or Spilled Sample in SRNL</td>
<td>Moderate</td>
<td>Unlikely</td>
<td>Significant</td>
<td>Reduce</td>
<td>Develop Sample &amp; Analytical Plans well in advance of actual operations including critical spare parts for analytical instruments, what if analysis (including identification of potential conflicts), splitting samples into multiple aliquots upon arrival, replicate analyses (especially as the concentration decreases or the target response time shortens), and contingency plans. (T48-RHS-44)</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
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<td></td>
<td></td>
<td>SRNL to implement corrective action to improve sample storage and management. (T48-RHS-31) - COMPLETE</td>
<td></td>
</tr>
<tr>
<td>Risk Number</td>
<td>Risk Title</td>
<td>Risk Level</td>
<td>Probability</td>
<td>Consequence</td>
<td>Approach</td>
<td>Description</td>
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<td>-----------------------------------------------------------------------------</td>
<td></td>
</tr>
<tr>
<td>T48-04</td>
<td>Laboratory Capability - Tank Farm</td>
<td>Moderate</td>
<td>Likely</td>
<td>Significant</td>
<td>Mitigate</td>
<td>Develop Sample &amp; Analytical Plans well in advance of actual operations including critical spare parts for analytical instruments, what if analysis (including identification of potential conflicts), splitting samples into multiple aliquots upon arrival, replicate analyses (especially as the concentration decreases or the target response time shortens), and contingency plans. (T48-RHS-44)</td>
<td>Moderate</td>
</tr>
<tr>
<td>Risk Number</td>
<td>Risk Title</td>
<td>Risk Level</td>
<td>Probability</td>
<td>Consequence</td>
<td>Approach</td>
<td>Description</td>
<td>Projected Residual Risk Level</td>
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</tr>
<tr>
<td>T48-05</td>
<td>Accessibility to Perform Work</td>
<td>Moderate</td>
<td>Likely</td>
<td>Significant</td>
<td>Reduce</td>
<td>Coordinate work with operations and other projects through participation in facility Work Window Lock-ins, 8 Week Lookaheads (T8s), and Plan of the Days (PODs). (T48-RHS-01)</td>
<td>Low</td>
</tr>
<tr>
<td>T48-06</td>
<td>Field materials are not available</td>
<td>Low</td>
<td>V. Unlikely</td>
<td>Marginal</td>
<td>Reduce</td>
<td>Quantify / track material. Expedite procurements when feasible. (T48-RHS-03)</td>
<td>Low</td>
</tr>
<tr>
<td>Risk Number</td>
<td>Risk Title</td>
<td>Risk Level</td>
<td>Probability</td>
<td>Consequence</td>
<td>Approach</td>
<td>Description</td>
<td>Projected Residual Risk Level</td>
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<td>-------------------------------</td>
</tr>
<tr>
<td>T48-09</td>
<td>Availability of Construction Equipment</td>
<td>Low</td>
<td>V. Unlikely</td>
<td>Significant</td>
<td>Accept</td>
<td>N/A</td>
<td>Low</td>
</tr>
<tr>
<td>T48-10</td>
<td>Readiness Assessment More Than a WSRC RA</td>
<td>Moderate</td>
<td>V. Unlikely</td>
<td>Critical</td>
<td>Reduce</td>
<td>Early development and input to the Startup Notification Report (SNR). Obtain appropriate buy-in from DOE prior to submittal. (T48-RHS-32)</td>
<td>Low</td>
</tr>
<tr>
<td>T48-11</td>
<td>Readiness Assessment Findings</td>
<td>Low</td>
<td>V. Unlikely</td>
<td>Marginal</td>
<td>Mitigate</td>
<td>Project Team develop and perform detailed management checklist prior to beginning RA. (T48-RHS-33)</td>
<td>Low</td>
</tr>
<tr>
<td>T48-12</td>
<td>Support Services Availability</td>
<td>Moderate</td>
<td>Likely</td>
<td>Significant</td>
<td>Reduce</td>
<td>Forecast resources and stick to plan. (T48-RHS-14) Integrate project activities into facility schedule. (T48-RHS-15)</td>
<td>Moderate</td>
</tr>
<tr>
<td>T48-14</td>
<td>Loss of Utilities</td>
<td>Moderate</td>
<td>Unlikely</td>
<td>Significant</td>
<td>Accept</td>
<td>N/A</td>
<td>Moderate</td>
</tr>
<tr>
<td>T48-15</td>
<td>Unsafe Conditions Discovered at Turnover</td>
<td>Moderate</td>
<td>Likely</td>
<td>Significant</td>
<td>Mitigate/Reduce</td>
<td>Ensure Safety/IH Engineer included in design reviews. (T48-RHS-40)</td>
<td>Low</td>
</tr>
<tr>
<td>Risk Number</td>
<td>Risk Title</td>
<td>Risk Level</td>
<td>Probability</td>
<td>Consequence</td>
<td>Approach</td>
<td>Description</td>
<td>Projected Residual Risk Level</td>
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</tr>
<tr>
<td>T48-16</td>
<td>Equipment Failure (Recycle Transfers)</td>
<td>Moderate</td>
<td>Unlikely</td>
<td>Significant</td>
<td>Accept</td>
<td>N/A</td>
<td>Low</td>
</tr>
<tr>
<td>T48-17</td>
<td>Tie-ins to Existing Facility</td>
<td>Moderate</td>
<td>Unlikely</td>
<td>Significant</td>
<td>Mitigate/Reduce</td>
<td>Design Services will perform early walk downs and validate existing conditions/equipment. (T48-RHS-11)</td>
<td>Low</td>
</tr>
<tr>
<td>T48-18</td>
<td>Cooling Coils Fail Test</td>
<td>Low</td>
<td>V. Unlikely</td>
<td>Significant</td>
<td>Mitigate</td>
<td>Perform heat balance to determine requirements. (T48-RHS-62)</td>
<td>Low</td>
</tr>
<tr>
<td>T48-19</td>
<td>Existing equipment cannot meet seismic qualification requirements</td>
<td>Moderate</td>
<td>Likely</td>
<td>Significant</td>
<td>Reduce/Mitigate</td>
<td>Design Services will perform early walk downs and validate existing conditions/equipment. (T48-RHS-11)</td>
<td>Low</td>
</tr>
<tr>
<td>T48-21</td>
<td>Modifications are determined to be required for the Transfer line/LPDT and Tank 48 to 50.</td>
<td>Low</td>
<td>V. Unlikely</td>
<td>Significant</td>
<td>Mitigate</td>
<td>Complete Safety Basis development and SIRC approval as early as possible. (T48-RHS-09)</td>
<td>Low</td>
</tr>
<tr>
<td>T48-25</td>
<td>Equipment Fails Surveillance</td>
<td>Moderate</td>
<td>Unlikely</td>
<td>Significant</td>
<td>Reduce</td>
<td>Identify attributes in AB requiring testing before design is complete. (T48-RHS-37)</td>
<td>Low</td>
</tr>
<tr>
<td>Risk Number</td>
<td>Risk Title</td>
<td>Risk Level</td>
<td>Probability</td>
<td>Consequence</td>
<td>Approach</td>
<td>Description</td>
<td>Projected Residual Risk Level</td>
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</tr>
<tr>
<td>T48-26</td>
<td>Safety Basis Impacts Design -Tank Farm</td>
<td>High</td>
<td>Unlikely</td>
<td>Crisis</td>
<td>Reduce/Mitigate</td>
<td>Complete Safety Basis development and SIRC approval as early as possible. (T48-RHS-09)</td>
<td>High</td>
</tr>
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<td></td>
<td>Develop R&amp;D Plan to ensure sufficient supporting data has been developed to support safety approach. (T48-RHS-10)</td>
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<td></td>
<td></td>
<td></td>
<td>Resolve SIL Impact (T48-RHS-60)</td>
<td></td>
</tr>
<tr>
<td>T48-27</td>
<td>Safety Basis Strategy not Accepted By DOE</td>
<td>Moderate</td>
<td>Likely</td>
<td>Significant</td>
<td>Reduce</td>
<td>Ensure formal/informal DOE involvement during SBS development and prior to WSRC request for approval to avoid final minute surprises. DOE is also represented in SIRC approval. (T48-RHS-30)</td>
<td>Low</td>
</tr>
<tr>
<td>Risk Number</td>
<td>Risk Title</td>
<td>Risk Level</td>
<td>Probability</td>
<td>Consequence</td>
<td>Approach</td>
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<td>Projected Residual Risk Level</td>
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</tr>
<tr>
<td>T48-36</td>
<td>Benzene Generation Rate - Tank Farm (Safety Basis)</td>
<td>High</td>
<td>V. Unlikely</td>
<td>Crisis</td>
<td>Mitigate</td>
<td>PIT to define a chemical qualification program to be put into place to ensure minimal benzene generation. (T48-RHS-22)</td>
<td>Moderate</td>
</tr>
<tr>
<td></td>
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<td></td>
<td></td>
<td>Perform chemical testing program that includes early testing of materials that will potentially cause an increase in benzene generation - DWPF recycle, HEU, ETP. (T48-RHS-23)</td>
<td></td>
</tr>
<tr>
<td>T48-50</td>
<td>TPB Decomposition Temperature – Saltstone (Safety Basis)</td>
<td>High</td>
<td>Likely</td>
<td>Crisis</td>
<td>Reduce</td>
<td>Complete testing on grout at various TPB concentrations and curing temperatures. (T48-RHS-28)</td>
<td>High</td>
</tr>
<tr>
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<td></td>
<td></td>
<td></td>
<td>Investigate required rates for windows of opportunity for processing in the Salt Strategy. (T48-RHS-63)</td>
<td></td>
</tr>
</tbody>
</table>

- PIT: Preventive Intervention Technique
- DWPF: Defense Waste Processing Facility
- HEU: Highly Enriched Uranium
- ETP: Environmental Test Program
- TPB: Tris(phenyl)borate
<table>
<thead>
<tr>
<th>Risk Number</th>
<th>Risk Title</th>
<th>Risk Level</th>
<th>Probability</th>
<th>Consequence</th>
<th>Approach</th>
<th>Description</th>
<th>Projected Residual Risk Level</th>
</tr>
</thead>
<tbody>
<tr>
<td>T48-51</td>
<td>Benzene Released in Saltstone (Safety Basis)</td>
<td>High</td>
<td>Likely</td>
<td>Crisis</td>
<td>Mitigate</td>
<td>Complete testing on grout at various TPB concentrations and curing temperatures. (T48-RHS-28) Investigate required rates for windows of opportunity for processing in the Salt Strategy. (T48-RHS-63)</td>
<td>High</td>
</tr>
<tr>
<td>T48-62</td>
<td>ARP Equip. Instal. Interferes With Installation of Above Ground Transfer Line</td>
<td>Moderate</td>
<td>Likely</td>
<td>Significant</td>
<td>Reduce</td>
<td>Monitor ARP schedule implementation and schedule Tank 48 activities to minimize any impact. (T48-RHS-61)</td>
<td>Moderate</td>
</tr>
<tr>
<td>T48-63</td>
<td>Fast-Track Schedule Requires Rework</td>
<td>High</td>
<td>Likely</td>
<td>Critical</td>
<td>Accept</td>
<td>N/A</td>
<td>Moderate</td>
</tr>
<tr>
<td>T48-64</td>
<td>Tank 50 Equipment Installation Impacted by Ongoing Transfers</td>
<td>High</td>
<td>Likely</td>
<td>Critical</td>
<td>Mitigate</td>
<td>Monitor other project schedule implementation and schedule Tank 48 activities to minimize any impact. (T48-RHS-64)</td>
<td>Moderate</td>
</tr>
</tbody>
</table>
## Phase II Project Risks

<table>
<thead>
<tr>
<th>Risk Number</th>
<th>Risk Title</th>
<th>Risk Level</th>
<th>Probability</th>
<th>Consequence</th>
<th>Approach</th>
<th>Description</th>
<th>Projected Residual Risk Level</th>
</tr>
</thead>
<tbody>
<tr>
<td>T48-20</td>
<td>Tank 48 Transfer Pump Fails Tests During Startup Testing</td>
<td>High</td>
<td>Likely</td>
<td>Critical</td>
<td>Reduce/Mitigate</td>
<td>Moderate</td>
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<td>Develop a plan for functional check of 48 to 50 transfer pump early in the project. (T48-RHS-38)</td>
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<td>Develop a strategy to identify pump on site that is comparable and not in use. (T48-RHS-39)</td>
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<tr>
<td>T48-28</td>
<td>Insufficient recycle available for aggregation</td>
<td>Moderate</td>
<td>Unlikely</td>
<td>Significant</td>
<td>Accept</td>
<td>N/A</td>
<td>Low</td>
</tr>
<tr>
<td>T48-29</td>
<td>Chemical Spills (Caustic)</td>
<td>Low</td>
<td>Likely</td>
<td>Marginal</td>
<td>Accept</td>
<td>N/A</td>
<td>Low</td>
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<tr>
<td>T48-31</td>
<td>Decomposition Products Generated By Additions to Tank</td>
<td>High</td>
<td>V. Unlikely</td>
<td>Crisis</td>
<td>Mitigate</td>
<td>PIT to define a chemical qualification program to be put into place to ensure minimal benzene generation. (T48-RHS-22)</td>
<td>Low</td>
</tr>
<tr>
<td>Risk Number</td>
<td>Risk Title</td>
<td>Risk Level</td>
<td>Probability</td>
<td>Consequence</td>
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<tr>
<td>T48-32</td>
<td>Analytical Detection Limit</td>
<td>High</td>
<td>Likely</td>
<td>Critical</td>
<td>Mitigate</td>
<td>Develop TPB Residual Strategy (TPB measurement / material balance) and obtain SIRC approval. (T48-RHS-34)</td>
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<td>Develop Sample &amp; Analytical Plans well in advance of actual operations including critical spare parts for analytical instruments, what if analysis (including identification of potential conflicts), splitting samples into multiple aliquots upon arrival, replicate analyses (especially as the concentration decreases or the target response time shortens), and contingency plans. (T48-RHS-44)</td>
<td></td>
</tr>
<tr>
<td>T48-34</td>
<td>Inadequate Suspension of Material</td>
<td>High</td>
<td>Unlikely</td>
<td>Crisis</td>
<td>Mitigate</td>
<td>PIT to perform a Mixing Study on Tank 50H. (T48-RHS-20)</td>
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<tr>
<td>Risk Number</td>
<td>Risk Title</td>
<td>Risk Level</td>
<td>Probability</td>
<td>Consequence</td>
<td>Approach</td>
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<tr>
<td>T48-35</td>
<td>Increased Sampling and Analysis</td>
<td>Moderate</td>
<td>Unlikely</td>
<td>Critical</td>
<td>Mitigate</td>
<td>Develop definitive sample plan in support of disposition. (T48-RHS-21)</td>
<td></td>
</tr>
<tr>
<td>T48-37</td>
<td>Inability to Meet End State</td>
<td>High</td>
<td>V. Unlikely</td>
<td>Crisis</td>
<td>Mitigate</td>
<td>Develop TPB Residual Strategy (TPB measurement / material balance) and obtain SIRC approval. (T48-RHS-34) Develop new end state criteria that allows some solids to remain behind (residual limit). (T48-RHS-07)</td>
<td></td>
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<tr>
<td>T48-40</td>
<td>Tank Film Cannot be Removed</td>
<td>High</td>
<td>Unlikely</td>
<td>Crisis</td>
<td>Mitigate</td>
<td>Develop new end state criteria that allows some solids to remain behind (residual limit). (T48-RHS-07) Evaluate rinsing effectiveness early. (T48-RHS-08)</td>
<td></td>
</tr>
<tr>
<td>Risk Number</td>
<td>Risk Title</td>
<td>Risk Level</td>
<td>Probability</td>
<td>Consequence</td>
<td>Approach</td>
<td>Description</td>
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<tr>
<td>T48-42</td>
<td>Transfer Pump Suction or Discharge Line Plugs</td>
<td>Moderate</td>
<td>Unlikely</td>
<td>Significant</td>
<td>Reduce/MITIGATE</td>
<td>Test and verify that existing flushing capabilities for transfer pump and transfer line are operational. (T48-RHS-56)</td>
<td>Low</td>
</tr>
<tr>
<td>T48-44</td>
<td>Inadequate Tank Space</td>
<td>Moderate</td>
<td>V. Unlikely</td>
<td>Critical</td>
<td>Reduce/MITIGATE</td>
<td>Perform calculations before transfer to ensure below the Saltstone limits on all constituents. (T48-RHS-27)</td>
<td>Low</td>
</tr>
<tr>
<td>T48-47</td>
<td>Tank 50 residual TPB level</td>
<td>High</td>
<td>Likely</td>
<td>Crisis</td>
<td>MITIGATE</td>
<td>Develop TPB Residual Strategy (TPB measurement / material balance) and obtain SIRC approval. (T48-RHS-34) Develop end state criteria that allows some solids to remain behind. (T48-RHS-07)</td>
<td>Low</td>
</tr>
<tr>
<td>T48-48</td>
<td>Saltstone Na limit (1M) cannot be met</td>
<td>Moderate</td>
<td>V. Unlikely</td>
<td>Critical</td>
<td>MITIGATE</td>
<td>Perform grout studies using one molar sodium. (T48-RHS-36)</td>
<td>Low</td>
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<tr>
<td>Risk Number</td>
<td>Risk Title</td>
<td>Risk Level</td>
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<tr>
<td>T48-49</td>
<td>Effect of Raw Material Impurities - Saltstone</td>
<td>Moderate</td>
<td>Unlikely</td>
<td>Critical</td>
<td>Reduce/Mitigate</td>
<td>Conduct testing to examine interaction of Tank 48H with impurities in Saltstone premix. (T48-RHS-42) - COMPLETE</td>
<td>Low</td>
</tr>
<tr>
<td>T48-55</td>
<td>Greater Than Assumed Number of Analyzed Samples Required - Saltstone</td>
<td>Moderate</td>
<td>Likely</td>
<td>Significant</td>
<td>Reduce/Mitigate</td>
<td>Develop definitive sample plan in support of disposition. (T48-RHS-21)</td>
<td>Moderate</td>
</tr>
<tr>
<td>T48-56</td>
<td>Saltstone Facility Benzene Generation Requires Equipment Modification at Saltstone</td>
<td>High</td>
<td>V. Likely</td>
<td>Crisis</td>
<td>Mitigate</td>
<td>If evaluations show increased benzene generation, implement modifications. (T48-RHS-54) Complete testing on grout at various TPB concentrations and curing temperatures. (T48-RHS-28) Investigate required rates for windows of opportunity for processing in the Salt Strategy. (T48-RHS-63)</td>
<td>High</td>
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<tr>
<td>Risk Number</td>
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<tr>
<td>T48-57</td>
<td>Process Material Fails TCLP - Saltstone</td>
<td>High</td>
<td>V. Unlikely</td>
<td>Crisis</td>
<td>Mitigate</td>
<td>Perform a test similar to TCLP early in project. (T48-RHS-48) - COMPLETE</td>
<td>High</td>
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<td>Complete testing on grout at various TPB concentrations and curing temperatures. (T48-RHS-28)</td>
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</tr>
<tr>
<td>T48-58</td>
<td>Inadequate scale up from R&amp;D - Saltstone</td>
<td>High</td>
<td>V. Unlikely</td>
<td>Crisis</td>
<td>Mitigate</td>
<td>Compare effect of grout test sample geometry on benzene release rates during TPB tests. (T48-RHS-47)</td>
<td>High</td>
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<tr>
<td>T48-59</td>
<td>Saltstone Facility production rate less than 83K gals/week</td>
<td>High</td>
<td>V. Unlikely</td>
<td>Crisis</td>
<td>Mitigate</td>
<td>Evaluate production rate and investigate the option of using different vaults (T48-RHS-59)</td>
<td>Low</td>
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<td>Investigate required rates for windows of opportunity for processing in the Salt Strategy. (T48-RHS-63)</td>
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<td>Risk Number</td>
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<tr>
<td>T48-60</td>
<td>Laboratory Capability - Saltstone</td>
<td>Moderate</td>
<td>Very Likely</td>
<td>Marginal</td>
<td>Reduce/ Mitigate</td>
<td>Develop definitive sample plan in support of disposition. (T48-RHS-21) Perform testing with grout at various TPB concentrations and curing temperatures. (T48-RHS-28) Develop Sample &amp; Analytical Plans well in advance of actual operations including critical spare parts for analytical instruments, what if analysis (including ID of potential conflicts), splitting samples into multiple aliquots upon arrival, replicate analyses (especially as the concentration decreases or the target response time shortens), and contingency plans. (T48-RHS-44)</td>
<td>Low</td>
</tr>
<tr>
<td>Risk Number</td>
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<tr>
<td>T48-65</td>
<td>Processing Window Unavailable - NEW RISK</td>
<td>High</td>
<td>V. Likely</td>
<td>Crisis</td>
<td>Mitigate</td>
<td>Identify and develop methods of operating MCU and Tank 48 concurrently with Tank 50 as a shared receipt tank. (T48-RHS-65) Identify alternative methods to disposition Tank 48. (T48-RHS-66)</td>
<td>High</td>
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</table>
## Risks External to T&PRA Contingency Analysis

<table>
<thead>
<tr>
<th>Risk Number</th>
<th>Risk Title</th>
<th>Risk Level</th>
<th>Probability</th>
<th>Consequence</th>
<th>Approach</th>
<th>Description</th>
<th>Projected Residual Risk Level</th>
</tr>
</thead>
<tbody>
<tr>
<td>T48-01</td>
<td>Funding Availability</td>
<td>High</td>
<td>Likely</td>
<td>Crisis</td>
<td>Reduce/Mitigate</td>
<td>Keep Senior Management informed about project needs/progress. Reduce funding availability. Ensure required funding is approved and if funding becomes unavailable, effect a baseline change proposal to project. (T48-RHS-12)</td>
<td>Moderate</td>
</tr>
<tr>
<td>T48-08</td>
<td>Requirements for Construction Change</td>
<td>High</td>
<td>V. Unlikely</td>
<td>Crisis</td>
<td>Mitigate</td>
<td>Ensure estimate is conservative. Have estimating perform contingency analysis and SE to perform T&amp;PRA analysis to ensure contingency is quantified to provide at least an 80% confidence of project under run. (T48-RHS-05)</td>
<td>Low</td>
</tr>
<tr>
<td>Risk Number</td>
<td>Risk Title</td>
<td>Risk Level</td>
<td>Probability</td>
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<td>Approach</td>
<td>Description</td>
<td>Projected Residual Risk Level</td>
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<tr>
<td>T48-13</td>
<td>Tank 48 Equipment Failure</td>
<td>High</td>
<td>Likely</td>
<td>Critical</td>
<td>Mitigate/ Reduce</td>
<td>Maintain critical spares. Design Authority will specify spare parts and Project Manager will determine plan. (T48-RHS-25)</td>
<td>Low</td>
</tr>
<tr>
<td>T48-22</td>
<td>Stakeholder Participation</td>
<td>High</td>
<td>Likely</td>
<td>Crisis</td>
<td>Reduce/ Mitigate</td>
<td>Develop communication plan for involving stakeholders. (T48-RHS-18)</td>
<td>Moderate</td>
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<td></td>
<td>Keep Stakeholders/ Senior Management informed of R&amp;D results. (T48-RHS-19)</td>
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<tr>
<td>T48-23</td>
<td>Regulatory Concerns (3116 implementation)</td>
<td>High</td>
<td>V. Unlikely</td>
<td>Crisis</td>
<td>Reduce</td>
<td>PIT Team to pursue 3116 WD process, actively engaging DOE, NRC and stakeholders. (T48-RHS-49)</td>
<td>High</td>
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<tr>
<td>T48-24</td>
<td>Regulatory Concerns (Class C permit not granted)</td>
<td>High</td>
<td>V. Unlikely</td>
<td>Crisis</td>
<td>Reduce</td>
<td>PIT Team to pursue NRC Class C permit, actively engaging NRC and stakeholders. (T48-RHS-50)</td>
<td>High</td>
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<tr>
<td>Risk Number</td>
<td>Risk Title</td>
<td>Risk Level</td>
<td>Probability</td>
<td>Consequence</td>
<td>Approach</td>
<td>Description</td>
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<tr>
<td>T48-41</td>
<td>Equipment Failure (Tank 50)</td>
<td>High</td>
<td>Likely</td>
<td>Critical</td>
<td>Reduce/</td>
<td>Maintain critical spares. Design Authority will specify spare parts and</td>
<td>Low</td>
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<td></td>
<td>Mitigate</td>
<td>Project Manager will determine plan. (T48-RHS-25)</td>
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</tr>
<tr>
<td>T48-43</td>
<td>Permitting Delay - Saltstone</td>
<td>High</td>
<td>Likely</td>
<td>Crisis</td>
<td>Mitigate</td>
<td>Perform R&amp;D and NESHAPS evaluation early before execution of the project.</td>
<td>Low</td>
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<td>(T48-RHS-45)</td>
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<tr>
<td>T48-45</td>
<td>Tank 50 Cooling (Saltstone Transfer) Inadequate</td>
<td>High</td>
<td>V. Unlikely</td>
<td>Crisis</td>
<td>Accept</td>
<td>N/A</td>
<td>Low</td>
</tr>
<tr>
<td>T48-46</td>
<td>Saltstone 0.2 Ci/gal Cs Modifications Not Ready in</td>
<td>High</td>
<td>V. Unlikely</td>
<td>Crisis</td>
<td>Mitigate</td>
<td>Proceed with an integrated schedule upon decision to implement aggregation</td>
<td>Moderate</td>
</tr>
<tr>
<td></td>
<td>Time to Support Strategy</td>
<td></td>
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<td>project. (T48-RHS-51)</td>
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</tr>
<tr>
<td>T48-54</td>
<td>Volume of Grout is Unacceptable</td>
<td>High</td>
<td>Unlikely</td>
<td>Crisis</td>
<td>Reduce</td>
<td>Determine the grout volume based on aggregation to meet the governing limit.</td>
<td>High</td>
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</tbody>
</table>
Risk & Opportunity Assessment Form

<table>
<thead>
<tr>
<th>Identified No.:</th>
<th>Document Name:</th>
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<tr>
<td>00-T48-01</td>
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</table>

**KASE #:** 00-T48-01

**Title:** Funding Availability

**Category (Optional):**

**Risk/Opportunity Type:** Funding Availability

**Assessed Element:** 1.0 Project Execution

**Date:** March 13, 2006

**Responsibility:**

- **A. Statement of Event:**
  - Basis: Project must be adequately funded.
  - Event: Funding falls short of need.
  - Risk: Project is delayed

- **B. Probability:**
  - Funding shortfalls occur with regularity.
  - Noncredible
  - Very Unlikely (VU)
  - Unlikely (U)
  - Likely (L)
  - Very Likely (VL)

- **C. Consequence:**
  - Schedule delay.

- **D. Risk/Opportunity Level:**
  - Low (L)
  - Moderate (M)
  - High (H)

- **E. Handling:**
  - Reduce/Mitigate
    - Keep Senior Management informed about project needs/progress.
    - Ensure required funding is approved and if funding becomes unavailable, effect a baseline change proposal to project.

- **F. Residual Risk Impact:**
  - Cost Consequence: $0
  - Schedule Consequence: 0

- **G. Description of Residual Risk:**
  - Residual risk is the additional time required to complete the project and will not be included in TSPRA contingency calculation, as if realized the project will have to be re-baselined through the change control process.

- **H. Triggers:**

- **I. Affected Work Scope:**

- **J. Additional Comments (optional):**

---

**Unclassified ONLY**
Risk & Opportunity Assessment Form

Assessed Element: 1.0 Project Execution
Title: Interfaces with Other Facilities and Projects

A. Statement of Event:

Basis: This project will interact with other facilities and projects
Event: Priorities conflict
Risk: Project is delayed

B. Probability:

Projects and facilities that interact with this project are subject to conflicting priorities

- Noncredible
- Very Unlikely (VU)
- Unlikely (U)
- Likely (L)
- Very Likely (VL)

C. Consequence:

For opportunities, document the benefit/cost ratio comparison between the original scope and proposed opportunity

Cost increases and schedule delays

D. Risk/Opportunity Level:

- Low (L)
- Moderate (M)
- High (H)

E. Handling:

Reduce
- Keep H-Tank Farm Facility and Salts tone/Project Owners & Managers informed about project needs and progress.
- Prepare a plan showing NaOH additions and transfers of recycle from Type IV tanks and receive concurrence from Facility and Transfer Planning Group.

F. Residual Risk Impact:

Cost Consequence: $100K
Schedule Consequence: 4 Wk(s)

G. Description of Residual Risk:

H. Triggers:

I. Affected Work Scope:

J. Additional Comments (optional):

The aggregation plan requires the addition of about 100 Kgal of NaOH and 3.4 Mgal of recycle added to Tanks 48 and 50 in a very congested East Hill.
### Risk & Opportunity Assessment Form

**Title:** Lost or Spilled Sample in SRNL

**Assessed Element:** 1.0 Project Execution

<table>
<thead>
<tr>
<th>Ident No.</th>
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<td>00-T48-03</td>
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</tbody>
</table>

**Category (Optional):** Basis: R&D efforts require sample material

**Event:** SRNL spills or loses sample

**Risk:** R&D process takes more time.

**A. Statement of Event:**

**B. Probability:**

(State the probability and basis that the risk/opportunity will come true without credit for HS)

- Noncredible
- Very Unlikely (VU) \( P < 0.15 \)
- Unlikely (U) \( 0.15 \leq P < 0.45 \)
- Likely (L) \( 0.45 \leq P < 0.75 \)
- Very Likely (VL) \( P \geq 0.75 \)

**C. Consequence:**

(State the consequences and quantify basis if that risk comes true without credit for RHS)

For opportunities, document the benefit:cost ratio comparison between the original scope and proposed opportunity

- Negligible (N)
- Marginal (M)
- Significant (S)
- Critical (C)
- Crisis (Cr)

**D. Risk/Opportunity Level:**

- Low (L)
- Moderate (M)
- High (H)

**E. Handling:**

<table>
<thead>
<tr>
<th>Handling Strategy</th>
<th>Handling Strategy Description and Bases</th>
<th>Reduced Risk</th>
<th>Implementation Cost</th>
<th>Tracking Tracking Distribution Selection</th>
</tr>
</thead>
<tbody>
<tr>
<td>Reduce</td>
<td>Develop Sample &amp; Analytical Plans well in advance of actual operations including critical spare parts for analytical instruments, what if analysis (including identification of potential conflicts, splitting samples into multiple aliquots upon arrival, replicate analyses especially as the concentration decreases or the target response time shortens), and contingency plans (T48-RHS-44) (Responsible for execution: SRNL - Bill Wilmarth)</td>
<td>VU S L</td>
<td>$10K</td>
<td>2 Wk</td>
</tr>
<tr>
<td></td>
<td>SRNL to implement corrective action to improve sample storage and management. (T48-RHS-31) (Responsible for execution: Mike Swain) - COMPLETE</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**F. Residual Risk Impact:**

<table>
<thead>
<tr>
<th>Cost Consequence</th>
<th>Schedule Consequence</th>
</tr>
</thead>
<tbody>
<tr>
<td>$0</td>
<td></td>
</tr>
<tr>
<td>$10,000</td>
<td>2 Wk</td>
</tr>
<tr>
<td>$125,000</td>
<td>4 Wk</td>
</tr>
</tbody>
</table>

**Distribution Selection:**

- Best
- Most Likely
- Worst

**G. Description of Residual Risk:**

**H. Triggers:**

**I. Affected Work Scope:**

**J. Additional Comments (optional):**

**UPDATED 8/16/05 - T48-RHS-44 and 31 have been completed, revised title to "Lost or spilled sample in SRNL."**
Risk & Opportunity Assessment Form

Identification No.: 00-T48-04
KASE#: 00-T48-04
Assessed Element: 1.0 Project Execution
Title: Laboratory Capability - Tank Farm
Category (Optional): 
Risk/Opportunity Type: 
BDER Level: 
Date: 
Responsibility: 

A. Statement of Event:
(State Event and Risk/Opportunity)
Basis: Process samples must be analyzed.
Event: Rate of return of analytical results is slowed.
Risk: Timing and progress of sample results is delayed.

B. Probability:
(State the probability and basis that the risk/opportunity will come true without credit for HS)
Parallel site (and LWD) projects may place competing demands on SRNL Analytical Staff. Key equipment is unique and seldom used. Potential for equipment failure or competing resource needs high.

Noncredible (P < 0.15)
Very Unlikely (VU) (0.15 ≤ P < 0.45)
Unlikely (U) (0.45 ≤ P < 0.75)
Likely (L) (0.75 ≤ P < 0.9)
Very Likely (VL) (P ≥ 0.9)

C. Consequence:
(State the consequences and quantify basis if that risk comes true without credit for RHS)
For opportunities, document the benefit/cost ratio comparison between the original scope and proposed opportunity
Process is disrupted and delays in sample results occur.

Worst Case Cost Impact: $125K
Worst Case Schedule Impact: 4 Wk(s)

Negligible (N) (C < 0.15)
Marginal (M) (0.15 ≤ C < 0.45)
Significant (S) (0.45 ≤ C < 0.75)
Critical (C) (0.75 ≤ C < 0.9)
Crisis (Cr) (C > 0.9)

D. Risk/Opportunity Level:
Low (L) Moderate (M) High (H) Probability x Consequence = RF/OF (optional):

E. Handling:
Handling Strategy (HS) Description and Bases
Reduced Risk Implementation Tracking
Prob. Cost Risk Cost Schedule (Optional)
Mitigate Develop Sample & Analytical Plans well in advance of actual operations (including identification of potential conflicts), splitting samples into multiple aliquots upon arrival, replicate analyses (especially as the concentration decreases or the target response time shortens), and contingency plans (T48-RHS-44) (Responsible for execution: SRNL - Bill Wilmarth)

L S M $10K 2

F. Residual Risk Impact:
Cost Consequence:
Schedule Consequence:

G. Description of Residual Risk:
Expect some delays during entire schedule with number of samples needed.

H. Triggers:
I. Affected Work Scope:
J. Additional Comments (optional):
### Risk & Opportunity Assessment Form

<table>
<thead>
<tr>
<th>Assessment Element:</th>
<th>Design/Install New Equipment</th>
</tr>
</thead>
<tbody>
<tr>
<td>Title:</td>
<td>Accessibility to Perform Work</td>
</tr>
<tr>
<td>Category (Optional):</td>
<td></td>
</tr>
<tr>
<td>Risk/Opportunity Type:</td>
<td>BDERLevel:</td>
</tr>
<tr>
<td>Date:</td>
<td></td>
</tr>
<tr>
<td>A. Statement of Event:</td>
<td></td>
</tr>
<tr>
<td>Basis: Construction work is required at or around Tank 48. Event: Congestion / Collocation of work impacts accessibility to area on or around Tank 48 and/or Operations planned activities. Risk: Scheduled construction activities impacted.</td>
<td></td>
</tr>
<tr>
<td>B. Probability:</td>
<td>Noncredible (VU) Likely (L) Likely (L) Very Likely (VL)</td>
</tr>
<tr>
<td>Tank 48 has one of the most congested tank tops at SRS. If not closely coordinated construction and operations activities will interfere with each other.</td>
<td></td>
</tr>
<tr>
<td>C. Consequence:</td>
<td>Negligible (N) Marginal (M) Significant (S) Critical (C) Crisis (Cr)</td>
</tr>
<tr>
<td>For opportunities, document the benefit/cost ratio comparison between the original scope and proposed opportunity. Schedule delay due to inability to perform work on Tank 48 area.</td>
<td></td>
</tr>
<tr>
<td>D. Risk/Opportunity Level:</td>
<td>Low (L) Moderate (M) High (H)</td>
</tr>
<tr>
<td>Probability x Consequence = RF/OF (optional):</td>
<td></td>
</tr>
<tr>
<td>E. Handling:</td>
<td></td>
</tr>
<tr>
<td>Handling Strategy:</td>
<td>Reduce</td>
</tr>
<tr>
<td>Handling Strategy (HS) Description and Basis:</td>
<td>coordinate work with operations and other projects through participation in facility Work Window Lockins, 8 Week Lookaheads (T8s), and Plan of the Days (PODs) (T48-RHS-01) (Responsible for execution: Owner - Renee Spires)</td>
</tr>
<tr>
<td>Reduced Risk Implementation Tracking</td>
<td></td>
</tr>
<tr>
<td>Prob.</td>
<td>Cons.</td>
</tr>
<tr>
<td>VU</td>
<td>S</td>
</tr>
<tr>
<td>F. Residual Risk Impact:</td>
<td>Cost Consequence: $0 Schedule Consequence: 0</td>
</tr>
<tr>
<td>Distribution Selection:</td>
<td>$100,000</td>
</tr>
<tr>
<td>G. Description of Residual Risk:</td>
<td>Minor schedule conflicts</td>
</tr>
<tr>
<td>H. Triggers:</td>
<td></td>
</tr>
<tr>
<td>I. Affected Work Scope:</td>
<td></td>
</tr>
<tr>
<td>J. Additional Comments (optional):</td>
<td></td>
</tr>
</tbody>
</table>

Unclassified ONLY
Risk & Opportunity Assessment Form

Identification No.:  00-T48-06
Assessed Element: 1.01 Design/Install New Equipment
Title: Field materials are not available
KASE#: ""
Category (Optional): ""
Risk/Opportunity Type: BDER Level: ""
Date: ""
Responsibility: ""
A. Statement of Event: (State Event and Risk/Opportunity)
   Basis: Materials are required for Tank 48 Project construction activities.
   Event: Materials are not available when required.
   Risk: Work unable to proceed.

B. Probability: (State the probability and basis that the risk/opportunity will come true without credit for HS)
   Noncredible: Very Unlikely (VU) Unlikely (U) Likely (L) Very Likely (VL)
   Probability: (P)

C. Consequence: (State the consequences and quantify basis if that risk comes true without credit for RHS)
   For opportunities, document the benefit/cost ratio comparison between the original scope and proposed opportunity.
   Schedule delay due to unavailability of material.

D. Risk/Opportunity Level: Probability x Consequence = RF/OF (optional): ""
   Low (L) Moderate (M) High (H)

E. Handling:
   Handling Strategy: Reduce
   Handling Strategy (HS) Description and Basis: [T48-RHS-03] (Responsible for execution: PM - Pen Mayson)
   Reduced Risk Implementation Tracking
   Distribution Selection:

F. Residual Risk Impact:
   Cost Consequence: $0
   Schedule Consequence: 1 Week

G. Description of Residual Risk: Minor delays

H. Triggers:

I. Affected Work Scope:

J. Additional Comments (optional): ""
Risk & Opportunity Assessment Form

Identification No.: 00-T48-08

Assessed Element: 1.01 Design/Install New Equipment

Title: Requirements for Construction Change

Category (Optional):

Risk/Opportunity Type: BDERLevel:

Responsibility:

A. Statement of Event:

(Entry Event and Risk/Opportunity)

(Basis: Conceptual design begins with a given set of requirements.

Event: Requirements change.

Risk: Scope increases.

B. Probability:

(Entry the probability and basis that the risk/opportunity will come true without credit for HS)

Typically Codes and Standards are relatively stable, however they can change.

○ Noncredible ○ Very Unlikely (VU) ○ Unlikely (U) ○ Likely (L) ○ Very Likely (VL)

\[ P < 0.15 \quad \text{or} \quad 0.15 \leq P < 0.45 \quad \text{or} \quad 0.45 \leq P < 0.75 \quad \text{or} \quad P \geq 0.75 \]

C. Consequence:

(Entry the consequences and quantify basis if that risk comes true without credit for RHS.

For opportunities, document the benefit/cost ratio comparison between the original scope and proposed opportunity)

Scope growth (extra stiffeners, missile shields, etc.) increases cost and delays schedule for redesign.

Worst Case Cost Impact: $400K

Worst Case Schedule Impact: 12 Wk(s)

○ Negligible (N) ○ Marginal (M) ○ Significant (S) ○ Critical (C) ○ Crisis (Cr)

\[ C < 0.15 \quad \text{or} \quad 0.15 \leq C < 0.45 \quad \text{or} \quad 0.45 \leq C < 0.75 \quad \text{or} \quad C \geq 0.75 \]

D. Risk/Opportunity Level:

○ Low (L) ○ Moderate (M) ○ High (H) Probability \times \text{Consequence} = \text{RF/OF} (optional):

E. Handling:

Handling Strategy

Handling Strategy (HS) Description and Bases

Reduced Risk Implementation Tracking

Prob. Risk Cost Schedule

Mitigate: Ensure estimate is conservative. Have estimating perform contingency analysis and SE to perform T&PRA analysis to ensure contingency is quantified to provide at least an 80% confidence of project under run.

(T48-RHS-05) (Responsible for execution: PM - Troy Donahue) COMPLETE

\[ \text{Distribution Selection:} \quad \text{VU} \quad \text{N} \quad \$9600 \quad 10 \text{ Wk} \]

F. Residual Risk Impact:

Cost Consequence: $0

Schedule Consequence: $0

\[ \text{Distribution Selection:} \quad \text{Best} \quad \text{Most Likely} \quad \text{Worst} \quad \$200,000 \quad \text{6 Wks} \]

G. Description of Residual Risk:

H. Triggers:

I. Affected Work Scope:

J. Additional Comments (optional):

UPDATE 9/7/05 - T48-RHS-05 has been completed.
### Risk & Opportunity Assessment Form

**Identification No.:** 00-T48-09  
**KASE #:**  
**Assessed Element:** 1.01 Design/Install New Equipment  
**Title:** Availability of Construction Equipment  
**Category (Optional):**  
**Risk/Opportunity Type:** BDE Level:  
**Date:**  
**Responsibility:**  

**A. Statement of Event:**  
Basis: Construction equipment (e.g., cranes, JLGs, Breathing Air Compressors) is needed to complete work.  
Event: Equipment is not available when needed.  
Risk: Construction activities are slowed or stopped.

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

- Noncredible  
- Very Unlikely (VU)  
- Unlikely (U)  
- Likely (L)  
- Very Likely (VL)  

\[ P < 0.15 \]  
\[ 0.15 \leq P < 0.45 \]  
\[ 0.45 \leq P < 0.75 \]  
\[ P \geq 0.75 \]

This project is a high profile, accelerated project, which should increase priority for access to equipment.

**C. Consequence:**  
(State the consequences and quantify basis if that risk comes true without credit for RH.

For opportunities, document the benefit/cost ratio comparison between the original scope and proposed opportunity)

- Negligible (N)  
- Marginal (M)  
- Significant (S)  
- Critical (C)  
- Crisis (Cr)  

\[ C < 0.15 \]  
\[ 0.15 \leq C < 0.45 \]  
\[ 0.45 \leq C < 0.75 \]  
\[ 0.75 \leq C < 0.9 \]  
\[ C > 0.9 \]

Schedule delay and loss of productivity due to availability of equipment.

**D. Risk/Opportunity Level:**  
- Low (L)  
- Moderate (M)  
- High (H)

Probability x Consequence = RF/OF (optional):

**E. Handling:**  
<table>
<thead>
<tr>
<th>Handling Strategy</th>
<th>Handling Strategy (HS) Description and Bases</th>
<th>Reduced Risk</th>
<th>Implementation</th>
<th>Tracking</th>
<th>Tracking</th>
</tr>
</thead>
<tbody>
<tr>
<td>Accept</td>
<td></td>
<td>VU</td>
<td>S</td>
<td>L</td>
<td>$6K</td>
</tr>
</tbody>
</table>

**F. Residual Risk Impact:**  
Cost Consequence: \$0  
Schedule Consequence: 0  
Distribution Selection:  
- Best  2 Wk(s)  
- Most Likely 4 Wk(s)  
- Worst  

**G. Description of Residual Risk:**

**H. Triggers:**

**I. Affected Work Scope:**

**J. Additional Comments (optional):**  
UPDATED 1/20/06 - Deleted T48-RHS-02
Risk & Opportunity Assessment Form

**Identification No.:** 00-T48-10

**Title:** Readiness Assessment More Than a WSRC RA

**Assessed Element:** 1.01 Design/Install New Equipment

**Category (Optional):**

**Date:**

**Responsibility:**

**A. Statement of Event:**

(State Event and Risk/Opportunity)

Basis: Process has to be proven ready to operate.

Event: ORR is required in addition to Management Checklist/Readiness Assessment

Risk: Start up is delayed.

**B. Probability:**

(State the probability and basis that the risk/opportunity will come true without credit for HS)

- Noncred ible (VC)
- Very Unlikely (VU)
- Unlikely (U)
- Likely (L)
- Very Likely (VL)

**C. Consequence:**

(State the consequences and quantify basis if that risk comes true without RHS.

For opportunities, document the benefit/cost ratio comparison between the original scope and proposed opportunity)

**Additional assessment time will be needed, schedule and cost impact**

**D. Risk/Opportunity Level:**

**E. Handling:**

Handling Strategy | Handling Strategy (HS) Description and Bases | Reduced Risk Implementation | Tracking (Optional)
--- | --- | --- | ---
Reduce | Early development and input to the Startup Notification Report (SNR). Obtain appropriate buy-in from DOE prior to submittal. (T48-RHS-32 (Responsible for execution: Owner - Renee Spires)) | | |

**F. Residual Risk Impact:**

- Cost Consequence: $0, $50,000, $200,000
- Schedule Consequence: 0, 3 Week(s), 2 Months

**G. Description of Residual Risk:**

Most likely is DOE oversight of WSRC RA.

**H. Triggers:**

- Most likely is DOE oversight of WSRC RA.

**I. Affected Work Scope:**

**J. Additional Comments (optional):**
Risk & Opportunity Assessment Form

Assessed Element: 1.01 Design/Install New Equipment

Title: Readiness Assessment Findings

Category (Optional):

Risk/Opportunity Type: BDER Level:

Date: Readiness Assessment Findings

A. Statement of Event: (State Event and Risk/Opportunity)
   Basis: Process has to be proved ready to operate
   Event: Process is found to be not ready by Readiness Assessment
   Risk: Project is delayed while concerns are resolved.

B. Probability: (State the probability and basis that the risk/opportunity will come true without credit for HS)
   - Noncredible
   - Very Unlikely (VU) (P < 0.15)
   - Unlikely (U) (0.15 ≤ P < 0.45)
   - Likely (L) (0.45 ≤ P ≤ 0.75)
   - Very Likely (VL) (P > 0.75)

C. Consequence: (State the consequences and quantify basis if that risk comes true without credit for RHS)
   For opportunities, document the benefit/cost ratio comparison between the original scope and proposed opportunity
   Additional time to resolve findings will be needed, schedule and cost impact

D. Risk/Opportunity Level:
   - Low (L)
   - Moderate (M)
   - High (H)

E. Handling:
   Handling Strategy (HS) Description and Bases
   - Mitigate: Project Team develop and perform detailed management checklist prior to beginning RA. (T48-RHS-33) (Responsible for execution: Owner - Renee Spires)
   - Handling Strategy (HS) Description and Bases
   - Reduced Risk Implementation Tracking
   - Distribution Selection:
     - Best
     - Most Likely
     - Worst

F. Residual Risk Impact:
   - Cost Consequence: $100K
   - Schedule Consequence: 4 Wk(s)

G. Description of Residual Risk:

H. Triggers:

I. Affected Work Scope:

J. Additional Comments (optional):

Unclassified ONLY
Document Name: Support Services Availability

**Risk & Opportunity Assessment Form**

**Identification No.:** 00-T48-12  
**KASE #:** 00-T48-12  
**Assessed Element:** 1.02 Ensure Operability of Existing Equipment

**Title:** Support Services Availability

**Category (Optional):**

**Risk/Opportunity Type:**

**Responsibility:**

**Date:**

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

Basis: Project requires support from other organizations  
Event: Support is not available in a timely way.  
Risk: Project is delayed

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

- Noncredible
- Very Unlikely (VU) \( P < 0.15 \)
- Unlikely (U) \( 0.15 \leq P < 0.45 \)
- Likely (L) \( 0.45 \leq P < 0.75 \)
- Very Likely (VL) \( P \geq 0.75 \)

**C. Consequence:**  
(State the consequences and quantify basis if that risk comes true without credit for RHS)

- Negligible (N) \( C < 0.15 \)
- Marginal (M) \( 0.15 \leq C < 0.45 \)
- Significant (S) \( 0.45 \leq C < 0.75 \)
- Critical (C) \( 0.75 \leq C < 0.9 \)
- Crisis (Cr) \( C \geq 0.9 \)

**D. Risk/Opportunity Level:**  
Low (L)  
Moderate (M)  
High (H)

**Handling:**

<table>
<thead>
<tr>
<th>Handling Strategy</th>
<th>Handling Strategy (HS) Description and Basis</th>
<th>Reduced Cost</th>
<th>Implementation</th>
<th>Tracking (Optional)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Reduce</td>
<td>Forecast resources and stick to plan.</td>
<td>U</td>
<td>S</td>
<td>M 0</td>
</tr>
<tr>
<td></td>
<td>(T48-RHS-14) (Responsible for execution: PM - Pen Mayson)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Integrate project activities into facility schedule</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>(T48-RHS-15) (Responsible for execution: Owner - Renee Spires)</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**F. Residual Risk Impact:**  
Cost Consequence: $0  
Schedule Consequence: 2 Wks  
Distribution Selection: $50,000

**G. Description of Residual Risk:**

**H. Triggers:**

**I. Affected Work Scope:**

**J. Additional Comments (optional):**
Risk & Opportunity Assessment Form

Identification No.: 00-T48-13
Assessed Element: 1.02 Ensure Operability of Existing Equipment

KASE#: 00-T48-13
Title: Tank 48 Equipment Failure

Category (Optional):
Risk/Opportunity Type: 
BDER Level: 

Date: 
Responsibility: 
A. Statement of Event: (State Event and Risk/Opportunity)
Basis: Process employs a variety of equipment.
Event: Equipment fails in normal service.
Risk: Process stops while equipment is repaired.

B. Probability: (State the probability and basis that the risk/opportunity will come true without credit for HS)
- Noncredible
- Very Unlikely (VU)
- Unlikely (U)
- Likely (L)
- Very Likely (VL)

Event failure in normal service must be expected.

P = Noncredible
U = Unlikely
L = Likely
VU = Very Unlikely

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

Process is halted
Schedule delay

C = Negligible (N)
M = Marginal (M)
S = Significant (S)
C = Critical (C)
Cr = Crisis (Cr)

D. Risk/Opportunity Level:
- Low (L)
- Moderate (M)
- High (H)

Probability x Consequence = RF/OF (optional):

E. Handling:

<table>
<thead>
<tr>
<th>Handling Strategy (HS) Description and Bases</th>
<th>Reduced Risk Implementation</th>
<th>Tracking (Optional)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Maintain critical spares. Design Authority will specify spare parts and Project Manager will determine plan. (T48-RHS-25)</td>
<td>U</td>
<td>N</td>
</tr>
</tbody>
</table>

F. Residual Risk Impact:
Cost Consequence: $0
Schedule Consequence: $0
Distribution Selection:
Best
Most Likely
Worst

G. Description of Residual Risk:
Failures will occur, but spare parts and forward planning will mitigate the impact.

H. Triggers:

I. Affected Work Scope:

J. Additional Comments (optional):
- UPDATED 8/17/05 - Removed cost impact as H-Area Tank Farm will fund any equipment repair during operations. Impact to project is limited to schedule only.
### Risk & Opportunity Assessment Form

**Identification No.:** 00-T48-14  
**Title:** Loss of Utilities  
**KASE#:**  
**Risk/Opportunity Type:** BDER Level:  
**Responsibility:**  
**Assessed Element:** 1.02 Ensure Operability of Existing Equipment  
**Date:** March 13, 2006

#### A. Statement of Event:
- **Event and Risk/Opportunity:** Basis: Process requires utilities (e.g., power, CRW)  
  Event: Utilities fail.  
  Risk: Process stops until utilities can be restored  

#### B. Probability:
- **Probability and basis that the risk/opportunity will come true without credit for HS**  
  Tank farm has a history of failure of utilities. This project plans to work with H-Tank Farm Facility to return systems to service.  
  - Noncredible (P < 0.15)  
  - Very Unlikely (VU) (0.15 ≤ P < 0.45)  
  - Unlikely (U) (0.45 ≤ P < 0.75)  
  - Likely (L) (P ≥ 0.75)  

#### C. Consequence:
- **Consequences and quantify basis if that risk comes true without credit for RHS**  
  For opportunities, document the benefit/cost ratio comparison between the original scope and proposed opportunity  
  Schedule delay and cost impact  
  - Worst Case Cost Impact: $100K  
  - Worst Case Schedule Impact: 4 Wk(s)  
  - Negligible (N) (C < 0.15)  
  - Marginal (M) (0.15 ≤ C < 0.45)  
  - Significant (S) (0.45 ≤ C < 0.75)  
  - Critical (C) (0.75 ≤ C < 0.9)  
  - Crisis (Cr) (C > 0.9)

#### D. Risk/Opportunity Level:
- **Probability x Consequence = RF/OF (optional):**

#### E. Handling:
- **Handling Strategy:** Accept  
  - Handling Strategy (HS) Description and Bases  
  - Reduced Risk Implementation Tracking  
    - Prob  
    - Cost  
    - Schedule  
    - Tracking (Optional)

#### F. Residual Risk Impact:
- **Cost Consequence:**  
  - Schedule Consequence:
  - $0  
  - $100,000  
  - Distribution Selection:
    - Best  
    - Worst

#### G. Description of Residual Risk:
- Worse case would be to provide temporary power to pumps, fans and instruments. Do not believe this would ever be necessary.

#### H. Triggers:

#### I. Affected Work Scope:

#### J. Additional Comments (optional):
- Risk reduced from in-situ processing since steam is not required.
<table>
<thead>
<tr>
<th><strong>Title:</strong>  Unsafe Conditions Discovered at Turnover</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Basis:</strong>  Process requires a safety (SMI 51) walk down before start up.</td>
</tr>
<tr>
<td><strong>Event:</strong>  Unsafe conditions are discovered during walk down.</td>
</tr>
<tr>
<td><strong>Risk:</strong>  Delay while remedial action is taken.</td>
</tr>
</tbody>
</table>

**A. Statement of Event:**

**B. Probability:**

- Noncredible
- Very Unlikely (VU)
- Unlikely (U)
- Likely (L)
- Very Likely (VL)  
  
- (P < 0.15)
- (0.15 ≤ P < 0.45)
- (0.45 ≤ P < 0.75)
- (P ≥ 0.75)

**C. Consequence:**

- Negligible (N)
- Marginal (M)
- Significant (S)
- Critical (C)
- Crisis (Cr)  
  
- (C < 0.15)
- (0.15 ≤ C < 0.45)
- (0.45 ≤ C < 0.75)
- (0.75 ≤ C < 0.9)
- (C ≥ 0.9)

**D. Risk/Opportunity Level:**

- Low (L)
- Moderate (M)
- High (H)  

**E. Handling:**

- Mitigate/Reduce
- Ensure Safety/IH Engineer included in design reviews  
  
- (T48-RHS-40) (Responsible for execution: DS - Lee Carey)

**F. Residual Risk Impact:**

- **Cost Consequence:**  $0  
- **Schedule Consequence:**  0  
- **Distribution Selection:**  $25,000  

**G. Description of Residual Risk:**

**H. Triggers:**

**I. Affected Work Scope:**

**J. Additional Comments (optional):**

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**Risk & Opportunity Assessment Form**

| **Assessed Element:**  1.02 Ensure Operability of Existing Equipment  |
| **Risk/Opportunity Type:**  BDER Level |
| **Responsibility:**  U |

---

**Handling Strategy Description and Bases**

<table>
<thead>
<tr>
<th>Handling Strategy</th>
<th>Reduced Risk</th>
<th>Implementation</th>
<th>Tracking</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mitigate/Reduce</td>
<td>U</td>
<td>M</td>
<td>L</td>
</tr>
</tbody>
</table>

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**Risk & Opportunity Assessment Form**

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**Unclassified ONLY**
### Risk & Opportunity Assessment Form

**Identification No.:** 00-T48-16  
**Blending Option Document No.:** 00-T48-16  
**Assessed Element:** 1.02 Ensure Operability of Existing Equipment  
**Title:** Equipment Failure (Recycle Transfers)

#### A. Statement of Event:
Basis: Equipment operability (Pumps, VFDs, Seals etc.) is necessary for process  
Event: Transfer pump, pump seals or other critical components fail  
Risk: Processing not possible until repair or replacement

#### B. Probability:
- **Noncredible** (P < 0.15)  
- **Very Unlikely (VU)**  
- **Unlikely (U)**  
- **Likely (L)**  
- **Very Likely (VL)**  

Based on historical transfer pump performance.

#### C. Consequence:
Worst case will be a prime mover fails in the Recycle Feed Tank

<table>
<thead>
<tr>
<th>Cost Consequence</th>
<th>Schedule Consequence</th>
</tr>
</thead>
<tbody>
<tr>
<td>$50,000</td>
<td>4 Wk(s)</td>
</tr>
</tbody>
</table>

#### D. Risk/Opportunity Level:
- **Low (L)**  
- **Moderate (M)**  
- **High (H)**

<table>
<thead>
<tr>
<th>Probability x Consequence = RF/OF (optional):</th>
</tr>
</thead>
</table>

#### E. Handling:

<table>
<thead>
<tr>
<th>Handling Strategy (HS) Description and Bases</th>
<th>Reduced Risk Implementation Tracking</th>
</tr>
</thead>
<tbody>
<tr>
<td>Accept</td>
<td>N</td>
</tr>
</tbody>
</table>

#### F. Residual Risk Impact:

<table>
<thead>
<tr>
<th>Schedule Consequence</th>
<th>Cost Consequence</th>
<th>Distribution Selection</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>0</td>
<td>$50,000</td>
</tr>
</tbody>
</table>

#### G. Description of Residual Risk:

A transfer pump failure is not considered as likely and this risk will be accepted

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*Unclassified ONLY*
Risk & Opportunity Assessment Form

Identification No.: 00-T48-17
Title: Tie-ins to Existing Facility
Category (Optional):

Risk/Opportunity Type: Modifications tie into existing systems and components

Event: Existing components are faulty (e.g., corroded, do not operate as expected).
Risk: Existing facility has to be modified/repaired to permit tie-ins.

A. Statement of Event:

B. Probability:

Noncredible
Very Unlikely (VU)
Unlikely (U)
Likely (L)
Very Likely (VL)
(P < 0.15) (0.15 ≤ P < 0.45) (0.45 ≤ P < 0.75) (P ≥ 0.75)

Ps

C. Consequence:

Negligible (N)
Marginal (M)
Significant (S)
Critical (C)
Crisis (Cr)
(C < 0.15) (0.15 ≤ C < 0.45) (0.45 ≤ C < 0.75) (0.75 ≤ C < 0.9) (C > 0.9)

Cm

D. Risk/Opportunity Level:

Low (L)
Moderate (M)
High (H)
Probability x Consequence = RF/OF (optional):

E. Handling:

Mitigate / Reduce
Design Services will perform early walk downs and validate existing conditions/equipment. (T48-RHS-11) (Responsible for execution: DS - Pierre Gautier)

Reduced Risk Implementation Tracking
Prob Cost Risk Cost Schedule Optional
VU S L $6K 2 Wk

F. Residual Risk Impact:

Cost Consequence: $0 $50,000 $100,000
Schedule Consequence: 0 2 Wk 4 Wk
Best Most Likely Worst

G. Description of Residual Risk:

H. Triggers:

I. Affected Work Scope:

J. Additional Comments (optional):
Risk & Opportunity Assessment Form

Identification No.: 00-T48-18

KASE#: 00-T48-18

Assessed Element: 1.02 Ensure Operability of Existing Equipment

Title: Cooling Coils Fail Test

Category (Optional):

Risk/Opportunity Type: BDER Level:

Date: March 13, 2006

A. Statement of Event:
    Basis: Maintain tank contents below DSA temp. Lim to minimize benzene generation from aggregation process
    Event: Existing cooling coils in both T48 and T50 are used for heat removal to maintain contents below DSA temp.
    Risk: Cooling coils fail the performance test, heat removal is impacted.

B. Probability:
    Cooling coils have been in service for many years however, design uses many loops allowing isolation of failed loops and continued use of operable loops. Corrosion control and in-service testing will be performed as part of the current program.

C. Consequence:
    Likely to very likely that a single loop may fail, but that loop can be valved out with minimal impact.

D. Risk/Opportunity Level:
    Probability x Consequence = RF/OF (optional):

E. Handling:
    Mitigate: Perform heat balance study to determine requirements.
    (T48-RHS-02) (Responsible for Execution: DA - Dennis Conrad) - Complete

F. Residual Risk Impact:
    Cost Consequence: $50,000
    Schedule Consequence: 0

G. Description of Residual Risk:

H. Triggers:

I. Additional Comments (optional):

J. Updated:
    1/20/06 - T48-RHS-62 Complete

Unclassified ONLY
Risk & Opportunity Assessment Form

Identification No.: 00-T48-19
Assessed Element: 1.02 Ensure Operability of Existing Equipment
Title: Existing equipment cannot meet seismic qualification requirements
KASE#: (Optional): 
Category (Optional):  
Risk/Opportunity Type: BDER Level: 
Date: 
A. Statement of Event: (State Event and Risk/Opportunity)
Basis: Equipment must be seismically qualified.
Event: Existing equipment cannot meet seismic qualification requirements
Risk: Equipment must be upgraded or replaced.

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

○ Noncredible ○ Very Unlikely (VU) ○ Unlikely (U) ○ Likely (L) ○ Very Likely (VL)
(P < 0.15) (1.5 ≤ P < 0.45) (0.45 ≤ P < 0.75) (P ≥ 0.75)

C. Consequence: (State the consequences and quantify basis if that risk comes true without credit for RHS)

For opportunities, document the benefit/cost ratio comparison between the original scope and proposed opportunity.
Schedule delay and cost increases for replacement of existing equipment (Worst case scenario)

Worst Case Cost Impact: $100,000
Worst Case Schedule Impact: 4 Wk(s)

○ Negligible (N) ○ Marginal (M) ○ Significant (S) ○ Critical (C) ○ Crisis (Cr)
(C < 0.15) (0.15 ≤ C < 0.45) (0.45 ≤ C < 0.75) (0.75 ≤ C < 0.9) (C > 0.9)

D. Risk/Opportunity Level: Probability x Consequence = RF/OF (optional):

E. Handling:

<table>
<thead>
<tr>
<th>Handling Strategy</th>
<th>Handling Strategy (HS) Description and Bases</th>
<th>Reduced Risk Implementation Tracking (Optional)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mitigate/Reduce</td>
<td>Design Services will perform early walk downs and validate existing conditions/equipment (T48-RHS-11) (Responsible for execution: DS - Pierre Gautier)</td>
<td>VU S L $6K 2 Wk</td>
</tr>
</tbody>
</table>

F. Residual Risk Impact:

<table>
<thead>
<tr>
<th>Cost Consequence:</th>
<th>$0</th>
<th>$50,000</th>
<th>$100,000</th>
</tr>
</thead>
<tbody>
<tr>
<td>Schedule Consequence:</td>
<td>0</td>
<td>0 Wk(s)</td>
<td>3 Wk(s)</td>
</tr>
</tbody>
</table>

Distribution Selection:

Best Most Likely Worst

G. Description of Residual Risk:

Some rew ork and redesign will be required

H. Triggers:

I. Affected Work Scope:

J. Additional Comments (optional):
Risk & Opportunity Assessment Form

Identification No.: 00-T48-20
Assessed Element: 1.02 Ensure Operability of Existing Equipment
KASE#: 00-T48-20
Title: Tank 48 Transfer Pump Fails Tests During Startup Testing
Category (Optional):
Risk/Oppportunity Type: BDER Level:

A. Statement of Event:
(State Event and Risk/Opportunity)
Basis: Equipment is tested before start up.
Event: Equipment fails tests.
Risk: Delay; equipment must be repaired or modified, or additional equipment must be designed,
procured, installed and tested.

B. Probability:
(State the probability and basis that the risk/opportunity will come true without credit for HS)
P =
Worst case assumes failure of existing T48 to T50 transfer pump. Installed for many years without use.
- Noncreditable
- Very Unlikely (VU)
- Unlikely (U)
- Likely (L)
- Very Likely (VL)
(P < 0.15)
(0.15 ≤ P < 0.45)
(0.45 ≤ P < 0.75)
(P ≥ 0.75)

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

C =

D. Risk/Oppportunity Level:
Low (L) Moderate (M) High (H)
Probability x Consequence = RF/OF (optional): ______

E. Handling:

<table>
<thead>
<tr>
<th>Handling Strategy (HS) Description and Bases</th>
<th>Reduced Risk Prob Cost</th>
<th>Implementation Risk Cost Schedule Tracking (Optional)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mitigate/Reduce</td>
<td>T48-RHS-38 (Responsible for execution: DA - Dennis Conrad) - COMPLETE</td>
<td>$6K 2 Wk</td>
</tr>
<tr>
<td>Develop a plan for functional check of 48 to 50 transfer pump early in the project.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>T48-RHS-39 (Responsible for execution: DA - Dennis Conrad)</td>
<td>$3K 1 Wk</td>
<td></td>
</tr>
<tr>
<td>Develop a strategy to identify pump on site that is comparable and not in use.</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

F. Residual Risk Impact:

<table>
<thead>
<tr>
<th>Schedule Consequence</th>
<th>Cost Consequence</th>
<th>Distribution Selection</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>$0</td>
<td>Best</td>
</tr>
<tr>
<td>6 Wk(s)</td>
<td>$250,000</td>
<td>Most Likely</td>
</tr>
<tr>
<td>12 Wk(s)</td>
<td>$400,000</td>
<td>Worst</td>
</tr>
</tbody>
</table>

G. Description of Residual Risk: Identifying spare pump and being ready to change out will significantly reduce risk.

H. Triggers:

I. Affected Work Scope:

J. Additional Comments (optional):
UPDATED 6/23/05 - Risk Re-opened - Pump testing was not considered "startup testing."
UPDATED 6/2/05 - Risk Closed - Testing successfully completed.
UPDATED 5/20/05 - T48-RHS-38 completed.
### Risk & Opportunity Assessment Form

**Assessed Element:** 1.02 Ensure Operability of Existing Equipment

**Title:** Modifications are determined to be required for the Transfer line/LPDT and T48 to 50.

**Category (Optional):**

**Risk/Opportunity Type:** BDER Level:

**Date:**

**Identification No.:** 00-T48-21

**KASE #:**

**Assessment:**

**Responsibility:**

**A. Statement of Event:**

(State the event and risk/opportunity) (State the probability and basis that the risk/opportunity will come true without credit for RHS)

**B. Probability:**

Transfer lines are not evaluated to handle batches with high (ca. 3,000 mg/L) organic TPB. Modifications for Tank 50 to saltstone are being handled as Minor Gate activities.

- Noncredible
- Very Unlikely (VU)
- Unlikely (U)
- Likely (L)
- Very Likely (VL)

**C. Consequence:**

(State the consequences and quantify basis if that risk comes true without credit for RHS)

For opportunities, document the benefit/cost ratio comparison between the original scope and proposed opportunity.

- Scope growth

**D. Risk/Opportunity Level:**

- Low (L)
- Moderate (M)
- High (H)

Probability x Consequence = R/F/O (optional):

**E. Handling:**

<table>
<thead>
<tr>
<th>Handling Strategy (HS) Description and Basis</th>
<th>Reduced Risk Implementation Tracking</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mitigate Complete Safety Basis development and SIRC approval as early as possible.</td>
<td>(T48-RHS-09) (Responsible for execution: DA - Dennis Conrad)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Handling Strategy</th>
<th>Prob</th>
<th>Cons</th>
<th>Risk</th>
<th>Cost</th>
<th>Schedule</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>VU</td>
<td>S</td>
<td>$12K</td>
<td>4 Wk</td>
<td></td>
</tr>
</tbody>
</table>

**F. Residual Risk Impact:**

<table>
<thead>
<tr>
<th>Cost Consequence</th>
<th>Schedule Consequence</th>
<th>Distribution Selection</th>
</tr>
</thead>
<tbody>
<tr>
<td>$0</td>
<td>0</td>
<td>Best</td>
</tr>
<tr>
<td>$50,000</td>
<td>0</td>
<td>Most Likely</td>
</tr>
<tr>
<td>$100,000</td>
<td>0</td>
<td>Worst</td>
</tr>
</tbody>
</table>

**G. Description of Residual Risk:**

**H. Triggers:**

**I. Affected Work Scope:**

**J. Additional Comments (optional):**

---

*Unclassified ONLY*
Basis: Project will fall under the scrutiny of various stakeholders.
Event: Stakeholders (DNFSB, DOE, Regulatory, etc.) do not accept R&D results.
Risk: Project will be delayed while resolving stakeholder concerns.

A. Statement of Event:

B. Probability:

(State the probability and basis that the risk/opportunity will come true without credit for HS)

Stakeholders are eager to offer their input.

C. Consequence:

(State the consequences and quantify basis if that risk comes true without credit for RHS)

Delay in authorization to proceed, schedule impact while stakeholder concerns are being resolved.

C. Consequence:

Delay in authorization to proceed, schedule impact while stakeholder concerns are being resolved.

D. Risk/Opportunity Level:

Probability x Consequence = RF/OF (optional):

E. Handling:

Reduced Risk Implementation Tracking

F. Residual Risk Impact:

Cost Consequence: $0 $0 $0 Distribution Selection:

G. Description of Residual Risk:

H. Triggers:

I. Additional Comments (optional):

J. Affected Work Scope:

Unclassified ONLY

Date Printed: 04/27/2006 8:31:59 AM

Unclassified ONLY
A. Statement of Event:

B. Probability:

Based upon the RT Team activities and feedback to date, rejection of the 3116WD for salt processing is considered very unlikely.

O Noncredible  ● Very Unlikely (VU)  O Unlikely(U)  O Likely(L)  ○ Very Likely (VL)

(P ≤ 0.15)  (0.15 ≤ P < 0.45)  (0.45 ≤ P < 0.75)  (P ≥ 0.75)

C. Consequence:

For opportunities, document the benefit/cost ratio comparison between the original scope and proposed opportunity.

Worst Case, the determination is not approved and processing strategy cannot be implemented as planned. This would require that the Salt Strategy be reworked to develop a different path forward.

Worst Case Cost Impact: $0  Worst Case Schedule Impact: 1 Yr(s)

O Negligible(N)  O Marginal(M)  O Significant(S)  O Critical(C)  O Crisis(Cr)

(C < 0.15)  (0.15 ≤ C < 0.46)  (0.45 ≤ C < 0.75)  (0.75 ≤ C < 0.9)  (C ≥ 0.9)

D. Risk/Opportunity Level:

O Low(L)  O Moderate(M)  O High(H)

Probability x Consequence = RF/OF (optional):

E. Handling:

Reduce PIT Team to pursue 3116 WD process, actively engaging DOE, NRC and stakeholders.

(T48-RHS-49) (Responsible for execution: PIT - Steve Thomas)

F. Residual Risk Impact:

Cost Consequence: $0  Schedule Consequence: $0  $0

Distribution Selection:

Best Most Likely Worst

G. Description of Residual Risk:

See J below

H. Triggers:

I. Affected Work Scope:

J. Additional Comments (optional):

If the worst case impact of this risk is realized the tank 48 Project (as currently scoped) could not be implemented and the Salt Strategy would be reworked to develop a different strategy as a path forward. The most likely case would be a serious delay to the project occurring during the final stages of 3116 approval. The best case would be that the RT strategy of working closely with DOE, NRC and stakeholders results in no delay to the project. The Tank 48 Project will track this risk and monitor the risk handling strategy execution (identified above) as the 3116 WD is developed and reviewed. The resolution of risks associated with regulatory activities was also identified and assigned to the RT Team in the SPP Program Risk Assessment (Y-RAR-G-00015, Revision 2).
Blending Option Document No.: 00-T48-24
Identification No.: 00-T48-24

Assessed Element: 1.03 Meet Regulatory Requirements
Title: Regulatory Concerns (Class C permit not granted)

KASE #: 00-T48-24

Risk/Opportunity Type: Regulatory Concerns (Class C Permit not granted)
Basis: An NRC Class C permit will be required for the disposal of blended Tank 48 contents in Saltstone
Event: A Class C permit cannot be obtained
Risk: Project is abandoned

A. Statement of Event:

B. Probability:

Noncredible
Very Unlikely (VU)
(0.15 ≤ P < 0.45)
Unlikely (U)
(0.45 ≤ P < 0.75)
Likely (L)
(VL)
Very Likely (VL)
(P > 0.75)

Based upon the RT Team activities and feedback to date, rejection of the 3116WD for salt processing is considered very unlikely.

C. Consequence:

Worst case, the determination is not approved and processing strategy cannot be implemented as planned. This would require that the Salt Strategy be rewired to develop a different path forward.

D. Risk/Opportunity Level:

Low
Moderate
High

E. Handling:

Reduce PIT Team to pursue NRC Class C permit, actively engaging NRC and stakeholders.
(T48-RHS-50) (Responsible for execution: PIT - Steve Thomas/Ross Fanning)

Reduced Risk
Probability
Implementation
Tracking

Risk
Cost
Schedule

VU
Cr
H
0
0

F. Residual Risk Impact:

Cost Consequence
Schedule Consequence
Distribution Selection

Best
Most Likely
Worst

G. Description of Residual Risk

See J below

H. Triggers:

I. Affected Work Scope:

J. Additional Comments (optional):

If the worst case impact of this risk is realized the Tank 48 Project (as currently scoped) could not be implemented and the Salt Strategy would be rewired to develop a different strategy as a path forward. The most likely case would be a serious delay to the project occurring during the final stages of 3116 approval. The best case would be that the RT strategy of working closely with NRC and stakeholders results in no delay to the project. The Tank 48 Project will track this risk and monitor the risk handling strategy execution as identified above. The resolution of risks associated with regulatory activities was also identified and assigned to the RT Team in the SPP Program Risk Assessment (Y-RAR-G-00015, Revision 2).
## Risk & Opportunity Assessment Form

<table>
<thead>
<tr>
<th>Identification No.: 00-T48-25</th>
<th>Assessed Element: 1.04 Meet Safety Requirements</th>
</tr>
</thead>
</table>

### Title:
Equipment Fails Surveillance

### Category (Optional):

### Risk/Opportunity Type: BDER Level:

### Date:

#### A. Statement of Event:
(State Event and Risk/Opportunity)
Basis: Equipment must demonstrate ability to pass required surveillances to satisfy Authorization Basis
Event: Equipment fails surveillance (incapable of passing surveillance as written)
Risk: Equipment unable to operate as required by Authorization Basis

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

- Noncredible
- Very Unlikely (VU)
- Unlikely (U)
- Likely (L)
- Very Likely (VL)

This event is intended to capture the risk that equipment cannot perform as credited in the Authorization Basis (i.e., AB says that a component is capable of performing some function, and surveillance testing cannot demonstrate this function). Simple equipment failure is addressed in other risk statements.

#### C. Consequence:
(State the consequences and quantify basis if that risk comes true without credit for RHS)

- Negligible (N)
- Marginal (M)
- Significant (S)
- Critical (C)
- Crisis (Cr)

For opportunities, document the benefit/cost ratio comparison between the original scope and proposed opportunity.

Either new equipment must be installed which can perform as required (redesign), or the AB must be revised to match the capability of the installed equipment.

#### D. Risk/Opportunity Level:

- Low (L)
- Moderate (M)
- High (H)

Probability x Consequence = RF/OF (optional):

#### E. Handling:

<table>
<thead>
<tr>
<th>Handling Strategy</th>
<th>Handling Strategy (HS) Description and Basis</th>
<th>Reduced Risk</th>
<th>Implementation</th>
<th>Tracking</th>
</tr>
</thead>
<tbody>
<tr>
<td>Reduce</td>
<td>Identify attributes in AB requiring testing before design is complete. (T48-RHS-37) (Responsible for execution: DA - Dennis Conrad)</td>
<td>VU</td>
<td>N</td>
<td>L</td>
</tr>
</tbody>
</table>

#### F. Residual Risk Impact:

<table>
<thead>
<tr>
<th>Cost Consequence</th>
<th>Schedule Consequence</th>
</tr>
</thead>
<tbody>
<tr>
<td>$0</td>
<td>0</td>
</tr>
<tr>
<td>$140,000</td>
<td>4 Wk(s)</td>
</tr>
</tbody>
</table>

#### G. Description of Residual Risk:

#### H. Triggers:

#### I. Affected Work Scope:

#### J. Additional Comments (optional):
### Risk & Opportunity Assessment Form

**Identification No.:** 00-T48-26  
**Assessed Element:** 1.04 Meet Safety Requirements  
**Title:** Safety Basis Impacts Design - Tank Farm  
**KASE #:**

#### Category (Optional):

**Risk/Opportunity Type:**

**Responsibility:**

**A. Statement of Event:**

(State Event and Risk/Opportunity)  
Basis: Design must conform to the Safety Basis  
Event: In order to comply with the Safety Basis, design has to be modified

Risk: Design will have to be redone.

**B. Probability:**

(Statet the probability and basis that the risk/opportunity will come true without credit for HS)

- Noncredible (P < 0.15)
- Very Unlikely (VU) (0.15 ≤ P < 0.45)
- Unlikely (U) (0.45 ≤ P < 0.75)
- Likely (L) (0.75 ≤ P < 0.9)
- Very Likely (VL) (P ≥ 0.9)

**C. Consequence:**

(Statet the consequences and quantify basis if that risk comes true without credit for RHS)

For opportunities, document the benefit/cost ratio comparison between the original scope and proposed opportunity.

Delay and cost of redesign, potential the worst case would be to install a nitrogen system on Tank 50 and associated safety instrumentation and controls and use of nitrogen on Tank 48.

**Worst Case Cost Impact:** $1M  
**Worst Case Schedule Impact:** 9 Mo(s)

- Negligible (N)  
- Marginal (M)  
- Significant (S)  
- Critical (C)  
- Crisis (Cr)

(C < 0.15)  
(0.15 ≤ C < 0.45)  
(0.45 ≤ C < 0.75)  
(0.75 ≤ C < 0.9)  
(C > 0.9)

**D. Risk/Opportunity Level:**

- Low (L)  
- Moderate (M)  
- High (H)

Probability x Consequence = RF/OF (optional):

**E. Handling:**

<table>
<thead>
<tr>
<th>Handling Strategy</th>
<th>Handling Strategy (HS) Description and Basis</th>
<th>Reduced Risk</th>
<th>Implementation</th>
<th>Tracking</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mitigate/Reduce</td>
<td>Complete Safety Basis development and SHRC approval as early as possible. (T48-RHS-09) (Responsible for execution: DA - Dennis Conrad)</td>
<td>VU</td>
<td>$12K</td>
<td>4 Wk</td>
</tr>
<tr>
<td></td>
<td>Develop R&amp;D Plan to ensure sufficient supporting data has been developed to support safety approach. (T48-RHS-10) (Responsible for execution: PIT - Larry Romanowski) - COMPLETE</td>
<td>Cr</td>
<td>$12K</td>
<td>4 Wk</td>
</tr>
<tr>
<td></td>
<td>Receive SIL Impact (T48-RHS-60) (Responsible for execution: DA - Dennis Conrad)</td>
<td>H</td>
<td>$12K</td>
<td>4 Wk</td>
</tr>
</tbody>
</table>

**F. Residual Risk Impact:**

<table>
<thead>
<tr>
<th>Cost Consequence:</th>
<th>$0</th>
<th>$750,000</th>
<th>$1,000,000</th>
</tr>
</thead>
<tbody>
<tr>
<td>Schedule Consequence:</td>
<td>0</td>
<td>6 Mo(s)</td>
<td>9 Mo(s)</td>
</tr>
</tbody>
</table>

Best Most Likely Worst

**G. Description of Residual Risk:**

**H. Triggers:**

**I. Affected Work Scope:**

**J. Additional Comments (optional):**

UPDATED 9/7/05 - T48-RHS-10 has been completed.

UPDATED 8/17/05 - Revised cost impacts.

UPDATED 8/2/05 - Added T48-RHS-60.
Risk & Opportunity Assessment Form

<table>
<thead>
<tr>
<th>Identification No.:</th>
<th>Assessed Element: 1.04 Meet Safety Requirements</th>
</tr>
</thead>
<tbody>
<tr>
<td>KASE#:</td>
<td>Safety Basis Strategy not Accepted By DOE</td>
</tr>
<tr>
<td>Category (Optional):</td>
<td>BDER Level:</td>
</tr>
<tr>
<td>Date:</td>
<td>Responsibility:</td>
</tr>
</tbody>
</table>

A. Statement of Event:
- Basis: Tank 48 Disposition Safety Basis is required to be approved by DOE for implementation
- Event: DOE does not accept the Safety Basis

B. Probability:
- (State the probability and basis that the risk/opportunity will come true without credit for RHS)
- DOE may find that Safety Basis as written will not support appropriate development of required safety documents and related analysis for safe disposition of organic inventory in tank 48
- Noncredible  Very Unlikely (VU)  Unlikely (U)  Likely (L)  Very Likely (VL)
- (P < 0.15)  (0.15 ≤ P < 0.45)  (0.45 ≤ P < 0.75)  (P ≥ 0.75)

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

D. Risk/Opportunity Level:
- Low (L)  Moderate (M)  High (H)
- Probability x Consequence = RF/OF (optional):

E. Handling:
- Reduce
- Ensure formal/informal DOE involvement during SBS development and prior to WSRC request for approval to avoid final minute surprises. DOE is also represented in SIRC approval.
- (T48-RHS-30) (Responsible for execution: WSMS - Schwenker)

F. Residual Risk Impact:
- Cost Consequence: $0  $50,000  $100,000
- Schedule Consequence: 0  2 Wks  4 Wks

G. Description of Residual Risk:
- H. Triggers:
- I. Affected Work Scope:
- J. Additional Comments (optional):
<table>
<thead>
<tr>
<th>Document Name:</th>
<th>Document No.:</th>
<th>Revision No.:</th>
<th>Page 27 Of 58</th>
</tr>
</thead>
</table>

### Risk & Opportunity Assessment Form

#### Identification No.:

00-T48-28

#### Assessed Element:

1.1 Transfer Recycle from T21, T23 to T48

#### Title:

Insufficient recycle available for aggregation

#### KASE#:

00-T48-28

#### Category (Optional):

Basis: DWPF recycle is assumed to be the aggregate for the Tank 48H material

Event: DWPF recycle not available

Risk: Inhibited water would need to be used.

#### A. Statement of Event:

An extended DWPF shutdown or extremely good evaporator operation could limit recycle availability.

#### B. Probability:

(State the probability and basis that the risk/opportunity will come true without credit for HS)

- Noncredible (P < 0.15)
- Very Unlikely (VU) (0.15 ≤ P < 0.45)
- Unlikely (U) (0.45 ≤ P < 0.75)
- Likely (L) (P ≥ 0.75)

#### C. Consequence:

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

Use inhibited water for aggregation.

Worst Case Cost Impact: **$50K**
Worst Case Schedule Impact: **2 Wk(s)**

- Negligible (C < 0.15)
- Marginal (M) (0.15 ≤ C < 0.45)
- Significant (S) (0.45 ≤ C < 0.75)
- Critical (C) (0.75 ≤ C < 0.9)
- Crisis (Cr) (C ≥ 0.9)

#### D. Risk/Opportunity Level:

- Low (L)
- Moderate (M)
- High (H)

Probability x Consequence = RF/OF (optional):

#### E. Handling:

<table>
<thead>
<tr>
<th>Handling Strategy (HS)</th>
<th>Description and Bases</th>
<th>Reduced Risk</th>
<th>Implementation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Accept</td>
<td></td>
<td>U</td>
<td>M</td>
</tr>
</tbody>
</table>

#### F. Residual Risk Impact:

<table>
<thead>
<tr>
<th>Cost Consequence</th>
<th>Schedule Consequence</th>
</tr>
</thead>
<tbody>
<tr>
<td>$0</td>
<td>0</td>
</tr>
<tr>
<td>$25,000</td>
<td>1 Wk(s)</td>
</tr>
<tr>
<td>$50,000</td>
<td>2 Wk(s)</td>
</tr>
</tbody>
</table>

Distribution Selection:

- Best
- Most Likely
- Worst

#### G. Description of Residual Risk:

#### H. Triggers:

#### I. Affected Work Scope:

#### J. Additional Comments (optional):
Do cume nt No .: 00-T48-29
Identi ficati on N o.: Chemical Spills (Caustic)

Title: Chemical Spills (Caustic)

Basis: Aggregation process requires 50 wt% caustic for chemistry control (free OH control) (approx. 100 Kgals)

Event: Caustic leaks and spills occur.
Risk: Release to environment is above RQ value (1,000 lb.), stopping further operation until issue is addressed

A. Statement of Event:

B. Probability:

Noncredible
Very Unlikely (VU)
Unlikely (U)
Likely (L)
Very Likely (VL)

(0 < P < 0.15) (0.15 < P < 0.45) (0.45 < P < 0.75) (P > 0.75)

C. Consequence:

For opportunities, document the benefit/cost ratio comparison between the original scope and proposed opportunity
Schedule delay and cost impact

D. Risk/Oppportunity Level:

Low (L) Moderate (M) High (H)

Probability x Consequence = RF/OF (optional):

E. Handling:

Handling Strategy
Accept

Handling Strategy (HS) Description and Bases

Reduced Risk Implementation Tracking
Prob. Cost Implementation Tracking
U N L $6K 2

F. Residual Risk Impact:

Cost Consequence:

Schedule Consequence:

G. Description of Residual Risk:

H. Triggers:

I. Affected Work Scope:

J. Additional Comments (optional):

UPDATED 9/7/05 - RHS changed to Accept.
Risk & Opportunity Assessment Form

Identification No.: 00-T48-31
KASE#: 1.3 Mix T48 Contents
Title: Decomposition Products Generated By Additions to Tank
Assessed Element: Basis: Existing waste contents and residue on internal structure will be mixed with new waste streams.
Event: Added streams to Tank 48H or Tank 50H results in partial decomposition forming byproducts (e.g., tarry substances).
Risk: Return to normal service is delayed.

A. Statement of Event:
B. Probability:
Testing to date show negligible reaction of Tank 48H with DWPF Recycle. Temperature and contact time minimized by proposed plan thereby reducing risk of reaction. Project already includes plans to test each stream for chemical interactions.

C. Consequence:

D. Risk/Opportunity Level:

E. Handling:

Handling Strategy (HS) Description and Bases

F. Residual Risk Impact:

G. Description of Residual Risk:
Residual risk is cost of limited R&D, delays and modifications to strategy

H. Triggers:

I. Affected Work Scope:

J. Additional Comments (optional):
Document Name: Analytical Detection Limit

A. Statement of Event:
Basis: Progress of Aggregation will be determined through analysis of samples
Event: Analytical method for TPB analysis may not be good enough to qualify end state
Risk: Return to normal service is delayed.

B. Probability:
(State the probability and basis that the risk/opportunity will come true without credit for RHS)
The quantity of heel and the end state (currently 378 grams or less) is unknown. As measurements approach the detection limit, the scatter frequently increases.

C. Consequence:
(State the consequences and quantify basis if that risk comes true without credit for RHS)
Additional R&D costs, schedule delay and development of new strategy

D. Risk/Opportunity Level:
Low (L) Moderate (M) High (H)
Probability x Consequence = RF/OF (optional):

E. Handling:
Handling Strategy
Mitigate
Develop TPB Residual Strategy (TPB measurement / material balance) and obtain SIRC approval.
(T48-RHS-34) (Responsible for execution: DA - Sam Shah)

F. Residual Risk Impact:
Cost Consequence: $0 $75,000 $150,000
Schedule Consequence: 0 3 Wk 4 Wk

G. Description of Residual Risk:
H. Triggers:
I. Affected Work Scope:
J. Additional Comments (optional):
**Risk & Opportunity Assessment Form**

**Assessed Element:** 1.3 Mix T48 Contents

**Title:** Inadequate Suspension of Material

**Category (Optional):**

**Risk/Opportunity Type:**

**Date:**

**Responsibility:**

**A. Statement of Event:**

_Basis:_ The basis for the planning document for Aggregation is that the TPB is suspended in a slurry. 

_Event:_ Characteristics of the material make suspension with the proposed equipment inadequate. 

_Risk:_ Decreased progress of TPB removal. Potential areas of higher density material must be taken care of.

**B. Probability:**

(Statement the probability and basis that the risk/opportunity will come true without credit for HS)

Existing tank equipment and material rheology have been extensively investigated and researched. MST solid content is not an issue. However, samples taken over the past two years are very low on solids.

- Noncreditable
- Very Unlikely (VU)
- Unlikely (U)
- Likely (L)
- Very Likely (VL)

**C. Consequence:**

(Statement the consequences and quantify basis if that risk comes true without credit for RHS)

Inadequate suspension causes inadequate TPB removal. Schedule delay and cost impact (additional equipment needed to suspend solids).

**D. Risk/Opportunity Level:**

<table>
<thead>
<tr>
<th>Probability x Consequence = RF/OF (optional):</th>
</tr>
</thead>
</table>

**E. Handling:**

<table>
<thead>
<tr>
<th>Mitigate</th>
<th>Handling Strategy (HS) Description and Bases</th>
<th>Reduced Risk</th>
<th>Implementation</th>
<th>Tracking</th>
</tr>
</thead>
<tbody>
<tr>
<td>PIT to perform a Mixing Study on Tank 50H</td>
<td>(T48-RHS-20) (Responsible for execution: PIT - Sterling Robertson) - COMPLETE</td>
<td>U</td>
<td>C</td>
<td>M</td>
</tr>
</tbody>
</table>

**F. Residual Risk Impact:**

<table>
<thead>
<tr>
<th>Schedule Consequence</th>
<th>Cost Consequence</th>
<th>Distribution Selection</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>$0</td>
<td>$0</td>
</tr>
<tr>
<td>1 Mo(s)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3 Mo(s)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**G. Description of Residual Risk:**

**H. Triggers:**

**I. Affected Work Scope:**

**J. Additional Comments (optional):**

_UPD ATED 9/7/05 - T48-RHS-20 Completed._

*Unclassified ONLY*
### Risk & Opportunity Assessment Form

**Identification No.:** 00-T48-35  
**KASE #:**  
**Assessed Element:** 1.3 Mix T48 Contents  
**Title:** Increased Sampling and Analysis  
**Category (Optional):**  
**Risk/Opportunity Type:** BDER Level:  
**Date:**  

### A. Statement of Event:
- **Basis:** Progress of TPB removal will be determined through sampling and analysis.  
- **Event:** Single samples are determined to have the potential to be inconsistent with actual tank contents  
- **Risk:** More numerous samples and analyses are required.

### B. Probability:
- **Past sampling has shown that consistent results are achieved over time. However, the sampling was during a period of no deliberate changes in the tank. When undergoing a process to remove TPB, it is important to pull multiple samples to insure that changes in TPB can be attributed to removal and not sample variations. As measurements approach the detection limit, the scatter frequently increases.**

### C. Consequence:
- **Increase sample frequency or analysis scope**  
- **Schedule delay and cost impact**

<table>
<thead>
<tr>
<th>Worst Case Cost Impact</th>
<th>Worst Case Schedule Impact</th>
<th>8 Wk(s)</th>
</tr>
</thead>
</table>

### D. Risk/Opportunity Level:
- **Low (L)**  
- **Moderate (M)**  
- **High (H)**  
- **Probability x Consequence = RF/OF (optional):**

### E. Handling:

<table>
<thead>
<tr>
<th>Handling Strategy</th>
<th>Handling Strategy (HS) Description and Bases</th>
<th>Reduced Risk</th>
<th>Implementation</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Mitigate</strong></td>
<td>Develop definitive sample plan in support of disposition. (T48-RHS-21) (Responsible for execution: PIT - Pete Hill)</td>
<td>U</td>
<td>S</td>
</tr>
</tbody>
</table>

### F. Residual Risk Impact:
- **Cost Consequence:**  
- **Schedule Consequence:**

<table>
<thead>
<tr>
<th>Distribution Selection</th>
<th>Best</th>
<th>Most Likely</th>
<th>Worst</th>
</tr>
</thead>
<tbody>
<tr>
<td>$0</td>
<td>$75,000</td>
<td>$150,000</td>
<td></td>
</tr>
<tr>
<td>3 Wks</td>
<td>4 Wks</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### G. Description of Residual Risk:
- Some resampling could still be necessary if inconsistent results were detected (increasing levels of constituents versus decreasing).

### H. Triggers:

### I. Affected Work Scope:

### J. Additional Comments (optional):
Identification No.: 00-T48-36

KASE #: Title:

Category (Optional): Benzene Generation Rate - Tank Farm (Safety Basis)

Risk/Opportunity Type: BDER Level:

Assessed Element: 1.04 Meet Safety Requirements

Date:

A. Statement of Event:

Basis: TRB benzene generation is assumed to be sufficiently low to allow processing with existing equipment
Event: Benzene generation rate exceeds current assumptions due to the presence of active catalysts in the material.
Risk: Process cannot be modified to accommodate the higher generated benzene rate

B. Probability:

Benzene generation rate has been researched. Scale-up is a concern for all chemical processes going from bench to field scale.

C. Consequence:

Design is halted until testing is performed to re-baseline safety basis. Schedule delay and cost impact.

D. Risk/Opportunity Level:

E. Handling:

F. Residual Risk Impact:

G. Description of Residual Risk:

Worse case cost impact is for implementation of an alternative disposition path which is not within project scope, therefore this residual is not included in T&PRA calculation.

H. Triggers:

I. Affected Work Scope:

J. Additional Comments (optional):

UPDATED 9/7/05 - T48-RHS-24 Deleted as not in project scope.
UPDATED 8/2/05 - Added "(Safety Basis)" to title.
UPDATED 8/31/05 - Changed assessable element to 1.04.

Unclassified ONLY
### Risk & Opportunity Assessment Form

#### Identification No.:
00-T48-37

#### Document Name:

#### Document No.:

#### Revision No.:

#### Page 34 Of 58

<table>
<thead>
<tr>
<th>KASE#</th>
<th>Assessed Element</th>
<th>Title</th>
<th>Category (Optional)</th>
<th>Risk/Opportunity Type</th>
<th>BDERLevel</th>
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<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Date:</th>
<th>Responsibility:</th>
</tr>
</thead>
</table>

#### A. Statement of Event:

(State Event and Risk/Opportunity)

Basis: Tank 48 contents are to be processed to meet an end state condition acceptable to allow return to service.

Event: Required end state is not met (excludes event that film cannot be removed).

Risk: Tank is delayed in returning to service.

#### B. Probability:

(State the probability and basis that the risk/opportunity will come true without credit for HS)

Sampling after mixing indicates that some solids are not readily suspended.

- Noncredible
- Very Unlikely (VU)
- Unlikely (U)
- Likely (L)
- Very Likely (VL)

#### C. Consequence:

(State the consequences and quantify basis if that risk comes true without credit for RHS)

For opportunities, document the benefit/cost ratio comparison between the original scope and proposed opportunity.

Implementation of residual strategy prior to reuse of tank, cost and schedule impact

- Worst Case Cost Impact: $500K
- Worst Case Schedule Impact: <6 Mo(s)

#### D. Risk/Opportunity Level:

- Low (L)
- Moderate (M)
- High (H)

#### E. Handling:

<table>
<thead>
<tr>
<th>Handling Strategy (HS) Description and Bases</th>
<th>Prob Cost</th>
<th>Risk</th>
<th>Cost</th>
<th>Schedule</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mitigate</td>
<td>Develop TPB Residual Strategy (TPB measurement / material balance) and obtain SRG approval. (T48-RHS-34) (Responsible for execution: DA - Sam Shah)</td>
<td>VU</td>
<td>N</td>
<td>L</td>
</tr>
<tr>
<td></td>
<td>Develop new end state criteria that allows some solids to remain behind (residual limit). (T48-RHS-07) (Responsible for execution: DA - Dennis Conrad)</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

#### F. Residual Risk Impact:

<table>
<thead>
<tr>
<th>Cost Consequence</th>
<th>Probability x Consequence = RF/OF (optional):</th>
</tr>
</thead>
</table>

- Best
- Most Likely
- Worst

#### G. Description of Residual Risk:

#### H. Triggers:

#### I. Affected Work Scope:

#### J. Additional Comments (optional):

---

**Unclassified ONLY**

Date Printed: 02/28/2006 4:39:37 PM
**Risk & Opportunity Assessment Form**

**Identification No.:** 00-T48-40  
**Title:** Tank Film Cannot be Removed

**Date:** March 13, 2006

**A. Statement of Event:**
- **Basis:** Tank 48 has a film of material on the tank walls that must be removed.
- **Event:** The selected method of rinsing with agitation is not effective.
- **Risk:** Film cannot be completely removed (cannot meet end state).

**B. Probability:**
- Noncredible (P < 0.15)  
- Very Unlikely (VU) (0.15 ≤ P < 0.45)  
- Unlikely (U) (0.45 ≤ P < 0.75)  
- Likely (L) (P ≥ 0.75)

**C. Consequence:**
- Delay and cost of development and deployment of additional technology to remove film.
- For opportunities, document the benefit/cost ratio comparison between the original scope and proposed opportunity.

**D. Risk/Opportunity Level:**
- Low (L)  
- Moderate (M)  
- High (H)

**E. Handling:**
- **Mitigate:** Develop new end state criteria that allows some solids to remain behind (residual limit)  
  (T48-RHS-07) (Responsible for execution: DA - Dennis Conrad)  
  Evaluate rinsing effectiveness early.  
  (T48-RHS-08) (Responsible for execution: Owner - Renee Spires)

<table>
<thead>
<tr>
<th>Handling Strategy (HS) Description and Basis</th>
<th>Reduced Risk</th>
<th>Implementation</th>
<th>Tracking</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Probability</td>
<td>Cost</td>
<td>Schedule</td>
</tr>
<tr>
<td></td>
<td>Consequence</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**F. Residual Risk Impact:**
- **Cost Consequence:** $0, $150,000, $250,000
- **Schedule Consequence:** 0, 2 Mo(2), 3 Mo(2)

**G. Description of Residual Risk:**

**H. Triggers:**

**I. Affected Work Scope:**

**J. Additional Comments (optional):**
- If rinsing is determined not to be effective, develop alternative plans for film removal from internal surfaces.
<table>
<thead>
<tr>
<th>A. Statement of Event:</th>
<th>B. Probability:</th>
<th>C. Consequence:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Basis: Equipment operability (Pumps, VFDs, Seals etc.) is necessary for process</td>
<td>(State the probability and basis that the risk/opportunity will come true without credit for HS)</td>
<td>(State the consequences and quantify basis if that risk comes true without credit for RHS. For opportunities, document the benefit/cost ratio comparison between the original scope and proposed opportunity)</td>
</tr>
<tr>
<td>Event: Slurry pump, VFD, pump seals or other critical components fail</td>
<td>With the number of components that must operate for an extended period, failures are likely during the aggregation program.</td>
<td>Worst case will be a VFD failure as it is assumed that Tank 50 mixing is adequate with one failed slurry pump. The concurrent failure of two slurry pumps is beyond very unlikely, otherwise slurry pump failure would be the worst case.</td>
</tr>
<tr>
<td>Risk: Processing not possible until repair or replacement</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>D. Risk/Opportunity Level:</th>
<th>E. Handling:</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Handling Strategy Description and Basis</td>
</tr>
<tr>
<td></td>
<td>Reducer/Mitigate</td>
</tr>
<tr>
<td></td>
<td>Maintain critical spares. Design Authority will specify spare parts and Project Manager will determine plan. (T48-RHS-25) (Responsible for execution: PM - Pen Mayson)</td>
</tr>
<tr>
<td></td>
<td>Probability x Consequence = RF/OF (optional):</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>F. Residual Risk Impact:</th>
<th>G. Description of Residual Risk:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cost Consequence:</td>
<td></td>
</tr>
<tr>
<td>Schedule Consequence:</td>
<td></td>
</tr>
<tr>
<td>Distribution Selection:</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>H. Triggers:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Updated 8/17/05 - Removed cost impact as H-Area Tank Farm will fund any equipment repair during operations. Impact to project is limited to schedule only.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>I. Affected Work Scope:</th>
<th>J. Additional Comments (optional):</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Risk & Opportunity Assessment Form

Identification No.: 00-T48-42

Assessed Element: 1.4 Transfer T48 to T50

Title: Transfer Pump Suction or Discharge Line Plugs

Category (Optional): Basis: T48 existing transfer pump in riser B5 will be used for transfer with new rerouted transfer line installed to T50

Event: Transfer pump and/or transfer line plugs

Risk: Transfer from T48 to T50 not possible

A. Statement of Event:

B. Probability:

Noncredible (P < 0.15) Very Unlikely (VU) Unlikely (U) Likely (L) Very Likely (VL) (0.15 ≤ P < 0.45) (0.45 ≤ P < 0.75) (P ≥ 0.75)

C. Consequence:

D. Risk/Opportunity Level:

Low (L) Moderate (M) High (H) Probability x Consequence = RF/OF (optional):

E. Handling:

Handling Strategy: Test and verify that existing flushing capabilities for transfer pump and transfer line are operational. (T48-RHS-56) (Responsible for execution: DA - Dennis Conrad)

Distributi on Selection:

F. Residual Risk Impact:

G. Description of Residual Risk:

H. Triggers:

I. Affected Work Scope:

J. Additional Comments (optional):

UPDATED 8/16/05 - Design activities include this verification.
Identification No.: 00-T48-43

Assessed Element: 1.5 Transfer from T50 to Saltstone Facility

Title: Permitting Delay - Saltstone

Risk/Opportunity Type: BDER Level:

Responsibility:

A. Statement of Event: (State Event and Risk/Opportunity)
Basis: Process requires numerous permits.
Event: Obtaining permits is complex and laborious.
Risk: Permits are not obtained in a timely way.

B. Probability: (State the probability and basis that the risk/opportunity will come true without credit for HS)
Unique constituents in Tank 48 waste require approval of 2 permits (disposal and air permits)
- Noncredible
- Very Unlikely (VU)
- Unlikely (U)
- Likely (L)
- Very Likely (VL)

C. Consequence: (State the consequences and quantify basis if that risk comes true without credit for RHS.
For opportunities, document the benefit/cost ratio comparison between the original scope and proposed opportunity)
Worst case assumes processing cannot proceed at SIF until permit is approved. Schedule is delayed while waiting to permit approval.

Worst Case Cost Impact: 1 Worst Case Schedule Impact: 1 Yr(s)

- Negligible (N)
- Marginal (M)
- Significant (S)
- Critical (C)
- Crisis (Cr)

D. Risk/Opportunity Level: Probability x Consequence = RF/OF (optional):

E. Handling:
Handling Strategy (HS) Description and Basis

Mitigate: Perform R&D and NEHAPS evaluation early before execution of the project.
(T48-RHS-45) (Responsible for execution: Owner - Renee Spires)

Reduced Risk Implementation Tracking

<table>
<thead>
<tr>
<th>Prob Cons</th>
<th>Risk</th>
<th>Cost</th>
<th>Schedule</th>
<th>Tracking</th>
</tr>
</thead>
<tbody>
<tr>
<td>L</td>
<td>Cr</td>
<td>H</td>
<td>$24K</td>
<td>8 Wk</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>$500K</td>
<td>1 Yr</td>
</tr>
</tbody>
</table>

F. Residual Risk Impact:
Cost Consequence: $0
Schedule Consequence: Best

Distribution Selection:

G. Description of Residual Risk:

H. Triggers:

I. Affected Work Scope:

J. Additional Comments (optional):

UPDATED 9/7/05 - Deleted T48-RHS-24 as not in project scope.
### Risk & Opportunity Assessment Form

**Identification No.:** 00-T48-44  
**Title:** Inadequate Tank Space  
**Category (Optional):** 
**Risk/Oppportunity Type:** 
**Date:** 
**Responsibility:** 

**A. Statement of Event:**
Basis: Large volumes of liquid must be added to Tank 48H and Tank 50H during the process to aggregate to the Saltstone limits.  
Event: Required additions (to meet Saltstone limits) exceed tank volume.  
Risk: Material must be transferred and adjusted before aggregation to Saltstone can occur.

**B. Probability:**
- Noncredible  
- Very Unlikely (VU)  
- Unlikely (U)  
- Likely (L)  
- Very Likely (VL)  
- (P < 0.15)  
- (1.5 ≤ P < 0.45)  
- (45 ≤ P < 0.75)  
- (P ≥ 0.75)

**C. Consequence:**
- Negligible (N)  
- Marginal (M)  
- Significant (S)  
- Critical (C)  
- Crisis (Cr)  
- (C < 0.15)  
- (1.5 ≤ C < 0.45)  
- (45 ≤ C < 0.75)  
- (C ≥ 0.75)

**D. Risk/Oppportunity Level:**
- Low (L)  
- Moderate (M)  
- High (H)  
- Probability x Consequence = RF/OF (optional):

**E. Handling:**

<table>
<thead>
<tr>
<th>Handling Strategy</th>
<th>Handling Strategy (HS) Description and Bases</th>
<th>Reduced Risk Implementation</th>
<th>Tracking</th>
</tr>
</thead>
<tbody>
<tr>
<td>Reduce/Mitigate</td>
<td>Perform calculations before transfer to ensure below the Saltstone limits on all constituents. (T48-RHS-27) (Responsible for execution: DA - Dennis Conrad)</td>
<td>N L $6K 2 Mo(s)</td>
<td></td>
</tr>
</tbody>
</table>

**F. Residual Risk Impact:**
- Cost Consequence: $0  
- Schedule Consequence: 0  
- Distribution Selection: $250,000  
- Best: Most Likely: Worst:

**G. Description of Residual Risk:** Transfer errors could still occur making Tank 50 batch not suitable for transfer to Saltstone.

**H. Triggers:**

**I. Affected Work Scope:**

**J. Additional Comments (optional):** UPDATED 8/16/05 - Saltstone flow sheet should handle these variances.
## Risk & Opportunity Assessment Form

**Identification No.:** 00-T48-45  
**Assessed Element:** 1.5 Transfer from T50 to Saltstone Facility  
**Title:** Tank 50 Cooling (Saltstone Transfer) Inadequate

### A. Statement of Event:

**Basis:** Continuous feed and continuous mixing will be required to feed Saltstone from Tank 50.

**Event:** This process could challenge the cooling capacity of Tank 50.

**Risk:** Process has to be modified to avoid excessive heat generation (e.g., batch operations).

### B. Probability:

(State Event and Risk/Opportunity)  
During the recent campaign to remove T50 solids tank temperature only reached 65 deg F without cooling. Cooling requirements are modest.

- Noncredible  
- Very Unlikely (VU)  
- Unlikely (U)  
- Likely (L)  
- Very Likely (VL)

\[ P = (P < 0.15) \]  
\[ (0.15 \leq P < 0.45) \]  
\[ (0.45 \leq P < 0.75) \]  
\[ P \geq 0.75 \]

### C. Consequence:

(State the consequences and quantify basis if that risk comes true without credit for RHS.

Use a batch process. Schedule delay.

Worst Case Cost Impact: 0  
Worst Case Schedule Impact: 3 Mo(s)

- Negligible (N)  
- Marginal (M)  
- Significant (S)  
- Critical (C)  
- Crisis (Cr)

\[ C = (C < 0.15) \]  
\[ (0.15 \leq C < 0.45) \]  
\[ (0.45 \leq C < 0.75) \]  
\[ (0.75 \leq C < 0.9) \]  
\[ C > 0.9 \]

### D. Risk/Opportunity Level:

- Low (L)  
- Moderate (M)  
- High (H)

Probability x Consequence = RF/OF (optional):

### E. Handling:

<table>
<thead>
<tr>
<th>Handling Strategy</th>
<th>Handling Strategy (HS) Description and Bases</th>
<th>Reduced Risk</th>
<th>Implementation</th>
<th>Tracking</th>
</tr>
</thead>
<tbody>
<tr>
<td>Accept</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Distribution Selection:**

- Best:
  - Cost Consequence: 0
  - Schedule Consequence: 0

- Most Likely:
  - Cost Consequence: 0
  - Schedule Consequence: 0

- Worst:
  - Cost Consequence: 0
  - Schedule Consequence: 3 Mo(s)

### G. Description of Residual Risk:

With sufficient temperature margin up to the levels allowed for Saltstone processing, tank cooling should not be a significant issue.

### H. Triggers:

I. Affected Work Scope:

J. Additional Comments (optional):
**Risk & Opportunity Assessment Form**

**Identification No.:** 00-T48-46

**Title:** Saltstone 0.2 Ci/gal Cs Modifications Not Ready in Time to Support Strategy

**Category (Optional):**

**Risk/Opportunity Type:** BDER Level:

**Date:**

**A. Statement of Event:**

(State Event and Risk/Opportunity)

Basis: Modifications to the Saltstone Facility to allow the processing of up to 0.2 Ci/gal Cs feed must be completed before processing can begin.

Event: Modifications are not complete when processing of Tank 48 contents is scheduled to begin.

Risk: Processing cannot begin.

**B. Probability:**

(Not credible)

Very Unlikely (VU) 0.25 ≤ P < 0.75

Unlikely (U) 0.15 ≤ P < 0.25

Likely (L) 0.05 ≤ P < 0.15

Very Likely (VL) P < 0.05

The focus and priority assigned to this project makes the realization of this event very unlikely.

**C. Consequence:**

(State the consequences and quantify basis if that risk comes true without credit for RHS)

The worst case delay was arrived at by team consensus.

| Worst Case Cost Impact | 0 |
| Worst Case Schedule Impact | 9 Mo(s) |

**D. Risk/Opportunity Level:**

Low (L) 0.15 ≤ C < 0.45

Moderate (M) 0.45 ≤ C < 0.75

High (H) C ≥ 0.75

Probability x Consequence = RF/OF (optional):

**E. Handling:**

<table>
<thead>
<tr>
<th>Handling Strategy</th>
<th>Handling Strategy (HS) Description and Bases</th>
<th>Reduced Risk Implementation</th>
<th>Tracking</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mitigate</td>
<td>Proceed with an integrated schedule upon decision to implement aggregation project (T48-RHS-51) (Responsible for execution: Owner - Renee Spires)</td>
<td>VU C M 0 0</td>
<td></td>
</tr>
</tbody>
</table>

**F. Residual Risk Impact:**

Cost Consequence: $0

Schedule Consequence: 0

Best

Distribution Selection: 2 Mo(s)

Most Likely

Worst

**G. Description of Residual Risk:**

**H. Triggers:**

**I. Affected Work Scope:**

**J. Additional Comments (optional):**
**Risk & Opportunity Assessment Form**

**Assessed Element:** 1.5 Transfer from T50 to Saltstone Facility

**Title:** Tank 50 residual TPB level

**KASE #:** 00-T48-47

**Assessed Element:** Tank 50 residual TPB level

**Risk/Opportunity Type:** BDER Level

**Date:** March 13, 2006

**Responsibility:**

**A. Statement of Event:**

(State Event and Risk/Opportunity)

Basis: Tank 50 contents are to be processed to allow return to normal service after the Tank 48 Project has been completed.

Event: Residual TPB prevents acceptable end state from being met

Risk: Tank is delayed in returning to service

**B. Probability:**

(State the probability and basis that the risk/opportunity will come true without credit for HS)

Sampling after mixing indicates that some solids are not readily suspended.

- Noncredible
- Very Unlikely (VU) (P < 0.15)
- Unlikely (U) (0.15 ≤ P < 0.45)
- Likely (L) (0.45 ≤ P < 0.75)
- Very Likely (VL) (P ≥ 0.75)

**C. Consequence:**

(State the consequences and quantify basis if that risk comes true without credit for RHS.

For opportunities, document the benefit/cost ratio comparison between the original scope and proposed opportunity)

Implementation of residual strategy prior to reuse of tank, cost and schedule impact.

**Worst Case Cost Impact:** $500K

**Worst Case Schedule Impact:** 6 Mo(s)

- Negligible (N) (C < 0.15)
- Marginal (M) (0.15 ≤ C < 0.45)
- Significant (S) (0.45 ≤ C < 0.75)
- Critical (C) (0.75 ≤ C < 0.9)
- Crisis (Cr) (C > 0.9)

**D. Risk/Opportunity Level:**

- Low (L)
- Moderate (M)
- High (H)

Probability x Consequence = RF/OF (optional): __________

**E. Handling:**

<table>
<thead>
<tr>
<th>Handling Strategy</th>
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<th>Implementation</th>
<th>Tracking</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Develop TPB Residual Strategy (TPB measurement / material balance) and obtain SIRC approval. (T48-RHS-34) (Responsible for execution: DA - Sam Shah)</td>
<td>L</td>
<td>N</td>
<td>L</td>
</tr>
<tr>
<td></td>
<td>Develop end state criteria that allows some solids to remain behind (T48-RHS-07) (Responsible for execution: Dennis Conrad)</td>
<td>$36K</td>
<td>8 Wk</td>
<td></td>
</tr>
</tbody>
</table>

**F. Residual Risk Impact:**

Cost Consequence: $0

Schedule Consequence: 0

Distribution Selection: $500,000

**G. Description of Residual Risk:**

**H. Triggers:**

**I. Affected Work Scope:**

**J. Additional Comments (optional):**
Risk & Opportunity Assessment Form

Assessed Element: 1.5 Transfer from T50 to Saltstone Facility

Title: Saltstone Na limit (1M) cannot be met

Category (Optional):

Risk/Opportunity Type: BDER Level:

Date:

A. Statement of Event:

(State Event and Risk/Opportunity)

Basis: Saltstone grout is assumed to be able to be generated at sodium concentrations down to one molar.

Event: Grout cannot be made at one molar sodium

Risk: Process will have to accommodate the higher sodium limit

B. Probability:

(State the probability and basis that the risk/opportunity will come true without credit for HS)

Saltstone has produced grout at lower Na molarities

- Noncredible
- Very Unlikely (VU) (P < 0.15)
- Unlikely (U) (0.15 ≤ P < 0.45)
- Likely (L) (0.45 ≤ P < 0.75)
- Very Likely (VL) (P ≥ 0.75)

C. Consequence:

(State the consequences and quantify basis if that risk comes true without credit for RHS)

For opportunities, document the benefit/cost ratio comparison between the original scope and proposed opportunity

Schedule delay - More sodium hydroxide would need to be added - increase amount of grout formed

Worst Case Cost Impact: $250K

Worst Case Schedule Impact: 4 Wk(s)

Cost Consequence:

Negligible (N) (C < 0.15)
Marginal (M) (0.15 ≤ C < 0.45)
Significant (S) (0.45 ≤ C < 0.75)
Critical (C) (0.75 ≤ C ≤ 0.9)
Crisis (Cr) (C > 0.9)

D. Risk/Opportunity Level:

- Low (L)
- Moderate (M)
- High (H)

Probability x Consequence = RF/OF (optional):

E. Handling:

Handling Strategy (HS) Description and Bases

Reduced Risk Implementation Tracking

<table>
<thead>
<tr>
<th>Handling Strategy</th>
<th>Handling Strategy (HS) Description and Bases</th>
<th>Reduced Risk</th>
<th>Implementation</th>
<th>Tracking</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mitigate</td>
<td>Perform grout studies using one molar sodium.</td>
<td>VU</td>
<td>L</td>
<td>$100K</td>
</tr>
</tbody>
</table>

F. Residual Risk Impact:

Cost Consequence: $0

Schedule Consequence: 0

Distribution Selection:

Best
Most Likely
Worst

G. Description of Residual Risk:

H. Triggers:

I. Affected Work Scope:

J. Additional Comments (optional):

UPDATED 8/16/05 - T48-RHS-36 complete. Grout studies show no impact
### Risk & Opportunity Assessment Form

#### Identification No.: 00-T48-49

- **Document Name:**
- **Revision No.:**
- **Page:** 85 of 110
- **Date:** March 13, 2006

#### Document Description:

**Assessed Element:** Chemicals added in SPF contain impurities.

**Title:** Effect of Raw Material Impurities - Saltstone

**Category (Optional):**

**Basis:**

- Chemicals added in SPF contain impurities.
- Event: Impurities increase rate of decomposition and reaction.
- Risk: Decomposition rate varies unpredictably; unknown intermediates form.

#### Probabilities:

- **Noncredible (P < 0.15)**
- **Very Unlikely (VU)**
- **Unlikely (U) (0.15 ≤ P < 0.45)**
- **Likely (L) (0.45 ≤ P < 0.75)**
- **Very Likely (VL) (P ≥ 0.75)**

**Acceptable reaction rates for Saltstone significantly lower than for Tank Farm. Multiple feed streams exist and interaction with Tank 48H waste unknown.**

#### Consequences:

- **Negligible (C < 0.15)**
- **Marginal (M) (0.15 ≤ C < 0.45)**
- **Significant (S) (0.45 ≤ C < 0.75)**
- **Critical (C) (0.75 ≤ C < 0.9)**
- **Crisis (Cr) (C ≥ 0.9)**

**Delay while process variation is researched and remedial action implemented.**

#### Risk/Opportunity Type: BDER Level: Low (L) Moderate (M) High (H)

#### Risk/Opportunity Level: Low (L) Moderate (M) High (H)

- **Probability x Consequence = Risk/Opportunity (optional):**

#### Handling Strategy:

<table>
<thead>
<tr>
<th>Handling Strategy</th>
<th>Handling Strategy (HS) Description and Bases</th>
<th>Reduced Risk</th>
<th>Implementation Cost</th>
<th>Tracking Strategy</th>
</tr>
</thead>
<tbody>
<tr>
<td>Reduce/ Mitigate</td>
<td>Conduct testing to examine interaction of Tank 48H with impurities in Saltstone premix.</td>
<td>VL</td>
<td>N</td>
<td>L</td>
</tr>
</tbody>
</table>

#### Residual Risk Impact:

- **Cost Consequence:** $0
- **Schedule Consequence:** $0
- **Distribution Selection:** 2 More

#### Description of Residual Risk:

- **If impurities are the cause of reaction, Saltstone should pay for development and implementation of specification changes.**
### Assessed Element: 1.04 Meet Safety Requirements

**Title:** TPB Decomposition Temperature - Saltstone (Safety Basis)

**Category (Optional):**

**Basis:** Curing of grout takes place at an elevated temperature. Event: R&D determines that TPB decomposition in the grout is within the proposed curing temperature. Risk: Significant modifications are necessary to Saltstone before aggregation can continue.

#### A. Statement of Event:

- **Event:** R&D determines that TPB decomposition in the grout is within the proposed curing temperature.

#### B. Probability:

<table>
<thead>
<tr>
<th>Probability</th>
<th>Basis</th>
</tr>
</thead>
<tbody>
<tr>
<td>Noncredible</td>
<td>$P &lt; 0.15$</td>
</tr>
<tr>
<td>Very Unlikely (VU)</td>
<td>$0.15 \leq P &lt; 0.45$</td>
</tr>
<tr>
<td>Unlikely (U)</td>
<td>$0.45 \leq P &lt; 0.75$</td>
</tr>
<tr>
<td>Likely (L)</td>
<td>$0.75 \leq P$</td>
</tr>
</tbody>
</table>

Risk: Significantly modified.

#### C. Consequence:

<table>
<thead>
<tr>
<th>Consequence</th>
<th>Basis</th>
</tr>
</thead>
<tbody>
<tr>
<td>Negligible (N)</td>
<td>$C &lt; 0.15$</td>
</tr>
<tr>
<td>Marginal (M)</td>
<td>$0.15 \leq C &lt; 0.45$</td>
</tr>
<tr>
<td>Significant (S)</td>
<td>$0.45 \leq C &lt; 0.75$</td>
</tr>
<tr>
<td>Critical (C)</td>
<td>$0.75 \leq C &lt; 0.9$</td>
</tr>
<tr>
<td>Crisis (Cr)</td>
<td>$C \geq 0.9$</td>
</tr>
</tbody>
</table>

Risk: Significant modifications are necessary to Saltstone before aggregation can continue.

#### D. Risk/Opportunity Level:

- **Risk Type:** Low (L)
- **Opportunity Type:** Moderate (M)

#### E. Handling:

<table>
<thead>
<tr>
<th>Handling Strategy</th>
<th>Handling Strategy (HS) Description and Bases</th>
<th>Reduced Risk</th>
<th>Implementation</th>
<th>Tracking</th>
</tr>
</thead>
<tbody>
<tr>
<td>Reduce</td>
<td>Complete testing on grout at various TPB concentrations and curing temperatures. (T48-RHS-28) (Responsible for execution: John Occhipinti)</td>
<td>Cr</td>
<td>H</td>
<td>$500K</td>
</tr>
<tr>
<td></td>
<td>Investigate required rates for windows of opportunity for processing in the Salt Strategy. (T48-RHS-63) (Responsible for execution: PIT - Larry Romanowski)</td>
<td>Cr</td>
<td></td>
<td>$150K</td>
</tr>
</tbody>
</table>

#### F. Residual Risk Impact:

- **Cost Consequence:**
  - $0
  - $250,000
  - $500,000
  - Distribution Selection: $500,000

#### G. Description of Residual Risk:

- Cost is limited to additional grout volume and will not be included in T&PRA for this Project as it is an SPF operational cost. Residual risk of schedule delay will directly impact Tank 48 Project.

#### H. Triggers:

- If testing shows aggregation will cause grout to not pass TCLP, then aggregation option would not be pursued. This risk only covers impacts from the rate of benzene released to the vault vapor space. See risk T48-069 for TCLP.

#### I. Affected Work Scope:

**Unclassified ONLY**
Document Name: 00-T48-51

Identification No.: 00-T48-51

Assessed Element: 1.04 Meet Safety Requirements

Title: Benzene Released in Saltstone (Safety Basis)

Category (Optional):

Risk/Opportunity Type: BDER

Date: March 13, 2006

Risk: Release exceeds safety and/or environmental limits.

A. Statement of Event:

B. Probability:

During grout curing it is expected that temperatures will exceed levels that will be used to help control releases in the Tank Farm.

C. Consequence:

D. Risk/Opportunity Level:

E. Handling:

F. Residual Risk Impact:

G. Description of Residual Risk:

H. Triggers:

I. Affected Work Scope:

J. Additional Comments (optional):

Unclassified ONLY
### Risk & Opportunity Assessment Form

**Identification No.:** 00-T48-54  
**Assessed Element:** 1.6 Process material at Saltstone Facility  
**Title:** Volume of Grout is Unacceptable  
**Category (Optional):**  
**Risk/Opportunity Type:**  
**Date:** March 13, 2006  
**Responsibility:** Several Stakeholders (DOE, CAB and DNFSB) will monitor activities on Tank 48. Event: Stakeholders reject path forward on Tank 48 based on the amount of grout produced being too great. Risk: Project abandoned.  

#### B. Probability:

(Indicate the probability and basis that the risk/opportunity will come true without credit for HS)

- Noncredible (P < 0.15)  
- Very Unlikely (VU) (15 ≤ P < 0.45)  
- Unlikely (U) (0.45 ≤ P < 0.75)  
- Likely (L) (0.75 ≤ P < 0.9)  
- Very Likely (VL) (P ≥ 0.9)

#### C. Consequence:

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

The worst case would require that the Salt Strategy be reworked to develop a different path forward.

- Worst Case Risk:  
  - Cost Consequence: $500K  
  - Schedule Consequence: 1 Yr  
  - Probability x Consequence = RF/OF (optional): [Calculations]

#### D. Risk/Opportunity Level:

- Low (L)  
- Moderate (M)  
- High (H)

#### E. Handling:

<table>
<thead>
<tr>
<th>Handing Strategy (HS) Description and Bases</th>
<th>Reduced Risk Implementation</th>
<th>Tracking #</th>
</tr>
</thead>
<tbody>
<tr>
<td>Reduce (T48-RHS-52) (Responsible for execution: PIT - Sterling Robertson)</td>
<td>$150,000</td>
<td>1 Yr</td>
</tr>
<tr>
<td></td>
<td>$500K</td>
<td>16 Wk</td>
</tr>
</tbody>
</table>

#### F. Residual Risk Impact:

- Cost Consequence: $0  
- Schedule Consequence: 0  
- Distribution Selection: Best

#### G. Description of Residual Risk:

H. Triggers:

I. Affected Work Scope:

J. Additional Comments (optional):

- UPDATED 9/7/05 - Deleted T48-RHS-24 as not in project scope.

  If the worst case impact of this risk is realized the tank 48 Project (as currently scoped) could not be implemented and the Salt Strategy would be reworked to develop a different path forward. The most likely case could be a serious delay to the project during which stakeholders concerns are resolved. The best case would be that the PIT strategy of working closely with stakeholders results in no delay to the project. The Tank 48 Project will track this risk and implement and monitor the progress of risk handling strategies (identified above).
### Risk & Opportunity Assessment Form

**Identification No.:** 00-T48-55  
**Title:** Greater Than Assumed Number of Analyzed Samples Required - Saltstone  
**Category (Optional):**  
**Risk/Opportunity Type:** BDER Level:  
**Date:** TANK 48 PROJECT  
**Responsibility:**  

#### A. Statement of Event:

- **Event:** Additional sampling is required to support required testing efforts.
- **Risk:** Process strategy must be modified.

#### B. Probability:

- **P** = Noncredible, Very Unlikely (VU) = (P < 0.15), Unlikely (U) = (15 ≤ P < 0.45), Likely (L) = (45 ≤ P < 0.75), Very Likely (VL) = (P ≥ 0.75).

#### C. Consequence:

- **C** = Negligible (N) = (C < 0.15), Marginal (M) = (15 ≤ C < 0.45), Significant (S) = (45 ≤ C < 0.75), Critical (C) = (75 ≤ C < 0.9), Crisis (Cr) = (C > 0.9).

#### D. Risk/Opportunity Level:

- **Reduction Mitigate:** Develop definitive sample plan in support of disposition. (T48-RHS-21) (Responsible for execution: PIT - Pete Hill)

#### E. Handling:

<table>
<thead>
<tr>
<th>Handling Strategy</th>
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<th>Implementation</th>
<th>Probability</th>
<th>Cost</th>
<th>Schedule</th>
</tr>
</thead>
<tbody>
<tr>
<td>Reduce Mitigate</td>
<td>(T48-RHS-21) (Responsible for execution: PIT - Pete Hill)</td>
<td>U S M</td>
<td></td>
<td></td>
<td>$12K</td>
<td>4 Wks</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>$10K</td>
<td>2 Wks</td>
</tr>
</tbody>
</table>

#### F. Residual Risk Impact:

- **Cost Consequence:** $0, $50,000, $100,000  
- **Schedule Consequence:** 0, 2 Wks, 4 Wks  
- **Distribution Selection:** Best, Most Likely, Worst

### Unclassified ONLY
### Risk & Opportunity Assessment Form

**Assessed Element:** Benzene generation at Saltstone Facility

**Title:** Saltstone Facility Benzene Generation Requires Equipment Modification at Saltstone

**Category (Optional):**

**Risk/Opportunity Type:**

**Date:**

**Responsibility:**

**Assessed Element:**

**Document Date:**

#### A. Statement of Event:

Basis: TRB benzene generation is assumed to be sufficiently low to allow processing with existing equipment.

Event: Benzene generation rate exceeds current assumptions.

Risk: Process will have to accommodate the higher level of generated benzene.

#### B. Probability:

(State the probability and basis that the risk/opportunity will come true without credit for HS)

Probability Evaluations are currently being performed to identify the potential for benzene generation through the addition of recycle.

- Noncredible (P < 0.05)
- Very Unlikely (VU) (0.05 ≤ P < 0.15)
- Unlikely (U) (0.15 ≤ P < 0.45)
- Likely (L) (0.45 ≤ P < 0.75)
- Very Likely (VL) (P ≥ 0.75)

#### C. Consequence:

(State the consequences and quantify basis if that risk comes true without credit for RHS)

For opportunities, document the benefit/cost ratio comparison between the original scope and proposed opportunity.

Saltstone Facility will require a tank ventilation system as a process control (possibly including an inerting/blanketing capability).

Worst Case Cost Impact: $3M

Worst Case Schedule Impact: 12 Mo(s)

- Negligible (N) (C < 0.15)
- Marginal (M) (0.15 ≤ C < 0.45)
- Significant (S) (0.45 ≤ C < 0.75)
- Critical (C) (C ≥ 0.75)

#### D. Risk/Opportunity Level:

- Low (L)
- Moderate (M)
- High (H)

Probability x Consequence = RF/OF (optional):.

#### E. Handling:

<table>
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</tr>
</thead>
<tbody>
<tr>
<td>Mitigate</td>
<td>If evaluations show increased benzene generation, implement modifications (T48-RHS-64) (Responsible for execution: Dennis Thompson)</td>
<td>Yr</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td>Complete testing on grout at various TPB concentrations and curing temperatures (T48-RHS-28) (Responsible for execution: John Ochpiinti)</td>
<td>$150K</td>
<td>16</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Investigate required rates for windows of opportunity for processing in the Salt Strategy (T48-RHS-63) (Responsible for execution: PIT Team - Larry Romanowski)</td>
<td>$500K</td>
<td>1</td>
<td></td>
</tr>
</tbody>
</table>

#### F. Residual Risk Impact:

<table>
<thead>
<tr>
<th>Schedule Consequence</th>
<th>Cost Consequence</th>
<th>Distribution Selection</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>$0</td>
<td>$150,000, $500,000</td>
</tr>
</tbody>
</table>

#### G. Description of Residual Risk:

#### H. Triggers:

#### I. Affected Work Scope:

- Updated 9/7/05 - Deleted T48-RHS-24 as not in project scope.
- Updated 8/16/05 - Added T48-RHS-63
- Updated 8/20/05 - Added "at Saltstone," to title.
- Updated 4/12/05 - Risk is being realized. To reduce the risk of proceeding without data to understand the potential scope of modifications required, the project will not proceed until data is available from grout testing.
Risk & Opportunity Assessment Form

Identification No.: 00-T48-57

Title: Process Material Falls TCLP - Saltstone

Category (Optional): Basis: TCLP (pre-qual) has to be acceptable as a nonhazardous material.

Event: TCLP (pre-qual) results show material to be hazardous.
Risk: Process cannot continue.

A. Statement of Event:

B. Probability:

C. Consequence:

D. Risk/Opportunity Level:

E. Handling:

F. Residual Risk Impact:

G. Description of Residual Risk:

H. Triggers:

I. Affected Work Scope:

J. Additional Comments (optional):
**Risk & Opportunity Assessment Form**

**Identification No.:** 00-T48-58  
**Assessed Element:** Inadequate scale up from R&D - Saltstone  
**Title:** 1.6 Process material at Saltstone Facility  
**Category (Optional):** 
**Risk/Opportunity Type:** 
**Date:** March 13, 2006

---

**A. Statement of Event:** 
Basis: R&D studies must be scaled-up to plant scale. Event: Scaled-up process does not meet performance requirements. Risk: Process halted.

**B. Probability:**  
Scale-up is a concern for all chemical processes going from bench to field scale (surface area to benzene generation, for example).
- Noncredible  
- Very Unlikely (VU) \( P < 0.15 \)  
- Unlikely (U) \( 0.15 \leq P < 0.45 \)  
- Likely (L) \( 0.45 \leq P < 0.75 \)  
- Very Likely (VL) \( P \geq 0.75 \)

**C. Consequence:**  
For opportunities, document the benefit/cost ratio comparison between the original scope and proposed opportunity. 
Project will be forced to use an alternate strategy.
- Negligible (N) \( C < 0.15 \)  
- Marginal (M) \( 0.15 \leq C < 0.45 \)  
- Significant (S) \( 0.45 \leq C < 0.75 \)  
- Critical (C) \( 0.75 \leq C < 0.9 \)  
- Crisis (Cr) \( C \geq 0.9 \)

**D. Risk/Opportunity Level:**  
- Low (L)  
- Moderate (M)  
- High (H)  
- Probability x Consequence = RF/OF (optional): 

**E. Handling:**  

<table>
<thead>
<tr>
<th>Handling Strategy (HS) Description and Bases</th>
<th>Handling Strategy</th>
<th>Reduced Risk</th>
<th>Implementation</th>
<th>Tracking</th>
</tr>
</thead>
<tbody>
<tr>
<td>Compare effect of grout test sample geometry on benzene release rates during TPB tests. (T48-RHS-47) (John Occhipinti)</td>
<td>VU</td>
<td>Cr</td>
<td>H</td>
<td>$10K</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**F. Residual Risk Impact:**  
- Cost Consequence: $0, $200,000, $500,000  
- Schedule Consequence: 0, 4 Mo(s), 1 Yr(s)

**G. Description of Residual Risk:**  
Most likely consequence is more testing required.

**H. Triggers:**

**I. Affected Work Scope:**

**J. Additional Comments (optional):**

**UPDATED 9/7/05 - Deleted T48-RHS-24 as not in project scope.**
### Risk & Opportunity Assessment Form

**Identification No.:** 00-T48-59  
**Title:** Saltstone Facility production rate less than 83K gals/week  
**Category (Optional):**  
**Risk/Opportunity Type:**   
**Date:** TANK 48 PROJECT  
**Risk Analysis Report** Page 93 of 110

**Assessed Element:** 1.6 Process material at Saltstone Facility  
**Document Name:**  
**Revision No.:**  
**Page:** 52 of 58

#### Event:
Saltstone cannot process at 83k gals/week.  
Risk: Process will have to take longer.

**A. Statement of Event:**
Saltstone has never been challenged to achieve this production rate.  

**B. Probability:**

<table>
<thead>
<tr>
<th>Probability</th>
<th>Basis</th>
<th>Risk/Opportunity Level</th>
</tr>
</thead>
<tbody>
<tr>
<td>Noncredible</td>
<td>(P ≤ 0.15)</td>
<td>Low (L)</td>
</tr>
<tr>
<td>Very Unlikely (VU)</td>
<td>(0.15 ≤ P &lt; 0.45)</td>
<td>Moderate (M)</td>
</tr>
<tr>
<td>Unlikely (U)</td>
<td>(0.45 ≤ P &lt; 0.75)</td>
<td>High (H)</td>
</tr>
<tr>
<td>Likely (L)</td>
<td>(0.75 ≤ P &lt; 1)</td>
<td>Critical (C)</td>
</tr>
<tr>
<td>Very Likely (VL)</td>
<td>(P ≥ 1)</td>
<td>Crisis (Cr)</td>
</tr>
</tbody>
</table>

**C. Consequence:**
Longer processing time. Schedule impact.

**Worst Case Cost Impact:** 0  
**Worst Case Schedule Impact:** 6 Mo(s)

<table>
<thead>
<tr>
<th>Consequence</th>
<th>Probability x Consequence = RF/OF (optional):</th>
</tr>
</thead>
<tbody>
<tr>
<td>Negligible (N)</td>
<td>(C ≤ 0.15)</td>
</tr>
<tr>
<td>Marginal (M)</td>
<td>(0.15 ≤ C &lt; 0.45)</td>
</tr>
<tr>
<td>Significant (S)</td>
<td>(0.45 ≤ C &lt; 0.75)</td>
</tr>
<tr>
<td>Critical (C)</td>
<td>(0.75 ≤ C &lt; 1)</td>
</tr>
<tr>
<td>Crisis (Cr)</td>
<td>(C ≥ 1)</td>
</tr>
</tbody>
</table>

**D. Risk/Opportunity Level:**  
- Low (L)  
- Moderate (M)  
- High (H)  
- Probability x Consequence = RF/OF (optional):  

**E. Handling:**  
- Evaluate production rate and investigate the option of using different vaults.  
- Investigate required rates for windows of opportunity for processing in the Salt Strategy.  

<table>
<thead>
<tr>
<th>Handling Strategy</th>
<th>Handling Strategy (HS) Description and Bases</th>
<th>Reduced Risk</th>
<th>Implementation</th>
<th>Ranking</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mitigate</td>
<td>VU</td>
<td>N</td>
<td>L</td>
<td></td>
</tr>
</tbody>
</table>

**F. Residual Risk Impact:**  
- Cost Consequence: $0  
- Schedule Consequence: 0  
- Distribution Selection:  
  - Best: 0  
  - Most Likely: 0  
  - Worst: 6 Mo(s)  

**G. Description of Residual Risk:**  

**H. Triggers:**  
- **I. Affected Work Scope:**  

**J. Additional Comments (optional):**  
- UPDATED 8/16/05 - Added T48-RHS-63  
- UPDATED 8/2/05 - Modified T48-RHS-59  
- UPDATED 6/28/05 - Added T48-RHS-59

---

Unclassified ONLY
Risk & Opportunity Assessment Form

**Assessed Element:** 1.6 Process material at Saltstone Facility

**Title:** Laboratory Capability - Saltstone

**Category (Optional):**

**Risk/Opportunity Type:**

**Date:**

**Responsibility:**

**A. Statement of Event:**

<table>
<thead>
<tr>
<th>Basis:</th>
<th>Event:</th>
<th>Risk:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Process samples must be analyzed.</td>
<td>Analysis exceeds current laboratory capabilities due to samples being too hot</td>
<td>large delay in analytical results.</td>
</tr>
</tbody>
</table>

**B. Probability:**

<table>
<thead>
<tr>
<th>P (Noncredible)</th>
<th>Very Unlikely (VU)</th>
<th>Unlikely (U)</th>
<th>Likely (L)</th>
<th>Very Likely (VL)</th>
</tr>
</thead>
<tbody>
<tr>
<td>(P ≤ 0.15)</td>
<td>(15 ≤ P ≤ 0.45)</td>
<td>(45 ≤ P ≤ 0.75)</td>
<td>(P ≥ 0.75)</td>
<td></td>
</tr>
</tbody>
</table>

Higher rad content invalidates past practice of pulling processing and TCLP samples and conducting tests in hood at Saltstone. Transporting samples and conducting tests in Cells most likely required.

**C. Consequence:**

For opportunities, document the benefit/cost ratio comparison between the original scope and proposed opportunity.

Delays in analytical results, especially if forced off-site. However, it is likely SRNL will perform required analyses. This is the basis of the consequences listed.

**D. Risk/Opportunity Level:**

<table>
<thead>
<tr>
<th>C (Noncredible)</th>
<th>Marginal (M)</th>
<th>Significant (S)</th>
<th>Critical (C)</th>
<th>Crisis (Cr)</th>
</tr>
</thead>
<tbody>
<tr>
<td>(C ≤ 0.15)</td>
<td>(15 ≤ C ≤ 0.45)</td>
<td>(45 ≤ C ≤ 0.75)</td>
<td>(C &gt; 0.9)</td>
<td></td>
</tr>
</tbody>
</table>

**E. Handling:**

<table>
<thead>
<tr>
<th>Handling Strategy</th>
<th>Handling Strategy (HS) Description and Bases</th>
<th>Reduced Risk</th>
<th>Implementation</th>
<th>Tracking</th>
</tr>
</thead>
<tbody>
<tr>
<td>Reduce/Mitigate</td>
<td>Develop definitive sample plan in support of disposition. (T48-RHS-21) (Responsible for execution: PIT - Pete Hill)</td>
<td>VU</td>
<td>$12K</td>
<td>4 wk</td>
</tr>
<tr>
<td></td>
<td>Perform testing with grout at various TPB concentrations and curing temperatures. (T48-RHS-28) (Responsible for execution: John Occhipinti)</td>
<td>S</td>
<td>$150K</td>
<td>16 wk</td>
</tr>
<tr>
<td></td>
<td>Develop Sample &amp; Analytical Plans well in advance of actual operations (including identification of potential conflicts), splitting samples into multiple aliquots upon arrival, replicate analyses (especially as the concentration decreases or the target response time shortens), and contingency plans. (T48-RHS-44) (Responsible for execution: SRNL - Bill Wilmuth)</td>
<td>L</td>
<td>$10K</td>
<td>2 wk</td>
</tr>
</tbody>
</table>

**F. Residual Risk Impact:**

<table>
<thead>
<tr>
<th>Schedule Consequence</th>
<th>Cost Consequence</th>
<th>Distribution Selection</th>
</tr>
</thead>
<tbody>
<tr>
<td>Best</td>
<td>$0</td>
<td>$35,000</td>
</tr>
<tr>
<td>Most Likely</td>
<td>$70,000</td>
<td></td>
</tr>
</tbody>
</table>

**G. Description of Residual Risk:**

**H. Triggers:**

**I. Affected Work Scope:**

**J. Additional Comments (optional):**

---

<table>
<thead>
<tr>
<th>Tracking#</th>
<th>Cost Schedule</th>
<th>Reduced Risk Strategy</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

---

**Unclassified ONLY**
Risk & Opportunity Assessment Form

Assessed Element: 1.1 Transfer Recycle from T21, T23 to T48

Title: Recycle Not Available - RISK CLOSED

KASE #: 00-T48-61

Category (Optional): Basis: It is assumed that infrastructure to allow recycle transfer to Tank 48 will be installed by the Tank 41 (Min Gate) Project.

Event: Tank 41 Project does not install the necessary infrastructure

Risk: Recycle cannot be transferred to Tank 48

A. Statement of Event:

B. Probability:

Probability x Consequence = RF/OF (optional):

C. Consequence:

Tank 48 Project would have additional scope to design and install infrastructure and will be delayed until a window is available during Min Gate operations to perform field modifications.

D. Risk/Opportunity Level:

E. Handling:

Handling Strategy (HS) Description and Bases

Reduced Risk Implementation Tracking

Prob Cost Risk Schedule

Militate: Monitor Min Gate activities for completion of recycle infrastructure scope, and if not performed under that project, initiate BCP early to add this scope to the Tank 48 Project such that the design may be completed and ready for implementation in the field once a Min Gate window is available. [T48-RHS-57] (Responsible for execution: Owner - Renee Spires)

F. Residual Risk Impact:

Schedule Consequence: 0 2 Weeks 1 Month

Best Most Likely Worst

G. Description of Residual Risk:

H. Triggers:

I. Affected Work Scope:

J. Additional Comments (optional):

UPDATED 10/31/05 - RISK CLOSED - Min Gate activities completed, infrastructure completed, this risk cannot be realized.
**Risk & Opportunity Assessment Form**

<table>
<thead>
<tr>
<th>Identification No.:</th>
<th>Assessed Element:</th>
<th>ARP Equip. Install. Interferes With Installation of Above Ground Transfer Line</th>
</tr>
</thead>
<tbody>
<tr>
<td>00-T48-62</td>
<td></td>
<td>(State Event and Risk/Opportunity)</td>
</tr>
<tr>
<td>KASE #:</td>
<td></td>
<td>Basis: An above ground transfer line will be used to transfer from Tank 48 to Tank 50</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Event: ARP Installation activity (equipment, cell covers etc.) prevent the use of the above ground transfer line.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Risk: Transfers are not possible until ARP Project completes installation.</td>
</tr>
</tbody>
</table>

**A. Statement of Event:**

- **Basis:** An above ground transfer line will be used to transfer from Tank 48 to Tank 50.
- **Event:** ARP Installation activity (equipment, cell covers etc.) prevent the use of the above ground transfer line.
- **Risk:** Transfers are not possible until ARP Project completes installation.

**B. Probability:**

- **Probability:** Noncredible (P < 0.15), Very Unlikely (VU) (15 ≤ P < 0.45), Unlikely (U) (45 ≤ P < 0.75), Likely (L) (P ≥ 0.75).

**C. Consequence:**

- **Consequence:** For opportunities, document the benefit/cost ratio comparison between the original scope and proposed opportunity.

**D. Risk/Opportunity Level:**

- **Risk Level:** Low (L), Moderate (M), High (H). Probability x Consequence = RF/OF (optional):

<table>
<thead>
<tr>
<th>Handling Strategy</th>
<th>Handling Strategy (HS) Description and Bases</th>
<th>Reduced Risk</th>
<th>Implementation</th>
<th>Tracking</th>
</tr>
</thead>
<tbody>
<tr>
<td>Reduce</td>
<td>Monitor ARP schedule implementation and schedule Tank 48 activities to minimize any impact.</td>
<td>U</td>
<td>S</td>
<td>M</td>
</tr>
</tbody>
</table>

**F. Residual Risk Impact:**

- **Cost Consequence:** $0, $0, $0
- **Schedule Consequence:** 0 Wk(s), 1 Wk(s), 2 Wk(s)
- **Distribution Selection:** Best, Most Likely, Worst

**G. Description of Residual Risk:**

**H. Triggers:**

**I. Affected Work Scope:**

**J. Additional Comments (optional):**
Risk & Opportunity Assessment Form

Identification No.: T48-63
KASE #: T48-63

Assessed Element: 1.7 General
Title: Fast-Track Schedule Requires Rework

Category (Optional):
Risk/Opportunity Type: BDER Level:

Date: 
Responsibility: 
Event of Risk:

Basis: The Tank 48 Project will be executed as a fast-track project.
Event: The fast-track process results in re-design and field rework.
Risk: Project cannot proceed until re-design or rework is complete.

A. Statement of Event:

B. Probability:
Parallel design fabrication paths and unconfirmed assumptions in design contribute to the probability of this risk being realized.
Noncredible Very Unlikely(VU) Unlikely(U) Likely(L) Very Likely(VL) (P < 0.15) (0.15 ≤ P < 0.45) (0.45 ≤ P < 0.75) (P ≥ 0.75)

C. Consequence:
Schedule and cost impact for re-design and rework.
Worst Case Cost Impact: $100,000 Worst Case Schedule Impact: 2 Mo(s)

D. Risk/Opportunity Level: Low(L) Moderate(M) High(H)
Probability x Consequence = RF/OF (optional):

E. Handling:

F. Residual Risk Impact:
Cost Consequence: $0 $50,000 $100,000 Distribution Selection:
Schedule Consequence: 0 4 Wks 2 Mo(s)

G. Description of Residual Risk:

H. Triggers:

I. Affected Work Scope:

J. Additional Comments (optional):
Risk & Opportunity Assessment Form

Assessed Element: 1.01 Design/Install New Equipment

Title: Tank 50 Equipment Installation Impacted by Ongoing Transfers

Category (Optional):

Risk/Opportunity Type: BDER Level:

Date:

Responsibility:

A. Statement of Event:

Basis: Tank 50 will be used by other Projects as an aggregation tank and to feed Saltsone.

Event: Other projects use Tank 50 and prevent modifications being performed that are required for Tank 48 Project.

Risk: Equipment cannot be installed while Tank 50 is in operation.

B. Probability:

(Noncredible Very Unlikely (VU) Unlikely (U) Likely (L) Very Likely (VL))

Based on currently scheduled work.

C. Consequence:

(Positive the probability and basis that the risk/opportunity will come true without credit for HS)

For opportunities, document the benefit/cost ratio comparison between the original scope and proposed opportunity)

Schedule delays

Worst Case Cost Impact: 0 Worst Case Schedule Impact: 2 Mo(s)

D. Risk/Opportunity

Level: Low (L) Moderate (M) Critical (C) Crisis (Cr)

Probability x Consequence = RF/OF (optional):

E. Handling:

Handling Strategy: Handling Strategy (HS) Description and Bases Reduced Risk Implementation Tracking

Mitigate: Monitor other project schedule implementation and schedule Tank 48 activities to minimize any impact.

(T48-RHS-64) (Responsible for execution: TCP Operations - Jim Hosmer)

F. Residual Risk Impact:

Cost Consequence: 0 Schedule Consequence: 0

Distribution Selection:

Best Most Likely Worst

G. Description of Residual Risk:

H. Triggers:

I. Affected Work Scope:

J. Additional Comments (optional):
### Risk & Opportunity Assessment Form

#### Assessed Element: 1.4 Transfer T48 to T50

**Title:** Processing Window Unavailable - NEW RISK

**Category (Optional):**

**Risk/Oppportunity Type:**

**Date:**

**Assessed Element:**

**Responsibility:**

#### A. Statement of Event:

*State Event and Risk/Oppportunity*

Basis: This project will require Tank 50 space to be available to receive Tank 48 material when required.

Event: MCU project is utilizing Tank 50 when it is needed by the Tank 48 Project and both projects cannot simultaneously utilize Tank 50.

Risk: Tank 48 Project cannot move waste from Tank 48 until Tank 50 space is available.

#### B. Probability:

*State the probability and basis that the risk/opportunity will come true without credit for HS*

- Noncredible
- Very Unlikely (VU)
- Unlikely (U)
- Likely (L)
- Very Likely (VL)

Basis: Currently both projects are competing for overlapping windows of Tank 50 use.

#### C. Consequence:

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

Schedule delay to Project.

#### D. Risk/Oppportunity Level:

- Low (L)
- Moderate (M)
- High (H)
- Very High (VH)

**Probability x Consequence = RF/OF (optional):**

#### E. Handling:

<table>
<thead>
<tr>
<th>Handling Strategy</th>
<th>Handling Strategy Description and Bases</th>
<th>Reduced Risk Implementation Tracking</th>
</tr>
</thead>
</table>
| Mitigate          | Identify and develop methods of operating MCU and Tank 48 concurrently with Tank 50 as a shared receipt tank. (T48-RHS-65) (Responsible for execution: LWD Engineering - John Schwenkler) Identify alternative methods to disposition Tank 48. (T48-RHS-66) (Responsible for execution: Neil Davis) | BDE R Level: |}

#### F. Residual Risk Impact:

<table>
<thead>
<tr>
<th>Cost Consequence</th>
<th>Schedule Consequence</th>
</tr>
</thead>
<tbody>
<tr>
<td>$0</td>
<td>0</td>
</tr>
<tr>
<td>$0</td>
<td>4 Wks</td>
</tr>
<tr>
<td>$0</td>
<td>3 Mo(s)</td>
</tr>
</tbody>
</table>

**Distribution Selection:**

- Best
- Most Likely
- Worst

#### G. Description of Residual Risk:

Best case is no impact. Most likely is being able to work around the windows with some parallel receipts in Tank 50 and minor impact. Worst case is concurrent operation not possible.

#### H. Triggers:

- I. Affected Work Scope:
- J. Additional Comments (optional):

*UPDATE 1/20/06* Title changed to "Processing window unavailable"
6.6: Crystal Ball Report

Summary:
Display Range is from $494,343 to $1,546,363
Entire Range is from $367,320 to $1,546,363
After 1,000 Trials, the Std. Error of the Mean is $6,956

Statistics:
<table>
<thead>
<tr>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Trials</td>
</tr>
<tr>
<td>Mean</td>
</tr>
<tr>
<td>Median</td>
</tr>
<tr>
<td>Mode</td>
</tr>
<tr>
<td>Standard Deviation</td>
</tr>
<tr>
<td>Variance</td>
</tr>
<tr>
<td>Skewness</td>
</tr>
<tr>
<td>Kurtosis</td>
</tr>
<tr>
<td>Coeff. of Variability</td>
</tr>
<tr>
<td>Range Minimum</td>
</tr>
<tr>
<td>Range Maximum</td>
</tr>
<tr>
<td>Range Width</td>
</tr>
<tr>
<td>Mean Std. Error</td>
</tr>
</tbody>
</table>

![Frequency Chart](chart.png)
Percentiles:

<table>
<thead>
<tr>
<th>Percentile</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>0%</td>
<td>$367,320</td>
</tr>
<tr>
<td>10%</td>
<td>$712,180</td>
</tr>
<tr>
<td>20%</td>
<td>$822,410</td>
</tr>
<tr>
<td>30%</td>
<td>$921,999</td>
</tr>
<tr>
<td>40%</td>
<td>$986,181</td>
</tr>
<tr>
<td>50%</td>
<td>$1,052,820</td>
</tr>
<tr>
<td>60%</td>
<td>$1,107,780</td>
</tr>
<tr>
<td>70%</td>
<td>$1,165,827</td>
</tr>
<tr>
<td>80%</td>
<td>$1,228,855</td>
</tr>
<tr>
<td>90%</td>
<td>$1,299,329</td>
</tr>
<tr>
<td>100%</td>
<td>$1,546,363</td>
</tr>
</tbody>
</table>
Risk: **T48-02**

Triangular distribution with parameters:
- Minimum: $0
- Likeliest: $0
- Maximum: $50,000

Selected range is from $0 to $50,000

Risk: **T48-03**

Beta distribution with parameters:
- Alpha: $2
- Beta: $13
- Scale: $125,000

Selected range is from $0 to +Infinity

Risk: **T48-04**

Triangular distribution with parameters:
- Minimum: $0
- Likeliest: $70,000
- Maximum: $125,000

Selected range is from $0 to $125,000

Risk: **T48-05**

Beta distribution with parameters:
- Alpha: $1
- Beta: $100
- Scale: $100,000

Selected range is from $0 to +Infinity
Risk: T48-10

Triangular distribution with parameters:
- Minimum: $0
- Likeliest: $50,000
- Maximum: $200,000

Selected range is from $0 to $200,000

Risk: T48-11

Beta distribution with parameters:
- Alpha: $1
- Beta: $100
- Scale: $50,000

Selected range is from $0 to +Infinity

Risk: T48-12

Beta distribution with parameters:
- Alpha: $1
- Beta: $100
- Scale: $50,000

Selected range is from $0 to +Infinity

Risk: T48-14

Beta distribution with parameters:
- Alpha: $1
- Beta: $100
- Scale: $100,000

Selected range is from $0 to +Infinity
Risk: **T48-15**

Beta distribution with parameters:

- Alpha: $1
- Beta: $100
- Scale: $25,000

Selected range is from $0 to +Infinity

Risk: **T48-16**

Beta distribution with parameters:

- Alpha: $1
- Beta: $100
- Scale: $50,000

Selected range is from $0 to +Infinity

Risk: **T48-17**

Triangular distribution with parameters:

- Minimum: $0
- Likeliest: $50,000
- Maximum: $100,000

Selected range is from $0 to $100,000

Risk: **T48-18**

Beta distribution with parameters:

- Alpha: $1
- Beta: $100
- Scale: $50,000

Selected range is from $0 to +Infinity
Risk: T48-19

Triangular distribution with parameters:
  Minimum $0  
  Likeliest $50,000  
  Maximum $100,000

Selected range is from $0 to $100,000

Risk: T48-21

Triangular distribution with parameters:
  Minimum $0  
  Likeliest $50,000  
  Maximum $100,000

Selected range is from $0 to $100,000

Risk: T48-25

Beta distribution with parameters:
  Alpha $1  
  Beta $100  
  Scale $140,000

Selected range is from $0 to +Infinity

Risk: T48-26

Triangular distribution with parameters:
  Minimum $0  
  Likeliest $750,000  
  Maximum $1,000,000

Selected range is from $0 to $1,000,000
Risk: **T48-27**

Triangular distribution with parameters:
- Minimum: $0
- Likeliest: $50,000
- Maximum: $100,000

Selected range is from $0 to $100,000

---

Risk: **T48-63**

Triangular distribution with parameters:
- Minimum: $0
- Likeliest: $50,000
- Maximum: $100,000

Selected range is from $0 to $100,000
### 6.7: Risk-O-Meter

<table>
<thead>
<tr>
<th>Risk Number</th>
<th>Risk Title</th>
<th>Risk Level</th>
<th>Closed</th>
<th>Not a Problem</th>
<th>Minor Concern</th>
<th>Major Concern</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>PHASE I Project Risks</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>T48-02</td>
<td>Interfaces with Other Facilities and Projects</td>
<td>M</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Keep H-Tank Farm Facility and Saltstone Project Owners &amp; Managers informed. Plan NaOH additions and transfers of recycle from Type IV tanks and receive concurrence.</td>
</tr>
<tr>
<td>T48-03</td>
<td>Lost or Spilled Sample in SRNL</td>
<td>M</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Develop Sample &amp; Analytical Plans. SRNL has improved sample storage and management.</td>
</tr>
<tr>
<td>T48-04</td>
<td>Laboratory Capability - Tank Farm</td>
<td>M</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Develop Sample &amp; Analytical Plans.</td>
</tr>
<tr>
<td>T48-05</td>
<td>Accessibility to Perform Work</td>
<td>M</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Coordinate work with operations and other projects.</td>
</tr>
<tr>
<td>T48-06</td>
<td>Field materials are not available</td>
<td>L</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Quantify / track material. Expedite procurements.</td>
</tr>
<tr>
<td>T48-09</td>
<td>Availability of Construction Equipment</td>
<td>L</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>N/A</td>
</tr>
<tr>
<td>T48-10</td>
<td>Readiness Assessment More Than a WSRC RA</td>
<td>M</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>SNR is developed and awaiting approval.</td>
</tr>
<tr>
<td>T48-11</td>
<td>Readiness Assessment Findings</td>
<td>L</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Detailed management checklist prior to beginning RA.</td>
</tr>
<tr>
<td>T48-12</td>
<td>Support Services Availability</td>
<td>M</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Forecast resources and stick to plan. Integrate project activities into facility schedule.</td>
</tr>
<tr>
<td>T48-14</td>
<td>Loss of Utilities</td>
<td>M</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>N/A</td>
</tr>
<tr>
<td>T48-15</td>
<td>Unsafe Conditions Discovered at Turnover</td>
<td>M</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Safety/IH Engineer included in design reviews.</td>
</tr>
<tr>
<td>T48-16</td>
<td>Equipment Failure (Recycle Transfers)</td>
<td>M</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>N/A</td>
</tr>
<tr>
<td>T48-17</td>
<td>Tie-ins to Existing Facility</td>
<td>M</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Perform early walk downs and validate existing conditions/equipment.</td>
</tr>
<tr>
<td>T48-18</td>
<td>Cooling Coils Fail Test</td>
<td>L</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Heat balance study completed.</td>
</tr>
<tr>
<td>T48-19</td>
<td>Existing equipment cannot meet seismic qualification requirements</td>
<td>M</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Perform early walk downs and validate existing conditions/equipment.</td>
</tr>
<tr>
<td>T48-21</td>
<td>Modifications are determined to be required for the Transfer line/LPDT and Tank 48 to 50.</td>
<td>L</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Complete Safety Basis development and SIRC approval as early as possible.</td>
</tr>
<tr>
<td>Risk Number</td>
<td>Risk Title</td>
<td>Risk Level</td>
<td>Closed</td>
<td>Not a Problem</td>
<td>Minor Concern</td>
<td>Major Concern</td>
<td>Remarks</td>
</tr>
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<td>-------------------------------------------------------------------------</td>
</tr>
<tr>
<td>T48-25</td>
<td>Equipment Fails Surveillance</td>
<td>M</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Identify attributes in AB requiring testing before design is complete.</td>
</tr>
<tr>
<td>T48-26</td>
<td>Safety Basis Impacts Design - Tank Farm</td>
<td>H</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Complete Safety Basis development and SIRC approval as early as possible.</td>
</tr>
<tr>
<td>T48-27</td>
<td>Safety Basis Strategy not Accepted By DOE</td>
<td>M</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Formal/ informal DOE involvement during SBS development.</td>
</tr>
<tr>
<td>T48-36</td>
<td>Benzene Generation Rate - Tank Farm (Safety Basis)</td>
<td>H</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Define and execute a chemical qualification program.</td>
</tr>
<tr>
<td>T48-51</td>
<td>Benzene Released in Saltstone (Safety Basis)</td>
<td>H</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Develop backup process. Testing on grout at various TPB concentrations and curing temperatures. Investigate processing rates/windows within Salt Strategy.</td>
</tr>
<tr>
<td>T48-62</td>
<td>ARP Equipment Installation Interferes With Above Ground Transfer Line</td>
<td>M</td>
<td></td>
<td></td>
<td></td>
<td>←</td>
<td>Monitor ARP schedule implementation</td>
</tr>
<tr>
<td>T48-63</td>
<td>Fast-Track Schedule Requires Rework</td>
<td>H</td>
<td></td>
<td>←</td>
<td></td>
<td>←</td>
<td>N/A</td>
</tr>
<tr>
<td>T48-64</td>
<td>Tank 50 Equipment Installation Impacted by Ongoing Transfers</td>
<td>H</td>
<td></td>
<td>←</td>
<td></td>
<td>←</td>
<td>Monitor other project schedule implementation.</td>
</tr>
</tbody>
</table>

Overall Project Phase I Risk

### PHASE II Project Risks

<table>
<thead>
<tr>
<th>Risk Number</th>
<th>Risk Title</th>
<th>Risk Level</th>
<th>Closed</th>
<th>Not a Problem</th>
<th>Minor Concern</th>
<th>Major Concern</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>T48-20</td>
<td>Tank 48 Transfer Pump Fails Tests During Startup Testing</td>
<td>H</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Functional check of 48 to 50 transfer pump successfully performed.</td>
</tr>
<tr>
<td>T48-28</td>
<td>Insufficient recycle available for aggregation</td>
<td>M</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>N/A</td>
</tr>
<tr>
<td>T48-29</td>
<td>Chemical Spills (Caustic)</td>
<td>L</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>N/A</td>
</tr>
<tr>
<td>T48-31</td>
<td>Decomposition Products Generated By Additions to Tank</td>
<td>H</td>
<td></td>
<td></td>
<td></td>
<td>←</td>
<td>PIT to define a chemical qualification program to be put into place to ensure minimal benzene generation.</td>
</tr>
<tr>
<td>T48-32</td>
<td>Analytical Detection Limit</td>
<td>H</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>TPB Residual Strategy (TPB measurement / material balance) is approved. Develop Sample &amp; Analytical Plans</td>
</tr>
<tr>
<td>T48-34</td>
<td>Inadequate Suspension of Material</td>
<td>H</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Perform a Mixing Study on Tank 50H.</td>
</tr>
<tr>
<td>Risk Number</td>
<td>Risk Title</td>
<td>Risk Level</td>
<td>Closed</td>
<td>Not a Problem</td>
<td>Minor Concern</td>
<td>Major Concern</td>
<td>Remarks</td>
</tr>
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<td>---------------</td>
<td>------------------------------------------------------------------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>T48-35</td>
<td>Increased Sampling and Analysis</td>
<td>M</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Develop definitive sample plan.</td>
</tr>
<tr>
<td>T48-37</td>
<td>Inability to Meet End State</td>
<td>H</td>
<td></td>
<td></td>
<td></td>
<td>←</td>
<td>TPB Residual Strategy approved. End state criteria to be developed.</td>
</tr>
<tr>
<td>T48-40</td>
<td>Tank Film Cannot be Removed</td>
<td>H</td>
<td></td>
<td></td>
<td></td>
<td>←</td>
<td>Develop new end state criteria. Evaluate rinsing effectiveness early. Testing has started. Update versus new results.</td>
</tr>
<tr>
<td>T48-42</td>
<td>Transfer Pump Suction or Discharge Line Plugs</td>
<td>M</td>
<td></td>
<td></td>
<td></td>
<td>←</td>
<td>Test and verify the existing flushing capabilities.</td>
</tr>
<tr>
<td>T48-44</td>
<td>Inadequate Tank Space</td>
<td>M</td>
<td></td>
<td></td>
<td></td>
<td>←</td>
<td>Perform calculations before transfer to ensure below the Saltstone limits on all constituents. Saltstone flowsheet should handle.</td>
</tr>
<tr>
<td>T48-47</td>
<td>Tank 50 residual TPB level</td>
<td>H</td>
<td></td>
<td></td>
<td>←</td>
<td>←</td>
<td>TPB Residual Strategy approved. End state criteria to be developed.</td>
</tr>
<tr>
<td>T48-48</td>
<td>Saltstone Na limit (1M) cannot be met</td>
<td>M</td>
<td></td>
<td></td>
<td></td>
<td>←</td>
<td>Grout studies show no impact.</td>
</tr>
<tr>
<td>T48-49</td>
<td>Effect of Raw Material Impurities - Saltstone</td>
<td>M</td>
<td></td>
<td></td>
<td></td>
<td>←</td>
<td>Examine interaction of Tank 48H with known additives and impurities to Saltstone Matrix.</td>
</tr>
<tr>
<td>T48-55</td>
<td>Greater Than Assumed Number of Analyzed Samples Required - Saltstone</td>
<td>M</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Develop definitive sample plan. Develop sampling plan for grout.</td>
</tr>
<tr>
<td>T48-57</td>
<td>Process Material Fails TCLP - Saltstone</td>
<td>H</td>
<td></td>
<td></td>
<td></td>
<td>←</td>
<td>Performed a test similar to TCLP with favorable results. Complete testing on grout at various TPB concentrations and curing temperatures.</td>
</tr>
<tr>
<td>T48-58</td>
<td>Inadequate scale up from R&amp;D - Saltstone</td>
<td>H</td>
<td></td>
<td>←</td>
<td></td>
<td>←</td>
<td>Evaluate existing R&amp;D effort to address potential scale-up issues. Develop backup process.</td>
</tr>
<tr>
<td>T48-59</td>
<td>Saltstone Facility production rate less than 83K gals/week</td>
<td>H</td>
<td></td>
<td>←</td>
<td>←</td>
<td>←</td>
<td>Evaluate production rate / investigate using different vaults. Investigate processing rates/windows within Salt Strategy.</td>
</tr>
<tr>
<td>T48-60</td>
<td>Laboratory Capability - Saltstone</td>
<td>M</td>
<td></td>
<td></td>
<td>←</td>
<td>←</td>
<td>Develop definitive sample plan. Perform testing with grout at various TPB concentrations and curing temperatures. Develop Sample &amp; Analytical Plans.</td>
</tr>
<tr>
<td>T48-65</td>
<td>Processing Window Unavailable</td>
<td>H</td>
<td></td>
<td>←</td>
<td>←</td>
<td>←</td>
<td>ID and Develop a method of operating Tank 48 and MCU concurrently. ID Alternative methods of Tank 48 disposition.</td>
</tr>
<tr>
<td>Risk Number</td>
<td>Risk Title</td>
<td>Risk Level</td>
<td>Closed</td>
<td>Not a Problem</td>
<td>Minor Concern</td>
<td>Major Concern</td>
<td>Remarks</td>
</tr>
<tr>
<td>-------------</td>
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<td>-------------------------------------------------------------------------</td>
</tr>
<tr>
<td>T48-01</td>
<td>Funding Availability</td>
<td>H</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Keep Senior Management informed, ensure required funding is approved, if unavailable, effect a baseline change proposal.</td>
</tr>
<tr>
<td>T48-08</td>
<td>Requirements for Construction Change</td>
<td>H</td>
<td></td>
<td></td>
<td>←</td>
<td>←</td>
<td>Ensure estimate is conservative perform contingency analysis and T&amp;PRA analysis.</td>
</tr>
<tr>
<td>T48-13</td>
<td>Tank 48 Equipment Failure</td>
<td>H</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Maintain critical spares.</td>
</tr>
<tr>
<td>T48-22</td>
<td>Stakeholder Participation</td>
<td>H</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Develop communication plan for Stakeholders/ Senior Management.</td>
</tr>
<tr>
<td>T48-23</td>
<td>Regulatory Concerns (3116 implementation)</td>
<td>H</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>PIT Team to pursue 3116 WD process.</td>
</tr>
<tr>
<td>T48-24</td>
<td>Regulatory Concerns (Class C permit not granted)</td>
<td>H</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>PIT Team to pursue NRC Class C permit.</td>
</tr>
<tr>
<td>T48-41</td>
<td>Equipment Failure (Tank 50)</td>
<td>H</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Maintain critical spares.</td>
</tr>
<tr>
<td>T48-43</td>
<td>Permitting Delay - Saltstone</td>
<td>H</td>
<td></td>
<td>←</td>
<td>←</td>
<td></td>
<td>Perform R&amp;D and NESHAPS evaluation early. Develop backup process.</td>
</tr>
<tr>
<td>T48-45</td>
<td>Tank 50 Cooling (Saltstone Transfer) Inadequate</td>
<td>H</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>N/A</td>
</tr>
<tr>
<td>T48-46</td>
<td>Saltstone 0.2 Ci/gal Cs Modifications Not Ready in Time to Support Strategy</td>
<td>H</td>
<td></td>
<td>←</td>
<td>←</td>
<td>Proceed with an integrated schedule upon decision to implement aggregation project.</td>
<td></td>
</tr>
<tr>
<td>T48-54</td>
<td>Volume of Grout is Unacceptable</td>
<td>H</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Determine the grout volume based on aggregation to meet the governing limit. Develop backup process.</td>
</tr>
</tbody>
</table>

**LEGEND**
- Risk has been closed
- Not a problem, no issues at this time
- Minor concern
- Major concern