Liquid Waste
Top Ten Program Risks

Date: June 22, 2010

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Doug Bumgardner, Savannah River Remediation
Sonitza Blanco, Department of Energy

Event:
Citizen’s Advisory Board
Waste Management Committee Meeting
Program Risks not Hazard Management

Provide Feedback & Continuous Improvement
Define the Work Scope
Perform Work Within Controls
Develop & Implement Hazards Controls
Analyze the Hazards

Working System

Integrated Safety Management System
Manages Hazards

Program Risks relate to increase in overall cost or schedule of Liquid Waste Project

22 Closures in 8 Years

3x Bulk Waste Removal
2x Sludge Prep
2x Sludge Feed
HLW Sludge Bulk Waste Removal
HLW Sludge Batch Feed Prep
DWPF Canisters
Salt Separation (ARP/MCU)
LL Waste (Salt Stone)

400 Canisters Per Year

2x Salt Prep and Salt processing

HLW Tank Cleaning
HLW Evap
ETP

HLW Tank Closure
HLW Sludge Removal and Batch Feed Prep
HLW Salt Waste Removal and Batch Feed Prep

Liquid Waste Project
Risk Management Approach

- Consistent with typical Project Management Process
- Covers entire Liquid Waste lifecycle
- Multiple categories: Business, Technical, Programmatic, etc.
- Risks change over life of project
- Real-time evaluation of risks and monthly review
- Annual formal Top-to-Bottom update of risks
  - Revision 5 supports System Plan Revision 15
Grading of Programmatic Risks

Example Likelihood Criteria
- Very Likely: ≤ 10 years
- Likely: 10-25 years
- Unlikely: 25-50 years
- Very Unlikely: > 50 years

Example Consequence Criteria
- Negligible: < 3 month delay
- Marginal: 3-12 months delay
- Significant: 1-2 years delay
- Severe: >2 years delay

Figure 3 – Risk Level Matrix

* Normally limited to assessing residual risks with Very Severe (Crisis) consequences
Example Risk Assessment Form

### Risk Assessment Form

**PBS SR-0014**  
**ID Number:** 012  
**Revision:** 03  
**Last Date Evaluated:** 8/12/2009  
**Status:** Active

#### Statement of Residual Risk:
Premature failure of installed spare equipment leads to canister production downtime while a new replacement is procured.

<table>
<thead>
<tr>
<th>Residual Likelihood</th>
<th>Basis</th>
<th>Residual Consequence</th>
<th>Basis</th>
</tr>
</thead>
<tbody>
<tr>
<td>Likely</td>
<td>Based upon the 20+ years of remaining operation of the DWPF, the potential for a premature failure of an installed spare is likely.</td>
<td>Significant</td>
<td>Premature failure of an installed spare is estimated to cause a canister production outage period judged to be up to 1 year in duration. Out-year residual impact of 1 year schedule delay, near-term residual impact of $10M to procure a new major equipment spare.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Residual Risk Level</th>
<th>Moderate</th>
</tr>
</thead>
</table>

#### NEAR TERM Residual Impact

<table>
<thead>
<tr>
<th>Residual Cost Impact ($K)</th>
<th>Best Case</th>
<th>Most Likely</th>
<th>Worst Case</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
</tbody>
</table>

#### OUT YEAR Residual Impact

<table>
<thead>
<tr>
<th>Residual Cost Impact</th>
<th>Best Case</th>
<th>Most Likely</th>
<th>Worst Case</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>0</td>
<td>225,000</td>
<td>450,000</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Residual Schedule Impact (Mths)</th>
<th>Most Likely</th>
<th>Worst Case</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>6 Mths</td>
<td>12 Mths</td>
</tr>
</tbody>
</table>

#### LIFE CYCLE Residual Impacts (total of Near Term and Out Year)

<table>
<thead>
<tr>
<th>Residual Cost Impact</th>
<th>Best Case</th>
<th>Most Likely</th>
<th>Worst Case</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>10,000</td>
<td>235,000</td>
<td>460,000</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Residual Schedule Impact (Mths)</th>
<th>Most Likely</th>
<th>Worst Case</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>6 Mths</td>
<td></td>
</tr>
</tbody>
</table>

#### Risk Assumptions:
- DWPF will produce canisters at maximum throughput for the duration of the program (based on achievable melt rate, planned outages, and waste loading for sludge being processed). DWPF near-term canister production is based on revised sludge mass values. Production of salt only cans is acceptable to DOE.

#### Event Comments:
The risk of a premature DWPF melter failure is addressed under Risk 021. The failure to provide a spare DWPF melter is addressed under Risk 022.
### Example Risk Status Report

<table>
<thead>
<tr>
<th>ID</th>
<th>Title</th>
<th>Risk Level</th>
<th>Status</th>
<th>Minor Concern</th>
<th>Major Concern</th>
<th>Remarks</th>
</tr>
</thead>
</table>
| 034  | DWPF impacted by Chemistry/Ecology of Sludge Waste Feed               | Low        | Closed |               |               | Major performance improvements being investigated. Research has been performed and implementation of 
|      |                                                                        |            |        |               |               | major outfall mixing is underway to be installed by September 2010.                                |
| 030  | Sampling and Analysis of Salt Feed to DWPF shows SWPF-WAC Cannot be Met after Processing | Low        |        |               |               | Batches are being sampled and data they meet the WAC.                                              |
| 037  | DWPF impacted by Chemistry of Salt Waste Feed                        | High       | Closed |               |               | The need for additional characterization is being evaluated. Characterization data and operating lessons 
|      |                                                                        |            |        |               |               | learned during ARPS-MCU operations will be used in optimizing sludge batch compatibility with the 
|      |                                                                        |            |        |               |               | SWPF waste stream for processing at DWPF.                                                          |
| 040  | Salt Dissolution Results in the Precipitation of Gibbsite             | Moderate   |        |               |               | Investigating methods to avoid gibbsite formation.                                                 |
| 041  | Formation of Sodium Aluninates in a Salt Tank                        | Moderate   |        |               |               | Developing flow sheets and mathematical models for salt removal that avoid crystallization.           |
| 042  | Salt Waste Heat or Tank Annu - Waste Cannot be Processed Through SWPF | High       | Closed |               |               | Developing a flow sheet with additional feed treatment or processing modifications.                 |
| 045  | Higher Loss Sludge Impacts DWPF Corridor Production                   | Low        |        |               |               | Sludge batch sampling, blending strategies development and qualification are being performed.        |
| 048  | Sludge Physical Properties Cause Delays in Meeting Sludge Feed Objectives | Low       |        |               |               | Physical characteristics of waste are being determined and used in development of removing technologies 
|      |                                                                        |            |        |               |               | that can tolerate variability in waste characteristics.                                            |
| 059  | Higher Than Expected Cu Levels in Salt Solution Impact Processing     | Low        | Closed |               |               | Batches are being sampled and no concerns have been identified to date.                           |
| 070  | Regress Constituents in SWPF Feed                                     | Moderate   |        |               |               | Evaluating the need for additional sampling and testing and developing tank sequencing blending strategies. |
| 071  | Unknown Physical Properties in Harsh Material During Mechanical Harsh Removal | Low        |        |               |               | FCC is being deployed to handle this risk.                                                         |
| 074  | MCUP Feed Requirements not met by ARPS Processing Strategy (Filter Breakthrough) | Low        |        |               |               | Robust filter design provides protection and a basis to accept the risk.                           |

<table>
<thead>
<tr>
<th>Risk has been transferred</th>
<th>Risk has been closed</th>
<th>Not a problem, no issues at this time</th>
<th>Minor concern</th>
<th>Major concern</th>
</tr>
</thead>
<tbody>
<tr>
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### Current Top Ten

**Area of Concern** | **Strategy to Address**  
---|---  
1. Equipment Reliability | System Health Monitoring, Maintenance Program and Spare Parts  
2. Major System Failure (for example, Melter or Evaporator) | System Health Monitoring, Spares, Development of Repair Techniques  
3. Tank Space Availability when Needed | Integrated System Planning  
4. Tank Leak Sites Reduce Useable Space | Structural Integrity Program  
5. Characterization of Waste | Early sampling and analysis, Development of robust processes to accommodate varying composition  
6. Technology Readiness | Testing, mock-up, lessons learned from DOE complex  
7. Salt Waste Processing Facility Start-Up Delayed or Processing Rate Limited | Interim Salt Disposition Project, Supplemental Salt Treatment Processes  
8. Meeting Tank Cleanliness Requirements for Closure | Use of new technologies included Enhanced Chemical Cleaning  
9. Availability of Closure Documentation | Integrated Planning and Development with Stakeholders  
10. Integration/Coupling of Execution Activities | Integrated System Planning, Integrated Operations and Projects Planning and Scheduling
• System Health Reporting Program fully implemented, Activities to improve degraded system all tracked within facility schedules
• Placed Tank 25 in drop tank service for the 2F evaporator
• 200+ High Level Waste Canisters processed at Defense Waste Processing Facility
• ~510 kgal of Salt Solution processed through Interim Salt Disposition Project
• Number of tanks that are actively in Waste Removal/Chemical Cleaning/Closure process has increased to 15 of the 22 tanks that are being closed
• Enhanced Chemical Cleaning real waste testing and design in progress
• Ready to deploy melter bubblers in DWPF this fall
• Tanks 18 and 19 residual characterization in progress
• Preliminary planning for Supplemental Salt Treatment
Summary

- Consistent with typical Project Management Process
- Covers entire Liquid Waste lifecycle
- Multiple categories: Business, Technical, Programmatic, etc.
- Risk changes over life of program
  - Real-time evaluation of risks and monthly review
  - Annual formal Top-to-Bottom update of risks
  - Risk profile is improving
- No risks prevent program completion