

ATTACHMENT 1:

Storage of Aluminum-Rich Supernate in Tank 11 Compliance Strategy And Matrix

Compliance Strategy

1. Corrosion Control:

The Tank Farm Corrosion Control Program, WSRC-TR-2002-00327, "CSTF Corrosion Control Program." specifies waste chemistry requirements designed to minimize the possibility of corrosion and its detrimental effects on tank integrity. An evaluation has been performed and concluded that the Tank 51 caustic addition to dissolve the aluminum will not result in the tank chemistry falling outside the limits specified in the Corrosion Control Program. The evaluation also concludes that Tank 11 will also remain compliant with the program for the proposed transfer of the aluminum-laden supernate.

The Defense Nuclear Facilities Safety Board (DNFSB) letter from Eggenberger to Rispoli dated August 29, 2007, requested the corrosion evaluation to account for wide variability of the final aluminum supernate composition. A revision to the evaluation is underway to address this and document the insensitivity of its conclusions to the actual amount of aluminum dissolved. This revision will be issued prior to transfer of caustic into Tank 51.

Following the transfer of the aluminum-laden supernate to Tank 11, corrosion control will be monitored via implementation of the existing Corrosion Control Program. Samples will be taken and analyzed, and chemistry adjustments will be made to maintain compliance with the program.

2. Transfer Control:

All requirements specified in the existing CST Safety Basis documents will be met during this evolution, as well as all Administrative Program requirements.

The gains made by dissolving the aluminum (i.e., reduction in cans produced in the Defense Waste Processing Facility, DWPF) will be protected to the extent practical. The intent is to keep the aluminum in solution and store only in Tank 11 until fed to the processing feed tank for the Salt Waste Processing Facility (SWPF). The transfer of other wastes into Tank 11, or the transfer out of Tank 11, will be prohibited under normal operating conditions. To ensure control of this waste, the Waste Transfer Summary Form will be revised to include statements prohibiting waste transfers into or out of Tank 11, with three exceptions:

- a. small volumes of Tank 11 contents are permitted to be transferred out of Tank 11 during performance of the periodic operability check of the Tank 11 transfer pump (see item 6 below).
- b. small volumes of waste will be permitted to drain back to Tank 11 during transfers out of or into other waste tanks. This also includes small amounts of post-transfer flush water.
- c. this prohibition does not apply during Emergency Conditions or if Tank 11 develops a leak.

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During performance of the Tank 11 transfer pump operability check, a transfer from Tank 11 to Tank 51 will be performed. The duration of the transfer will be short and the transfer will be terminated when waste is visually observed flowing into Tank 51. A small volume of Tank 11 supernate will be removed from Tank 11 during this test. (Note: While this is the current plan for performing the test, an alternate receipt tank may be chosen in the future, depending upon Facility conditions at the time of the test.)

Per current tank farm procedure following waste transfers, the transfer lines are drained and then potentially flushed. The physical arrangement of the transfer piping system is such that the transfer line to Tank 11 represents a "low-spot" and requires that small amounts of waste be permitted to drain back into Tank 11 for some transfers into or out of other waste tanks. Similarly, the low-spot will be flushed following completion of the transfer to remove residual accumulations of waste in the piping. Both the drain back and flush water volumes are small and are not expected to adversely impact the chemistry of the Tank 11 supernate or cause the dissolved aluminum to precipitate.

During normal operations, the Tank 11 chemistry will be protected to minimize the potential for bulk aluminum precipitation from the supernate. If a leak is detected during the initial transfer of Tank 51 into Tank 11, the transfer into Tank 11 will be terminated and the supernate in Tank 11 will be removed and returned to Tank 51 until the liquid level is below the leak site. The required transfer procedure will be issued and available prior to initiating the transfer into Tank 11.

In the unlikely event that a leak occurs in Tank 11 following the initial transfer filling period where Tank 51 is designated to receive the Tank 11 supernate, the material in Tank 11 above the leak site(s) would be transferred to Type III/IIIA waste tanks utilizing the contingency tank space maintained to comply with the requirements in DOE Order 435.1 (see Item 6). Initially, any accumulated supernate in the Tank 11 annulus would be returned to the primary tank as necessary to allow field activities to be initiated and implemented in a controlled manner to transfer the material to the contingency space maintained in the Type III/IIIA tanks. A plan as directed by SW 11.3-AOP-001 would be developed to identify the transfer activities, receipt tanks, etc. to address the emergent leakage. Fundamental considerations to the decision-making process for where to send the Tank 11 material would be:

- a. Amount of material needing to be sent from Tank 11 to reduce tank level below the emergent leak location(s) if warranted.
- b. Evaluation of the compliant tanks having the available space to determine appropriate volumes to send to a tank or tanks to maintain the receipt tank(s) within all DSA requirements

Compliance Strategy (Cont.)

- c. Consideration of the potential processing impacts for the planned transfer of material from Tank 11 on mission execution. Options for where to send the material that were compliant with DSA requirements and did not represent an overall negative mission impact would be selected over options that were compliant with DSA requirements but did represent an overall negative mission impact, given all other logistics and options being equal.

These considerations would be fundamental aspects of the response conditions that would be developed and implemented. The Department of Energy would be involved with this decision making process via on-going DOE facility interactions in the unlikely event this condition arose.

3. Visual Inspection:

The last video inspection of the Tank 11 annulus was successfully performed in March 2006. This inspection did not detect any new leak sites. The current leak sites are at 189" and 235" above the tank bottom. As required by the current In-Service Inspection Plan, Tank 11 will continue to be visually inspected on the two-year frequency specified for all Type I waste tanks.

During the actual transfer of Tank 51 aluminum-laden supernate into Tank 11, video cameras will be used to perform visual inspection of the annulus. In the unlikely event a new leak site developed, these video inspections will provide early detection of the new leak. An annulus inspection plan will be developed and implemented prior to introducing Tank 51 supernate into Tank 11. The plan will:

- Describe the riser location(s) to install cameras,
- Require a visual inspection prior to initiating the transfer into Tank 11 (note: a previously completed inspection may be used to satisfy this requirement)
- Require real time video inspections during the transfer
- Specify the frequency of the inspections after the transfer is completed, and
- Define the duration that the inspection plan is in effect.

Following completion of the inspection plan, the requirements of the In-Service Inspection Plan will govern the frequency and scope of future Tank 11 inspections.

4. Leak Detection Equipment:

The Federal Facilities Agreement (FFA) between the DOE and the South Carolina Department Of Health And Environmental Control (SCDHEC) requires the detection of a leak from the waste tank into the annulus within 24 hours. SCDHEC has accepted the use of conductivity probes (two probes located 180 degrees apart) and a dip tube as meeting this requirement. These conductivity probes and dip tube are routinely in service. Compensatory actions are implemented in the event both

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conductivity probes are out of service. The actions ensure periodic verification of the annulus liquid level is performed using an alternate means such as visual inspection.

A Technical Safety Requirement Surveillance also performs an operability check of the conductivity probe instrument loops every seven days. This Surveillance, however, is performed on Tank 11 to protect assumptions made in the Documented Safety Analysis for the annulus explosion event by limiting the amount of accumulated material in the annulus. While this Surveillance Requirement was not developed to ensure leak detection and does not assure continuous monitoring, the seven day operability check of the instrument loops provide assurance that the leak detection is operable and capable of detecting leakage into the annulus between surveillances.

Periodic monitoring of primary tank liquid level provides another means of detecting leakage into an annulus. Reel tapes are used to measure tank liquid level and are equipped with both low and high alarm setpoints to alert Operations personnel of unexpected level changes in the tank. During waste transfers, sending and receiving tank level indications provided by reel tapes are factored into material balance calculations. The calculations ensure that the volume of waste transferred into the receipt tank is within acceptable tolerances of the volume transferred out of the sending tank.

The annulus conductivity probes, annulus dip tube and tank reel tape all provide alarms to a control room manned 24 hours per day, 7 days per week. Operations response to the alarms is governed by written procedures that initiate an investigation into the cause of the alarm and take further action as appropriate.

5. Leak Response Procedures:

All leak response procedures are issued and in place. SW11.3-AOP-001 provides the Control Room operator the response steps should a leak be detected in the annulus. The annulus transfer jet is the primary means for mitigating a leak into the annulus by recirculating the waste back into the primary tank. The jet is installed in the Tank 11 annulus and all procedures necessary to initiate a transfer from the annulus are issued and available for use.

The Contingency Transfer System (CTS) is also available for deployment to respond to a leak if needed. The equipment necessary to conduct CTS operations is stored in a safe location and maintained in a state of readiness. At least three CTS pumps are available for use and each successfully passed a performance test to verify pump performance before placing in storage. At least two hoses are available and both successfully passed a pressure test to verify the hoses are leak-tight.

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A program consisting of surveillances, preventive maintenance, and inspection plans is in place to provide assurance that the equipment and components necessary to deploy the CTS are available and operable if needed. Aspects of the program include:

- verification that the shelf-life of the hoses has not expired and that a leak test of each hose is performed annually.
- verification that the shelf-life of the CTS pumps has not expired.
- performance of a quarterly load test of the electric generator that will provide power to the CTS pump.
- verification that extension cords, hose support stands, and tripod assembly are available for use.

During a WSRC internal review of the above program, weaknesses in the implementation of the above program have been identified. In addition, the DOE staff has requested additional commercially available items that may be used to deploy the CST system be added to the program to provide additional assurance that the CTS system can be rapidly deployed if needed. Surveillance of these additional items will be added to the program. Both requested the program additions and the program weaknesses are tracked in the STARS database and both will be closed prior to initiating the transfer into Tank 11.

The procedure for deployment and operation of the CTS is issued and available. This procedure specifies which annulus riser to install the CTS pump, which tank riser to recirculate waste to, as well as instruction for safely operating the transfer system. In addition, operator training on and limited mock-up of the CTS was recently completed in H-Tank Farm.

6. Capability To Transfer Waste Out Of Tank 11:
Contingency tank space is kept in reserve in compliant Type III/IIIA waste tanks to accept the contents of a leaking waste tank, as required by DOE Order 435.1. The provision for maintaining reserve space is required in WSRC-TR-2002-00403, "Tank Farm Transfer Control Program & Pump Tank Transfer Jet Control Program," and this capability is a basic assumption in planning documents such as the WSRC Disposition Processing Plan and/or System Plan.

To ensure WSRC is capable of responding to a leak in Tank 11, the Tank 11 transfer pump will be tested for operability prior to transferring Tank 51 supernate into Tank 11. The initial test will initiate a Tank 11 to Tank 51 transfer. Upon visual indication of liquid entering Tank 51, the transfer will be terminated.

To ensure continued operability of the Tank 11 transfer pump, a program will be implemented to periodically test the pump. The current plan is to repeat the initial test and implement a brief transfer to Tank 51. However, as Facility conditions

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change, alternate testing protocol may be employed but will be adequate to ensure pump operability. The program for implementing the periodic operability check, as well as the test frequency, will be established prior to transferring liquid into Tank 11.

As was stated in Item #2 above, in an emergency condition or leaking waste tank, the primary concern will be protection of the environment and the safety of personnel. Process considerations will be tertiary but will be considered prior to the transfer of Tank 11 aluminum-laden supernate to another waste tank.

7. Feed Specification For The Salt Waste Processing Facility:
WSRC expects that the aluminum-laden supernate to be stored in Tank 11 can be successfully processed in the Salt Waste Processing Facility (SWPF). A three liter sample was obtained from Tank 51 and a bench-scale test was performed to validate the aluminum dissolution flowsheet. To provide confidence that the Tank 11 supernate can be processed through the SWPF, additional laboratory analysis will be conducted using the final supernate solution from the bench-scale test. A final report will be issued prior to transfer of waste into Tank 11 documenting the capability to process this waste through SWPF. If the report concludes the waste in Tank 11 cannot be processed directly through SWPF, then the waste will be blended with other waste to meet the SWPF requirements. WSRC has many blending options to meet the SWPF WAC. Also, a sample of the final Tank 11 supernate following the transfer from Tank 51 will be taken and analyzed to document the processibility of the supernate through the SWPF.
8. Liquid Level In Tank 11:
The baseline planning case for the aluminum dissolution projects the final liquid level in Tank 11 to be less than 140-145" specified in the letter from SCDHEC to Mr. R. Campbell dated September 4, 2007. WSRC will comply with this restriction and control all liquid additions to Tank 11 to prevent exceeding this limit. A revision to N-ESR-G-00001, "High Level Waste Emergency Response Data And Waste Tank Data," will be issued prior to transfer of liquid into Tank 11 that specifically lists a maximum permissible liquid height of 145".
9. Additional Waste Transfers Into Tank 11:
WSRC recognizes that no additional waste transfers into Tank 11 will be allowed (except the small volume transfers described in #2 and #6 above) and will be specifically prohibited in the revised Authorization Agreement to be received from the DOE. A revision to the Waste Transfer Summary Form will be revised to implement the control prior to the transfer of liquid into Tank 11.

Compliance Matrix

DNESB/ DOE/ SCDHEC Action	Requirement	Frequency	Responsibility	Implementing Document	Status
1	<p>Complete the following activities in support of Corrosion Control Program:</p> <p>a. DOE will conduct and document an evaluation of the final composition of the aluminum-rich supernate to ensure compliance with the Corrosion Control Program. The evaluation will account for the wide uncertainty range of the final supernate composition:</p> <p>b. DOE will continue to monitor the chemistry conditions in Tank 11 and make adjustments to meet the requirements of the Corrosion Control Program while the supernate remains in the tank.</p>	<p>N/A</p> <p>As required by Corrosion Control Program</p>	<p>LWO Engineering– R. L. Salizzoni</p>	<ul style="list-style-type: none"> • X-ESR-H-00099, Rev. 0, "Corrosion Evaluation for Aluminum Removal for Sludge Batch 5" will be revised to evaluate potential impact to the uncertainty in the final dissolved aluminum concentration at the completion of the dissolution process. • CSTF Corrosion Control Program (WSRC-TR-2002-00327) 	<p>To be issued prior to transfer of liquid into Tank 51. Tracked via Integrated Facility schedule.</p> <p>Complete</p>

DNISB/ DOE/ SCDH/C Action	Requirement	Frequency	Responsibility	Implementing Document	Status
2	<p>a. DOE will meet the requirements of the Transfer Control Program to ensure that only compatible waste will be transferred into Tank 11:</p> <p>Complete the following activities in support of Transfer Control Program:</p>	N/A	LWO Engineering- R. L. Salizzoni	<p>All Safety Basis requirements will continue to be implemented for the transfer of aluminum-laden supernate to Tank 11. Examples of the key TSR Administrative Programs that will ensure these requirements are met are provided below:</p> <ul style="list-style-type: none"> • 5.8.2.10, "Nuclear Criticality Safety Program" • 5.8.2.12, "Structural Integrity Program" • 5.8.2.13, "Corrosion Control Program" • 5.8.2.19, "Sludge Carryover Minimization Program" • 5.8.2.21, "Transfer Control Program" • 5.8.2.27, "Flammability Control Program" • 5.8.2.31, "Hydrogen Generation Rate Control" • 5.8.2.32, "Waste Characterization System Control Program" 	Complete

DN/SE/ DOE/ SCDHEC Action	Requirement	Frequency	Responsibility	Implementing Document	Status
2 (Cont.)	<p>Complete the following activities in support of Transfer Control Program: (Cont.)</p> <p>b. DOE will also ensure that aluminum-rich supernate in Tank 11 is not transferred to any other tank or evaporator system in violation of the Transfer Control Program or the evaporator waste acceptance criteria.</p>	N/A	LWO Engineering- R. L. Salizzoni	<ul style="list-style-type: none"> The Waste Transfer Summary Form will be revised to include a new restriction to prevent the transfer of aluminum-laden supernate into or out of Tk 11, with the exceptions previously discussed in Item #2 of the Compliance Strategy. 	<p>The form will be revised prior to the transfer into Tank 11. Tracked via Integrated Facility schedule.</p>
3	<p>Complete the following activities in support of Visual Inspections:</p> <p>a. DOE will continue the visual inspections of Tank 11 as required by the In-Service Inspection Program;</p> <p>b. DOE will implement real-time video surveillance in annulus while Tank 11 is receiving waste.</p>	<p>As Specified in the ISI Program</p> <p>N/A</p>	<p>LWO Engineering- R. L. Salizzoni</p> <p>LWO Operations- M. Borders</p>	<ul style="list-style-type: none"> WSRC-TR-2002-00061. "In-Service Inspection Program for High Level Waste Tanks" specifies the inspection requirements and periodicity A Tank 11 annulus inspection plan will provide the visual inspection requirements and frequency of inspection 	<p>Complete</p> <p>Inspection plan will be issued prior to the transfer into Tank 11. Tracked via Integrated Facility schedule.</p>

DNESB/ DOE/ SCDHEC Action	Requirement	Frequency	Responsibility	Implementing Document	Status
4	<p>Complete the following activities in support of Tank 11 Leak Detection Equipment:</p> <p>a. DOE will comply with the Technical Safety Requirements of leak detection.</p>	N/A	LWO Operations- M. Borders	<ul style="list-style-type: none"> • WSRC-SA-2002-00007, "Concentration, Storage, And Transfer Documented Safety Analysis" • S-TSR-G-00001, "Concentration, Storage, And Transfer Technical Safety Requirements" and associated implementing procedures. • Federal Facilities Agreement (requires an annulus leak detection system to detect a failure of the primary tank wall) • Alarm response procedures (annulus conductivity probes, annulus dip tube, reel tape low level) • SW11.3-AOP-001, "Annulus Leak Investigation" • Annulus Inspection Plan (see Item #3 of the Compliance Matrix above) 	<p>Issued</p> <p>Issued</p> <p>Complete</p> <p>Issued</p> <p>Complete</p> <p>See Item #3 above for Status</p>

DNFSB/ DOE/ SCDHEC Action	Requirement	Frequency	Responsibility	Implementing Document	Status
5	<p>Complete the following activities in support of Tank 11 Leak Response Procedures:</p> <p>a. DOE will ensure the leak response procedures are in place and will validate the operability of all associated contingency transfer equipment prior to transferring waste to Tank 11.</p>	As noted	LWO Operations- M. Borders	<ul style="list-style-type: none"> • Surveillance procedures SW9.6-SVP-11-6.7 and SW9.6-SVP-11-8.15 verify the availability and operability of the Contingency Transfer equipment (hoses, pumps, generator) • SW11.1-WTS(A-P) is a generic procedure for implementing a Contingency Transfer. • Correct deficiencies in program for ensuring operability of the CTS (ref. STARS 2007-CTS-012059) • Ensure monthly surveillance procedure SW9.6-SVP-11-6.7 addresses the number of cable tray and hose support stands to deploy the CTS (ref. STARS 2007-CTS-012498) 	<p>Issued</p> <p>Issued</p> <p>STARS item will be closed prior to transferring waste into Tank 11. Tracked via integrated Facility schedule.</p> <p>STARS item will be closed prior to transferring waste into Tank 11. Tracked via integrated Facility schedule.</p>

DNFSB/ DOE/ SCDHEC Action	Requirement	Frequency	Responsibility	Implementing Document	Status
6	<p>Complete the following activities in support of maintaining capability to transfer waste out of Tank 11:</p> <p>a. DOE will ensure that adequate emergency tank space is maintained to implement contingency transfer operations:</p> <p>b. DOE will validate the operability of Tank 11 waste transfer pump prior to adding waste to Tank 11, and will periodically validate operability throughout the period the aluminum-rich supernate is stored in Tank 11.</p>	<p>N/A</p> <p>N/A</p>	<p>LWO Engineering – R. L. Salizzoni</p> <p>LWO Operations- M. Borders</p>	<ul style="list-style-type: none"> • DOE Order 435.1, "Radioactive Waste Management" • Tank Farm Transfer Control Program (WSRC-TR-2002-00403) • CBU-PIT-2006-00070, "Disposition Processing Plan." planning assumption • Electronic Transfer Approval Form (ETAF) • Work Order #794473, will perform pre-transfer operability check. • Development of a periodic program to verify operability is an open item tracked in STARS (ref. STARS tracking # 2007-CTS-010225) 	<p>Complete</p> <p>Transfer pump operability will be verified prior to transfer into Tank 11. Tracked via Integrated Facility schedule.</p> <p>Program requirement and frequency to be established prior to transfer into Tank 11. Tracked via Integrated Facility schedule.</p>

DNESB/ DOE/ SCDHEC Action	Requirement	Frequency	Responsibility	Implementing Document	Status
7	<p>Complete the following activities in support of ensuring Tank 11 aluminum-rich supernate will meet feed specification for Salt Waste Processing Facility:</p> <p>a. DOE will verify by sampling prior to transferring to Tank 11 that the waste can be processed in SWPF. Additional sampling during the SWPF processing campaign will ensure that the aluminum-rich supernate meets the SWPF feed criteria.</p>	N/A	LWO Engineering – R. L. Salizzoni	<ul style="list-style-type: none"> • Final report documenting ability to process aluminum-laden supernate through SWPF using supernate from the benchscale test. • Confirmatory sample of final Tank 11 supernate will be obtained. Analysis and final report will document ability to process actual aluminum-laden supernate through SWPF. • Prior to transfer of material to SWPF, sampling will demonstrate compliance with the SWPF requirements. 	<p>Report to be issued prior to transfer to Tank 11. Tracked via Integrated Facility schedule.</p> <p>Tracked via Integrated Facility schedule.</p> <p>Normal process – no tracking required.</p>
8	The proposed transfer into Tank 11 will be limited to a liquid level in the tank to a range of approximately 140 to 145 inches.	N/A	LWO Operations- M. Borders	<ul style="list-style-type: none"> • N-ESR-G-00001 will be revised to restrict tank levels from exceeding 145”. 	N-ESR-G-00001 will be revised prior to transfer of waste into Tank 11. Tracked via Integrated Facility schedule.

DNRSB/ DOE/ SCDHEC Action	Requirement	Frequency	Responsibility	Implementing Document	Status
9	No other wastes may be transferred to Tank 11 without prior written approval by SCDHEC.	N/A	LWO Operations- M. Borders	<ul style="list-style-type: none"> The Waste Transfer Summary Form will be revised to prevent the transfer of waste into Tk. 11, with the exceptions previously discussed in Item #2 of the Compliance Strategy. 	The form will be revised prior to the transfer into Tank 11. Tracked via Integrated Facility schedule.