



**Department of Energy**  
Savannah River Operations Office  
P.O. Box A  
Aiken, South Carolina 29802

SEP 01 1991

Mr. Ambrose L. Schwallie, President  
Westinghouse Savannah River Company  
Aiken, SC 29802

Dear Mr. Schwallie:

SUBJECT: In-Tank Precipitation (ITP) Start-up Authorization

Reference: Letter, Schwallie to Fiori, 9-1-95, "ITP Request for Startup Authorization"

The Department of Energy authorizes Westinghouse Savannah River Company to startup the ITP facility. This authorization is based on your referenced letter and the Department of Energy's (DOE's) review that verified personnel, programs, and equipment are ready to support Radioactive Operation of ITP. Enclosed is the Final Validation Report for ITP Startup for your staff's information. This report documents the DOE staff review and closure for the eighteen DOE Operational Readiness Review pre-start findings and other DOE pre-start concerns. You are expected to meet your commitments to DOE as outlined in the startup management plan, namely assuring that senior management is on shift during startup.

Also enclosed is the Safety Evaluation Report (SER), Revision 2, Supplement 1, which addresses closure of the one open issue related to ITP startup from SER Rev 2 of the In-Tank Processing Safety Analysis Report (SAR) Addendum (WSRC-SA-15, Revision 8). This SER supplement reflects DOE's acceptance of the SAR Addendum and Operational Safety Requirements (WSRC-RP-94-303, Revision 6) and authorizes their use as Authorization Basis Documents. You are requested to include the enclosed SER supplement into the Authorization Basis defined in Manual WSRC-IM-94-10 within 14 days from the date of this letter. There are no further SER issues to be resolved prior to startup of the ITP facility.

Your staff is to be commended for their efforts in reaching this important milestone. This facility startup is significant for DOE and WSRC as it is a major step toward vitrification of waste currently stored in high level waste tanks at SR.

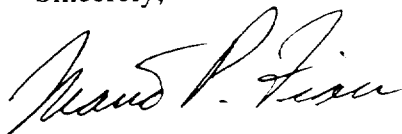
SEP 01 1995

Mr. Ambrose L. Schwallie

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If you have any further questions, contact me or A. Lee Watkins, Assistant Manager for High Level Waste, at (803) 208-6053.

Sincerely,



Mario P. Fiori  
Manager

PD:JLO:tct

Enclosures (2)

1. Final Validation Report for  
ITP Startup, 9/1/95
2. In-Tank Processing SER,  
Revision 2, Supplement 1,  
9/1/95

MB-95-0230

cc w/o encl's:

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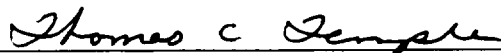
**SAFETY EVALUATION REPORT**  
SUPPLEMENT 1 to REVISION 2  
CLOSURE OF OXALIC ACID AND WATER ADDITION ISSUE

**FOR THE  
SAVANNAH RIVER SITE**

**IN-TANK PROCESSING FACILITIES**

**SAFETY ANALYSIS REPORT ADDENDUM  
AND OPERATIONAL SAFETY REQUIREMENTS**

SEPTEMBER 1995

  
SER Preparer

  
SER Reviewer

  
ED Division Director 9/1/95

**THE OFFICE OF THE ASSISTANT MANAGER FOR  
HIGH LEVEL WASTE  
SAVANNAH RIVER OPERATIONS OFFICE  
U. S. DEPARTMENT OF ENERGY**

## **Introduction**

This Safety Evaluation Report (SER) supplement (Supplement 1) to Revision 2 of the In-Tank Processing SER, issued by letter, Fiori to Schwallie dated August 4, 1995 (MC-95-0052), addresses the Westinghouse Savannah River Company (WSRC) actions taken to resolve Open Issue 9.3.

## **Background**

Issue 9.3 from SER Revision 2 required actions by WSRC to revise In-Tank Processing Safety Analysis Report (SAR) Addendum, WSRC-SA-15, Revision 8, Section 3.3.1.9, to provide an adequate basis that the addition of chemical cleaning solutions (most notably Oxalic Acid (OA) and caustic solutions), as well as the inadvertent addition of large quantities of water (e.g., from cooling coil failures upon an earthquake), did not cause the vapor space in Tanks 48 to reach the Composite Lower Flammability Limit (CLFL) assuming molecular diffusion is the only transport/dispersion mechanism. Several issues were identified in the corresponding SER discussion which were to be considered in resolving Issue 9.3. [It should be noted, too, that Tank 49 is not addressed by this SER Supplement since SER Revision 2 already prevents normal transfer to Tank 49. If emergency conditions arose requiring transfer, all CLFL impacts would be addressed via In-Tank Processing Operational Safety Requirement (OSR), WSRC-RP-94-303, Revision 6, Administrative Control 6.5.15.1, prior to the transfer.]

WSRC revised Section 3.3.1.9 via Authorization Basis Document (ABD) Change Request HLW-CRF-95075 on August 31, 1995, to incorporate analyses performed to address and resolve Issue 9.3. This SER Supplement 1 addresses this ABD Change Request as well as the supporting analyses referred to therein.

## **Evaluation**

### **Chemical Cleaning Solution Impacts -**

ABD Change Request HLW-CRF-95075 revised several sections of the SAR Addendum to eliminate the use of OA as an acceptable cleaning solution. Thus, the potential impacts from OA on the reaction with Tetraphenylborate (TPB) causing increased benzene generation have been eliminated. For planned chemical evolutions involving inhibited water or caustic, the controls provided in SAR Addendum Section 3.3.1.9, as well as OSR 6.5.15.1, were reviewed by DOE staff and judged adequate and appropriate. The key parameters identified which affect the time to reach CLFL for chemical cleaning solution additions, and the key assumptions/controls to help prevent/minimize this event, are adequately described. The inadvertent addition of these chemical cleaning solutions was evaluated in SER Revision 2 and DOE staff concurred with the SAR Addendum conclusion this was incredible. The changes to Section 3.3.1.9 under HLW-CRF-95075 were reviewed by DOE staff, and this conclusion remains valid.

### **Cooling Coil Failure Impacts -**

During the precipitation and concentration phases of ITP operation, it is postulated that a cooling water system rupture could occur (e.g., from an earthquake) along with a loss of ventilation. The safety basis described in the SAR Addendum is such that this event should not generate sufficient benzene to violate the position that molecular diffusion alone will prevent the formation of the vapor space reaching CLFL is less than 3 days. However, calculation M-CLC-H-01161 was issued on August 30, 1995, to address this potential and showed that the sudden addition of 500 gallons of cooling water (note that Section 3.3.1.9 was revised to require each cooling coil loop to be valved out, but the volume of water in these coils is ~3500 gallons) during the precipitation or concentration phase could cause, under conservative assumptions, sufficient benzene generation to reach the CLFL within 3 days with the concurrent loss of ventilation. Therefore, calculation M-CLC-H-01161 also evaluated the probability of the combination of events occurring which could cause this condition to be created. This calculation concluded that it was "beyond extremely

unlikely" ( $< 10^{-6}/\text{yr}$ ) as defined in DOE Standard 3009-94; however, this was based primarily on engineering judgment with respect to probabilities of sequence contributors.

DOE staff reviewed calculation M-CLC-H-01161 and concluded insufficient basis existed to judge this event as beyond extremely unlikely, but did conclude the combination of events was still extremely unlikely.

Therefore, WSRC took action to determine how long the Tank 48 vapor space would be above CLFL should the total cooling coil volume (3500 gal; calculation actually used 4000 gal) be released into the tank. Calculation M-CLC-H-01167 was issued September 1, 1995, and concluded that within 4 hours all regions of the tank vapor space would be back below CLFL (occurs because the additional total quantity of benzene generated from the reaction with water is limited - i.e., does not continue indefinitely). DOE staff reviewed this calculation and determined it was reasonable and adequate, yet conservative. The conservatisms included in this calculation which, if relaxed, would reduce the 4 hour result are:

- (1) it is unreasonable to assume all 3500 gallons from the cooling coils will participate in the reaction with the tank contents. This would require every coil to suffer a guillotine break, possibly even longitudinally to allow this quick of a release.
- (2) no credit was taken for the thermal gradients or residual convective air flows inside the tank vapor space, both of which have been shown to be present, and certainly promote better mixing.

The results of testing (reference HLW-ITP-95-0476, "ITP Radioactive Commissioning Tests - Phase I") have shown that, given the Tank 48 vapor space is initially inerted to the OSR requirement, it requires at least 6 days for the oxygen level to increase by even 1.5%. Thus, even if the extremely unlikely combination of events occur to somehow cause the benzene generation to exceed CLFL, this would last 4 hours or less, and during this interval there would be insufficient oxygen present for a deflagration to occur (should an ignition source be present).

Should an earthquake occur causing cooling coil failures to such an extent and at the worst time in the processing cycle (maximum level of concentration) that the Tank 48 vapor space somehow reached CLFL in the first hour(s) of the event, the necessary actions by Operations personnel would be to leave the tank isolated ("bottled up") until the benzene could dissipate throughout the vapor space and return back below CLFL before initiating air-based ventilation. This operating scheme is advocated in the In-Tank Processing OSRs, although ultimately the OSRs recognize that establishing air-based ventilation as early as possible to maintain the vapor space below CLFL as the current safety posture from the SAR Addendum. To address the results of the calculations addressed above, procedure SW16.3-AOP-008, "Loss of Ventilation," was revised to provide Operations personnel direction to ensure at least 8 hours had elapsed or the combustible gas concentration had exceeded 25% of CLFL before initiating air-based ventilation. This delay is well within the allowable 12 hours in OSR 3.2.1, and has no impact on the overall deflagration event probability described in Section 3.4.1 and Appendix C of the SAR Addendum. DOE staff review of this change to procedure SW16.3-AOP-008 finds it adequately implements the provisions from calculation M-CLC-H-01167, yet remains well within the requirements dictated by the SAR Addendum and OSRs. Therefore, DOE staff finds this procedure change acceptable and adequate.

### **Conclusions**

The changes to SAR Addendum Section 3.3.1.9, as well as the analyses issued and evaluated above, combined with the two controls put in place (i.e., isolation of cooling coils and revision to procedure SW16.3-AOP-008), are adequate to resolve Open Issue 9.3 of the In-Tank Processing SER Revision 2. However, as indicated above, the strategy and justification provided above is not completely reflected in the SAR Addendum. Therefore, the following Revision Issue must be


incorporated into the SAR Addendum no later than the first annual update. [Note, the number of this Revision Issue is the next sequential number from SER Revision 2.]

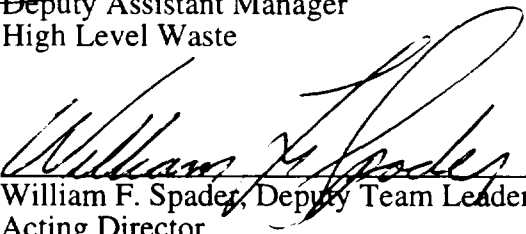
**Issue 9-9** [Revision Issue] Incorporate the strategy of relying on oxygen control for the extremely unlikely event of a cooling coil failure causing the Tank 48 vapor space to potentially exceed CLFL for several hours.

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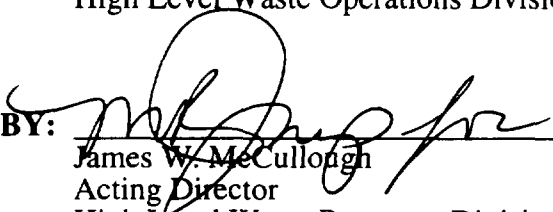
HIGH LEVEL WASTE

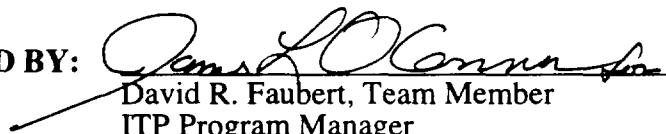
FINAL DOE VALIDATION REPORT  
FOR  
IN-TANK PRECIPITATION FACILITY STARTUP

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## I. INTRODUCTION AND SUMMARY

The U.S. Department of Energy (DOE) conducted a validation of the startup activities of the In-Tank Precipitation (ITP) Facility, which is managed and operated by the Westinghouse Savannah River Company (WSRC). This validation was performed in accordance with the "DOE Validation Plan for In-Tank Precipitation Facility Startup", Revision 0, dated May 27, 1994, which was prepared in accordance with SRIP 5480.31.1A, " Facility Startup Approval Process". The validation began on June 12, 1994. The DOE validation areas were consistent with the 22 functional areas defined in the WSRC Readiness Self Assessment (RSA), the WSRC Operational Readiness Review (ORR) and readiness of the site DOE organization, which meet the intent of the Minimum Core Requirements in DOE Order 5480.31. The validation activities were documented in the "DOE Validation Report for In-Tank Precipitation Facility Startup," dated April 4, 1995, herein after referred to as the Validation Report. Validation issues which were not closed at the time of that report were addressed in the "DOE Supplemental Validation Report for In-Tank Precipitation Facility Startup," dated May 11, 1995, herein after referred to as the Supplemental Validation Report. The Supplemental Validation Report documents the validation status for proceeding with the DOE ORR, which was conducted from May 15 through May 25, 1995.

The ORR Team concluded that ITP operations can be safely started by WSRC upon: 1) correction of management identified discrepancies that existed at the commencement of the ORR, 2) correction of the pre-start findings from the ORR, and 3) completion of an independent confirmation of the satisfactory implementation of the authorization basis. This report, herein after is referred to as the Final Validation Report, documents closure of these items and serves as the basis for the DOE approval to startup ITP.

The DOE validation team completed and documented validation of startup readiness in the following areas in the Validation Report and Supplemental Validation Report pending closure of the WSRC ORR corrective actions. These WSRC ORR actions are closed, and no further documentation is necessary:

- FA2 - Construction
- FA3 - Organization and Staffing
- FA5 - Procedures
- FA8 - Quality Assurance
- FA9 - Configuration Management
- FA10 - Maintenance and Surveillance
- FA11 - Radiation Protection
- FA12 - Fire Protection
- FA13 - Emergency Preparedness
- FA14 - Independent Review and Oversight
- FA15 - Nuclear Criticality Safety
- FA16 - Test Requirement and Acceptance
- FA17 - Issues Management
- FA18 - Safeguards and Security
- FA19 - Packaging and Transportation
- FA20 - Occupational Safety and Health
- FA21 - Procurement
- FA22 - Conduct of Operations
- Site DOE Readiness

In the remaining areas, the DOE validation team has completed and documented validation of startup readiness in this report. In all cases, the DOE validation team has completed validation of

closure of these issues. Specific validation activities associated with these issues are discussed in the following sections.

## **II. VALIDATION RESULTS**

### **WSRC Readiness Self-Assessment and Operational Readiness Review**

The DOE validation team has completed its review of ITP's readiness for startup and subsequent operations, which included extensive oversight of the RSA, and WSRC ORR. The RSA and WSRC ORR were performed to assess the readiness of the ITP facility for operation. The RSA was very comprehensive in breadth and depth, including approximately 1300 acceptance criteria resulting in 385 prestart corrective actions and 371 post-start corrective actions. The WSRC ORR was performed in October 1994 and was a combination of oversight of the RSA and independent assessments to determine readiness. The WSRC ORR had 50 findings and 13 carry-over findings from the RSA, for a total of 63 findings with 152 prestart corrective actions.

As a result of the time elapsed and additional work performed (hot tie-ins, chemical cleaning modifications, procedure implementation, etc.), the WSRC ORR expanded the scope of the ORR and performed an extended ORR segment April 19 - May 3, 1995. The extended ORR was performance based and focused on observation of activities, procedure implementation, and conduct of operations. The extended ORR resulted in two additional findings with three prestart corrective actions.

The 14 open prestart corrective actions at the start of the DOE ORR have been closed. Closure of these 14 corrective actions has been entered into the HLW Integrated Management System (IMS) for tracking (Accession No. 95-05-0033) and has since been closed. The RSA and WSRC ORR processes used at ITP were adequate to determine facility readiness to operate.

Overall, the RSA and WSRC ORR were a comprehensive and objective tool for determining facility readiness. The DOE validation team endorses the results of the RSA and WSRC ORR efforts.

At the start of the DOE ORR there were 104 key event "H" (Ready for DOE ORR) and "P" (Chemical Addition to Tank 48) MTS items, all of these items have been closed by WSRC. The Validation Team performed a random sample of some of the closure package for these 104 MTS items and determined that the closure of these items were adequate.

### **Functional Area 1 - Design**

The DOE final validation effort for this functional area consisted of closure of HLW IMS issues at the time the Supplemental Validation Report was issued.

The DOE validation team had determined that all Design Change Packages required for startup have not closed, and therefore associated documents have not been updated. The DOE validation team entered this issue into the HLW IMS for tracking to closure, (Accession No. 95-05-0036) To validate this corrective action, DOE reviewed a random sample of 12 control room P&ID's to ensure that changes had been incorporated into the drawings as required by procedure 4.01 of the 7E Manual. Many of these drawings had changes incorporated or were being implemented. No discrepancies were noted in this review. Based on the actions taken by WSRC and the independent verification by DOE, this item is closed.

The DOE validation team considers this functional area satisfactory for radioactive operations of ITP.

#### **Functional Area 4 - Training and Qualification**

The DOE final validation effort for this functional area consisted of closure of HLW IMS issues at the time the Supplemental Validation Report was issued.

The DOE validation team also noted in the Validation Report that Shift Supervisor and Shift Manager candidates had not completed their qualification cards. The qualification cards state that these candidates must perform a complete watch at each of the lower-level operator positions. The Operations Manager indicated that these candidates only performed the recording of routine readings for each of these positions rather than standing a complete watch. WSRC management has revised the startup qualification cards for these positions to include round-taking requirements at each of the field operator positions prior to radioactive startup. These additional requirements will reinforce the location of key monitoring equipment as well as familiarize these candidates with the routines associated with the field operator positions. The DOE validation team considers these actions adequate. This issue was entered into the HLW IMS (Accession No. 95-05-0032) for tracking and has been closed by WSRC Memo HLW-TNG-0209 which specifies the round-taking requirements for shift supervisors and shift managers for qualification purposes.

The DOE validation team considers this functional area satisfactory for radioactive operations of ITP.

#### **Functional Area 6 - Safety Documents**

The DOE final validation effort for this functional area consisted of closure of HLW IMS issues at the time the Supplemental Validation Report was issued.

One issue remained to be closed from the DOE oversight of the WSRC ORR. This involved the formality of the Authorization Basis Document (ABD) change control programs.

The DOE validation team assessed the Authorization Basis Document (ABD) change control program given in WSRC Manual S4, Procedure ENG.02, "High Level Waste Management Authorization Basis Document Revision Process," by reviewing the results of the training provided to the ITP engineers and by interviewing the engineer in the HLW Safety Analysis Group who is responsible for the programmatic implementation of this procedure. A draft desk top instruction for ITP Engineering regarding specific details of implementing ENG.02 was also reviewed. Based on the results of these efforts, the DOE validation team has concluded that an adequate ABD change control program is in place, with the near-term desk top instruction providing needed clarifying improvements. However, implementation of this program was not fully assessed since all of the required elements have not been implemented at ITP. Thus the DOE validation team will assess full implementation prior to startup. This item was entered in the HLW IMS (Accession No. 95-05-0035) and has since been closed (see discussion below).

The Validation Team interviewed the Cognizant Engineer on the details and requirements of ENG.02. The Cognizant Engineer demonstrated the use of the desk top instruction for ABD change requests. The Cognizant Engineer was knowledgeable of the use of ABD pending changes and the use of them for USQD technical evaluation. Cognizant Engineers are sent a copy of index for ABD changes whenever the index changes. These actions are sufficient to close this issue. This issue is closed.

Five prestart findings (PR1-4, SE1-1, SE2-1, SE2-2, SE1-3) were identified during the DOE ORR that were related to the adequacy of the Safety Analysis Report, the Operational Safety Requirements (OSRs) and the implementation through the Process Requirements. These findings are closed individually in Section III of this report.

The DOE validation team considers this functional area satisfactory for radioactive operations of ITP.

### **Functional Area 7 - Environmental Protection**

The DOE final validation effort for this functional area consisted of tracking of HLW IMS issues at the time the Supplemental Validation Report was issued.

The DOE validation team has verified that the Treatability Variance for the failed ITP filters has been modified to include nitrobenzene. WSRC forwarded the package requesting modification to the permit to the United States Environmental Protection Agency (EPA) on April 4, 1995. EPA approval is expected, however the issue will remain open until approval is received. EPA published its "Notice of Intent to Approve" on July 31, 1995, which started a 30 day comment period. The DOE validation team has entered this issue into the HLW IMS for tracking to closure. This is not considered a chemical addition issue, since it is related to filter operations and the HLW IMS item has been tied to Filter Building Operation. (Accession No. 95-03-0014)

The DOE validation team considers this functional area satisfactory for radioactive operations of ITP.

### **III. DOE ORR PRE-START CLOSURE**

#### **EP1-1 Emergency Response SCBA equipment is not available on a consistent basis.**

To assure that emergency equipment and supplies are restored and replenished on a timely basis following in-plant drill usage, a "Report of Emergency Equipment use during a Facility Drill" has been developed and implemented. This form is administered by the drill coordinator following all in-plant drills, is filled out by the on-shift Manager, and is sent to the Facility Support Manager for any necessary follow-up action required to restore the equipment to full readiness. This requirement has been disseminated to all Operations shift crews via Shift Orders.

The Validation Team has reviewed the form described above and finds that it contains the necessary attributes to adequately address all emergency equipment usage during in-plant drills and provides a means to assure that all emergency equipment is restored following drills. Additionally, the Validation Team reviewed the monthly tickler which periodically verifies that all specified emergency equipment is available and in good operating condition. Numerous members of the operating crews were interviewed and a thorough understanding of the use of this form was displayed. Observations of an in-plant drill confirmed the proper use of the "Emergency Equipment Use" form. The Validation Team concludes that actions taken are adequate to close this finding. This finding is closed.

#### **IS1-1 Industrial Hygiene (IH) management has not clearly established program responsibilities to ensure adequate staffing levels.**

Procedures were reviewed, modified, and approved to identify steps which require IH coverage. IH and SRS Fire Department have updated their memorandum of Agreement (MOA) to clearly define roles of IH personnel during an emergency or spill. IH management has briefed and prepared written guidance to IH technicians of their roles and responsibilities.

The Validation Team has reviewed the closure package for this finding, which included a list of procedures which have been modified, the MOA between IH & the fire department, proposed & agreed to changes to the (Emergency Planning Implementation Procedure) EPIP, and the

guidance provided to the IH technicians. These actions resolve the concern of the ORR team, and are adequate and appropriate. This finding is closed.

**MG3-1 Key Elements of the startup plan have not been finalized and approved.**

A Management Overview Plan has been developed and approved (HLW-ITP-95-0403, "Facility Management Control of In-Tank Precipitation Startup Evolutions").

The Validation Team reviewed HLW-ITP-95-0403, "Facility Management Control Of In-Tank Precipitation Startup Evolutions, dated July 11, 1995" and finds that the plan provides an adequate description and sufficient detail of the overall strategy and startup plan for ITP. The plan integrates the startup schedule milestones, details the qualification requirements for the oversight Senior Managers, describes the process of accomplishing the remaining testing, provides the requirements for the completion of necessary operator qualification items, describes the radiological monitoring program, and specifies which facility operations are required to be observed by the ITP Management team. Comments and guidance provided by DOE have been adequately addressed. Discussions with the Facility Manager of ITP reveal that the overall startup of ITP will be in accordance with the strategy described in the above mentioned document. Actions completed by ITP Management are adequate to close this ORR Finding. This finding is closed.

**MT1-1 Reverse traceability procedures for M&TE found out-of calibration are cumbersome, resulting in excessive delays in evaluating instrumentation and overlooks supporting OSRs.**

WSRC issued an Immediate Procedure Change (IPC) to WM-QI-1121. This IPC requires the M&TE Coordinator to notify the Facility, Engineering and Maintenance Managers of out of calibration conditions (OOC). OOC's are discussed at the Plan of the Day (POD). SCD-4 program has incorporated this line of inquiry to assess timeliness of disposition.

The Validation Team reviewed the IPC to WM-QI-1121, the incorporated changes to SCD-4 and two Inter-Office Memorandums. These documents show that the commitments of the corrective action plan have been implemented. It is too early to ensure that "excessive delays" are prevented but management attention has been brought to this area. This action beyond the Corrective Action Plan actions will probably have the most direct effect. A cognizant engineer has been assigned to work with the M&TE custodian to resolve OOC notices. The actions taken are satisfactory to close this issue. This finding is closed.

**MT1-2 Repeat findings of out-of-calibration occurrences of the (M&TE) FCI flow calibrators are not being aggressively resolved.**

WSRC has completed the commitments in the Corrective Action Plan to review maintenance procedures. No procedure changes were required. The calibration frequency for FCI flow calibrators has been reduced from 1 year to 6 months.

The Validation Team reviewed M&TE files with the custodian, and the SCD-4 program changes. Instruments will continue to be monitored for OOC conditions. The reduction of the calibration frequency solves this problem. No procedure changes were required. The Validation Team reviewed M&TE files with the M&TE Coordinator and determined that the tracking system is up to date. This system will detect repeated OOC conditions. No indication of a programmatic or procedure problem exists. This finding is closed.

**OP4-1 Execution of the lockout/tagout system did not provide for adequate control of system impacts on Limiting Conditions for Operations (LCOs)**

Facility Management developed and administered training modules which addressed the requirements for reviewing Lockouts for impacts against safety documentation; these training modules were attended by Operations personnel. Additionally, required reading was completed by Operations and Engineering personnel regarding the requirements for lockout review for systems which are covered by safety basis documentation. Engineering management issued an Office Memorandum to all Engineering personnel reviewing the systems for which an Engineering review was mandatory and the methodology to be used during the review. Additional Management emphasis has been placed on performing ongoing assessments to assure that the execution of lockout/tagouts provide an adequate control of system impacts on LCOs.

The Validation Team reviewed the lesson plans and attended several Operator training sessions where the requirements and methodology for assuring LCO maintenance was maintained during lockout/tagout activities were maintained. These training sessions adequately addressed the importance of adequately controlling the installation of lockout/tagouts to preserve the LCOs. Interviews were conducted with members of the Operations staff and an adequate understanding of the lockout program, as it pertains to maintaining LCO compliance, was observed. Additionally, ITP management has been observed performing ongoing and special assessments of the administration of lockout/tagouts and reinforcing the importance of thorough lockout reviews. The Validation Team performed and will continue to perform special assessments with focus on the coordination of lockout/tagout administration and the identification of LCO impacts. Actions taken, results of observations, and ITP management attention in this area are adequate to assure satisfactory performance. This finding is closed.

**OP4-2 On several occasions, the shift operations managers (Shift Manager, Shift Technical Engineers, and Shift Supervisor) failed to give adequate attention to maintaining plant operations within the limits specified in plant OSRs and LCOs.**

Specialized training was developed and administered to Operations personnel as part of the regular cycle training. The training presented a detailed review of the Safety envelope including Operational Safety Requirements, Process Requirements, and Safety Analysis Report Addendum for ITP/ESP. The training also included numerous Operational Safety Requirements (OSR) related exercises to reinforce the methodology which is to be utilized to assure OSR compliance. ITP Management developed and implemented an LCO Status Board, which is being maintained in the Shift Manager's office, and has entries for all conditions where Limiting Conditions for Operations (LCOs) are not being met. Focused ITP Management attention to assure that adequate attention is being given to Safety Envelope maintenance is ongoing and includes; (1) Briefings/sessions regarding OSR/PR implementation (given by Plant Manager and Operations Manager, (2) Frequent assessments by Management staff with on-spot feedback, and (3) Routine assessments by staff personnel.

The Validation Team attended and assessed the specialized training which was given for corrective action for this finding. The breadth and depth of the training and subsequent discussions adequately addressed the content and methodology to be used in administering OSR's and PR's. The exercises with OSR related circumstances were also sufficiently challenging and provided strength in further administration of OSR/PR's. Interviews with Operations management (Shift Manager, Shift Supervisor, and Shift Technical Engineer) revealed an adequate level of knowledge regarding the content and use of the OSR/PR's. Observations by the Validation Team reveal that Operations crews display an adequate level of concern and attention toward maintaining the ITP/ESP operation within the Safety Envelope. The DOE Facility Representatives will continue to perform assessments pertaining to OSR/PR implementation and compliance and will provide real-time feedback for issues noted that indicate

any erosion of the maintenance of the Safety Envelope. Shift coverage by DOE staff will occur before, during and after the first chemical strike; special emphasis will be focused on OSR/PR compliance with immediate feedback to ITP management for areas of deficiency. The special training administered, the additional emphasis from the ITP Management team, and the commitment from the Operations staff (based on interviews and observations) is adequate to close this finding. This finding is closed.

**PR1-1 EOP 005 needs an engineering and operational analysis to ensure the actions specified provide a safe method of shutting down the ITP systems and components in the event of a control room evacuation.**

WSRC Engineering performed a Unresolved Safety Question Determination (USQD) and an Operational Analysis of SW 16.4-EOP-005 and determined that some changes would be needed to avoid any potential operational conflicts. The Procedures Organization revised the procedure and received final approval for the procedure.

The Validation Team reviewed the procedure changes, submitted by Engineering which corrected identified deficiencies, and verified field implementation of the required procedure changes. The procedure changes identified numerous additional actions required for a Control Room Evacuation and re-prioritized numerous action steps. A review of the Operational Analysis revealed that all Safety Analysis assumptions are preserved in the performance of this Emergency Operating Procedure. Shift briefings which were conducted to assure that Operations personnel were current and aware of the changes to EOP-005. The Validation Team interviewed Operations personnel following the implementation of the above mentioned procedure changes and verified that adequate knowledge was achieved. The Validation Team concurs that actions taken are adequate for closure of this finding. This finding is closed.

**PR1-2 A controlled set of 241-82H procedures needs to be staged at a location so that in the event of a control room evacuation, facility management has the information necessary to ensure safety of the facility, associated equipment and personnel, and the environment.**

An evaluation was performed to identify the necessary procedures which would be required to place and maintain the facility in a safe shutdown condition in the event of an unplanned Control Room evacuation. The identified procedures (Emergency Operating Procedures (EOP's) and Emergency Plan Implementing Procedures (EPIP's)) are located at the Operations Support Center (OSC) and are on controlled distribution. Operations personnel have been notified of the location of these procedures through the Operations required reading program. Additionally, a monthly tickler has been developed to periodically assure that the manuals are being maintained up-to-date.

The Validation Team reviewed the selected procedures and concur that the availability of the identified procedures in the OSC is adequate to place and maintain the facility in a safe shutdown condition from outside the Control Room. In the event that the OSC is also uninhabitable, a complete set of all operating procedures is available in Building 707H. Interviews with Operations personnel were conducted and adequate knowledge was displayed with regard to the location and availability of the EOP's and EPIP's. Additionally, The Validation Team has observed and assessed in-plant drills requiring Control Room evacuations and the subsequent use of these selected procedures. Actions taken and operator knowledge are adequate to close this item. This finding is closed.

**PR1-3 Five SOPs or SRs require additional information to ensure operators understand and can successfully accomplish them.**

The five procedures identified by the DOE ORR Board as having deficiencies which need correction were reviewed by the ITP Procedures Group. Changes were generated to correct the identified deficiencies as necessary. Additionally, the Procedures Group and Facility Management has placed additional emphasis on the level of review and validation required in the procedure approval process. Additional operators have been made available to assist in the procedure review/validation process; this was accomplished by suspending cycle training for the five week period prior to the addition of chemicals.

The Validation Team reviewed the procedure changes submitted to correct the ORR identified deficiencies and verified field implementation of the required procedure changes. Interviews with the management personnel of the procedures group provided evidence that these deficiencies were not indicative of a programmatic breakdown. Additional emphasis has been placed on procedure reviews and validations through field observations of these activities. The Validation Team has observed that additional operators are available in the field and have been witnessed performing detailed procedure walkdowns and validations. The continuation of the "First Time Use" procedure execution requirements also assures that necessary changes to procedures in progress are corrected in an appropriate manner. Additionally, the assignment of ITP Facility Management to shift coverage during significant facility evolution provides an increased focus and assurance that procedures are performed correctly and are technically correct. The above observations provide a basis for the closure of this finding. This finding is closed.

**PR1-4 The procedures related issues contained within the Safety Evaluation Report (SER) and Authorization Commitment Matrix (ACM) that have yet to be resolved and implemented must be closely monitored and tracked in order to assure implementation and closeout.**

Commitments of the CAP are complete in that SAR and OSR revisions for ACM or SER issues are complete (except SER issue 9.7 covered by SE1-3). PR revisions are complete for chemical additions to tank 48 as detailed in HLW-ITP-950399.

Closure package is complete on this issue. The Validation Team independently reviewed the closure (i.e., SAR, OSR PR changes) for all the SER (Rev. 1) Table 1 Open Issues. Issue 9.7 must remain open for this issue but is closed with SE1-3 (IMS 95-06-0015). The closure package gives the correct status of all open issues from the SER. The Validation Team reviewed the procedure changes required for 14 of 17 miscellaneous ACM entries. Items 3, 6, 9 (as listed in package) are verified to be tied to correct milestone. All SAR and OSR revisions are complete for the ACM entries and SER Table 10 items. PR revisions are complete and implemented for chemical addition. See HLW-ITP-950399 for the PR implementation plan for future key events. The actions taken by WSRC are adequate for closure. This finding is closed.

**RP1-1 Physical access control for High Radiation Areas is not in place for the filter/stripper building.**

WSRC designed and implemented physical access control for the Filter/Stripper Building and Tanks 48 & 49. A weekly tickler for the inspection of High Radiation Areas has also been implemented.



A field walkdown was performed to determine the adequacy of the controls. The controls were adequate within the building. The roundsheet and weekly inspection ticklers were reviewed and determined to be satisfactory. The actions taken by WSRC are adequate for closure. This finding is closed.

**RP1-2 Contamination control vs. ALARA considerations at the filter/stripper building require resolution.**

Facility management designed and ordered containment huts at the appropriate entrances to the Filter / Stripper building to provide an area for protective clothing removal. These huts are outside the building where exposure rates are reduced. The facility installed a hut on the west side of the filter stripper building to demonstrate installation. It was agreed upon that the remaining huts did not need to be installed until just prior to the introduction of materials into the building to minimize weather exposure to the huts. Engineering will design permanent structures after building operation to account for lessons learned from Batch #1 operations.

The Validation Team inspected the installed hut and reviewed the design for the uninstalled huts. It was determined the huts will serve their designed functions. The Validation Team had concerns, which were adequately addressed by WSRC, in the following areas: 1) confined space, 2) habitability, 3) maintenance, 4) Life Safety code, and 5) expected dose. DOE has verified that an entry has been made into the MTS system to ensure a review is conducted after batch 1. The actions taken are adequate to close this item. This finding is closed.

**SEI-1-1 OSR Surveillance Requirements do not periodically verify that the exhaust ventilation flow rate from each filter is at least 1000 SCFM.**

SAR page changes and OSR changes associated with verification of damper position were initiated. In addition, a DCF was processed to remove the "Normal" position from the switch.

The Validation Team reviewed implemented DCF J-DCF-H-00666, which removed the ability to fully close the filter cell ventilation dampers, and ABD Change Request HLW-CRF-95044 and HLW-CRF-95048, which documents damper position and cell cover assumptions. An additional OSR change is in process to provide a damper position surveillance. This action is appropriately tied to Filter Cell Operation. This OSR change is being routed for approval and will be in place prior to filter operation. These actions implement finding SEI-1. This finding is closed.

**SEI-3 Current safety documentation does not completely address the hazards and risks associated with ITP operations.**

Each of the ten SER Rev. 1 Table and Appendix C issues have been tracked through to closure with AB changes and procedure changes when necessary.

DOE evaluated the closure of each of the SER Rev. 1 Table 1 issues and documented the closure of each (except issue 9.7) in SER Rev. 2. Issue 9.7 was evaluated and closed in an SER Rev. 2 Supplement issue September 1, 1995. The implementation of these open issues was validated and documented in PR1-4. DOE performed in depth review of 5 of the (1, 6, 9, 10, 11) Appendix C issues. #1. DOE performed independent calculations and reviewed the revised ASD as documented in the May monthly report. #6. The process requirement and procedures were reviewed that control the access to the stripper building. #9. OA is verified to be stored in a system with no common piping with other systems in the cold feeds area. It is transported in a dedicated dumpster. Independent Verification is performed prior to unloading a truck into the

storage tank. STPB has an IV performed prior to unloading. It is pumped directly to tank 48 on a line not shared with other process chemical lines. ST has IV performed prior to unloading. It is transported via drums to tank 48 and pumped directly to the tank. #10. Pump leakage rate and cooling coil failure rate is specifically addressed in SAR Section 3.3.1.92. Bounding calculations have been prepared for Background Release Rate. #11. All above ground transfer lines which are not seismically qualified were locked out to prevent usage until qualified. This lockout was reviewed and walked down by the DOE ITP Facility Representatives.

The final issue in SE1-3 is the AB change required to document the just-in-time delivery of STPB. The change request (HLW-CRF-95026) was reviewed and determined to accurately reflect this evolution. These actions are sufficient to close this issue. This finding is closed.

**SE2-1 Some surveillance procedures do not provide the necessary assurance that OSR surveillance requirements are met.**

Commitments of the CAP are complete to address the VAMP and CAM setpoints and calibrations. These requirements are controlled by surveillance procedures.

The closure package is complete and accurately documents closure of this issue. The Validation Team independently verified that surveillance procedures SW16.6-SR-3.3.2 Rev. 2 and 3.3.3 Rev. 2 contained the CAM and VAMP setpoints verifications. This finding is closed.

**SE2-2 Several programs and controls required by the AB have not been fully implemented.**

CAP commitments were completed as follows: CALF calculations are resolved or are covered by SE-3 issues. Procedures were developed for an emergency blower for tank 50 and to dilute spilled precipitate. Stripper Building occupancy requirements were clarified for oxygen and benzene. Independent Verification was added to the chemical addition procedures at cold feeds.

The closure package is complete and thorough to document closure of this issue. Additional comments: Water addition effect will be reviewed and closed with issue SE1-3 (IMS 95-06-0015). For issue no. 4 (Stripper Building Occupancy), the closure report documents the actions necessary to verify oxygen content of the stripper building atmosphere. Benzene concentration will be detected with personal benzene monitors. The combination of oxygen detection and personal benzene monitors closes the occupancy issue. The procurement and procedures for personal benzene monitors is identified as a constraint to filter operation and tracked by MTS item 95-34539. This finding is closed.

**TR3-1 Plans for completing remaining Practical Factors are not complete.**

A Management Plan (HLW-ITP-950401) has been developed to address the corrective actions taken as a result of this finding. Personnel readiness and qualification are discussed. The plan also addresses the coordination of the completion of the required practical factors and establishes ties to the facility schedule.

The Validation Team has reviewed the WSRC submittal (HLW-ITP-950424) for closure of this finding. An assessment of remaining qualification card practical factors has been completed and included in the Attachments of the Management Plan. The practical factors are segregated and listed as they pertain to Facility milestones. Performance of the practical factors will be witnessed by Facility management and are tied to the daily Plan of the Day (POD) schedule to assure timely completion. The Validation Team concurs that the management plan adequately

addresses the methodology necessary to assure that remaining "perform" practical factors are completed in accordance with facility milestones. This finding is closed.

#### IV. MISCELLANEOUS ISSUES

During preparation of a sample from Tank 48 for filtering with a testing unit in the Savannah River Technology Center (SRTC) shielded cells, it was determined that NaTPB removed soluble Plutonium (Pu) and retained it in the floating precipitate layer. This work was performed to determine the amount of sodium titanate (ST) needed for batch 1 processing. NaTPB was added to the sample to facilitate filtering out cesium to better determine the amount of Pu/Sr/Ur present. Soluble uranium was not effected by the NaTPB addition. The effect of NaTPB on Pu had not been noted before and had not been analyzed for nuclear criticality safety or effects on other postulated accidents in the ITP Safety Analysis Report (SAR). This issue was determined after the completion of the Department of Energy (DOE) Operational Readiness Review (ORR).

The DOE validation team performed an independent review of the reports Westinghouse Savannah River Company (WSRC) developed to address the criticality issue. "Nuclear Criticality Safety Evaluation of the In-Tank Precipitation Chemical Addition Process" (WSRC-TR-95-0348) concludes that the process will remain subcritical under normal and credible abnormal conditions. DOE's review determined that the report is consistent with the methodology already discussed in the SER Rev. 2, Section 9.4. Three separate process phases of chemical addition, mixing and washing were considered. Conservative assumptions were made to ensure bounding conditions with safety factors of 388, for the chemical addition phase, and 105 for the mixing phase. The washing phase was shown to be included within the conditions of the previous two phases of the process. Conservative assumptions include: 1) considering all fissile material to be plutonium in the chemical addition phase, 2) taking no credit for the strong neutron poison (boron) within the tetraphenylborate (TPB) molecule, 3) the limited concentration factor provided by the fact that the Pu would settle out of solution in the TPB precipitate matrix.

DOE reviewed the report "Effect the Recent Analyses of Tank 48 Waste Sample on In-Tank Precipitation Precipitant Burn Source Term" (HLW-REG-940209) and concluded that continued use of the SAR release fraction of 0.003 is acceptable. This report determined that the release mechanism for non-volatile plutonium is still consistent with the previously determined mechanism of entrainment with the combustion products of burning cesium tetraphenylborate and potassium tetraphenylborate. A search of published release rates are equal to 0.003 or are less conservative. Further research of published reports document that the release of actinides from soot producing fires directly correlates with the concentration of the actinide. Thus the chemical structure of Pu is independent of it's release fraction. DOE has determined that these reports to accurately address the release fraction of 0.003 and the release mechanism.

The final report reviewed by DOE discusses the results of filter testing a radioactive sample. "Preliminary Evaluation of Plutonium Decontamination During Filtration of In-Tank Precipitation Slurries", (SRT-LWP-95-0081 Rev. 2) concludes that less than 1.9% of the plutonium inventory will pass through the filter to the filtrate. This work is consistent with studies performed in 1982 and 1983 that are the basis for current filter performance criteria. The filtration test was performed six times with consistent results. This type of testing shows that, while the mechanism of the admix has not been determined, there is no effect on the process. This study and report accurately concludes that NaTPB and mixing of plutonium does not effect filter performance criteria.

DOE concludes that a SAR update is required to document the TPB plutonium removal phenomenon during the annual update but no other authorization basis documents will require revision.

## V. CONCLUSIONS

The DOE validation of the ITP startup process has been a comprehensive review of WSRC's readiness to operate the facility. It has consisted of performance-based independent assessments and objective oversight of WSRC activities. The DOE validation team also conducted independent reviews to verify DOE's ability to oversee operations at the facility.

The DOE validation team has reviewed the WSRC Readiness to Proceed letter. Based on this letter, the DOE ORR results, and the entire validation effort, the DOE validation team considers ITP ready for startup. The DOE validation team has verified that: 1) correction of management identified discrepancies that existed at the commencement of the DOE ORR have been satisfactorily closed based on closure of the WSRC ORR findings and the key event "H" and "P" MTS items, 2) closure of the pre-start findings from the ORR, as discussed in Section III above, and 3) completion of an independent confirmation of the satisfactory implementation of the authorization basis included as Attachment 1.

It is the conclusion of the Validation Team that ITP operations can be safely started and operated by WSRC.



**Department of Energy**  
Savannah River Operations Office  
P.O. Box A  
Aiken, South Carolina 29802

SEP 01 1991

Mr. Ambrose L. Schwallie, President  
Westinghouse Savannah River Company  
Aiken, SC 29802

Dear Mr. Schwallie:

SUBJECT: In-Tank Precipitation (ITP) Start-up Authorization

Reference: Letter, Schwallie to Fiori, 9-1-95, "ITP Request for Startup Authorization"

The Department of Energy authorizes Westinghouse Savannah River Company to startup the ITP facility. This authorization is based on your referenced letter and the Department of Energy's (DOE's) review that verified personnel, programs, and equipment are ready to support Radioactive Operation of ITP. Enclosed is the Final Validation Report for ITP Startup for your staff's information. This report documents the DOE staff review and closure for the eighteen DOE Operational Readiness Review pre-start findings and other DOE pre-start concerns. You are expected to meet your commitments to DOE as outlined in the startup management plan, namely assuring that senior management is on shift during startup.

Also enclosed is the Safety Evaluation Report (SER), Revision 2, Supplement 1, which addresses closure of the one open issue related to ITP startup from SER Rev 2 of the In-Tank Processing Safety Analysis Report (SAR) Addendum (WSRC-SA-15, Revision 8). This SER supplement reflects DOE's acceptance of the SAR Addendum and Operational Safety Requirements (WSRC-RP-94-303, Revision 6) and authorizes their use as Authorization Basis Documents. You are requested to include the enclosed SER supplement into the Authorization Basis defined in Manual WSRC-IM-94-10 within 14 days from the date of this letter. There are no further SER issues to be resolved prior to startup of the ITP facility.

Your staff is to be commended for their efforts in reaching this important milestone. This facility startup is significant for DOE and WSRC as it is a major step toward vitrification of waste currently stored in high level waste tanks at SR.

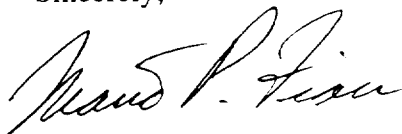
SEP 01 1995

Mr. Ambrose L. Schwallie

2

If you have any further questions, contact me or A. Lee Watkins, Assistant Manager for High Level Waste, at (803) 208-6053.

Sincerely,



Mario P. Fiori  
Manager

PD:JLO:tct

Enclosures (2)

1. Final Validation Report for  
ITP Startup, 9/1/95
2. In-Tank Processing SER,  
Revision 2, Supplement 1,  
9/1/95

MB-95-0230

cc w/o encl's:

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T. J. O'Toole, EH-1, DOE-HQ  
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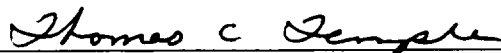
**SAFETY EVALUATION REPORT**  
SUPPLEMENT 1 to REVISION 2  
CLOSURE OF OXALIC ACID AND WATER ADDITION ISSUE

**FOR THE  
SAVANNAH RIVER SITE**

**IN-TANK PROCESSING FACILITIES**

**SAFETY ANALYSIS REPORT ADDENDUM  
AND OPERATIONAL SAFETY REQUIREMENTS**

SEPTEMBER 1995

  
SER Preparer

  
SER Reviewer

  
ED Division Director 9/1/95

**THE OFFICE OF THE ASSISTANT MANAGER FOR  
HIGH LEVEL WASTE  
SAVANNAH RIVER OPERATIONS OFFICE  
U. S. DEPARTMENT OF ENERGY**

## **Introduction**

This Safety Evaluation Report (SER) supplement (Supplement 1) to Revision 2 of the In-Tank Processing SER, issued by letter, Fiori to Schwallie dated August 4, 1995 (MC-95-0052), addresses the Westinghouse Savannah River Company (WSRC) actions taken to resolve Open Issue 9.3.

## **Background**

Issue 9.3 from SER Revision 2 required actions by WSRC to revise In-Tank Processing Safety Analysis Report (SAR) Addendum, WSRC-SA-15, Revision 8, Section 3.3.1.9, to provide an adequate basis that the addition of chemical cleaning solutions (most notably Oxalic Acid (OA) and caustic solutions), as well as the inadvertent addition of large quantities of water (e.g., from cooling coil failures upon an earthquake), did not cause the vapor space in Tanks 48 to reach the Composite Lower Flammability Limit (CLFL) assuming molecular diffusion is the only transport/dispersion mechanism. Several issues were identified in the corresponding SER discussion which were to be considered in resolving Issue 9.3. [It should be noted, too, that Tank 49 is not addressed by this SER Supplement since SER Revision 2 already prevents normal transfer to Tank 49. If emergency conditions arose requiring transfer, all CLFL impacts would be addressed via In-Tank Processing Operational Safety Requirement (OSR), WSRC-RP-94-303, Revision 6, Administrative Control 6.5.15.1, prior to the transfer.]

WSRC revised Section 3.3.1.9 via Authorization Basis Document (ABD) Change Request HLW-CRF-95075 on August 31, 1995, to incorporate analyses performed to address and resolve Issue 9.3. This SER Supplement 1 addresses this ABD Change Request as well as the supporting analyses referred to therein.

## **Evaluation**

### **Chemical Cleaning Solution Impacts -**

ABD Change Request HLW-CRF-95075 revised several sections of the SAR Addendum to eliminate the use of OA as an acceptable cleaning solution. Thus, the potential impacts from OA on the reaction with Tetraphenylborate (TPB) causing increased benzene generation have been eliminated. For planned chemical evolutions involving inhibited water or caustic, the controls provided in SAR Addendum Section 3.3.1.9, as well as OSR 6.5.15.1, were reviewed by DOE staff and judged adequate and appropriate. The key parameters identified which affect the time to reach CLFL for chemical cleaning solution additions, and the key assumptions/controls to help prevent/minimize this event, are adequately described. The inadvertent addition of these chemical cleaning solutions was evaluated in SER Revision 2 and DOE staff concurred with the SAR Addendum conclusion this was incredible. The changes to Section 3.3.1.9 under HLW-CRF-95075 were reviewed by DOE staff, and this conclusion remains valid.

### **Cooling Coil Failure Impacts -**

During the precipitation and concentration phases of ITP operation, it is postulated that a cooling water system rupture could occur (e.g., from an earthquake) along with a loss of ventilation. The safety basis described in the SAR Addendum is such that this event should not generate sufficient benzene to violate the position that molecular diffusion alone will prevent the formation of the vapor space reaching CLFL is less than 3 days. However, calculation M-CLC-H-01161 was issued on August 30, 1995, to address this potential and showed that the sudden addition of 500 gallons of cooling water (note that Section 3.3.1.9 was revised to require each cooling coil loop to be valved out, but the volume of water in these coils is ~3500 gallons) during the precipitation or concentration phase could cause, under conservative assumptions, sufficient benzene generation to reach the CLFL within 3 days with the concurrent loss of ventilation. Therefore, calculation M-CLC-H-01161 also evaluated the probability of the combination of events occurring which could cause this condition to be created. This calculation concluded that it was "beyond extremely



unlikely" ( $< 10^{-6}/\text{yr}$ ) as defined in DOE Standard 3009-94; however, this was based primarily on engineering judgment with respect to probabilities of sequence contributors.

DOE staff reviewed calculation M-CLC-H-01161 and concluded insufficient basis existed to judge this event as beyond extremely unlikely, but did conclude the combination of events was still extremely unlikely.

Therefore, WSRC took action to determine how long the Tank 48 vapor space would be above CLFL should the total cooling coil volume (3500 gal; calculation actually used 4000 gal) be released into the tank. Calculation M-CLC-H-01167 was issued September 1, 1995, and concluded that within 4 hours all regions of the tank vapor space would be back below CLFL (occurs because the additional total quantity of benzene generated from the reaction with water is limited - i.e., does not continue indefinitely). DOE staff reviewed this calculation and determined it was reasonable and adequate, yet conservative. The conservatisms included in this calculation which, if relaxed, would reduce the 4 hour result are:

- (1) it is unreasonable to assume all 3500 gallons from the cooling coils will participate in the reaction with the tank contents. This would require every coil to suffer a guillotine break, possibly even longitudinally to allow this quick of a release.
- (2) no credit was taken for the thermal gradients or residual convective air flows inside the tank vapor space, both of which have been shown to be present, and certainly promote better mixing.

The results of testing (reference HLW-ITP-95-0476, "ITP Radioactive Commissioning Tests - Phase I") have shown that, given the Tank 48 vapor space is initially inerted to the OSR requirement, it requires at least 6 days for the oxygen level to increase by even 1.5%. Thus, even if the extremely unlikely combination of events occur to somehow cause the benzene generation to exceed CLFL, this would last 4 hours or less, and during this interval there would be insufficient oxygen present for a deflagration to occur (should an ignition source be present).

Should an earthquake occur causing cooling coil failures to such an extent and at the worst time in the processing cycle (maximum level of concentration) that the Tank 48 vapor space somehow reached CLFL in the first hour(s) of the event, the necessary actions by Operations personnel would be to leave the tank isolated ("bottled up") until the benzene could dissipate throughout the vapor space and return back below CLFL before initiating air-based ventilation. This operating scheme is advocated in the In-Tank Processing OSRs, although ultimately the OSRs recognize that establishing air-based ventilation as early as possible to maintain the vapor space below CLFL as the current safety posture from the SAR Addendum. To address the results of the calculations addressed above, procedure SW16.3-AOP-008, "Loss of Ventilation," was revised to provide Operations personnel direction to ensure at least 8 hours had elapsed or the combustible gas concentration had exceeded 25% of CLFL before initiating air-based ventilation. This delay is well within the allowable 12 hours in OSR 3.2.1, and has no impact on the overall deflagration event probability described in Section 3.4.1 and Appendix C of the SAR Addendum. DOE staff review of this change to procedure SW16.3-AOP-008 finds it adequately implements the provisions from calculation M-CLC-H-01167, yet remains well within the requirements dictated by the SAR Addendum and OSRs. Therefore, DOE staff finds this procedure change acceptable and adequate.

### **Conclusions**

The changes to SAR Addendum Section 3.3.1.9, as well as the analyses issued and evaluated above, combined with the two controls put in place (i.e., isolation of cooling coils and revision to procedure SW16.3-AOP-008), are adequate to resolve Open Issue 9.3 of the In-Tank Processing SER Revision 2. However, as indicated above, the strategy and justification provided above is not completely reflected in the SAR Addendum. Therefore, the following Revision Issue must be


incorporated into the SAR Addendum no later than the first annual update. [Note, the number of this Revision Issue is the next sequential number from SER Revision 2.]

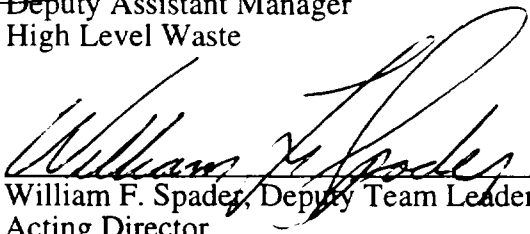
**Issue 9-9** [Revision Issue] Incorporate the strategy of relying on oxygen control for the extremely unlikely event of a cooling coil failure causing the Tank 48 vapor space to potentially exceed CLFL for several hours.

U.S. DEPARTMENT OF ENERGY

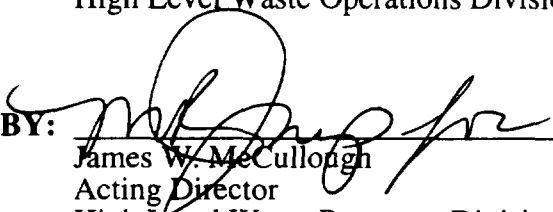
HIGH LEVEL WASTE

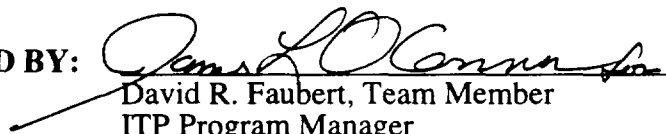
FINAL DOE VALIDATION REPORT  
FOR  
IN-TANK PRECIPITATION FACILITY STARTUP

APPROVED BY:  DATE: 9/1/95  
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Deputy Assistant Manager  
High Level Waste

CONCURRED BY:  DATE: 9/1/95  
William F. Spader, Deputy Team Leader  
Acting Director  
High Level Waste Engineering Division

CONCURRED BY: T. Zach Smith for DATE: 9/1/95  
William D. Pearson  
Acting Director  
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Acting Director  
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AUTHORED BY:  DATE: 9/1/95  
David R. Faubert, Team Member  
ITP Program Manager  
High Level Waste Programs Division

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## I. INTRODUCTION AND SUMMARY

The U.S. Department of Energy (DOE) conducted a validation of the startup activities of the In-Tank Precipitation (ITP) Facility, which is managed and operated by the Westinghouse Savannah River Company (WSRC). This validation was performed in accordance with the "DOE Validation Plan for In-Tank Precipitation Facility Startup", Revision 0, dated May 27, 1994, which was prepared in accordance with SRIP 5480.31.1A, " Facility Startup Approval Process". The validation began on June 12, 1994. The DOE validation areas were consistent with the 22 functional areas defined in the WSRC Readiness Self Assessment (RSA), the WSRC Operational Readiness Review (ORR) and readiness of the site DOE organization, which meet the intent of the Minimum Core Requirements in DOE Order 5480.31. The validation activities were documented in the "DOE Validation Report for In-Tank Precipitation Facility Startup," dated April 4, 1995, herein after referred to as the Validation Report. Validation issues which were not closed at the time of that report were addressed in the "DOE Supplemental Validation Report for In-Tank Precipitation Facility Startup," dated May 11, 1995, herein after referred to as the Supplemental Validation Report. The Supplemental Validation Report documents the validation status for proceeding with the DOE ORR, which was conducted from May 15 through May 25, 1995.

The ORR Team concluded that ITP operations can be safely started by WSRC upon: 1) correction of management identified discrepancies that existed at the commencement of the ORR, 2) correction of the pre-start findings from the ORR, and 3) completion of an independent confirmation of the satisfactory implementation of the authorization basis. This report, herein after is referred to as the Final Validation Report, documents closure of these items and serves as the basis for the DOE approval to startup ITP.

The DOE validation team completed and documented validation of startup readiness in the following areas in the Validation Report and Supplemental Validation Report pending closure of the WSRC ORR corrective actions. These WSRC ORR actions are closed, and no further documentation is necessary:

- FA2 - Construction
- FA3 - Organization and Staffing
- FA5 - Procedures
- FA8 - Quality Assurance
- FA9 - Configuration Management
- FA10 - Maintenance and Surveillance
- FA11 - Radiation Protection
- FA12 - Fire Protection
- FA13 - Emergency Preparedness
- FA14 - Independent Review and Oversight
- FA15 - Nuclear Criticality Safety
- FA16 - Test Requirement and Acceptance
- FA17 - Issues Management
- FA18 - Safeguards and Security
- FA19 - Packaging and Transportation
- FA20 - Occupational Safety and Health
- FA21 - Procurement
- FA22 - Conduct of Operations
- Site DOE Readiness

In the remaining areas, the DOE validation team has completed and documented validation of startup readiness in this report. In all cases, the DOE validation team has completed validation of

closure of these issues. Specific validation activities associated with these issues are discussed in the following sections.

## **II. VALIDATION RESULTS**

### **WSRC Readiness Self-Assessment and Operational Readiness Review**

The DOE validation team has completed its review of ITP's readiness for startup and subsequent operations, which included extensive oversight of the RSA, and WSRC ORR. The RSA and WSRC ORR were performed to assess the readiness of the ITP facility for operation. The RSA was very comprehensive in breadth and depth, including approximately 1300 acceptance criteria resulting in 385 prestart corrective actions and 371 post-start corrective actions. The WSRC ORR was performed in October 1994 and was a combination of oversight of the RSA and independent assessments to determine readiness. The WSRC ORR had 50 findings and 13 carry-over findings from the RSA, for a total of 63 findings with 152 prestart corrective actions.

As a result of the time elapsed and additional work performed (hot tie-ins, chemical cleaning modifications, procedure implementation, etc.), the WSRC ORR expanded the scope of the ORR and performed an extended ORR segment April 19 - May 3, 1995. The extended ORR was performance based and focused on observation of activities, procedure implementation, and conduct of operations. The extended ORR resulted in two additional findings with three prestart corrective actions.

The 14 open prestart corrective actions at the start of the DOE ORR have been closed. Closure of these 14 corrective actions has been entered into the HLW Integrated Management System (IMS) for tracking (Accession No. 95-05-0033) and has since been closed. The RSA and WSRC ORR processes used at ITP were adequate to determine facility readiness to operate.

Overall, the RSA and WSRC ORR were a comprehensive and objective tool for determining facility readiness. The DOE validation team endorses the results of the RSA and WSRC ORR efforts.

At the start of the DOE ORR there were 104 key event "H" (Ready for DOE ORR) and "P" (Chemical Addition to Tank 48) MTS items, all of these items have been closed by WSRC. The Validation Team performed a random sample of some of the closure package for these 104 MTS items and determined that the closure of these items were adequate.

### **Functional Area 1 - Design**

The DOE final validation effort for this functional area consisted of closure of HLW IMS issues at the time the Supplemental Validation Report was issued.

The DOE validation team had determined that all Design Change Packages required for startup have not closed, and therefore associated documents have not been updated. The DOE validation team entered this issue into the HLW IMS for tracking to closure, (Accession No. 95-05-0036) To validate this corrective action, DOE reviewed a random sample of 12 control room P&ID's to ensure that changes had been incorporated into the drawings as required by procedure 4.01 of the 7E Manual. Many of these drawings had changes incorporated or were being implemented. No discrepancies were noted in this review. Based on the actions taken by WSRC and the independent verification by DOE, this item is closed.

The DOE validation team considers this functional area satisfactory for radioactive operations of ITP.

#### **Functional Area 4 - Training and Qualification**

The DOE final validation effort for this functional area consisted of closure of HLW IMS issues at the time the Supplemental Validation Report was issued.

The DOE validation team also noted in the Validation Report that Shift Supervisor and Shift Manager candidates had not completed their qualification cards. The qualification cards state that these candidates must perform a complete watch at each of the lower-level operator positions. The Operations Manager indicated that these candidates only performed the recording of routine readings for each of these positions rather than standing a complete watch. WSRC management has revised the startup qualification cards for these positions to include round-taking requirements at each of the field operator positions prior to radioactive startup. These additional requirements will reinforce the location of key monitoring equipment as well as familiarize these candidates with the routines associated with the field operator positions. The DOE validation team considers these actions adequate. This issue was entered into the HLW IMS (Accession No. 95-05-0032) for tracking and has been closed by WSRC Memo HLW-TNG-0209 which specifies the round-taking requirements for shift supervisors and shift managers for qualification purposes.

The DOE validation team considers this functional area satisfactory for radioactive operations of ITP.

#### **Functional Area 6 - Safety Documents**

The DOE final validation effort for this functional area consisted of closure of HLW IMS issues at the time the Supplemental Validation Report was issued.

One issue remained to be closed from the DOE oversight of the WSRC ORR. This involved the formality of the Authorization Basis Document (ABD) change control programs.

The DOE validation team assessed the Authorization Basis Document (ABD) change control program given in WSRC Manual S4, Procedure ENG.02, "High Level Waste Management Authorization Basis Document Revision Process," by reviewing the results of the training provided to the ITP engineers and by interviewing the engineer in the HLW Safety Analysis Group who is responsible for the programmatic implementation of this procedure. A draft desk top instruction for ITP Engineering regarding specific details of implementing ENG.02 was also reviewed. Based on the results of these efforts, the DOE validation team has concluded that an adequate ABD change control program is in place, with the near-term desk top instruction providing needed clarifying improvements. However, implementation of this program was not fully assessed since all of the required elements have not been implemented at ITP. Thus the DOE validation team will assess full implementation prior to startup. This item was entered in the HLW IMS (Ascension No. 95-05-0035) and has since been closed (see discussion below).

The Validation Team interviewed the Cognizant Engineer on the details and requirements of ENG.02. The Cognizant Engineer demonstrated the use of the desk top instruction for ABD change requests. The Cognizant Engineer was knowledgeable of the use of ABD pending changes and the use of them for USQD technical evaluation. Cognizant Engineers are sent a copy of index for ABD changes whenever the index changes. These actions are sufficient to close this issue. This issue is closed.

Five prestart findings (PR1-4, SE1-1, SE2-1, SE2-2, SE1-3) were identified during the DOE ORR that were related to the adequacy of the Safety Analysis Report, the Operational Safety Requirements (OSRs) and the implementation through the Process Requirements. These findings are closed individually in Section III of this report.

The DOE validation team considers this functional area satisfactory for radioactive operations of ITP.

### **Functional Area 7 - Environmental Protection**

The DOE final validation effort for this functional area consisted of tracking of HLW IMS issues at the time the Supplemental Validation Report was issued.

The DOE validation team has verified that the Treatability Variance for the failed ITP filters has been modified to include nitrobenzene. WSRC forwarded the package requesting modification to the permit to the United States Environmental Protection Agency (EPA) on April 4, 1995. EPA approval is expected, however the issue will remain open until approval is received. EPA published its "Notice of Intent to Approve" on July 31, 1995, which started a 30 day comment period. The DOE validation team has entered this issue into the HLW IMS for tracking to closure. This is not considered a chemical addition issue, since it is related to filter operations and the HLW IMS item has been tied to Filter Building Operation. (Accession No. 95-03-0014)

The DOE validation team considers this functional area satisfactory for radioactive operations of ITP.

### **III. DOE ORR PRE-START CLOSURE**

#### **EP1-1 Emergency Response SCBA equipment is not available on a consistent basis.**

To assure that emergency equipment and supplies are restored and replenished on a timely basis following in-plant drill usage, a "Report of Emergency Equipment use during a Facility Drill" has been developed and implemented. This form is administered by the drill coordinator following all in-plant drills, is filled out by the on-shift Manager, and is sent to the Facility Support Manager for any necessary follow-up action required to restore the equipment to full readiness. This requirement has been disseminated to all Operations shift crews via Shift Orders.

The Validation Team has reviewed the form described above and finds that it contains the necessary attributes to adequately address all emergency equipment usage during in-plant drills and provides a means to assure that all emergency equipment is restored following drills. Additionally, the Validation Team reviewed the monthly tickler which periodically verifies that all specified emergency equipment is available and in good operating condition. Numerous members of the operating crews were interviewed and a thorough understanding of the use of this form was displayed. Observations of an in-plant drill confirmed the proper use of the "Emergency Equipment Use" form. The Validation Team concludes that actions taken are adequate to close this finding. This finding is closed.

#### **IS1-1 Industrial Hygiene (IH) management has not clearly established program responsibilities to ensure adequate staffing levels.**

Procedures were reviewed, modified, and approved to identify steps which require IH coverage. IH and SRS Fire Department have updated their memorandum of Agreement (MOA) to clearly define roles of IH personnel during an emergency or spill. IH management has briefed and prepared written guidance to IH technicians of their roles and responsibilities.

The Validation Team has reviewed the closure package for this finding, which included a list of procedures which have been modified, the MOA between IH & the fire department, proposed & agreed to changes to the (Emergency Planning Implementation Procedure) EPIP, and the



guidance provided to the IH technicians. These actions resolve the concern of the ORR team, and are adequate and appropriate. This finding is closed.

**MG3-1 Key Elements of the startup plan have not been finalized and approved.**

A Management Overview Plan has been developed and approved (HLW-ITP-95-0403, "Facility Management Control of In-Tank Precipitation Startup Evolutions").

The Validation Team reviewed HLW-ITP-95-0403, "Facility Management Control Of In-Tank Precipitation Startup Evolutions, dated July 11, 1995" and finds that the plan provides an adequate description and sufficient detail of the overall strategy and startup plan for ITP. The plan integrates the startup schedule milestones, details the qualification requirements for the oversight Senior Managers, describes the process of accomplishing the remaining testing, provides the requirements for the completion of necessary operator qualification items, describes the radiological monitoring program, and specifies which facility operations are required to be observed by the ITP Management team. Comments and guidance provided by DOE have been adequately addressed. Discussions with the Facility Manager of ITP reveal that the overall startup of ITP will be in accordance with the strategy described in the above mentioned document. Actions completed by ITP Management are adequate to close this ORR Finding. This finding is closed.

**MT1-1 Reverse traceability procedures for M&TE found out-of calibration are cumbersome, resulting in excessive delays in evaluating instrumentation and overlooks supporting OSRs.**

WSRC issued an Immediate Procedure Change (IPC) to WM-QI-1121. This IPC requires the M&TE Coordinator to notify the Facility, Engineering and Maintenance Managers of out of calibration conditions (OOC). OOC's are discussed at the Plan of the Day (POD). SCD-4 program has incorporated this line of inquiry to assess timeliness of disposition.

The Validation Team reviewed the IPC to WM-QI-1121, the incorporated changes to SCD-4 and two Inter-Office Memorandums. These documents show that the commitments of the corrective action plan have been implemented. It is too early to ensure that "excessive delays" are prevented but management attention has been brought to this area. This action beyond the Corrective Action Plan actions will probably have the most direct effect. A cognizant engineer has been assigned to work with the M&TE custodian to resolve OOC notices. The actions taken are satisfactory to close this issue. This finding is closed.

**MT1-2 Repeat findings of out-of-calibration occurrences of the (M&TE) FCI flow calibrators are not being aggressively resolved.**

WSRC has completed the commitments in the Corrective Action Plan to review maintenance procedures. No procedure changes were required. The calibration frequency for FCI flow calibrators has been reduced from 1 year to 6 months.

The Validation Team reviewed M&TE files with the custodian, and the SCD-4 program changes. Instruments will continue to be monitored for OOC conditions. The reduction of the calibration frequency solves this problem. No procedure changes were required. The Validation Team reviewed M&TE files with the M&TE Coordinator and determined that the tracking system is up to date. This system will detect repeated OOC conditions. No indication of a programmatic or procedure problem exists. This finding is closed.

**OP4-1 Execution of the lockout/tagout system did not provide for adequate control of system impacts on Limiting Conditions for Operations (LCOs)**

Facility Management developed and administered training modules which addressed the requirements for reviewing Lockouts for impacts against safety documentation; these training modules were attended by Operations personnel. Additionally, required reading was completed by Operations and Engineering personnel regarding the requirements for lockout review for systems which are covered by safety basis documentation. Engineering management issued an Office Memorandum to all Engineering personnel reviewing the systems for which an Engineering review was mandatory and the methodology to be used during the review. Additional Management emphasis has been placed on performing ongoing assessments to assure that the execution of lockout/tagouts provide an adequate control of system impacts on LCOs.

The Validation Team reviewed the lesson plans and attended several Operator training sessions where the requirements and methodology for assuring LCO maintenance was maintained during lockout/tagout activities were maintained. These training sessions adequately addressed the importance of adequately controlling the installation of lockout/tagouts to preserve the LCOs. Interviews were conducted with members of the Operations staff and an adequate understanding of the lockout program, as it pertains to maintaining LCO compliance, was observed. Additionally, ITP management has been observed performing ongoing and special assessments of the administration of lockout/tagouts and reinforcing the importance of thorough lockout reviews. The Validation Team performed and will continue to perform special assessments with focus on the coordination of lockout/tagout administration and the identification of LCO impacts. Actions taken, results of observations, and ITP management attention in this area are adequate to assure satisfactory performance. This finding is closed.

**OP4-2 On several occasions, the shift operations managers (Shift Manager, Shift Technical Engineers, and Shift Supervisor) failed to give adequate attention to maintaining plant operations within the limits specified in plant OSRs and LCOs.**

Specialized training was developed and administered to Operations personnel as part of the regular cycle training. The training presented a detailed review of the Safety envelope including Operational Safety Requirements, Process Requirements, and Safety Analysis Report Addendum for ITP/ESP. The training also included numerous Operational Safety Requirements (OSR) related exercises to reinforce the methodology which is to be utilized to assure OSR compliance. ITP Management developed and implemented an LCO Status Board, which is being maintained in the Shift Manager's office, and has entries for all conditions where Limiting Conditions for Operations (LCOs) are not being met. Focused ITP Management attention to assure that adequate attention is being given to Safety Envelope maintenance is ongoing and includes; (1) Briefings/sessions regarding OSR/PR implementation (given by Plant Manager and Operations Manager, (2) Frequent assessments by Management staff with on-spot feedback, and (3) Routine assessments by staff personnel.

The Validation Team attended and assessed the specialized training which was given for corrective action for this finding. The breadth and depth of the training and subsequent discussions adequately addressed the content and methodology to be used in administering OSR's and PR's. The exercises with OSR related circumstances were also sufficiently challenging and provided strength in further administration of OSR/PR's. Interviews with Operations management (Shift Manager, Shift Supervisor, and Shift Technical Engineer) revealed an adequate level of knowledge regarding the content and use of the OSR/PR's. Observations by the Validation Team reveal that Operations crews display an adequate level of concern and attention toward maintaining the ITP/ESP operation within the Safety Envelope. The DOE Facility Representatives will continue to perform assessments pertaining to OSR/PR implementation and compliance and will provide real-time feedback for issues noted that indicate

any erosion of the maintenance of the Safety Envelope. Shift coverage by DOE staff will occur before, during and after the first chemical strike; special emphasis will be focused on OSR/PR compliance with immediate feedback to ITP management for areas of deficiency. The special training administered, the additional emphasis from the ITP Management team, and the commitment from the Operations staff (based on interviews and observations) is adequate to close this finding. This finding is closed.

**PR1-1 EOP 005 needs an engineering and operational analysis to ensure the actions specified provide a safe method of shutting down the ITP systems and components in the event of a control room evacuation.**

WSRC Engineering performed a Unresolved Safety Question Determination (USQD) and an Operational Analysis of SW 16.4-EOP-005 and determined that some changes would be needed to avoid any potential operational conflicts. The Procedures Organization revised the procedure and received final approval for the procedure.

The Validation Team reviewed the procedure changes, submitted by Engineering which corrected identified deficiencies, and verified field implementation of the required procedure changes. The procedure changes identified numerous additional actions required for a Control Room Evacuation and re-prioritized numerous action steps. A review of the Operational Analysis revealed that all Safety Analysis assumptions are preserved in the performance of this Emergency Operating Procedure. Shift briefings which were conducted to assure that Operations personnel were current and aware of the changes to EOP-005. The Validation Team interviewed Operations personnel following the implementation of the above mentioned procedure changes and verified that adequate knowledge was achieved. The Validation Team concurs that actions taken are adequate for closure of this finding. This finding is closed.

**PR1-2 A controlled set of 241-82H procedures needs to be staged at a location so that in the event of a control room evacuation, facility management has the information necessary to ensure safety of the facility, associated equipment and personnel, and the environment.**

An evaluation was performed to identify the necessary procedures which would be required to place and maintain the facility in a safe shutdown condition in the event of an unplanned Control Room evacuation. The identified procedures (Emergency Operating Procedures (EOP's) and Emergency Plan Implementing Procedures (EPIP's)) are located at the Operations Support Center (OSC) and are on controlled distribution. Operations personnel have been notified of the location of these procedures through the Operations required reading program. Additionally, a monthly tickler has been developed to periodically assure that the manuals are being maintained up-to-date.

The Validation Team reviewed the selected procedures and concur that the availability of the identified procedures in the OSC is adequate to place and maintain the facility in a safe shutdown condition from outside the Control Room. In the event that the OSC is also uninhabitable, a complete set of all operating procedures is available in Building 707H. Interviews with Operations personnel were conducted and adequate knowledge was displayed with regard to the location and availability of the EOP's and EPIP's. Additionally, The Validation Team has observed and assessed in-plant drills requiring Control Room evacuations and the subsequent use of these selected procedures. Actions taken and operator knowledge are adequate to close this item. This finding is closed.

**PR1-3 Five SOPs or SRs require additional information to ensure operators understand and can successfully accomplish them.**

The five procedures identified by the DOE ORR Board as having deficiencies which need correction were reviewed by the ITP Procedures Group. Changes were generated to correct the identified deficiencies as necessary. Additionally, the Procedures Group and Facility Management has placed additional emphasis on the level of review and validation required in the procedure approval process. Additional operators have been made available to assist in the procedure review/validation process; this was accomplished by suspending cycle training for the five week period prior to the addition of chemicals.

The Validation Team reviewed the procedure changes submitted to correct the ORR identified deficiencies and verified field implementation of the required procedure changes. Interviews with the management personnel of the procedures group provided evidence that these deficiencies were not indicative of a programmatic breakdown. Additional emphasis has been placed on procedure reviews and validations through field observations of these activities. The Validation Team has observed that additional operators are available in the field and have been witnessed performing detailed procedure walkdowns and validations. The continuation of the "First Time Use" procedure execution requirements also assures that necessary changes to procedures in progress are corrected in an appropriate manner. Additionally, the assignment of ITP Facility Management to shift coverage during significant facility evolution provides an increased focus and assurance that procedures are performed correctly and are technically correct. The above observations provide a basis for the closure of this finding. This finding is closed.

**PR1-4 The procedures related issues contained within the Safety Evaluation Report (SER) and Authorization Commitment Matrix (ACM) that have yet to be resolved and implemented must be closely monitored and tracked in order to assure implementation and closeout.**

Commitments of the CAP are complete in that SAR and OSR revisions for ACM or SER issues are complete (except SER issue 9.7 covered by SE1-3). PR revisions are complete for chemical additions to tank 48 as detailed in HLW-ITP-950399.

Closure package is complete on this issue. The Validation Team independently reviewed the closure (i.e., SAR, OSR PR changes) for all the SER (Rev. 1) Table 1 Open Issues. Issue 9.7 must remain open for this issue but is closed with SE1-3 (IMS 95-06-0015). The closure package gives the correct status of all open issues from the SER. The Validation Team reviewed the procedure changes required for 14 of 17 miscellaneous ACM entries. Items 3, 6, 9 (as listed in package) are verified to be tied to correct milestone. All SAR and OSR revisions are complete for the ACM entries and SER Table 10 items. PR revisions are complete and implemented for chemical addition. See HLW-ITP-950399 for the PR implementation plan for future key events. The actions taken by WSRC are adequate for closure. This finding is closed.

**RP1-1 Physical access control for High Radiation Areas is not in place for the filter/stripper building.**

WSRC designed and implemented physical access control for the Filter/Stripper Building and Tanks 48 & 49. A weekly tickler for the inspection of High Radiation Areas has also been implemented.

A field walkdown was performed to determine the adequacy of the controls. The controls were adequate within the building. The roundsheet and weekly inspection ticklers were reviewed and determined to be satisfactory. The actions taken by WSRC are adequate for closure. This finding is closed.

**RP1-2 Contamination control vs. ALARA considerations at the filter/stripper building require resolution.**

Facility management designed and ordered containment huts at the appropriate entrances to the Filter / Stripper building to provide an area for protective clothing removal. These huts are outside the building where exposure rates are reduced. The facility installed a hut on the west side of the filter stripper building to demonstrate installation. It was agreed upon that the remaining huts did not need to be installed until just prior to the introduction of materials into the building to minimize weather exposure to the huts. Engineering will design permanent structures after building operation to account for lessons learned from Batch #1 operations.

The Validation Team inspected the installed hut and reviewed the design for the uninstalled huts. It was determined the huts will serve their designed functions. The Validation Team had concerns, which were adequately addressed by WSRC, in the following areas: 1) confined space, 2) habitability, 3) maintenance, 4) Life Safety code, and 5) expected dose. DOE has verified that an entry has been made into the MTS system to ensure a review is conducted after batch 1. The actions taken are adequate to close this item. This finding is closed.

**SEI-1-1 OSR Surveillance Requirements do not periodically verify that the exhaust ventilation flow rate from each filter is at least 1000 SCFM.**

SAR page changes and OSR changes associated with verification of damper position were initiated. In addition, a DCF was processed to remove the "Normal" position from the switch.

The Validation Team reviewed implemented DCF J-DCF-H-00666, which removed the ability to fully close the filter cell ventilation dampers, and ABD Change Request HLW-CRF-95044 and HLW-CRF-95048, which documents damper position and cell cover assumptions. An additional OSR change is in process to provide a damper position surveillance. This action is appropriately tied to Filter Cell Operation. This OSR change is being routed for approval and will be in place prior to filter operation. These actions implement finding SEI-1. This finding is closed.

**SE1-3 Current safety documentation does not completely address the hazards and risks associated with ITP operations.**

Each of the ten SER Rev. 1 Table and Appendix C issues have been tracked through to closure with AB changes and procedure changes when necessary.

DOE evaluated the closure of each of the SER Rev. 1 Table 1 issues and documented the closure of each (except issue 9.7) in SER Rev. 2. Issue 9.7 was evaluated and closed in an SER Rev. 2 Supplement issue September 1, 1995. The implementation of these open issues was validated and documented in PR1-4. DOE performed in depth review of 5 of the (1, 6, 9, 10, 11) Appendix C issues. #1. DOE performed independent calculations and reviewed the revised ASD as documented in the May monthly report. #6. The process requirement and procedures were reviewed that control the access to the stripper building. #9. OA is verified to be stored in a system with no common piping with other systems in the cold feeds area. It is transported in a dedicated dumpster. Independent Verification is performed prior to unloading a truck into the

storage tank. STPB has an IV performed prior to unloading. It is pumped directly to tank 48 on a line not shared with other process chemical lines. ST has IV performed prior to unloading. It is transported via drums to tank 48 and pumped directly to the tank. #10. Pump leakage rate and cooling coil failure rate is specifically addressed in SAR Section 3.3.1.92. Bounding calculations have been prepared for Background Release Rate. #11. All above ground transfer lines which are not seismically qualified were locked out to prevent usage until qualified. This lockout was reviewed and walked down by the DOE ITP Facility Representatives.

The final issue in SE1-3 is the AB change required to document the just-in-time delivery of STPB. The change request (HLW-CRF-95026) was reviewed and determined to accurately reflect this evolution. These actions are sufficient to close this issue. This finding is closed.

**SE2-1 Some surveillance procedures do not provide the necessary assurance that OSR surveillance requirements are met.**

Commitments of the CAP are complete to address the VAMP and CAM setpoints and calibrations. These requirements are controlled by surveillance procedures.

The closure package is complete and accurately documents closure of this issue. The Validation Team independently verified that surveillance procedures SW16.6-SR-3.3.2 Rev. 2 and 3.3.3 Rev. 2 contained the CAM and VAMP setpoints verifications. This finding is closed.

**SE2-2 Several programs and controls required by the AB have not been fully implemented.**

CAP commitments were completed as follows: CALF calculations are resolved or are covered by SE-3 issues. Procedures were developed for an emergency blower for tank 50 and to dilute spilled precipitate. Stripper Building occupancy requirements were clarified for oxygen and benzene. Independent Verification was added to the chemical addition procedures at cold feeds.

The closure package is complete and thorough to document closure of this issue. Additional comments: Water addition effect will be reviewed and closed with issue SE1-3 (IMS 95-06-0015). For issue no. 4 (Stripper Building Occupancy), the closure report documents the actions necessary to verify oxygen content of the stripper building atmosphere. Benzene concentration will be detected with personal benzene monitors. The combination of oxygen detection and personal benzene monitors closes the occupancy issue. The procurement and procedures for personal benzene monitors is identified as a constraint to filter operation and tracked by MTS item 95-34539. This finding is closed.

**TR3-1 Plans for completing remaining Practical Factors are not complete.**

A Management Plan (HLW-ITP-950401) has been developed to address the corrective actions taken as a result of this finding. Personnel readiness and qualification are discussed. The plan also addresses the coordination of the completion of the required practical factors and establishes ties to the facility schedule.

The Validation Team has reviewed the WSRC submittal (HLW-ITP-950424) for closure of this finding. An assessment of remaining qualification card practical factors has been completed and included in the Attachments of the Management Plan. The practical factors are segregated and listed as they pertain to Facility milestones. Performance of the practical factors will be witnessed by Facility management and are tied to the daily Plan of the Day (POD) schedule to assure timely completion. The Validation Team concurs that the management plan adequately

addresses the methodology necessary to assure that remaining "perform" practical factors are completed in accordance with facility milestones. This finding is closed.

#### **IV. MISCELLANEOUS ISSUES**

During preparation of a sample from Tank 48 for filtering with a testing unit in the Savannah River Technology Center (SRTC) shielded cells, it was determined that NaTPB removed soluble Plutonium (Pu) and retained it in the floating precipitate layer. This work was performed to determine the amount of sodium titanate (ST) needed for batch 1 processing. NaTPB was added to the sample to facilitate filtering out cesium to better determine the amount of Pu/Sr/Ur present. Soluble uranium was not effected by the NaTPB addition. The effect of NaTPB on Pu had not been noted before and had not been analyzed for nuclear criticality safety or effects on other postulated accidents in the ITP Safety Analysis Report (SAR). This issue was determined after the completion of the Department of Energy (DOE) Operational Readiness Review (ORR).

The DOE validation team performed an independent review of the reports Westinghouse Savannah River Company (WSRC) developed to address the criticality issue. "Nuclear Criticality Safety Evaluation of the In-Tank Precipitation Chemical Addition Process" (WSRC-TR-95-0348) concludes that the process will remain subcritical under normal and credible abnormal conditions. DOE's review determined that the report is consistent with the methodology already discussed in the SER Rev. 2, Section 9.4. Three separate process phases of chemical addition, mixing and washing were considered. Conservative assumptions were made to ensure bounding conditions with safety factors of 388, for the chemical addition phase, and 105 for the mixing phase. The washing phase was shown to be included within the conditions of the previous two phases of the process. Conservative assumptions include: 1) considering all fissile material to be plutonium in the chemical addition phase, 2) taking no credit for the strong neutron poison (boron) within the tetraphenylborate (TPB) molecule, 3) the limited concentration factor provided by the fact that the Pu would settle out of solution in the TPB precipitate matrix.

DOE reviewed the report "Effect the Recent Analyses of Tank 48 Waste Sample on In-Tank Precipitation Precipitant Burn Source Term" (HLW-REG-940209) and concluded that continued use of the SAR release fraction of 0.003 is acceptable. This report determined that the release mechanism for non-volatile plutonium is still consistent with the previously determined mechanism of entrainment with the combustion products of burning cesium tetraphenylborate and potassium tetraphenylborate. A search of published release rates are equal to 0.003 or are less conservative. Further research of published reports document that the release of actinides from soot producing fires directly correlates with the concentration of the actinide. Thus the chemical structure of Pu is independent of it's release fraction. DOE has determined that these reports to accurately address the release fraction of 0.003 and the release mechanism.

The final report reviewed by DOE discusses the results of filter testing a radioactive sample. "Preliminary Evaluation of Plutonium Decontamination During Filtration of In-Tank Precipitation Slurries", (SRT-LWP-95-0081 Rev. 2) concludes that less than 1.9% of the plutonium inventory will pass through the filter to the filtrate. This work is consistent with studies performed in 1982 and 1983 that are the basis for current filter performance criteria. The filtration test was performed six times with consistent results. This type of testing shows that, while the mechanism of the admix has not been determined, there is no effect on the process. This study and report accurately concludes that NaTPB and mixing of plutonium does not effect filter performance criteria.

DOE concludes that a SAR update is required to document the TPB plutonium removal phenomenon during the annual update but no other authorization basis documents will require revision.

## V. CONCLUSIONS

The DOE validation of the ITP startup process has been a comprehensive review of WSRC's readiness to operate the facility. It has consisted of performance-based independent assessments and objective oversight of WSRC activities. The DOE validation team also conducted independent reviews to verify DOE's ability to oversee operations at the facility.

The DOE validation team has reviewed the WSRC Readiness to Proceed letter. Based on this letter, the DOE ORR results, and the entire validation effort, the DOE validation team considers ITP ready for startup. The DOE validation team has verified that: 1) correction of management identified discrepancies that existed at the commencement of the DOE ORR have been satisfactorily closed based on closure of the WSRC ORR findings and the key event "H" and "P" MTS items, 2) closure of the pre-start findings from the ORR, as discussed in Section III above, and 3) completion of an independent confirmation of the satisfactory implementation of the authorization basis included as Attachment 1.

It is the conclusion of the Validation Team that ITP operations can be safely started and operated by WSRC.