WSRC-RP-2002-00615
Revision 2

JUSTIFICATION FOR CONTINUED OPERATIONS

HB-LINE

SAVANNAH RIVER SITE

ALTERNATE HYDROGEN CONTROL FOR PHASE I SCRAP RECOVERY PROCESSING (U)

Publication Date: December 2004

UNCLASSIFIED	
Does not contain Unclassified Controlled Nuclear Information	
ADC & Reviewing Official:	Joel C. Williams WSRS Regulatory Programs [signature]
Name & Title:	
Date:	12/21/04
Basis:	IG-SR-03, 02/04

Westinghouse Savannah River Company
Closure Business Unit
Aiken, SC 29808

SAFETY • RESPONSIBILITY • SECURITY
SRS
SAVANNAH RIVER SITE

PREPARED FOR THE U.S. DEPARTMENT OF ENERGY UNDER CONTRACT NO. DE-AC09-96SR18500

DISCLAIMER

JUSTIFICATION FOR CONTINUED OPERATIONS

SAVANNAH RIVER SITE

ALTERNATE HYDROGEN CONTROL FOR PHASE I SCRAP RECOVERY PROCESSING (U)

Date: December 2004

Westinghouse Savannah River Company
Nuclear Materials Stabilization & Storage Division
Aiken, SC 29808

PREPARED FOR THE U.S. DEPARTMENT OF ENERGY UNDER CONTRACT NO. DE-AC09-96SR18500

This page intentionally left blank.

TABLE OF CONTENTS

ACRONYM LIST

cfm	Cubic Feet per Minute
DP	Differential Pressure
DSA	Documented Safety Analysis
FMR	F-Area Metal Residues
GES	Glovebox Exhaust System
H_2	Hydrogen
JCO	Justification for Continued Operation
LCO	Limiting Condition for Operation
LFL	Lower Flammability Limit
MOI	Maximum Exposed Offsite Individual
SAR	Safety Analysis Report
SS	Safety Significant
TSR	Technical Surveillance Requirements
VVS	Vessel Vent System
WSRC	Westinghouse Savannah River Company

REVISION LOG

Revision Number	Date
0	March 2003
1	April 2004
2	December 2004

SUMMARY OF REVISIONS

Revision 1:

Section 2.0 PURPOSE. Added reference for the fact that LFL does not need to be adjusted for temperature.

Section 2.2 EXPIRATION OF THE JCO. Revised section such that the JCO expires one year from implementation. Deleted the option for JCO expiration upon completion of JCO material because new materials are continually being identified.

Section 5.4 FREQUENCY. Revised section to clarify that the basis of the frequency for JCO operations is based on 2000 hr/yr of dissolution time. Added discussion that yearly operation under JCO controls was 275 hours under revision 0 and that operations under revision 1 are also expected to be significantly bounded by the 2000 hr/yr basis.

General Updated References and minor editorial changes

LCO 3.1.2A Revised layout to be consistent with TSR. Added note clarifying that entry into Condition A is not required when Condition C is entered. Clarified existing note as applicable during performance of SR 4.1.2.3 for Condition A. Duplicated note for SR 4.1.2.4 with reference to Condition C. Added note clarifying that entry into Condition C is not required when Condition A is entered. Removed reference to response plans and updated completion times to be consistent with TSRs.

LCO 3.1.2A BASES Added discussion Neptunium Oxide Gloveboxes to be consistent with TSR. Clarified that testing of HEPA filters is not credited by HB-Line Safety Basis for consequence mitigation. Revised bases to reflect changes to the LCO. Updated references and minor editorial changes.

LCO 3.3.2A BASES Added explanation for note concerning entry into Condition B when additions are being made through the charge chute. Updated references and minor editorial changes.

DESIGN FEATURES Minor editorial changes.

Revision 2:

Added a new definition for SOLID SCRAP as stated in Section 1.0 (Summary) and as defined in Appendix A.

Revised the expiration of the JCO to the conclusion of the limited SOLID SCRAP processing campaign.

Updated references throughout Justification for Continued Operations.

SUMMARY OF REVISIONS (Continued)

Revision 2 (Continued):

Added a new Criticality Safety Limit for a potential credible scenario.

Revised Notes in LCO 3.1.2A for clarification.

This page intentionally left blank.

1.0 SUMMARY

This Justification for Continued Operation (JCO) provides justification for operation of Phase I scrap recovery with an alternate method of hydrogen control during the dissolution of SOLID SCRAP[1]. As defined in Appendix A, SOLID SCRAP is material containing metals, alloys, and/or compounds (oxides, fluorides, etc.) of actinides and/or other elements. MIXED SCRAP and F-Area Metal Residues (FMR) are subsets of SOLID SCRAP. SOLID SCRAP, when dissolved in acid, may generate hydrogen chemically at concentrations greater than the lower flammability limit (LFL) (without dilution). During normal operations, the alternate method consists of the following to maintain hydrogen concentrations below 25% of LFL when processing the SOLID SCRAP.

- An Administrative Control requiring that an engineering evaluation of the materials to be dissolved be performed prior to charging to ensure that hydrogen concentrations remain below 25% of LFL for normal operation and below LFL for upset conditions.
- Operating with the dissolver charge chute cover removed providing a higher than normal purge flow rate (per the conditions stated in Reference 1) with the glovebox exhaust fans providing the purge motive force
- A revised LCO 3.3.2 (3.3.2A), Air Purge Dissolvers requiring that the charge chute cover be removed and made inaccessible. LCO 3.3.2A also requires that the charge chute is not obstructed, three H-Canyon Exhaust Fans are operating, and the building backup power system is operable prior to and during dissolution or heel removals.
- A revised LCO 3.1.2 (3.1.2A), Glovebox Exhaust System removing the requirement for alternate purge for the dissolvers.
- Revise the Design Feature A.1.3 (A.1.3A), to eliminate the vacuum air purge tap.

Operating the dissolvers (RD-13 and 14) with the charge chute cover removed will increase the flow rate through the dissolvers but will significantly reduce the capability to measure differential pressure between the dissolver wing cabinet and the dissolver. Therefore, TSR Limiting Condition for Operation (LCO) 3.3.2 will be temporarily replaced by LCO 3.3.2A in Appendix A of this JCO to ensure that hydrogen concentrations are maintained below 25% LFL (See Section 4.0) during normal operations. In addition, LCO 3.1.2 will be temporarily replaced by LCO 3.1.2A in Appendix A of this JCO. LCO 3.1.2A addresses the alternate method of hydrogen control for the Glovebox Exhaust System (GES) and ensures that the required motive force for the dissolver purge is maintained during normal operations.

[1] The term “SOLID SCRAP” in this JCO only refers to the materials to be processed in Phase I Scrap Recovery under the requirements of this JCO.

Under upset conditions (loss of the glovebox exhaust fans), three H-Canyon Exhaust Fans are required to be running in order to provide the motive force to maintain hydrogen concentrations in the dissolvers below LFL (References 1 and 6). The revised Administrative Control 6.4.17.4A requires an Engineering Evaluation to be performed to ensure that the amount of material charged can be diluted with the dilution rates under normal and upset conditions specified in Reference 1. Maintaining hydrogen concentrations below 25% LFL for normal operations and LFL for upset conditions will ensure that hydrogen explosions are unlikely, thereby protecting the health and safety of workers and the public and protecting the environment.

2.0 PURPOSE

This JCO provides justification for an alternate method of hydrogen control during the dissolution of SOLID SCRAP. The SOLID SCRAP may chemically generate hydrogen greater than LFL (without dilution). This JCO evaluates the risks and documents the technical basis for the alternate method for hydrogen control to prevent hydrogen in the dissolvers from exceeding 25% of the LFL for normal operations and exceeding LFL for upset conditions. The LFL for hydrogen does not need to be adjusted for temperature per Reference 2.

2.1 BASIS AND APPLICABLE DOCUMENTED SAFETY ANALYSIS DOCUMENT

This JCO establishes the safety basis and controls to ensure hydrogen control during the dissolution of SOLID SCRAP. The SOLID SCRAP may generate chemical hydrogen at concentrations greater than LFL but must be dissolved to meet SRS missions. More flow through the dissolver vapor space is needed for hydrogen dilution than is currently available under the current normal operating conditions with the charge chute cover on. In addition, the time to reach LFL is much shorter than for materials currently being dissolved. Therefore, an alternate method of hydrogen dilution is required to ensure that 25% LFL is not exceeded for normal operation and LFL is not exceeded for upset conditions.

The HB-Line Safety Analysis Report (SAR) (Ref. 3) identified two sources of hydrogen generation during the processing of mixed scrap. The first source of hydrogen is from chemical generation of hydrogen from the reaction of metallic scrap with the nitric acid during the heat-up phase of dissolution. The second source is from radiolytic decomposition of the solution (water) from alpha particle interactions. The rate of hydrogen generated by radiolysis is much less than that generated chemically.

Considering hydrogen generation sources and loss of purge in the dissolvers, the SAR frequency analysis (Ref. 4) assumes that the LFL in the dissolvers will be reached within one hour. The SOLID SCRAP will chemically generate hydrogen at a higher rate than could be processed with the limited dilution flow available through the modified charge chute cover. Therefore, during normal operations, the charge chute cover will be removed during dissolution of these materials. Removing the charge chute cover will provide higher flow rates on the order of 20 cfm that will provide dilution of the chemically generated hydrogen maintaining it below 25% LFL (Ref. 1). Upon loss of normal power, the building backup power system provides power to the glovebox exhaust fans. Further, under upset conditions, operator action will not be needed to maintain the hydrogen concentration below LFL if the HB-Line glovebox exhaust fans and scrubbers are not operating for the proposed mode of operation with the charge chute cover removed. The H-Canyon Exhaust Fans will provide adequate hydrogen dilution with the glovebox exhaust fans and scrubbers not running to maintain hydrogen concentrations below LFL (Ref. 1). No new abnormal operational conditions are expected with the charge chute cover removed during normal operation. This JCO describes compensatory measures and controls to ensure that the hydrogen concentrations are maintained below 25% of LFL during normal operations and below LFL under upset conditions.

The HB-Line TSRs (Ref. 5) requires that the minimum required air purge into and through the Phase I dissolvers during normal operations be maintained (Limiting Condition for Operation LCO 3.3.2 in conjunction with LCO 3.1.2). Maintaining the air purge will ensure that the hydrogen concentrations are less than or equal to 25% of the LFL for a hydrogen mixture in air. The current air purge is provided by drawing cabinet air into the vapor space of the dissolver through a hole in the charge chute cover and out through the Vessel Vent System (VVS). The glovebox exhaust fans and the H-Canyon Exhaust Fans provide the vacuum for the VVS. The alternate operation involves removing the charge chute cover during the dissolution phase by providing a higher flow rate through the dissolver vapor space thereby maintaining the hydrogen concentration at or below 25% of LFL for material that generates hydrogen at higher rates. Flow measurements through the dissolvers during normal operation (with scrubbers off) documented in Reference 6 indicate an average flow rate of 30 cfm (average of dissolvers, RD-13 and 14). Considering experimental and system uncertainty, the average flow rate was reduced to 20 cfm (Ref. 1).

If the glovebox fans fail and the scrubbers are not operating, the H-Canyon exhaust will supply the motive force for hydrogen purge (Ref. 1). The measured purge rate from Reference 6 was 10 cfm. Adjusting for uncertainty (Ref. 1), the adjusted flow rate with the glovebox exhaust fans and scrubbers off was 6.6 cfm.

This JCO will replace the TSR requirements in LCO 3.3.2 and Administrative Control 6.4.17.4 and modify the requirements in LCO 3.1.2 for the scrap recovery operations involving SOLID SCRAP. In addition, Design Feature A.1.3 is revised to remove reference to the charge chute cover vacuum air purge tap (See Appendix A). LCO, Design Feature, and administrative control replacement and modification will commence upon DOE approval and completion of the implementation plan for the JCO. This JCO can be used for processing MIXED SCRAP or the TSR requirements can be reinstated for processing MIXED SCRAP when there is no longer a need to process SOLID SCRAP as outlined by this JCO.

2.2 EXPIRATION OF THE JCO

This JCO will expire at the conclusion of the limited SOLID SCRAP processing campaign. This campaign is anticipated to begin in April 2005 and includes SOLID SCRAP (which includes material from F-Area). Westinghouse Savannah River Company (WSRC) will formally notify the Department of Energy-Savannah River Office when the JCO is no longer applicable.

3.0 BACKGROUND AND DESCRIPTION OF EVENT

Prior to the FY00 campaign to dissolve Mixed Scrap; the material dissolved in HB-Line did not generate significant hydrogen due to dissolution in the dissolvers. Hydrogen generation was principally by radiolysis of the solution in the dissolver. Even for heat source material, this generation rate is much less than the rate associated with dissolving material with metallic impurities. The radiolytically generated hydrogen was diluted to ≤ 25% LFL by providing pressurized purge air with the process air compressors. This purge air was introduced through the level instrumentation (the “bubbler” system).

With the introduction of Mixed Scrap in FY00, new controls were introduced because of a significant increase in hydrogen resulting from the chemical reaction of the metallic impurities in the “scrap” with nitric acid. New controls included material characterization to predict the hydrogen generation rate and total H_2 concentration produced for each item charged, a new Safety Significant (SS) alarm to ensure adequate purge flow, new operator response actions and response times for a loss of purge. The additional purge necessary to maintain the hydrogen (radiolytic and chemical) concentration below 25% of LFL was added by drilling a hole in the charge chute cover of each dissolver. A minimum of 1.1 cfm through the hole was credited by monitoring the differential pressure (DP) between the dissolver and the glovebox with a new SS DP alarm. On a loss of purge (low DP and/or loss of glovebox exhauster fans), LCO actions require an alternate method of dilution be provided within as little as 1 hour to ensure the vapor space does not reach 100% of LFL. This is presently accomplished by removing the charge chute cover completely and/or opening funnel valves to allow more air to flow through the dissolver to the VVS.

In preparation to dissolve SOLID SCRAP, an alternate method for hydrogen control was evaluated. The alternate method was required to prevent the hydrogen produced from exceeding 25% of the LFL during normal operation and 100% of the LFL upon loss of the normal purge function.

The alternate method for hydrogen control requires that the charge chute cover be removed prior to dissolution of the SOLID SCRAP and remain off the dissolver during the entire dissolution phase, which was estimated to be four hours. Based on recent test data, the average flow rate through the dissolver charge chute when a glovebox exhaust fan and three H-Canyon Exhaust Fans are operating (scrubber not operating) was measured at 30 cfm (Ref. 6).

During switchover of the operating glove box exhaust fan to the standby glovebox exhaust fan, hydrogen concentrations are maintained below 25% LFL. The coastdown and startup characteristics of the glove box exhaust fans were measured using Measuring and Test Equipment (M&TE) methods to provide good data quality. When the standby fan was started it was at full speed in less than five seconds (Ref. 6). The operating fan required greater than 80 seconds to coast down. These test results demonstrate there is a small decrease in flow when the fans are switched, with the dilution flow decreasing less than 3% during the transfer. This momentary decrease in flow is well within the experimental uncertainty applied to the flow data in Reference 1. Therefore, the hydrogen concentration will not increase above 25% LFL during glovebox exhaust fan switchover.

In case of mechanical failure of the operating fan (upset conditions such as broken drive belts) the standby fan is actuated when the vacuum in the exhaust plenum drops to three inches water gage. In this case, flow will drop to about 55-60% of the steady state flow, and the hydrogen concentration in the dissolver vapor space may temporarily go above 25% of LFL. It will not exceed LFL because the amount charged to the dissolver is limited such that below-LFL conditions are maintained even if no glovebox exhaust fans are operating (Reference 1). The hydrogen concentration will rapidly go to less than or equal to 25% of LFL when the standby fan starts up.

In the event of a loss of glovebox exhaust fans and scrubbers in HB-Line, the three H-Canyon Exhaust Fans will supply the motive force for hydrogen purge. The average measured hydrogen purge rate through the dissolver charge chutes obtained from only the H-Canyon exhaust system with three fans running is 10 cfm (Ref. 6). In Reference 1, purge flow rates for future engineering evaluations of materials to be processed, with a conservative estimate of experimental uncertainty, are specified for engineering packages that implement Section 6.4.17.4 of the TSR (Ref. 5). These flow rates are 20 cfm for normal operation and 6.6 cfm with the glovebox exhaust fans and scrubbers not operating. Reference 1 requires a calculation of the hydrogen concentration with the glovebox exhaust fans and scrubbers off that verifies the hydrogen concentrations are less than or equal to 25% LFL during normal operations and less than LFL under upset conditions.

3.1 FACILITY STATUS

Both Phase I and Phase II portions of the HB-Line are operational. However, Phase I normal air purge flow through the hole in the charge chute cover is not operational due the charge chute cover being removed. Therefore, Design Feature A.1.3 describing the vacuum air purge tap for the dissolvers is not applicable for this JCO. LCO 3.3.2A and AC 6.4.17.4A in Appendix A of this JCO temporarily replace TSR LCO 3.3.2 and Administrative Control 6.4.17.4. LCO 3.1.2 has been modified to remove Action E.4. LCO 3.1.2A also requires that the glovebox exhaust system and the low glovebox vacuum alarms be operable. Design Feature A.1.3A in Appendix A of this JCO temporarily replaces Design Feature A.1.3. The controls in Appendix A of this JCO are only applicable to scrap recovery operations for the SOLID SCRAP.

4.0 COMPENSATORY MEASURES

The compensatory measures described below consist of modifying the existing controls in the HB-Line Authorization Basis documents and adding a number of new controls. These modified and new controls are embodied in LCOs 3.1.2A, 3.3.2A, the Administrative Controls, and Design Features presented in Appendix A of this JCO.

1. The charge chute cover shall be removed and made inaccessible prior to starting dissolution and heel removal.

2. Three H-Canyon Exhaust Fans are required to be operating before charging SOLID SCRAP to the dissolvers. If at any time less than three H-Canyon Exhaust Fans are operating, the Dissolver Heaters shall be shut down and the introduction of SOLID SCRAP shall be stopped.

3. The building (Building 221 HB-Line) backup power system is required to be operable before charging SOLID SCRAP to the dissolvers. If at any time the building backup power system is inoperable, the Dissolver Heaters shall be shut down and the introduction of SOLID SCRAP shall be stopped.

4. Verify that the HB-Line Glovebox Exhaust System (GES) is operational before charging the SOLID SCRAP to the dissolver or initiating heel removals per LCO 3.1.2A in Appendix A.

5. Visually verify that each dissolver charge chute shall not have obstructions that could restrict purge airflow except during charging and other additions.

6. An engineering evaluation shall be made of any material that is to be dissolved prior to it being charged to the dissolver. The engineering evaluation shall specify limits on the amount of material that can be charged in a dissolver batch. The engineering evaluation shall ensure that the hydrogen concentration can be maintained less than or equal to 25% of LFL with a flow rate through the dissolver charge chute of 20 cfm (per the conditions stated in Reference 1) during normal operations. It shall also ensure that the hydrogen concentration can be maintained at less than LFL with a flow rate of 6.6 cfm (per the conditions stated in Reference 1) through the dissolver charge chute during abnormal operations (inoperable Scrap Recovery Glovebox Exhaust System).

One additional Criticality Safety Limit for Phase I that is based upon diverse parameter divergent control has been identified and is incorporated into the HB-Line Double Contingency Analysis (Reference 9). The Criticality Safety Limit is presented in Table 6.4.7-1A-A in Appendix A.

5.0 RISK OF CONTINUED OPERATION

5.1 SCHEDULE FOR COMPLETING DOCUMENTED SAFETY ANALYSIS DOCUMENT REVISIONS

There are no current plans to include the alternate hydrogen control methods in this JCO in an update of the HB-Line Documented Safety Analysis (DSA) (Ref. 3). This JCO is intended to be a limited use document applicable only to the Phase I processing of SOLID SCRAP. If it is determined that the alternate methods for hydrogen control are to be employed in the future for discrete campaigns, a revised JCO will be issued.

5.2 EVENT SCENARIO AND RELEASE PATHWAY

During normal operation, the vacuum maintained in the vapor space by the VVS sweeps out hydrogen generated in the dissolvers. The dissolvers rely on the vacuum provided by the VVS to draw cabinet air into and through the vessel vapor space. This vacuum purge provides hydrogen dilution and prevents accumulation of chemical and radiolytic hydrogen in the vessel vapor space. The glovebox exhaust fans and the H-Canyon Exhaust Fans (through the VVS) and the scrubber provide the motive force for the vacuum maintained on each vessel. Upon loss of normal power, the building backup power system provides power to the glovebox exhaust fans. If the glovebox exhaust fans should fail, the three H-Canyon Exhaust Fans provide enough vacuum to prevent the hydrogen in the dissolver vapor space from reaching LFL.

Hydrogen can be generated in the Phase I dissolvers from the chemical reaction between nitric acid and metallic and/or non-metallic impurities in the SOLID SCRAP material. These metallic and/or non-metallic impurities generate hydrogen when being dissolved in nitric acid catalyzed with potassium fluoride. The generation of hydrogen by chemical reaction occurs early in the dissolution cycle, is temperature dependent, and ends shortly after the dissolver solution is heated up (approximately one to two-hours). Nominally, any chemically generated hydrogen begins to evolve after the dissolver reaches a dissolution temperature of about 60°C and ends after reaching boiling.

The SAR (Ref. 3) hydrogen explosion scenario assumes the failure of the VVS to draw dilution air into the dissolvers (e.g. failure of the glovebox exhaust fans), or a blockage of the VVS piping or the GES ductwork. Any of these failures would allow hydrogen to accumulate inside the dissolvers until the LFL of a hydrogen-air mixture (4%) was exceeded. For the source term and consequence evaluations, the scenario assumes an ignition source is available and causes the hydrogen-air mixture to explode. The dissolver is assumed to fail, releasing plutonium nitrate solution in aerosol and liquid forms from the vessel to the cabinet. The cabinet forms a barrier that limits the amount of aerosol and liquid released to the room. Based on this scenario the VVS and the GES are classified as Safety Significant systems in the SAR and protect the facility worker and workers outside of the facility. These functional classifications are maintained for the operations identified in this JCO.

The SAR (Ref. 3) accident analysis models the hydrogen explosion as a detonation for all receptors. Hydrogen generation rates and vessel geometry were considered. Chemical hydrogen generation during mixed scrap dissolution occurs rapidly after the dissolution temperature is reached, but subsides completely after all impurities have reacted. All of the mixtures can achieve hydrogen levels that will support deflagration in a fraction of the time that detonation level could be achieved. The consequences of detonation bound those of a deflagration. This scenario remains unchanged for this JCO.

5.3 CONSEQUENCES

The HB-Line SAR (Ref. 3) reports the consequences of a fifth and sixth level hydrogen explosion from Phase I operations involving scrap recovery. Reference 8 documents that the F-Area Metal Residue source term is within the bounds of the currently approved SAR (Ref 3). For any other material to be processed under this JCO, additional engineering analysis is required to document that the source term remains within the bounds of the currently approved SAR. Hydrogen is assumed to have the maximum concentration for the explosion with the initial release modeled as a 3-minute release of all process vessels through the facility stack. Site worker consequences are reported as 1.9-rem and offsite consequences (Maximum Exposed Offsite Individual, MOI) are reported as 0.2-rem. These doses are well below the evaluation guidelines of 100 rem for the onsite workers (100 to 600 meters) and 25 rem for the MOI. These consequences are unchanged from the SAR consequence analysis for this JCO.

5.4 FREQUENCY

The fault tree analysis for a hydrogen explosion in HB-Line (Ref. 4) was used as the basis for the frequency evaluation of explosions in the dissolvers. The frequency of an explosion in the dissolvers from the analyses in Reference 4 is 5.4E-03/yr or Unlikely. The fault tree data was modified to consider two modes of operation (Ref. 7). The first mode (Mode A) includes running the dissolvers with the charge chute cover removed during the chemical hydrogen generation phase (dissolution) but otherwise replaced during the radiolytic hydrogen generation phase, or for dissolution of materials other than the SOLID SCRAP defined in this JCO. The second mode (Mode B) includes running with the charge chute cover always off and inaccessible. HB-Line dissolvers will operate in Mode B. For operations in Mode B, it is assumed that the dissolvers are in dissolution for 2000 hours/year. The 2000 hours/year of dissolution time bounds the amount of time (in one year) that HB-Line will be operating in Mode B. Recent operations in Mode B comprised less than 275 hours. This is well below the 2000 hours/year assumed in the frequency calculation. F-Area and HB-Line estimate approximately 200 items will require disposition by HB-Line. A significant fraction of these items can and will be dispositioned outside of this JCO. It is anticipated that SOLID SCRAP processing under this JCO will be less than 400 hours. Therefore, under this revision of the JCO, usage of Mode B is expected to be significantly bounded by the 2000 hours/year assumption.

A conditional probability of an ignition of hydrogen gas, given a ventilation failure is used per the SAR explosion frequency analysis (Ref. 4). Based on these modifications to the frequency analysis, the estimated frequency of a hydrogen explosion in the dissolvers for Operating Mode B is 2.64E-03/year (Ref. 7) maintaining the frequency in the unlikely bin. This frequency is conservatively high since it does not include credit for hydrogen dilution provided by the operation of the canyon exhaust fans.

5.5 RISK

The risk to the onsite worker and the MOI is expected to remain as a Category II event based on an unlikely frequency associated with the moderate consequences (potential for a serious but non-life threatening injury). The frequency and consequence estimates are unchanged from the current HB-Line DSA (Ref. 3). There are no other controls other than those discussed in the JCO that will further reduce the risk of this event to the onsite worker and the MOI. The risk is based on maximum consequences from the entire Phase I process inventory and very conservative assumptions in establishing the event frequency and is, therefore, an acceptable level of risk.

For the onsite worker at 100 to 600 meters and the offsite public, a hydrogen explosion on the 5th level is a Class II event with moderate consequences and an Unlikely frequency. The risk to these receptors from a hydrogen explosion during scrap recovery operations for the SOLID SCRAP defined in this JCO will be at the same level as that previously analyzed in the HB-Line SAR (Ref. 3). This conclusion is based on onsite consequences of 1.9-rem and offsite consequences of 0.2-rem. The calculated event frequency for a hydrogen explosion assuming the alternate method for hydrogen control and the time at risk was determined to be 2.64E-03/yr as compared to the SAR frequency of 5.4E-03/yr. Therefore, the risk for onsite and offsite receptors is determined to be within the evaluation guidelines.

6.0 CONCLUSION

The consequences of a hydrogen explosion in the dissolvers are not impacted by this action, and risk, based on the frequency binning and the estimated consequences is not increased. The evaluation in this JCO shows that operations involving Phase I processing of SOLID SCRAP can be conducted at an adequate level of safety to protect the environment, the offsite public, the onsite worker, and the facility worker. The conclusion is based on an evaluation of the hazards, proposed controls, and other preventive and mitigative features in HB-Line.

7.0 REFERENCES

1. Hallman, D.F., HB-Line Dissolver Dilution Flows and Dissolution Capability with the Dissolver Charge Chute Cover Off (U), WSRC-TR-2003-00029, Rev. 2, Westinghouse Savannah River Company, Aiken, SC, November 2004.

2. Dyer, W.G. and Williams, J.C., Impact of Temperature on Hydrogen Lower Flammability Limit for Separations Facilities, WSRC-TR-2003-00313, Rev. 0, Westinghouse Savannah River Site, Aiken, SC, July 2003.

3. HB-Line Safety Analysis Report (U), WSRC-SA-2001-00009, Rev. 4, Westinghouse Savannah River Company, Aiken, SC, October 2004.

4. Lux, R.C., HB-Line Hydrogen Explosion Frequency, S-CLC-H-00805, Rev. 1, Westinghouse Safety Management Solutions, LLC, Aiken, SC, May 2002.

5. Westinghouse Savannah River Site Technical Safety Requirements, Separations Area Operations, Building 221-H, HB-Line, WSRC-TS-97-7, Rev. 18, Westinghouse Savannah River Company, Aiken, SC, October 2004.

6. Lemonds, D.P., HB-Line Dissolver Air Flow Test (U), WSRC-TR-2003-00028, Rev. 2, Westinghouse Savannah River Site, Aiken, SC, November 2004.

7. Morton, G.R., Frequency Estimation of a Hydrogen Ignition in HB-Line Dissolvers, S-CLC-H-00974, Rev. 0, Westinghouse Safety Management Solutions, LLC, Aiken, SC, December 2002.

8. Hallman, D.F., Source Term Evaluation, Processing FB-Line Metal Residues in HB-Line Phase I (U), S-CLC-H-01032, Washington Safety Management Solutions, LLC, Aiken, SC, November 2004.

9. Nuclear Criticality Safety Evaluation (NCSE): Double Contingency Analysis for HB-Line (U). N-NCS-H-00120, Revision 13, Washington Safety Management Solutions, LLC, Aiken, SC, December 2004.

APPENDIX A – TEMPORARY LIMITING CONDITIONS FOR OPERATION AND ADMINSTRATIVE CONTROL FOR ALTERNATE HYDROGEN CONTROL

INTRODUCTION

This JCO provides the basis for the dissolution of SOLID SCRAP residues containing higher concentrations of metallic and/or non-metallic impurities than previously processed. In order to prevent hydrogen concentrations in the dissolver vapor space from exceeding 25% of the LFL during normal operations and exceeding LFL upon loss of the dissolver glovebox exhaust fans, the dissolvers will be operated with the charge chute cover removed. Removing the charge chute cover provides higher purge flow rates through the dissolver vapor space than operating with the cover on. Also, flow tests were performed (JCO Ref. 6) to determine the flow rates through the dissolver vapor space during normal operations (glovebox exhaust fans on, scrubbers off) and during upset conditions (loss of glovebox exhaust fans and scrubbers). Under upset conditions, three H-Canyon Exhaust Fans provide purge flow. The JCO specifies controls for normal operating conditions (glovebox exhaust fans, scrubbers, and H-Canyon exhaust fans running) and upset conditions (only H-Canyon Exhaust Fans running).

Based on References 5 and 6, LCO 3.3.2 is not required and a new LCO (LCO 3.3.2A) addressing removal of the charge chute cover from the charge chute, making it inaccessible and inspecting for obstructions is required. In addition, changes to LCO 3.1.2 and replacement of Administrative Control 6.4.17.4 were required. The changes to LCO 3.1.2 (LCO 3.1.2A) and the replacement for LCO 3.3.2 (LCO 3.3.2A) are provided in this Appendix as part of this JCO. Included in this JCO is the new Administrative Control replacing 6.4.17.4 (6.4.17.4A) of the current TSRs. LCOs 3.1.2A and 3.3.2A do not come under the requirements of TSR Section 6.8.2.1.e. Also, DESIGN FEATURE A.1.3, Process Vessels is revised to remove reference to the charge chute cover, as it is no longer used per this JCO.

For the purposes of this JCO, SOLID SCRAP is defined to be solid material metals, alloys, and/or compounds (oxides, fluorides, etc.) of actinides and/or other elements. MIXED SCRAP and FMR are subsets of SOLID SCRAP. The SOLID SCRAP, when dissolved in acid, may generate hydrogen chemically at concentrations greater than LFL (without dilution). (Refer to section 6.4.17.1 in the TSR and 6.4.17.4A in the JCO for further details regarding exclusions for material that may be processed).

3.1.2A GLOVEBOX EXHAUST SYSTEM

LCO: Each HB-Line Glovebox Exhaust System shall be OPERABLE (1 fan in service, 1 OPERABLE fan in standby).

AND

Each glovebox low vacuum alarm shall be OPERABLE with a setpoint that ensures the alarm actuates if the vacuum in the respective glovebox is less than 0.3 inches Water Gauge (WG) relative to the maintenance areas.

MODE APPLICABILITY: All MODES

PROCESS AREA APPLICABILITY: Phase I Gloveboxes, Phase II Gloveboxes, Waste Handling Line Gloveboxes and Phase III Gloveboxes

ACTIONS

CONDITION	REQUIRED ACTION	COMPLETION TIME
-------------- **NOTE** ------------ Entry into Condition A is not required for a standby fan interlock failure. ------------------------------------ -------------- **NOTE** ------------ Entry into Condition A is not required when performing SR 4.1.2.3 unless the surveillance fails or is delayed or interrupted during performance. ------------------------------------	-------------- **NOTE** ------------ Required Action A.1 shall be performed only if the Scrap Recovery Glovebox Exhaust System standby fan is inoperable. ------------------------------------	
A. The standby fan for either glovebox exhaust system is inoperable.	A.1 Stop the introduction of SOLID SCRAP into the dissolver(s).	IMMEDIATELY
	A.2 Restore the affected standby fan to OPERABLE status.	31 Days

(continued)

3.1.2A GLOVEBOX EXHAUST SYSTEM

ACTIONS (continued)

CONDITION	REQUIRED ACTION	COMPLETION TIME
B. A glovebox low vacuum alarm is inoperable.	--------------**NOTE**-------------- Required Action B.1 does not have to be performed for a glovebox that is in WARM STANDBY if the glovebox has a cabinet panel removed. -------------------------------------	
	--------------**NOTE**-------------- If a low vacuum condition is detected while performing Required Action B.1, Condition G shall be entered. -------------------------------------	
	B.1 Establish an alternate method for monitoring glovebox vacuum to verify the minimum required vacuum of 0.3 inches WG is being maintained in the affected glovebox.	IMMEDIATELY **<u>AND</u>** Monitor every 12 Hours
	B.2 Restore the affected low vacuum alarm to OPERABLE status.	7 Days

(continued)

3.1.2A GLOVEBOX EXHAUST SYSTEM

ACTIONS (continued)

CONDITION	REQUIRED ACTION	COMPLETION TIME
-------------- **NOTE** ------------ Entry into Condition C is not required for an inoperable standby fan. ------------------------------------ -------------- **NOTE** ------------ Entry into Condition C is not required when performing SR 4.1.2.4 unless the surveillance fails or is delayed or interrupted during the performance. ------------------------------------		
C. The standby fan interlock for either glovebox exhaust system is inoperable.	C.1 Assign Interlock Watch Personnel or equivalent to provide fan startup when required for the affected glovebox exhaust system.	IMMEDIATELY
	C.2 Restore the affected standby fan interlock to OPERABLE status.	31 Days

(continued)

3.1.2A GLOVEBOX EXHAUST SYSTEM

ACTIONS (continued)

CONDITION	REQUIRED ACTION	COMPLETION TIME
D. The Required Action(s) and associated Completion Time(s) of Conditions A, B, or C are not met.	D.1 Place the affected gloveboxes in WARM STANDBY.	6 Hours
	D.2 Restore compliance with the LCO.	21 Days
E. Both Scrap Recovery Glovebox Exhaust fans are inoperable.	E.1 Stop the introduction of SOLID SCRAP into the dissolvers.	IMMEDIATELY
	E.2 Turn off the heater block to any dissolver that is in a dissolution or heel removal cycle.	IMMEDIATELY
	E.3 Install any cabinet panels removed from gloveboxes served by the Scrap Recovery Glovebox Exhaust System.	IMMEDIATELY
	E.4 Place all gloveboxes served by the Scrap Recovery Glovebox Exhaust System in WARM STANDBY.	6 Hours
	E.5 Restore at least one Scrap Recovery Glovebox Exhaust Fan to OPERABLE status.	21 Days

(continued)

3.1.2A GLOVEBOX EXHAUST SYSTEM

ACTIONS (continued)

CONDITION	REQUIRED ACTION	COMPLETION TIME
F. Both Neptunium Oxide Glovebox Exhaust fans are inoperable.	F.1 Install any cabinet panels removed from gloveboxes served by the Neptunium Oxide Glovebox Exhaust System.	IMMEDIATELY
	F.2 Place all gloveboxes served by the Neptunium Oxide Glovebox Exhaust System in WARM STANDBY.	6 Hours
	F.3 Restore at least one Neptunium Oxide Glovebox Exhaust Fan to OPERABLE status.	21 Days

(continued)

3.1.2A GLOVEBOX EXHAUST SYSTEM

ACTIONS (continued)

CONDITION	REQUIRED ACTION	COMPLETION TIME
------------- NOTE ------------- This Condition is not applicable to a glovebox that is in WARM STANDBY if the glovebox has a cabinet panel removed. **-------------------------------------**		
G. A valid glovebox low vacuum alarm is activated. **<u>OR</u>** When performing alternate monitoring per Condition B, the minimum required vacuum of 0.3 inches WG is not being maintained in the affected glovebox.	G.1 Place the affected glovebox in WARM STANDBY. G.2 Restore compliance with the LCO.	6 Hours 21 Days

3.1.2A GLOVEBOX EXHAUST SYSTEM

SURVEILLANCE REQUIREMENTS

SURVEILLANCE REQUIREMENT		FREQUENCY
SR 4.1.2.1	Deleted	
SR 4.1.2.2	CALIBRATE each glovebox low vacuum alarm.	Annually
SR 4.1.2.3	Perform a FUNCTIONAL TEST on both glovebox exhaust fans in each system.	2 Months
SR 4.1.2.4	Perform a FUNCTIONAL TEST on the glovebox exhaust standby fan interlock for each system.	Annually
SR 4.1.2.5	Perform a CALIBRATION on the glovebox exhaust standby fan interlock for each system.	Annually
SR 4.1.2.6	Perform a FUNCTIONAL TEST on each glovebox low vacuum alarm.	2 Months

3.3.2A AIR PURGE DISSOLVERS (RD-13 and RD-14)

LCO: Each dissolver charge chute cover shall be removed and made inaccessible.

AND

The charge chute on each dissolver is free of obstructions.

AND

Three (3) H-Canyon Exhaust Fans are Operating.

AND

The Building Backup Power System is OPERABLE.

MODE APPLICABILITY: OPERATION and WARM STANDBY

PROCESS AREA APPLICABILITY: RD-13 AND RD-14

ACTIONS

CONDITION	REQUIRED ACTION	COMPLETION TIME
A. A charge chute cover is accessible.	A.1 Make the charge chute cover inaccessible.	IMMEDIATELY

(continued)

3.3.2A AIR PURGE DISSOLVERS (RD-13 and RD-14)

ACTIONS (continued)

CONDITION	REQUIRED ACTION	COMPLETION TIME
B. The charge chute cover is on the charge chute. **<u>OR</u>** The charge chute is obstructed. **-------------NOTE--------------** Entry into Condition B requires all Required Actions to be completed prior to exiting the LCO. **------------------------------------**	B.1.1 Remove the charge chute cover from the affected charge chute **<u>OR</u>** B.1.2 Remove the obstruction from the affected charge chute	IMMEDIATELY IMMEDIATELY
	B.2 Stop the introduction of SOLID SCRAP into the affected dissolver	IMMEDIATELY
---------------NOTE------------- Entry into Condition B is not required when charging or additions are made through the affected charge chute. **------------------------------------**	B.3 Turn off the heater block to the affected dissolver if it is in a dissolution or heel removal cycle.	IMMEDIATELY

(continued)

3.3.2A AIR PURGE DISSOLVERS (RD-13 and RD-14)

ACTIONS (continued)

CONDITION	REQUIRED ACTION	COMPLETION TIME
C. Less than three (3) H-Canyon Exhaust Fans are operating.	C.1 Stop the introduction of SOLID SCRAP into the dissolvers.	IMMEDIATELY
	AND	
	C.2 Turn off the heater block to the dissolvers if it is in a dissolution or heel removal cycle.	IMMEDIATELY
D. The Building Backup Power System is inoperable.	D.1 Stop the introduction of SOLID SCRAP into the dissolvers.	IMMEDIATELY
	AND	
	D.2 Turn off the heater block to the dissolvers if it is in a dissolution or heel removal cycle.	IMMEDIATELY

3.3.2A AIR PURGE DISSOLVERS (RD-13 and RD-14)

SURVEILLANCE REQUIREMENTS

SURVEILLANCE REQUIREMENT		FREQUENCY
SR 4.3.2.1A	Verify that each dissolver charge chute cover is inaccessible.	Prior to Charging or Heel Removal Operations (at the affected dissolver)
SR 4.3.2.2A	Verify at each dissolver charge chute that there is no obstruction (including the charge chute cover) to restrict purge airflow. **---------- NOTE ----------** The extension allowed by SR 4.0.2 does not apply. **--------------------**	12 Hours **<u>AND</u>** Prior to Charging or Heel Removal Operations (at the affected dissolver)

3.1.2A GLOVEBOX EXHAUST SYSTEM

BASES

BACKGROUND SUMMARY	The HB-Line Glovebox Exhaust System consists of two separate fan systems. Both systems are designed to exhaust process cabinets and gloveboxes and to maintain a vacuum in the cabinets and gloveboxes of greater than or equal to 0.3 inches Water Gage (WG) with respect to the maintenance areas. The Scrap Recovery Glovebox Exhaust System exhausts air from the Phase I gloveboxes and cabinets, the Vessel Vent System (VVS), and the waste conveyor. The Neptunium Oxide Glovebox Exhaust System exhausts the gloveboxes and cabinets in the Phase II, Phase III and Waste Handling process lines. In each system, the exhaust air is pulled by the in service system fan through the glovebox HEPA filters and through two sets of efficiency-testable HEPA filters. These testable glovebox HEPA filters are periodically tested by HB-Line normal operating procedures but are not credited in the Safety Basis for mitigating the consequences of analyzed accidents. The combined exhaust air from both glovebox exhaust systems is delivered to the H-Canyon exhaust tunnel, and then pulled by the 292-H fans through the 294-H and 294-1H Sand Filters and discharged to the 291-H Stack. Each glovebox exhaust system consists of two exhaust fans. The Scrap Recovery Glovebox Exhaust System provides the motive force for a vacuum air purge on the Phase I dissolvers. The vacuum air purge is necessary to dilute and sweep hydrogen out of the dissolver vapor space and into the VVS. This purge maintains the hydrogen concentration in the dissolver vapor space at less than or equal to 25% of the Lower Flammability Limit (LFL) for a hydrogen mixture in air (4% by volume per Reference 6). The vacuum air purge minimizes the potential for a deflagration occurring in a dissolver. Each glovebox exhaust system normally operates with one fan in service and the other fan in standby. The standby fan is interlocked to start automatically if the in service fan fails or is unable to maintain the desired vacuum in the process cabinets and gloveboxes. Both exhaust fans in each glovebox exhaust system are supported by the Backup Power System. Fan running lights and alarms are provided in the control rooms (Ref. 1).

(continued)

3.1.2A GLOVEBOX EXHAUST SYSTEM

BASES

APPLICATION TO SAFETY ANALYSIS	LCO 3.1.2A is applied to ensure that each glovebox exhaust system is capable of maintaining the required negative pressure differential in the gloveboxes with respect to the maintenance areas. The pressure differential works in conjunction with the glovebox to confine hazardous materials inside the glovebox where they can eventually be exhausted to the H-Canyon Exhaust Ventilation System. This pressure differential is required to minimize the potential for a release of contaminated cabinet/glovebox air to the process rooms. The Glovebox Exhaust Fans also maintain a vacuum in the dissolvers relative to the gloveboxes to pull air through the dissolver vapor spaces and dilute the hydrogen. Noncompliance with this LCO will not exceed the offsite exposure criteria set to protect the health and safety of the public from the release of radioactive material.
LIMITING CONDITION FOR OPERATION	In order to minimize the potential release of contaminants, the gloveboxes shall be maintained at a vacuum relative to maintenance areas. The air in the gloveboxes is exhausted by two glovebox exhaust systems, each consisting of an in-service fan and a standby fan. For a glovebox exhaust system to be considered OPERABLE, one of the exhaust fans in the pair shall be in service, and the other shall be OPERABLE and in standby. The standby fan shall be capable of automatically starting upon loss of power to the running fan or if the running fan is not capable of maintaining the desired vacuum in the process cabinets and gloveboxes. The exceptions to this requirement for an OPERABLE glovebox exhaust system are when both fans in a system are under the control of an operator for the performance of SR 4.1.2.3 or SR 4.1.2.4, or when both fans are in service under the control of an operator and the surveillance is progressing without delay or interruption. Maintaining greater than or equal to 0.3 inches of WG vacuum ensures that the gloveboxes are at the desired negative pressure with respect to the maintenance areas, and is based on the recommendations of Reference 2. In order to minimize hydrogen buildup in the dissolver vapor space during dissolution cycles, the glovebox exhaust fans, through the Vessel Vent System, draw glovebox air into the vapor space to dilute hydrogen to acceptable levels.

(continued)

3.1.2A GLOVEBOX EXHAUST SYSTEM

BASES

LIMITING CONDITION FOR OPERATION (continued)	Each glovebox low vacuum alarm shall provide continuous monitoring capability to the Phase I Control Room to ensure the desired vacuum conditions are being maintained in the respective gloveboxes. A glovebox low vacuum alarm is considered OPERABLE when it is capable of providing a control room alarm if the vacuum in the glovebox (with respect to the maintenance areas) reaches the alarm setpoint. The actual alarm setpoint used is greater than 0.3 inches WG to account for instrument uncertainty. The uncertainty is based on an engineering calculation (Ref. 3). The requirement that the vacuum in a glovebox be greater than or equal to 0.3 inches WG is not applicable to a glovebox that is in WARM STANDBY and has a cabinet panel removed. This exception is further addressed in the bases for the Required Action statements and Surveillance Requirements. A glovebox low vacuum alarm does not apply to the Vessel Vent System Glovebox since this glovebox does not have its own low vacuum alarm.
MODE APPLICABILITY	Since radioactive material may be present in the gloveboxes during any MODE, glovebox exhaust fans shall be available at all times to maintain adequate air flow to minimize the potential for release of contamination. Each glovebox exhaust system is required to have one exhaust fan OPERABLE and in standby, and the other exhaust fan is required to be in service during all MODES. Maintaining the glovebox at a vacuum of greater than or equal to 0.3 inches WG, and the associated low vacuum alarms, is also applicable to all MODES.
PROCESS AREA APPLICABILITY	The glovebox exhaust systems are designed to generate a negative pressure in the gloveboxes relative to the maintenance areas. This will minimize the potential for spreading any airborne contamination. Therefore, this LCO is applicable to Phase I Gloveboxes, Phase II Gloveboxes, Phase III Gloveboxes, and Waste Handling Line Gloveboxes.

(continued)

3.1.2A GLOVEBOX EXHAUST SYSTEM

BASES

ACTION STATEMENTS

A.1

When performing SR 4.1.2.3, it is not necessary to enter Condition A if a glovebox exhaust fan is momentarily (appropriate control action with proper anticipated response) under operator control to test the function of the fan. This contingency is allowed provided the operator(s) performing the test has direct control of the fan and may restore it at any time. However, should it become apparent that the fan cannot be maintained as required, the system shall be immediately declared inoperable and Condition A entered. The presence of, and direct control by, the operators can stabilize any unexpected condition.

If the Scrap Recovery Glovebox Exhaust System standby fan is inoperable, the introduction of SOLID SCRAP into the dissolver(s) shall be stopped IMMEDIATELY. The Scrap Recovery Glovebox Exhaust System provides the motive force for the dissolver vacuum air purge. The capability to maintain a reliable vacuum air purge on each dissolver is diminished with the standby fan inoperable. Stopping the introduction of SOLID SCRAP into the dissolver reduces the rate at which hydrogen is produced in the dissolvers and minimizes the potential for reaching hydrogen concentrations sufficient for a deflagration.

Since only the Scrap Recovery Glovebox Exhaust System fans provide the motive force for the dissolver vacuum air purge, a Note states that this Required Action is only applicable when the Scrap Recovery Glovebox Exhaust System standby fan is inoperable.

A note has been included stating that entry into Condition A is not required for standby fan interlock failure. The standby fan being inoperable does not cause the standby fan interlock to be inoperable. If the standby fan is inoperable and Condition A has been entered, Condition C must also be entered if the standby fan interlock becomes inoperable.

(continued)

3.1.2A GLOVEBOX EXHAUST SYSTEM

BASES

ACTION STATEMENTS (continued)	A.2	Two glovebox exhaust systems operate in HB-Line, each containing a pair of exhaust fans. Normally, one fan per pair is in service while the other is in standby. If either standby fan is found to be inoperable, it shall be restored to OPERABLE status and placed back in standby within 31 Days. The Completion Time recognizes that one exhaust fan is in service maintaining the necessary vacuum and that ventilation interlocks automatically shut down the air supply fans and room exhaust fans upon the loss of both glovebox exhaust fans for either system. Engineering judgment forms the basis that 31 days is an allowable time to restore the inoperable fan.
	B.1	In order to ensure that personnel recognize and respond to a glovebox low vacuum condition, an alarm is required to provide continuous monitoring capability. If a glovebox low vacuum alarm is inoperable, an alternate monitoring method may be used to detect a low vacuum condition. Typically, Control Room Watch personnel may substitute visual monitoring of other instrumentation to detect a low vacuum condition. Action to initiate alternate monitoring is taken IMMEDIATELY, because without negative pressure, airborne contamination in the affected glovebox could be released into adjacent process rooms. Continued monitoring at 12-Hour intervals is based upon engineering judgement. This monitoring combined with the glovebox exhaust interlocks ensuring an exhaust fan is always in service, provide assurance that the affected glovebox is maintained at a negative pressure relative to the maintenance areas.

(continued)

3.1.2A GLOVEBOX EXHAUST SYSTEM

BASES

ACTION STATEMENTS (continued)

B.1 (continued)

If the alternate monitoring detects a low vacuum condition, Condition G shall be entered to further minimize the potential for a release from the affected glovebox. A low vacuum condition is defined as the vacuum in the affected glovebox with respect to the maintenance areas not being greater than or equal to 0.3 inches WG.

To ensure the accuracy and functionality of alternate monitoring instrumentation, it shall comply with Installed Process Instrumentation (IPI) Program requirements.

Required Action B.1 does not have to be performed for a glovebox that is in WARM STANDBY and has a cabinet panel removed to facilitate maintenance or a similar activity. When a cabinet panel is removed, it is not possible to maintain the required 0.3 inches WG negative pressure in the glovebox. Upon panel removal, the low vacuum condition would be acknowledged by the Control Room operator. Therefore, upon detection of an inoperable alarm for the glovebox, the action to establish an alternate method to detect a low vacuum condition is not necessary.

B.2 Up to 7 Days in continued operation is permitted, assuming an alternate monitoring method to detect and monitor for a low vacuum condition is in place to serve as the compensatory measure required per Required Action B.1. The alternate monitoring method shall be continued until the affected low vacuum alarm is returned to OPERABLE status. The Completion Time of 7 Days is based on engineering judgment and is deemed an allowable amount of time to restore an alarm.

(continued)

3.1.2A GLOVEBOX EXHAUST SYSTEM

BASES

ACTION STATEMENTS (continued)

C.1 When performing SR 4.1.2.4, it is not necessary to enter Condition C if a glovebox exhaust fan interlock is momentarily (appropriate control action with proper anticipated response) under operator control to test its function. This contingency is allowed provided the operator(s) performing the test has direct control of the interlock and may restore it at any time. However, should it become apparent that the interlock cannot be maintained as required, the system shall be immediately declared inoperable and Condition C entered. The presence of, and direct control by, the operators can stabilize any unexpected condition.

Glovebox exhaust standby fan interlocks are provided in each glovebox exhaust system to activate the standby fan if the fan in service fails. If either glovebox exhaust standby fan interlock is found to be inoperable, an alternate method to provide standby fan startup to the affected glovebox exhaust system shall be in place IMMEDIATELY. Interlock Watch personnel or equivalent shall be in place to manually switch to the standby fan if the in service fan in the affected glovebox exhaust system becomes inoperable, unless another alternate method to provide standby fan startup to the affected glovebox exhaust system has been provided. The manual interlock is a measure that compensates for the inoperable electrical interlock, providing secondary compliance with the requirement for having an OPERABLE glovebox exhaust fan in standby. The duties and responsibilities of the Interlock Watch Personnel are described in facility procedures. Interlock Watch Personnel or equivalent are not required if the associated standby fan is inoperable per Condition A.

A note has been included stating that entry into Condition C is not required for an inoperable standby fan. The standby fan interlock being inoperable does not cause the standby fan to be inoperable if compensatory measures are established to provide the interlock function. Condition A must still be entered if the standby fan is inoperable for any other reason than the standby fan interlock being inoperable.

(continued)

3.1.2A GLOVEBOX EXHAUST SYSTEM

BASES

ACTION STATEMENTS (continued)

C.2 The Interlock Watch Personnel or alternate method shall be maintained for up to 31 Days or until the affected interlock is returned to OPERABLE status. Interlock Watch Personnel are not required if the associated standby fan is inoperable per Condition A.

D.1 If the Required Actions and Completion Times of Conditions A, B, or C are not met, all affected gloveboxes shall be placed in WARM STANDBY to restrict the movement, handling and transfer of SNM. To continue unrestricted operations in excess of the allowed LCO extensions, while depending on compensatory measures to perform safety functions, would not represent good operating practice.

The Completion Time of 6 Hours for entry into WARM STANDBY is considered safe and achievable based on engineering judgment and operating experience.

D.2 Within 21 Days of entering Condition D, the restoration of the inoperable glovebox exhaust system equipment shall be accomplished, restoring compliance with the LCO. The Completion Time of 21 Days is sufficient to evaluate the conditions and return the equipment to OPERABLE status, restoring compliance with the LCO.

(continued)

3.1.2A GLOVEBOX EXHAUST SYSTEM

BASES

ACTION STATEMENTS (continued)

E.1 If both Scrap Recovery Glovebox Exhaust System fans are inoperable, there is no assurance that an adequate purge is being provided to the dissolvers. The introduction of SOLID SCRAP into the dissolvers shall be stopped IMMEDIATELY. Stopping the introduction of SOLID SCRAP into the dissolvers reduces the rate at which chemically generated hydrogen is produced in the dissolvers and minimizes the potential for reaching hydrogen concentrations sufficient for a deflagration in the vapor space.

E.2 IMMEDIATELY turning off the heater block to any dissolver that is in a dissolution or heel removal cycle will help slow down the release of chemically generated hydrogen into the dissolver vapor space. The production rate of chemically generated hydrogen is temperature sensitive. Turning off the heater block decreases the dissolver temperature and the production rate of chemically generated hydrogen. This minimizes the potential for reaching hydrogen concentrations sufficient for a deflagration in the dissolver vapor space.

E.3 Any transferable or airborne contamination associated with Phase I glovebox activities are normally confined by proper operation of the Scrap Recovery Glovebox Exhaust System. If the Scrap Recovery Glovebox Exhaust System is inoperable, this confinement function may be degraded. If a glovebox served by the Scrap Recovery Glovebox Exhaust System had a cabinet panel removed, the potential for an airborne contamination release increases. With both glovebox exhaust fans inoperable and with a cabinet panel removed, a potential release pathway exists. Therefore, any removed cabinet panels shall be installed IMMEDIATELY to close any potential release pathway. This Required Action permits the installation of a temporary type panel cover in lieu of the permanent cabinet panel. Refer to Administrative Controls Section 6.4.17 of the TSR (Ref. 4) for more details on the use of temporary panels.

(continued)

3.1.2A GLOVEBOX EXHAUST SYSTEM

BASES

ACTION STATEMENTS (continued)	E.4	If the Scrap Recovery Glovebox Exhaust System is inoperable (i.e., both exhaust fans are inoperable), it is necessary to restrict the movement of SNM in all gloveboxes served by the Scrap Recovery Glovebox Exhaust System (i.e., affected gloveboxes). By placing the affected gloveboxes in WARM STANDBY, all handling, movement and transfer of SNM in the affected gloveboxes is restricted and the potential for accidents that could result in the release of airborne contamination is reduced. The Completion Time of 6 Hours for entering WARM STANDBY is considered both safe and achievable based on engineering judgement and operating experience. NOTE: TSR, LCO 3.1.2, Required Action E.4 requires an alternate method of hydrogen dilution be provided when both Scrap Recovery Glovebox fans are inoperable. This JCO relies on three H-Canyon exhaust fans running to provide hydrogen dilution when both Scrap Recovery Glovebox fans are inoperable. A Technical Report (Ref. 5) demonstrates that the three H-Canyon exhaust fans can maintain the hydrogen concentrations below LFL when both of the Scrap Recovery Glovebox fans are inoperable. Based on the above, the requirement to provide an alternate method for hydrogen dilution is not required. Therefore, Required Action E.4 from LCO 3.1.2 of TSR is deleted from LCO 3.1.2A of this JCO and the other Required Actions are renumbered.
	E.5	With both glovebox exhaust fans in Scrap Recovery Glovebox Exhaust System inoperable, there is a reduced level of safe operations. The Completion Time of 21 Days is considered the maximum amount of time to operate at this reduced level of safety.

(continued)

3.1.2A GLOVEBOX EXHAUST SYSTEM

BASES

ACTION STATEMENTS (continued)

F.1 Any transferable or airborne contamination associated with Phase II, Phase III or Waste Handling Line glovebox activities is normally confined by proper operation of the Neptunium Oxide Glovebox Exhaust System. If both fans in the Neptunium Oxide Glovebox Exhaust System are inoperable, this confinement function may be degraded. If a glovebox served by the Neptunium Oxide Glovebox Exhaust System had a cabinet panel removed, the potential for an airborne contamination release increases. With both glovebox exhaust fans inoperable and with a cabinet panel removed, a potential release pathway exists. Therefore, any removed cabinet panels shall be installed IMMEDIATELY to close any potential release pathway. This Required Action permits the installation of a temporary type panel cover in lieu of the permanent cabinet panel. Refer to Administrative Controls Section 6.4.17 of the TSR (Ref. 4) for more details on the use of temporary panels.

F.2 If the Neptunium Oxide Glovebox Exhaust System is inoperable (i.e., both exhaust fans are inoperable), it is necessary to restrict the movement of SNM in all gloveboxes served by the Neptunium Oxide Glovebox Exhaust System (i.e., affected gloveboxes). By placing the affected gloveboxes in WARM STANDBY, all handling, movement and transfer of SNM in the affected gloveboxes is restricted and the potential for accidents that could result in the release of airborne contamination is reduced.

F.3 With both glovebox exhaust fans in Neptunium Oxide Glovebox Exhaust System inoperable, there is a reduced level of safe operations. The Completion Time of 21 Days is considered the maximum amount of time to operate at this reduced level of safety.

(continued)

3.1.2A GLOVEBOX EXHAUST SYSTEM

BASES

ACTION STATEMENTS (continued)	G.1	Any transferable or airborne contamination associated with glovebox activities is normally confined by the glovebox exhaust systems maintaining the proper vacuum on the gloveboxes. If a valid glovebox low vacuum alarm is activated or the minimum vacuum level is reached during alternate monitoring, it could be an indication the required vacuum cannot be maintained on a glovebox. A loss of vacuum, as determined either by a low vacuum alarm activating or through alternate monitoring of the glovebox vacuum, could degrade the confinement function of the glovebox making it necessary to restrict the movement of SNM in the glovebox. By placing the affected glovebox in WARM STANDBY, all handling, movement and transfer of SNM in the affected glovebox is restricted and the potential for the release of airborne contamination is reduced. The Completion Time of 6 Hours for entry into WARM STANDBY is considered both safe and achievable based on engineering judgment and operating experience. When a cabinet panel is removed from a glovebox, the glovebox exhaust for that glovebox is reconfigured into a maintenance mode and it is not possible to maintain the required 0.3 inches WG negative pressure in the glovebox. Other programs in place (e.g., Radiation Control Program) identify and implement measures to minimize the potential for airborne contamination releases when a cabinet panel is removed. These measures may include enclosing the panel opening in a temporary confinement hut and implementation of additional radiological protection controls and associated surveillances. Therefore, this condition does not apply to any gloveboxes in WARM STANDBY that have a cabinet panel removed.

(continued)

3.1.2A GLOVEBOX EXHAUST SYSTEM

BASES

ACTION STATEMENTS (continued)	G.2	Within 21 Days of entering Condition G, the restoration of the minimum required vacuum of 0.3 inches WG (or greater) to the affected glovebox shall be accomplished, restoring compliance with the LCO. The Completion Time of 21 Days is sufficient to evaluate the conditions and return the affected equipment to OPERABLE status, restoring compliance with the LCO.

(continued)

3.1.2A GLOVEBOX EXHAUST SYSTEM

BASES

SURVEILLANCE REQUIREMENTS

4.1.2.1 Deleted

4.1.2.2 Each glovebox is provided with alarms to warn if the vacuum is not being maintained in the glovebox. All glovebox low vacuum alarms shall be CALIBRATED Annually. Periodic CALIBRATION of these alarms ensures they are functioning properly. This surveillance does not have to be performed on gloveboxes when they have cabinet panels removed. This surveillance frequency is based on engineering judgment. Failure to meet or perform this Surveillance Requirement requires entry into Condition B of this LCO.

4.1.2.3 A FUNCTIONAL TEST shall be performed at least every 2 Months on each glovebox exhaust fan (i.e., operating and standby fans) in both systems. This test will ensure that both fan systems are capable of keeping a fan running at all times and maintaining the proper negative pressure in the glovebox. The surveillance frequency is based on engineering judgment. Failure to meet or perform this Surveillance Requirement requires entry into Condition A, E, or F of this LCO depending on the number of inoperable fans.

4.1.2.4 A FUNCTIONAL TEST shall be performed on the glovebox exhaust standby fan interlock for each glovebox exhaust system at least Annually. Interlocks are provided in each glovebox exhaust system to activate the standby fan if the primary fan fails. The test will ensure that the interlocks are capable of operating as designed. The frequency of this SR is based on engineering judgment. Failure to meet or perform this Surveillance Requirement requires entry into Condition C of this LCO.

(continued)

3.1.2A GLOVEBOX EXHAUST SYSTEM

BASES

SURVEILLANCE REQUIREMENTS (continued)	4.1.2.5	Each glovebox exhaust system is provided with an interlock to activate the standby fan if the glovebox fan plenum vacuum is not maintained. This ensures that the glovebox is maintained at a proper negative pressure. Only one pressure switch is used to activate the exhaust fan interlocks. These interlocks shall be CALIBRATED Annually. Periodic CALIBRATION of these interlocks ensures they are functioning properly. The frequency of this Surveillance Requirement is based on engineering judgment. Failure to meet or perform this Surveillance Requirement requires entry into Condition C of this LCO.
	4.1.2.6	A FUNCTIONAL TEST shall be performed at least every 2 Months on each glovebox low vacuum alarm. This test ensures that the alarm is OPERABLE and received in the Control Room. This surveillance does not have to be performed on gloveboxes when they have cabinet panels removed. The surveillance frequency is based on engineering judgment. Failure to meet or perform this Surveillance Requirement requires entry into Condition B of this LCO. If the glovebox low vacuum alarm FUNCTIONAL TEST utilizes installed instrumentation to verify an alarm setpoint for a glovebox, then the accuracy and functionality of the installed instrumentation shall be ensured. This shall be accomplished by ensuring that all such instrumentation complies with IPI Program requirements.

(continued)

3.1.2A GLOVEBOX EXHAUST SYSTEM

BASES

REFERENCES	1)	HB-Line Safety Analysis Report (U), WSRC-SA-2001-00009, Revision 4, October 2004.
	2)	Nuclear Air Cleaning Handbook, DOE-HDBK-1169-2003, November 2003.
	3)	Glovebox to Maintenance Areas Differential Pressure Uncertainty Calculation for HB-Line, J-CLC-H-00723, Revision 2, November 6, 2000.
	4)	Technical Safety Requirements, Separations Area Operations, Building 221-H, HB-Line, WSRC-TS-97-7, Revision 18, October 2004.
	5)	HB-Dissolver Dilution Flows and Dissolution Capability with Dissolver Charge Chute Cover Off (U), WSRC-TR-2003-00029, Revision 2, November 2004
	6)	Dyer, W.G. and Williams, J.C. Impact of Temperature on Hydrogen Lower Flammability Limit for Separations Facilities. WSRC-TR-2003-00313, Revision 0, July 2003.

3.3.2A AIR PURGE DISSOLVERS (RD -13 AND RD -14)

BASES

BACKGROUND SUMMARY	The Scrap Recovery Glovebox Exhaust System, through the VVS, provides the motive force for the vacuum maintained on process vessels including the Phase I dissolvers. This vacuum provides the motive force for the vacuum air purge provided for the Phase I dissolvers (RD-13 and RD-14). Purge air is normally drawn from the wing cabinet into each dissolver vapor space through an open purge tap in the dissolver charge chute cover. The purge air, along with evolving hydrogen generated by alpha radiolysis or chemical reaction in the dissolver, is swept out of the dissolver vapor space through the VVS piping for eventual exhaust to the H-Canyon Exhaust Ventilation System (Ref. 2). Under operations covered by this JCO, purge air is drawn through the dissolver charge chute with the charge chute cover removed and inaccessible. With the charge chute cover removed, the vacuum in each dissolver becomes too low to be adequately measured by the existing design thereby preventing the dissolver low vacuum alarms from operating.
APPLICATION TO SAFETY ANALYSIS	The Scrap Recovery Glovebox Exhaust System provides the motive force for a vacuum air purge on the Phase I dissolvers. The vacuum air purge is necessary to dilute and sweep hydrogen out of the dissolver vapor space and into the VVS. This purge maintains the hydrogen concentration in the dissolver vapor space at less than or equal to 25% of the Lower Flammability Limit (LFL) for a hydrogen mixture in air (4% by volume). The vacuum air purge minimizes the potential for a deflagration occurring in a dissolver. Noncompliance with this LCO will not exceed the offsite exposure criteria set to protect the health and safety of the public from the release of radioactive material.
LIMITING CONDITION FOR OPERATION	This LCO, in conjunction with LCO 3.1.2A, ensures for OPERATION that the minimum required vacuum air purge into and through Phase I dissolvers (RD-13 and RD-14) is maintained. The minimum required purge is based upon maintaining a dissolver vapor space at less than or equal to 25% LFL for a hydrogen mixture in air (Ref. 1). The vacuum air purge flow rate into a dissolver is proportional to the

(continued)

3.3.2A AIR PURGE DISSOLVERS (RD -13 AND RD -14)

BASES

LIMITING CONDITION FOR OPERATION (continued)

vacuum in the dissolver. A Technical Report calculates the flow rate through the dissolvers at 20 cfm with the charge chute cover removed. The flow rate is based on test data with experimental uncertainty (Ref. 1). The motive force for the calculated flow rate shall be provided by the Scrap Recovery Glovebox Exhaust System, whose operation is assured by compliance with LCO 3.1.2A.

The charge chute on each dissolver shall be verified to be (visual inspection from the operating area) free of obstructions to ensure there is an unrestricted flow of purge air into the dissolver vapor space. The presence of an obstruction could restrict the air purge flow to less than the minimum required for sufficient hydrogen dilution and removal. The exception to the obstruction requirements is during charging and making other additions to the dissolvers through the charge chute.

If the Glovebox Exhaust Fans are not operating, three H-Canyon Exhaust Fans will provide an adequate purge flow through Dissolvers RD-13 and RD-14. The purge flow is based upon maintaining a dissolver vapor space at less than LFL for a hydrogen mixture in air (Ref. 1). A Technical Report calculates the flow rate through the dissolvers at 6.6 cfm based on test data and experimental uncertainty (Ref. 1).

Backup electrical power is automatically provided to Building 221-HBL by a diesel generator in the event that normal sources of power are lost (Ref. 2). The backup power system consists of the diesel, generator, batteries, Automatic Transfer Switch and switch gear, and diesel fuel. The diesel generator supplies power to the Safety Significant glovebox exhaust fans as well as well as other HB-Line safety and non-safety equipment (Ref. 3).

(continued)

3.3.2A AIR PURGE DISSOLVERS (RD -13 AND RD -14)

BASES

MODE APPLICABILITY	Having the backup power system OPERABLE ensures that the HB-Line will have the necessary backup electrical power during loss of normal power. This LCO is applicable only when SOLID SCRAP is processed in the Phase I dissolvers. In OPERATION and WARM STANDBY, SOLID SCRAP material in the dissolvers is capable of generating hydrogen through alpha radiolysis or chemical reactions. The dissolver charge chute cover shall be removed and made inaccessible and the charge chute shall be free of obstructions, (except during charging and any other additions through the charge chute**)** during these MODES to ensure sufficient vacuum air purge is provided to the dissolvers to dilute and remove the hydrogen. With the charge chute cover off, the flow rate through each dissolver vapor space must be maintained at a flow rate of greater than or equal to 20 cfm to ensure minimum required purge is available for normal operations. One operating Phase I Glovebox Exhaust fan, and three H-Canyon Exhaust Fans provide motive force to ensure this flow rate (Ref. 1). The building backup power system ensures that power is available for the glovebox exhaust fans upon loss of normal power.
PROCESS AREA APPLICABILITY	This LCO is applicable to the Scrap Recovery Dissolvers RD-13 and RD-14 because SNM may be present in these vessels and radiolytically and chemically generated hydrogen can be produced.

(continued)

3.3.2A AIR PURGE DISSOLVERS (RD -13 AND RD -14)

BASES

ACTION STATEMENTS	A.1	If the charge chute cover is not made inaccessible (i.e., secured to a permanent structure, or locked in a container, or placed in another glovebox), then there is the potential for personnel to place it on the charge chute following charging of the dissolver. IMMEDIATELY making the affected charge chute cover inaccessible is an adequate and sufficient compensatory measure for ensuring that the cover is not replaced limiting air flow through the affected dissolver. All Required Actions in Condition B are required to be completed before exiting LCO 3.3.2A. This will ensure that the hydrogen concentration in the vapor space of the affected dissolver will remain below 25% LFL.

(continued)

3.3.2A AIR PURGE DISSOLVERS (RD -13 AND RD -14)

BASES

ACTION STATEMENTS (continued)

Entry into Condition B is not required when charging or additions are made through the affected charge chute. The charge chute is used to supply purge air and to make additions to the dissolver. The note clarifies the fact that normal process additions through the charge chute are not considered obstructions. The duration and size of normal process additions are such that the magnitude and duration of any obstruction during performance of these activities is not significant.

B.1.1 If a dissolver charge chute cover is not removed flow through the hole in the charge chute is not adequate to provide hydrogen purge for the materials described in this JCO. IMMEDIATELY removing the affected charge chute cover is an adequate and sufficient compensatory measure for ensuring that the minimum required dissolver purge air flow, is being maintained through the affected dissolver.

B.1.2 If a dissolver charge chute is found to have an obstruction that could restrict purge air flow, except during charging and any other additions through the charge chute, there is no assurance that an adequate purge is being provided to the affected dissolver(s). IMMEDIATELY removing the obstruction from the charge chute ensures that adequate purge flow is maintained through the affected dissolver.

B.2 The introduction of SOLID SCRAP into the dissolver(s) shall be stopped IMMEDIATELY. Stopping the introduction of SOLID SCRAP into the dissolver(s) reduces the rate at which chemically generated hydrogen is produced in the dissolver(s) and minimizes the potential for reaching hydrogen concentrations sufficient for a deflagration in the vapor space.

(continued)

3.3.2A AIR PURGE DISSOLVERS (RD -13 AND RD -14)

BASES

ACTION STATEMENTS (continued)	B.3	IMMEDIATELY turning off the heater block to any dissolver that is in a dissolution or heel removal cycle will help slowdown the release of chemically generated hydrogen into the dissolver vapor space. The production rate of chemically generated hydrogen is temperature sensitive. Turning off the heater block decreases the dissolver temperature and the production rate of chemically generated hydrogen. This minimizes the potential for reaching hydrogen concentrations sufficient for a deflagration in the dissolver vapor space.

(continued)

3.3.2A AIR PURGE DISSOLVERS (RD -13 AND RD -14)

BASES

ACTION STATEMENTS (continued)	C.1	Three (3) H-Canyon Exhaust Fans are required to be operating to ensure that they are available to provide adequate backup purge air if the Scrap Recovery Glovebox Exhaust System fails during dissolution. Though the evolution of chemically generated hydrogen subsides, radiolytic hydrogen continues to be generated. With no compensatory measures implemented, the generation of hydrogen by alpha radiolysis could, over time, cause the hydrogen concentration in the dissolver vapor space to exceed the LFL. This also is prevented by the operation of three H-Canyon Exhaust Fans until the Scrap Recovery Glovebox Exhaust System is restored to OPERABLE status. IMMEDIATELY stopping the introduction of SOLID SCRAP into the dissolver(s) reduces the rate at which chemically generated hydrogen is produced in the dissolver(s) and minimizes the potential for reaching hydrogen concentrations sufficient for a deflagration in the vapor space without adequate back-up purge flow from the H-Canyon Exhaust Fans.
	C.2	IMMEDIATELY turning off the heater block to any dissolver that is in a dissolution or heel removal cycle will help slowdown the release of chemically generated hydrogen into the dissolver vapor space. The production rate of chemically generated hydrogen is temperature sensitive. Turning off the heater block decreases the dissolver temperature and the production rate of chemically generated hydrogen. This minimizes the potential for reaching hydrogen concentrations sufficient for a deflagration in the dissolver vapor space without adequate back-up purge flow from the H-Canyon Exhaust Fans.

(continued)

3.3.2A AIR PURGE DISSOLVERS (RD -13 AND RD -14)

BASES

ACTION STATEMENTS (continued)	D.1	The building backup power system is required to be OPERABLE to ensure that backup power is available for the glovebox exhaust fans to provide purge air upon loss of normal power. IMMEDIATELY stopping the introduction of SOLID SCRAP into the dissolver(s) reduces the rate at which chemically generated hydrogen is produced in the dissolver(s) and minimizes the potential for reaching hydrogen concentrations sufficient for a deflagration in the vapor space without adequate purge flow from the glovebox exhaust fans.
	D.2	IMMEDIATELY turning off the heater block to any dissolver that is in a dissolution or heel removal cycle will help slowdown the release of chemically generated hydrogen into the dissolver vapor space. The production rate of chemically generated hydrogen is temperature sensitive. Turning off the heater block decreases the dissolver temperature and the production rate of chemically generated hydrogen. This minimizes the potential for reaching hydrogen concentrations sufficient for a deflagration in the dissolver vapor space without adequate purge flow from the glovebox exhaust fans.
SURVEILLANCE REQUIREMENTS	4.3.2.1A	Prior to starting the dissolution cycle, a visual check from the operating area shall be performed on each dissolver to verify that the charge chute cover has been made inaccessible. For example, “inaccessible” refers to the cover being removed from the charge chute and secured to a permanent structure, or locked in a container, or placed in another glovebox. The surveillance frequency of “Prior to Charging or Heel Removal Operations (at the affected dissolver)” is specified to provide assurance that the charge chute cover is made inaccessible to ensure that it cannot be put on the charge chute limiting purge air flow through the dissolver.

(continued)

3.3.2A AIR PURGE DISSOLVERS (RD -13 AND RD -14)

BASES

SURVEILLANCE REQUIREMENTS (continued)	4.3.2.2A	A visual check from the Operating Room side shall be performed on each dissolver charge chute to verify that there is no obstruction to block airflow. An obstruction also includes the charge chute cover. This visual check from the Operating Room side provides assurance that there is an adequate open flow path for purge air into the dissolver vapor space. The surveillance frequency of "Prior to Charging or Heel Removal Operations (at the affected dissolver)" is specified to provide assurance that there is an open flow path for purge air into the dissolver vapor space before chemical generation of hydrogen can occur. The surveillance frequencies of 12 Hours provides assurance that there is an open flow path for purge air into the dissolver vapor space to provide continuous dilution and removal of radiolytically generated hydrogen. This frequency is based upon the time it would take for a dissolver to reach LFL from the generation of radiolytic hydrogen assuming the purge was lost because of complete obstruction. Should an obstruction occur, this frequency, along with other implementation requirements, realistically provides adequate time for compensatory measures to be implemented to ensure the LFL is not reached. Therefore, a Note has been included that the extension allowed by SR 4.0.2 does not apply. Failure to meet or perform this SR requires entry into Condition B of this LCO.

(continued)

3.3.2A AIR PURGE DISSOLVERS (RD -13 AND RD -14)

BASES

REFERENCES	1)	HB-Dissolver Dilution Flows and Dissolution Capability with Dissolver Charge Chute Cover Off (U), WSRC-TR-2003-00029, Revision 2, November 2004.
	2)	HB-Line Safety Analysis Report (U), WSRC-SA-2001-00009, Revision 4, October 2004.
	3)	Technical Safety Requirements, LCO 3.4.1, Separations Area Operations, Building 221-H, HB-Line, WSRC-TS-97-7, Revision 18, October 2004.

ADMINISTRATIVE CONTROLS

6.4.7A Nuclear Criticality Safety Program

Table 6.4.7-1A-A
DCA Criticality Safety Limits (Phase I – Diverse Parameter Divergent Control) for ^{239}Pu

TYPE	MAXIMUM VALUE	UNITS
Limits for Phase I dissolvers: a) Mass of plutonium in each dissolver	520	Grams equivalent ^{239}Pu
AND		
b) Maximum dissolver solution width	3.74	Inches

6.4.17.4A An engineering evaluation shall be made of any material that is to be dissolved prior to it being charged to the dissolver. The engineering evaluation shall specify limits on the amount of material that can be charged in a dissolver batch. The engineering evaluation shall ensure that the hydrogen concentration can be maintained less than or equal to 25% of LFL with a flow rate through the dissolver charge chute of 20 cfm (per the conditions stated in Reference 1 of LCO 3.3.2A) during normal operations. It shall also ensure that the hydrogen concentration can be maintained at less than LFL with a flow rate of 6.6 cfm (per the conditions stated in Reference 1 of LCO 3.3.2A) through the dissolver charge chute during abnormal operations (inoperable Scrap Recovery Glovebox Exhaust System).

ADMINISTRATIVE CONTROLS
DESIGN FEATURES

A.1.3A Process Vessels

The Phase I and Phase II process vessels serve as SS components to prevent and mitigate the consequences of hydrogen deflagrations. The process vessels are designed and configured to minimize spark/ignition sources inside the vessels; i.e. motors, bearings, and electrical connection are located outside the vessels in conduit or electrical junction boxes. Cabinet air pulled through the charge chute via the VVS supplies purge air for the dilution of chemically and radiolytically generated hydrogen.

The process vessels are also designed to mitigate effects of hydrogen deflagrations and resin explosions by not forming shrapnel or missiles as a result of a pressure wave created during the deflagration or the chemical reaction.

The Phase I process vessels serve as SS components to mitigate seismic events. The process vessels will remain upright, reducing the energy imparted to release and disperse material. An SS design attribute of certain process vessels (e.g., dissolver, PHT, VVCT, Filtrate Tank, and Phase II vessels except JT-71, JT-72, NT-11 and NT-12) is the dimensional analysis that ensures favorable geometry of the vessels is maintained.

The Phase II process vessels listed in Reference 1 below shall be inspected periodically.

Reference

1. Posnick, J., Corrosion Evaluation of Phase II Process Tanks and Nuclear Safety Blanks, NMS-EHB-2001, Revision 0, March 6, 2001.