U.S. Department of Energy
Office of River Protection
P.O. Box 450
Richland, Washington 99352

04-WTP-177

Mr. J. P. Henschel, Project Director
Bechtel National, Inc.
2435 Stevens Center
Richland, Washington 99352

Dear Mr. Henschel:

CONTRACT NO. DE-AC27-01RV14136 – DISPOSITION OF QUESTIONS FROM ANALYTICAL LABORATORY PRELIMINARY CONSTRUCTION AUTHORIZATION REQUEST (CAR) REVIEW

References:

1. BNI letter from J. P. Henschel to R. J. Schepens, ORP, "Request for Review and Approval of the Construction Authorization Request for the Hanford Waste Treatment and Immobilization Plant - Analytical Laboratory Facility," CCN: 087896, dated June 2, 2004.

2. ORP letter from R. J. Schepens to J. P. Henschel, BNI, "Safety Evaluation Report (SER) of the Analytical Laboratory Construction Authorization Request (CAR)," 04-WTP-167, dated July 29, 2004.

This letter forwards the U.S. Department of Energy, Office of River Protection (ORP) disposition on questions/responses from review of the Analytical Laboratory CAR submitted by Bechtel National, Inc. (BNI) in Reference 1. The CAR was approved by ORP in Reference 2. The attached questions and associated responses (or summaries of responses) are part of the review record, and are provided to assist in tracking completion of the commitments made by BNI in the responses. If BNI elects to change any of the commitments in these responses, please advise ORP so that ORP may evaluate whether a corresponding change in authorization basis or Construction Authorization Agreement is necessary prior to changing the commitment. (It is expected that this prior approval will only be necessary, in most cases, for those commitments which have already been explicitly identified as Conditions of Acceptance for the Construction Authorization Agreement.)

If you have any questions, please contact me, or your staff may call Lewis F. Miller, Jr., Waste Treatment and Immobilization Plant Project Safety Authorization Basis Team, (509) 376-6817.

Sincerely,

Roy J. Schepens
Manager

WTP:LFM

Attachment

# Disposition of Questions from Analytical Laboratory (LAB) Preliminary Safety Analysis Report (PSAR) Review

| Question No. | U.S. Department of Energy (DOE), Office of River Protection (ORP) Question | Contractor Response | ORP Disposition |
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| **AL-PSAR -001** | This question dealt with a reference in the LAB PSAR to the Radiation Protection Program providing the information on handling and disposal of HEPA filters.<br><br>How does the *Radiation Protection Program [for Design and Construction]* [RPP] (24590-WTP-RPP-ESH-01-001) provide the necessary information for safe removal, handling, packaging, and disposal of ventilation system HEPA filters? | The LAB PSAR Section 2.5.5 will be revised prior to submitting the PSAR for DOE approval to refer to the Radiological Control Program, 24590-WTP-PL-NS-01-001 rather than the Radiation Protection Program (RPP). | The response is acceptable. Bechtel National, Inc. (BNI) will change the PSAR prior to submittal of the approved PSAR on May 4, 2004. The Radiological Controls Program includes the Waste Treatment and Immobilization Plant (WTP) Radiological Control Manual and radiological procedures that direct the use of radiological work planning and implementation of radiological controls to safely conduct radiological work, including that discussed in this section for HEPA filters. The RPP serves mainly to show how the regulatory requirements of 10 CFR Part 835 are implemented and references the Radiological Controls Program. |
| **AL-PSAR -002** | This question dealt with apparently conflicting statements on the amount of samples in the LAB hot cells.<br><br>Which of the two statements cited above is true? | The basis for the hot cell inventory is critical to establishing an unambiguous definition of the safe-operating envelope and thus both the above statements are true. 24590-LAB-Z0C-W14T-00003 refers to the maximum bounding count of 20ml sample equivalents that could be present in the hot cells due to steady state operations. To estimate a maximum hotcell sample count for the plant life, all reasonable events that could take place must be considered. Tank farm analysis is just one of many samples that | The response is acceptable because it clarified the two different statements on the amount of samples in the LAB. |

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| | | could be required to be analyzed on a routine basis over the life of the plant. For this reason, tank farm data were used to represent a group of such samples that may be required to create a reasonable bounding sample equivalent number.<br><br>In 24590-WTP-PL-RP-01-004, Revision 3, Analytical Laboratory Design Requirements; WTP Sampling and Analysis Plan, Appendix C, page C-5 and -6 it is stated that tank farm samples, TF 1a through 1d will be outsourced. The WTP Sampling and Analysis Plan, Revision 3 is a real time estimate of the WTP sampling needs and is used as a general guide for LAB design. However, the LAB should not be designed for the exact sample count that is indicated in the sampling and analysis plan as a maximum. The WTP Sampling and Analysis Plan represents a reasonable estimate of the WTP needs with no margin up or down; it does not provide bounding numbers. | |
| **AL-PSAR-003** | This question dealt with selected control strategies as discussed in the Design Basis Event (DBE) on vessel spills and pipe leaks in the LAB facility (24590-LAB-Z0C-W14T-00005).<br><br>What is the magnitude of uncontained aerosol and what is the impact to the worker?<br>What seat leakage criteria will be imposed on the damper?<br>Explain the fail-closed mechanism of the damper. | 1. There is a qualitative discussion of Facility Worker dose in Section 7.1.3.3 of the DBE calculation. The dose to the Facility Worker is not calculated; however, based on Severity Level (SL)-2 to the Co-located Worker, the consequences to the Facility Worker would be high. The control strategy is discussed in the DBE calculation and in Chapter 3 of the PSAR.<br><br>2. The C3 decontamination booth isolation damper will be purchased "bubble tight" per ASME AG-1. Periodic leak testing of the C3 decontamination booth damper has not been required in the PSAR; the PSAR will be updated at the next PSAR update to require leak testing the damper to an acceptable leakage level. The potential leakage will be evaluated and if acceptable, the results will be documented in the DBE calculation and PSAR and a request to delete the leak testing requirements will be submitted to ORP for review and | The response is acceptable. The C3 decontamination glovebox isolation damper will be purchased to bubble tight leakage criteria and it will fail closed on loss of differential pressure, power, or service air thereby minimizing worker dose. Also, the damper will be periodically leak tested and made part of the Technical Safety Requirements (TSR); this requirement will be added in the next PSAR update. |

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| | | approval.<br><br>3. The damper actuator solenoid fails on loss of power, venting air from the actuator and allowing the actuator spring to drive the damper closed. Loss of plant service air to the actuator would result in the same spring to close action. | |
| **AL-PSAR-004** | This question dealt with initial control strategies as discussed in the DBE on vessel spills and pipe leaks in the LAB facility (24590-LAB-Z0C-W14T-00005).<br><br>How is the level alarm powered? | The C5 tank cell indicator and alarm are powered by normal power, as noted by the reviewer.<br><br>There is no interlock associated with the sump level alarm and no credit is taken for the alarm in any of the safety analyses. Section 7.1.1.1 of 24590-LAB-Z0C-W14T-00005 lists the initial Control Strategy Elements (CSE) as identified by the ISM team as a potential suite of controls of the hazardous situation. The credited controls are then selected from the CSEs but usually do not include all of the CSEs initially listed. The final controls are confirmed by the DBE calculation and are listed in Section 7.1.1.2 of the DBE calculation.<br><br>The Important to Safety (ITS) control discussed in Section 2.4.14.2.4.2 of the LAB PSAR is the interlock associated with isolation damper C5Y-YD-6229 (on the C5 exhaust from the C3 decon booth), which is also powered by normal power. | The response is acceptable. No credit is taken for the sump level alarm in any of the safety analyses as a final control strategy. |
| **AL-PSAR-005** | This question dealt with passive confinement of the C5 ventilation area following a seismic hotcell fire event.<br><br>How is the term "passive confinement" defined? Specifically, is an un-powered ventilation system considered to be a "passive confinement | The LAB facility has an active C5 ventilation system during normal operations. However, during certain events the C5 fans will not operate. The analysis of the loss of the C5V fans event, shows that the LAB confinement complies with all applicable aspects of the Safety Requirement Document (SRD) without additional requirements for safety features. This means, for the events analyzed, the design of the LAB meets the SRD. This confinement philosophy is referred to as "passive confinement" in the PSAR and supporting documentation where passive confinement is defined as closure of the C3 decontamination | The response is acceptable. The redefinition of passive confinement to include the required closure of damper C5V-YD-6229 is acceptable. Single failure was considered but because of the high reliability of the damper verified by a periodic closure test, redundancy is not |

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| | system"? If so, how can it be verified that all leakage from the un-powered ventilation system boundary is filtered through the HEPA filters for all accidents that rely on the "passive confinement" system? | booth damper to isolate from the balance of the C5 system, with containment of hazardous material achieved by the confinement structure, the C5 exhaust boundary, and the isolation dampers without forced air flow. Leakage from the passive confinement structure is unfiltered and accounted for in the DBE calculation. The concept is basically the same as a judicial arrangement of filtration assets during a facility blackout condition (see Section 2.6 of DOE-HDBK-1169). Unfiltered leakage paths have been identified and are accounted for in Section 3.4.1.2 of the PSAR. The passive confinement is considered safety significant to support the credited safety function to provide confinement of radioactive materials released following the seismic and hotcell fire events described in PSAR Chapter 3.<br><br>The above statement will be added to section 3.1 and modified in section 4.4.2.1 of the LAB PSAR at the next update.<br><br>Appendix A uses passive confinement throughout in control strategy elements and one safety case requirement (SCR) (SCR-UVENT/N0001). These CSEs and SCR will be updated at the next PSAR update to clarify the terminology.<br><br>Note: The term "passive confinement," where used in the LAB PSAR, or associated SIPD, design basis calculations, or associated safety analyses, includes an active element, the C3 decon booth damper, C5V-YD-6229, which must fail closed for the confinement boundary assumed in the safety analysis to be accurate. The single failure criterion for this active component was considered. The damper and instrumentation have been specified to be safety significant, QL-2 to increase the reliability to close in the event of low flow. In addition, the damper is designed to fail closed (fail to the safe position). Based on the high reliability of the damper to close which is demonstrated by the TSR testing (periodic closure test) required in section 5.5.1 of the PSAR, redundancy of the damper and instrumentation was not | considered necessary. The revised definition of passive confinement will be included in the next PSAR update. |

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| | | required. | |
| **AL-PSAR-006** | This question dealt with access control in the LAB.<br><br>a) How does the RPP cited in SCR-UADM/N0014 and documented in *Radiation Protection Program for Design and Construction* (24590-WTP-RPP-ESH-01-001) provide the specific activities needed for access control to R5 and C5 areas?<br><br>b) How does the RPP provide specific details for implementation of facility surveys and dosimetry, Radiological Work Permits, and Job Hazard Analyses? | Chapter 7 of the general information PSAR will be revised to include detail on the radiological control program such that the SIPD appendices could reference chapter 7. The SIPD appendices for all facilities will then not reference either RPP or RCP, but include the specific elements of the radiological control program from chapter 7; for example, access control, contamination control, radiological work planning and so on. Chapter 7 will include references to the existing RPP and RCP as necessary. Chapter 7 will include sufficient detail to justify the administrative controls; specific procedures will not be included except perhaps to demonstrate how the program is implemented. For example, the description of "access control" would be a paragraph, demonstrating how such an element would function to prevent facility worker over-exposure during an event and justify its inclusion as part of the administrative radiological control credited. The Chapter 7 update will be performed as part of the Final Safety Analysis Report (FSAR), consistent with the existing conditions of acceptance to add additional descriptions of 7 functional elements from Reg Guide 3.52.<br><br>a) The LAB PSAR will be revised by the next PSAR update to remove reference to the RPP as the basis for administrative controls and will provide a description of the specific control required. For instance, SCR-UADM/N0009 which currently states “RPP provides for continuous radiation monitoring at hot cell export points during export activities” will be revised to state “Administrative controls will provide for continuous radiation monitoring at hot cell export points during export activities.”<br><br>b) Similar to a) above, uses of RPP as the basis for specific administrative radiological controls in other facility specific volumes of the PSAR (e.g., High-Level Waste [HLW] or Pretreatment [PT] facility specific volumes) will be revised in | The response is acceptable. The change will provide for a detailed description of applicable administrative radiation protection controls in the PSAR and FSAR. Possible confusion over the basis for the controls will be eliminated. |

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| | | the next PSAR update. For example, if the example cited above were used in the HLW PSAR it would need to be revised. However, if the HLW PSAR simply cited "RPP" without reference to a specific control this would not need to be changed until the FSAR. | |
| **AL-PSAR-007** | This question dealt with Control Strategy Elements.<br>a) How can an administrative CSR calling out the RPP [SCR-UADM/N0014] be cited without an initiating CSE?<br>b) Why doesn't CSD-UARL/N0008 have an SCR specified since there are “High” consequences identified for facility workers? | a) Appendix A provided on March 1, 2004, was printed before the link between CSD-UARL/N0008 and SCR-QINST/N0001 was made. The DBE selection report correctly identifies the link. Appendix A will be revised to show this link in the PSAR when it is submitted for DOE approval.<br>b) CSE's have been identified for those SCDs noted in the Cited Submittal Text above. These CSEs will be included in the PSAR when it is submitted for DOE approval. | The response is acceptable. Discussion with BNI on April 15, 2004, indicated that the stated revisions will be part of the May 4 delivery of the final approved LAB PSAR. |
| **AL-PSAR-008** | This question dealt with the LAB operational risk assessment (ORA).<br><br>What is the impact to the LAB ORA of incorporating the severity level consequence calculations found in the severity level calc-note (24590-LAB-Z0C-W14T-00003) submitted with the LAB PSAR? | 1. BNI will develop a written process within 60 days of the LAB PSAR approval to periodically assess the performance of barriers, engineered safety features and administrative controls as discussed in Schepens 3-31-03 letter to Naventi (03-AMWTP-025).<br><br>2. As a result of the known and anticipated changes in the WTP that have or will occur prior to the next PSAR update, BNI will requantify the ORA and submit the results of the requantification prior to the next revision of the PSAR in December, 2005. If, after development of the process in Item 1, an assessment determines that requantification is not likely to conclude that the risk goals for the WTP may be exceeded, BNI may request a delay in the requantification.<br><br>3. BNI will provide a schedule for requantification that commits | The response is acceptable. It makes a commitment to address the question in a requantification of the LAB risk estimate before submittal of the next revision of the LAB PSAR in 2005. This commitment to a future resolution of the questions is considered acceptable because it will allow sufficient time to perform further analysis or consider mitigative actions before approval of the final LAB design if unexpected problems arise in the LAB risk |

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| | | to requantify the LAB risk as the first phase of the overall requantification effort. The schedule will be provided within 60 days of ORP approval of the LAB PSAR. | estimate. In addition, the response makes a commitment to requantify the entire ORA (including the laboratory portion) and to develop a procedure for periodic assessment of the impact to the ORA of ongoing design changes. These further commitments will be tracked, reviewed and approved by ORP as part of the risk assessment and ORA requantification process. |
| **AL-PSAR-009** | This question dealt with hazard categorization of the LAB.<br><br>How does the referenced Hazard Categorization 24590-LAB-U4C-60-00001 support the Hazard Category 2 estimate presented in the text of section 3.3.2.1.2? | Hazard categorization calculation 24590 LAB U4C 60 00001 is in the revision process and will be issued prior to the final PSAR being issued to DOE for approval. The sample inventory and sample waste streams used in the revision to the hazard categorization calculation are presented in 24590-LAB-Z0C-W14T-00003, Severity Level Calculations for the LAB Facility. These provide the basis for the radionuclide quantities used in the hazard calculation. | The response is acceptable. An update of 24590-LAB-U4C-60-00001, *Analytical Laboratory Hazard Categorization* (Rev. B) was made available after this question was submitted. It provides the basis for the statements made in the cited submittal text. |
| **AL-PSAR-010** | This question dealt with leak path factors.<br><br>a) What door or doors would need to be opened for excavation, considering that the fire and released particulate are in the hotcells, which are unoccupied, and receptors are outside the | a) Opening of doors is no longer relevant to the determination of LPF for the hotcell. The LPF has been determined specifically for the hotcell.<br><br>b) The comparison has been removed from the fire DBE calculation 24590-LAB-Z0C-W14T-00006 that has been revised (Revision A) and has been provided to DOE for review.<br><br>c) & d) The fire DBE calculation 24590-LAB-Z0C-W14T-00006 has been revised (Revision A) and has been provided to | The response is acceptable based on the clarification provided and the fact that an analytical laboratory-specific leak path factor has been calculated. |

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| | hotcell area?<br><br>b) How can a 1.7 MW, 5 minute fire (based on specific combustibles in the hotcells) be considered similar in severity and duration to the 5 MW, 80 minute fire in the 235-F building or the 15 MW, 50 minute fire in the HB-Line?<br><br>c) Why weren't the CFAST runs performed for the WTP LAB facility (and documented in 24590-LAB-Z0C-W14T-00006, Design Basis Event: Fire in Laboratory Facility) used for estimating the LPF instead of comparisons that do not appear to be valid with fire simulations at the Savannah River Site?<br><br>d) What is the technical basis for using the same LPF for a pressurized release from a single sample bottle (which has no potential for increasing hotcell air pressure) as for a fire in the hotcells (which does have the potential for a hotcell pressure increase)? | DOE for review. | |
| **AL-PSAR-011** | This question dealt with leak path | The radiological inventory in the LAB has been revised | The response is acceptable. |

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| | factors.<br><br>a) What is the relationship between leakage from the cells under stagnant conditions (past the HEPA? Through the cell walls and engineered inbleeds?) and leakage through a stage of HEPA filters under normal flow conditions?<br><br>b) If there is no relationship, what is the technical basis for the assumed LPF of 0.05? | downward. This revision makes the events evaluated in section 3.4.1.1, Vessel Spills and Pipe Leaks, severity level 3 (SL-3) events which do not require quantitative evaluation. This event is described in sections 3.3.6.5 and 3.3.6.6. Section 3.4.1.1 will be deleted from the PSAR in its entirety. | The referenced text and the PSAR section containing it have been deleted. |
| **AL-PSAR-012** | This question dealt with the basis for passive confinement using active components.<br><br>a) What is the basis for an interlock, which depends on active components [for example, a differential pressure (dp) instrument and its associated control circuit, actuator, and damper], being considered a "passive boundary?<br><br>b) If active components such as the dp instrument, signal conditioning, interposing devices, actuator, and damper are credited for assuring | The interlock is now on C5V flow from the hotcell. Upon loss of the C5V fans, flow is lost and the interlock will signal the isolation damper to close. During this event, there is no motive force (pressurization) to move airborne contamination from the C5 area. The reason that the interlock is considered ITS is because during the Seismic event, the interlock must not fail in a manner to prevent the damper from closing. In an accident scenario, the isolation damper is designed to fail safe, (e.g. on loss of power, or air pressure, the damper fails closed), therefore, no ITS power is required to insure isolation (passive confinement). The low flow interlock provides no credited ITS safety functions for the passive confinement, the Safety Significant classification is assigned to the low flow interlock solely to provide the capability to survive the Seismic Event.<br><br>The definition of passive confinement for the LAB hotcell DBE is per the discussion in AL-PSAR-005. | The response is acceptable. Regarding questions (a) and (b) concerning the use of active components, in response to AL-PSAR-005, the contractor defined the LAB passive confinement feature as containment of hazardous material achieved by the confinement structure, the C5 exhaust boundary, and the isolation dampers without forced air flow. The term passive confinement, where used in the LAB PSAR, or associated SIPD, design basis calculations, or associated safety analyses, includes an active element, the C5V-YD- |

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| | confinement, how can this configuration be considered "passive confinement?"<br><br>c) As described in Chapter 2 of the LAB PSAR and as reflected in Chapter 4, no ITS electrical power is provided in the LAB facility. What failure modes and effects of SSCs supporting the differential pressure interlock function are credited for performing the safety function without any source of electrical power? | | 6229 damper, which must fail closed for the confinement boundary assumed in the safety analysis to be accurate. As described in disposition of the response to AL-PSAR-005, the reviewers found the revised passive confinement definition to be acceptable contingent on this requirement being incorporated in the next PSAR update.<br><br>Regarding question (c), the response further clarified that the isolation damper and appurtenances will be designed to fail closed on loss of power or air pressure, and that the safety significant classification is assigned to the low flow interlock solely for the seismic DBE. The reviewers found this acceptable, because it clarified the basis for failure modes and effects associated with the isolation damper and its control circuits and components. |
| **AL-PSAR-013** | This question dealt with the basis for post-accident monitoring for the LAB facility.<br><br>a) For the LAB design, what instrumentation will be used to | General: A tailored version of IEEE 497-2002 is used to identify and establish requirements for instrumentation for monitoring of variables and systems for accident conditions. IEEE 497 was added to the SRD as an implementing standard for SC 4.3-4 as a result of ABAR 24590-WTP-SE-ENS-03-478. The variables to be monitored will be identified in facility specific ISM meetings. | The response is acceptable subject to the changes below. BNI will submit, in the next PSAR update, a description of the accident monitoring instrumentation and associated |

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| | satisfy SRD Safety Criterion 4.3-4 and its tailored implementing standard IEEE Std 497-2002, *Standard Criteria for Accident Monitoring Instrumentation for Nuclear Power Generating Stations*?<br><br>b) What variable types (Type A, B, or D, as defined in the tailored IEEE Std 497, and as applicable to the AL facility) are assigned to the instrumentation? Please provide the basis for the variable type assigned. | A guide specifically for the conduct of these meetings, 24590-WTP-GPG-SANA-013, Identification of Instrumentation and Monitoring Requirements Important to Safety has been developed.<br><br>a) To date, LAB ISM meetings haven't been conducted to identify IEEE 497 instrumentation. These meetings will be conducted as part of LAB ISM Cycle III. b) The current tailoring of IEEE 497 is expected to provide an adequate basis for typing the identified variables. The basis for assignment of variable type will be documented in the ISM meeting minutes.<br><br>b) ISM meetings to identify accident monitoring instrumentation and associated variable types will be completed and the information will be included in the next PSAR update. | variable types, pursuant to the tailored version of IEEE Std 497-2002 and governed by the ISM process. This is acceptable because BNI has committed to a tailored version of IEEE Std 497-2002 for this instrumentation, but the WTP design has not yet progressed to the level of detail whereby BNI could make this implementing information available for review. |
| **AL-PSAR-014** | This question dealt with the basis for implementing standards, and consequences of a fire defeating the dp interlock.<br><br>a) What is the basis for the apparent exclusion, in AL PSAR Section 4.4.2.4.3, of IEEE Std 344, *IEEE Recommended Practice for Seismic Qualification of Class 1E Electrical Equipment for Nuclear Power Generating Station*, as an implementing standard for the electrical equipment associated with the | Clarification of the design is required for this discussion. The dP interlock has been replaced by the C5 exhaust flow interlock to the isolation damper since the 30% PSAR deliverable. This interlock is designed to fail safe (closed) on a loss of power; therefore, ITS power is not required. This interlock will close on loss of flow to ensure isolation of the C3 decon booth from the C5 atmosphere during normal operations.<br><br>The DBE for the subject SSC is a seismically induced fire. Unmitigated consequences are SL-2 to the collocated worker. Defense in depth requires a minimum of 2 independent physical barriers, at least one of which must be Safety Significant (SS). In this case, the ISM selected the C5 low exhaust flow interlock as the SS barrier. Per SC 4.1-3, the interlock is categorized as SC-III.<br><br>Answers to the questions above are based on this clarification. | The responses to parts (a) and (b) of the question are acceptable, because they describe a design basis acceptable for SL-2 consequences to a collocated worker and consistent with the SRD.<br><br>The response to part (c) is acceptable, pending submittal, review, and acceptance, at the next PSAR update, of BNI's design approach for designing, qualifying, or protecting the decontamination booth damper |

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| | differential pressure interlock for the isolation damper in the C5V exhaust duct from the C3 decontamination booth?<br><br>b) What is the scope of the applicability of IEEE Std 384 to the differential pressure interlock described in AL PSAR Sections 4.4.2.2 and 4.4.2.4.3? Does this apply to independence of redundant interlock divisions, or to independence of ITS circuits and equipment from the non-ITS circuits and equipment, or both? What are the consequences if the design basis fire defeats the interlock, and why are the consequences acceptable?<br><br>c) What is the effect of a design basis fire on the ability of the differential pressure interlock circuits, interposing hardware, actuator, and damper to perform its confinement function as described in the AL PSAR? What are the consequences if the design basis fire defeats the interlock, and why are the consequences | a) Project tailoring of IEEE 344 makes it applicable for SDC, SC-I items. Qualification of equipment in the LAB will be as discussed in response to AL-PSAR-017.<br><br>b) IEEE 384 applies to independence of ITS circuits and equipment from non-ITS circuits and equipment; the interlock does not have redundant divisions.<br><br>c) While the fire is internal to the hotcell, the interlock is external and not expected to be affected by the hotcell fire. The C3 decon booth damper is also located external to the hotcell. Calculation 24590-LAB-Z0C-W14T-00006 has determined that the maximum temperature in the C5 exhaust ducting during the hotcell fire would be less than 150 degrees C. This would also be the maximum temperature that could occur at the C3 decon booth damper, although the actual temperature would be expected to be lower. Two paths will be pursued to address this issue: 1) the damper will be specified and procured to remain functional at the elevated temperatures; or 2) the maximum temperature at the damper location will be evaluated and the damper will be protected against elevated temperatures. The PSAR will be updated by the next PSAR update. | from the effects of the DBE fire. |

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| | acceptable? | | |
| **AL-PSAR-015** | This question dealt with reduction of dose consequences.<br><br>What is the significance of characterizing a reduction by a factor of 20 (1/0.05) as a factor of more than 15? | The radiological inventory in the LAB has been revised downward. This revision makes the events evaluated in section 3.4.1.1, Vessel Spills and Pipe Leaks, SL-3 events which are not considered design basis events. Section 3.4.1.1 will be deleted from the PSAR in its entirety. | The response is acceptable. The referenced text and the PSAR section containing it have been deleted. |
| **AL-PSAR-016** | This question dealt with seismic design loads in the LAB.<br><br>a) What adjustments have been made to the values of $C_a$ and $C_v$ to account for the increase in return period for PC2 facilities from 500 years to 1,000 years?<br><br>b) What is the correct frame type for the LAB facility?<br><br>c) How does structure type of the Hot Cell (concrete shear wall) correlate to the identified structure type of the remainder the facility (steel frame) and therefore impact the seismic load on the hot cell? | a) The site specific ZPA and Peak Acceleration (CCN defined in The Probabilistic Seismic Hazard Analysis, DOE Hanford Site, Washington, WHC-SD-W236A-TI-002, Revision 1 are less than the ZPA and Peak spectral values defined in Uniform Building Code (UBC). Therefore, the use of the UBC values is conservative. 24590-LAW-S0C-S15T-00001, page 2 and 3 describe the UBC seismic loading and the comparison to the site-specific spectrum and base shear. 24590-LAW-S0C-S15T-00001 was previously reviewed by DOE as noted in section 4.1.1.2 of ORP/OSR-2002-18, Revision 0.<br><br>b) The LAB structural steel framing system uses a dual system of Special Concentrically Braced Frames (SCBF) steel with Special Moment Resisting Frame (SMRF) in the East-West direction. Per Table 16-N of UBC-97, the appropriate R-value is 7.5. The North-South direction uses SCBF steel. Per Table 16-N of UBC-97, the appropriate R-value is 6.4. For conservatism, the R-value of 6.4 will be used in both directions. The concrete below elevation 17’-0” (i.e. Hotcell) uses concrete shear walls as the seismic structural system. Per Table 16-N of UBC-97, the appropriate R-value is 4.5. The PSAR text will be updated to reflect these R-values prior to submittal for DOE approval.<br><br>c) As stated under item b above, the PSAR text will be updated to indicate the R-values used prior to being submitted for DOE | The response is acceptable because it provides a more complete justification for the use of UBC seismic factors, redefines more appropriate “R-Values” for analysis of the steel and concrete portions of the structure independently, and commits to incorporation of new “R-Values” into the PSAR and structural calculations prior to start of construction. |

| Question No. | U.S. Department of Energy (DOE), Office of River Protection (ORP) Question | Contractor Response | ORP Disposition |
|---|---|---|---|
| | | approval. Calculations 24590-LAB-S0C-S15T-00004 and 24590-LAB-S0C-S15T-00006 will be revised to reflect R=4.5 for the hotcell and R=6.4 for the main steel structure before using the results for any design or construction activity. | |
| **AL-PSAR-017** | This question dealt with the seismic design load in the LAB.<br><br>What methodology will be used for the seismic analysis and qualification of equipment within the LAB? | Section 2.4.5.3 Seismic Analysis of the General Information volume states, "The seismic analysis of the SSC's will be consistent with sections 7.2 and 7.3 of 24590-WTP-RPT-ST-01-002, *Seismic Analysis and Design Approach*. The requirements under section 7.3, *Seismic Analysis of SC-III and SC-IV Structures, Systems, and Components*, are implemented in 24590-WTP-3PS-FB01-T001, *Engineering Specification for Structural Design Loads for Seismic Category III & IV Equipment and Tanks*. | The response is acceptable because they provide a clear reference to the requirements for analysis of equipment. The references include the General Information Volume of the PSAR and the Specification imposing the appropriate requirements. |
| **AL-PSAR-018** | This question dealt with loads used in the LAB calculations.<br>a) How are static soil loads fully incorporated in concrete load combinations identified in Appendix C of BNI Calculation 24590-LAB-S0C-S15T-00004?<br>b) Why are the off-axis seismic terms not included in load combinations groups U6sxxx, U6wxxx, U7nwxx, U7swxx, U7esxx, and U7wsxx? | Calculations 24590-LAB-S0C-S15T-00004 and 24590-LAB-S0C-S15T-00006 will be revised to correct the omission prior to submittal of the PSAR for DOE approval and before using the results for any design or construction activity. | The response is acceptable because BNI agreed to correct (incorporate) the omitted portions of the code required load combinations. BNI provided a commitment to incorporate results from new load combinations into design calculations prior to related construction activities. |
| **AL-PSAR-019** | This question dealt with hotcell fire loadings.<br><br>a) What is the basis for the use of 32 lbs of polyethylene in the PSAR calculations when the | a) The PFHA calculated the maximum amount of combustibles (all assumed to be polyethylene) that could be in each cell to prevent reaching an upper air temperature of 500 degrees F. This calculation determined that there is a maximum of 30 lbs of combustible material in Hotcells HC 1 or HC 14. It also assumes that there is a maximum of 15 pounds of combustibles | The response is acceptable. The DBE and hotcell FHA calculations will be revised to have a consistent input (e.g., fire loading), assumptions, and scenarios, and that these fire |

| Question No. | U.S. Department of Energy (DOE), Office of River Protection (ORP) Question | Contractor Response | ORP Disposition |
|---|---|---|---|
| | PFHA estimates a total of 45 lbs of combustible material in the hotcell?<br><br>b) In terms of pounds of combustible material and fire severity (MW):<br>1. What is an estimation of the minimum hotcell fire load necessary to produce flash-over?<br>2. What is an estimation of the minimum hotcell fire load necessary to produce a temperature of 160˚C at the C5 primary filter banks?<br>3. What is an estimation of the minimum hotcell fire load necessary to produce plugging of the C5 primary filter bank?<br>4. What is an estimation of the minimum hotcell fire load necessary to produce an exposure in excess of the radiological limits to the public or co-located worker?<br>5. What is the maximum fire load (under normal and abnormal conditions) in the hotcell considering all combustible materials, | in HC 2, HC 3, HC 4, HC 5, HC 6, HC 7, HC 8, HC 9, HC 10, HC 11, HC 12, or HC 13. The PFHA also assumes that a fire only starts in one of the 14 hotcells and that there is not enough combustible loading and heat release rate to reach flashover which would spread the fire to adjoining cells. The PFHA also assumes that the SC III partitions will physically prevent the combustibles from one cell mixing with the combustibles in an adjacent cell.<br><br>The Hotcell Fire DBE used the maximum amount of plastics derived from Lab PFHA, Table B-3, Analytical Laboratory Combustible Loading Assumptions to determine that the maximum amount of combustibles in the total hotcell to be 32 lbs. Thirty-two pounds were considered to be located in either HC 1 or HC 14 in the analysis of the challenges to the inbleed and exhaust HEPA filters. Postulating a fire involving 45 pounds of combustibles would be inconsistent with the PFHA which postulates that a fire may start in any one of the 14 hotcells and that the fire does not spread beyond that hot cell (i.e., any fire is confined to a single hotcell). A fire involving 45 pounds of combustible would imply a fire involving more than one hotcell. A fire involving 32 pounds of plastics is clearly more challenging to the HEPA filters than a fire involving 15 pounds.<br><br>b) 1) The maximum amount of material needed to reach flashover has not been calculated however, calculation 24590-LAB-U1C-FPW-00001 calculates that the minimum heat release required to reach flashover is:<br>• HC 1 or HC 14 is 1542 kW·<br>• HC 2 or HC 3 is 1301 kW·<br>• HC 4, HC 5, HC 6, or HC 7 is 1335 kW·<br>• HC 8 or HC 9 is 1542 kW· | loads will be assured through operating limits defined in the WTP Combustible Control Program and Technical Safety Requirements. The amended calculations will: a) itemize combustibles (fixed and transient) used in each hotcell analysis to confirm the assumptions used in the calculations, and b) show the degree of conservatism in the hotcell FHA analysis by calculating the hypothetical fire load necessary for flashover conditions. The revision of the calculations will occur on a schedule mutually agreed to by ORP and BNI. Based on the margin to flashover conditions, on either a temperature or peak heat release basis, documented in the current hotcell fire analyses, the potential increase in combustible loads is not expected to result in flashover conditions in the hotcells and are not expected to result in a significant increase in the mitigated dose to the co-located worker due to cell pressurization during the fire event. This conclusion will be |

| Question No. | U.S. Department of Energy (DOE), Office of River Protection (ORP) Question | Contractor Response | ORP Disposition |
|---|---|---|---|
| | including, but not limited to, manipulator boots, plastic glovebox parts, absorbent material, cable insulation, window oil (if not gas filled), flammable liquid reagents, and maximum transient materials?<br><br>c) What is the basis for the different design fire scenarios (including scenario descriptions, maximum available fuel mass, and use of bounding data) in the Analytical Laboratory Hotcell Fire Analysis (24590-LAB-U1C-FPW-00001), which is based on a fire scenario involving 30 pound of polyethylene bottles, and the DBE analysis (24590-LAV-Z0C-W14T-00006), which evaluated design basis fires involving 32 pounds of polyethylene and, in Attachment A, Sheet No. A-49, 353 kilograms of polyethylene? Why don't the two analyses, dealing with the same fire area, evaluate consistent design fire scenarios | • HC 10 or HC 11 is 1369 kW·<br>• HC 12 or HC 13 is 1403 kW.<br>This exceeds the 1000 kW Heat Release Rate calculated for 32 lbs of polyethylene for HC-1 in the LAB PSAR and 700 KW for 30 lbs of combustibles for HC 1 or HC 14 calculated in Calculation 24590-LAB-U1C-FPW-00001. The difference in the HRRs is described in c) below.<br><br>2) The hotcell fire DBE has not estimated the minimum hotcell fire load to produce a temperature in excess of 160°C at the C5 primary filter banks. As discussed in PSAR section 3.4.1.2.6, the air temperature in the exhaust plenum of the filtration system did not exceed 150°C (maximum temperature is approximately 130°C) for the fires evaluated (32 pounds of material).<br><br>3) The hotcell fire DBE has calculated that approximately 3 kg of soot is generated by burning 32 pounds of plastic and that approximately 92 grams of radioactive aerosols will be generated. Assuming that C5 continues to operate, the soot will mix with ventilation flows from other areas before passing through three filter banks, each containing four HEPA filters. Therefore, this material spreads out over 12 active filters. Each filter can accommodate 600 g of aerosol. The filters (12 x 600 g = 7200 g of particles) are able to accommodate this aerosol loading (3092g) without plugging. An estimate of the minimum hotcell fire load necessary to produce plugging of the C5 primary filter bank is approximately 76 pounds ([7200 gm material to plug filters / 3000 gm generated by 32 lbs] x 32 lbs). This conclusion does not depend on the status of the C5 fans.<br><br>4) The hotcell fire DBE assumes the following: | verified by the revised analyses (fire DBE and hotcell FHA) before the construction of analytical laboratory design features that could be impacted if flashover conditions are determined to exist. |

| Question No. | U.S. Department of Energy (DOE), Office of River Protection (ORP) Question | Contractor Response | ORP Disposition |
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| | with coordinated heat release rate (HRR) curves?<br><br>d) What is the documented overall conservatism in the Analytical Laboratory Hotcell Fire Analysis (24590-LAB-U1C-FPW-00001), and the DBE analysis (24590-LAV-Z0C-W14T-00006), given the differing methods used to perform these analyses?<br><br>e) What large-scale test data was used to perform or confirm the results of the flashover analysis and where is this documented?<br><br>f) On what basis were manipulator boots, cable insulation, and other combustibles in the LAB hotcell excluded from consideration in the fire hazard and DBE analyses? | • All of the material at risk in the hot cell is involved in the fire, that is, the damage ratio (DR) is 1<br>• ARF and RF have been assigned based on DOE-HDBK-3010<br>• There is no forced ventilation. Material released by the fire leaks out of the hotcell directly to the environment.<br>• The hotcell leak path factor and X/Q have been conservatively accounted for.<br><br>Increases in the combustible loading assumed in the analysis will result in higher hotcell pressures during the fire. Increased pressure may increase the leak path factor, that is, a larger fraction of the material may reach the environment. Increased combustible material loads will be evaluated in the future to determine bounding consequences.<br><br>A scenario in which all material is assumed to be released through the filters rather than through the hotcell structure has been evaluated. This evaluation uses the bounding values from section 5.4.1 of DOE Handbook - 3010 to determine the consequences of a failure of the C5 exhaust HEPA filters during a fire. In this event, the mitigated consequences to the co-located worker are 2 rem and consequences to the public are 2E-3 rem. See attachment 5 for further discussion of the evaluation. This evaluation will be included as a beyond design basis event in the next PSAR update.<br><br>5) Calculation 24590-LAB-U1C-FPW-000001 has made the assumption that the maximum amount of combustibles in HC 1 or HC 14 is 30 lbs and 15 lbs for HC 2, HC 3, HC 4, HC 5, HC 6, HC 7, HC 8, HC 9, HC 10, HC 11, HC 12, HC 13. Additionally, LAB PFHA 24590-LAB-RPT-ESH-02-001, | |

| Question No. | U.S. Department of Energy (DOE), Office of River Protection (ORP) Question | Contractor Response | ORP Disposition |
|---|---|---|---|
| | | Revision 1, Appendix B, Tables B-3, lists the amount of combustibles in each cell. LAB PFHA-LAB-RPT-EHS-02-001 is listed as a reference in the LAB PSAR.<br><br>During review of the fire scenario, the justification for the ARF and RF values used in the DBE was questioned (see Table 2 in 24590-LAB-Z0C-W14T-00006). This justification will be updated by the next PSAR update to agree with the text in DOE-HDBK-3010 as follows: "These represent bounding ARF and RF values. From Section 7.3.11.2 of the DOE-HDBK-3010, small 20-ml sample vials will not support internal pressures and the lids will fail due the heat flux of the fire."<br><br>6) PFHA 24590-LAB-RPT-ESH-02-001, Revision 0 identified that a fire within the hotcell may reach post flashover temperatures of 1600-1800 degrees F and thereby damage the C5 HEPA filters. Without specific combustible loading information, it was assumed that a fire within the hotcell would reach flashover. As design evolved, and as a result, an exercise performed with LAB Process Engineering it was ascertained that there was approximately 0 to 5 lbs of transient combustible material within each cell. Realizing that there would be additional combustible loading and to allow for operation flexibility, scoping calculations where performed using NRC spreadsheets to determined what the maximum storage area and amount of combustibles could be present to not exceed a 500 F layer temperature, these values where determined to be 30 and 15 lbs respectively. These scoping calculations were the basis for determining the combustible loading within each hotcell. It was also determined that since the stainless steel partitions separating various cells were SC-3 and welded to the stainless steel | |

| Question No. | U.S. Department of Energy (DOE), Office of River Protection (ORP) Question | Contractor Response | ORP Disposition |
|---|---|---|---|
| | | confinement of the hotcell that it was not physically possible for combustibles from one cell to combine with combustibles from another cell. These scoping calculations were validated and used in calculation 24590-LAB-U1C-FPW-00001 with the sole purpose of supporting the LAB PFHA. The heat release rate was determined by extensive research of various sources (National Institute of Standards and Technology [NIST], NFPA, SFPE Handbook, DOE, NRC, Google Searches, etc). The most conservative value was obtained from the SFPE Handbook.<br><br>The determination of the 32 lbs of polyethylene for the DBE calculation were based on the LAB PFHA information that there was a total of 32 lbs of plastic throughout the entire Analytical Laboratory Hotcell. The scenario that described the use of 353 kg of polyethylene was a previous scenario and no longer applies. The DBE calculation Attachment A will be revised to remove discussions regarding past analyses and systems configurations (e.g. oil filled windows) that existed at the time the analysis was initiated.<br><br>To be conservative the 32 lbs of plastic was all considered to be located within Hotcell 1 since it is the closest cell to the C5 HEPA filters. The fire loading is based on 32 lbs (14.5 kg) of polyethylene. Polyethylene was selected to represent the fire loading because of its high heat of combustion (43 MJ/kg). Thus, the total energy available for release is 623 MJ. If released over a 5 minute period with an efficiency of 80% the resulting heat release rate (HRR would be 1.7 MW). This HRR would be considered the upper extreme bound on the fire behavior. If spread over 10 minutes the HRR would be 0.8 MW. A more likely rate can be obtained from data on full scale trash fires. For an effective diameter of 0.8 meters the | |

| Question No. | U.S. Department of Energy (DOE), Office of River Protection (ORP) Question | Contractor Response | ORP Disposition |
|---|---|---|---|
| | | HRR for a packing density of 30 kg/m3, would be 0.4 MW. There is other data on full scale for burning trash. A 4.1 kg sack produced a HRR of 0.35 MW. The duration of this peak was about 200 seconds with a total fire duration exceeding 9 minutes. A scale-up based strictly on mass would result in a Peak Heat Release Rate (PHRR) of 1.2 MW. Such a scale up is often over conservative, thus the PHRR will be taken as 1.0 MW in developing the nominal fire curve.<br>*(These HRR values are consistent with the information provided by Schirmer Engineering:*<br>• *Heat Release Rate Tests of Plastic Containers* by D.W. Stroup and D. Madrzykowski of the Building and Fire Research Laboratory (BFRL) at the NIST. *Two experiments were conducted to help characterize the potential hazard from ignition of two nominally 136 L (30 gal) trash containers made from high density polyethylene (HDPE) and loaded with cellulosic debris. Each trash was approximately 515 mm in diameter and 700 mm tall. The trash container alone had a mass of 3.6 kg (8lbs). Each trash container had 10 kg of debris "typical of a construction site. An open flame was applied to the contents of the trash container using a propane torch. The trash was lit approximately half-way down the container and next to the side of the container. The HRR from Trash container 1 grew to a maximum of approximately 300 KW prior to being suppressed at approximately 800 seconds. The heat release from Trash container 2 tracked the development of the fire in Trash Container 1 for the first 3 minutes after ignition. Then the heat release rates diverge with trash container 2 only reaching a peak of approximately 150KW. SUMMARY: the two trash* | |

| Question No. | U.S. Department of Energy (DOE), Office of River Protection (ORP) Question | Contractor Response | ORP Disposition |
|---|---|---|---|
| | | *containers were observed to burn in a different manner due to the way the containers melted. In the first test, the container opened up from the top down and had a PHRR of approximately 300 KW. In the second test, the trash container melted and opened from the midpoint in the container down. This resulted in a container that tended to close into itself instead of open up and yielded a PHRR of approximately 150 KW. While these two experiments provided some insight into the HRR and heat flux from the trash containers and debris described above, fire development is dependent on many factors, including: material (fuel) properties, material geometry, containment and ventilation to name a few. In these experiments, a change in how the container melted resulted in a significant difference in Heat Release Rate.* The 300 KW Peak Heat Release Rate for a container containing 3.6 kg of polyethylene and 10 kg of cellulosic material used in *Heat Release Rate Tests of Plastic Containers* is less than the 350 KW Peak Heat Release Rate used in the DBE Calculation. Proportionally, each heat release curve supports the results of the other.<br><br>*Centre for Advanced Engineering, Fire Engineering Design Guide, A H Buchanan, page31 Table 4.2: Rates of burning for some liquid and solid fuels, Heat Release Rate for Polyethylene is listed as 1.36 MW/m$^2$ (floor).* This matches Calculation 24590-LAB-U1C-FPW-00001, Section 2.2 Confirmed Inputs, Polyethylene Peak Heat Release rate per unit floor area of fuel (Q") listed as 1400 kW/m2. The heat release rate used in calculation 24590-LAB-U1C-FPW-0001 is based on: | |

| Question No. | U.S. Department of Energy (DOE), Office of River Protection (ORP) Question | Contractor Response | ORP Disposition |
|---|---|---|---|
| | | Q = (Q" AFuel)<br><br>Where<br>AFuel = Storage Area Fuel Surface Area (m2)<br>Q" = heat release rate per unit floor area of fuel (kW/m2)<br><br>AFuel = 0.50 m2<br><br>Q" = 1400 kW/m2<br><br>Q = 700 kW<br><br>Therefore the information provided by Schirmer Engineering supports both the modeling used in the CFAST calculation using a full scale heat release curve and the theoretical values used in the bench scale values used in Calculation 24590-LAB-U1C-FPW-00001.<br><br>b) Calculation 24590-LAB-U1C-FPW-0001 used the following conservatisms.<br>• When predicting fire duration it is calculated that 100% of the available combustibles are consumed by the fire. In reality, a fire never completely consumes all of the available combustibles.<br>• Since the walls, floor, and ceilings of the hotcell are either stainless steel or concrete a calculation to determine gas layer temperature was performed if a cell was all stainless steel or all concrete and reported the most conservative of the two. In reality, the temperature would be between the two values calculated.<br>• To determine gas layer temperature a conservative fire duration of 20 minutes was used versus the calculated | |

| Question No. | U.S. Department of Energy (DOE), Office of River Protection (ORP) Question | Contractor Response | ORP Disposition |
|---|---|---|---|
| | | time of 15.07 minutes fire duration.<br>• The main level of conservatism involved the calculations to predict the minimum heat release rate necessary for flashover. Researchers have extensively studied the minimum HRR needed to cause flashover in a compartment. The studies suggest that minimum heat release rate increases with the size of the compartment and depends, in a complicated way, on the ventilation in the compartment. If there is too little ventilation, flashover cannot occur. If there is an excessive amount of ventilation, the excess airflow dilutes and cools the smoke, so a larger HRR is needed to reach the critical temperature condition for flashover. (In calculation 24590-LAB-U1C-FPW-0001, one of the vent openings between cells was conservatively considered to be blocked by an object being moved by the overhead monorail crane, thus, the heat release rate calculated is conservatively below the actual heat release rate. This is further illustrated in Attachment 1). The construction materials and thickness of the ceiling and upper walls are important factors in determining whether flashover will occur. These factors also determine the time required for flashover in a compartment that does reach the critical temperature.<br><br>Researchers have used several approaches to estimate the onset of flashover within a compartment. These approaches are typically based on simplified mass and energy balances in a single-compartment fire along with correlations to fire experiments.<br><br>Visually, researches report flashover as a discrete event in full scale fire tests and actual fire incidents. Numerous variables | |

| Question No. | U.S. Department of Energy (DOE), Office of River Protection (ORP) Question | Contractor Response | ORP Disposition |
|---|---|---|---|
| | | can affect the transition of a compartment fire to flashover. Thermal influences are clearly important where radiative and convective heat flux are assumed to be driving forces. Ventilation conditions, compartment volume, and chemistry of the hot gas layer can also influence the occurrence of flashover. Rapid transition to flashover adds to the uncertainty of attempts to quantify the onset of flashover with laboratory experiments. Although the flashover process is not easy to quantify in terms of measurable physical parameters, a working definition can formulated from the considerable body of flashover-related full-scale fire test data accumulated from a variety of sources. The occurrence of flashover within a compartment is the ultimate signal of untenable conditions within the compartment of fire origin as well as a sign of greatly increased risk to other compartments within the building (LAB Hotcell) A number of experimental studies of full-scale fire have been performed to provide simple correlations to predict HRR required for flashover. These include the following methods that were used to predict the minimum HRR needed to reach flashover in calculation 24590-LAB-U1C-FPW-0001:<br>• Method of McCaffrey, Quintiere, and Harkleroad (MQH);<br>• Method of Babrauskas; and<br>• Method of Thomas<br><br>The most conservative result of these three methods was reported as results. Attachment 2 Illustrates the wide variety of heat releases obtained in calculation 24590-LAB-U1C-FPW-00001.<br><br>As noted in part b) 4 above, an evaluation has been performed that evaluates a beyond design basis fire. The conclusions are included here as attachment 5. | |

| Question No. | U.S. Department of Energy (DOE), Office of River Protection (ORP) Question | Contractor Response | ORP Disposition |
|---|---|---|---|
| | | c) As described in d) above, full-scale tests were used to develop the methods for predicting the minimum heat release necessary for flashover. Calculation 24590-LAB-U1C-FPW-00001 used experimental data from the SFPE handbook and the DBE calc 24590-LAB-Z0C-W14T-00006 used scaled-up full-scale test data, respectively, as inputs to the heat release rate for the prediction methods.<br><br>d) Since the fire scenario in 24590-LAB-U1C-FPW-00001 does not reach flashover, it is reasonable to assume that not all of the combustibles within a cell will ignite.<br>However, the LAB PFHA included assumptions for the combustible loading within each hotcell. The transient combustibles will range from 0 to 5 pounds. To capture the additional combustible loading (manipulator boots, cords, etc) scoping calculations were performed to determine the upper bound of combustibles that could be present and maintain the upper gas temperature below 500 °F. Since these values are assumptions, they will need to be verified in future revisions of the PFHA.<br><br>Additionally, to demonstrate what effects a 50% greater combustible loading and 50% increase in storage area fuel surface area would have on gas layer temperature draft results are illustrated in Attachment 3 and 4.<br><br>During meetings to discuss the resolution of this question, it was identified that the combustible loads quantities analyzed in the fire DBE calculation and Hotcell FHA may not be limiting. Quantities of combustible materials in the hotcells could be twice as high as was assumed in the analyses. Based on the margin to flashover conditions, on either a temperature | |

| Question No. | U.S. Department of Energy (DOE), Office of River Protection (ORP) Question | Contractor Response | ORP Disposition |
|---|---|---|---|
| | | or peak heat release basis documented in the current hotcell fire analyses, the potential increase in combustible loads should not result in flashover conditions in the hotcells and would result in an insignificant increase in the mitigated dose to the co-located worker due to cell pressurization during the fire event. This conclusion can be verified by the revised analyses (fire DBE and Hotcell FHA) before the construction of LAB design features that could be impacted if flashover conditions are determined to exist.<br><br>The fire DBE calculation (24590-LAB-Z0C-W14T-00006) and Hotcell FHA (24590-LAB-U1C-FPW-00001) will be revised to have consistent input (e.g., fire loading) assumptions and fire scenarios. Combustible load limits used in these calculations will be protected by operating limits defined in the WTP Combustible Control Program and Technical Safety Requirements, as necessary. The amended calculations will: a) itemize combustibles (fixed and transient) used in each hotcell analysis to confirm the assumptions used in the calculations, and b) show the degree of conservatism in the Hotcell FHA analysis by calculating the hypothetical fire load necessary for flashover conditions. The revision will occur on a schedule mutually agreed to by BNI and ORP. | |
| **AL-PSAR-020** | This question dealt with fire resistance and containment of radioactive materials.<br><br>a) What procedures and methods will be implemented to assure the fire resistance of these various openings whenever the devises have been removed for maintenance, etc.? | a) The fire Safety group has drafted a fire protection system impairment procedure that will be implemented prior to commissioning of the LAB.<br><br>b) The current design of the shielded transfer tunnel, located in the hot cell floor, has covered openings in the top that allows access to a transfer cart. The construction of the shielding for the transfer tunnel is substantially heavier then the construction used for a fire barrier. The doors leading to the transfer tunnel are maintained closed unless a transfer is underway. | The response is acceptable subject to the changes below. The hotcell structure is required to provide confinement for the duration of the postulated DBE fire, including protection for necessary penetrations. A fire protection impairment procedure has been drafted and |

| Question No. | U.S. Department of Energy (DOE), Office of River Protection (ORP) Question | Contractor Response | ORP Disposition |
|---|---|---|---|
| | b) What fire resistance can be ascribed to the transfer drawer/glove box entry systems to the hotcell and any other openings not included in memorandum CCN 076664? | During the time of a transfer, one door is opened and the four sided cart, located in the tunnel, is loaded. Once loaded the cart moves to the transfer point using a screw drive. The door used to load the cart is closed and the transfer door is opened and the items are removed from the cart and the door closed.<br><br>The current design of the shielded transfer imports and exports, located in the hotcells has covered openings on the top of a shielded drawer-like device - one opening and cover is inside the hotcell and one is outside the hotcell wall (exports have glove boxes on the exterior). The construction of the shielding for the imports/exports is substantially heavier then the construction used for a fire barrier. The openings are maintained closed unless a transfer is underway.<br><br>During the time of a transfer, the one cover is opened, the object to be transferred is loaded, and the cover is closed. The object is rolled through the drawer to the area below the other opening, the cover is opened, the object lifted out of the transfer import/export, and the cover closed.<br><br>Based upon the methods of operation described and the heavy construction of these shielded transfer openings, it is the fire protection engineer's professional judgment that the hot cell integrity will not be jeopardized by the postulated fire. | will be implemented prior to commissioning. In addition, the design and operation of the transfer tunnel, opening, and drawer (that is not described in the PFHA) is such that it will not jeopardize the required containment. As a Condition of Acceptance, BNI must issue the final fire protection procedure prior to commissioning. |
| **AL-PSAR-021** | This question dealt with the ion exchange system in the hotcell.<br><br>a) What is the size of the ion exchange system used in the hot cells to remove?<br><br>b) radiocesium from the samples? | a) The Ion Exchange (IX) columns used for the removal of radiocesium in the hotcells are small, commercially available columns that contain approximately 3 grams of resin. The volume of sample processed through these columns will contain approximately 0.002 grams of dissolved solids from the PT or HLW Processes. Each column is used one time before disposal to solid waste. The resin is an inorganic resin $[(NH_4)_3P(Mo_3O_{10})_4]$ demonstrated to be effective for the removal of cesium at Savannah River Site. The compound was | The response is acceptable. The ion exchange system is so small that it doesn't present a safety problem. |

| Question No. | U.S. Department of Energy (DOE), Office of River Protection (ORP) Question | Contractor Response | ORP Disposition |
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| | c) What are the typical and maximum loadings of radiocesium on the resin before elution?<br><br>d) Where is the radiocesium sent after elution?<br><br>e) What is done with the spent ion exchange resin?<br><br>f) Has an accident been analyzed for the loaded ion exchange resin, and if so, what were the results? | chosen because it is an inorganic material and therefore both the flammability and stability to radiation damage is minimized.<br><br>b) , c), and d) One IX column is used per sample. Multiple samples cannot be used in a single IX column because it could cause cross-contamination of samples. After the IX columns are used once, the entire column is disposed as solid waste; the columns are not eluted.<br><br>e) An accident scenario with a loaded IX system has not been considered because the columns will never become loaded.<br><br>f) The mass of radiocesium processed through IX column (i.e. 0.002 g) is insignificant compared to the 5 g of dissolved and undissolved solids in the PT and HLW samples that are typically received by the hotcell where removal of radiocesium by IX is carried out. Therefore, a radiological dose consequence scenario is not required for the material that is loaded on the IX column. | |
| **AL-PSAR-022R** | This question dealt with the LAB risk estimate.<br><br>What is the impact to the LAB ORA of incorporating the latest version of SIPD (Chapter 3, appendix A) submitted with the LAB PSAR? | 1. BNI will develop a written process within 60 days of the LAB PSAR approval to periodically assess the performance of barriers, engineered safety features and administrative controls as discussed in Schepens 3-31-03 letter to Naventi (03-AMWTP-025).<br><br>2. As a result of the known and anticipated changes in the WTP that have or will occur prior to the next PSAR update, BNI will requantify the ORA and submit the results of the requantification prior to the next revision of the PSAR in December 2005. If, after development of the process in Item 1, an assessment determines that requantification is not likely to conclude that the risk goals for the WTP may be exceeded, | The response is acceptable. It makes a commitment to address the question in a requantification of the LAB risk estimate before submittal of the next revision of the LAB PSAR in 2005. This commitment to a future resolution of the questions is considered acceptable because it will allow sufficient time to perform further analysis or consider mitigative actions |

| Question No. | U.S. Department of Energy (DOE), Office of River Protection (ORP) Question | Contractor Response | ORP Disposition |
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| | | BNI may request a delay in the requantification.<br><br>3. BNI will provide a schedule for requantification that commits to requantify the LAB risk as the first phase of the overall requantification effort. The schedule will be provided within 60 days of ORP approval of the LAB PSAR. | before approval of the final LAB design if unexpected problems arise in the LAB risk estimate. In addition, the response makes a commitment to requantify the entire ORA (including the laboratory portion) and to develop a procedure for periodic assessment of the impact to the ORA of ongoing design changes. These further commitments will be tracked, reviewed and approved by ORP as part of the risk assessment and ORA requantification process. |
| **AL-PSAR-023** | This question dealt with the LAB risk estimate.<br><br>What is the impact to the LAB ORA of revising the assumption that the C3 hood prefilter drop accident consequences are at the severity level maximum of 0.1 REM for a public receptor? | 1. BNI will develop a written process within 60 days of the LAB PSAR approval to periodically assess the performance of barriers, engineered safety features and administrative controls as discussed in Schepens 3-31-03 letter to Naventi (03-AMWTP-025).<br><br>2. As a result of the known and anticipated changes in the WTP that have or will occur prior to the next PSAR update, BNI will requantify the ORA and submit the results of the requantification prior to the next revision of the PSAR in December, 2005. If, after development of the process in Item 1, an assessment determines that requantification is not likely to conclude that the risk goals for the WTP may be exceeded, BNI may request a delay in the requantification.<br><br>3. BNI will provide a schedule for requantification that commits | The response is acceptable. It makes a commitment to address the question in a requantification of the LAB risk estimate before submittal of the next revision of the LAB PSAR in 2005. This commitment to a future resolution of the questions is considered acceptable because it will allow sufficient time to perform further analysis or consider mitigative actions before approval of the final LAB design if unexpected problems arise in the LAB risk |

| Question No. | U.S. Department of Energy (DOE), Office of River Protection (ORP) Question | Contractor Response | ORP Disposition |
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| | | to requantify the LAB risk as the first phase of the overall requantification effort. The schedule will be provided within 60 days of ORP approval of the LAB PSAR. | estimate. In addition, the response makes a commitment to requantify the entire ORA (including the laboratory portion) and to develop a procedure for periodic assessment of the impact to the ORA of ongoing design changes. These further commitments will be tracked, reviewed and approved by ORP as part of the risk assessment and ORA requantification process. |
| **AL-PSAR-024R** | This question dealt with the LAB risk estimate.<br><br>What is the impact to the LAB ORA of incorporating the changes in SSC classification as a result of ABAR 24590-WTP-SE-ENS-03-032? | 1. BNI will develop a written process within 60 days of the LAB PSAR approval to periodically assess the performance of barriers, engineered safety features and administrative controls as discussed in Schepens 3-31-03 letter to Naventi (03-AMWTP-025).<br><br>2. As a result of the known and anticipated changes in the WTP that have or will occur prior to the next PSAR update, BNI will requantify the ORA and submit the results of the requantification prior to the next revision of the PSAR in December, 2005. If, after development of the process in Item 1, an assessment determines that requantification is not likely to conclude that the risk goals for the WTP may be exceeded, BNI may request a delay in the requantification.<br><br>3. BNI will provide a schedule for requantification that commits to requantify the LAB risk as the first phase of the overall requantification effort. The schedule will be provided within 60 days of ORP approval of the LAB PSAR. | The response is acceptable. It makes a commitment to address the question in a requantification of the LAB risk estimate before submittal of the next revision of the LAB PSAR in 2005. This commitment to a future resolution of the questions is considered acceptable because it will allow sufficient time to perform further analysis or consider mitigative actions before approval of the final LAB design if unexpected problems arise in the LAB risk estimate. In addition, the response makes a commitment to requantify the entire ORA |

| Question No. | U.S. Department of Energy (DOE), Office of River Protection (ORP) Question | Contractor Response | ORP Disposition |
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| | | | (including the laboratory portion) and to develop a procedure for periodic assessment of the impact to the ORA of ongoing design changes. These further commitments will be tracked, reviewed and approved by ORP as part of the risk assessment and ORA requantification process. |
| **AL-PSAR-025** | This question dealt with the LAB risk estimate.<br><br>What is the impact to the LAB ORA of incorporating the "passive confinement" decontamination factors credited in chapter 3 of the PSAR during accidents involving C5 loss of depression? | 1. BNI will develop a written process within 60 days of the LAB PSAR approval to periodically assess the performance of barriers, engineered safety features and administrative controls as discussed in Schepens 3-31-03 letter to Naventi (03-AMWTP-025).<br><br>2. As a result of the known and anticipated changes in the WTP that have or will occur prior to the next PSAR update, BNI will requantify the ORA and submit the results of the requantification prior to the next revision of the PSAR in December, 2005. If, after development of the process in Item 1, an assessment determines that requantification is not likely to conclude that the risk goals for the WTP may be exceeded, BNI may request a delay in the requantification.<br><br>3. BNI will provide a schedule for requantification that commits to requantify the LAB risk as the first phase of the overall requantification effort. The schedule will be provided within 60 days of ORP approval of the LAB PSAR. | The response is acceptable. It makes a commitment to address the question in a requantification of the LAB risk estimate before submittal of the next revision of the LAB PSAR in 2005. This commitment to a future resolution of the questions is considered acceptable because it will allow sufficient time to perform further analysis or consider mitigative actions before approval of the final LAB design if unexpected problems arise in the LAB risk estimate. In addition, the response makes a commitment to requantify the entire ORA (including the laboratory portion) and to develop a procedure for periodic |

| Question No. | U.S. Department of Energy (DOE), Office of River Protection (ORP) Question | Contractor Response | ORP Disposition |
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| | | | assessment of the impact to the ORA of ongoing design changes. These further commitments will be tracked, reviewed and approved by ORP as part of the risk assessment and ORA requantification process. |
| **AL-PSAR-026R** | This question dealt with the LAB risk estimate.<br><br>1. Under the current laboratory design, what is the reliability of the fire suppression system, which was assumed to be SIL-2 with a failure rate of 5E-3/demand in the preliminary LAB risk assessment?<br><br>2. What is the impact to the LAB risk assessment of revising this assumption? | 1. BNI will develop a written process within 60 days of the LAB PSAR approval to periodically assess the performance of barriers, engineered safety features and administrative controls as discussed in Schepens 3-31-03 letter to Naventi (03-AMWTP-025).<br><br>2. As a result of the known and anticipated changes in the WTP that have or will occur prior to the next PSAR update, BNI will requantify the ORA and submit the results of the requantification prior to the next revision of the PSAR in December, 2005. If, after development of the process in Item 1, an assessment determines that requantification is not likely to conclude that the risk goals for the WTP may be exceeded, BNI may request a delay in the requantification.<br><br>3. BNI will provide a schedule for requantification that commits to requantify the LAB risk as the first phase of the overall requantification effort. The schedule will be provided within 60 days of ORP approval of the LAB PSAR. | The response is acceptable. It makes a commitment to address the question in a requantification of the LAB risk estimate before submittal of the next revision of the LAB PSAR in 2005. This commitment to a future resolution of the questions is considered acceptable because it will allow sufficient time to perform further analysis or consider mitigative actions before approval of the final LAB design if unexpected problems arise in the LAB risk estimate. In addition, the response makes a commitment to requantify the entire ORA (including the laboratory portion) and to develop a procedure for periodic assessment of the impact to the ORA of ongoing design changes. These further |

| Question No. | U.S. Department of Energy (DOE), Office of River Protection (ORP) Question | Contractor Response | ORP Disposition |
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| | | | commitments will be tracked, reviewed and approved by ORP as part of the risk assessment and ORA requantification process. |
| **AL-PSAR-027** | This question dealt with passive confinement boundaries.<br><br>a) There appears to be an inconsistency regarding filters in the C2/C3 to C5 inbleed ductwork. The PSAR Section 4.4.2.2 identifies the filters to be HEPA type, whereas the V&ID 24590-LAB-M8-C5V-00001001, Revision 0 drawing calls them medium efficiency filters. What is the filter type that will be used?<br><br>b) In the LAB the C5 inbleed comes directly from the C2 area. If medium efficiency filters are used, provide justification that these filters will be adequate to protect the worker from flow reversals from C5 into C2.<br><br>c) The C2/C3 to C5 inbleeds are safety significant. The V&ID identifies a fire damper in the inbleed ductwork. What seat leakage criteria will the fire | a) & b) DCN 24590-LAB-M8N-C5V-00001 modified the inbleed to change the moderate efficiency filter to HEPA.<br><br>c) The inbleed fire damper is solely for the protection of the HEPA filter during a hotcell fire event. There are no leakage requirements for this component since the HEPA filter provides the boundary against leakage. The proposed surveillance requirements for the fire dampers are discussed in LAB PSAR section 5.5.3. The wording for a draft TSR would typically be: "Fire dampers shall be tested in accordance with NFPA 90A, Standard for the Installation of Air-Conditioning and Ventilating Systems to ensure that the fire dampers operate as intended." The frequency of testing would typically be every 2 years. | The response is acceptable. Filters located in the C2/C3 to C5 in-bleed ductwork are HEPA type, not medium efficiency filters. A DCN was issued by the contractor to change the filters to HEPA type. The V&ID drawing will be changed to show HEPA filters as described by the DCN. Additionally, the function of the fire damper located in the in-bleed ductwork is to protect the HEPA filter and does not have to be of a low seat leakage design. Standard NFPA operational verification testing will be performed on the fire damper. |

| Question No. | U.S. Department of Energy (DOE), Office of River Protection (ORP) Question | Contractor Response | ORP Disposition |
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| | damper be purchased to? Also, provide details of TSR surveillance test requirements for this damper. | | |
| **AL-PSAR-028** | This question dealt with the in cell mechanical handling equipment.<br><br>a) What seismic classification is the in cell monorail, hoists, solid waste handling system, and the auto-sampling system (ASX) designed to?<br><br>b) For the equipment and systems identified above, please clarify whether they are ITS.<br><br>c) What is the impact to existing DBE analyses of a failure to any of the equipment and systems identified above? What seismic classification is the in cell monorail, hoists, solid waste handling system, and the auto-sampling system (ASX) designed to? | a) and b) ITS structure, system, and components (SSCs) in the LAB that are classified as SS are designed to Seismic Category III; the LAB has no Safety Class (SC) SSCs. Specific to items listed in a) above - the hotcell monorail - from Section 4.4.2.3, the monorail airlocks must maintain continuity of the confinement boundary and are SS and SC-III, the hotcell monorail itself is not ITS. The hoists, solid waste handling system (with the exception of the waste transfer port which provides confinement and is classified as SS) and the ASX are not ITS.<br><br>c) Failure of any of the non-ITS SSCs does not impact the existing DBE analysis. SSCs are identified during the ISM process based on identified hazards related to the facility design and operations. | The response is acceptable. LAB In-cell handling systems and components in the LAB that are classified as SS and are designed to Seismic Category III are the hotcell monorail airlocks since they must maintain continuity of the confinement boundary, and the waste transfer port which provides confinement. The hotcell monorail itself is not ITS. The hoists, solid waste handling system and the ASX are also not ITS. There are no runway support beams or monorails that perform a safety function. Failure of any of the non-ITS SSCs has no adverse impact on the existing DBE analyses. |
| **AL-PSAR-029** | This question dealt with safety functional requirements.<br><br>Since the C5V exhaust fans are non ITS, QL-2 components, why | The sentence stating that the structural components allow the ventilation system to maintain a negative differential pressure (an Additional Protection Class [APC] SCR) is inappropriate in the discussion of functional requirements for safety significant SSCs. No reliance on APC SSCs is credited to provided static | The response is acceptable. BNI has agreed to remove the statement from the PSAR that refers to reliance on APC SSCs to provide static confinement |

| Question No. | U.S. Department of Energy (DOE), Office of River Protection (ORP) Question | Contractor Response | ORP Disposition |
|---|---|---|---|
| | is providing the ability to maintain a negative pressure in the hotcell a safety related functional requirement? | confinement functionality. This sentence will be deleted from PSAR section 4.4.2.3 prior to being submitted for DOE approval. | functionality. This will be done prior to submittal of the PSAR to DOE for approval. |
| **AL-PSAR-030** | This question dealt with pneumatic transfer of samples.<br><br>What hazard and accident analysis has been done to evaluate events involving pneumatic transfer of samples between facilities, including stuck capsules in transit and breached transfer lines? | During the ASX hazard analysis process, each facility was looked at separately. The ASX boundary for the LAB is at the facility wall and includes the transfer piping inside the facility. The pneumatic transfer system (PTS) outside the LAB that connects to the other facilities is shown in Pre-Treatment P&IDs, therefore, the hazards analyzed for the PTS are included in the Pre-Treatment section of SIPD as draft entries. The hazards analyzed were direct radiation due to a stuck carrier in the PTS outside a facility, carrier breakout due to PTS failure, multiple carrier breakout during a seismic event, and direct radiation hazard from spread of contamination through the PTS when there is a breach of the sample carrier inside the PTS. These hazards will be addressed in the next PSAR update.<br><br>The most severe consequences resulting from these hazards were qualitatively determined by the ISM team to be moderate to the Facility Worker for the direct radiation hazard related to transfer of the cesium sample. The radiation release scenarios, resulted in low to the Facility Worker with SL-4 to the Public and the Co-located worker this is based on a single sample spill as quantified in the *Unmitigated Consequence Calculations of the Lab Facility*, 24590-LAB-Z0C-W14T-00003. | The response is acceptable. Events involving the inter-facility PTS will be included in the authorization basis with the next PT PSAR update. Discussion with the contractor clarified the PT PSAR will address PTS events for all facilities and these analyses include appropriate sample waste streams; e.g., sample transfer from the HLW facility is included with the appropriate HLW waste stream in the PT PSAR. |
| **AL-PSAR-031** | This question dealt with severity level calculations for the LAB facility.<br><br>How are the assumptions cited in the attachment compatible with the SRD Appendix B section | During discussion with the DOE for development of the Laboratory PSAR, the inventory for the Laboratory was revisited. The changes to the inventory are as follows:<br><br>**Hot Cells**<br><br>The maximum count of sample bottles that will be present in the | The response is acceptable. While the inventory is still conservative, it is more realistically related to assuring operational flexibility of the laboratory. |

| Question No. | U.S. Department of Energy (DOE), Office of River Protection (ORP) Question | Contractor Response | ORP Disposition |
|---|---|---|---|
| | cited above? (A numerical event probability estimate is not expected in responding to this question.) | Hot Cells at any given time over a 24-hour period is 126-20 ml samples and 8-250 ml Tank Farm sample bottles. Normalizing to 20 ml sample bottles, a total of 226-20 ml sample equivalents are anticipated. An additional 15 % should be added to account for sample rework. Therefore, the estimated maximum count of 20 ml sample equivalents present in the hot cells during steady state operations is 226*1.15 = 260- 20 ml sample equivalents.<br><br>Of the 260 sample equivalents, about 99% will contain liquid/slurry samples and the remaining 1% will contain HLW glass samples.<br><br>In addition to the inventory for day-to-day operations in the hot cells, reserve capacity must be provided in order to perform analyses necessary to support diagnostic troubleshooting of process upsets, optimization and improvements to limited technology, and other unscheduled samples. As a bounding case, it is assumed that analytical activities related to troubleshooting a process upset is conducted concurrent to analyses related to optimization studies for limited technology. The troubleshooting activity and the optimization study could each require 5 liters of sample material. An additional 2 liters is added to account for unscheduled samples or potential increases to the current sampling plan. Therefore, it is assumed that up to 12 liters of sample material could be introduced into the hot cells for these unscheduled analyses, potentially yielding an additional inventory of 12,000ml/20ml = 600 sample equivalents.<br>This material could be located in the hot cells, the C5 vessel, or a combination of the two locations.<br><br>**C5 Vessel (RLD-VSL-0165)**<br><br>The C5 vessel will be maintained with an expectation to minimize | |

| Question No. | U.S. Department of Energy (DOE), Office of River Protection (ORP) Question | Contractor Response | ORP Disposition |
|---|---|---|---|
| | | transfers to the PT Facility. Anticipated laboratory waste-waste generation will require transfer of the C5 vessel once every 30 days. Assuming a steady-state input into the tank of 30 samples/day over a 30-day period yields a result of 900 sample equivalents for routing operations.<br><br>As described above, additional reserve capacity must be provided in the C5 Vessel. The reserve capacity inventory is 600 sample equivalents.<br><br>A table was attached to the response, but is not included here. | |
| **AL-PSAR-032** | This question dealt with dampers in the hotcell inbleeds.<br>a) There appears to be an inconsistency regarding the dampers in the hotcell inbleeds. The V&ID cited above and other sections of the PSAR identify fire dampers in the hotcell inbleeds. The PSAR reference cited above refers to smoke dampers. Please clarify.<br>b) Assuming that the dampers are fire dampers, and if a fire were to occur in the hot cell with a concurrent unavailability of the C5V exhaust fans, what is the impact of smoke particles overloading the HEPA filter located in the hotcell inbleed. | a) The dampers on the hotcell inbleeds are fire dampers to protect the HEPA filters from heat from the hotcell fire. There are no smoke dampers on the inbleed lines. PSAR section 3.4.2.1.6 will be revised to indicate that the design includes fire not smoke dampers prior to the submittal of the PSAR for DOE review.<br><br>b) As a result of the fire, the hotcell is pressurized momentarily if the C5 ventilation system is not operating (to approximately 0.02 in. water column gauge pressure relative to the ambient) per PSAR 3.4.1.2.1. The function of the HEPA filters during a fire is to prevent an unfiltered release thru the inbleed lines, therefore, if the filters are fouled, a release is still prevented. Normally, the room where the inbleeds are located (room A-0141) has cascade airflow into the hotcell, pulled by C5V. If an alignment occurred during a fire where the C2V fans where ventilating room A-0141, the fans do not have the capacity to fail a fouled HEPA filter. Room A-0141 would have to get to -10 in. water column to fail the HEPAs. Therefore, there is no adverse affect of smoke fouling the inbleed HEPAs. | The response is acceptable. PSAR Section 3.4.2.1.6 will be revised to indicate fire dampers in the in-bleed ductwork rather than smoke dampers. Fire dampers are acceptable since in the event of smoke fouling of the HEPA filters, the C2V fan shutoff static pressure capability is insufficient to cause HEPA filter failure. |

| Question No. | U.S. Department of Energy (DOE), Office of River Protection (ORP) Question | Contractor Response | ORP Disposition |
|---|---|---|---|
| **AL-PSAR-033** | This question dealt with Quality Levels for LAB SSCs designated as SS and APC.<br><br>a) What is the Quality Level applied to the two types of LAB Important to Safety SSCs identified in the PSAR: 1) safety significant SSCs and 2) APC SSCs?<br><br>b) Has there been any reduction in Quality Level applied to SSCs as a result of the reclassification of SSCs as SC, SS, and APC?<br><br>c) How will the new SSC classification system effect procurement of Important to Safety SSCs?<br><br>d) Are engineering procedures in place, as required by Section 1.2.1 of QA Policy Q-02.1, for application of quality levels to the new Important to Safety SSC designations used for the LAB?<br><br>e) Is there a one-to-one quality level assignment for the three new safety classifications of | a) Safety significant items are QL-2 and APC items are commercial grade. In some instances (e.g., hotcell windows), the SS SSCs may be purchased as commercial items and dedicated for their intended function through commercial grade dedication.<br><br>b) & e) The definition of quality levels for ITS SSCs is as follows (ref procedure 24590-WTP-3DP-G04T-00905, Revision 3): SDC / SC = QL-1, SDS / SS = QL-2, and RRC / APC = commercial. RRC / APC items may be classified as QL-3 if they are IHLW affecting or AP if they have air permit requirements associated with them. 24590-WTP-GPP-SANA-002, Revision 11, Hazard Analysis, Development of Hazard Control Strategies, and Identification of Standards, section 3.6.8.2, further defines the quality levels for ITS SSCs as SC = QL-1, SS = QL-2 and APC as in accordance with the QAM and DOE Order 414.1A. On the WTP, compliance with DOE Order 414.1A is demonstrated by compliance with the QAM. In the case of APC SSCs, the ISM team evaluates APC SSCs to ensure compliance with the QAM and associated engineering procedures. This review will identify any additional WTP QAM elements that may be required beyond those required for CM. Should any requirements be identified beyond CM, they would be documented for application.<br><br>c) Quality levels are specified in engineering documents and flow through to procurement packages. Revisions to Quality Levels due to the new safety classifications have no effect on the procurement process for LAB ITS SSCs. However, as SSCs in HLW, PT, LAW, and Balance of Facilities (BOF) are reclassified from SDC/SDS/RRC to SC/SS/APC, there may be some effect on the procurement effort due to the potential downgrading of quality levels. The net effect has not been fully assessed for HLW, PT, LAW, BOF. | The response is acceptable. Quality levels for both SS and APC SSCs within the analytical laboratory are well defined and are covered by the QAM and procedure 24590-WTP-3DP-G04T-00905 Revision 3. |

| Question No. | U.S. Department of Energy (DOE), Office of River Protection (ORP) Question | Contractor Response | ORP Disposition |
|---|---|---|---|
| | SC, SS, and APC similar to what was done with SDC (QL-1) and SDS (QL-2)? | d) Procedure 24590-WTP-3DP-G04T-00905 Revision 3 issued 12/17/03, and in effect as of the issue date, covers the new SC, SS and APC safety classifications. | |
| **AL-PSAR-034** | This question dealt with the LAB Fire DBE.<br><br>a) What is the justification for using a wind speed of 11.1 mph in the DBE Fire calculation for the LAB facility in light of data obtained from Figure 1-6 of the PSAR General Information Volume which shows a probability for winds of 40 mph?<br><br>b) What method will BNI use to verify the assumptions used in the analysis of LPF? Certain key inputs used to determine LPF are estimated assumptions that should be verified. The effective air leakage area $A_E$ is taken from ASHRAE 2001 Table 1, page 26.15, which is generic in nature and not specific to the LAB. | a) The DBE: Fire in Laboratory Facility uses a highest average wind speed of 11.1 mph for a release over several hours (conservatively taken as 8 hours, see assumption 4 in the calculation). Thus, variable wind speed, including wind gusts, is accounted for in calculating the 'total release' and the 'total dose' from this release. In addition, presence of hotcell bay, which surrounds the hotcells, is conservatively ignored.<br><br>Use of this wind speed is also consistent with the atmospheric dispersion coefficient used in the calculation. The atmospheric dispersion coefficients $(\chi / Q)$ are calculated consistent with the methodology recommended in Regulatory Guide 1.145, "*Atmospheric dispersion Models for Potential Accident Consequence Assessments at Nuclear Power Plants*", 1982. The guide recommends that both 99.5 % sector specific and 95 % overall site $(\chi / Q)$ be calculated for each location of interest (Guide 1.145, Section 4). The limiting value for the WTP was found to be 99.5 % sector specific value (Section 2.1.6.5, 24590-WTP-GPG-SANA-004, Revision 2). Use of higher wind speeds leads to greater dispersion of plume, which leads to a smaller value of $(\chi / Q)$.<br><br>b) The LPF for the hot cell was determined using the methodology contained in the Draft DOE guidance; this guide provides a methodology for estimating a LPF. The guide however, says that for buildings not designed to contain materials by an active ventilation system or HEPA filters are relatively leaky and the LPF usually defaults to 1. In the case of the hot cell structure, it is designed to contain radiological materials. The penetrations are sealed and the walls and | The response is acceptable. The wind speed of 11.1 mph used in the Hot Cell Fire DBE calculation is based on meteorological data unique to Hanford and is acceptable. The Fire in the Laboratory Hot Cell DBE uses a highest average wind speed of 11.1 mph for a release over several hours. Thus, variable wind speed, including wind gusts, is accounted for in calculating the 'total release' and the 'total dose' from this release consistent with PSAR General Information Volume Figure 1-6. Additionally, inputs used in determining LPF were determined to be consistent with the methodology found in Draft DOE Guidance G 421.1-X. Leakage area criteria used in the Fire DBE calculation for hot cell windows, master slave manipulators, pipe and duct penetrations, and other potential leak paths were reviewed and found to be based on known standards and found |

| Question No. | U.S. Department of Energy (DOE), Office of River Protection (ORP) Question | Contractor Response | ORP Disposition |
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| | | floors are painted. The walls of the hot cell are roughly 3 feet thick, thus it is reasonable to assume any release or migration of material to the hot cell bay room is through a tortuous path. The selection of a LPF of 0.5 is described in Section 5.2.4 of the fire DBE. The event analyzed in the calc was a fire. As discussed in the guide, the fire has the potential to over pressurize the system and may exceed the capacity of the ventilation system, thus forcing material out through large cracks or door ways in the facility. The LAB fire analysis essentially assumed a similar phenomena, that is the fire forces the material out through the cracks or penetration seals in the hot cell. This is an unlikely release path due to the thickness of the walls (e.g., tortuous path) and the fact that the total estimated area of the cracks or penetrations is 10 % of the exhaust duct area. Thus the expected path out of the hot cell would be through the exhaust duct (inlet duct is closed). This was not credited in the analysis to avoid trying to quantify or determine flows through the HEPA filters (and HEPA filter LPF) given low flow.<br><br>The calculated consequences (mitigated) for this event, assuming no filtration and a LPF 0.5 for the hot cell, is 8 rem to the co-located worker. This is well below the RES limits assuming bounding conditions. The consequences are based on the following bounding assumptions:<br>• 17 L of material adjacent to the 32 pounds of combustibles<br>• All 17 L of material is released<br>• All 32 lbs of polyethylene is consumed<br>• Consequences are based on the worst case ULD<br><br>Assuming more realistic yet conservative assumptions would reduce the consequences significantly, i.e., on the average 31 | to be acceptable and conservative. |

| Question No. | U.S. Department of Energy (DOE), Office of River Protection (ORP) Question | Contractor Response | ORP Disposition |
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| | | samples are received daily and processed immediately, and the highest ULD stream represents < 50 % of the samples received.<br><br>BNI has not planned a hotcell preoperational baseline leak test. Based on the extremely low flow rate from the hotcell during the brief pressurization (approximately 100 cfm per Section 5.2.4 of the fire DBE), it would be extremely difficult to perform a meaningful test that correlates with the conditions of the DBE analysis. | |
| **AL-PSAR-035** | This question dealt with the LAB Fire DBE.<br>What is the justification for not providing an allowance for leakage area from the hot cell due to structural cracks as a result of the LAB seismic DBE event? | The mitigated dose for the seismic event is calculated as 13 rem. The entire inventory of radioactive material is assumed to be present in the hotcell impacted by the fire. In addition, presence of the hotcell bay, which surrounds the hotcells, is conservatively ignored. The C5 confinement (hotcells, C5 ventilation ducts, etc) are SC-III items. This conservative approach sufficiently accounts for any minor cracks in the confinement boundary caused by a design basis earthquake. | The response is acceptable. An additional allowance for leakage area from the hot cell due to structural cracks as a result of the LAB seismic DBE event was not provided in the DBE calculation. However, the walls of the hot cell are roughly 30 inches thick, thus it is reasonable to assume any release or migration of material to the hot cell bay room is through a more tortuous path than that around the penetrations that have been considered in the analysis. Based on the conservative nature of the leak paths already considered in the analysis, and other conservative calculation inputs, the overall contribution of seismically induced cracks in the three foot thick walls and |

| Question No. | U.S. Department of Energy (DOE), Office of River Protection (ORP) Question | Contractor Response | ORP Disposition |
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| | | | the consequential release would be insignificant. |
| **AL-PSAR-036** | This question dealt with the need for two physical barriers for SL-1 or SL-2 events.<br><br>Why is it acceptable to use an administrative control (i.e., inventory control) when the SRD, both in Table 1 of Appendix B as well as the text on page B-13, specifies that two or more independent **physical** barriers are required for SL-1 or SL-2 events? | The first confinement barrier against the hotcell fire is comprised of the containers storing the sample material in the hotcell. These containers will be designated APC.<br>The second barrier is the combination of different items encompassing the passive confinement boundary. The PSAR and DBE calculation will be updated accordingly at the next PSAR update. | The response is acceptable based on the commitment to classify the sample bottles as APC and to update the PSAR and DBE calculation at the next PSAR update. |