Department of Energy
Washington, DC 20585

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MEMORANDUM FOR RICHARD B. PROVENCHER
DEPUTY MANAGER
IDAHO CLEANUP PROJECT

FROM: DR. STEVEN L. KRAHN
ACTING ASSISTANT DEPUTY SECRETARY FOR
SAFETY AND SECURITY PROGRAM
ENVIRONMENTAL MANAGEMENT

SUBJECT: Evaluation of Idaho Facility Ventilation Systems in Response to Defense Nuclear Facilities Safety Board Recommendation 2004-2, Final Reports

Based on review of the information included in the subject reports, evaluation by the Defense Nuclear Facilities Safety Board (DNFSB) 2004-2 Independent Review Panel, the Environmental Management Technical Advisory Board, and input from the Office of the Chief of Nuclear Safety, the reports are approved with the following considerations:

- The review for the Idaho Nuclear Technology and Engineering Center Fuel Storage Area and the Idaho Nuclear Technology and Engineering Center Irradiated Fuel Storage Facility concludes that the ventilation systems were appropriately evaluated against the safety significant criteria associated with the established DNFSB 2004-2 evaluation guidelines and adequately met them.

- The review for the Idaho Nuclear Technology and Engineering Center Laboratory Facilities concludes that the ventilation systems were appropriately evaluated against the safety significant criteria associated with the established DNFSB 2004-2 evaluation guidelines with a single gap identified with respect to the lack of an interlock between the supply and exhaust fans. Closure of the identified gap is not recommended since interlocking of the two fans: 1) is not a credited function in the Documented Safety Analysis (DSA); 2) could result in a loss of ventilation flow to another building; and 3) would only result in contamination spread in the building with the loss of exhaust flow.

- The review for the Idaho Nuclear Technology and Engineering Center Process Equipment Waste Evaporation Facility concludes that the ventilation systems were appropriately evaluated against the safety significant criteria associated with the established DNFSB 2004-2 evaluation guidelines with a single gap identified with respect to the lack of an interlock between the supply and exhaust fans. Closure of the identified gap is not recommended since although there is no interlock between the supply and exhaust fans they are:

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1) procedurally shutdown by operators when the alarm sounds indicating a loss of exhaust air; 2) not a credited function in the DSA; 3) evaporation operations are being discontinued; and 4) consequences of the event are limited to contamination spread with the loss of exhaust flow.

If you have any further questions, please contact me at (202) 586-5151.

Attachments

cc:
D. Chung, EM-2
F. Marcinowski, EM-3
M. Gilbertson, EM-50

INDEPENDENT REVIEW

OF

Idaho Nuclear Technology and Engineering Center (INTEC) Fuel Storage Area Ventilation System Evaluation Report

August 2009

Executive Summary

The Defense Nuclear Facilities Safety Board (DNFSB) Recommendation 2004-2 Independent Review Panel (IRP) reviewed the Idaho Nuclear Technology and Engineering Center (INTEC) Fuel Storage Area Ventilation System Evaluation Report utilizing the process and criteria outlined in Department of Energy's (DOE's) *Ventilation System Evaluation Guidance for Safety-Related and Non-Safety-Related System* (2004-2 Ventilation System Evaluation Guide).

The INTEC Fuel Storage Area is Hazard Category 2 and is designed with a combination of passive structures and a ventilation system for contamination control and worker protection. The facility Documented Safety Analysis (DSA) does not credit the ventilation system for mitigation of analyzed hazard release events and therefore does not classify the system as safety significant or safety class

As specified in the 2004-2 Ventilation System Evaluation Guide for Hazard Category 2 facilities, the performance criteria for safety significant ventilation systems were used to evaluate the ventilation system. The conclusion of the evaluation is that the design features of the facility ventilation system meet the performance criteria for safety significant ventilation systems as specified in Table 5.3 of the 2004-2 Ventilation System Evaluation Guide.

The IRP concludes that the INTEC Fuel Storage Area ventilation systems evaluation was performed in accordance with the criteria in the DNFSB 2004-2 Ventilation System Evaluation Guide.

Results of Independent Review Panel's Review of the Idaho Nuclear Technology and Engineering Center (INTEC) Fuel Storage Area Ventilation System Evaluation Report

1. INTRODUCTION

The Defense Nuclear Facilities Safety Board (DNFSB) Recommendation 2004-2 Independent Review Panel (IRP) reviewed the Idaho Nuclear Technology and Engineering Center (INTEC) Fuel Storage Area Ventilation System Evaluation report utilizing the process and criteria outlined in Department of Energy's (DOE's)*Ventilation System Evaluation Guidance for Safety-Related and Non-Safety-Related System* (2004-2 Ventilation System Evaluation Guide).

As stated in Revision 1 of the DNFSB Recommendation 2004-2 Implementation Plan, the focus of the ventilation system evaluation is to:

- Verify that appropriate performance criteria are derived for ventilation systems
- Verify that these systems can meet the performance criteria, if applicable, and
- Determine if any physical modifications are necessary to enhance safety performance.

The IRP team reviewed the INTEC Fuel Storage Area Ventilation System Evaluation report to determine whether it was performed in accordance with the 2004-2 Ventilation System Evaluation Guide; evaluate the appropriateness of the evaluation results and methods proposed for eliminating identified gaps, if any, between the existing ventilation system and applicable performance criteria; and provide any additional input considered appropriate to the responsible program and site offices.

2. FACILITY AND VENTILATION SYSTEM OVERVIEW

The INTEC Fuel Storage Area (FSA) began operations in April 1984, and has a specified design life of 40 years. The original mission of the FSA was to provide short-term underwater storage of fuels destined to be reprocessed in the Fluorinel Dissolution Process Area. When the decision to end fuel reprocessing was made in April 1992, the mission of the FSA changed to receiving and storing nuclear fuel for an undefined interim period. Fuel receipt and storage at the FSA is continuing until a decision is made regarding the ultimate disposition of the fuel or until alternative fuel storage options, such as dry storage, are selected, and implemented. In accordance with a settlement agreement with the State of Idaho, the U.S. Department of Energy , and the U.S. Navy, all fuel must be removed from the FSA pools by December 31, 2023.

The primary FSA operations and/or operating systems include truck and cask receiving; fuel handling; fuel cutting (not performed in the past and not currently intended to be performed in the future) and preparation; water treatment and management; HVAC; and waste management. Truck and cask receiving operations occur in the truck receiving and the cask receiving and decontamination areas. These receipt operations include receiving cask shipments, decontaminating and venting casks, and transporting casks to different locations within and between the cask receiving and decontamination area and the fuel unloading pools.

Building ventilation is designed to maintain pressure within the fuel storage area below atmospheric pressure to ensure that building exhaust is directed through a high efficiency particulate air (HEPA) filter system. Pressures are progressively lower from clean areas such as offices to potentially contaminated and likely contaminated areas.

3.0 REVIEW RESULTS

3.1 Derivation of Ventilation System Performance Criteria and Confinement Strategy

The INTEC Fuel Storage Facility ventilation evaluation appropriately followed the process outlined in the 2004-2 Ventilation System Evaluation Guide in developing the Data Collection Table used to identify accidents, their unmitigated consequences, and the confinement strategy based upon the Documented Safety Analysis (DSA) in effect at the time of the analysis, SAR-113, "Safety Analysis Report for the CPP-666 Fuel Storage Area (FSA)," and the draft of the next annual update. The major difference between these documents was the conversion of the unmitigated accident analyses from the Radiological Safety Analysis Computer (RSAC)-5 INL-developed analysis code to the DOE Toolbox MELCOR Accident Consequence Code System 2 (MACCS2). Accident conclusions did not change as a result of using the MACCS2 code. The Facility Evaluation Team (FET) performing the functional classification evaluation reviewed the DSA to identify applicable release scenarios and confinement conditions assumed in determining the consequences of mitigated and unmitigated releases, and determine if ventilation is properly classified based upon how/if it was used to mitigate events. Based on their evaluation, the FET concluded that the Fuel Storage Facility ventilation system was not credited with any event mitigation and therefore did not need to be classified as either safety class or safety significant. The ventilation system is utilized for contamination control for the protection of workers.

The IRP concluded that FET appropriately reviewed the safety classification of the ventilation system as specified in the 2004-2 Evaluation Guide.

3.2 Evaluation of Ventilation System Against the Selected Performance Criteria

The INTEC Fuel Storage Facility Ventilation Report evaluated the Fuel Storage Facility building confinement ventilation systems utilizing the safety significant criteria from the 2004-2 Ventilation Evaluation Guide (as called for in the Guide for Hazard Category 2 facilities).. The INTEC Fuel Storage Facility Ventilation System Evaluation Report

documents the systematic evaluation of the ventilation systems against the 2004-2 performance criteria that was carried out to identify any performance gaps. The FET concluded that there were no gaps against the 2004-2 criteria.

The IRP concluded that evaluation of the ventilation systems against the 2004-2 Ventilation System Evaluation performance criteria was appropriately performed.

4. CONCLUSIONS

IRP concludes that the INTEC Fuel Storage Area Ventilation System Evaluation was performed in accordance with the criteria in the DNFSB 2004-2 Ventilation System Evaluation Guide.

5. RECOMMENDATIONS

The IRP recommends that the Program Secretarial Office and Central Technical Authority accept the INTEC Fuel Storage Area Ventilation System Evaluation.

6. REVIEW TEAM MEMBERS

James O'Brien, IRP Chairman, Office of Health, Safety and Security
Robert Nelson, IRP Member, Office of Environmental Management

Note: The IRP has established a review process that includes an initial review by two members of the IRP to determine whether the evaluation: (1) is consistent with the implementation plan methodology and expectations (including choice of evaluation criteria) and (2) was performed and documented with an appropriate the level of detail and rigor.

A detailed-full IRP team review will be performed if the ventilation evaluation report is not consistent with the implementation plan, was not performed with an appropriate level of detail or rigor (after consultation with the report developers), or has unique ventilation strategies, gap analysis, or corrective actions that warrant full IRP review.

For the INTEC Fuel Storage Facility evaluation, a detailed-full IRP team review was not determined to be necessary.

INDEPENDENT REVIEW

OF

Idaho Nuclear Technology and Engineering Center (INTEC) Irradiated Fuel Storage Facility Ventilation System Evaluation Report

August 2009

Executive Summary

The Defense Nuclear Facilities Safety Board (DNFSB) Recommendation 2004-2 Independent Review Panel (IRP) reviewed the Idaho Nuclear Technology and Engineering Center (INTEC) Irradiated Fuel Storage Facility Ventilation System Evaluation report utilizing the process and criteria outlined in Department of Energy's *Ventilation System Evaluation Guidance for Safety-Related and Non-Safety-Related System* (2004-2 Ventilation System Evaluation Guide).

The INTEC Irradiated Fuel Storage Facility (CPP-603) is Hazard Category 2 and is designed with a combination of passive structures and a ventilation system for contamination control and worker protection. The facility Documented Safety Analysis (DSA) does not credit the ventilation system for mitigation of analyzed hazard release events and therefore does not classify the system as safety significant or safety class. The Facility Evaluation Team performing the ventilation review evaluated the DSA accidents to determine whether the ventilation system was appropriately classified and concluded that is was correctly classified.

As specified in the 2004-2 Ventilation System Evaluation Guide for Hazard Category 2 facilities, the performance criteria for safety significant ventilation systems were used to evaluate the ventilation system. The conclusion of the evaluation was that the design features of the facility ventilation system meet the performance criteria for safety significant ventilation systems, as specified in Table 5.3 of the 2004-2 Ventilation System Evaluation Guide.

The IRP concludes that the INTEC Irradiated Fuel Storage Facility ventilation systems evaluation was performed in accordance with the criteria in the DNFSB 2004-2 Ventilation System Evaluation Guide.

Results of Independent Review Panel's Review of the Idaho Nuclear Technology and Engineering Center (INTEC) Irradiated Fuel Storage Facility Ventilation System Evaluation Report

1. INTRODUCTION

The Defense Nuclear Facilities Safety Board (DNFSB) Recommendation 2004-2 Independent Review Panel (IRP) reviewed the Idaho Nuclear Technology and Engineering Center (INTEC) Irradiated Fuel Storage Facility Ventilation System Evaluation report utilizing the process and criteria outlined in Department of Energy's (DOE's) *Ventilation System Evaluation Guidance for Safety-Related and Non-Safety-Related System* (2004-2 Ventilation System Evaluation Guide).

As stated in Revision 1 of the DNFSB Recommendation 2004-2 Implementation Plan, the focus of the ventilation system evaluation is to:

- Verify that appropriate performance criteria are derived for ventilation systems
- Verify that these systems can meet the performance criteria, if applicable, and
- Determine if any physical modifications are necessary to enhance safety performance.

The IRP team reviewed the INTEC Irradiated Fuel Storage Facility Ventilation System Evaluation report to determine whether it was performed in accordance with the 2004-2 Ventilation System Evaluation Guide; evaluate the appropriateness of the evaluation results and methods proposed for eliminating identified gaps, if any, between the existing ventilation system and applicable performance criteria); and provide any additional input considered appropriate to the responsible program and site offices.

2. FACILITY AND VENTILATION SYSTEM OVERVIEW

The INTEC Irradiated Fuel Storage Facility is designed to provide safe, interim, fuel storage pending retrieval of the stored fuel for final disposal. To meet this goal, the main operations performed in the facility include receiving spent nuclear fuels from other facilities, repackaging and conditioning fuels for interim storage, safely storing fuels, and packaging fuels for removal from the facility. The facility mission will continue until all fuels have been removed. It is projected that the facility will continue to store fuel until 2035.

The Irradiated Fuel Storage Facility functional areas include the (1) cask receiving area, (2) cask transfer pit and permanent containment structure, (3) fuel handling cave, (4) fuel storage area, (5) control room/instrument room, and (6) crane maintenance area. In addition to these functional areas, other miscellaneous facility support areas include a

standby generator room (inactive); a heating, ventilating, and air conditioning (HVAC) equipment area; and an access building area.

Building ventilation is designed to maintain pressure within the fuel storage area below atmospheric pressure to ensure that building exhaust is directed through a high efficiency particulate air (HEPA) filter system. Pressures are progressively lower from clean areas such as offices to potentially contaminated and likely contaminated areas.

3.0 REVIEW RESULTS

3.1 Derivation of Ventilation System Performance Criteria and Confinement Strategy

The INTEC Irradiated Fuel Storage Facility ventilation evaluation appropriately followed the process outlined in the 2004-2 Ventilation System Evaluation Guide in developing the Data Collection Table used to identify accidents, their unmitigated consequences, and the confinement strategy based upon the Documented Safety Analysis (DSA) in effect at the time of the analysis, SAR-114, "Safety Analysis Report for the Irradiated Fuel Storage Facility (IFSF)." The Facility Evaluation Team (FET) performing the functional classification evaluation reviewed the DSA to identify applicable release scenarios and confinement conditions assumed in determining the consequences of mitigated and unmitigated releases, and determine if ventilation is properly classified based upon how/if it was used to mitigate events. The FET concluded that the Fuel Storage Facility ventilation system was not credited with any event mitigation and therefore did not need to be classified as either safety class or safety significant. The ventilation system is utilized for contamination control for the protection of workers.

The IRP concluded that FET appropriately reviewed the safety classification of the ventilation system as specified in the 2004-2 Evaluation Guide.

3.2 Evaluation of Ventilation System Against the Selected Performance Criteria

The INTEC Irradiated Fuel Storage Facility ventilation report evaluated the building confinement ventilation system utilizing the safety significant criteria from the 2004-2 Ventilation Evaluation Guide (as called for in the Guide for Hazard Category 2 facilities). The INTEC Irradiated Fuel Storage Facility Ventilation System Evaluation Report documents the systematic evaluation of the ventilation systems against the 2004-2 performance criteria that was carried out to identify any performance gaps. No gaps were identified .

The IRP concluded that evaluation of the ventilation systems against the 2004-2 Ventilation System Evaluation performance criteria was appropriately performed.

4. CONCLUSIONS

IRP concludes that the INTEC Irradiated Fuel Storage Facility ventilation systems evaluation was performed in accordance with the criteria in the DNFSB 2004-2 Ventilation System Evaluation Guide.

5. RECOMMENDATIONS

The IRP recommends that the Program Secretarial Office and Central Technical Authority accept the INTEC Irradiated Fuel Storage Facility Ventilation System Evaluation.

6. REVIEW TEAM MEMBERS

James O'Brien, IRP Chairman, Office of Health, Safety and Security
Robert Nelson, IRP Member, Office of Environmental Management

Note: The IRP has established a review process that includes an initial review by two members of the IRP to determine whether the evaluation: (1) is consistent with the implementation plan methodology and expectations (including choice of evaluation criteria) and (2) was performed and documented with an appropriate the level of detail and rigor.

A detailed-full IRP team review will be performed if the ventilation evaluation report is not consistent with the implementation plan, was not performed with an appropriate level of detail or rigor (after consultation with the report developers), or has unique ventilation strategies, gap analysis, or corrective actions that warrant full IRP review.

For the INTEC Irradiated Fuel Storage Facility evaluation, a detailed-full IRP team review was not determined to be necessary.

INDEPENDENT REVIEW

OF

Idaho Nuclear Technology and Engineering Center (INTEC) Laboratory Facilities Ventilation System Evaluation Report

August 2009

Executive Summary

The Defense Nuclear Facilities Safety Board (DNFSB) Recommendation 2004-2 Independent Review Panel (IRP) reviewed the Idaho Nuclear Technology and Engineering Center (INTEC) Laboratory Facilities Ventilation System Evaluation report utilizing the process and criteria outlined in Department of Energy's *Ventilation System Evaluation Guidance for Safety-Related and Non-Safety-Related System* (2004-2 Ventilation System Evaluation Guide).

The INTEC Laboratory Facilities are Hazard Category 2 and are designed with a combination of passive structures and ventilation systems for contamination control and worker protection. The Laboratory Facilities Documented Safety Analysis (DSA) does not credit the ventilation systems for mitigation of analyzed hazard release events and therefore does not classify the system as safety significant or safety class.

The Site and Facility Evaluation Teams performing the ventilation review evaluated DSA accidents to determine whether the ventilation systems was appropriately classified and concluded that is was correctly classified. As specified in the 2004-2 Ventilation System Evaluation Guide for Hazard Category 2 facilities, the performance criteria for safety significant ventilation systems were used to evaluate the ventilation system. The Evaluation Teams concluded that ventilation systems meet all but one of the safety significant criteria. The performance gap is that there is not an interlock between the supply and exhaust fans.

The Evaluation Teams analyzed the impact of modifying the ventilation system to close the gap and found that because two laboratory facility buildings share the same supply fan, interlocking the supply fan to cause it to shutdown with the loss of an exhaust fan in one building would cause loss of ventilation flow and contamination control concerns in the other building. Since, interlocking of the two fans is not a credited function in the DSA and could result in a loss of ventilation flow to another building, the Evaluation Teams concluded that closure of the gap was not appropriate.

The IRP concludes that the INTEC Laboratory Facilities ventilation systems evaluation was performed in accordance with the criteria in the DNFSB 2004-2 Ventilation System Evaluation Guide.

Results of Independent Review Panel's Review of the Idaho Nuclear Technology and Engineering Center (INTEC) Laboratory Facilities Ventilation System Evaluation Report

1. INTRODUCTION

The Defense Nuclear Facilities Safety Board (DNFSB) Recommendation 2004-2 Independent Review Panel (IRP) reviewed the Idaho Nuclear Technology and Engineering Center (INTEC) Laboratory Facilities Ventilation System Evaluation report utilizing the process and criteria outlined in Department of Energy's (DOE's) *Ventilation System Evaluation Guidance for Safety-Related and Non-Safety-Related System* (2004-2 Ventilation System Evaluation Guide).

As stated in Revision 1 of the DNFSB Recommendation 2004-2 Implementation Plan, the focus of the ventilation system evaluation is to:

- Verify that appropriate performance criteria are derived for ventilation systems
- Verify that these systems can meet the performance criteria, if applicable, and
- Determine if any physical modifications are necessary to enhance safety performance.

The IRP team reviewed the INTEC Laboratory Facilities Ventilation System Evaluation Report to determine whether it was performed in accordance with the 2004-2 Ventilation System Evaluation Guide; evaluate the appropriateness of the evaluation results and methods proposed for eliminating identified gaps, if any, between the existing ventilation system and applicable performance criteria; and provide any additional input considered appropriate to the responsible program and site offices.

2. FACILITY AND VENTILATION SYSTEM OVERVIEW

The INTEC Laboratory Facilities are classified as Hazard Category 2 facilities and are designed with a combination of passive structures and a ventilation system for contamination control and worker protection. The Documented Safety Analysis (DSA) does not require that the ventilation system be safety-significant or safety-class system, structure or component (SSC). Therefore, DSA does not identify functional requirements and performance criteria for the confinement ventilation system.

The primary confinement systems for the INTEC Laboratory Facilities consist of hoods, gloveboxes, and a hot cell. The laboratory hoods and hot cell rely on air velocity to confine gases and prevent airborne materials from being released into the laboratory. The laboratory gloveboxes are sealed enclosures operated by gloves built into the gloveboxes. These systems are vented through roughing and high efficiency particulate air (HEPA)

filters to the roofs of buildings CPP-602 or CPP-630 or to the Atmospheric Protection System (APS) in building CPP-649 via the building CPP-601 east vent tunnel, which vents to the Main Stack. In accordance with procedures, HEPA filters in the ventilation exhaust system are periodically checked for excess pressure drop. When the pressure drop is too high and flow cannot be maintained, or efficiency is too low, the filters are replaced. Building ventilation is designed to maintain pressure within the fuel storage area below atmospheric pressure to ensure that building exhaust is directed through a HEPA filter system. Pressures are progressively lower from clean areas such as offices to potentially contaminated and likely contaminated areas.

3.0 REVIEW RESULTS

3.1 Derivation of Ventilation System Performance Criteria and Confinement Strategy

The process used by the Site and Facility Evaluation Teams in performing the functional classification evaluation was to review the DSA to identify applicable release scenarios and confinement conditions assumed in determining the consequences of mitigated and unmitigated releases, and determine if ventilation is properly credited as a safety-significant or safety-class system. If ventilation is credited, the DSA would also be reviewed to identify credited system functions and required performance criteria.

The hazard analysis in the facility DSA evaluated credible scenarios for releases due to fire, breach of confinement, explosion, external events, and natural phenomena hazards. There are no credible criticality scenarios. Credible bounding scenarios evaluated are a facility fire, an earthquake, and confinement breaches.

The hazard and accident analyses in the DSA do not credit the confinement ventilation system for any event; therefore, the system is not designated safety-significant or safety-class and functional requirements and performance criteria are not identified. The ventilation system provides protection for workers under the purview of the radiation protection program (contamination control).

The IRP concluded that the Evaluation Teams appropriately reviewed the safety classification of the ventilation system as specified in the 2004-2 Evaluation Guide.

3.2 Evaluation of Ventilation System Against the Selected Performance Criteria

The Evaluation Teams evaluated the building confinement ventilation systems utilizing the safety significant criteria from the 2004-2 Ventilation Evaluation Guide (as called for in the Guide for Hazard Category 2 facilities). The system evaluation involved a review of the Fire Hazards Analysis and the DSA. A facility walk down was performed by the Evaluation Teams. The system evaluation results demonstrate that these systems meet each performance criteria for a safety significant system in all but one case. The performance gaps identified was that the supply and exhaust fans are not interlocked to prevent a confinement pressurization if the supply fan operates while the exhaust fan is down.

3.3 Evaluation of physical modifications to enhance safety performance

The Evaluation Teams analyzed impact of modifying the ventilation system to close the gap and found that because two laboratory facility building share the same supply fan, interlocking the supply fan to cause it to shutdown with the loss of an exhaust fan in one building would cause loss of ventilation flow and contamination control concerns in the other building. Specifically, CPP-602 and CPP-601 share the same supply fan. Interlocking the supply fan with the CPP-602 exhaust fan could result in a loss of ventilation flow through CPP-601. CPP-601 is undergoing decontamination and dismantlement. Interlocking of the supply and exhaust fans is not a function credited by the INTEC Laboratory Facility DSA. Since, interlocking of the two fans is (1) not a credited function in the DSA, (2) could result in a loss of ventilation flow to another building, and (3) would only result in contamination spread in the building with the loss of exhaust flow, the Evaluation Teams concluded that closure of the gap was not appropriate.

The IRP concluded that evaluation of the ventilation systems against the 2004-2 Ventilation System Evaluation performance criteria was appropriately performed.

4. CONCLUSIONS

Based on the results of the hazard and accident analyses, the INTEC Laboratory Facilities confinement ventilation systems are not required to be designated as safety-significant or safety-class. The ventilation systems are defense-in-depth for protection for workers under the purview of the radiation protection program (contamination control). The systems were evaluated against the performance attributes expected of safety-significant ventilation systems and meet all but one of those attributes. There is not a interlock between the supply and exhaust fans. Interlocking of the two fans is not a credited function in the DSA and interlocking could result in a loss of ventilation flow to another facility.

IRP concludes that the INTEC Laboratory Facilities ventilation systems evaluation was performed in accordance with the criteria in the DNFSB 2004-2 Ventilation System Evaluation Guide.

5. RECOMMENDATIONS

The IRP recommends that the Program Secretarial Office and Central Technical Authority accept the INTEC Laboratory Facilities Ventilation System Evaluation.

6. REVIEW TEAM MEMBERS

James O'Brien, IRP Chairman, Office of Health, Safety and Security
Robert Nelson, IRP Member, Office of Environmental Management

Note: The IRP has established a review process that includes an initial review by two members of the IRP to determine whether the evaluation: (1) is consistent with the implementation plan methodology and expectations (including choice of evaluation criteria) and (2) was performed and documented with an appropriate the level of detail and rigor.

A detailed-full IRP team review will be performed if the ventilation evaluation report is not consistent with the implementation plan, was not performed with an appropriate level of detail or rigor (after consultation with the report developers), or has unique ventilation strategies, gap analysis, or corrective actions that warrant full IRP review.

For the INTEC Laboratory Facilities evaluation, a detailed-full IRP team review was not determined to be necessary.

INDEPENDENT REVIEW

OF

Idaho Nuclear Technology and Engineering Center (INTEC) Process Equipment Waste Evaporator (PEWE) Facility Ventilation System Evaluation Report

August 2009

Executive Summary

The Defense Nuclear Facilities Safety Board (DNFSB) Recommendation 2004-2 Independent Review Panel (IRP) reviewed the Idaho Nuclear Technical and Engineering Center (INTEC) Process and Equipment Waste Evaporator (PEWE) Ventilation System Evaluation Report utilizing the process and criteria outlined in Department of Energy's *Ventilation System Evaluation Guidance for Safety-Related and Non-Safety-Related System* (2004-2 Ventilation System Evaluation Guide).

The PEWE is a Hazard Category 2 facility designed with a combination of passive structures and a ventilation system for contamination control and worker protection. The Evaporator Facility Documented Safety Analysis (DSA) does not credit safety the ventilation system for mitigation of analyzed hazard release events and therefore does not classify the system as significant or safety class.

The Site and Facility Evaluation Teams performing the ventilation review evaluated DSA accidents to determine whether the ventilation systems was appropriately classified and concluded that is was correctly classified. As specified in the 2004-2 Ventilation System Evaluation Guide for Hazard Category 2 facilities, the performance criteria for safety significant ventilation systems were used to evaluate the ventilation system. The Evaluation Teams concluded that ventilation systems meet all but one of the safety significant criteria. The performance gap is that there is not an interlock between the supply and exhaust fans.

The Evaluation Teams analyzed performance capability of the ventilation system to determine the safety benefit of closure of the gap. Although, there is no interlock between the supply and fans, the supply fans are procedurally shutdown by operators upon indication of a loss of exhaust air. Furthermore, since there is no safety credit for this interlock function required by the PEWE DSA and consequences of the event are limited to contamination spread, the Evaluation Teams concluded that gap closure was not warranted.

The IRP concludes that the INTEC PEWE ventilation systems evaluation was performed in accordance with the criteria in the DNFSB 2004-2 Ventilation System Evaluation Guide.

Results of Independent Review Panel's Review of the Idaho Nuclear Technical and Engineering Center (INTEC) Process and Equipment Waste Evaporator (PEWE) Ventilation System Evaluation Report

1. INTRODUCTION

The DNFSB Recommendation 2004-2 Independent Review Panel (IRP) reviewed the Idaho Nuclear Technical and Engineering Center (INTEC) Process and Equipment Waste Evaporator (PEWE) Ventilation System Evaluation Report utilizing the process and criteria outlined in DOE's *Ventilation System Evaluation Guidance for Safety-Related and Non-Safety-Related System* (2004-2 Ventilation System Evaluation Guide).

As stated in Revision 1 of the DNFSB Recommendation 2004-2 Implementation Plan, the focus of the ventilation system evaluation is to:

- Verify that appropriate performance criteria are derived for ventilation systems
- Verify that these systems can meet the performance criteria, if applicable, and
- Determine if any physical modifications are necessary to enhance safety performance.

The IRP team reviewed the INTEC PEWE to determine whether it was performed in accordance with the 2004-2 Ventilation System Evaluation Guide; evaluate the appropriateness of the evaluation results and methods proposed for eliminating identified gaps, if any, between the existing ventilation system and applicable performance criteria; and provide any additional input considered appropriate to the responsible program and site offices.

2. FACILITY AND VENTILATION SYSTEM OVERVIEW

The INTEC PEWE was originally constructed form 1950 to 1952, and began operation in 1953 to treat radioactive liquid waste from INTEC processes. The PEWE is located in the Rare Gas Plant/Waste Building. The PEWE reduces the volume of hazardous waste needed to be stored. The PEWE evaporates the wastes, producing concentrated wastes (bottoms) and vapor condensates (overheads). Originally, the concentrated bottoms were sent to the Tank Farm Facility and overheads were transferred to the Service Waste System. In preparation for Tank Farm Facility closure, transfers of newly generated liquid waste solutions to the Tank Farm Facility are administratively prohibited as of September 30, 2005. Currently, the concentrated bottoms are drained to a bottoms tank for transfer or recycling for further processing.

Confinement of the liquid radioactive waste in the PEWE collection systems in the Fuel Process Building and the Westside Waste Holdup Tank System, and the Rare Gas

Plant/Waste Building is provided by the collection tanks and vessels, the concrete walls, and liners of the cells and vaults where the tanks and vessels are located. The vessel off gas system (VOG) is directly connected to the process off gas (POG) portion of the INTEC Atmospheric Protection System (APS). The VOG maintains a vacuum on the PEWE System vessels. The VOG and POG APS provide high-efficiency particulate air (HEPA) filtration prior to discharge to the INTEC Main Stack.

3.0 REVIEW RESULTS

3.1 Derivation of Ventilation System Performance Criteria and Confinement Strategy

The Site Evaluation Team and the Facility Evaluation Team (Evaluation Teams) reviewed the DSA to identify applicable release scenarios and confinement conditions assumed in determining the consequences of mitigated and unmitigated releases, and determine if ventilation is properly classified as not being a safety significant or safety class system.

The IRP concluded that the Evaluation Teams appropriately reviewed the safety classification of the ventilation system as specified in the 2004-2 Evaluation Guide.

3.2 Evaluation of Ventilation System Against the Selected Performance Criteria

The Evaluation Teams evaluated the building confinement ventilation system utilizing the safety significant criteria from the 2004-2 Ventilation Evaluation Guide (as called for in the Guide for Hazard Category 2 facilities). The system evaluation involved a review of the Fire Hazards Analysis and the DSA. A facility walk down was performed by the Evaluation Teams.

The system evaluation results demonstrate that these systems meet all but one of the attributes of a safety significant system. The performance gap identified is that the PEWE supply and exhaust fans are not interlocked.

3.3 Evaluation of physical modifications to enhance safety performance

The Evaluation Teams analyzed performance capability of the ventilation system to determine the safety benefit of closure of the gap.

Although, there is no interlock between the supply and fans and they will not automatically shutdown on a high pressure condition, the supply fans are procedurally shutdown by operators when the alarm sounds indicating a loss of PEWE exhaust air. Since there is (1) no safety credit for this interlock function required by the PEWE DSA, (2) evaporation operations within the PEWE will be discontinued either this or next year, and (3) consequences of the event are limited to contamination spread, the Evaluation Teams concluded that gap closure was not warranted.

The IRP concluded that evaluation of the ventilation systems against the 2004-2 Ventilation System Evaluation performance criteria was appropriately performed.

4. CONCLUSIONS

Based on the results of the hazard and accident analyses, the PEWE confinement ventilation system is not required to be designated as safety-significant or safety-class. The ventilation system is defense-in-depth for protection for workers under the purview of the radiation protection program (contamination control). The system was evaluated against the performance attributes expected of safety-significant ventilation systems and meets all but one of those attributes. There is not an interlock between the supply and exhaust fans. There are no plans to upgrade this system to include an interlock.

IRP concludes that the INTEC PEWE Facility ventilation systems evaluation was performed in accordance with the criteria in the DNFSB 2004-2 Ventilation System Evaluation Guide.

5. RECOMMENDATIONS

The IRP recommends that the Program Secretarial Office and Central Technical Authority accept the INTEC PEWE Ventilation System Evaluation.

6. REVIEW TEAM MEMBERS

James O'Brien, IRP Chairman, Office of Health, Safety and Security
Robert Nelson, IRP Member, Office of Environmental Management

Note: The IRP has established a review process that includes an initial review by two members of the IRP to determine whether the evaluation: (1) is consistent with the implementation plan methodology and expectations (including choice of evaluation criteria) and (2) was performed and documented with an appropriate the level of detail and rigor.

A detailed-full IRP team review will be performed if the ventilation evaluation report is not consistent with the implementation plan, was not performed with an appropriate level of detail or rigor (after consultation with the report developers), or has unique ventilation strategies, gap analysis, or corrective actions that warrant full IRP review.

For the INTEC PEWE evaluation, a detailed-full IRP team review was not determined to be necessary.