

**Root Causes and Corrective Actions for
Deficiencies in Safety Management**

**Building 707 Thermal Stabilization
Event**

Rocky Flats Field Office

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Summary

In February 2001, Building 707 thermally stabilized oil-laden plutonium material without sampling and analyzing the material as specified by the administrative controls in the Basis for Interim Operations (BIO). Both Kaiser-Hill and the Rocky Flats Field Office overlooked this requirement on numerous occasions even after the Defense Nuclear Facilities Safety Board (DNFSB) staff pointed out the requirement. Unusual glovebox pressure fluctuations and incorrect furnace temperature settings occurred as result of not adhering to the specified safety controls. This report identifies the deficiencies in safety management that contributed to the event, their root causes, and corrective actions that will preclude recurrence.

Event Chronology and Identification of Safety Management Deficiencies

In November 1992, the DNFSB expressed a concern regarding the potential for a violent reaction due to unknown constituents being heated during thermal stabilization activities in Building 707. The Site committed to sample all plutonium materials planned to be thermally stabilized and apply appropriate process controls to preclude violent reactions. In February 1993, a group of plutonium experts was chartered to review the results of the sampling and assist the Building 707 Production Manager in identifying appropriate furnace processing parameters. This process was incorporated into an existing Operations Order in March 1993 and a week later was incorporated into 4-32300-ADM-POP010 (POP010). No reference to POP010 or the sampling requirement was incorporated into the already approved thermal stabilization procedure, 4-30000-FO-0023 (FO-0023) [**Error 1 – After POP010 was issued, FO-0023 was not revised to incorporate the sampling requirements.**]. Sampling and analysis of plutonium oxides was performed and the results reviewed by the group of experts. Sampling and analysis was limited to the backlog of plutonium oxide that was brushed from plutonium metal and material from duct holdup. The results indicated no unusual violent reaction would occur from plutonium oxide that was formed from the oxidation of plutonium metal. In order to decrease personnel radiation exposure and reduce costs, the Rocky Flats Field Office issued a memorandum in January 1995 that provided sampling relief from plutonium oxide that was brushed from plutonium metal items. For duct holdup material, the expert group recommended stabilizing a very small quantity of material per run. Thermal stabilization of duct material was never performed. The duct holdup material was transferred to the residue program to dispose of at the Waste Isolation Pilot Plant and did not require any thermal stabilization because sampling and analysis proved the material was not pyrophoric.

Over the next several years, with very few exceptions, thermal stabilization was performed on material that did not require sampling and analysis. The expert group was disbanded in October 1997 since no sampling was being performed. Also over the next few years, multiple re-organizations and re-assignments of personnel occurred. Personal knowledge of these sampling requirements was lost.

In September 1999, the Building 707 BIO was approved by RFFO. Included as an administrative control in the Technical Safety Requirements is a control that requires "Characterization/sampling to identify the presence of organics or other reactive materials to allow appropriate controls for furnace/stabilization operations." These controls were never implemented into the operating procedure, FO-0023 [**Error 2- After the Building 707 BIO was approved, FO-0023 was not revised to incorporate the sampling requirement.**].

In April 2000, POP010 was proposed for cancellation because it was considered obsolete. POP010 was among several other documents being proposed for cancellation. A safety evaluation screen was performed but missed the Administrative Control requirements under the Building 707 BIO [**Error 3 – A safety evaluation screen was performed on POP010 cancellation, but failed to recognize the sampling requirement under the**

BIO.]. The implementing procedure for the sampling requirement was cancelled and ultimately led to a TSR violation. Neither the facility representative nor the responsible personnel in the RFFO Nuclear Safety Division knew about the cancellation of the implementing procedure [**Error 4 – RFFO was not aware that the BIO implementing procedure had been cancelled.].**

In November 2000, a Job Hazard Analysis (JHA) was completed for FO-0023. The requirement for performing a JHA came into effect several years after FO-0023 was issued. The JHA was being performed on FO-0023 and other previously issued procedures as a retrofit to this requirement. The nuclear safety engineer did not check the BIO requirements to see if any hazard controls were required for this activity. The fire protection engineer did not ensure that the Health and Safety Practices Manual 31.11 hazard control requirements were identified for this activity. Therefore the JHA did not integrate all hazards and controls from other available documents; specifically, the furnace explosion hazards and controls in the BIO were not incorporated into the JHA. [**Error 5 – The JHA for FO-0023 failed to integrate all hazards and controls from other available documents.].**

In February 2001, the last cans of material requiring thermal stabilization were being processed in support of closure of the Material Access Area. The stabilization crew discovered that the material contained oil and the supervisor requested an evaluation. A team composed of safety professionals from Environmental Safety, Criticality Safety, Nuclear Safety, and Fire Protection Engineering performed the evaluation. Both the nuclear safety and the fire protection engineer inadequately validated that the scope of the proposed evolution was authorized under the current set of controls. The nuclear safety engineer did not identify and ensure the sampling requirement under the BIO and the fire protection engineer did not ensure that the Health and Safety Practices Manual 31.11 requirements were captured in the implementing procedure (FO-0023). [**Error 6 – The evaluation by the safety professionals inadequately validated that the scope of the proposed activity was authorized under the current safety controls and failed to implement the required safety controls.].** As a result, the evaluation concluded that the thermal stabilization of the oily material was safe but the furnace charge should be limited to 200 grams of material due to criticality concerns.

FO-0023 was revised to drain excess oil from the material prior to thermal stabilization. The JHA was also revised to allow draining of the excess oil prior to weighing the material. The safety evaluation screen performed on FO-0023 change failed to recognize the administrative control requirements under the Building 707 BIO for sampling [**Error 7 – The safety evaluation screen performed for the first FO-0023 change failed to recognize the sampling requirement under the BIO.].**

The thermal stabilization crew again questioned the evaluation and a plutonium oxide expert in RFFO was consulted at home and recommended pouring off any excess oil and pausing at two lower furnace temperatures to first volatilize any organic compounds in a controlled manner and then oxidize any plutonium metal. The RFFO expert was not authorized to provide technical direction although he expected his recommendations to be

followed [**Error 8 – Technical direction was given by a non-Contracting Officer Technical Representative (COTR).**]. Additionally, the RFFO plutonium expert was not aware of the administrative control requirements under the Building 707 BIO for sampling when he gave his recommendations [**Error 9 – RFFO Safety instructions were conveyed without knowledge of all applicable hazard analysis and controls.**].

The previous evaluation and the expert advice was reviewed and the supervisor and the thermal stabilization crew were satisfied that it was safe to proceed with thermal stabilization of the oily material without incorporation of the expert advice on pausing at two lower furnace temperatures. [**Error 10 – The decision to not incorporate the safety instructions was made without knowledge of all applicable hazard analysis and controls.**]. Thermal stabilization was performed on second shift and one observer thought he observed a minor pressure fluctuation on the glovebox pressure gage [**Error 11 – No formal reporting of the event was made to RFETS management outside of Building 707.**]. The glovebox pressure gage provides an indication to the operator that glovebox pressure is negative relative to the room.

During the next day, discussions and evaluations continued on the course of action. It was decided at the end of the day to repeat the stabilization process with personnel staged to watch for any unusual pressure fluctuations [**Error 12 – When faced with an operational anomaly, facility personnel failed to utilize the integrated safety management approach to review the scope of work, hazard analysis and controls necessary to safety proceed with the proposed activity.**]. Building management recognized the possibility of pressurization and personnel were directed to wear respirators during the evolution. An RFFO individual, that was supporting the review board efforts on the criticality safety operational pause, attended the pre-evolutionary brief for the second shift and learned of the previous pressurization event and the precautions being taken for the second run of oily material. Concerns were raised and communicated with the facility representative, RFFO review board lead, and Building 707 management. No technical evaluation was performed by the facility representative [**Error 13 – RFFO failed to validate whether the activity was bounded by the current authorization basis and required controls were implemented.**]. Concerns were discussed but the contractor path forward was misunderstood and RFFO believed that actions being taken by the Building 707 management would incorporate the RFFO expert's recommendation [**Error 14 – RFFO Safety instructions were conveyed informally.**]. Thermal stabilization was performed on 2nd shift without incorporation of the RFFO temperature hold point recommendations and glovebox pressure fluctuations and glove movements were confirmed [**Error 15 – No formal reporting of the event was made to RFETS management outside of Building 707.**]. The evolution was discontinued.

The RFFO deputy manager became aware of the unusual glovebox pressure fluctuation and discussions were held between the deputy manager, the RFFO plutonium expert, the assistant manager for engineering, and Building 707 management. It was decided to incorporate the two temperature holds previously recommended by the RFFO plutonium expert. [**Error 16 – When faced with an operational anomaly, RFFO personnel failed**

to utilize the integrated safety management approach to review the scope of work, hazard analysis and controls necessary to ensure the facility was safely proceeding with the proposed activity. RFFO did not ask the proper questions and ensure implementation of the authorization basis safety controls.] It was discovered later that the temperature hold points recommended were incorrect due to a lack of discussion on units of temperature (°C versus °F) [**Error 17 – RFFO Safety instructions were conveyed informally.**]. A change to FO-0023 was made. The safety evaluation screen performed on FO-0023 change failed to recognize the administrative control requirements under the Building 707 BIO for sampling [**Error 18 – The safety evaluation screen performed for the second FO-0023 change failed to recognize the sampling requirement under the BIO.**].

The thermal stabilization was performed on 2nd shift with facility representative oversight. No unusual pressure fluctuation was observed.

The DNFSB staff became aware of the events. A conference call was held between Kaiser-Hill Safety-management, Building 707 management, the assistant manager for engineering, the assistant manager for performance assessment, and the headquarter and onsite DNFSB staff. Discussions focused on the Site commitment made to the DNFSB for material sampling prior to thermal stabilization and how this was being met. The DNFSB staff also pointed out the sampling requirement in the BIO and questioned how the requirement was being met. The meeting concluded and Kaiser-Hill management focused their attention on sampling the remaining material and did not determine if a TSR violation had occurred [**Error 19 – Kaiser-Hill management failed to check if a BIO violation existed even after the sampling requirement was pointed out.**]. A RFFO nuclear safety engineer recognized the BIO requirement for sampling, but did not verify that the TSR administrative controls were implemented. [**Error 20 – RFFO failed to verify if the BIO TSR administrative controls were implemented.**].

The remaining oily material was finally sampled and Thermogravimetric Analysis and Infrared Spectrometry were performed. Formal calculations were completed to determine burn times and temperatures. Procedure FO-0023 was revised to reflect four temperature hold points as a result of the sampling analysis. The safety evaluation screen performed on FO-0023 change failed to recognize the administrative control requirements under the Building 707 BIO for sampling [**Error 21 – The safety evaluation screen performed for the third FO-0023 change failed to recognize the sampling requirement under the BIO.**].

The final thermal stabilization runs were completed satisfactorily.

More than two weeks elapsed since the first pressurization event. The DNFSB staff questioned the RFFO manager on the administrative control requirement to sample material prior to stabilization. Not until this time was the lack of a sampling/characterization program and the associated BIO violation recognized by RFFO [**Error 22 – RFFO was slow to recognize the TSR administrative control violation even**

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after pointed out by DNFSB staff.]. After discussions with the contractor management,
a TSR violation was declared.

Summary of Errors

From this event, the following errors have been identified:

Error 1 – After POP010 was issued, FO-0023 was not revised to incorporate the sampling requirements.

Error 2- After the Building 707 BIO was approved, FO-0023 was not revised to incorporate the sampling requirement.

Error 3 – A safety evaluation screen was performed on POP010 cancellation, but failed to recognize the sampling requirement under the BIO.

Error 4 – RFFO was not aware that the BIO implementing procedure had been cancelled.

Error 5 – The JHA for FO-0023 failed to integrate all hazards and controls from other available documents.

Error 6 – The evaluation by the safety professionals inadequately validated that the scope of the proposed activity was authorized under the current safety controls and failed to implement the required safety controls.

Error 7 – The safety evaluation screen performed for the first FO-0023 change failed to recognize the sampling requirement under the BIO.

Error 8 – Technical direction was given by a non-Contracting Officer Technical Representative (COTR).

Error 9 – RFFO safety instructions were conveyed without knowledge of all applicable hazard analysis and controls.

Error 10 – The decision to not incorporate the safety instructions was made without knowledge of all applicable hazard analysis and controls.

Error 11 – No formal reporting of the event was made to RFETS management outside of Building 707

Error 12 – When faced with an operational anomaly, facility personnel failed to utilize the integrated safety management approach to review the scope of work, hazard analysis and controls necessary to safely proceed with the proposed activity

Error 13 – RFFO failed to validate whether the activity was bounded by the current authorization basis and required controls were implemented.

Error 14 – RFFO safety instructions were conveyed informally.

Error 15 – No formal reporting of the event was made to RFETS management outside of Building 707.

Error 16 – When faced with an operational anomaly, RFFO personnel failed to utilize the integrated safety management approach to review the scope of work, hazard analysis and controls necessary to ensure the facility was safely proceeding with the proposed activity. RFFO did not ask the proper questions and ensure implementation of the authorization basis safety controls.

Error 17 – RFFO safety instructions were conveyed informally.

Error 18 – The safety evaluation screen performed for the second FO-0023 change failed to recognize the sampling requirement under the BIO.

Error 19 – Kaiser-Hill management failed to check if a BIO violation existed even after the sampling requirement was pointed out.

Error 20 – RFFO failed to verify if the BIO TSR administrative controls were implemented.

Error 21 – The safety evaluation screen performed for the third FO-0023 change failed to recognize the sampling requirement under the BIO.

Error 22 – RFFO was slow to recognize the TSR administrative control violation even after pointed out by DNFSB staff.

Summary of Root Causes/Corrective Actions

Several deficiencies in the safety management in Kaiser-Hill and RFFO were discovered from the February 2001 thermal stabilization event in Building 707. The following root causes have been identified and are discussed below along with the corrective actions:

1. The process to implement and maintain safety controls was inadequate.

The following corrective actions address this root cause:

- Kaiser-Hill will ensure that all Authorization Basis requirements are accurately implemented in procedures/work control documents. This action will be performed in Building 707, 776/777, and the Material Stewardship facilities.
- Based on the results of the Authorization Basis implementation check above, Kaiser-Hill will assess the need to perform a similar check in Building 371 and 771.
- RFFO will provide technical direction to Kaiser-Hill to provide the results of the Authorization Basis crosswalk mapping and require Kaiser-Hill to provide notification of cancellation packages for any of the Authorization Basis implementing procedures.
- RFFO will perform an internal assessment of the procedure cancellation process.
- Kaiser-Hill will ensure that the pre-stabilization sampling requirements are incorporated in the Building 371 BIO and operating procedures.
- RFFO will independently verify that the pre-stabilization sampling requirements have been incorporated into the Building 371 BIO and are adequately implemented and understood by responsible personnel.
- The results of the Kaiser-Hill investigation that led to the missed commitments and pertinent recommendations have been forwarded to Building 371 management for information.
- RFFO and Kaiser-Hill will jointly perform a review of DNFSB commitments since 1990, including closed actions, and validate adequate implementation and tracking of DNFSB commitments.
- RFFO will perform an assessment of the Independent Validation/Review (IVR) process and direct modifications to the process based on the results.

2. Individuals' knowledge of the Unreviewed Safety Question Determination (USQD) process is weak.

The following corrective actions address this root cause:

- Kaiser-Hill will prepare a formal Lessons Learned that documents the breakdown in the USQD process. The Lessons Learned will be incorporated, as appropriate, into training, procedures, and documents, be briefed to the Site Nuclear Safety Center of Excellence, and distributed to appropriate organizations across the plantsite.

3. Individuals' knowledge of implementing elements of the Integrated Safety Management Processes is weak.

The following corrective actions address this root cause:

- Kaiser-Hill will revise the IWCP manual to achieve work control documents that identify and focus on the most important and task unique safety issues. A mentoring process will be implemented to train safety professionals that prepare JHAs. This will be an ongoing process of training for safety professionals.
- Kaiser-Hill will prepare a formal Lessons Learned that documents the breakdown in the Integrated Safety Management process. The Lessons Learned will be incorporated, as appropriate, into training, procedures, and documents, be briefed to the Site Nuclear Safety Center of Excellence, and distributed to appropriate organizations across the plantsite.
- A formal RFFO Lessons Learned will be prepared which documents oversight weaknesses that occurred. The Lessons Learned will be shared with the RFFO staff and other sites. The Lessons Learned will be incorporated into appropriate Subject Matter Expert training.
- As an element of the RFFO realignment, the RFFO internal processes will be reviewed to ensure that quality assurance principles are incorporated.
- Kaiser Hill will establish a Safety Assessment Center that will be used as a clearinghouse for all site events with safety implications.

4. Management information reporting system to identify potential safety problems was inadequate.

The following corrective actions address this root cause:

- Kaiser-Hill will establish a Safety Assessment Center (SAC) that will be used as a clearinghouse for all site events with safety implications. The SAC will increase event-reporting sensitivity such that unusual conditions, especially those events that are lower than an internally reportable level, are categorized according to its safety implications and either trended or brought to appropriate levels of management attention.
- The projects will issue daily operations reports to include conditions that might not meet the reporting requirements for the Shift Superintendents report.

5. No policy/procedure to handle emergent technical direction exists.

The following corrective actions address this root cause:

- RFFO will establish the process for providing information and initiating technical direction to Kaiser-Hill with RFFO Subject Matter Experts (SMEs). This process will ensure that RFFO SMEs understand what technical direction is and how technical direction is provided to the contractor.
- RFFO will conduct training on this process with all RFFO SMEs.

6. Kaiser-Hill management failed to check if a BIO violation existed after the sampling requirement was pointed out.

The following corrective actions address this root cause:

- Kaiser-Hill will prepare a formal Lessons Learned that documents the breakdown in the Integrated Safety Management process. The Lessons Learned will be incorporated, as appropriate, into training, procedures, and documents, be briefed to the Site Nuclear Safety Center of Excellence, and distributed to appropriate organizations across the plantsite.

All applicable corrective actions will be tracked and their closure verified by Kaiser-Hill and RFFO. In addition, RFFO will plan an assessment after approximately 6 months of implementation of the corrective actions to assess effectiveness of the corrective actions. The following RootCause/Corrective Action Matrix is a result of the fact-finding performed by Kaiser-Hill and RFFO and provides a link between the errors, their root causes, and associated corrective actions. The corrective action also indicates the responsible party and provides an estimated completion date. Attached also is a matrix that provides a crosswalk between the DNFSB Staff observations, the identified errors, their root causes, and associated corrective actions.

Root Cause/Corrective Actions

Error	Root Cause	Corrective Action
<p>1. After POP010 was issued, FO-0023 was not revised to incorporate the sampling requirements.</p> <p>2. After the Building 707 BIO was approved, FO-0023 was not revised to incorporate the sampling requirement.</p> <p>4. RFFO was not aware that the BIO implementing procedure had been cancelled.</p> <p>20. RFFO failed to verify if the BIO TSR administrative controls were implemented.</p>	<p>1. The process to implement and maintain safety controls was inadequate.</p>	<ol style="list-style-type: none"> 1. Kaiser-Hill will ensure that all Authorization Basis requirements are accurately implemented in procedures/work control documents. This action will be performed in Building 707, 776777, and the Material Stewardship facilities. (Powers, ECD: June 30, 2001) 2. Based on the results of the Authorization Basis implementation check above, Kaiser-Hill will assess the need to perform a similar check in Building 371 and 771. (Powers, ECD: TBD following 1.) 3. Kaiser-Hill will ensure that the pre-stabilization sampling requirements are incorporated in the Building 371 BIO and operating procedures. (Complete) 4. RFFO will independently verify that the pre-stabilization sampling requirements have been incorporated into the Building 371 BIO and are adequately implemented and understood by responsible personnel. (Complete) 5. The results of the Kaiser-Hill investigation that led to the missed commitments and pertinent recommendations have been forwarded to Building 371 management for information. (Completed) 6. RFFO and Kaiser-Hill will jointly perform a review of DNFSB commitments since 1990, including closed actions, and validate adequate implementation and tracking of DNFSB commitments. (Sargent/Swanson, ECD: June 30, 2001) 7. RFFO will perform an assessment of the Independent Validation/Review (IVR) process and direct modifications to the process based on the results. (P. Hartman, ECD: September 30, 2001) 8. RFFO will provide technical direction to Kaiser-Hill to provide the results of the Authorization Basis crosswalk mapping and require Kaiser-Hill to provide notification of cancellation packages for any of the Authorization Basis implementing procedures. (P. Hartman, ECD: May 30, 2001) 9. RFFO will perform an internal assessment of the procedure cancellation process. (P. Hartman, ECD: June 30, 2002)

Error	Root Cause	Corrective Action
<p>3. A safety evaluation screen was performed on POP010 cancellation, but failed to recognize the sampling requirement under the BIO.</p> <p>7. The safety evaluation screen performed for the first FO-0023 change failed to recognize the sampling requirement under the BIO.</p> <p>18. The safety evaluation screen performed for the second FO-0023 change failed to recognize the sampling requirement under the BIO.</p> <p>21. The safety evaluation screen performed for the third FO-0023 change failed to recognize the sampling requirement under the BIO.</p>	<p>2. Individuals' knowledge of the Unreviewed Safety Question Determination process is weak.</p>	<p>10. Kaiser-Hill will prepare a formal Lessons Learned that documents the breakdown in the USQD process. The Lessons Learned will be incorporated, as appropriate, into training, procedures, and documents, be briefed to the Site Nuclear Safety Center of Excellence, and distributed to appropriate organizations across the plantsite. (Snyder, ECD: July 31, 2001)</p>
<p>5. The JHA for FO-0023 failed to integrate all hazards and controls from other available documents.</p> <p>6. The evaluation by the safety professionals inadequately validated that the scope of the proposed activity was authorized under the current safety controls and failed to implement the required safety controls.</p> <p>9. RFFO safety instructions were conveyed without knowledge of all applicable hazard analysis and controls.</p> <p>10. The decision to not incorporate the safety instructions was made without knowledge of all applicable hazard analysis and controls.</p> <p>12. When faced with an operational anomaly, facility personnel failed to utilize the integrated safety management approach to review the scope of work, hazard analysis and controls necessary to safety proceed with the proposed activity</p> <p>13. RFFO failed to validate whether the activity was bounded by the current authorization basis and required controls were implemented.</p> <p>16. When faced with an operational anomaly, RFFO personnel failed to utilize the integrated safety management approach to review the scope of work, hazard analysis and controls necessary to ensure the facility was safely proceeding with the proposed activity. RFFO did not ask the proper questions and ensure implementation of the authorization basis</p>	<p>3. Individuals' knowledge of implementing elements of the Integrated Safety Management Processes is weak.</p>	<p>11. Kaiser-Hill will revise the IWCP manual to achieve work control documents that identify and focus on the most important and task unique safety issues. A mentoring process will be implemented to train safety professionals that prepare JHAs. This will be an ongoing process of training for safety professionals. (Powers, ECD: May 30, 2001)</p> <p>12. Kaiser-Hill will prepare a formal Lessons Learned that documents the breakdown in the Integrated Safety Management process. The Lessons Learned will be incorporated, as appropriate, into training, procedures, and documents, be briefed to the Site Nuclear Safety Center of Excellence, and distributed to appropriate organizations across the plantsite. (Snyder, ECD: July 31, 2001)</p> <p>13. A formal RFFO Lessons Learned will be prepared which documents oversight weaknesses that occurred. The Lessons Learned will be shared with the RFFO staff and other sites. The Lessons Learned will be incorporated into appropriate Subject Matter Expert training. (Sargent, ECD: August 30, 2001)</p> <p>14. As an element of the RFFO realignment, the RFFO internal processes will be reviewed to ensure that quality assurance principles are incorporated. (P. Hartman, ECD: July 31, 2001)</p> <p>15. Kaiser Hill will establish a Safety Assessment Center that will be used as a clearinghouse for all site events with safety implications. (Completed)</p>

<p>safety controls.</p> <p>22. RFFO was slow to recognize the TSR administrative control violation even after pointed out by DNFSB staff.</p>		
<p>11.15. No formal reporting of the event was made to RFETS management outside of Building 707.</p>	<p>4. Management information reporting system to identify potential safety problems was inadequate.</p>	<p>15. Kaiser Hill will establish a Safety Assessment Center that will be used as a clearinghouse for all site events with safety implications. (Completed)</p>
<p>Error</p> <p>8. Technical direction was given by a non-Contracting Officer Technical Representative (COTR).</p> <p>14.17. RFFO safety instructions were conveyed informally.</p>	<p>Root Cause</p> <p>5. No policy/procedure to handle emergent technical direction exists.</p>	<p>Corrective Action</p> <p>16. RFFO will clarify the process for providing information and initiating technical direction to Kaiser-Hill with Subject Matter Experts. (Cannode, ECD: July 31, 2001)</p>
<p>19. Kaiser-Hill management failed to check if a BIO violation existed even after the sampling requirement was pointed out.</p>	<p>6. Kaiser-Hill safety personnel failed to recognize the sampling requirement under the BIO.</p>	<p>17. Kaiser-Hill will prepare a formal Lessons Learned that documents the breakdown in the Integrated Safety Management process. The Lessons Learned will be incorporated, as appropriate, into training, procedures, and documents, be briefed to the Site Nuclear Safety Center of Excellence, and distributed to appropriate organizations across the plantsite. (Snyder, ECD: July 31, 2001)</p>
		<p>18. Kaiser-Hill will track and validate closure of Kaiser-Hill completed corrective actions. (Snyder, ECD: August 31, 2001)</p> <p>19. RFFO will perform a validation of the completed corrective actions after Kaiser-Hill closure verification. (Jeffries, ECD: October 30, 2001)</p> <p>20. RFFO will perform an assessment on the effectiveness of Kaiser-Hill corrective actions after 6 months of implementation. (Dalton, ECD: February 28, 2002)</p>

Actions Addressing DNFSB Staff Issue Report Observations

DNFSB Staff Issue Report Observation	Error	Root Cause	Corrective Action
... controls DOE committed to implement to address concerns raised during the Board's deliberation regarding Building 707 were overlooked.	1,2,4,20,22	1	1,2,3,4,6,8,9
Lack of recognition and implementation of the TSR control in the BIO during these operations. – evidenced in K-H activity-level hazard analysis	5	3	11,12
Lack of recognition and implementation of the TSR control in the BIO during these operations. – evidenced in the thermal stabilization procedure	1,2	1	1,2,3,4,7,8,9
Lack of recognition and implementation of the TSR control in the BIO during these operations. – evidenced in the execution of the operations	6,9,10,12,13,16	3	11,12,13,14
Lack of recognition and implementation of the TSR control in the BIO during these operations. – evidenced in DOE oversight	4,9,13,16,20,22	1,3	4,6,7,8,9,13,14
Although several safety personnel were consulted during the course of this event, the applicable scope of work and hazard analysis were not reviewed.	6	3	12
Review of applicable work scope and hazard analysis is called for by the basic functions of Integrated Safety Management upon encountering such operational anomalies.	6,9,10,12,13,16	3	11,12,13,14
Proper review of the BIO/TSR would have identified the TSR control for sampling/characterization.	3,5,6,7,10,12,13,16,18,21	2,3	10,11,12,13,14
USQD referenced for the procedure changes to incorporate the initial temperature hold points did not address the TSR control for sampling/characterization.	3,7,18,21	2	10
The recommendations of the DOE-RFFO plutonium expert were informally provided to Kaiser-Hill and informally addressed, as evidenced by the initial failure to implement the temperature hold points.	8,14,17	5	16
The recommendation for safety controls were made without knowledge of all applicable hazard analysis and controls.	9,10,12,16	3	11,12,13,14
There was no formal reporting of the unusual glovebox pressure fluctuations to RFETS upper management. Lack of such reporting may have contributed to the failure to recognize the BIO/TSR coverage of thermal stabilization.	11,15	4	15
The determination that a TSR violation had occurred was made more than two weeks following the first unusual glovebox pressure fluctuations, several days after the Board's staff discussion of BIO/TSR coverage with RFETS personnel and only after the staff specifically identified the issue to senior DOE-RFO management.	19,20,22	1,6	1,2,8,9,12,13

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