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CC: S. Hess

RECEIVED
9 '99
M. H. SCHLENDER

Mr. Michael Schlender
Brookhaven Science Associates, LLC
Brookhaven National Laboratory
Upton, New York 11973

Dear Mr. Schlender:

SUBJECT: APPROVAL OF UNREVIEWED SAFETY ISSUE DETERMINATION/ SAFETY EVALUATION (USID/SE) FOR PILE FAN SUMP REMOVAL FOR BROOKHAVEN RESEARCH REACTOR DECOMMISSIONING PROJECT (BGRR-SE-99-02)

The Brookhaven Group (BHG) has reviewed your request to begin removal of the BGRR Pile Fan Sump. BHG has determined that the actions referenced in USID/SE BGRR-SE-99-02 are appropriate with the requirements of DOE Order 5480.21, Unreviewed Safety Questions and DOE-EM-STD-5503-94, EM Health and Safety Plan Guidelines. Therefore, removal of the BGRR Pile Fan Sump is authorized.

If you have any questions regarding this matter, please contact Lloyd Nelson of my staff at (516) 344-5225.

Sincerely,

George J. Malosh
Brookhaven Group Manager

cc: J. Goodenough, EPG, CH
M. Holland, BHG
S. Mallette, BHG
M. Dikeakos, BHG

Safety Evaluation Number: **BGRR – SE – 99 – 02** **Revision Number:** 0

Prepared by: S. H. Moss SHMoss 9/14/99 **Date:** 09/14/99

Description of proposed activity: WBS 1.3, Pile Fan Sump, Piping and Soils Removal

The Pile Fan Sump (PFS) is an operational sump that collects water from various BGRR, HFBR and ancillary facilities. Plant Engineering Division is modifying the Main Stack drain lines to be compliant with Suffolk County Article 12 requirements. The proposed modification is to plug drains in the Building 704 Fan house and Building 802 Fan house, remove portions of the existing drain and ventilation piping, cap and "abandon-in-place" other portions of the drain piping under the Building 704 Fan house footprint, and remove the PFS. The PFS is a concrete structure that weighs approximately 28,000 pounds and has approximately 300 feet of drain piping associated with the system.

The activities proposed here include:

1) Before and during excavation and drain line removals, work progress will be controlled by monitoring for radioactive materials in the pipes and in contiguous soils.
2) Remove the underground drain line outside of Building 802 Fan House Stack drain line to the east wall of Building 704 Fan House. This will be from the point of the new piping installation to Building 704.
3) Remove the underground drain line from the Building 704 Fan House to the PFS, approximately 150 feet of 4-inch Cast Iron piping.
4) Remove the 14-inch Acid Off-gas ventilation duct and the 2-inch Stainless Steel effluent line from the PFS to Building 801.
5) Cap the 14-inch Acid Off-gas ventilation duct downstream of the PFS and the Building 802 Fan House.
6) Remove the 5-foot wide by 7-foot long by 10-foot deep Pile Fan Sump structure.
7) If the Building 704 fan rooms have not been cleared of equipment and decontaminated before the drain lines are plugged, then berms will be installed in the Building 704 Fan House rooms to prevent any water inleakage from spreading contamination by seeping under the roll-up door onto the uncontrolled asphalt outside.
8) Characterize and dispose of the waste materials, concrete, cast iron and steel piping, and contaminated soils.
9) Conduct verification surveys, samples and analysis to show compliance with the removal action objectives.
10) Conduct independent verification surveying, sampling and analysis.
11) Backfill areas where components or soils have been removed.
12) Prepare activity closure report.

Purpose:

The purpose of WBS 1.3 for the BGRR Decommissioning Project is Removal of Pile Fan Sump, Piping and Soils. It specifically consists of: removing the Pile Fan Sump (PFS) and associated drain piping to reduce the "footprint" of the BGRR Complex and address sub-Area of Concern 9D of the IAG between DOE, EPA and NYSDEC.

References:

(1) Procedure No. BGRR-SOP-0902, "Safety Evaluations for Unreviewed Safety Issue Determinations", Rev.0 dated 7/12/99.
(2) BGRR-002, "Hazard Classification and Auditable Safety Analysis for Brookhaven Graphite Research Reactor (BGRR) Decommissioning Project", Rev. 2 dated September 8, 1999.
(3) BGRR-001, "Brookhaven Graphite Research Reactor (BGRR) Project Management Plan", Rev.0 dated May 26, 1999, as concurred with by DOE.
(4) BNL ES&H Manual Standard 1.3.3, "Safety Analysis Reports / Safety Assessment Documents", Rev.1 dated 7/28/92. [URL= https:sbms.bnl.gov/ld/ld08/ld08d081.htm]
(5) DOE-STD-1027-92, "Hazard Categorization and Accident Analysis Techniques for Compliance with DOE order 5480.23, Nuclear Safety Analysis Reports" Change Notice No. 1 dated September 1997.
(6) LA-12846-MS, "Specific Activities and DOE-STD-1027-92 Hazard Category 2 Thresholds", LANL Fact Sheet issued November 1994.
(7) LA-12981-MS, "Table of DOE-STD-1027-92 Hazard Category 3 Threshold Quantities for the ICRP-30 List of 757 Radionuclides", LANL Fact Sheet issued August 1995.
(8) BNL Memorandum of Agreement (MOA) between BGRR Project Office and HFBR regarding ownership and control of Fan House Building 704 and Associated Equipment, Systems and Structures, dated 12/11/98.
(9) BNL Action Memorandum for Brookhaven Graphite Research Reactor Pile Fan Sump Removal Action dated 8/13/99.

(10) BNL Task-specific Environment, Safety and Health Plan (TEHASP) for Pile Fan Sump Removal Activities. (Copy included as Attachment No. 1)
(11) BNL Dwg. No. 9561-M1, Sht. 1 of 2, "Mechanical Site Layout", Rev. 0 dated 8/20/99.
(12) BNL Dwg. No. 9561-M2, Sht. 2 of 2, "New Stand Pipe Detail", Rev. 0 dated 8/20/99.
(13) BNL Memorandum dated August 6, 1999, from C. Newson to S. Pulsford, "Removal of the Pile Fan Sump, Associated Piping, and Soils".
(14) BNL Memorandum dated August 18, 1999, from M. Fallier to Distribution, "Minutes of Meeting – HFBR Stack Drain and Pile Fan Sump Projects".
(15) DOE Letter dated August 27, 1999, from G. Malosh to M. Schlender, "Approval for the Pile Fan Sump Action Memorandum for the Brookhaven Graphite Research Reactor Decommissioning Project (BGRR-DP)".
(16) BGRR Technical Work Document "Pile Fan Sump Removal Activities". (Copy included as Attachment No. 2).
(17) NUREG/CR-0672, "Technology, Safety and Costs of Decommissioning a Reference Boiling Water Reactor Power Station", June 1980.
(18) Long Island Power Authority – Shoreham Nuclear Power Station – NRC Docket No. 50-322, "Updated Decommissioning Plan", February 1993.
(19) Brookhaven Graphite Research Reactor Decommissioning Project Health and Safety Plan (HASP)-BGRR-0006, dated September, 1999.
(20) BNL Pile Fan Sump Soil Sampling and Analysis Report dated May 29, 1998 by Environmental Restoration Division.
(21) BNL Memorandum dated April 16, 1997, from M. Brooks to M. S. Davis, "Root Cause Analysis – Detection of Radionuclides in Pile Fan Sump Occurrence".

SCREENING CRITERIA

Safety Function(s) of Systems Affected

1. Will the proposed activity affect the safety function(s) or failure mode(s) of the equipment/facility? (Y) N N/A

Because of its defunct status and defueled state, the BGRR has no current requirements for redundant systems and/or safety class or safety significant SSCs (Systems, Structures and Components). Therefore, no safety functions exist that are directly associated with current components or equipment considered part of the scope of the BGRR Decommissioning Project. Where no safety functions exist, there can be NO effect on the safety function by the proposed activity.

The Pile Fan Sump is not solely a BGRR component. In addition to receiving liquid effluent from Building 704, the Pile Fan Sump also receives input from the HFBR Stack drain and Bldg 801 Acid Off-gas Line (inactive) lowpoint drain. These concerns have already been resolved with the affected organizations [Refs. 13 & 14].

The Pile Fan Sump and associated piping, which carried or contained contaminated liquid, has in fact already failed [Ref. 21]. The reason for the removal of it is based the subsequent designation of it as sub-Area-of-Concern (AOC) 9D under the Interagency agreement between DOE, EPA, and NYSDEC, regarding the Brookhaven National Laboratory site. By removing the old sump/piping, replacing with Suffolk County Article 12 compliant Stack Drain system and remediating the affected soil, the impact on the environment will be reduced. By removing the components in question (Pile Fan Sump and associated piping), the failure mode will be eliminated.

While the proposed activity will not affect the safety function(s) of the facility [as there are none]; it will affect the failure mode(s) [in a positive way], by eliminating one of the old failure modes. The answer to question 1 of Safety Function(s) of System Affected is '**YES**'.

2. Will any new failure modes be introduced by the proposed activity? (Y) N N/A

While BGRR-002, "Hazard Classification and Auditable Safety Analysis for the BGRR Decommissioning Project", Rev. 2 dated September 8, 1999 [Ref. 2], has not yet been approved by DOE; it is anticipated that approval will come before the Pile Fan Sump work is completed.

Without the BGRR-ASA for comparison, any failure mode associated with the proposed activity constitutes a new failure mode. Guidance for the selection of appropriate failure modes to consider was taken from other decommissioning projects [Refs. 17 & 18]. The failure modes selected and associated accident analyses presented in Appendix A are; Crane Load Drop, Waste Container Drop, Contaminated Waste Bag Rupture/Fire, and Explosion of LPG Leaked from a Forklift. The Task-specific Environment , Safety and Health Safety Plan for the Pile Fan Sump Removal Activities [Ref. 10] and the BGRR

Technical Work Document for Pile Fan Sump Removal Activities [Ref. 16], bar the use of flame cutting equipment. Therefore, no accident scenario based on an oxyacetylene explosion was considered. Based on the physical characteristics of the materials to be removed (concrete, metal piping and soil), Combustible Waste Fire was deemed not a credible accident scenario. Based on a review of the Task-specific Environment , Safety and Health Plan for the Pile Fan Sump Removal Activities [Ref. 10] and the BGRR Technical Work Document for Pile Fan Sump Removal Activities [Ref. 16], the work to be performed in support of the proposed activity does not require or include the use of Contamination Control Envelope Structures or HEPA Filter Units (which could rupture as an accident scenario, if present).

In the absence of the BGRR-ASA, the proposed activity represents a new activity, with its own unique spectrum of potential failure modes. Even with the inclusion of the BGRR-ASA, the proposed activity (CERCLA Time-Critical Removal Action) represents an activity not covered by the BGRR-ASA (per Table 1.1 – ASA Applicability Table of Section 1.4 – Scope of Work), assuming the BGRR-ASA is approved by DOE as currently drafted).

As the proposed activity is specifically defined as being outside the scope of the BGRR-ASA and consists of deconstruction and remediation activities to be performed as part of a CERCLA Time Critical Removal Action, it may well introduce new failure modes not previously considered under the BGRR-ASA. The answer to Question 2 of the Safety Function(s) of System Affected is **'YES'**.

Effects on Safety

1.	Could the proposed activity increase the probability of occurrence of an accident previously evaluated in the ABD?	Y	(N)	N/A

For the Brookhaven Graphite Research Reactor Decommissioning Project, the authorization basis document is the BGRR-ASA (which is not approved by DOE). In light of that fact, the letter from DOE approving the Pile Fan sump Action Memorandum [Ref. 15], specifically directs that both a Project-level and a Task-specific Health and Safety Plan be prepared and approved by BNL prior to the fieldwork for the proposed activity. These documents temporarily fulfil the role of authorization basis documentation.

In the absence of an approved BGRR-ASA, there are no accident occurrence probabilities to be reviewed for impact by the proposed activity (as neither the BGRR-DP Health And Safety Plan [Ref. 19] nor the Task-specific Environment, Safety and Health Plan [Ref. 10] contain any accident analyses/probability of occurrences). This makes the trivial answer (prior to the approval of the BGRR-ASA) 'NO'.

However, the BGRR-ASA must still be reviewed for the potential impact of the proposed activity on the probability of occurrences for the accident scenarios contained within the BGRR-ASA. Because of the "Routine Risk" nature of the defueled BGRR (classified as a "Radiological Facility"), a rigorous probabilistic risk assessment was not required as part of the Auditable Safety Analysis. Instead, using a graded approach and the guidance offered in BNL ES&H Standard 1.3.3, {https:sbms.bnl.gov/ld/ld08/ld08d081.htm}[Ref. 4], the Risk Assessment Tables of Section 3.2 of the BGRR-ASA were developed.

Among the events analyzed in BGRR-ASA Section 3.2 – Risk Assessment are; Seismic Event, High Winds, Graphite Dust Detonation, Loss of Pile Negative Pressure System Ventilation, Loss of Pile Negative Pressure System Filtration, Crane Load Drop, Fire, Facility Worker Exposure to Toxic Material.

The proposed activity has no capability to impact the probability of occurrence of Seismic Events or High Winds (which are natural phenomena). Additionally, as the proposed activity is limited to the removal of the Pile Fan Sump, associated piping and potentially contaminated soils; it has no potential to impact the probability of events occurring at other local buildings e.g., Buildings 701 & 702. This eliminates from further consideration; Graphite Dust Detonation, Loss of Pile Negative Pressure System Ventilation, Loss of Pile Negative Pressure System Filtration, and Building 701 Crane Load Drop. The only remaining accident scenarios from the BGRR-ASA to be considered are: Risk Assessment No. 007, covering Fire; and Risk Assessment No. 008, covering Facility Workers Exposure to Toxic / Hazardous Materials.

The proposed activity involves the exposure by digging and removal of contaminated concrete, steel piping and potentially contaminated soil. There are no significant amounts of combustible materials involved and only mechanical means used for separation (no flame cutting). The accident analysis of the proposed activity in Appendix A includes two accident scenarios which already and independently address the potential for initiation of fire. These events are; Explosion of LPG Leaked from a Forklift and Contaminated Waste Bag Rupture/Fire. The proposed activity, having its own fire probability assessment, represents no increase in the probability of fire as defined in BGRR-ASA Risk Assessment No.7.

Finally, as 'Potential Initiators' under Risk Assessment No. 008 covering Facility Worker Exposure to Toxic/Hazardous Materials are; natural phenomenon, operator error, or equipment failure causing breach of deactivated piping or equipment containing residual hazardous/toxic material. The only BGRR-DP facility workers are those directly involved in the decommissioning process, including the performance of the proposed activity. Therefore, the proposed activity does not increase the probability of occurrence of this event. It merely reflects one of the potential initiators of this event. The proposed activity represents no increase in the probability of occurrence of the event as defined in BGRR-ASA Risk Assessment No. 008.

So the non-trivial answer to Question 1 of 'Effects on Safety' is also 'NO'.

The proposed activity does not increase the probability of any accident evaluated in the authorization basis document(ation).

2. Could the proposed activity increase the probability of occurrence of a malfunction of equipment, systems, or components that are Important-to-Safety? Y (N) N/A

As was already discussed in response to Screening Criterion No. 1 under 'Safety Function(s) of Systems Affected'; the BGRR has no current requirements for redundant systems and/or safety class or safety significant SSCs (Systems, Structures and Components) due to its defunct status and defueled state. Therefore, no safety functions exist that are directly associated with the proposed activity covered by this USID/SE. Without equipment, systems or components that are Important-to-Safety, there can be no probability of occurrence of a malfunction of equipment, systems or components that are Important-to-Safety; nor any increase in same.

The proposed activity COULD NOT increase the probability of occurrence of a malfunction of equipment, systems or components that are Important-to-Safety.

3. Could the proposed activity create the possibility of an accident of a different type than those previously evaluated in the ABD? (Y) N N/A

As already discussed in the response to Screening Criterion No. 2 under 'Safety Function(s) of Systems Affected', the answer to this question is 'YES'. However, the consequences of any such accident , as discussed in Appendix A are bounded under the consequences of accidents presented in the BGRR-ASA.

4. Could the proposed activity create the possibility of an equipment, system, or component malfunction of a different type than those previously evaluated in the ABD? (Y) N N/A

As already discussed in the response to Screening Criterion No. 2 under 'Safety Function(s) of Systems Affected', the answer to this question is 'YES'. However, the consequences of any such malfunction , as discussed in Appendix A are bounded under the consequences of accidents presented in the BGRR-ASA.

5. Does the proposed activity reduce the Margin-of-Safety as defined in the basis for any ABD? Y (N) N/A

In BGRR-SOP-0902 [Ref. 1], the procedure states "In the context of this procedure a Margin-of-Safety is reduced if the Safety Limit or Limiting Condition of Operation or Administrative Control as defined in the Authorization Basis Document(s) is violated". As this safety evaluation is based upon the guidance provided in the above referenced procedure, that definition of Margin-of-Safety compels the answer 'NO'.

The proposed activity DOES NOT reduce the Margin-of-Safety as defined in the BGRR-ASA because the work is being reviewed under the USI process prior to authorization and will not violate any of the Administrative Controls already contained in the BGRR-ASA as long as the work is performed as described in the task specific technical work documents [Refs. 9, 10, 15, 16 and 19]

Authorization Basis Document(s) Changes

1. Is a change to the facility ABD(s) being made? (Y) N N/A

The BGRR-ASA refers to the performance of work outside the scope of the ASA as requiring the use of the USI process as defined in BGRR-SOP-0902 [Ref. 1]. The proposed activity covered here specifically falls under that classification (see ASA Table 1.1 – ASA Applicability Table, for CERCLA Removal Actions). The completed and approved USID/SE for the proposed activity should be considered as an addendum and amendment to the BGRR-ASA.

Therefore, it does constitute a change to the BGRR-ASA and requires the approval of the DOE Project Manager for the BGRR Decommissioning Project, prior to implementation. The answer to Question 1 under 'Authorization Basis Document(s) Changes' is 'YES'.

SAFETY EVALUATION CONCLUSION

Based on the evaluation of the evidence cited above, the issue --

_____ Does NOT constitute an Unreviewed Safety Issue.

__✓__ Does constitute an Unreviewed Safety Issue.

**** IF ANY OF THE ABOVE ARE YES, THEN A USI EXISTS. ****

Clyde T. Newson 9/14/99
BGRR Project Engineer Signature/ Date

Stephen V. Mussolino 9/14/99
BGRR Project ES&H Manager Signature/ Date

Stephen K. Pulgle 9/15/99
BGRR Project Manager Signature/ Date

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BGRR Project QA Representative Signature/ Date