Department of Energy
Washington, DC 20585

JAN 23 2009

The Honorable A. J. Eggenberger
Chairman
Defense Nuclear Facilities Safety Board
635 Indiana Avenue, N.W., Suite 700
Washington, DC 20004-2901

Dear Mr. Chairman:

The purpose of this letter is to report the Department of Energy's (DOE) closure of the electrical safety issues at our Plutonium Finishing Plant (PFP) and at Hanford tank farms identified in your September 17, 2008, letter to the Assistant Secretary for Environmental Management.

On December 4, 2008, representatives of our Richland Operations Office and the Office of River Protection briefed the Defense Nuclear Facilities Safety Board on the actions taken to address the items identified in the September 17, 2008, letter regarding the PFP and tank farms, respectively. Copies of the two presentations are enclosed. Based on the presentations and subsequent discussions DOE believes these issues are closed.

One follow-up action was identified for the PFP during the discussions. This action entails the PFP contractor conducting an evaluation, related to protection of the 234-5Z switchgear that compares the merits of one or more of the following options:

- Installation of spray shield(s) to protect the back of 234-5Z switchgear;
- Plugging or removal of selected fire suppression sprinkler heads near the switchgear;
- Installation of spray shields at selected sprinkler heads; and
- Reducing combustible loading in the switchgear room.

The purpose of these actions is to reduce the potential for damage should the sprinkler system be activated. We expect to complete this evaluation by May 31, 2009.

If you have any further questions, please contact me at (202) 586-0738 or Dae Chung, Deputy Assistant Secretary for Safety Management and Operations, at (202) 586-5151.

Sincerely,

James M. Owendoff
Chief Operations Officer for
Environmental Management

Enclosures

cc:
I. Triay, EM-1
M. Whitaker, HS-1.1
D. Brockman, RL
S. Olinger, ORP

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Richland Operations Office Plutonium Finishing Plant Closure Project

Electrical Safety DNFSB Briefing
December 4, 2008
Matt McCormick, RL
Kathleen Jennings-Mills, CHPRC

PFP Project Status

- New contractor started October 1, 2008, CH2MHill Plateau Remediation Company (CHPRC)

- FY09 Status and Planning
  - Continue de-inventory, shipment of 3013 containers greater than %50 complete
  - 3 D&D crews working 234-5Z and Plutonium Reclamation Facility
  - First glovebox removed
  - CHPRC developing vital safety system back out plans and the cold and dark process

- DOE expectation is to complete slab on grade of PFP by 2013

DNFSB PFP Electrical Safety Concerns
Letter of September 17, 2008

- Cable Condition Monitoring Program
- Unprotected 480-Volt Switchgear
  - Personnel Hazards: 234-5Z
  - Impact to Safety Significant Loads: 234-5Z
  - Possible Damage: 291-Z
- Hydrogen Accumulation Hazards
- Evaluation of Thermography During Routine Electrical Inspections

Cable Condition Monitoring Program

Concern: Use industry practices to estimate the remaining life of safety related cables and that the Savannah River Site could provide a suitable model to follow.

PFP Response and Path Forward

- **PFP is Implementing a program that encompasses DNFSB Suggestions**
  - Application of IEEE Standard 1205
  - Discussions with EPRI and SRS
  - Discussions with Cable Assessment Contractors
  - Use of Nuclear Power industry practices

- **PFP's program will be modeled after the Savannah River Site**
  - Initiate PFP program, January 2009
  - Complete review and start implementation, September 2009
  - D&D electrical deactivation and backout plans will be developed prior to program implementation

Unprotected 234-5Z 480-VoltSwitchgear

Concern: Water spray resulting from an activation of the sprinkler system would likely penetrate the switchgear and could ***generate hazardous conditions****.*

PFP Response and Path Forward

- **Sprinkler Actuation in Switchgear Room**
  - Personnel Hazards Assessment
    - Room 266 is a restricted access area
    - Routinely unoccupied
    - Immediate evacuation of all 234-5Z personnel in the event of fire, fire alarm, or sprinkler actuation
    - Fire department pre-incident plan describes electrical hazards and electrical isolation procedures
    - Fire-fighters do not enter until electrical hazards are eliminated
      - Demonstrated in drill conducted, July 2008

Current access restrictions, evacuation and response procedures are adequate to prevent exposure to hazardous condition in the event of sprinkler activation.

Unprotected 234-5Z 480-VoltSwitchgear

*Concern: Water spray resulting from an activation of the sprinkler system would likely penetrate the switchgear and could leave **safety-significant loads without power**.*

PFP Response and Path Forward

- **Sprinkler Actuation in Switchgear Room**
  - Impact to Safety Significant Loads

    DSA credited safety significant loads continue to function following loss of switchgear
    - Uninterruptible power supplies enable safe evacuation and PFP shutdown following loss of switchgear
    - Restoration of switchgear operation is not driven by DSA

Switchgear is not Safety Class, Safety Significant, or Defense in Depth

Unprotected 291-Z 480-Volt Switchgear

Concern: Water could have leaked inside the switchgear. PFP agreed to evaluate the switchgear for damage.

PFP Response and Path Forward

- **Switchgear inspected for damage, June 2008 (see photo's)**
  - No indications of damage were found
  - Water stains occurred several years ago during maintenance activities
  - Roofing inspections were conducted in July and November 2008
  - Removed water stains and painted to detect any future leaks, completed September 2008
  - Identified water leaks are being sealed (currently underway)

Conduits at 291-Z switchgear showing evidence of past water exposure

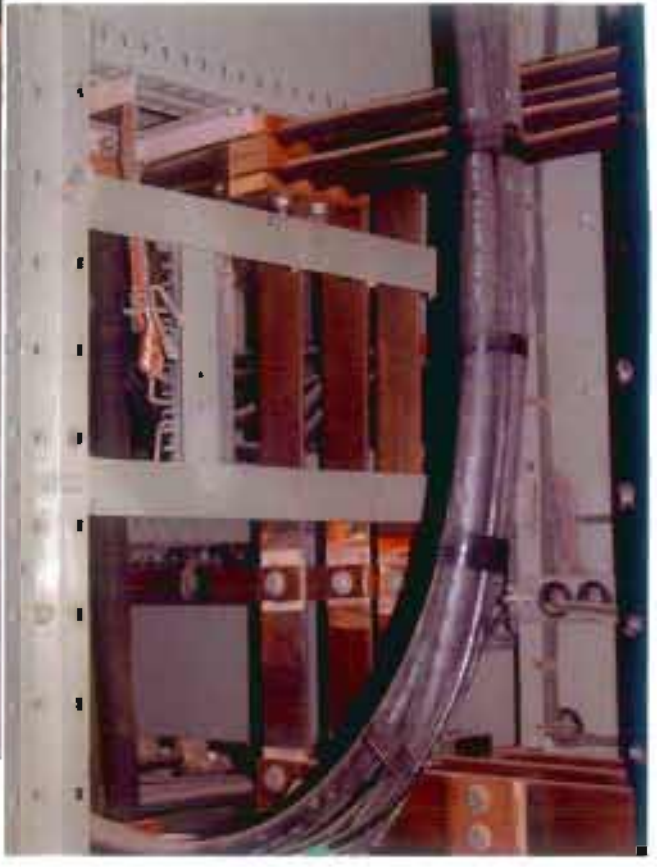
Rear of 291-Z electrical enclosure after repainting

291-Z Switchgear enclosure. Lower panel below water stains

Lower panel interior close-up - left

Lower panel interior close-up - right

291-Z Switchgear enclosure. Upper panel below water stains



291-Z Switchgear enclosure. Upper panel interior close-up - left

Hydrogen Accumulation Hazard in 234-5Z Switchgear Battery Room

Concern: PFP evaluate design modifications to prevent hydrogen accumulation in the space between the duct and the ceiling in room 269.

PFP Response and Path Forward

- Hydrogen accumulation surveys, August 2008
  - No flammable gas detected
- Ventilation exchange rate survey, August 2008
  - High exchange rate
  - Active ventilation between duct and ceiling
- Low Hydrogen generation from batteries, per manufactures information
- Annunciation in 321 Control Room upon charging system failure
- Regularly scheduled checks of batteries (electrolyte, cell voltage, charging system, etc.) are conducted

Modifications are not needed to prevent accumulation of hydrogen in room 269.

Room 269 HVAC Duct

Hydrogen Accumulation Hazard in 2721-Z Standby Generator Room

Concern: Open-filament space heater above lead-acid batteries in the diesel generator room. An explosion could result if hydrogen of sufficient concentration were to come in contact with the open filament of the space heater.

PFP Response and Path Forward

- Heating element maximum surface temperature is below Hydrogen autoignition temperature
- Survey of ventilation exchange rate, August 2008
    - High passive exchange rate
    - Ventilation pathways above heater elevation
- Low Hydrogen liberation from batteries
    - Regularly scheduled checks of batteries (electrolyte, cell voltage, charging system, etc.) are conducted
    - Micon annunciation upon charging system failure

Modifications are not needed to prevent accumulation of hydrogen in room 2721-Z.

2721-Z heater - angled mounting prevents accumulation of hydrogen gas

2721-Z penthouse ventilation dampers

2721-Z inlet and penthouse vents

Evaluation of Thermography During Routine Electrical Inspections

Concern: Use of thermography devices be evaluated for routine inspection of electrical switchgear, motor control centers, panel boards, and control panels.

PFP Response and Path Forward

- CHPRC Engineering is evaluating numerous contractors providing thermographic imaging services for potential use on the Hanford site
- PFP will evaluate electrical equipment to determine if thermographic monitoring would be effective by September 2009
  - Evaluation will consider remaining plant life
  - Routine maintenance that includes inspection and cleaning of electrical equipment
  - Switchgear breakers are removed, inspected and tested on a regular scheduled PM program
  - and history of no main switchgear breaker failure

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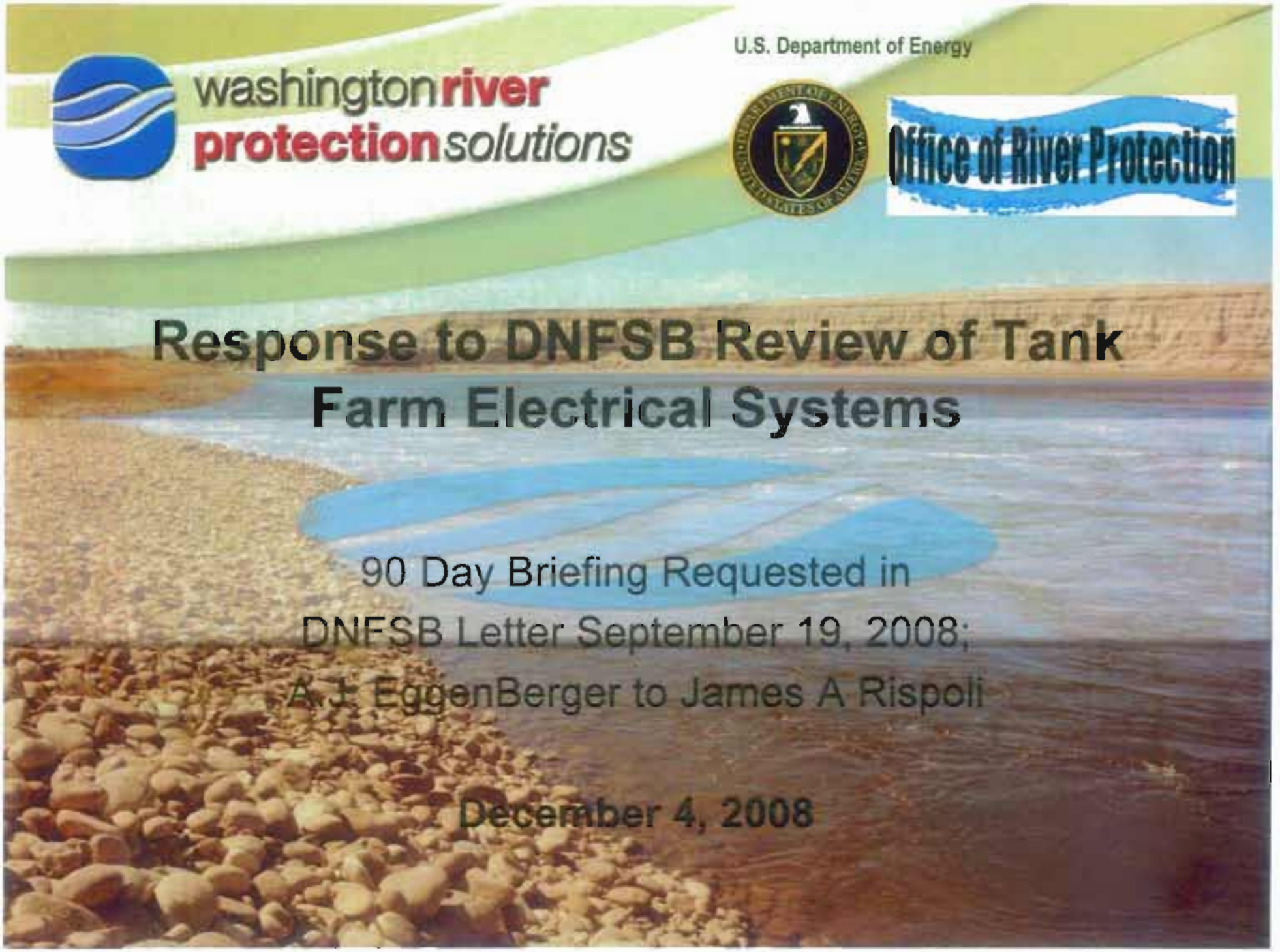
washington river protection solutions
U.S. Department of Energy
Office of River Protection
Response to DNFSB Review of Tank Farm Electrical Systems
90 Day Briefing Requested in
DNFSB Letter September 19, 2008;
A.J. EggenBerger to James A Rispoli
December 4, 2008

Issue 1: Electrical Calculations and Studies

- **Issue:** Electrical calculations and studies performed in 2001, 2005, and 2007 identified deficient design conditions affecting electrical systems. Several of the identified deficiencies have not been corrected.

- **DNFSB Recommendation:** Resolve all design deficiencies as soon as possible.

Issue 1: Current Status and Planned Corrective Actions

- A detailed evaluation of each original issue has been completed by TOC electrical engineering personnel:
  - No bonding or grounding issues were identified.
  - Load calculations assume a demand factor of 1, whereas systems are lightly loaded and the operating load of energized devices and conductors are currently within their approved ratings.
  - NEC issues and the items requiring field work have been identified.
  - Of the 78 originally identified issues:
    - Issues affect legacy systems.
    - 48 issues have been resolved, including 19 resolved since the Board staff review.
    - 30 issues remain open that require field work. (see next slide for path forward)

Issue 1: Current Status and Planned Corrective Actions

- The 30 open field items have been reviewed and divided into those that can be worked with a local lock and tag and those that require a complete farm electrical outage to work.
  - A detailed list of the actions required by farm has been prepared that forms the basis for work order instructions to resolve the remaining issues.
  - 14 Items have been identified that can be worked with a local lock and tag.
    - Lock and tag walk downs have been completed for the first three items
    - Work packages are in preparation with the first anticipated to be worked week ending 12/5
  - Remaining 16 items scheduled to be worked on a farm by farm basis during the next scheduled electrical outage for that farm.
    - A complete electrical outage schedule has been developed for all farms beginning with AN farm in February 2009.
    - Schedule targets completion of the outages and resolution of all identified issues in the affected farms in FY2009.

Issue 1: Causal Analysis

- Problem Evaluation Request (PER) issued.
- First step is to perform causal analysis and evaluate extent of condition to identify needed corrective actions.
- Causal analysis has been initiated and is still ongoing. Preliminary information indicates causes include:
  - PERs were generated for majority of issues. However, the originator inconsistently identified the issues as a failure to meet a requirement (NEC non-compliance) on the PER form.
  - Issues were not adequately communicated between organizations (Engineering & Operations)
  - Previous management direction/emphasis on closure of old PERs associated with unfunded process improvements allowed closure of some issues without completion of adequate corrective actions.
  - Management did not adequately track closure of these electrical issues.

Issue 1: Extent of Condition

- Evaluation of extent of condition initiated and is ongoing.
  - Document control system was searched to identify all issued electrical load calculations and studies.
  - Nine (9) additional electrical load studies have been identified.
    - Five (5) studies contain no issues.
    - Four (4) studies contain legacy issues that will be reviewed and resolved in same manner as previously discussed 78 issues.
- Corrective actions to prevent recurrence are being finalized, which will include:
  - Workshop to identify improvements to PER system
  - Complete review of electrical load study issues and document in released engineering document.
  - Complete field work to resolve electrical items.

Issue 2: Non-Safety Significant (SS) Electrical System Powering SS Loads

- **Issue:** The Board notes that power to the safety-significant ventilation system for double-shell tanks in the Tank Farms is not classified as safety-significant.

- **DNFSB Recommendation:** This situation is acceptable as long as the time to reach flammable conditions in the tank head space is on the order of a month or longer. If the time to reach flammable conditions is significantly reduced by waste retrieval and transfer operations, the Department of Energy (DOE) should reevaluate the functional classification of the electrical power supply and distribution systems.

Issue 2: Current Status and Planned Corrective Actions

- TSR Administrative Controls are already in place that address this issue:
  - Contained in AC 5.10, Flammable Gas Controls, Key Element 5.10.2f. "DST and SST Time to LFL Determination"
  - Requires to periodically (not to exceed annually) confirm the Completion Times and Surveillance Frequencies in LCOs.
  - If a decrease in Surveillance Frequency is required, a revision to the Surveillance Frequency shall be implemented IMMEDIATELY by the TFC. ORP shall be notified of any decrease in LCO Surveillance Frequency implemented by the TFC within 48 hours, and a TSR amendment shall be submitted for ORP approval within 60 days.
  - See next slide for implementation.

Issue 2: Current Status and Planned Corrective Actions

- Waste Compatibility Assessment documents are prepared prior to all retrievals and waste transfers that calculate the time to reach 25% of the LFL prior to the following activities and operations:
  - Waste transfers into DSTs (which addresses retrieval and transfer operations)
  - Large water additions (> 10,000 gal) to DSTs
  - Chemical additions of sodium hydroxide or sodium nitrite to DSTs for waste chemistry management
  - Any activity or operation in a DST that could cause a bulk waste temperature increase greater than that assumed in the analysis (e.g., planned extended primary/annulus ventilation system outage)

Issue 2: Current Status and Planned Corrective Actions

- In addition, the time to reach LFL is recalculated on an annual basis to account for changes in waste constituents resulting from updates to the Best Basis Inventory and for waste temperature trends. Documented in annual update to the flammable gas technical basis documents.

- No corrective actions are required to address this issue.