David J. Bannister, Vice President
and Chief Nuclear Officer
Omaha Public Power District
Fort Calhoun Station FC-2-4
P.O. Box 550
Fort Calhoun, NE  68023-0550

SUBJECT: SUMMARY OF MEETING WITH OMAHA PUBLIC POWER DISTRICT REGARDING A PRELIMINARY SUBSTANTIAL FINDING

Dear Mr. Bannister:

This refers to the public regulatory conference meeting conducted at Arlington, Texas on August 18, 2010, between the NRC and your staff. The participants discussed the circumstances associated with a preliminary finding with substantial safety significance regarding the mitigation of a potential flood at the Fort Calhoun Station.

This meeting was classified as a Category 1 public meeting, as communicated in the meeting notice (ADAMS ML102160648). This provided an opportunity for members of the public to discuss regulatory issues with the NRC after the business portion of the meeting, but before the meeting adjourned. No comments were brought forward by the public.

The attendance list for the meeting is enclosed with this summary (Enclosure 1). A copy of the Omaha Public Power District presentation slides is also enclosed (Enclosure 2). A copy of the Omaha Public Power District meeting minutes for the external flooding expert panel for sandbagging effectiveness which was referred to during the meeting is enclosed (Enclosure 3).

In accordance with 10 CFR 2.390 of the NRC's "Rules of Practice," a copy of this letter, and its enclosures, will be available electronically for public inspection in the NRC Public Document Room or from the Publicly Available Records component of NRC’s document system (ADAMS). ADAMS is accessible from the NRC Web Site at http://www.nrc.gov/reading-rm/adams.html (the Public Electronic Reading Room).
Should you have any questions concerning this matter, we will be pleased to discuss them with you.

Sincerely,

/RA/

Thomas R. Farnholtz, Chief
Engineering Branch 1
Division of Reactor Safety

Dockets: 50-285
Licenses: DPR-40

Enclosures:
1. Attendance List
2. OPPD Presentation Slides

cc w/enclosures:

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Omaha Public Power District
Fort Calhoun Station FC-2-4 Adm
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Fort Calhoun, NE 68023-0550

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Radiation Control Program
Nebraska Health & Human Services
Division of Public Health
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Lincoln, NE 68509-5026

Mr. Bill R. Hansher
Manager (Acting) - Nuclear Licensing
Omaha Public Power District
Fort Calhoun Station FC-2-4 Adm.
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Fort Calhoun, NE 68023-0550

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Congressional Affairs Officer (Jenny.Weil@nrc.gov)
OEMail Resource
ROPReports
OEDO RIV Coordinator (Margie.Kotzalas@nrc.gov)

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KEYWORD: Fort Calhoun Station Regulatory Conference August 2010

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OFFICIAL RECORD COPY  T=Telephone  E=E-mail  F=Fax
REGULATORY CONFERENCE WITH FORT CALHOUN STATION

August 18, 2010

U.S. Nuclear Regulatory Commission Region IV Office
612 East Lamar Blvd Arlington TX 76006

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<tr>
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<tr>
<td>Susan Baughn</td>
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<tr>
<td>Allen Bereck</td>
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<tr>
<td>John Kirkland</td>
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<td>Donna Gun</td>
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<td>Edward George</td>
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<td>Nicole Coleman</td>
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<td>Ray Kellar</td>
<td>NRC OE</td>
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<tr>
<td>Christi Maxer</td>
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<td>Elmo Collins</td>
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<td>Michael fern</td>
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<td>Megan Williams</td>
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## REGULATORY CONFERENCE WITH FORT CALHOUN STATION

August 18, 2010

U.S. Nuclear Regulatory Commission Region IV Office  
612 East Lamar Blvd Arlington TX 76006

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<tr>
<td>Lynnea Wilkins</td>
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<td>Roy Caniano</td>
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<td>Chuck Castro</td>
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<td>Lara Ueking</td>
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<td>Woody Grabill</td>
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Fort Calhoun Station Regulatory Conference

External Flooding
August 18, 2010

Opening Remarks
Jeff Reinhart – Site Vice President

Agenda
- Introductions
- Key Points and Objectives
- Performance Deficiency Corrective Actions
- Root Cause Analysis Results
- Extent of Condition Review
- Risk Significance Considerations
- Closing Remarks

Introductions
- Jeff Reinhart - Site Vice President
- Harry Faulhaber - Division Manager Engineering
- Mike Ferre - Shift Manager/Manager System Engineering
- Joe McManus - Manager Projects
- Tim Miller - Superintendent Maintenance
- Alan Hassler - Supervisor PRA
- Kavi Hyde - Supervisor Design Engineering
- Susan Baughn - Manager Nuclear Licensing
- Donna Guen - Supervisor Regulatory Compliance
- Allen Berck - Supervisor Emergency Planning
Key Points and Objectives
- Protection against and mitigation of external flooding is of utmost importance to OFPD.
- Although the USAR is not clear, OFPD is targeting up to 1014 feet.
- Actions completed to address deficiencies in procedures, equipment, and training.
- Additional actions are in progress to update station design basis.
- Cause analysis completed to identify root and contributing causes.
- Actions assigned to address causes and extent of condition.
- OFPD requests consideration of additional information regarding risk.

Fort Calhoun Station Regulatory Conference
Performance Deficiency Corrective Actions
Harry Faulhaber – Division Manager Engineering

Procedures to Protect Plant From External Flooding
- AOP-1: Acts of Nature
- AOP-36: Emergency Fill of Emergency Feedwater Storage Tank
- AOP-38: Blowdown Water Main Trouble
- EPR-TSC-2: Catastrophic Flooding Preparations
- GM-R-4E-1002: Flood Control Preparedness for Land Levees
- PE-RN-AE-1001: Floodgate and Floodplain Installation and Removal
- PE-RN-AE-1002: Floodgate Inspection and Repair
- PE-RN-AE-1003: Installation of Portable SG Makeup Pumps

Corrective Actions Completed
- Implemented external flooding action plan (Oct. 2009)
- Short-term and long-term actions identified
- Project Manager assigned (Jan 2010)
- Project team assigned (Jan 2010)
- Action plan reviewed and updated routinely
- Procedures and equipment have been upgraded to enhance protection of vital structures to 1014 feet.
Corrective Actions Completed

- Purchased four additional gasoline powered steam generator feed make-up pumps.
- Verified readiness of pumps and associated equipment.
- Upgraded implementing procedure (PE-RR-AE-002).
- Verified readiness of equipment and materials.
  Fire water storage tank cross-connect to emergency feedwater storage tank.
  Filling emergency feedwater storage tank.
- Upgraded or verified implementing procedure.
  ADR-35/AOP-19
  EWP-TSC-0.

Corrective Actions Completed

- Verified readiness of floodpumps and associated equipment.
- Upgraded implementing procedure (PE-RR-AE-1001).
- Upgraded sandbagging equipment and materials.
  Upgraded sandbagging machine and purchased additional machine.
  Upgraded implementing procedure (GM-RR-AE-1002).
- Fabricated new floodplated to protect to 1014 feet.
  Updated implementing procedure (PE-RR-AE-1001).

Corrective Actions Completed

- Verified the Intake Structure cell water level can be maintained using a raw water pump.
- Verified preventive maintenance tasks for flood protection equipment.
- Conducted ERO drill to demonstrate ERO decision making and sandbag berm construction.

ERO Demonstration
July 16, 2010

- Primary objectives of the scenario were to demonstrate, evaluate and validate the following:
  Decision making
  Procedures and methods
  Practical demonstration of sandbagging.

8/20/2010

-3- Enclosure 2
ERO Demonstration Results
July 16, 2010

- ERO was conservatively activated
- Demonstrated ability to construct a sandbag berm
- Demonstrated use of procedures
- Demonstrated protection for elevations greater than 1009.5 ft
- Maintained effective decay heat removal and core cooling

Corrective Actions In Progress

- Implement design change to improve efficiency of floodgate installation
  Includes associated procedures changes
- Conduct maintenance refresher training on sandbagging and floodgate installation
- Review Probable Maximum Flood (PMF) in accordance with AR 150
- Update station external flooding design basis as required

Historical Improvements

- 1992
  AR 150 "Army of Engineers" issued, including maps to sandbag entrenches of the
  plant to 1204 ft when river level reached 1007.5 ft
  AR 1500 and AR 1500 - 150 "Floodgates Replacement and Repair" revised to
  include ASME floodcreep and visual inspection of response equipment

- 1993
  Engineering Analysis Report, DMR-70-200, "Determines that extraneous flooding
  was most probable flood 1205 ft above flood stage (FDF) Portable water
  pumps provided and procedures written for use

- 1995
  GH-98-45 - 082, "Flood Control Preparations for Sandbagging" is issued for
  installing sandbags to prevent FCS from a Missouri River flood
  Design sheets for sandbagging "Sandbagging Design FCS" is transmitted. Includes a
  study of the inundation of external flooding

8/20/2010
Root Cause Analysis

- Extent of Cause
  - Potential for other commitments/design basis not clearly translated into the FSAR/USAR

- Extent of Condition
  - Potential for other commitments/design basis not adequately implemented in procedures
  - External flooding
  - Design changes not evaluated in view of new data

RCA Corrective Actions

- Review 1998 USAR verification project database items for proper condition reporting threshold
- Focus and prioritize comprehensive review of USAR to ensure adequate implementation into procedures to ensure commitments and requirements are clearly translated in the USAR

Enclosure 2
**Additional Extent of Condition Review**

- Reviewed corrective actions from previous 95002 inspection for applicability
- Causal analysis process improvements
- Rigor in NRC violation corrective actions
- Reviewed Corrective Action program for similar issues as noted in inspection report

**Fort Calhoun Station Regulatory Conference**

Risk Significance Considerations
Harry Faulhaber – Division Manager Engineering

**Risk Significance Considerations**

- Historical Risk Perspective
- Frequency of Flooding
- Timeline for Response to Flooding
- Ability to Prevent Vital Structures
- Steam Generator Make-up Reliability
- Base Case Selection

**Summary of FCS External Flood CDF**
**Frequency of Flooding**

Uncertainty of Flood Occurrence Frequency Studied by Jack Benjamin and Associates

At lower frequencies near flooding occurrence, distributions have a high degree of uncertainty.

Most values of occurrence for floods ≥ 10 ft. is about 17% lower than PCS estimates.

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**Flooding Frequency versus Elevation**

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**Available Time/Rate of Rise**

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**Recent Operating Experience**

- PCS has entered AOP-I several times this year.
  - Control Room received early and accurate information.
  - Station practice is early entry into AOP-I.
  - Site personnel responded with urgency and diligence.
- PCS has demonstrated Command and Control and early decision making.
Ability To Protect Vital Structures

- Doors could have been protected with sandbags or steel plates above existing floor slabs.
- Sandbags and steel plates were available on-site.
- Additional supplies readily available nearby.

Priorities:
1. Auxiliary Building
2. In-place Structure

Auxiliary Building Protection

Floor elevation higher than 1010.8 ft.

Auxiliary Building Entrance/Footgates

Exposed to 1000 ft.

Exposed to 1010 ft.
Risk Parameter Differences

- Suggested NRC human error probability is 4x10E(-3)
- Equipment availability negligible
  - A pump failure would be addressed
  - Core pumps are sufficient for severe upset and DNI and ENS treatments
  - Pre-staged pumps are a "starter set" and would be supplemented by others
  - Could be streamlined in the future
  - ECP not required
  - Steam generator depletion time is larger than 15 hours

Overall Risk Assessment

Closing Remarks

- Protection against and mitigation of external flooding is of utmost importance to OPG
- Actions completed to address the performance deficiency
- Protection is provided for vital structures up to 1014 ft
- RCA completed and corrective actions are in progress
- Extent of cause/condition reviews have been completed
  - The RCCA is a significant factor in protecting the health and safety of the public
  - The risk created by the performance deficiency is low
  - We respectfully request reconsideration of risk
External Flooding Expert Panel for Sandbagging Effectiveness

Date:
August 2, 2010

Facilitators:
Joe McManis

Participants:
Chris Moeller  Senior Emergency Planning Representative
Sondra Bowser:  Working Crew Leader - SFM
Tim Miller:  Superintendent Maintenance - FCS
Alexander Peters:  Control Room Supervisor
David Haas:  Senior Nuclear Design Engineer - Mechanical
Anthony Filips:  Nuclear Engineer
Rob Swerczek:  PRA Representative
Nik Vassios:  Field Engineer
Carl Nielsen:  Project Manager

Guests:
Donna Guinn:  Supervisor Regulatory Compliance
Justin Wiemer:  PRA Co-op
Brian Chee:  PRA Co-op

Purpose

The purpose of this expert panel is to establish an approximate sandbagging success likelihood profile that represents, in a quantitative manner, the degree of confidence FCS has in the ability to protect the auxiliary building and intake structure for Missouri River floods in excess of 1010 ft up to floods of 1014 ft and the basis for that confidence level.

Background

The FCS USAR states (or at least implies) that OPPD will protect the auxiliary building and the intake structure via use of floodgates and sandbags. FCS procedures rely on sandbags for building protection above 1009.5. The guidance for implementing sandbagging protection is contained in GM-RR-AE-1002 (see attached). However, the guidance is very limited when floods are expected to exceed 1009.5 ft. Specifically, procedure GM-RR-AE-1002 calls for draping sandbags over the floodgates.

Based on NRC review of the procedure, it was concluded that there was essentially zero likelihood that sandbag berms could be constructed. Their assessment did not credit any other procedure or organization. The actual SDP assumed that even at flood levels as low as 1010 ft elevation; the credit for sandbagging was set to zero.
**Issue Definition**

Given a flooding event is predicted to occur on the Missouri River it is important that OPPD confidently defines the sandbagging success profile. In establishing this profile the expert panel participants should consider the actual state of the plant at the time the violation was cited. Specifically,

- One sandbagging motor was missing
- Sand on site was limited
- The procedures had not yet been revised
- General site awareness of potential flood hazards was not as great as it is now

Based on the drill of July 16, 2010, several observations are relevant:

- Overall staff available to fill sandbags is more than 70 people (35 per alternating shift)
- Sandbags can be filled via machine at a rate of 21 per minute
- Total number of sandbags required to protect to 1014’ msl:
  - Auxiliary Building: 6,500
  - Intake Structure: 9,000
- Time for river rise is 45-210 hours. This affects preparation time available.
- River rise forecast is based on data from the USACE.
- Site begins to flood at 1004’ msl, making movement around the site difficult. This is noted by NRC as a concern.
- Sandbag elevations necessary to protect various doors is attached

**Summary**

On Monday, August 2, 2010, the expert panel convened to discuss external flooding plant protection, procedures related to sandbagging and installation floodgates and the results of the July 16th drill. The expert panel discussed which actions would be needed to protect both the Intake Structure and Auxiliary Building. The sandbags would be pre-staged in the Intake Structure and Auxiliary Building (as mentioned in the procedure). Input was received from multiple participants for each door. Pros and cons were weighed by participating members and a consensus of likelihood was agreed upon and documented. The items discussed for the Intake Structure were doors IS-1, IS-2, IS-3, IS-4 and IS-5 and with additional discussion on a sandbag wall between the traveling screens and Raw Water vault openings. The items discussed for the Auxiliary Building were doors 1007-1A/1B, 1007-9, 1007-19, 1011-1, 1011-2, 1011-3, 1011-4, 1011-11, 1013-4, Corridor 26 and the Room 66 grating to the stressing gallery. For the Auxiliary Building, sandbags would be brought in through the roll-up door on the railroad siding to use for the Auxiliary Building entrance door first, and then the roll-up door and railroad siding with all materials inside.
There was some discussion by maintenance personnel about the manpower and time it takes to sandbag the doors. Maintenance personnel decided that welding plates to the door would be a better use of resources in some cases. An e-mail was sent from Maintenance to Licensing which documented the welding resources available (welders, welding machines, etc.) to FCS and the ERO if needed. Maintenance mentioned that there are enough steel plates on site for flooding protection. Maintenance mentioned that the time to weld a plate to a personnel door would take 4 hours or less and a large door would be 8 hours or less.

During the discussion, the likeliness of successful protection of each opening in the Intake Structure and Auxiliary Building was determined. Each likeliness ranking referred to the percent of success of protection. The success likeliness rankings are as follows: extremely likely = 95% success, very likely = 90%, likely = 75%, uncertain = 50%, doubtful = 25%, very doubtful = 10% and impossible = 0%.

DEN was tasked to determine the height at which the column between the personnel door, IS-4, and roll-up door, IS-5, would lose structural integrity. DEN calculated that the column is structurally sound up to a level of 1010.8’ msl. The operations representative mentioned that the sluice gate/RW pumps would be used to control water level in the cells. The expert panel decided the intake structure protection was “extremely likely” to a level of 1010.8’ msl including operating the sluice gates and RW pumps. The expert panel decided internal (protection from trash trough) intake structure protection was “impossible” above 1010.8’ msl.

For the Auxiliary Building, the probability of success could be determined from the levels at which the doors would be challenged. For Auxiliary Building floods up to 1010.8’, the protection would be “very likely”, which corresponds to 90% success. For Auxiliary Building floods up to 1014’, the protection were averaged over two levels, from 1010.8’ to 1013’, then from 1013’ to 1014’. For floods between level 1010.8’ and 1013’, the protection would be “very likely”, which corresponds to 90% success. For floods between 1013’ to 1014’, the protection would be “likely”, corresponding to 75% success. To combine these values, success would be 90% for 2.2 feet, from 1010.8’ to 1013’, then success would be 75% for 1 foot, from 1013’ to 1014’. When these values are combined for a level of protection between 1010.8’ to 1014’, the probability of success is 85%.
The following table documents the results of the expert panel discussion.

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<td>Aux</td>
<td>1007-1A 1B</td>
<td>Very Likely</td>
<td>90</td>
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<td>Floodgate and 2550 sandbag 7’ (4.5’ above floodgate) pyramid spanning Radwaste and Corr. 26 w/ floodgate</td>
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<td>Aux</td>
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<td>90</td>
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<td>Aux</td>
<td>RR Siding Cor. 26</td>
<td>Extremely Likely</td>
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<td>Add 8.25’ x 4.5’ plate above existing floodgate. Channel exists to support plate and easy access to sandbags if needed</td>
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<td>30 sandbags for 1’ of protection</td>
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<td>Aux</td>
<td>DG Room Plate</td>
<td>Likely</td>
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<td>3’x3’ Plate on floor of Equipment hatch 1013’ elev. to stressing gallery requires 60 sandbags</td>
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<td>Intake</td>
<td>IS-5</td>
<td>Extremely Likely</td>
<td>95</td>
<td>1010.8</td>
<td>Install existing floodgate and weld (2) 2’ x 6’ plate above gate</td>
</tr>
<tr>
<td>Intake</td>
<td>IS-5</td>
<td>Impossible</td>
<td>0</td>
<td>1014</td>
<td>Install existing floodgate and weld (2) 6’x1.5’ plates above gate</td>
</tr>
<tr>
<td>Building</td>
<td>Door</td>
<td>Likeliness</td>
<td>% Success</td>
<td>To Level</td>
<td>Comments</td>
</tr>
<tr>
<td>----------</td>
<td>------------</td>
<td>--------------</td>
<td>-----------</td>
<td>----------</td>
<td>-------------------------------------------------------------------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>Intake</td>
<td>Screen Wall</td>
<td>Very Likely</td>
<td>90</td>
<td>1011.5</td>
<td>4’ x 8’ plywood wall with plastic sheet and sandbags placed behind. Need knee braces - using sluice gates and RW pumps to help control cell level, sandbag instrument trenches</td>
</tr>
<tr>
<td>Intake</td>
<td>Screen Wall</td>
<td>Doubtful</td>
<td>25</td>
<td>1014</td>
<td>4’ wood wall no protection past 1011.5, requires sandbagging the trash chute, control of gates being on water side of the screen wall, throttle RW pumps</td>
</tr>
</tbody>
</table>

**Expert Panel References Used or Discussed**
- PE-RR-AE-1001 Floodgate Installation and Removal
- GM-RR-AE-1002 Flood Control Preparedness for Sandbagging
- Welder and welding e-mail from Maintenance to Licensing on April 28, 2010
- FCS Floodgate Strategy
- Expert Panel Guidance – WEC
- CEOG Guidelines for Using Expert Panels
- 1011’ Flood e-mail from DEN about load on Intake Structure column on August 9, 2010