Omaha Public Power District
1946 - 2006
Fort Calhoun Station
P.O. Box 550
Fort Calhoun, NE 68023

January 8, 2007
LIC-06-0131

U. S. Nuclear Regulatory Commission
Attn: Document Control Desk
Mail Station P1-137
Washington, DC 20555

Reference: Docket No. 50-285

Subject: Licensee Event Report 2006-007 Revision 0 for the Fort Calhoun Station

Please find attached Licensee Event Report 2006-007, Revision 0, dated January 8, 2007. This report is being submitted pursuant to 10 CFR 50.73(a)(2)(ii)(B), 50.73(a)(2)(v)(B, C and D) and 50.73(a)(2)(ix)(A). If you should have any questions, please contact me.

Sincerely,

H. J. Faulhaber
Division Manager
Nuclear Engineering

HJF/epm

Attachment

c:
B. S. Mallett, NRC Regional Administrator, Region IV
Alan Wang, NRC Project Manager
J. D. Hanna, NRC Senior Resident Inspector
INPO Records Center

IE22

NRC FORM 366 (6-2004) U.S. NUCLEAR REGULATORY COMM

APPROVED BY OMB: NO. 3150-0104 EXPIRES: 06/30/2007

Estimated burden per response to comply with this mandatory collection request: 50 hours. Reported lessons learned are incorporated into the licensing process and fed back to industry. Send comments regarding burden estimate to the Records and FOIA/Privacy Service Branch (T-5 F52), U.S. Nuclear Regulatory Commission, Washington, DC 20555-0001, or by internet e-mail to infocollects@nrc.gov, and to the Desk Officer, Office of Information and Regulatory Affairs, NEOB-10202, (3150-0104), Office of Management and Budget, Washington, DC 20503. If a means used to impose an information collection does not display a currently valid OMB control number, the NRC may not conduct or sponsor, and a person is not required to respond to, the information collection.

LICENSEE EVENT REPORT (LER)

(See reverse for required number of digits/characters for each block)

1. FACILITY NAME	2. DOCKET NUMBER	3. PAGE
Fort Calhoun Station	05000285	1 OF 3

4. TITLE

Inadequate Seismic Design of Reactor Vessel Head Refueling Stand

5. EVENT DATE			6. LER NUMBER			7. REPORT DATE			8. OTHER FACILITIES INVOLVED	
MONTH	DAY	YEAR	YEAR	SEQUENTIAL NUMBER	REV NO.	MONTH	DAY	YEAR	FACILITY NAME	DOCKET NUMBER
										05000
11	08	2006	2006	- 007 -0	00	01	08	2007	FACILITY NAME	DOCKET NUMBER 05000

9. OPERATING MODE

5

10. POWER LEVEL

0

11. THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR§: *(Check all that apply)*

- ☐ 20.2201(b)
- ☐ 20.2201(d)
- ☐ 20.2203(a)(1)
- ☐ 20.2203(a)(2)(i)
- ☐ 20.2203(a)(2)(ii)
- ☐ 20.2203(a)(2)(iii)
- ☐ 20.2203(a)(2)(iv)
- ☐ 20.2203(a)(2)(v)
- ☐ 20.2203(a)(2)(vi)
- ☐ 20.2203(a)(3)(i)
- ☐ 20.2203(a)(3)(ii)
- ☐ 20.2203(a)(4)
- ☐ 50.36(c)(1)(i)(A)
- ☐ 50.36(c)(1)(ii)(A)
- ☐ 50.36(c)(2)
- ☐ 50.46(a)(3)(ii)
- ☐ 50.73(a)(2)(i)(A)
- ☐ 50.73(a)(2)(i)(B)
- ☐ 50.73(a)(2)(i)(C)
- ☐ 50.73(a)(2)(ii)(A)
- ☒ 50.73(a)(2)(ii)(B)
- ☐ 50.73(a)(2)(iii)
- ☐ 50.73(a)(2)(iv)(A)
- ☐ 50.73(a)(2)(v)(A)
- ☒ 50.73(a)(2)(v)(B)
- ☒ 50.73(a)(2)(v)(C)
- ☒ 50.73(a)(2)(v)(D)
- ☐ 50.73(a)(2)(vii)
- ☐ 50.73(a)(2)(viii)(A)
- ☐ 50.73(a)(2)(viii)(B)
- ☒ 50.73(a)(2)(ix)(A)
- ☐ 50.73(a)(2)(x)
- ☐ 73.71(a)(4)
- ☐ 73.71(a)(5)
- ☐ OTHER

Specify in Abstract below or in NRC Form 366A

12. LICENSEE CONTACT FOR THIS LER

FACILITY NAME	TELEPHONE NUMBER (Include Area Code)
Erick Matzke, Compliance Engineer	402-533-6855

13. COMPLETE ONE LINE FOR EACH COMPONENT FAILURE DESCRIBED IN THIS REPORT

CAUSE	SYSTEM	COMPONENT	MANU-FACTURER	REPORTABLE TO EPIX	CAUSE	SYSTEM	COMPONENT	MANU-FACTURER	REPORTABLE TO EPIX

14. SUPPLEMENTAL REPORT EXPECTED

☒ YES *(If yes, complete 15. EXPECTED SUBMISSION DATE)* ☐ NO

15. EXPECTED SUBMISSION DATE

MONTH	DAY	YEAR
4	30	2007

ABSTRACT *(Limit to 1400 spaces, i.e., approximately 15 single-spaced typewritten lines)*

During the 2006 refueling outage, a question was raised regarding the seismic mounting requirements for the Reactor Vessel Head (RVH) while it is in the laydown area on the 1045'-0" elevation of containment.

The RVH is not restrained when it is in the laydown area. Upon further review, it was discovered that the floor beams and piers that support the RVH are not seismically qualified for loads due to the RVH. If there was a failure of the head stand during an earthquake and the head fell to the northeast direction and penetrated the floors in that area, the shutdown cooling (SDC), safety injection piping and components in the basement below could be severely degraded. This would result in placing the plant in an unanalyzed condition. This is an unacceptable scenario that would potentially put the plant at risk due to the loss of decay heat removal capability.

The root cause appears to be an original design oversight.

During the 2006 refueling outage, a plant modification installed a seismic guard in the laydown area to preclude this scenario. This guard prevents the RVH from falling toward vulnerable equipment. The RVH falling other directions is bounded. Therefore, with the addition of the seismic guard, the consequences of the RVH falling from its support location in the laydown area are found to be acceptable.

LICENSEE EVENT REPORT (LER)

FACILITY NAME (1)	DOCKET (2)	LER NUMBER (6)			PAGE (3)
		YEAR	SEQUENTIAL NUMBER	REVISION NUMBER	
Fort Calhoun Nuclear Station	05000285	2006	- 007	- 00	2 OF 3

NARRATIVE *(If more space is required, use additional copies of NRC Form 366A)* **(17)**

BACKGROUND

The containment internal structure provides support to refueling equipment in addition to supporting and protecting safety-related systems and components. In order to perform this function, it is designed for a "no loss of function" during gross equipment failures and forces imposed by natural phenomena (earthquakes, tornadoes, flooding conditions, wind, ice, etc).

EVENT DESCRIPTION

During the 2006 refueling outage, it became necessary to perform maintenance underneath the Replacement Reactor Vessel Head (RRVH). On October 28, 2006, the decision was made to elevate the RRVH 40 inches above the level of the head support stand. A temporary stand was fabricated for that purpose. At that time, the reactor was completely defueled and no fuel was present in containment. It had not been anticipated that the RRVH would be sitting on the temporary stand when refueling was to begin. Therefore, seismic loads were not considered in the design of the stand.

However, due to the duration of maintenance activities, it became necessary to load fuel while the work on the RRVH was progressing. While performing the maintenance a question was raised regarding the seismic requirements needed for the temporary head stand to begin fuel movement. At this time, engineering discovered the seismic design basis for the permanent RVH head stand and laydown area was unknown. As a result of this discovery, condition report (CR) 200605083 was written to investigate the potential consequences of the RVH falling during a seismic event.

The investigation revealed that this configuration was not acceptable from a design basis perspective. Equipment and piping located in the area where damage could occur includes the following equipment required for decay heat removal:

- Two high pressure safety injection (HPSI) headers
- Two of the eight HPSI discharge isolation valves (HCV-317 and HCV-318)
- Low pressure safety injection (LPSI) header
- One of the four LPSI discharge isolation valves (HCV-331)
- The shutdown cooling (SDC) suction header
- Power and control cables to SDC suction header isolation valve (HCV-348)

With fuel in the vessel, an un-isolable break in the SDC suction line results in an open path from the reactor coolant system (RCS) to the containment floor. The loss of all three safety injection headers upstream of their respective isolation valves would result in a plant condition where it would not be possible for SI water to reach the RCS. The result of one or both of these events placed the plant in an unanalyzed condition.

At the time of discovery the plant was defueled with all the fuel in the spent fuel pool. The plant was not in a prohibited condition at that time. This event is being reported pursuant to 10 CFR 50.73(a)(2)(ii)(B), 50.73(a)(2)(v)(B, C and D) and 50.73(a)(2)(ix)(A).

CONCLUSION

The calculations associated with the RVH laydown area floor (containment elevation 1045'-0") were reviewed. The original design calculations did not include seismic loads but applied a differential pressure load (due to a hypothetical loss of coolant accident) to the floor. This may have been assumed to bound the seismic loads during normal operation. However, it would not necessarily bound the seismic loads with the RVH in the laydown area during refueling operations. It was discovered from reviewing the calculations that this configuration was not considered part of the original design basis. Since this condition has existed for the life of the plant (initial criticality - 1973), no root cause could be determined. The root cause appears to be an original design oversight.

FACILITY NAME (1)	DOCKET (2)	LER NUMBER (6)			PAGE (3)
		YEAR	SEQUENTIAL NUMBER	REVISION NUMBER	
Fort Calhoun Nuclear Station	05000285	2006	- 007	- 00	3 OF 3

NARRATIVE *(If more space is required, use additional copies of NRC Form 366A)* **(17)**

CORRECTIVE ACTIONS

An attempt was made to qualify the existing floor. However, the piers that the RVH rests on have little shear resistance and the beams are under-designed when torsional and shear loads from a maximum hypothetical earthquake are considered. Engineering change (EC) 39709 installed a seismic guard that will prevent the RVH from falling into the area of concern. This protects the SDC suction header and two of the three SI headers. Therefore decay heat removal is still possible after a postulated earthquake. This modification was completed and accepted for operation on November 14, 2006.

If the RVH falls toward the bioshield wall or containment wall, it will be deflected with very little structural damage. These massive walls are very close to the RVH. The RVH would have little time to pick up sufficient momentum to cause significant damage. A drop straight through the floor is bounded by a heavy load drop analysis (EA-FC-98-008) and does not result in any unacceptable conditions. The RVH falling into the refueling cavity (and hypothetically onto the fuel transfer machine) is bounded by a fuel-handling accident in containment (UFSAR Section 14.18). Thus the consequences of the RVH falling from its support location in the laydown area in any direction, except the undesired location, are acceptable.

Because the RVH is now prevented from falling in the undesired location and damaging equipment required for decay heat removal, the plant is in an analyzed condition before, during, and after fuel movement during refueling outages. The consequences have been analyzed and are acceptable from a design basis perspective. All the equipment previously mentioned has been analyzed and adequately protected.

SAFETY SIGNIFICANCE

With fuel in the vessel, an un-isolable break in the SDC suction line results in a condition of an open path from the RCS to the containment floor. The loss of all three safety injection headers upstream of their respective isolation valves would result in an unanalyzed plant condition where it would not be possible for SI water to reach the RCS. The result of one or both of these events is unanalyzed. The consequences of this event are being reviewed and is expected to be completed to allow a revision to this document by April 30, 2007.

SAFETY SYSTEM FUNCTIONAL FAILURE

This event does result in a safety system functional failure in accordance with NEI-99-02.

PREVIOUS SIMILAR EVENTS

There have not been any other instances of a similar nature that have occurred at the Fort Calhoun Station.