

Barry S. Allen  
Vice President - Nuclear

419-321-7676  
Fax: 419-321-7582

October 24, 2010

L-10-293

10 CFR 50.73

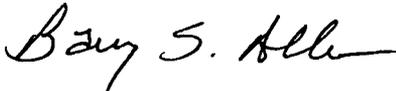
ATTN: Document Control Desk  
United States Nuclear Regulatory Commission  
Washington, D.C. 20555-0001

SUBJECT:  
Davis-Besse Nuclear Power Station  
Docket Number 50-346, License Number NPF-3  
Licensee Event Report 2010-004

Enclosed is Licensee Event Report (LER) 2010-004, "Spent Fuel Pool Rack Patterns Did Not Comply With Technical Specification 3.7.16." This LER is being reported in accordance with 10 CFR 50.73(a)(2)(i)(B), operation in a condition prohibited by the Technical Specifications.

There are no regulatory commitments contained in this letter or its enclosure. The actions described represent intended or planned actions and are described for information only. If there are any questions or if additional information is required, please contact Mr. Patrick J. McCloskey, Manager, Site Regulatory Compliance, at (419) 321-7274.

Sincerely,



Barry S. Allen

JCS

Enclosure: LER 2010-004-00

cc: NRC Region III Administrator  
NRC Resident Inspector  
NRR Project Manager  
Utility Radiological Safety Board

IEZZ  
NRR

<b>NRC FORM 366</b> (6-2004)		<b>U.S. NUCLEAR REGULATORY COMMISSION</b>			APPROVED BY OMB NO. 3150-0104		EXPIRES 8/31/2010		
<b>LICENSEE EVENT REPORT (LER)</b>									
(See reverse for required number of digits/characters for each block)									
<b>1. FACILITY NAME</b> Davis-Besse Nuclear Power Station					<b>2. DOCKET NUMBER</b> 05000346			<b>3. PAGE</b> 1 OF 4	
<b>4. TITLE</b> Spent Fuel Pool Rack Patterns Did Not Comply With Technical Specification 3.7.16									
<b>5. EVENT DATE</b>			<b>6. LER NUMBER</b>			<b>7. REPORT DATE</b>			<b>8. OTHER FACILITIES INVOLVED</b>
MONTH	DAY	YEAR	YEAR	SEQUENTIAL NUMBER	REV NO.	MONTH	DAY	YEAR	FACILITY NAME
08	26	2010	2010	- 004	- 00	10	24	2010	DOCKET NUMBER 05000
<b>9. OPERATING MODE</b> 1									
<b>10. POWER LEVEL</b> 100									
<b>11. THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR §:</b> (Check all that apply)									
<input type="checkbox"/> 20.2201(b)			<input type="checkbox"/> 20.2203(a)(3)(i)			<input type="checkbox"/> 50.73(a)(2)(i)(C)			<input type="checkbox"/> 50.73(a)(2)(vii)
<input type="checkbox"/> 20.2201(d)			<input type="checkbox"/> 20.2203(a)(3)(ii)			<input type="checkbox"/> 50.73(a)(2)(ii)(A)			<input type="checkbox"/> 50.73(a)(2)(viii)(A)
<input type="checkbox"/> 20.2203(a)(1)			<input type="checkbox"/> 20.2203(a)(4)			<input type="checkbox"/> 50.73(a)(2)(ii)(B)			<input type="checkbox"/> 50.73(a)(2)(viii)(B)
<input type="checkbox"/> 20.2203(a)(2)(i)			<input type="checkbox"/> 50.36(c)(1)(i)(A)			<input type="checkbox"/> 50.73(a)(2)(iii)			<input type="checkbox"/> 50.73(a)(2)(ix)(A)
<input type="checkbox"/> 20.2203(a)(2)(ii)			<input type="checkbox"/> 50.36(c)(1)(ii)(A)			<input type="checkbox"/> 50.73(a)(2)(iv)(A)			<input type="checkbox"/> 50.73(a)(2)(x)
<input type="checkbox"/> 20.2203(a)(2)(iii)			<input type="checkbox"/> 50.36(c)(2)			<input type="checkbox"/> 50.73(a)(2)(v)(A)			<input type="checkbox"/> 73.71(a)(4)
<input type="checkbox"/> 20.2203(a)(2)(iv)			<input type="checkbox"/> 50.46(a)(3)(ii)			<input type="checkbox"/> 50.73(a)(2)(v)(B)			<input type="checkbox"/> 73.71(a)(5)
<input type="checkbox"/> 20.2203(a)(2)(v)			<input type="checkbox"/> 50.73(a)(2)(i)(A)			<input type="checkbox"/> 50.73(a)(2)(v)(C)			<input type="checkbox"/> OTHER
<input type="checkbox"/> 20.2203(a)(2)(vi)			<input checked="" type="checkbox"/> 50.73(a)(2)(i)(B)			<input type="checkbox"/> 50.73(a)(2)(v)(D)			Specify in Abstract below or in NRC Form 366A
<b>12. LICENSEE CONTACT FOR THIS LER</b>									
FACILITY NAME Joseph C. Sturdavant, Senior Nuclear Specialist								TELEPHONE NUMBER (Include Area Code) (419) 321-8199	
<b>13. COMPLETE ONE LINE FOR EACH COMPONENT FAILURE DESCRIBED IN THIS REPORT</b>									
CAUSE	SYSTEM	COMPONENT	MANU-FACTURER	REPORTABLE TO EPIX	CAUSE	SYSTEM	COMPONENT	MANU-FACTURER	REPORTABLE TO EPIX
<b>14. SUPPLEMENTAL REPORT EXPECTED</b>							<b>15. EXPECTED SUBMISSION DATE</b>		
<input checked="" type="checkbox"/> YES (If yes, complete EXPECTED SUBMISSION DATE). <input type="checkbox"/> NO							MONTH	DAY	YEAR
							12	31	2010
<b>ABSTRACT</b> (Limit to 1400 spaces, i.e., approximately 15 single-spaced typewritten lines)									
<p>On August 26, 2010, an issue with the Bases for Technical Specification (TS) 3.7.16, "Spent Fuel Storage," was identified. TS 3.7.16 requires fuel assemblies in the Spent Fuel Pool to be placed in the storage racks per the criteria shown in TS Figure 3.7.16-1, which in turn references the TS Bases. At the time of this discovery, there were fuel assemblies in the Spent Fuel Pool that did not comply with this TS.</p> <p>The TS 3.7.16 Limiting Condition for Operation (LCO) Action requires actions to move the non-complying fuel assembly to an allowable location with an Action Completion Time of "immediately." Davis-Besse has concluded that action to bring these fuel assemblies into compliance with the TS was not initiated in a timeframe commensurate with the required action completion time. Additionally, this condition existed in the past since the conversion to Improved Standard TS. Therefore, this event is being reported pursuant to 10 CFR 50.73(a)(2)(i)(B) as a condition prohibited by the TS.</p> <p>The evaluation of this issue is not complete. Therefore, the cause of the event is indeterminate at this time. Corrective Actions to date include a TS Bases change to permit spent fuel storage in the modules as analyzed. A detailed Root Cause evaluation is in progress to determine the cause of this event and corrective actions. The results will be provided in a revision to this report.</p>									

**LICENSEE EVENT REPORT (LER)  
CONTINUATION SHEET**

1. FACILITY NAME	2. DOCKET	6. LER NUMBER			3. PAGE
Davis-Besse Unit Number 1	05000346	YEAR	SEQUENTIAL NUMBER	REVISION NUMBER	2 OF 4
		2010	-- 004 --	00	

**NARRATIVE**

Energy Industry Identification System (EIS) codes are identified in the text as [XX].

**System Description:**

The Spent Fuel Pool facility [DB] at the Davis-Besse Nuclear Power Station (DBNPS) is designed to assure the safe storage of irradiated fuel assemblies under normal and accident conditions. The Spent Fuel Pool structure provides for the containment and confinement of the fuel assemblies, and prevents significant reduction in coolant inventory under normal and accident conditions.

The 21 high density Spent Fuel Pool racks [DB-RK] store a maximum of 1,624 fuel assemblies. The rack cells are arranged in a rectangular array of parallel rows. Boral®, which is a neutron absorber, is attached to all four sides of each cell. Between individual racks, and between peripheral racks and the pool walls, there is a gap. This gap forms a “flux trap” which reduces neutron movement between fuel assemblies in adjacent racks. The criticality analysis for the Spent Fuel Pool (Holtec Report No. HI-2002359) concluded the combination of Boral and flux traps provides the option to position each fuel assembly in three different patterns within the racks – Mixed Zone Three Region, Checkerboard, and Homogeneous Loading. These loading patterns maintain k-effective less than 0.95 for fuel assemblies with initial nominal enrichments less than or equal to 5.05 weight percent Uranium-235, assuming the Spent Fuel Pool water is unborated. Fuel stored in the Spent Fuel Pool is administratively limited to a maximum nominal enrichment of 5.0 weight percent Uranium-235. This allows compliance with subsection “b” of 10 CFR 50.68, “Criticality Accident Requirements.” The position of a fuel assembly within a pattern is dependent upon its “category”. The category is based on the burnup/initial enrichment restrictions contained in the Technical Specifications. The detailed requirements for use of each pattern, or combination of patterns, are contained in administrative procedures.

During accident conditions, credit may be taken for the Boron in the Spent Fuel Pool water when showing k-effective is maintained less than or equal to 0.95. The criticality analysis determined a Boron concentration of approximately 630 parts per million (ppm) in the Spent Fuel Pool water is required to maintain k-effective at 0.945 for the worst-case fuel handling accident, (i.e., a 5.05 weight percent enriched assembly misloaded in a Checkerboard pattern).

**Technical Specification(s):**

Technical Specification (TS) 3.7.16, “Spent Fuel Storage,” Limiting Condition for Operation (LCO) 3.7.16 requires the fuel assemblies stored in the Spent Fuel Pool be placed in the storage racks in accordance with the criteria shown in TS Figure 3.7.16-1. TS Figure 3.7.16-1 includes a NOTE that the approved loading patterns are specified in the TS Bases. In accordance with TS LCO 3.7.16, when the requirements of the LCO are not met, actions to move the non-complying fuel assembly to an allowable location shall be initiated “immediately” (pursued without delay and in a controlled manner per TS Definition 1.3).

**Technical Specifications Bases Document:**

The TS Bases Document (Revision 7 in effect at the time of discovery) stated “The restrictions delineated in Figure 3.7.16-1 and the Required Actions are consistent with the criticality safety analysis performed for the Spent Fuel Pool (Ref. 1). Reference 1 is the DBNPS Updated Safety Analysis Report (USAR) Section 9.1.2.1. The criticality analyses qualify the high density rack modules for storage of the fuel assemblies in one of three different loading patterns subject to certain restrictions: Mixed Zone Three Region (MZTR), Checkerboard (CB), and Homogeneous Loading (HL). TS Figure 3.7.16-1 provides the Category-specific

**LICENSEE EVENT REPORT (LER)  
CONTINUATION SHEET**

1. FACILITY NAME	2. DOCKET	6. LER NUMBER			3. PAGE
Davis-Besse Unit Number 1	05000346	YEAR	SEQUENTIAL NUMBER	REVISION NUMBER	3 OF 4
		2010	-- 004	-- 00	

**NARRATIVE**

Technical Specifications Bases Document (continued):

burnup/enrichment limitations. Different loading patterns may be used in different rack modules, provided each rack module contains only one loading pattern. The loading pattern restrictions are maintained in fuel handling administrative procedures.”

**DESCRIPTION OF EVENT:**

On August 26, 2010, a corrective action document was initiated to document an issue with the Bases for TS 3.7.16. The TS Bases in effect at the time described three acceptable fuel loading patterns within the Spent Fuel Pool. The TS 3.7.16 TS Bases stated that fuel stored within each individual rack module shall be the same pattern and that different loading patterns may be used in different rack modules, provided each rack module contains only one loading pattern. However, the original Bases for Technical Specification 3.9.13 (currently TS 3.7.16, following the conversion to Improved Standard Technical Specifications on December 13, 2008), contained an additional sentence which stated, “Two different loading patterns may be used in a single rack module, subject to certain additional restrictions.” Both the old and new TS Bases went on to state that the loading pattern restrictions are maintained in fuel handling administrative procedures.

The additional sentence regarding two different loading patterns in a single rack is consistent with the criticality safety analysis performed for the spent fuel racks, as documented in Holtec report HI-2002359, and with the bases documented in the NRC Safety Evaluation Report for DBNPS License Amendment 247 (approved October 19, 2001), which implemented the changes associated with the installation of the existing high density spent fuel racks.

This additional sentence continued to be present in the Bases for TS 3.9.13 until the conversion to Improved Standard Technical Specifications via License Amendment 279 (approved November 20, 2008), when this TS was renumbered to TS 3.7.16.

At the time of discovery (August 26, 2010), some of the fuel assemblies were in two different loading patterns in a single Spent Fuel Pool rack module.

On August 27, 2010, the Bases for TS 3.7.16 were revised to restore the removed text allowing two different loading patterns in a single rack module. However, in accordance with TS 3.7.16, when the requirements of the LCO were found not to be met, actions to move the non-complying fuel assemblies to an allowable location were not initiated “immediately” (pursued without delay and in a controlled manner per TS Definition 1.3). Additionally, this condition existed in the past since the conversion to Improved Standard TS. Therefore, this issue is being reported in accordance with 10 CFR 50.73(a)(2)(i)(B), as operation in a condition prohibited by the Technical Specifications.

Evaluation and analysis of this issue is not complete, and the results will be provided in a revision to this Licensee Event Report.

**CAUSE OF EVENT:**

As stated above, the cause analysis of this issue is not complete. Therefore, the cause of the event is indeterminate at this time. Results of this analysis will be provided in a revision to this Licensee Event Report.

**LICENSEE EVENT REPORT (LER)  
CONTINUATION SHEET**

1. FACILITY NAME	2. DOCKET	6. LER NUMBER			3. PAGE
Davis-Besse Unit Number 1	05000346	YEAR	SEQUENTIAL NUMBER	REVISION NUMBER	4 OF 4
		2010	-- 004	-- 00	

**NARRATIVE**

**ANALYSIS OF EVENT:**

The use of the USAR-described "combination of patterns" or previous TS 3.9.13 Bases "Two different loading patterns may be used in a single rack module" is consistent with the criticality safety analysis performed for the high density spent fuel storage racks, as documented in Holtec report HI-2002359, and with the bases documented in the NRC Safety Evaluation Report for DBNPS License Amendment 247, which implemented the changes associated with the installation of the existing high density spent fuel storage racks. Because the fuel assemblies in the Spent Fuel Pool were always in an acceptable pattern per the criticality safety analysis, this issue had no safety significance.

**Reportability Discussion:**

When the requirements of TS LCO 3.7.16 were found not to be met and actions to move the non-complying fuel assemblies to an allowable location were not initiated "immediately" (pursued without delay and in a controlled manner per TS Definition 1.3) the station was not in compliance with the applicable Technical Specification. Additionally, this condition existed in the past since the conversion to Improved Standard TS. Therefore, this issue is being reported in accordance with 10 CFR 50.73(a)(2)(i)(B), as operation in a condition prohibited by the Technical Specifications.

**CORRECTIVE ACTIONS:**

Technical Specification 3.7.16 Bases was changed on August 27, 2010, to reflect the analyzed configuration of two (2) different loading patterns in a single rack module in the Spent Fuel Pool.

The Davis-Besse Technical Specifications were evaluated for the extent of this condition to determine if there were any other TS LCOs that may point to the TS Bases for additional information. No other similar instances were found.

Additional corrective actions identified following completion of the cause evaluation for this event will be provided in a revision to this Licensee Event Report.

**PREVIOUS SIMILAR EVENTS**

The review for any previous similar events is included in the cause evaluation and will be provided in a revision to this Licensee Event Report.