



Kewaunee Nuclear Power Plant
N490, State Highway 42
Kewaunee, WI 54216-9511
920-388-2560

Operated by
Nuclear Management Company, LLC



March 12, 2001

10 CFR 50.73

U. S. Nuclear Regulatory Commission
Attention: Document Control Desk
Washington, D.C. 20555

Ladies/Gentlemen:

Docket 50-305
Operating License DPR-43
Kewaunee Nuclear Power Plant
Reportable Occurrence 2000-015-01

In accordance with the requirements of 10 CFR 50.73, "Licensee Event Report System," the attached Licensee Event Report (LER) supplement for reportable occurrence 2000-015-01 is being submitted. This report does not contain any new commitments.

Sincerely,

Kyle A. Hoops
Manager-Kewaunee Plant

GOR

Attach. LER 2000-15-01

cc - INPO Records Center
US NRC Senior Resident Inspector
US NRC, Region III

IED2

LICENSEE EVENT REPORT (LER)

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

Estimated burden per response to comply with this mandatory information collection request: 50 hrs. Reported lessons learned are incorporated into the licensing process and fed back to industry. Forward comments regarding burden estimate to the Records Management Branch (T-6 F33), U.S. Nuclear Regulatory Commission, Washington, DC 20555-0001, and to the Paperwork Reduction Project (3150-0104), Office of Management and Budget, Washington, DC 20503. If 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.

FACILITY NAME (1) Kewaunee Nuclear Power Plant	DOCKET NUMBER (2) 05000305	PAGE (3) 1 OF 8
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TITLE (4)
Service Water Traveling Water Screens Not Sealed As Per USAR

EVENT DATE (5)			LER NUMBER (6)			REPORT DATE (7)			OTHER FACILITIES INVOLVED (8)	
MONTH	DAY	YEAR	YEAR	SEQUENTIAL NUMBER	REVISION NUMBER	MONTH	DAY	YEAR	FACILITY NAME	DOCKET NUMBER
11	09	2000	2000	-- 015 --	01	03	12	2001		05000
									FACILITY NAME	DOCKET NUMBER
										05000

THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR §: (Check one or more) (11)

OPERATING MODE (9) N	20.2201(b)	20.2203(a)(2)(v)	50.73(a)(2)(i)	50.73(a)(2)(viii)
POWER LEVEL (10) 097	20.2203(a)(1)	20.2203(a)(3)(i)	x 50.73(a)(2)(ii)	50.73(a)(2)(x)
	20.2203(a)(2)(i)	20.2203(a)(3)(ii)	50.73(a)(2)(iii)	73.71
	20.2203(a)(2)(ii)	20.2203(a)(4)	50.73(a)(2)(iv)	OTHER
	20.2203(a)(2)(iii)	50.36(c)(1)	50.73(a)(2)(v)	Specify in Abstract below or in NRC Form 366A
	20.2203(a)(2)(iv)	50.36(c)(2)	50.73(a)(2)(vii)	

LICENSEE CONTACT FOR THIS LER (12)

NAME Gerald Riste - Licensing Leader	TELEPHONE NUMBER (Include Area Code) (920)388-8424
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COMPLETE ONE LINE FOR EACH COMPONENT FAILURE DESCRIBED IN THIS REPORT (13)

CAUSE	SYSTEM	COMPONENT	MANUFACTURER	REPORTABLE TO EPIX	CAUSE	SYSTEM	COMPONENT	MANUFACTURER	REPORTABLE TO EPIX

SUPPLEMENTAL REPORT EXPECTED (14)

YES (If yes, complete EXPECTED SUBMISSION DATE).	X NO	EXPECTED SUBMISSION DATE (15)	MONTH	DAY	YEAR
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ABSTRACT (Limit to 1400 spaces, i.e., approximately 15 single-spaced typewritten lines) (16)

During a review of the Kewaunee Nuclear Power Plant (KNPP) Updated Safety Analysis Report (USAR) a question arose concerning the status of access covers on the intake traveling water screens. The USAR states that these covers are to be gasketed, sealed, and strengthened to accommodate high water levels that may develop due to a seiche on Lake Michigan.

Contrary to the statement in the USAR, the covers have historically been left open to allow visual inspection of the screens during operator rounds. Open access covers also provide an additional means of flushing the screens of excessive aquatic debris during unusual lake conditions.

Current lake low-level conditions preclude the onset of the design basis seiche and its potential consequences. The traveling water screens have been closed.

LICENSEE EVENT REPORT (LER)
TEXT CONTINUATION

FACILITY NAME (1)	DOCKET (2)	LER NUMBER (6)			PAGE (3)
		YEAR	SEQUENTIAL NUMBER	REVISION NUMBER	
Kewaunee Nuclear Power Plant	05000305	2000	015	01	2 of 8

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

DESCRIPTION OF EVENT

On November 9, 2000, while the plant operated at 97% power, a member of Kewaunee's staff questioned a feature of the service water [BI] traveling water screen [SCN] covers. The Updated Safety Analysis Report (USAR) states, "gasketed traveling water screen covers to be sealed and strengthened." Contrary to this USAR statement the covers were open and not gasketed. Subsequent to the discovery of this condition, the traveling water screen covers were closed and an operability determination completed concerning the lack of gaskets. The operability determination concluded that as long as Lake Michigan's water level remained below 580.8 feet International Great Lake Datum (IGLD) the equipment that was hypothesized to be damaged due to a seiche would not be, and thus remains operable. Current lake level is 577 feet IGLD or less. Therefore, the seiche-caused-rise in lake water level would not reach a level where lake water would spill from the covers onto the screenhouse [MK] floor; preventing shorting and/or damage to safety related equipment. The traveling water screens are used to prevent large objects from entering the circulating water [BS], service water and fire protection systems. The traveling water screen covers are used for inspection and maintenance of the screens.

CAUSE OF THE EVENT

The cause of the event appears to be confusion between two studies concerning maximum Lake Michigan water level described in the USAR. One study is an analysis done by Wisconsin Public Service Corporation (WPSC) the other an independent calculation performed by the Atomic Energy Commission (AEC). WPSC's analysis was based on information from the Office of the Chief of Engineers, as modified to determine hurricane surge height. In this analysis the combined effects of wind and pressure produced the maximum surge height of 1.9 feet which resulted in a maximum lake level of 584.2 feet. Based upon a study performed by the Corps of Engineers, the results were determined to be satisfactory. The AEC performed an independent calculation of the maximum lake level. The AEC's calculation determined the maximum seiche lake level to be 589.9 feet.

LICENSEE EVENT REPORT (LER)
TEXT CONTINUATION

FACILITY NAME (1)	DOCKET (2)	LER NUMBER (6)			PAGE (3)
Kewaunee Nuclear Power Plant	05000305	YEAR	SEQUENTIAL NUMBER	REVISION NUMBER	3 of 8
		2000	015	01	

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

As the screenhouse basement floor is at elevation 586 feet, the WPSC study showed no flooding would occur in the screenhouse whereas the AEC calculation showed the lake water level to reach 4 feet above the screenhouse floor. As the top of the traveling water screen covers is 4 feet above the screenhouse floor the AEC's calculation resulted in water leaking from the covers under the analysis assumptions.

As both analyses are listed in the USAR, and the WPSC analysis is described first, it appears the WPSC analysis was used to determine the condition of the screen covers. Because the WPSC analysis showed the covers could be left open without a concern for leakage, the covers were left open to facilitate inspection, cleaning, and maintenance.

ANALYSIS OF THE EVENT

This event is being reported in accordance with 10CFR50.73(a)(2)(ii)(B), as a condition that was outside the design basis of the plant. Contrary to the design basis of the plant, the traveling water screen covers have historically been left open to allow visual inspection of the screens during operator rounds. This event was also reported to the NRC in accordance with 10CFR50.72(b)(1)(ii)(B) at 1501 on November 9, 2000.

During severe weather conditions the AEC postulated that a seiche could occur on Lake Michigan causing the lake level outside the Kewaunee Nuclear Power Plant (KNPP) to reach 589.9 feet, 8 feet above the maximum lake level. If this were to occur, water could flow out of the opening of the open covers into the screenhouse. After the level reached 4 inches in the screenhouse, the water would flow down the screenhouse tunnel to the emergency diesel generator rooms. Emergency Diesel Generator [EK] B's room has doors which restrict the water from entering. Emergency Diesel Generator A room also has doors that would restrict the water from entering, however a Service Water piping trench bypasses the door. The trench is 31 inches deep by 45 inches wide with a 24-inch service water line and a 2.5-inch service water pre-treatment line. The water would follow this trench under the wall and into Emergency Diesel Generator A's room. Once the water enters the room it may damage safeguards equipment in the room.

LICENSEE EVENT REPORT (LER)
TEXT CONTINUATION

FACILITY NAME (1)	DOCKET (2)	LER NUMBER (6)			PAGE (3)
		YEAR	SEQUENTIAL NUMBER	REVISION NUMBER	
Kewaunee Nuclear Power Plant	05000305	2000	015	01	4 of 8

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

This event has the potential for rendering Safeguards Train A's equipment inoperable. It was postulated that the water flowing into Emergency Diesel Generator Room A from screenhouse flooding could short out the equipment connected to KNPP's Safeguard Bus 5. This would render train A 4160 volt and 480 volt equipment inoperable.

A change to the plant design, prior to the plant being licensed, has reduced, if not eliminated, the consequences of this event. However this change was not included in the USAR analysis of this event. On January 3, 1973 a drawing change was approved which reflected an installed water barrier in the service water trench between the screenhouse access tunnel and Emergency Diesel Generator A's room. This installation was subsequent to the issuance of the AEC's Safety Analysis, dated July 24, 1972, which raised the seiche issue. The water barrier seals the trench, preventing water from flowing into the EDG A room except for a 4-inch drainage pipe that penetrates the water barrier. This 4-inch drainage pipe matches the trench's 4-inch drain line located at the bottom of the trench in the EDG A room. The barrier was installed immediately following the issuance of the AEC's Safety Evaluation for the KNPP. Water that entered EDG A room through the 4-inch barrier drainage hole would exit the trench through the 4-inch trench drain line. The water then gravity drains to the turbine building sump and is pumped outside the plant. Thus this water barrier has reduced, if not eliminated, the consequences of the seiche.

During power production operation at Kewaunee there is a difference in level between the lake and the forebay due to circulating water pump operation. There can be as much as a 5.9-foot difference in forebay level verses lake level. As noted earlier the calculation performed by the AEC determined the seiche lake level to reach 589.9 feet. On December 1, 2000 forebay levels were monitored as they corresponded to one and two pump operation. The lake level at the time was at 576.9 feet. With two circulating water pumps running Kewaunee's forebay level was 57% and 68% with one circulating water pump running. The 57% forebay level equates to a level of 571 feet while 68% equates to a level of 573.3 feet. With two circulating water pumps running the forebay level is 5.9 feet below the lake level and with one pump running, 3.6 feet below the lake level. The only time a circulating water pump is not operating is for short periods during an outage when maintenance is being performed on the

LICENSEE EVENT REPORT (LER)
TEXT CONTINUATION

FACILITY NAME (1)	DOCKET (2)	LER NUMBER (6)			PAGE (3)
		YEAR	SEQUENTIAL NUMBER	REVISION NUMBER	
Kewaunee Nuclear Power Plant	05000305	2000	015	01	5 of 8

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

pumps or the main condenser. Therefore, for a majority of time the lower forebay level offsets the consequences of a seiche significantly, when the circulating water pumps are operating. This assumes off-site power is available to run the circulation water pumps. If off-site power were not available then lake level would match forebay level.

To ensure the elevation of the lake per IGLD matched the indicated level in the forebay, data was reviewed from Kewaunee's 2000 refueling outage. On May 24, 2000 both circulating water pumps were off. As recorded by Kewaunee's plant process computer forebay level indicated 76%, this equates to 577 feet. Reviewing the data obtained from the US Army Corps of Engineers website for May 24, 2000 showed Lake Michigan level at 577.6 feet IGLD. These numbers are within the accuracy of the indication. Therefore, IGLD indication and Kewaunee plant indications for feet equate.

A review was performed of Lake Michigan's level between 1974 and present to determine when the lake level was greater than or equal to 580.8 feet. This information was obtained using the US Army Corps of Engineers website data (<http://huron.lre.usace.army.mil/michigan.html>). From this the following months are when Lake Michigan's level exceeded 580.8 feet.

1974 – April through October (7 months)

1975 – May through September (5 months)

1976 – April through August (5 months)

1983 - June & July (2 months)

1984 – July through September (3 months)

1985 – April through December (9 months)

1986 – January through December (12 months)

1987 – January through July (7 months)

1997 – May through October (6 months)

Total = 56 months or approximately 18% of the total time.

LICENSEE EVENT REPORT (LER)
TEXT CONTINUATION

FACILITY NAME (1)	DOCKET (2)	LER NUMBER (6)			PAGE (3)
Kewaunee Nuclear Power Plant	05000305	YEAR	SEQUENTIAL NUMBER	REVISION NUMBER	6 of 8
		2000	015	01	

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

Before the water would travel towards the emergency diesel generator rooms it has to exceed four inches on the screenhouse floor. As part of Kewaunee's modifications due to the AEC seiche calculation a 4-inch ramp was installed at the screenhouse exit. Prior to the level on the screenhouse floor exceeding 4 inches, two stairways are exposed to a lower elevation. The stairways' 44 inch entrances are level with the screenhouse floor. These stairways lead to the circulating water pump room that has an approximate volume of 360,000 gallons. Assuming 50% of the volume contains equipment the room could hold approximately 180,000 gallons of water. This will add additional delays before water would travel to the diesel generator room.

In addition to the low likelihood of occurrence, the operators have time to close the covers should the seiche event occur. In discussions with the US Army Corps of Engineers the period of the seiche may be from one day to two days. This would be enough time for an operator to close the traveling water screen covers.

To mitigate the consequences of a seiche, operator actions had been added to an emergency operating procedure. In February of 1985 Emergency Operating Procedure, E-0-05, "Natural Disaster," was revised to include action to close the traveling water screen covers. In procedure E-0-05, revision B, when the operators are informed of a flood or tornado warning, the inspection doors (covers) on the traveling screens must be shut and strengthened with the installed wood braces. This action was meant to prevent flooding in the screenhouse responding to a Final Safety Analysis Report (FSAR) question, (2.14.3) from the AEC. The current revision of E-0-05, Rev. I, states that, "when informed of a flood or tornado warning the inspection doors on the west side of the traveling screens shall be closed and braced."

Therefore, had weather conditions existed that would have resulted in the extremely unlikely conditions resulting in a seiche, it is safe to assume that the operators would have closed the inspection doors. Although not gasketed, this would have prevented the most severe aspects of a high lake level.

LICENSEE EVENT REPORT (LER)
TEXT CONTINUATION

FACILITY NAME (1)	DOCKET (2)	LER NUMBER (6)			PAGE (3)
		YEAR	SEQUENTIAL NUMBER	REVISION NUMBER	
Kewaunee Nuclear Power Plant	05000305	2000	015	01	7 of 8

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

If the operators had not closed the covers to the traveling water screens and the circulating water pumps remained operating the water level in the forebay would not have reached a level where water would flow from the traveling water screen covers. If the circulating water pumps had stopped, with the covers open, water would flow from the traveling water screens covers onto the screenhouse floor down into the circulating water pump room. Once the circulating water pump room is full and the water level in the screenhouse reaches 4 inches the water would flow down the screenhouse access tunnel towards the emergency diesel rooms'. The water would be prevented from entering the Emergency Diesel Generator B's room by the doors. Flow into Emergency Diesel Generator A's room would be limited by the water barrier in the service water trench and would only flow through the 4 inch drainage pipe. Once inside the Emergency Diesel Generator A's room trench the water would drain from the trench via the trench drain line to the turbine building sump where it is automatically pumped outside the plant.

CORRECTIVE ACTIONS

The traveling water screen covers were immediately closed and strengthened. An evaluation was performed to determine the consequences of operation without the covers gasketed. This evaluation determined that unless Lake Michigan reached a level of 580.8 feet or higher no leakage would occur from the traveling water screen covers.

Administrative measures were put in place to monitor Lake Michigan level monthly to provide warning prior to reaching a level of 580.8 feet.

A corrective action evaluation was initiated to determine further, if any, actions to be taken.

LICENSEE EVENT REPORT (LER)
TEXT CONTINUATION

FACILITY NAME (1)	DOCKET (2)	LER NUMBER (6)			PAGE (3)
Kewaunee Nuclear Power Plant	05000305	YEAR	SEQUENTIAL NUMBER	REVISION NUMBER	8 of 8
		2000	015	01	

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

ADDITIONAL INFORMATION

To investigate the attributes of a seiche and its effect on the Kewaunee Nuclear Power Plant several organizations were contacted. Those contacted include; the U.S. Army Corp of Engineers, Field Research Facility, Hydraulics Branch, and the Corp Research Branch; the National Oceanic and Atmospheric Administration (NOAA) Great Lakes Environmental Research Laboratory; the University of Chicago; and the University of Wisconsin – Sea Grant Institute. From discussions with these organizations, it appears that the KNPP's current extreme lake level analysis is overly conservative.

Although the current analysis appears overly conservative, Kewaunee's traveling water screens will be maintained in the configuration described in the USAR until such time as an evaluation, done in accordance with 10 CFR 50.59, can justify a change in that configuration.

SIMILAR EVENTS

None.