WOLF CREEK
NUCLEAR OPERATING CORPORATION

December 6, 2010

Russell A. Smith
Plant Manager

WO 10-0081

U. S. Nuclear Regulatory Commission
ATTN: Document Control Desk
Washington, DC 20555

Subject: Docket No. 50-482: Licensee Event Report 2010-011-00, "Completion of a Technical Specification Required Shutdown due to an Essential Service Water Leak"

Gentlemen:

Water leakage was detected from the underground portion of the 'A' Essential Service Water supply piping. The plant conservatively declared the train inoperable, entered the applicable Technical Specifications and, when unable to repair the leak in the allowed outage time, placed the plant in Mode 5. Engineering evaluation of the piping concluded that the ESW train was able to perform its safety function. The enclosed Licensee Event Report (LER) is being submitted pursuant to 10 CFR 50.73(a)(2)(i)(A) to document this condition.

This letter contains no commitments. If you have any questions concerning this matter, please contact me at (620) 364-4156, or Mr. Richard D. Flannigan at (620) 364-4117.

Sincerely,

Russell A. Smith

RAS/rlt

Enclosure

cc: E. E. Collins Jr (NRC), w/e
G. B. Miller (NRC), w/e
B. K. Singal (NRC), w/e
Senior Resident Inspector (NRC), w/e

IE22
NRR

NRC FORM 366 U.S. NUCLEAR REGULATORY COMMISSION
(10-2010)

LICENSEE EVENT REPORT (LER)

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

1. FACILITY NAME	2. DOCKET NUMBER	3. PAGE
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4. TITLE
Completion of a Technical Specification Required Shutdown due to an Essential Service Water Leak

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
10	05	2010	2010	- 011 -	00	12	06	2010	FACILITY NAME	DOCKET NUMBER
										05000

9. OPERATING MODE
Mode 1

10. POWER LEVEL
100%

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)
Richard D. Flannigan, Manager Regulatory Affairs	(620) 364-4117

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

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

On October 2, 2010 indications of water leakage from a buried portion of the 'A' Essential Service Water (ESW) system was identified. Wolf Creek Generating Station conservatively declared the train inoperable and entered the applicable Technical Specifications. Workers excavated the soil and found a through-wall leak in the pipe. The leakage could not be fixed within the allowed outage time of the Technical Specifications and the plant was shutdown to Mode 5. The cause of the through-wall leak was internal diameter initiated pitting. The through-wall leak on the 'A' ESW pipe was repaired by encapsulation.

Subsequent Engineering evaluation of the through-wall leak concluded that the pipe possessed sufficient structural integrity to endure all design loadings and that the system was capable of performing its design safety function.

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BACKGROUND

The safety-related Essential Service Water (ESW) system [EIIS Code: BI] removes heat from plant components that require cooling for safe shutdown of the reactor or following a Design Basis Accident. The ESW system also provides emergency make-up to the fuel storage pool and Component Cooling Water systems [EIIS code: CC], and is the backup water supply to the Auxiliary Feedwater System [EIIS Code: BA]. The ESW system consists of two redundant cooling water trains. The ESW trains are each supplied with a pump that is fed from the Ultimate Heat Sink (UHS) [EIIS Code: BS]. The functions of the piping are passive. The piping provides a pressure boundary and a flow path for cooling water to and from the UHS.

PLANT CONDITIONS AT THE TIME OF THE EVENT

Mode 1
100% power

DESCRIPTION OF EVENT

On October 1, 2010 at 2000 CDT, water was reported coming through an electrical penetration in the Control Building. The associated electrical conduit terminated in the 'A' ESW valve house west of the Control Building. The valve house is an underground pipe vault with a concrete cover. A crane was needed to remove the cover. On October 2, 2010 at 0300 CDT, personnel entered the 'A' ESW valve house and discovered a leak from a 2-inch tear on the boot seal of the 'A' ESW return line. The leak rate was approximately 10 gpm.

A chemistry sample of the water was taken and it was determined to be lake water. As a result, on October 2, 2010, at 0642 CDT, the 'A' ESW system was declared inoperable per Technical Specification (TS) action statements 3.7.8 and 3.8.1. Soil was excavated around the valve house and a through-wall leak was found in the buried 'A' ESW supply pipe located three feet south of the valve house wall penetration. The pipe is 30-inch diameter welded carbon steel. The plant was subsequently shut down on October 5, 2010 prior to exceeding the TS allowed outage time with the leak not repaired. Mode 3 was entered on 10/5/2010 at 0930 CDT and Mode 5 was entered on 10/6/2010 at 1533 CDT. During the shutdown, no other equipment was inoperable and no human performance events occurred that complicated the event.

The corrosion mechanism responsible for the through-wall leak in buried ESW supply pipe was internal diameter (ID)-initiated pitting. The characteristics of the through-wall pit (overall pit size at time of wall penetration and apparent growth rate) are similar to pits found in above ground ESW pipes. The dominant corrosion degradation mechanism identified in the above ground piping is under-tubercle (under-deposit) pitting corrosion. Based on available evidence, the dominant corrosion mechanisms are the same for above ground and underground ESW piping.

Engineering evaluation of the as-found condition concluded that with a leaking through-wall penetration, the 'A' ESW pipe remained structurally adequate and was capable of withstanding all applied design loadings. Estimates of the system leakage from the through-wall leak assuming open air are approximately 30 gpm. With the confinement of the soil, the leak rate would have been less than 30 gpm. This leak rate is significantly lower than the tolerable Ultimate Heat Sink inventory loss rate of 140 gpm and did not prevent the required flow rates from being supplied to ESW loads. On October 13, 2010 at 0450 CDT the 'A' ESW system was restored to service.

BASIS FOR REPORTABILITY

10 CFR 50.73(a)(2)(i)(A) requires reporting "the completion of any nuclear plant shutdown required by the plant's Technical Specifications." A shutdown of the plant was completed per TS 3.7.8 and 3.8.1 when Mode 3 was entered on October 5, 2010. Additionally, a 4-hour notification was made per 10 CFR 50.72(b)(2)(i) when the plant shutdown was initiated on October 4, 2010. After the shutdown, Engineering concluded that the 'A' ESW pipe would have been able to perform its safety function.

ROOT CAUSE

Normal Wolf Creek Lake water chemistry, aggravated by stagnant/low flow areas, produced localized pits on the carbon steel piping interior, which developed a through-wall defect.

Engineering studies predicted buried ESW piping leaks would not occur for many years. As a result, plans and contingencies were not in place to respond to the emergent buried ESW piping leak in October 2010.

CORRECTIVE ACTIONS

The plant was shutdown and the through wall leak was repaired by encapsulation.

A guided wave test was performed on the excavated sections of both supply and return piping. Additional encapsulations were performed to reduce the likelihood of near term development of additional leaks.

The development of contingency plans for underground pipe leaks has been started. Planning has started for underground ESW piping replacement.

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SAFETY SIGNIFICANCE

This event is of low safety significance. Though degraded piping reduces design and operating safety margins, no flaw was identified that challenged the structural integrity of the piping or the required flow rates that are supplied to ESW loads. The opposite train of ESW was always operable.

OPERATING EXPERIENCE/PREVIOUS SIMILAR OCCURRENCES

Wolf Creek has experienced previous leaks in the ESW piping. For each leak identified, ESW has been shown to maintain structural integrity and not significantly challenge the UHS volume margin.