



Robert J. Bayer
Plant Manager

July 12, 2021
WO 21-0024

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

Subject: Docket No. 50-482: Licensee Event Report 2021-003-00, "Automatic Reactor Trip Due to Low Steam Generator Level"

Commissioners and Staff:

The enclosed Licensee Event Report (LER) 2021-003-00 is being submitted pursuant to 10 CFR 50.73(a)(2)(iv)(A) regarding an Engineered Safety Features Actuation and automatic reactor trip at Wolf Creek Generating Station.

This letter contains no commitments. If you have any questions concerning this matter, please contact me at (620) 364-4015, or Ron Benham at (620) 364-4204.

Sincerely,

A handwritten signature in black ink, appearing to read "R. J. Bayer", written in a cursive style.

Robert J. Bayer

RJB/rlt

Enclosure: LER 2021-003-00

cc: S. S. Lee (NRC), w/e
S. A. Morris (NRC), w/e
N. O'Keefe (NRC), w/e
Senior Resident Inspector (NRC), w/e



LICENSEE EVENT REPORT (LER)

(See Page 3 for required number of digits/characters for each block)
(See NUREG-1022, R.3 for instruction and guidance for completing this form
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Estimated burden per response to comply with this mandatory collection request: 80 hours. Reported lessons learned are incorporated into the licensing process and fed back to industry. Send comments regarding burden estimate to the FOIA, Library, and Information Collections Branch (T-6 A10M), U.S. Nuclear Regulatory Commission, Washington, DC 20555-0001, or by e-mail to Infocollections.Resource@nrc.gov, and the OMB reviewer at: OMB Office of Information and Regulatory Affairs, (3150-0104), Attn: Desk ail: oir_submission@omb.eop.gov. The NRC may not conduct or sponsor, and a person is not required to respond to, a collection of information unless the document requesting or requiring the collection displays a currently valid OMB control number.

1. Facility Name
Wolf Creek Generating Station

2. Docket Number
05000 482

3. Page
1 OF 4

4. Title
Automatic Reactor Trip Due to Low Steam Generator Level

5. Event Date			6. LER Number			7. Report Date			8. Other Facilities Involved	
Month	Day	Year	Year	Sequential Number	Revision No.	Month	Day	Year	Facility Name	Docket Number
05	12	2021	2021	003	00	07	12	2021		05000
									Facility Name	Docket Number
										05000

9. Operating Mode

1

10. Power Level

8%

11. This Report is Submitted Pursuant to the Requirements of 10 CFR §: (Check all that apply)

<input type="checkbox"/> 10 CFR Part 20	<input type="checkbox"/> 20.2203(a)(2)(vi)	<input type="checkbox"/> 50.36(c)(2)	<input checked="" type="checkbox"/> 50.73(a)(2)(iv)(A)	<input type="checkbox"/> 50.73(a)(2)(x)
<input type="checkbox"/> 20.2201(b)	<input type="checkbox"/> 20.2203(a)(3)(i)	<input type="checkbox"/> 50.46(a)(3)(ii)	<input type="checkbox"/> 50.73(a)(2)(v)(A)	<input type="checkbox"/> 10 CFR Part 73
<input type="checkbox"/> 20.2201(d)	<input type="checkbox"/> 20.2203(a)(3)(ii)	<input type="checkbox"/> 50.69(g)	<input type="checkbox"/> 50.73(a)(2)(v)(B)	<input type="checkbox"/> 73.71(a)(4)
<input type="checkbox"/> 20.2203(a)(1)	<input type="checkbox"/> 20.2203(a)(4)	<input type="checkbox"/> 50.73(a)(2)(i)(A)	<input type="checkbox"/> 50.73(a)(2)(v)(C)	<input type="checkbox"/> 73.71(a)(5)
<input type="checkbox"/> 20.2203(a)(2)(i)	<input type="checkbox"/> 10 CFR Part 21	<input type="checkbox"/> 50.73(a)(2)(i)(B)	<input type="checkbox"/> 50.73(a)(2)(v)(D)	<input type="checkbox"/> 73.77(a)(1)(i)
<input type="checkbox"/> 20.2203(a)(2)(ii)	<input type="checkbox"/> 21.2(c)	<input type="checkbox"/> 50.73(a)(2)(i)(C)	<input type="checkbox"/> 50.73(a)(2)(vii)	<input type="checkbox"/> 73.77(a)(2)(i)
<input type="checkbox"/> 20.2203(a)(2)(iii)	<input type="checkbox"/> 10 CFR Part 50	<input type="checkbox"/> 50.73(a)(2)(ii)(A)	<input type="checkbox"/> 50.73(a)(2)(viii)(A)	<input type="checkbox"/> 73.77(a)(2)(ii)
<input type="checkbox"/> 20.2203(a)(2)(iv)	<input type="checkbox"/> 50.36(c)(1)(i)(A)	<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)(v)	<input type="checkbox"/> 50.36(c)(1)(ii)(A)	<input type="checkbox"/> 50.73(a)(2)(iii)	<input type="checkbox"/> 50.73(a)(2)(ix)(A)	

OTHER (Specify here, in abstract, or NRC 366A).

12. Licensee Contact for this LER

Licensee Contact
Ron Benham, Director Nuclear and Regulatory Affairs

Phone Number (Include area code)
(620) 364-4204

13. Complete One Line for each Component Failure Described in this Report

Cause	System	Component	Manufacturer	Reportable to IRIS	Cause	System	Component	Manufacturer	Reportable to IRIS

14. Supplemental Report Expected

No Yes (If yes, complete 15. Expected Submission Date)

15. Expected Submission Date

Month Day Year

16. Abstract (Limit to 1560 spaces, i.e., approximately 15 single-spaced typewritten lines)

On 5/12/2021, Wolf Creek Generating Station was performing initial reactor startup following Refueling Outage 24 (RF24). With reactor power at approximately 8%, steam generator levels began to oscillate while in automatic control. Operators took manual control of the main feedwater regulating bypass valves but were unable to stabilize steam generator levels prior to reaching the "C" steam generator low level reactor trip setpoint. At 1125 Central Daylight Time (CDT), the reactor tripped and an auxiliary feedwater actuation occurred. All equipment responded as expected. ENS notification #55252 was made at 1441 CDT in accordance with 10 CFR 50.72(b)(2)(iv)(B) due to reactor scram, and 10 CFR 50.72(b)(3)(iv)(A) for a specified system actuation.

The cause of the event was determined to be during the 7300 modification, improper utilization of main feedwater regulating bypass valves inherent valve curves did not take into consideration system flow characteristics. The result was an inaccurate correlation of feed flow with valve position within the system. This led to a mismatch in feed flow demand and actual feed flow to the steam generators. Due to improper gain settings, the mismatch began to diverge and led to a reactor trip on low steam generator water level. Following tuning of control parameters, operators were able to commence reactor startup and reached full power on 5/15/2021.



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

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1. FACILITY NAME	2. DOCKET NUMBER	3. LER NUMBER		
		YEAR	SEQUENTIAL NUMBER	REV NO.
Wolf Creek Generating Station	05000- 482	2021	003	00

NARRATIVE

PLANT CONDITION PRIOR TO EVENTS

The plant was at Mode 1 returning to service following Refueling Outage 24 (RF24) and was at approximately 8% power when the reactor tripped. No systems, structures, or components (SSCs) were inoperable at the beginning of the event which contributed to the event.

DESCRIPTION OF STRUCTURE(S), SYSTEM(S), AND COMPONENT(S)

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

During Refueling Outage 24 (RF24), the feedwater control system [JB] was upgraded. The newly upgraded system is a digital based Emerson Ovation System. This system operates in two modes: low-power and high-power. The transition between the two is based on the measured loop feedwater flow exceeding a predefined threshold. Both control modes operate the main feed regulating valves (MFRVs) and the MFRV bypass valves [SJ-V], as appropriate. The transition between the low-power and high-power modes of operation is accomplished automatically. The old system required manual actions that would demand operator attention, during start up and shutdown.

EVENT DESCRIPTION

At 1125 Central Daylight Time (CDT) on May 12, 2021, Wolf Creek's reactor tripped in automatic due to low 'C' steam generator [SB-SG] water level. Prior to the reactor trip, Control Room personnel had brought the plant from ~1 percent to ~8 percent power and had entered Mode 1 following RF24. Operators stabilized power at ~8 percent where they intended to hold for Ovation testing and tuning of the newly installed modification. Although steam generator level control was initially stable in automatic, operators observed steam generator levels begin to oscillate. Initially, narrow range was most observable, but it became evident on wide range level as well.

As the oscillations increased and diverged, operators determined they should take manual control of the MFRV bypass valves to stabilize steam generator levels prior to commencement of control system tuning. Simultaneous with operators deciding to take manual control, 7300 project personnel and the Westinghouse Ovation engineer were monitoring trends and had agreed that the MFRV bypass valves should be taken to manual control. Operators placed all four bypass valves in manual; however, operator actions were unable to stabilize steam generator levels before 'C' steam generator level lowered to 23.5 percent, the low-low steam generator level reactor trip and main feedwater isolation set point. This resulted in the reactor tripping in automatic and initiating the Main Feedwater Isolation and Auxiliary Feedwater Actuation.

BASIS FOR REPORTABILITY

The reactor trip and actuation of Engineered Safety Feature Actuation System (ESFAS) instrumentation actuation described in this event is reportable per 10 CFR 50.73(a)(2)(iv)(A), which requires reporting of "Any event or condition that resulted in manual or automatic actuation of any of the systems listed in paragraph (a) (2) (iv) (B) of this section..." Paragraph (B)(1) of 10 CFR 50.73(a)(2)(iv) includes "Reactor Protection System (RPS) including: reactor scram or reactor trip." Paragraph (B)(6) of 10 CFR 50.73(a)(2)(iv) includes "PWR auxiliary or emergency feedwater."

ENS notification 55252 was made at 1441 CDT on May 12, 2021, in accordance with 10 CFR 50.72(b)(2)(iv)(B), which requires notification within 4 hours, and 10 CFR 50.72(b)(3)(iv)(A) which requires notification within 8 hours.



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1. FACILITY NAME	2. DOCKET NUMBER	3. LER NUMBER		
Wolf Creek Generating Station	05000- 482	YEAR 2021	SEQUENTIAL NUMBER 003	REV NO. 00

NARRATIVE

CAUSE

The cause was determined to be that during the 7300 modification, improper utilization of MFRV bypass valves inherent valve curves did not take into consideration system flow characteristics. The result was an inaccurate correlation of feed flow with valve position within the system. This led to a mismatch in feed flow demand and actual feed flow to the steam generators. Due to improper gain settings, the mismatch began to diverge and led to a reactor trip on low steam generator water level.

CORRECTIVE ACTIONS

Immediate actions taken:

- At 1125, Control Room personnel entered EMG E-0, REACTOR TRIP.
- At 1130, the plant exited EMG E-0 and the Control Room transitioned to EMG ES-02, REACTOR TRIP RESPONSE.
- At 1210, Operations commenced GEN 00-005, MINIMUM LOAD TO HOT STANDBY from EMG ES-02.

Actions taken to address the causes:

- 1) Tuning changes have been made to adjust the bypass valve curve and low power controller gain within the Ovation controls to provide smoother bypass valve control, decreased steam generator level oscillations, and improve process control stability.
- 2) Just-In-Time Training (JITT) was performed with operators prior to starting back up on May 14. Changes made between the JITT performed for the May 12 and May 14 startup include the following additions:
 - Reactor operators were required to each take control of the MFRV bypass valves after a level swing had been started in a steam generator. They then stopped the steam generator swing.
 - Operators performed a manual swap over from the MFRV bypass valves to the MFRVs.

Actions planned:

- 1) To prevent a change to the feedwater bypass trim characteristics that would alter the tuning, a note is to be added to the MFRV bypass valve drawing that if the trim parts are changed, the Ovation bypass valve control parameters need to be reviewed for impact.
- 2) To address the risk aspect of the root cause, objectives are being added to the new lesson plan for the training for the digital engineering qualification.



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1. FACILITY NAME Wolf Creek Generating Station	2. DOCKET NUMBER 05000- 482	3. LER NUMBER		
		YEAR 2021	SEQUENTIAL NUMBER 003	REV NO. 00

NARRATIVE

SAFETY SIGNIFICANCE

There were no safety consequences impacting plant or public safety from this event. The operating crew responded appropriately to lowering steam generator levels. All safety equipment operated appropriately and as designed. There was no loss of any function that would have prevented fulfillment of actions necessary to: shutdown the reactor and maintain it in a safe shutdown condition, remove residual heat, control the release of radioactive material, or mitigate the consequences of an accident.

OPERATING EXPERIENCE/PREVIOUS EVENTS

LER 2015-003-00 describes an event that occurred at Wolf Creek on May 3, 2015, during startup from RF20. While swapping feedwater control from the MFRV bypass valves to the MFRVs a high steam generator level was received on C steam generator resulting in a turbine trip, feedwater isolation signal, and eventual reactor trip. This specific event was caused by a lack of a reliable and consistent standardization between the operating crews to control the transfer of the steam generator feedwater flow between the MRFV bypass valves and the MFRVs. This previous event is related to the current occurrence as it is associated with steam generator level oscillations during low power ascensions and difficulties with bypass valve control. However, it is specific to the old analog feedwater control system.