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U.S. Nuclear Regulatory Commission
Document Control Desk
Washington, D.C. 20555-0001

Subject: **Docket No. 50-361**
Licensee Event Report No. 2009-001
San Onofre Nuclear Generating Station, Unit 2

Dear Sir or Madam:

This submittal provides Licensee Event Report (LER) 2009-001 to report an automatic actuation of the reactor protection system at Unit 2 on September 13, 2009 pursuant to 10 CFR 50.73(a)(2)(iv)(A). A failure of an intake structure recirculation gate during a heat treatment of the intake led to an increase in the condenser inlet temperature. The subsequent decrease in condenser vacuum actuated a turbine trip from 94% power and reactor trip. All safety systems and components functioned as required. This event did not affect the health and safety of either plant personnel or the public.

If you require any additional information, please contact me.

Sincerely,

Albert R. Hochevar
Station Manager

Unit 2 LER No. 2009-001

cc: E. E. Collins, NRC Regional Administrator, Region IV
G. G. Warnick, NRC Senior Resident Inspector, San Onofre Units 2 & 3

P.O. Box 128
San Clemente, CA 92672

NRC FORM 366 (9-2007)	U.S. NUCLEAR REGULATORY COMMISSION	APPROVED BY OMB: NO. 3150-0104	EXPIRES: 08/31/2010
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 hours. Reported lessons learned are incorporated into the licensing process and fed back to industry. Send comments regarding burden estimate to the Records Management Branch (T-6 E6), U.S. Nuclear Regulatory Commission, Washington, DC 20555-0001, or by internet e-mail to bjs@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 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.	

1. FACILITY NAME	2. DOCKET NUMBER	3. PAGE
San Onofre Nuclear Generating Station Unit 2	05000-361	1 OF 4

4. TITLE

Unit Trip on Low Vacuum Caused by Intake Circulating Water Gate

5. EVENT DATE			6. LER NUMBER			7. REPORT DATE			8. OTHER FACILITIES INVOLVED	
MO	DAY	YEAR	YEAR	SEQUENTIAL NUMBER	REV NO	MO	DAY	YEAR	FACILITY NAME	DOCKET NUMBER
09	13	2009	2009	001	00	11	12	2009	FACILITY NAME	DOCKET NUMBER

9. OPERATING MODE	1
10. POWER LEVEL	94

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

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

12. LICENSEE CONTACT FOR THIS LER

NAME	TELEPHONE NUMBER (Include Area Code)
Douglas R. Bauder, Plant Manager	(949) 368-4685

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
A	NN	GATE		Y					

14. SUPPLEMENTAL REPORT EXPECTED				15. EXPECTED SUBMISSION DATE	MONTH	DAY	YEAR
	YES (If yes, complete EXPECTED SUBMISSION DATE)	X	NO				

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

On 9/13/09 (Event Date) at approximately 12:42 PDT, Unit 2 automatically tripped from 94 percent power on low condenser vacuum [JC] caused when a Circulating Water [NN] intake structure recirculation gate stopped in mid-position. Heat treatment of the intake water tunnels is periodically performed to control marine growth. Intake structure recirculation gates allow reversal of the normal flow path, directing heated water from the condenser discharge through the inlet tunnel, and seawater through the outlet tunnel to the condenser inlet.

Operators performing the heat treatment were in the process of reversing the circulating water tunnel flow when the gate stopped 45% open, allowing heated water to enter the condenser inlet. Although actions were taken to reduce power and restore the gate alignment, the continued loss of condenser vacuum caused an automatic turbine trip and reactor trip. All post-trip equipment functioned as required and the event has a low safety significance.

The gate misaligned when it operated on 9/5/09; a loose stem stop nut was found. The gate was operated on 9/9/09 after maintenance; the misalignment was not corrected and the gate failed to move into position on 9/13/09. Unit 2 was restarted on 9/16/09. Corrective action was taken to improve the procedural guidance for gate maintenance and to implement a rapid response recovery for gate operations.

Plant:	San Onofre Nuclear Generating Station (SONGS) Unit 2
Event Date:	September 13, 2009
Reactor Vendor:	Combustion Engineering
Mode:	Mode 1
Power:	94 percent

On 9/13/09 (Event Date) at approximately 12:42 PDT, Unit 2 automatically tripped from 94 percent power on low condenser vacuum [JC] caused when Circulating Water [NN] Heat Treatment Recirculation Gate 5 stopped in mid-position. On 9/13/09 at 13:12, Southern California Edison reported this occurrence to the NRC in accordance with 10CFR50.72(b)(3)(iv)(A)(NRC Event Log #45347) for an event that resulted in a valid actuation of the Reactor Protection System, including a reactor trip. This LER is being submitted in accordance with 10CFR50.73(a)(2)(iv)(A).

Background

Heat treatment of the intake water tunnels is periodically performed to control marine growth. Intake structure recirculation gates allow reversal of the normal flow path, directing heated water from the condenser discharge through the inlet tunnel, and seawater through the outlet tunnel to the condenser inlet. Circulating Water Heat Treatment Gate 5 is one of four gates operated for heat treatment. Gate 5 is opened to divert the heated condenser discharge to the inlet tunnel.

Gate 5 is 15’ 4” wide, 14’ 5” high, and 1’ 9” thick, made of reinforced concrete with a rubber edge seal, and weighs about 78,000 lbs. The gate is positioned using two 25 ft. long six inch diameter threaded shafts (stems) driven by a Limitorque SMB-5 actuator through two geared right angle drives.

Gate 5 was operated on 9/5/09 during a sequence of operations to prepare the intake for heat treatment. When the gate was closed two loud bangs were heard. Latent damage to the drive shaft coupling keys was not discovered at that time. Maintenance personnel replaced missing set screws on a gate shaft (stem) stop nut; however, the gate was not sufficiently realigned and leveled. Optional procedure steps to level the gate and adjust the stop nuts were not performed.

On 9/9/05 another attempt was made to complete the Unit 2 heat treatment. With the power reduced to about 85 percent, the heat treatment was halted when Gate 5 stopped at about 30-35 percent open. Operators were able to reverse the heat treatment sequence and successfully recover the unit before a substantial loss of vacuum. The reduced power level and relative intake gate positions provided sufficient time for effective operator action.

Subsequent investigation by maintenance personnel revealed that the Gate 5 actuator thermal overload had tripped, the drive was damaged, and both drive shaft keys were sheared. The gate was slightly out of position, but it was believed debris in the intake had prevented the gate from seating fully closed; it was not recognized that the gate was off level and had been dragged against the guide channels until the motor tripped. The gate was repaired and successfully stroked to about 10% open as a test of the repair (the gate cannot be moved through the full range with the unit on line and the normal condenser inlet / outlet alignment).

Description of Event:
On 9/13/05 at12:22 PDT operators performing a heat treatment of the Unit 2 intake were in the process of reversing the circulating water tunnel flow through a sequence of gate operations. Power had been reduced from 100 percent to approximately 94 percent for the heat treatment. At 12:31 Gate 5 stopped moving at the 45 percent open position. With Gate 5 open and the other intake structure gates repositioning to reverse the tunnel flow, heated water from the condenser discharge was partially diverted to the condenser inlet. The increasing condenser circulating water inlet temperature caused the condenser vacuum to decrease.

Control Room operators responded by reducing turbine load and directing field operators to realign the gates. Gate 5 could not be closed; as a result the condenser vacuum continued to decrease. At 12:40 the “Lo Vacuum Pretrip” alarm annunciated, followed about one minute later by an automatic turbine trip on loss of condenser vacuum and Unit 2 reactor trip.

Cause of the Event:
The direct cause was a misalignment of Gate 5 which initially occurred on 9/5/09. The corrective maintenance did not level the gate, leading to the failure on 9/13/09. The work process did not employ a formal troubleshooting plan, the gate was not fully tested, and there was an inadequate preparation for a potential gate failure before proceeding with the heat treatment.

Corrective Actions
The applicable maintenance procedures were revised to include a positive method of securing both set screws, and the circulating stop gate inspection procedure was revised to require removal of the stem covers to determine the stem heights.

Maintenance revised the “Troubleshooting Plant Equipment and Systems” procedure to require the approval of an SRO for high risk activities and communicated the expectations to follow and observe the formal procedure for troubleshooting. Maintenance also formed an incident response team with multi-disciplined skills to lead future troubleshooting efforts.

Operations enhanced the heat treatment procedure to incorporate a rapid response strategy for each intake structure gate and revised procedures to require a manual reactor trip when any plant parameter is at a valid pretrip setpoint and continuing to degrade.

Safety Significance
The safety significance of the event was minimal. All plant safety systems and components operated as required following the Unit 2 automatic trip. Unit 3 remained on line at 100 percent power and was unaffected by the event. The intake structure also supplies the Salt Water Cooling (SWC) System which removes heat from the safety related Component Cooling Water (CCW) System. An evaluation determined there were no deleterious impacts to either system from the increased intake structure temperatures. The heat treatment was sufficiently completed to minimize marine growth in the CCW Heat Exchanger. Safety System Components (SSCs) were not adversely affected by the event, and the event remained bounded by the UFSAR Section 15.2.1.3 “Loss of Condenser Vacuum.”

Operating Experience (OE)

12/31/07 SONGS Unit 2 Gate 5 was damaged during maintenance when the gate bottomed out on support cribbing, caused by improper management of the repair task. Corrective action was taken to review the lessons learned and the procedure “Circulating Water Stop gate and Operator Inspection,” was revised to include an instruction on how to verify the gate is level prior to assembly and a requirement to ensure the gate is lowered prior to disassembly. Had the optional procedure step of removing the stem covers been performed to verify the gate is level, the gate misalignment could have been averted, precluding the Unit 2 trip on 9/13/09.