



Long  
Island  
Power  
Authority

Shoreham Nuclear Power Station  
P.O. Box 628  
North Country Road  
Wading River, N.Y. 11792

JAN 25 1994

LSNRC-2143

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

Licensee Event Report 93-002  
Shoreham Nuclear Power Station - Unit 1  
Docket No. 50-322

Ladies and Gentlemen:

In accordance with 10CFR50.73, enclosed is Shoreham Nuclear Power Station's Licensee Event Report 93-002.

Should you have any questions or require additional information, please do not hesitate to call my office.

Very truly yours,

A. J. Bortz  
Resident Manager

RAP/kc  
Enclosure

cc: C. L. Pittiglio  
T. T. Martin  
R. Nimitz

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## LICENSEE EVENT REPORT (LER)

ESTIMATED BURDEN PER RESPONSE TO COMPLY WITH THIS INFORMATION COLLECTION REQUEST: 500 HRS. FORWARD COMMENTS REGARDING BURDEN ESTIMATE TO THE RECORDS AND REPORTS MANAGEMENT BRANCH (P-630), U.S. NUCLEAR REGULATORY COMMISSION, WASHINGTON, DC 20555, AND TO THE PAPERWORK REDUCTION PROJECT (3150-0104), OFFICE OF MANAGEMENT AND BUDGET, WASHINGTON, DC 20503.

FACILITY NAME (1) Shoreham Nuclear Power Station, Unit 1										DOCKET NUMBER (2) 0 5 0 0 0 3 2 2				PAGE (3) 1 OF 07	
TITLE (4) Fire in Primary Containment Requiring Containment Evacuation and Off-Site Fire Department Assistance															
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 NAMES None				DOCKET NUMBER(S) 0 5 0 0 0		
12	28	93	93	002	0	01	25	94					0 5 0 0 0		
OPERATING MODE (9) N		THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR 5. (Check one or more of the following) (11)													
POWER LEVEL (10) 01010		20.402(b)				20.405(c)				50.73(a)(2)(iv)				73.71(b)	
		20.405(a)(1)(i)				50.36(e)(1)				50.73(e)(2)(v)				73.71(c)	
		20.405(a)(1)(ii)				50.36(e)(2)				50.73(e)(2)(vii)				OTHER (Specify in Abstract below and in Text, NRC Form 366A)	
		20.405(a)(1)(iii)				50.73(a)(2)(i)				50.73(e)(2)(viii)(A)					
		20.405(a)(1)(iv)				50.73(a)(2)(ii)				50.73(e)(2)(viii)(B)					
		20.405(a)(1)(v)				50.73(a)(2)(iii)				X 50.73(e)(2)(ix)					
LICENSEE CONTACT FOR THIS LER (12)															
NAME Robert A. Pauly, Operational Compliance Engineer										TELEPHONE NUMBER AREA CODE 516 929-8300					
COMPLETE ONE LINE FOR EACH COMPONENT FAILURE DESCRIBED IN THIS REPORT (13)															
CAUSE	SYSTEM	COMPONENT	MANUFACTURER	REPORTABLE TO NRC		CAUSE	SYSTEM	COMPONENT	MANUFACTURER	REPORTABLE TO NRC					
SUPPLEMENTAL REPORT EXPECTED (14)										EXPECTED SUBMISSION DATE (15)		MONTH	DAY	YEAR	
YES (If yes, complete 15) NO										X					

ABSTRACT (Limit to 1400 characters; approximately fifteen single-space typewritten lines) (16)

On 12/28/93, at 2245 hours, a fire occurred in the Reactor Building Primary Containment which required an evacuation and assistance from an off-site fire department. The fire occurred when falling slag from oxy-acetylene torch cutting entered a jet pump nozzle access window in the biological shield wall and ignited a portion of a temporary water collection system (paper towel, rope, herculite and griffolyn). This water collection system was installed to collect the potentially contaminated cooling water produced from core boring through the slightly activated bioshield wall. The Fire Brigade was activated at 2247 hours and directed people to evacuate the area. The Wading River Fire Dept. was called at 2304 and arrived at 2311 hours. The fire was declared out at 2320 hours. Eleven people reported to the First Aid Office suffering from smoke inhalation. The NRC was notified of this event at 2345 hours per 10CFR50.72(b)(1)(vi). This event is also reportable per 10CFR50.73(a)(2)(x). Corrective actions included suspension of work within the bioshield wall until resolution of concerns regarding egress, ventilation, emergency lighting/communications, and personnel accountability. Also, all fire permits were temporarily withdrawn and reassessed. Finally, program enhancements and improvements in the Primary Containment work conditions have been initiated.

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

PLANT AND SYSTEM IDENTIFICATION

General Electric - Boiling Water Reactor

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

IDENTIFICATION OF THE EVENT

While cutting the star support assembly with an oxy-acetylene torch, a fire occurred in the Primary Containment [NH] which required both evacuation of the Primary Containment and assistance from an off-site fire department.

Event Date: 12/28/93

Report Date: 01/25/94

CONDITIONS PRIOR TO THE EVENT

254 slightly irradiated fuel assemblies are stored in the Spent Fuel Pool. Decommissioning of the site is in progress.

DESCRIPTION OF THE EVENT

On 12/28/93, decommissioning work associated with partial removal of the biological shield wall was in progress. The biological shield wall is located in the Primary Containment [NH] and originally surrounded the reactor pressure vessel (RPV). (The RPV, with the exception of the lower bowl, has already been removed as part of decommissioning.) The bioshield wall is a two foot thick, steel lined, steel reinforced, concrete filled cylinder, with an inner radius of 11'-3" and an outer radius of 13'-3". Its original purpose was to reduce the neutron flux inside the Primary Containment during reactor operations. This wall is slightly activated and the top two thirds are being removed as part of decommissioning.

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TEXT (If more space is required, use additional NRC Form 365A's) (17)

The concrete section of the bioshield wall will be segmented by use of a diamond wire saw. To provide access for the wire and the rigging, holes are bored into the wall from the inside of the wall. The core bore drill requires water for cooling and since the wall is slightly activated, a temporary water collection system has been constructed to collect the water. Inside the bioshield wall, this system consists of sheets of herculite and griffolyn which direct the water to a herculite trough. This herculite trough runs all around the inner circumference of the bioshield wall from approximately the top of the RPV lower bowl to the base of the RPV pedestal (approximately 20' high). It is suspended by fiber twine ropes. The ropes on one side are attached to the RPV lower bowl and the ropes on the other side of the trough pass through jet pump nozzle access doors and are attached to any available structure on the outside of the bioshield wall. Finally, to prevent any accidental leakage from escaping out through the jet pump access openings, a roll of absorbent paper towels was placed across the sill.

On 12/28/93, at 2245 hours, a rigging hole was being cut in one of the steel star support members located outside the upper bioshield wall at elevation 137', using an oxy-acetylene torch. Falling slag from the cutting, struck one or more structures and landed on the sill of the jet pump nozzle access opening at elevation 102'. This slag ignited the roll of paper towels which in turn, ignited the fiber twine rope. The rope burned through and fell down into the reactor pedestal area where it continued to burn as well as melt pieces of the griffolyn and herculite. Personnel working in the Primary Containment noticed smoke, but observed no flame. They reported a fire to the Control Room and began to evacuate the area. A worker inside the bioshield wall discharged a water fire extinguisher into the top portion of the water collection system prior to exiting.

The Control Room activated the Fire Brigade at 2247 hours. The Fire Brigade Chief and Watch Engineer entered the containment and directed the workers to leave the area. Due to the large generation of smoke and difficulty in locating the source, the Wading River Fire Department (WRFD) was called at 2304 hours and arrived at 2311 hours. The Fire Brigade made an inspection to ensure that all personnel had evacuated the area and searched for the source of the fire. One brigade member's air pack ran low before they were able to locate the source of the smoke. The WRFD, now at the scene, performed a further investigation and found the charred remains of towel material and rope in a jet pump access opening. The WRFD discharged one 5-gallon water fire extinguisher



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

onto the smoldering remains. The fire was declared out at 2320 hours. Eleven workers reported to the First Aid Office suffering symptoms of smoke inhalation, e.g., chest pains, sore throat, etc. However, none of these people required any further medical assistance.

The Watch Engineer notified station management of the fire. The Watch Engineer also determined that this event was reportable under 10 CFR 50.72(b)(1)(vi) and the NRC was notified at 2345 hours. This event was also determined to be reportable under 10 CFR 50.73(a)(2)(x).

All work inside the Primary Containment was temporarily suspended. An Incident Report Review Board was convened and a formal Root Cause Analysis was initiated. An independent investigation by the Nuclear Quality Assurance Department was requested by the Resident Manager.

#### CAUSE OF THE EVENT

The primary cause of this event was the failure to cover up all openings in the bioshield wall in the area of the slag path, with fire retardant material. Covering the openings was necessary because the decision had been made to conduct oxy-acetylene torch cutting of the star support assembly outside the bioshield while the water collection system was still in place inside the bioshield wall.

Personnel constructed the water collection system, which contained combustible materials, e.g., paper towels and fiber twine rope, with the understanding that openings in the bioshield wall would be covered, as necessary. The Fire Protection Permit for the cutting work included the requirement to cover "adjacent" openings, and that no unprotected combustibles were to be located within 35 feet. There is an opening in the bioshield wall, which is directly below the cutting, and this was covered with a siltemp blanket.

However, the work outside the bioshield wall is performed on scaffolding at various elevations. The star support member is approximately at elevation 137', while the open jet pump access is approximately at elevation 102' and 10 degrees in azimuth away from the cut location. The presence of the scaffolding, ladders, pipes, ducting, etc., make it difficult for a worker at elevation 137', and a fire watch at elevation 78', to observe the opening at elevation 102'.

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ESTIMATED BURDEN PER RESPONSE TO COMPLY WITH THIS INFORMATION COLLECTION REQUEST: 60.8 HRS. FORWARD COMMENTS REGARDING BURDEN ESTIMATE TO THE RECORDS AND REPORTS MANAGEMENT BRANCH (P-830), U.S. NUCLEAR REGULATORY COMMISSION, WASHINGTON, DC 20555, AND TO THE PAPERWORK REDUCTION PROJECT (2150-0104), OFFICE OF MANAGEMENT AND BUDGET, WASHINGTON, DC 20503.

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

Further reasons why the combustible materials were not observed by the cutting personnel and/or why the opening was not protected include the following:

- Compensatory protection measures were not adequately interpreted and/or specified in the fire permit for the cutting.
- The fire permit did not clearly assign responsibility to ensure prior to the start of cutting that a walkdown was to be performed to specifically verify the absence of unprotected combustibles.
- There was no requirement directing workers to look for unexpected day-to-day changes in the work environment, such as placement of combustible materials in a vulnerable location.

**ANALYSIS OF THE EVENT**

This event could have had very serious industrial safety consequences for personnel. There is limited ventilation in the Primary Containment, and the top of containment (reactor cavity) was not open to the Secondary Containment atmosphere. The fire caused the Primary Containment to fill with thick, acrid smoke, making it difficult to breathe and also difficult to see well enough to evacuate easily. Several people did have to be assisted in finding their way out. Eleven people reported to the First Aid Office suffering from symptoms of smoke inhalation. However, nobody required any further medical assistance.

Precautions taken prior to the fire in preparation for these activities helped minimize the consequences of this event. The amount of combustible material in the primary containment is maintained very low. The smoke was produced from the smoldering herculite and griffolyn, neither of which will support an open flame. The herculite and griffolyn were chosen because they are fire retardant materials. Their smoldering was due to being in contact with the burning fiber twine rope.

This event had negligible consequences for station equipment. The only equipment in the Primary Containment that is required to be operable are three seismic monitoring recorders and they were not affected by this event. Less than half of one core load (254 fuel bundles) of slightly irradiated fuel assemblies was in the Spent

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

Fuel Pool. The pool has 6' thick walls and a 5' thick floor which are all classified as 3-hour fire barriers. Furthermore, no active cooling is required (or operating), and the pool location is several floor elevations above the fire. Thus the fuel was safely protected from this fire.

CORRECTIVE ACTIONS

- The fire brigade and the Wading River Fire Department both responded to the fire.
- All work within the Primary Containment was suspended pending interim resolution of concerns regarding egress, ventilation, emergency lighting, emergency communications, and personnel accountability.
- All fire permits at Shoreham were withdrawn pending a walkdown of the job areas by Fire/Safety and the responsible supervisor; review of the permit by the Resident Manager; and revision of permits as necessary to reflect job-specific fire protection and industrial safety considerations.
- The water collection system was repaired.

As a result of this event, a review of the fire permit process and of the work conditions in the Primary Containment was performed. It was determined that additional programmatic enhancements and improvements in the work conditions were warranted. Examples of these are:

- Review methods to minimize the spread of slag during cutting.
- Revise the procedure for fire permit issuance to ensure that Fire/Safety personnel perform a field walkdown of job areas before issuing a permit; to require that each permit specifically address the unique conditions associated with each job; to require that each permit for hot work specify the number and location of fire watches; to have permits for hot work require pre-shift walkdowns to identify and remove or protect combustible materials.
- Perform a review of recent changes in the Fire/Safety staff and level of qualifications.

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

- Establish specific pre-shift briefing guidance for hot work.
- Establish a method for rapid ventilation of the Primary Containment and within the bioshield wall.
- Establish improved egress from inside the bioshield wall.
- Review lighting inside the Primary Containment, and within the bioshield wall, and establish an alternate lighting source if necessary.
- Improve existing or provide additional Gaitronics speakers in the Primary Containment.
- Conduct regular evacuation drills for exiting the bioshield wall and Primary Containment.
- Improve the markings for exit pathways from the bioshield wall and Primary Containment.

A broader review of the implications of the above for other station areas and activities is also planned.

ADDITIONAL INFORMATION

- a) Manufacturer and model numbers of failed component(s)

None

- b) LER numbers of previous similar events

None