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RECORD #107

TITLE: Air Intrusion Into BWR Primary Systems

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UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D. C. 20555

April 15, 1983

MEMORANDUM FOR: R. R. Bellamy, Chief
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G. D. Brown, Chief
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THRU: L. J. Cunningham, Chief, Section B *[Signature]*

FROM: J. E. Wigginton, Health Physicist
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Division of Emergency Preparedness
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Office of Inspection and Enforcement

SUBJECT: AIR INTRUSIONS INTO BWR PRIMARY SYSTEMS

Events at the Pilgrim and Susquehanna facilities prompted me to investigate and evaluate the validity of the reported causation factor for marked increase in main steam line radiation levels (see enclosed DAILY REPORT ENTRIES). For both events, the licensees attributed the increased radiation levels in reactor steam to air intrusions resulting from condensate demineralizer operations. The proposed scenarios suggested increased N-16 production from the increased free oxygen as a result of the reported air accident.

Informal discussions with representatives from General Electric, NRR's Chemical Engineering Branch, and INPO all led me to the same conclusion - it is very improbable that air intrusions could have caused the large steam line radiation increases. The G. E. contact recalled early physical experiments at the Borax reactor where pure nitrogen and oxygen were injected with no resultant change in offgas radiation levels. However, when hydrogen was introduced, marked N-16 increases were evident (identical process demonstrated by Dresden H₂ corrosion control program, and explained in enclosed INPO SOER and EPRI Journal article).

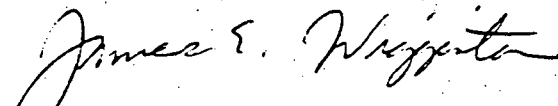
Multiple addresses

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The consensus opinion is that a more probable cause for the increased radiation levels of the two events could be resin and/or amine injection from the condensate demineralizers. Since a stagnant, offline demineralizer can produce amines, G. E. recommends a thorough rinse prior to returning an idle bed online. An improperly regenerated resin bed can also be a source of amines.

INPS's SOER 82-13, "Intrusion of resin, Lubricating Oil, and Organic Chemicals Into Reactor Coolant Water" provides an excellent compilation of six reactor coolant intrusion events. High main steam radiation levels should prompt licensees to note changes in other chemical parameters (ph, chloride, conductivity) sensitive to potential intrusions and not just concentrate on fission product analysis.

Since INPO is continuing to pursue the Pilgrim and Susquehanna events, I plan no further active efforts on this matter, but will monitor and provide feedback to you on the ongoing INPO efforts.


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Enclosures: As stated

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Facility	Notification	Item or Event	Regional Action
DPRP			
Three Mile Island Units 1 and 2 (DNs 50-289/320) Oyster Creek (DN 50-219)	12/3 SRI Phone	The GPU Nuclear Corporation's Manager - Security, R. Rice, retired and has been replaced by H. Masini, the former Assistant Security Manager.	Information Item
> Pilgrim (DN 50-293)	12/3 ENS	At 2:47 p.m. 12/3, the licensee received a main steam line high radiation alarm shortly after placing the 'G' Condensate Demineralizer on line. Operators manually reduced power from 99 percent to 50 percent. The alarm has been attributed to air entrapped in the demineralizer. The licensee investigated the cause of air entrapment while holding power at 50 percent. The plant returned to 100 percent power at 1:30 a.m. 12/4.	Per MC 2515
Millstone Units 1 and 2 (DNs 50-245/336)	12/6 SRI Fax	An annual audit will be conducted by INPO at Millstone Units 1 and 2 on 12/6 - 16/82.	Information Item
DRMA			
Richard T. Ferri, Director, DRMA, is in Headquarters today and tomorrow attending a counterpart meeting.			
John J. McOscar, Chief, Administrative Branch, is in Headquarters today and tomorrow attending budget discussions.			

Licensee/Facility	Notification/Subject	Description of Items or Events
DPRP		
Peach Bottom Unit 2 50-278	2/18 SRI phone	About 10 a.m., 2/18 during a vendor fuel test, a spent fuel rod was released from its lifting tool as it was being placed into a gamma scan machine in the spent fuel pool. Being only supported at the bottom, the rod then bent over several feet at the top. No release occurred relative to this event. The rod was recovered and returned to its storage position about 9 p.m., 2/18 and will not be re-used.
Sasquehanna Units 1 and 2 50-287/388	2/22 RRI fax/ Annual Emergency Drill	The licensee will hold their annual full-scale emergency drill on 2/22. State and local governments will participate. Region I inspection team will observe. The FEMA public meeting to discuss the drill will be held on 2/25 in Berwick, Pa. Media interest is expected.
Peach Bottom Unit 2 50-277	2/22 SRI fax	On 2/21 the licensee identified a tube-to-shell leak in the 2B feedwater heater. Power was reduced to 80 percent, the "B" heater string was isolated, and a shutdown for repair is scheduled for 10 p.m., 2/22.
Sasquehanna Unit 1 50-287	2/22 SRI phone	About 1:04 a.m., 2/22 the unit tripped from 100 percent power due to a main steam line high radiation signal. This resulted in a reactor trip and MSIV closure. Containment isolation and HPCI & RCIC initiated as expected on low reactor water level. Reactor coolant samples taken at 2 a.m. indicated no increase in iodine activity; therefore, no evidence of fuel damage. Subsequent investigation revealed that while transferring resin beds a slug of air was introduced resulting in large increases in nitrogen-16 that caused a spurious high activity in the main steam line.

Enclosures
REDACTED

EPRI Journal January/February 1983
And

INPO SOER 82-13, "INTRUSION OF RESIN, LUBRICATING OIL,
AND ORGANIC CHEMICALS INTO REACTOR COOLANT
WATER."

NOT PUBLICALLY AVAILABLE