

March 5, 2004

Mr. Dominique Delattre  
Head, Regulatory Activities Unit  
IAEA INES/NEWS Coordinator  
International Atomic Energy Agency  
Wagramer Strasse 5, P.O. Box 100  
A-1400 Wien  
AUTRICHE

Dear Mr. Delattre:

The following operating experience reports from United States reactors are enclosed for your consideration for including in the AIRS database:

NRC Information Notice 2003-20: Derating Whiting Cranes Purchased Before 1980

NRC Information Notice 2004-01: Auxiliary Feedwater Pump Recirculation Line Orifice Fouling - Potential Common Cause Failure

Each report is being submitted in the following two media: (1) a hard copy of the input file for the AIRS database; and (2) a 3.5-inch HD diskette containing the input file for the AIRS database in WordPerfect format.

If you have any questions regarding these reports, please call Jerry Dozier of my staff. He can be reached at 301-415-1014.

Sincerely,

*/RA/*  
William D. Beckner, Chief  
Reactor Operations Branch  
Division of Inspection Program Management  
Office of Nuclear Reactor Regulation

Enclosures: As stated

cc w/enclosures:  
Dr. Pekka T. Pyy  
Administrator, Operating Experience & Human Factors  
Nuclear Safety Division  
Nuclear Energy Agency  
OECD  
Le Seine St. Germain, Batiment B  
12, Boulevard des Iles  
92130 - Issy-les-Moulineaux  
FRANCE

March 5, 2004

Mr. Dominique Delattre  
Head, Regulatory Activities Unit  
IAEA INES/NEWS Coordinator  
International Atomic Energy Agency  
Wagramer Strasse 5, P.O. Box 100  
A-1400 Wien  
AUTRICHE

Dear Mr. Delattre:

The following operating experience reports from United States reactors are enclosed for your consideration for including in the AIRS database:

NRC Information Notice 2003-20: Derating Whiting Cranes Purchased Before 1980

NRC Information Notice 2004-01: Auxiliary Feedwater Pump Recirculation Line Orifice Fouling - Potential Common Cause Failure

Each report is being submitted in the following two media: (1) a hard copy of the input file for the AIRS database; and (2) a 3.5-inch HD diskette containing the input file for the AIRS database in WordPerfect format.

If you have any questions regarding these reports, please call Jerry Dozier of my staff. He can be reached at 301-415-1014.

Sincerely,

**/RA/**

William D. Beckner, Chief  
Reactor Operations Branch  
Division of Inspection Program Management  
Office of Nuclear Reactor Regulation

Enclosures: As stated

cc w/enclosures:

Dr. Pekka T. Pyy  
Administrator, Operating Experience & Human Factors  
Nuclear Safety Division  
Nuclear Energy Agency  
OECD  
Le Seine St. Germain, Batiment B  
12, Boulevard des Iles  
92130 - Issy-les-Moulineaux  
FRANCE

Distribution (Transmittal Letter, Cover Sheet, and Coding Sheet Only):

PUBLIC JEDyer, NRR MCullingford, NRR WKane, DEDE  
OES R/F JLieberman, OIP JDunn Lee, OIP

ADAMS ACCESSION NUMBER: ML040690503

DOCUMENT NAME: C:\ORPCheckout\FileNET\ML040690503.wpd

OFFICE	RSE:OES:IROB:DIPM	IMA:OES:IROB:DIPM	SC:OES:IROB:DIPM	C:IROB:DIPM
NAME	IJDozier	KAGray	TReis	WDBeckner
DATE	02/26/2004	02/26/2004	03/04/2004	03/05/2004

**OFFICIAL RECORD COPY**

# INCIDENT REPORTING SYSTEM

---

<b>IRS NO.</b>	<b>EVENT DATE</b>	<b>01/29/2003</b>	<b>DATE RECEIVED</b>
<b>EVENT TITLE</b>			
NRC Information Notice 2003-20: Derating Whiting Cranes Purchased Before 1980			
<b>COUNTRY</b>	<b>PLANT AND UNIT</b>	<b>REACTOR TYPE</b>	
USA	Indian Point Unit 2	PWR	
<b>INITIAL STATUS</b>	<b>RATED POWER (MWe NET)</b>		
	N/A		
<b>DESIGNER</b>	<b>1st COMMERCIAL OPERATION</b>		
Westinghouse 4lp	08/01/1974		

---

## **ABSTRACT**

The U.S. Nuclear Regulatory Commission (NRC) is issuing this information notice (IN) to notify licensees of a recent report from Whiting Corporation concerning the derating of Whiting cranes sold before 1980.

NRC INFORMATION NOTICE 2003-20

Please refer to the dictionary of codes corresponding to each of the sections below and to the coding guidelines manual.

---

1. **Reporting Categories:**                    1.4                    \_\_\_\_\_
  
2. **Plant Status Prior to the Event:**   N/A                    \_\_\_\_\_
  
3. **Failed/Affected Systems:**            3.KG                    \_\_\_\_\_
  
4. **Failed/Affected Components:**       4.2.7                    \_\_\_\_\_
  
5. **Cause of the Event:**                    5.3.3                    \_\_\_\_\_
  
6. **Effects on Operation:**                6.0                    \_\_\_\_\_
  
7. **Characteristics of the Incident:**     7. 14                    \_\_\_\_\_
  
8. **Nature of Failure or Error:**           8.0                    \_\_\_\_\_
  
9. **Nature of Recovery Actions:**         9.0                    \_\_\_\_\_

UNITED STATES  
NUCLEAR REGULATORY COMMISSION  
OFFICE OF NUCLEAR REACTOR REGULATION  
OFFICE OF NUCLEAR MATERIAL SAFETY AND SAFEGUARDS  
WASHINGTON, D.C. 20555

October 22, 2003

NRC INFORMATION NOTICE 2003-20: DERATING WHITING CRANES PURCHASED  
BEFORE 1980

Addressees

All holders of operating licenses for nuclear power reactors, except those who have permanently ceased operations and have certified that fuel has been permanently removed from the reactor vessel; applicable decommissioning reactors, fuel facilities, and independent spent fuel storage installations.

Purpose

The U.S. Nuclear Regulatory Commission (NRC) is issuing this information notice (IN) to notify licensees of a recent report from Whiting Corporation concerning the derating of Whiting cranes sold before 1980. It is expected that recipients will review the information for applicability to their facilities and consider actions, as appropriate, to address this problem. However, suggestions contained in this IN are not NRC requirements; therefore, no specific action or written response is required.

Description of Circumstances

On January 29, 2003, Whiting Corporation submitted a 10 CFR Part 21 report (Event Notification No. 39545 and Part 21 No. 2003-002-00) to the NRC. The concern described in this report was specific to the Whiting #25 Hoist Unit (Gear Case). When the crane is lifting a load at or near its nominal rating, the stress in one or possibly two internal support bolts in this assembly may be significantly over the design allowable stress. These bolts connect the gear case housing to an open frame that supports bearings and other components in the gear train. If a bolt failed, the open frame might deform, affecting gear alignment. Whiting identified this problem during an engineering analysis, and Whiting Corporation was not aware of any crane failures due to this concern.

The exact extent of the overstressed condition can only be determined by analyzing each hoist; however, based on its findings, Whiting Corporation stated that a 50 percent reduction in rated hoist capacity of the affected cranes would allow continued use of the cranes without compromising design safety factors. Whiting indicated that this limitation should be enforced until the overstressed bolts have been replaced or analysis shows that an overstressed condition does not exist.

**ML032960205**

On February 12, 2003, Whiting Corporation submitted a followup Part 21 report to the NRC related to the above notification. As a result of the ongoing investigation and resolution of the January 29, 2003, notification, Whiting identified five cranes that utilize a different hoist configuration that was also subject to a similar overstress condition. This condition applied to special hoist arrangements using a Whiting #10 Hoist Unit, rather than the previously identified Whiting #25 Hoist Unit. The cranes are installed at the following nuclear power plants: Indian Point, Cooper, Columbia Generating Station, Vermont Yankee, and Millstone. Whiting Corporation stated that these hoist units are to be limited to 20 percent of rated capacity to avoid compromising design factors and that this limitation should be enforced until the units are upgraded.

### Discussion

The identified conditions involve calculated stresses in the support bolts that exceed design limits specified in applicable design standards. No actual failures have occurred. Failure of the components subject to the overstress condition would not directly result in failure of the crane to retain its load. However, the failure of a support bolt may result in deformation of the frame housing the gear train bearings. The deformation would allow misalignment and potential overstress of gear teeth to develop. The gear teeth transmit torque from the hoist motor and holding brake to the load drum. Therefore, this concern is a facility and personnel safety issue.

This Part 21 report is applicable to a wide variety of cranes purchased prior to 1980, including reactor building cranes, turbine building cranes, fuel handling cranes, spent fuel cranes, intake structure cranes, auxiliary building cranes, refueling cranes, cask handling cranes, fuel gantry cranes, radwaste handling cranes, screenwell cranes, heater bay cranes, and pumphouse cranes. Other cranes may also be impacted.

During the Part 21 evaluation process, Whiting Corporation failed to identify a decommissioning reactor facility (Fermi 1) that utilized one of the affected hoist units. This particular Part 21 report is applicable to decommissioning reactors as well as operating reactors because decommissioning facilities continue to utilize cranes for fuel handling, radioactive waste handling, and related activities for handling contaminated or activated structures, systems, and components in support of decommissioning.

The Part 21 report requests crane owners to contact Whiting Corporation at e-mail address [Whiting-Nuclear@WhitingCorp.com](mailto:Whiting-Nuclear@WhitingCorp.com) and provide the following information: customer name, contact person, e-mail address, telephone number, crane serial number, and date of next scheduled outage. The above Part 21 reports may be obtained from NRC's home page at <http://www.nrc.gov/reading-rm/doc-collections/event-status/part21/>.

This IN requires no specific action or written response. If you have any questions about this notice, contact one of the persons listed below or the appropriate project manager.

***/RA/***

William D. Beckner, Chief  
Reactor Operations Branch  
Division of Inspection Program Management  
Office of Nuclear Reactor Regulation

***/RA/***

Charles L. Miller, Director  
Division of Industrial and  
Medical Nuclear Safety  
Office of Nuclear Material Safety  
and Safeguards

Technical Contacts: Steven Jones, NRR  
301-415-2712  
E-mail: [srj@nrc.gov](mailto:srj@nrc.gov)

Jack Foster, NRR  
(301) 415-3647  
E-mail: [jwf@nrc.gov](mailto:jwf@nrc.gov)

William C. Huffman, NMSS  
301-415-1141  
E-mail: [wch@nrc.gov](mailto:wch@nrc.gov)

Attachment: List of Recently Issued NRC Information Notices

LIST OF RECENTLY ISSUED  
NRC INFORMATION NOTICES

Information Notice No.	Subject	Date of Issuance	Issued to
2003-19	Unanalyzed Condition of Reactor Coolant Pump Seal Leakoff Line During Postulated Fire Scenarios or Station Blackout	10/06/2003	All holders of operating licenses or construction permits for pressurized water reactors (PWRs).
2003-18	General Electric Type SBM Control Switches With Defective Cam Followers	09/26/2003	All holders of operating licenses for nuclear power reactors, except those who have permanently ceased operations and have certified that fuel has been permanently removed from the reactor vessel.
2003-17	Reduced Service Life of Automatic Switch Company (ASCO) Solenoid Valves With Buna-N Material	09/29/2003	All holders of operating licenses for nuclear power reactors.
2003-16	Icing Conditions Between Bottom of Dry Storage System and Storage Pad	10/06/2003	All 10 CFR Part 72 licensees and certificate holders.
2003-15	Importance of Followup Activities in Resolving Maintenance Issues	09/05/2003	All holders of operating licenses for nuclear power reactors except those who have permanently ceased operation and have certified that fuel has been permanently removed from the reactor vessel.

**Note:** NRC generic communications may be received in electronic format shortly after they are issued by subscribing to the NRC listserver as follows:

To subscribe send an e-mail to <[listproc@nrc.gov](mailto:listproc@nrc.gov)>, no subject, and the following command in the message portion:

subscribe gc-nrr firstname lastname

# INCIDENT REPORTING SYSTEM

---

<b>IRS NO.</b>	<b>EVENT DATE</b>	<b>10/24/2002</b>	<b>DATE RECEIVED</b>
----------------	-------------------	-------------------	----------------------

## EVENT TITLE

NRC Information Notice 2004-01: Auxiliary Feedwater Pump Recirculation Line Orifice Fouling - Potential Common Cause Failure

### COUNTRY

USA

### PLANT AND UNIT

Point Beach

### REACTOR TYPE

PWR

### INITIAL STATUS

100%

### RATED POWER (MWe NET)

N/A

### DESIGNER

Westinghouse 2lp

### 1st COMMERCIAL OPERATION

12/21/1970

---

## ABSTRACT

The U.S. Nuclear Regulatory Commission (NRC) is issuing this information notice to inform addressees of the potential common cause failure of auxiliary feedwater pumps because of fouling of pump recirculation line flow orifices.

NRC INFORMATION NOTICE 2004-01

Please refer to the dictionary of codes corresponding to each of the sections below and to the coding guidelines manual.

---

1.	<b><u>Reporting Categories:</u></b>	<b><u>1.3</u></b>	<b><u>1.6</u></b>	<u>          </u>
2.	<b><u>Plant Status Prior to the Event:</u></b>	<b><u>2.1.1</u></b>	<u>          </u>	<u>          </u>
3.	<b><u>Failed/Affected Systems:</u></b>	<b><u>3.BB</u></b>	<u>          </u>	<u>          </u>
4.	<b><u>Failed/Affected Components:</u></b>	<b><u>4.2.8</u></b>	<u>          </u>	<u>          </u>
5.	<b><u>Cause of the Event:</u></b>	<b><u>5.1.1.1</u></b>	<b><u>5.3.3</u></b>	<b><u>5.4.19</u></b>
6.	<b><u>Effects on Operation:</u></b>	<b><u>6.0</u></b>	<u>          </u>	<u>          </u>
7.	<b><u>Characteristics of the Incident:</u></b>	<b><u>6.10</u></b>	<u>          </u>	<u>          </u>
8.	<b><u>Nature of Failure or Error:</u></b>	<b><u>8.3</u></b>	<u>          </u>	<u>          </u>
9.	<b><u>Nature of Recovery Actions:</u></b>	<b><u>9.1</u></b>	<u>          </u>	<u>          </u>

UNITED STATES  
NUCLEAR REGULATORY COMMISSION  
OFFICE OF NUCLEAR REACTOR REGULATION  
WASHINGTON, D.C. 20555

January 21, 2004

NRC INFORMATION NOTICE 2004-01: AUXILIARY FEEDWATER PUMP  
RECIRCULATION LINE ORIFICE FOULING -  
POTENTIAL COMMON CAUSE FAILURE

Addressees:

All holders of operating licenses or construction permits for nuclear power reactors, except those that have permanently ceased operations and have certified that fuel has been permanently removed from the reactor.

Purpose:

The U.S. Nuclear Regulatory Commission (NRC) is issuing this information notice to inform addressees of the potential common cause failure of auxiliary feedwater pumps because of fouling of pump recirculation line flow orifices. It is expected that recipients will review the information for applicability to their facilities and consider actions, as appropriate, to avoid similar problems. However, suggestions in this information notice are not NRC requirements; therefore no specific action or written response is required.

Background:

Point Beach Nuclear Plant (PBNP) is a two unit site. Each unit has a turbine-driven AFW pump (pumps 1P29 and 2P29) which can supply water to both steam generators. Additionally, the plant has two motor-driven AFW pumps (pumps P38A and P38B) each of which can be aligned to a steam generator in each unit. Each pump has a recirculation line back to the condensate storage tanks (CSTs) to ensure minimum flow to prevent hydraulic instabilities and dissipate pump heat. The recirculation line contained a pressure reducing, flow restricting orifice. An arrow is pointing to the recirculation flow restricting orifice (RO) in the major flow path AFW diagram provided in Figure 1 and a picture of the RO is provided in Figure 2.

The RO used a multi-stage, anti-cavitation trim package installed in the body of a globe valve to limit flow. This style of orifice or flow restrictor was installed in the AFW recirculation lines at PBNP in the past few years to eliminate cavitation caused by the old orifices. This type of flow restrictor used very small channels and holes in each stage combined with a tortuous path to limit flow and prevent cavitation.

**ML040140460**

AFW System - Major Flow Paths

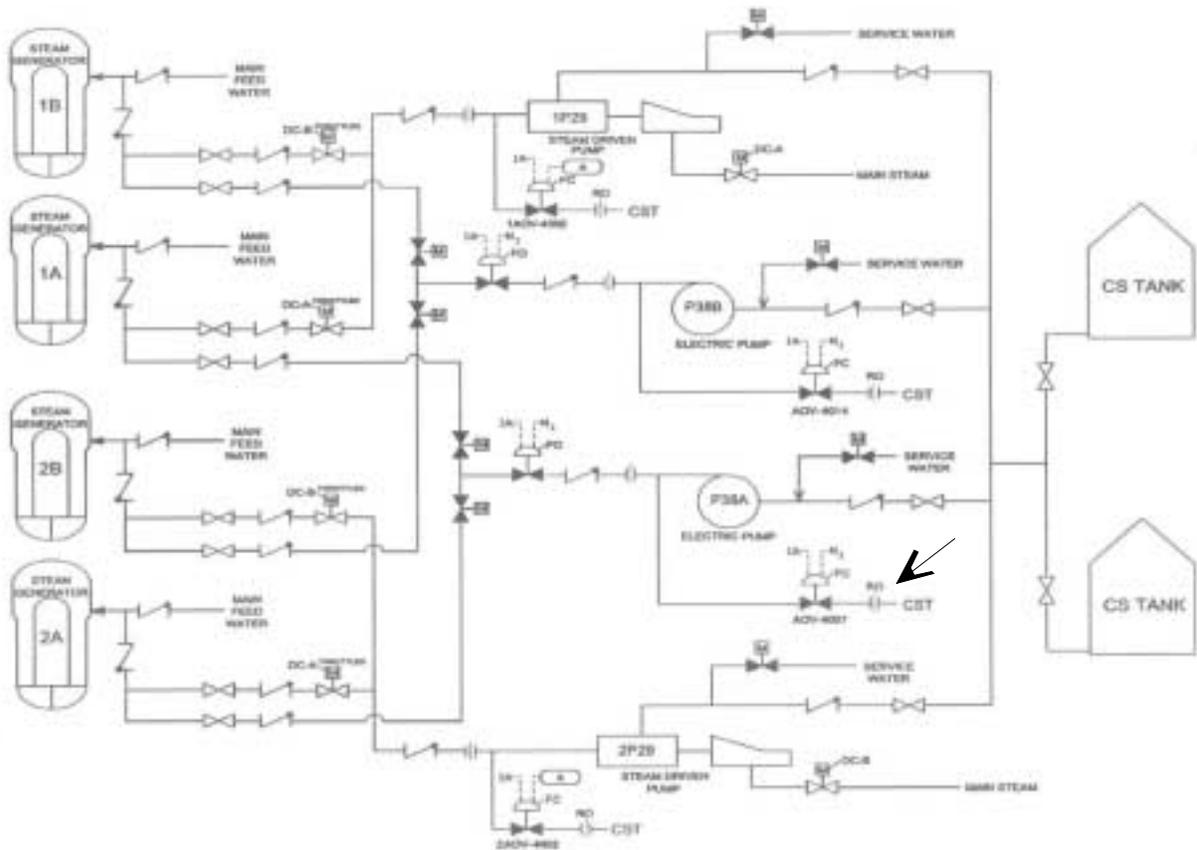


Figure 1. AFW System - Major Flow Paths



Figure 2. Recirculation Flow Restricting Orifice

Description of Circumstances:

On October 24, 2002, during post-maintenance surveillance testing of the P38A motor-driven AFW pump at PBNP, the licensee observed AFW recirculation line flow to be 64.5 gpm, which was less than the 70 gpm acceptance criterion. Normal flow through the recirculation line was 75 gpm. Suspecting instrument error, plant personnel vented and recalibrated the flow instrument. The P38A AFW pump was then started and tested again; however, the observed recirculation flow was essentially unchanged. Following that test run, the recirculation flow orifice was removed and inspected.

After removal of the orifice internals, partial blockage was observed in 24 of the 54 holes in the outermost sleeve. No particles were found on any of the inner sleeves. Samples of the particles removed from the orifice were retained for analysis. A boroscope inspection of the recirculation piping at the orifice location revealed no evidence of debris. Following cleaning and reassembly, the orifice was reinstalled and the P38A AFW pump was successfully retested. Testing was successfully completed on the other three AFW pumps to verify acceptable recirculation flow by October 25, 2002.

During the next several days, PBNP personnel evaluated the implications of the orifice plugging event. An apparent cause evaluation was initiated with specific directions to assess and evaluate the potential extent of condition. An action plan was developed to identify the source of the debris found in the orifice and to determine what other testing or flushing would be required to assure that future plugging did not occur.

As the investigations continued, questions developed concerning the operability of the AFW system while supplied by its safety-related water supply, the service water (SW) system. Although the service water supply was provided through a basket strainer, it was recognized that the strainer mesh was larger than the much finer RO channel holes and could allow debris to pass that could clog the RO. These concerns culminated in a meeting on October 29, 2002, at which PBNP personnel concluded that there was no longer a reasonable assurance that operation of the AFW system using its safety-related suction source of service water would not result in potential AFW recirculation line orifice clogging.

In a worst case scenario, Point Beach personnel determined that it may be possible, although unlikely, for each of the four flow control orifices, each associated with one of the four AFW pumps, to restrict the flow through the associated recirculation line. Under such conditions, it was hypothesized that if the discharge valves for the AFW pumps were throttled, adequate flow might be unavailable through the recirculation line and pump damage could occur due to overheating.

On October 29, 2002, all four AFW pumps were declared inoperable. Both units entered their technical specification action statements and required actions which directs immediate action to restore an AFW system to operable status. Immediate corrective actions consisted of briefing the on-shift crew of the potential consequences of restricted recirculation flow and initiating procedure changes. The operators were also directed to secure a running AFW pump if the pump discharge flows should be decreased to less than 50 gpm for the motor-driven pumps or 75 gpm for the turbine-driven pumps. These flow rates were substantially above the point at which pump damage could occur. Information tags were placed at the AFW pump flow indicators on the main control boards to convey that information. With these administrative controls in place, operations declared the AFW system operable, about four hours after the

pumps had been declared inoperable. An incident investigation was initiated to collect and confirm the facts of this event description beginning with the discovery of the P-38A AFW pump degraded recirculation flow during post-maintenance testing and concluding with the decision to declare the AFW system inoperable.

In accordance with 10 CFR 50.72(b)(3)(v), an eight-hour ENS notification (EN #39330) was made on October 29, 2002. The LER is available in ADAMS (Accession Number ML032890115).

A PBNP multi-discipline event resolution team was formed to identify and resolve the issues associated with the discovery of this condition. Activities included initiation of a root cause evaluation (RCE) to determine the root and contributing causes for the postulated common-mode failure that would render all AFW pump recirculation lines with restricted flow rates. The RCE concluded that this event had a direct root cause and an organizational root cause. The direct root cause was the failure by design engineering to properly evaluate the potential for orifice plugging within the design process. Instead of revisiting the design for adequacy and evaluating the potential for plugging of the proposed orifices within the rigor of the design process, the 10 CFR 50.59 safety evaluation was revised to justify the proposed design. The organizational root cause was less than adequate management oversight of the design modification process.

Also, in January and February 2003, a specially fabricated orifice was tested at a contractor laboratory in an effort to determine a plugging probability with service water. Definitive testing occurred on February 21 when a debris mixture of sand, silt, and zebra mussel shells, representative of what would exist in the Point Beach SW system, was injected into a closed loop configuration of piping, an orifice, and a centrifugal pump. The orifice plugged in much less than one minute after the mixture was injected into the loop. These results were contrary to those of a previously performed computational particle fouling model analysis that indicated that plugging was unlikely because of the particle size distribution of debris in SW and the shear forces in the holes and channels of the orifices developed with the minimum flow required through the orifice for pump cooling.

#### Discussion:

A special inspection was conducted by the NRC to evaluate the facts, circumstances, and licensee actions, and documented in NRC Inspection Report 50-266/02-15 and 50-301/02-15 (Accession Number ML030920128). This issue was determined to be of Yellow risk significance for Unit 1, an issue with substantial importance to safety, and Red risk significance for Unit 2, an issue of high importance to safety. The difference in significance between the Units was a result of the longer period of time that the AFW recirculation line pressure reduction orifices were installed in Unit 2. (See Final Determination Letter, dated December 11, 2003, Accession Number ML033490022).

This information notice requires no specific action or written response. If you have any questions regarding the information notice, please contact the technical contacts listed below or the appropriate Office of Nuclear Reactor Regulation (NRR) project manager.

***/Original signed by: Terrence Reis/***  
William D. Beckner, Chief  
Reactor Operations Branch  
Division of Inspection Program Management  
Office of Nuclear Reactor Regulation

Technical contacts:	Jerry Dozier, NRR (301) 415-1014 E-mail: <a href="mailto:jxd@nrc.gov">jxd@nrc.gov</a>	Paul Krohn, Region III (920) 755-2309 E-mail: <a href="mailto:pgk1@nrc.gov">pgk1@nrc.gov</a>
---------------------	---	--

Attachment: List of Recently Issued NRC Information Notices

LIST OF RECENTLY ISSUED  
NRC INFORMATION NOTICES

Information Notice No.	Subject	Date of Issuance	Issued to
2002-26, Sup 2	Additional Failure of Steam Dryer After A Recent Power Uprate	01/09/2004	All holders of an operating license or a construction permit for nuclear power reactors, except those that have permanently ceased operations and have certified that fuel has been permanently removed from the reactor.
2003-11, Sup 1	Leakage Found on Bottom-Mounted Instrumentation Nozzles	01/08/2004	All holders of operating licenses or construction permits for nuclear power reactors, except those that have permanently ceased operations and have certified that fuel has been permanently removed from the reactor.
2003-22	Heightened Awareness for Patients Containing Detectable Amounts of Radiation from Medical Administrations	12/09/2003	All medical licensees and NRC Master Materials License medical use permittees.
2003-21	High-Dose-Rate-Remote-Afterloader Equipment Failure	11/24/2003	All medical licensees.
2003-20	Derating Whiting Cranes Purchased Before 1980	10/22/2003	All holders of operating licenses for nuclear power reactors, except those who have permanently ceased operations and have certified that fuel has been permanently removed from the reactor vessel; applicable decommissioning reactors, fuel facilities, and independent spent fuel storage installations.

**Note:** NRC generic communications may be received in electronic format shortly after they are issued by subscribing to the NRC listserver as follows:

To subscribe send an e-mail to <[listproc@nrc.gov](mailto:listproc@nrc.gov)>, no subject, and the following command in the message portion:

subscribe gc-nrr firstname lastname