

UNITED STATES
NUCLEAR REGULATORY COMMISSION
OFFICE OF INSPECTION AND ENFORCEMENT
WASHINGTON, D. C. 20555

September 13, 1979

IE Circular No. 79-19

LOOSE LOCKING DEVICES ON INGERSOLL-RAND PUMP IMPELLERS

Description of Circumstances:

Three reports have been submitted to the NRC regarding the loosening of locking devices on the impellers of pumps manufactured by the Ingersoll-Rand Company.

The first report was submitted as a significant deficiency (10 CFR 50.55[e]) by Arkansas Power and Light Company in letters of March 17, 1978 and May 9, 1978. The licensee reported excessive noise and vibrations in both Low Pressure Safety Injection (LPSI) pumps during the preoperational test program on Unit 2 of Arkansas Nuclear One (ANO). It was discovered that the washers, jam nut and cap nut used to retain the impellers were missing on both pumps (Ingersoll-Rand Type 8X20WD). The licensee's corrective action involved the installation of a tab washer. This corrective action was, also, taken on the containment spray pumps (Ingersoll-Rand Type 6X23WD) because of similarity of design.

The second report was submitted by Duke Power Company in a licensee event report (LER 50-287/78-23) dated January 24, 1979. The symptoms were similar to those observed at ANO Unit 2 in that high vibration was detected in a reactor building spray pump (Ingersoll-Rand Type 4X11A) for Oconee Unit No. 3. The licensee found that the impeller had worked loose. The corrective action included a revision to the maintenance procedure to specify torque requirements.

The third report was 10 CFR 21 Report No. 79-01 submitted by Portland General Electric Co. on April 16, 1979. This report identified a deficiency that may exist in the Trojan Nuclear Plant containment spray pumps (Ingersoll-Rand Type 6X23WD) in that there is a potential for the impeller lock nut to loosen. The potential deficiency was identified because of the similarity of the containment spray pumps design to the residual heat removal (RHR) pumps (Ingersoll-Rand Type 8X20WD) and the discovery of a loose lock nut on an RHR pump during pump maintenance. The corrective action was to provide a positive mechanical lock on the impeller nut.

Westinghouse Nuclear Service Division has issued a Technical Bulletin to Westinghouse plant owners on loose lock nuts on Ingersoll-Rand Types W, WD, and WDF pumps. Excerpts from that Technical Bulletin are in Enclosure No. 1. Combustion Engineering, Inc. has, also, informed the NRC of their actions relative to the same problem in a letter dated March 13, 1978; excerpts from this letter are in Enclosure No. 2.

Recommended Action for Licensee's Consideration

All holders of operating licenses and construction permits should be aware of the potential deficiency described above. It is recommended that the licensees review the pumps used or planned for use in safety related systems at their facilities to determine if Ingersoll-Rand Types A, W, WD, WDF are installed. If these pumps, or units with similar impeller locking systems, are used; the licensees should determine that the impellers are presently locked in an acceptable manner and that maintenance and installation instructions provide adequate guidance to ensure that pump impellers are securely locked in place.

No written response to this Circular is required. If you need additional information regarding this subject, please contact the Director of the appropriate NRC Regional Office.

Enclosure No. 1: Excerpt from Westinghouse NSD Technical Bulletin No. NSD-TB-78-3

Enclosure No. 2: Excerpt from Combustion Engineering Inc.
Letter to Nuclear Regulatory Commission, March 13, 1978

Enclosure No. 1

EXCERPT FROM WESTINGHOUSE NUCLEAR
SERVICE DIVISION TECHNICAL BULLETIN
No. NSD-TB-78-3 April 21, 1978

Several plants under construction have experienced a loosening of the impeller lock nut on the Ingersoll Rand RHR Pumps. The problem has occurred during the initial startup of the pump or during flushing operations.

The possible causes for this lock nut becoming loose could include: running the pumps in reverse rotation, improper torquing of the lock nut, or the effects of foreign materials in the pumped fluids which could cause binding of the impeller.

Westinghouse, in conjunction with the supplier, has developed retrofit kits. These kits may be provided as an alternate method to further assure a more positive locking mechanism than that originally furnished with the pump.

*Quantity & Model 8 X 20 W	-	(2) PNJ, PGE, PEG, AMP.
Quantity & Model 8 X 20 WD	-	(2) TVA, TEN, VGB, VRA, DAP, DBP, APR.
Quantity & Model 8 X 20 WDF	-	(2) WAT, WBT, CGE, CQL, CRL, CSL, CTL, NEU, DMW, TBX, TCX, CAE, CBE, CCE, CDE, DCP, DDP, NAH, NCH, LLP, LMP, GAE, GBE, PBJ, PCJ.

Enclosure No. 2
Excerpts from Combustion Engineering Inc.
Letter to the Nuclear Regulatory Commission

March 13, 1978
LD-78-019

Dr. Ernest Volgenau, Director
Office of Inspection and Enforcement
U. S. Nuclear Regulatory Commission
Washington, D. C. 20555

Dear Dr. Volgenau:

This is to confirm my telephone conversation with Mr. Davis of your office on March 10, 1978.

On February 17, 1978 Arkansas Power and Light reported to Mr. Jim Gagliardo, NRC Region IV, the successive failures of the two Low Pressure Safety Injection Pumps' impeller retaining parts at the initiation of shutdown cooling during Pre-Operational testing at ANO-2. That report was made pursuant to the provisions of 10 CFR 50.55(e).

Since that time, Combustion Engineering has investigated whether similarly designed pumps (Ingersoll-Rand WD & WDF models) have been supplied by C-E to other nuclear facilities. We have determined that four other Combustion Engineering supplied Nuclear Steam Supply Systems have this type of impeller locking system on their Ingersoll-Rand pumps and may be susceptible to this type of failure. They are Northeast Utilities' Millstone Unit II, Louisiana Power and Light's Waterford Unit 3 and Southern California Edison's San Onofre Units 2 and 3.

Dr. Ernst Volgenau

- 2 -

Millstone Unit II is currently shutdown for refueling and maintenance; the earliest initial operation of either Waterford Unit 3 or San Onofre Units 2 and 3 pumps is expected in late 1979. In our opinion no condition currently exists which adversely affects the health and safety of the public.

Arkansas Power and Light has committed to provide the Nuclear Regulatory Commission a detailed report of the pump failures and their intended corrective action. Combustion Engineering, in conjunction with Ingersoll-Rand, is supporting that effort. Ingersoll-Rand has modification kits available which provide a more positive locking design. Combustion Engineering is recommending prompt installation of these modification kits on ANO-2 and Millstone II. We are recommending to Louisiana Power and Light and Southern California Edison that the modification kits be installed prior to initial operation of their pumps.

Very truly yours,

COMBUSTION ENGINEERING, INC.

LISTING OF IE CIRCULARS ISSUED IN
LAST SIX MONTHS

Circular No.	Subject	Date of Issued	Issued to
79-19	Loose Locking Devices on Ingersoll-Rand Pumps	9/13/79	All Power Reactor Licensees with a CP and/or OL
79-18	Proper Installation of Target Rock Safety-Relief Valves	9/10/79	All Power Reactor Licensees with a CP and/or OL
79-17	Contact Problem in SB-12 Switches on General Electric Company Metalclad Circuit Breakers	8/14/79	All Power Reactor Licensees with a CP and/or OL
79-16	Excessive Radiation Exposures To Members Of The General Public And A Radiographer	8/16/79	All Radiography Licensees
79-15 (Correc- tion)	Bursting of High Pressure Hose and Malfunction of Relief Valve "O" Ring in Certain Self-Contained Breathing Apparatus	8/22/79	All Research Reactors
79-15	Bursting of High Pressure Hose and Malfunction of Relief Valve "O" Ring in Certain Self-Contained Breathing Apparatus	8/8/79	All Materials Priority I, Fuel Cycle and Operating Power Reactor Licensees
79-14	Unauthorized Procurement and Distribution of XE-133	7/13/79	All Medical Licensees except Teletherapy Medical Licensees and to all Radiopharmaceutical Suppliers
79-13	Replacement of Diesel Fire Pump Starting Contactors	7/13/79	All Power Reactor Operating Facilities and all Utilities having a CP
79-12	Potential Diesel Generator Turbocharger Problem	6/28/79	All Power Reactors Operating Facilities and all Utilities having a CP

LISTING OF IE CIRCULARS ISSUED IN
LAST SIX MONTHS

Circular No.	Subject	Date of Issue	Issued to
79-11	Design/Construction Interface Problem	6/27/79	All Applicants for, and Holders of Power Reactor CPs
79-10	Pipefittings Manufactured from Unacceptable Material	6/26/79	All Power Reactor Licensees with a CP and/or OL
79-09	Occurrences of Split or Punctured Regulator Diaphragms In Certain Self Contained Breathing Apparatus	6/22/79	All Materials Priority I, Fuel Cycle and Operating Reactor Licensees
79-08	Attempted Extortion - Low Enriched Uranium	5/18/79	All Fuel Facilities Licensed by NRC
79-07	Unexpected Speed Increase of Reactor Recirculation MG Set Resulted in Reactor Power Increase	5/2/79	All Holders of BWR OL's or CP's
79-06	Failure to Use Syringe and Bottle Shields in Nuclear Medicine	4/19/79	All Holders of Medical Licensees except teletherapy licensees