

UNITED STATES
NUCLEAR REGULATORY COMMISSION
OFFICE OF INSPECTION AND ENFORCEMENT
WASHINGTON, DC 20555

October 8, 1986

IE COMPLIANCE BULLETIN NO. 86-03: POTENTIAL FAILURE OF MULTIPLE ECCS PUMPS
DUE TO SINGLE FAILURE OF AIR-OPERATED VALVE
IN MINIMUM FLOW RECIRCULATION LINE

Addressees:

All facilities holding an operating license or a construction permit.

Purpose:

The purposes of this bulletin are (1) to inform addressees of single failures of minimum flow recirculation lines containing air-operated isolation valves which could result in a common-cause failure of all emergency core cooling system (ECCS) pumps in a system, (2) to request that licensees affected by the problem promptly provide appropriate instructions and training to plant operators on how to recognize the problem if it occurs and take appropriate mitigating actions, (3) to request that licensees notify the NRC concerning the existence of the problem at their facility, and (4) to request that licensees inform the NRC of measures taken to correct this and/or other significant problems that are identified as a result of this bulletin.

Description of Circumstances:

There have been four recent cases where a design deficiency has been found involving the minimum flow recirculation paths for ECCS pumps. Although these four cases all involve safety injection (SI) pumps in Westinghouse-designed reactors, similar problems also could exist in other systems and at other types of reactors. This design deficiency was first discovered at the Point Beach Nuclear Plant and was subsequently described in IE Information Notice 85-94. A similar problem involving residual heat removal (RHR) system loop selection logic was later found in several BWR plants. This problem was addressed in IE Compliance Bulletin 86-01.

On July 24, 1985, Wisconsin Electric Company submitted a report in accordance with 10 CFR Part 21 for the Point Beach Nuclear Plant describing a design deficiency involving the minimum flow recirculation valves for the SI pumps. At Point Beach the discharge lines for each of the SI pumps are connected to a common recirculation header to provide a test flow path and a recirculation flow path for minimum flow at times when the reactor coolant system (RCS) pressure exceeds the SI pump shutoff head. The common recirculation header is provided with two air-operated valves in series. These valves close to isolate the

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refueling water storage tank (RWST) from the containment sump during the recirculation phase of emergency core cooling following a postulated loss-of-coolant accident (LOCA). Closure of these valves is intended to prevent containment reactor coolant from being pumped outside containment to the RWST during the recirculation phase. Both of the recirculation header isolation valves are designed to fail closed when their control circuits lose electrical power or control air pressure. The Part 21 report noted that a single failure (open) of the breaker associated with either of the two valves would isolate the minimum flow path for both SI pumps, defeat the control room remote operation capability of the affected valve, and cause the loss of control room valve position indication.

On February 5, 1986, Carolina Power and Light submitted LER 86-01 describing essentially the identical design deficiency involving the minimum flow recirculation path for the SI pumps at H. B. Robinson. On June 20, 1986, Rochester Gas and Electric discovered a similar design deficiency at the Ginna Plant and on June 25, 1986, Florida Power and Light Company reported a similar design deficiency at the Turkey Point Plant.

The concern in all four cases above involves a postulated small break LOCA which initiates a safety injection signal that starts the SI pumps. During a small break LOCA, RCS pressure may not readily decrease below the SI pump shutoff head. A single failure resulting in the loss of the minimum flow path concurrent with SI pump actuation would cause the pumps to operate deadheaded until RCS pressure decayed below the SI pump shutoff head. The simultaneous loss of minimum flow valve position indication in the control room will exacerbate this loss of minimum flow path. The availability of valve position indication is not expected to sufficiently ameliorate this event. Operating the SI pumps deadheaded would result in pump damage and failure within a few minutes. The failure of multiple trains in an ECCS due to a single failure violates the single failure criterion in General Design Criterion (GDC) 35 (10 CFR 50, Appendix A). In all the above cases, the short-term corrective actions taken by the licensees were to mechanically block open the SI pump recirculation valves to ensure a minimum flow path and to revise the applicable plant LOCA procedures to manually close these valves prior to switching to the recirculation mode. This short term action should be carefully weighed against the requirements to minimize containment leak paths in the ECCS recirculation mode of operations and the reliability of operator actions in this regard.

Actions Required:*

1. Promptly determine whether or not your facility has a single-failure vulnerability in the minimum flow recirculation line of any ECCS pumps that could cause a failure of more than one ECCS train.
2. If the problem exists: (a) promptly instruct all operating shifts of the problem and measures to recognize and mitigate the problem; (b) promptly develop and implement corrective actions which bring your facility into compliance with GDC 35.

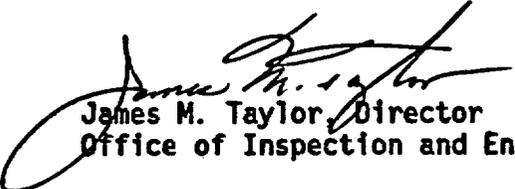
*Actions required of the BWR plants in response to IE Compliance Bulletin 86-01 need not be repeated in responding to this Bulletin.

3. Within 30 days of receipt of this bulletin, (a) provide a written report to the NRC which identifies whether or not this problem exists at your facility, (b) if the problem exists (or existed), include in the report the justification for continued operation and identify the short-term modifications to plant operating procedures or hardware that have been or are being implemented to ensure safe plant operations.
4. If the problem exists (or existed), provide a written report within 90 days of receipt of this bulletin informing the NRC of the schedule for long-term resolution of this and/or any other significant problems that are identified as a result of this bulletin.

The written report shall be submitted to the appropriate Regional Administrator under oath or affirmation under provisions of Section 182a, Atomic Energy Act of 1954, as amended. Also, the original copy of the cover letter and a copy of the report shall be transmitted to the U.S. Nuclear Regulatory Commission, Document Control Desk, Washington, D.C. 20555 for reproduction and distribution.

This request for information was approved by the Office of Management and Budget under blanket clearance number 3150-0011. Comments on burden and duplication may be directed to the Office of Management and Budget, Reports Management, Room 3208, New Executive Office Building, Washington, D.C. 20503.

If you have questions regarding this matter, please contact the Regional Administrator of the appropriate NRC regional office or one of the technical contacts listed below.


James M. Taylor, Director
Office of Inspection and Enforcement

Technical Contact: Henry Bailey, IE
(301) 492-9006

Ron Young, IE
(301) 492-8985

Attachment: List of Recently Issued IE Bulletins

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	9/25 #3c	86-224			
*SEE PREVIOUS CONCURRENCE	DI	*IE	*EGCB: IE	*NRR	
	JMTaylor	DGable	RBaer	GHolahan	
	9/15/86	7/10/86	8/13/86	8/27/86	
*DEPER: IE	*DEPER: IE	*DEPER: IE	DD: DEPER: IE	*D: DEPER: IE	DD: IE
RYoung:md	HABailey	JRosenthal	SASchwartz	ELJordan	RWStarostecki
1/86	7/9/86	8/12/86	9/5/86	8/29/86	1/86

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	*IE DGable 7/ /86	*EGCB:IE RBAer 8/ /86	*NRR GHolahan 8/ /86
DEPER: IE RYoung:md 8/ /86	DEPER: IE HABailey 8/ /86	DEPER: IE DPAllison 8/ /86	DD: DEPER: IE SASchwartz 8/ /86
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*IE
DGable
7/ /86

Rob Beer
EGCB: IE
RBAer
8/13/86

John Holahan
GHolahan
8/27/86

DEPER: IE
RYoung:md
8/ /86

DEPER: IE
HABailey
8/ /86

J.R.
DEPER: IE
DPAllison
8/12/86

DD: DEPER: IE
SASchwartz
8/ /86

D: DEPER: IE
ELJordan
8/ /86

DD: IE
RHVollmer
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JMTaylor
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SASchwartz
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D: DEPER: IE
ELJordan
7/ /86

DD: IE
RHVollmer
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LIST OF RECENTLY ISSUED
IE BULLETINS

Bulletin No.	Subject	Date of Issue	Issued to
86-02	Static "0" Ring Differential Pressure Switches	7/18/86	All power reactor facilities holding an OL or CP
86-01	Minimum Flow Logic Problems That Could Disable RHR Pumps	5/23/86	All GE BWR facilities holding an OL or CP
85-03	Motor-Operated Valve Common Mode Failures During Plant Transients Due To Improper Switch Settings	11/15/86	All power reactor facilities holding an OL or CP
85-02	Undervoltage Trip Attachments Of Westinghouse DB-50 Type Reactor Trip Breakers	11/5/86	All power reactor facilities holding an OL or CP
85-01	Steam Binding Of Auxiliary Feedwater Pumps	10/29/86	Nuclear power facilities and CPs listed in attachment 1 for action; all other nuclear power facilities for information
84-03	Refueling Cavity Water Seal	9/24/84	All power reactor facilities holding an OL or CP except Ft. St. Vrain
84-02	Failures Of General Electric Type HFA Relays In Use In Class 1E Safety Systems	3/12/84	All power reactor facilities holding an OL or CP
84-01	Cracks In Boiling Water Reactor Mark I Containment Vent Headers	2/3/84	All BWR facilities with Mark I containment and currently in cold shutdown with an OL for action and all other BWRs with an OL or CP for information

OL = Operating License
CP = Construction Permit