March 31, 1986 50-250

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MEMORANDUM FOR: Albert F. Gibson, Director
Division of Reactor Safety
Region II

FROM: Thomas M. Novak, Acting Director
Division of PWR Licensing-A

SUBJECT: TIA 85-51 REQUIREMENTS FOR INSERVICE TESTING OF RELIEF VALVES

Your memorandum dated July 23, 1985, requested guidance relating to the requirements for inservice testing (IST) of relief valves used for overpressure protection of various safety-related systems. You specifically requested assistance regarding the testing requirements of ECCS accumulator tank relief valves at Turkey Point, Units 3 and 4, and guidance regarding testing requirements for relief valves in general.

Your request was reviewed by the Engineering Issues Branch (EIB) and the details of the review are enclosed. EIB has concluded that the testing of the ECCS accumulator tank relief valves at Turkey Point, Units 3 and 4, is not required. However, as stated in the enclosure, there are cases where this interpretation cannot be made. The Code has recently been revised to clarify the IST requirements for relief valves and will resolve any concerns as licensee's update to the newer Code requirements.

The enclosed review by EIB is being provided to all the Regions due to the generic nature of the guidance provided in relation to the IST requirements for relief valves used for overpressure protection of various safety-related systems.

I trust you find the enclosed guidance responsive to your request and resolves your specific concerns relating to the testing requirements of the ECCS accumulator tank relief valves at the Turkey Point Plant. If we can be of further assistance, please do not hesitate to contact us.

Thomas M. Novak, Acting Director
Division of PWR Licensing-A

Enclosure:
As stated

cc: See next page

*See previous concurrence

*LA:PAD#2	*PM:PAD#2	*D:PAD#2	AD:PWR-A
D. Miller	D. McDonald;bg	L. Rubenstein	T. Novak
3/ /86	3/ /86	3/ /86	3/31/86

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Region II

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Your memorandum dated July 23, 1985, requested guidance relating to the requirements for inservice testing (IST) of relief valves used for overpressure protection of various safety-related systems. You specifically requested assistance regarding the testing requirements of ECCS accumulator tank relief valves at Turkey Point, Units 3 and 4, and guidance regarding testing requirements for relief valves in general.

Your request was reviewed by the Engineering Issues Branch (EIB) and the details of the review are enclosed. EIB has concluded that the testing of the ECCS accumulator tank relief valves at Turkey Point, Units 3 and 4, is not required. This determination is based on the current wording of the inservice testing Code, ASME Section XI. However, as stated in the enclosure, there are cases where this interpretation cannot be made. The Code has recently been revised to clarify the IST requirements for relief valves and will resolve any concerns as licensee's update to the newer Code requirements.

The enclosed review by EIB is being provided to all the Regions due to the generic nature of the guidance provided in relation to the IST requirements for relief valves used for overpressure protection of various safety-related systems.

I trust you find the enclosed guidance responsive to your request and resolves your specific concerns relating to the testing requirements of the ECCS accumulator tank relief valves at the Turkey Point Plant. If we can be of further assistance, please do not hesitate to contact us.

Thomas M. Novak, Acting Director
Division of PWR Licensing-A

Enclosure:
As stated

cc: See next page

LA:PAD#2	PM:PAD#2	D:PAD#2	AD:PWR-A
D. Miller	C. D. McDonald;bg	M. Rubenstein	T. Novak
3/24/86	3/26/86	3/27/86	3/ /86

cc:
V. Stello
J. Heltemes
J. Partlow
J. Taylor
E. Jordan
E. Rossi
R. Baer
B. Grimes
W. Russell
T. Speis
R. Bernero
G. Lainas
D. Crutchfield
D. Eisenhut
J. Miller
G. Holahan
S. Varga
E. Butcher
B. Sheron
T. Murley
J. Keppler
R. Martin
J. Martin

ENCLOSURE

ENGINEERING ISSUES BRANCH
EVALUATION OF REGION II CONCERNS
INSERVICE TESTING REQUIREMENTS FOR RELIEF VALVES

As requested in memorandum dated July 23, 1985, the Engineering Issues Branch (EIB) has reviewed the Region II questions regarding the requirements for inservice testing of relief valves used for overpressure protection of various safety-related systems. In Reference 1, Region II specifically requested assistance regarding testing requirements of ECCS accumulator tank relief valves at Turkey Point 3 and 4. Region II also requested guidance regarding testing requirements for relief valves in general.

EIB has concluded that the confusion about whether to test various ASME Class 1, 2, and 3 relief valves is due to the specific wording of past editions of the inservice testing code, ASME Section XI. These editions, which are currently being implemented for plant inservice testing, specify that those valves to be included for inservice testing be "Class 1, 2, and 3 . . . which are required to perform a specific function in shutting down a reactor . . . or in mitigating the consequences of an accident." Because of this wording, most licensees do not include the majority of overpressure protection valves in their inservice testing programs. The licensee for Turkey Point is an example of this, as stated in the Region II memorandum where a determination has been made that the function of the accumulator relief valves is not required for safety in the context of the referenced Code wording.

However, there are some systems wher this interpretation clearly cannot be made, i.e., where the failure of a relief valve will disable the function of a safety system. A recent AEOD report (E. Brown to K. Seyfrit dated November 25, 1985) described an event where low setpoints on relief valves jeopardized or severely impaired capabilities of the Standby Liquid Control System on a Boiling Water Reactor. A copy of the AEOD report is attached.

Fortunately, the Code has recently been revised to clarify this area. The Winter 1985 Addenda to the 1983 Section XI Code specifically requires inservice testing of all Class 1, 2, and 3 overpressure protection devices. Therefore, in the future, as licensees update to this newer Code requirement at the beginning of their next 10 year inspection interval, as defined in 10 CFR 50.55a(g), all of the Code Class 1, 2, and 3 relief valves will have to be included in the inservice testing program and inservice tested.

Principal Contributors:
G. Hammer
F. Cherny

Attachment: As stated

ATTACHMENT

DISTRIBUTION:
PDR
ROAB SF
ROAB CF
EBrown
MChiramal
KSeyfrit
TIppolito
CHeltemes, Jr.
SRubin, AEOD
FCherny, NRR
JPage, NRR

August 13, 1985

MEMORANDUM FOR: Karl V. Seyfrit, Chief
Reactor Operations Analysis Branch
Office for Analysis and Evaluation
of Operational Data

AEOD/T507

THRU: Matthew Chiramal, Chief
Engineering Section
Reactor Operations Analysis Branch
Office for Analysis and Evaluation
of Operational Data

FROM: Earl J. Brown
Engineering Section
Reactor Operations Analysis Branch
Office for Analysis and Evaluation
of Operational Data

SUBJECT: STANDBY LIQUID CONTROL SYSTEM PRESSURE RELIEF VALVES LIFT AT A PRESSURE LOWER THAN REACTOR COOLANT PRESSURE

The enclosed report is forward for your information and further consideration. This event at Hatch 2 in which the relief valves lifted at 600 and 700 psig rather than the specified range of 1350 psig ± 25 psig appears to be an isolated case resulting from degraded valves. A review of operational data of relief valves in the standby liquid control system did not identify similar events. It does not appear that additional NRC effort is needed.

/s/

Earl J. Brown
Engineering Section
Reactor Operations Analysis Branch
Office for Analysis and Evaluation
of Operational Data

E/B.
ROAB:AEOD
EBrown:as
8/9/85

SC:ROAB:AEOD
MChiramal
8/9/85

BC:ROAB:AEOD
KVSeyfrit
8/9/85

DD:AEOD
TIppolito
8/12/85

8509190232

AEOD TECHNICAL REVIEW REPORT*

UNIT: E. I. Hatch, Unit 2
DOCKET NO.: 50-366
LICENSEE: Georgia Power Company
NSSS/AE: General Electric/Bechtel

TR REPORT NO.: AEOD/T
DATE:
EVALUATOR/CONTACT: Earl J. Brown

SUBJECT: STANDBY LIQUID CONTROL SYSTEM PRESSURE RELIEF VALVES LIFT AT A PRESSURE LOWER THAN REACTOR COOLANT PRESSURE

EVENT DATE: May 5, 1984 (LER 366/84-005)

SUMMARY

Both loops of the standby liquid control system would have been unable to inject sodium pentaborate because, during a test, relief valves lifted at 600 and 700 psig rather than the set point range of 1350 psig ± 25 psig. A review of available data suggests that these events were isolated cases and were the result of degraded valves rather than an indication of a generic problem. No additional AEOD effort seems necessary at this time.

DISCUSSION

It was discovered during bench tests that pressure relief valves in the standby liquid control (SLC) system at Edwin I. Hatch, Unit 2 lifted at a pressure lower than the set pressure of 1350 psig ± 25 psig. The event occurred on May 5, 1984 and is described in LER 366/84-005. The test procedure is performed at six month intervals. The "A" loop relief valve, 2C41-F029A, lifted at 600 psig and the "B" loop relief valve, 2C41-F029B, lifted at 700 psig. Since this lift pressure was several hundred psig below the set pressure, it represents a situation quite different from normal set point drift.

A review of the P&ID drawing indicates that lifting of either of these relief valves would result in recirculation of the pump discharge flow back to the intake side of the SLC pump. Hence, in the event of an injection signal, the as found condition of the relief valves indicates that the sodium pentaborate solution would just recirculate through the SLC pump rather than be injected into the reactor vessel when the reactor pressure is greater than 700 psig.

Investigation by the licensee revealed the stem on relief valve 2C41-F029A was broken at the cotter pin hole which permitted the valve spring to decompress and lose tension. Relief valve 2C41-F029B was found to have excessive wear on the valve stem and the valve stem guide.

* This document supports ongoing AEOD and NRC activities and does not represent the position or requirements of the responsible NRC program office.

The immediate corrective action by the licensee was to replace the damaged relief valves, Lonergan Model LCT-20, with a different model, LCT-30, supplied by the same manufacturer. Since this mode of failure has potential generic implications which resulted in complete inability to inject sodium pentaborate when needed, a search of the Sequence Coding Search System (SCSS) data base was conducted to review for similar events.

The data base search of SCSS was conducted for relief valves in standby liquid control systems and all events in standby liquid control systems. There were 43 events involving the SLC system, but only 11 events involved a relief valve in the SLC system. Table 1 is a list of the 11 events with LER number, plant name, event date, and event description with the cause of failure if it was stated in the LER. It is evident from the 11 events that low relief valve lift pressures of 600 and 700 psig only occurred for two valves at Hatch Unit 2 and one at Pilgrim. The valves at Hatch 2 were physically damaged with a broken stem on one valve and excessive wear on the other valve. However, one event at Pilgrim (item 3) identifies a low lift pressure at approximately 600 psig but the cause could not be determined. Subsequent testing of the valve at Pilgrim resulted in valve lift within set point specifications. Although the very low lift pressure of 600 psig was similar at Hatch and Pilgrim, the valves were supplied by different manufacturers. The valves at Hatch were manufactured by Lonergan and that at Pilgrim was manufactured by Crosby.

The valves identified for all events in Table 1 were manufactured by either Crosby or Lonergan. The valves at Pilgrim and Vermont Yankee are Crosby valves and those at Hatch and Brunswick are Lonergan valves. Hence, only four plants have reported problems with relief valves lifting outside of specification requirements. Furthermore, at least two sites have identified that relief valve lift problems appear related to the test procedure. Discussions with licensee staff at Brunswick (items 7, 8, and 9) revealed that the test procedure was the primary cause of relief valve lifting outside of specification limits. The reduced time interval between tests was apparently not effective (18 months to 6 months) in reducing improper lift pressure. However, the test procedure was changed from using the SLC pump pressure and audio recognition of valve lift to bench testing with water and a portable positive displacement pump. Since that procedure was implemented, there have been no further reports involving SLC relief valves.

A search of NPRDS was conducted in an attempt to further assess potential generic implications. There were no additional BWR plants identified in that search that use the Model LCT-20 relief valves. However, the search did identify use of the same model valve at a few PWR plants in the service water system, component cooling water system, feedwater system, and auxiliary feedwater system. However, no unusual events were identified.

FINDINGS AND CONCLUSIONS

A review of the available operating data appears to suggest that the two relief valves lifting at 600 to 700 psig at Hatch 2 were isolated events. Furthermore, those valves were degraded in a manner that has not been reported by other licensees. It also appears that certain test methods used (like at Brunswick) to establish the pressure at which these valves lift may be the primary cause of reported lift pressures outside the acceptable set pressure range.

Based on available information, it is concluded that these events do not represent a generic issue for BWR plants relative to inability to inject sodium pentaborate into the reactor vessel when needed. There does not appear to be a need for additional NRC action at this time.

TABLE 1

RELIEF VALVE EVENTS IN STANDBY LIQUID CONTROL SYSTEM

	LER Number/Plant	Event Date	Event Description
1.	271/81-031 Vermont Yankee	11-9-81	Relief Valve SR-39-B was found to have set point of 1540 psig. Set point range was 1400-1490 psig. Suspected cause of drift was crystallization of sodium pentaborate.
2.	271/84-013 Vermont Yankee	7-21-84	Relief valves SR-11-38 A&B were found to have a set point below the required range. Most probable cause of low setpoint was the testing technique.
3.	293/85-001 Pilgrim 1	1-1-85	SLC system was inoperable due to debris in SLC system storage tank and test tank. The "A" relief valve lifted at about 600 psig vs. a set point of 1450 psig. The "B" relief valve, which lifted below setpoint but within range, was found with pieces of rubber gloves between the blowdown adjusting orifice and plunger. Cause of "A" lifting low is unknown. It lifted at the required setpoint on subsequent bench tests.
4.	321/81-006 Hatch 1	1-19-81	SLC loop "A" relief valve, 1C41-F029A, lifted at 1200 psig vs. a setpoint of 1325 ± 75 psig. Cause was attributed to setpoint drift.
5.	321/81-020 Hatch 1	3-18-81	SLC loop "B" relief valve, 1C41-F029B, lifted at 1180 psig vs. a setpoint of 1325 ± 75 psig. Cause was attributed to setpoint drift.

TABLE 1 (Continued)

6.	321/83-102 Hatch 1	10-11-83	SLC relief valve 1C41-029A would not lift in the range 1325 ± 75 psig. Valve was disassembled, and cleaned and bench tested successfully.
7.	324/82-041 Brunswick 2	3-14-82	SLC relief valve 2-C41-F029A lifted at 1465 psig vs setpoint of 1400 ± 50 psig. Further evaluation is planned. Test frequency was changed to 6 month intervals from 18 month intervals.
8.	325/80-057 Brunswick 1	7-3-80	SLC relief valve 1-C41-F029B did not lift in the setpoint range of 1400 ± 50 psig. Cause was attributed to setpoint drift. Test interval increased to every 6 months.
9.	325/83-019 Brunswick 1	4-25-83	Both units had SLC relief valves outside the setpoint range of 1400 ± 50 psig. Unit 1 relief valves 1-C41-F029A and F029B lifted at 1321 psig and 1529 psig respectively. Unit 2 relief valves 2-C41-F029A and F029B lifted at 1403 psig (acceptable) and 1323 psig respectively. Cause appears to have been the test method which utilized SLC discharge pressure and an audible report of valve opening.
10.	366/81-014 Hatch 2	3-18-81	SLC relief valve failed to lift at 1400 psig vs. set pressure of 1350 ± 50 psig. Cause was setpoint drift.
11.	366/84-005 Hatch 2	5-25-84	SLC relief valves in loops "A" and "B" (2C41-F029A and 2C41-F029B) lifted at 600 psig and 700 psig respectively. Would have been unable to inject sodium pentaborate into reactor vessel. Cause was damaged and worn valve components.