James A. FitzPatrick
Nuclear Power Plant
P.O. Box 41
Lycoming, New York 13093
315 342 3840

Radford J. Converse
Resident Manager

NewYorkPower Authority

September 25, 1987
JAFP-87-0756

United States Nuclear Regulatory Commission
Attention: Document Control Desk
Washington, DC 20555

SUBJECT: JAMES A. FITZPATRICK NUCLEAR POWER PLANT
DOCKET NO. 50-333
INSPECTION NOS. 85-022 AND 83-04

Gentlemen:

NRC Inspection (NRCI) Open Item 85-022-01 addresses the operation of the "E" SRV valve during the scram which occurred July 19, 1985. NRCI Open Item 83-04-03 addresses LER-83-06 which reported an out-of-tolerance as-found test of the "D" SRV. LER 87-004-01 addresses the out of specification setpoint test results of three Target Rock relief valves in February 1987. This letter responds to a request from the JAF Resident Inspector to formally respond to both open items, LER 87-004-01, and to provide a summary of the 2-stage Target Rock SRV setpoint issue and its applicability at FitzPatrick.

Attachment 1 provides an overview of the industry Target Rock SRV setpoint problem.

Attachment 2 provides a summary of the recent test history of FitzPatrick's SRV pilot assemblies tested at Wyle Laboratories of Huntsville, Alabama.

Attachment 3 is G.E. Document DRF-A00-02948 which addresses the detectability, history, and impact of SRV drift. Included in this document is a discussion which addresses the unreliable use of reactor vessel dome region pressure instrumentation for the purpose of determining SRV lift setpoints.

Attachment 4 is an excerpt from the G.E. Document NEDE-30476, "Setpoint Drift Investigation of Target Rock 2-Stage Safety Relief Valve", which shows the sensitivity to setpoint drift on all SRVs as compared to the safety limit of 1375 psig.

Attachment 5 is the G.E. Document NEDO-22226 which provided the technical justification to modify FitzPatrick's license during plant Cycle 5 to justify operation with one SRV out of service.

Attachment 6 is the G.E. Document NEDO-30120, dated April 1983, which provided the technical basis for operating with one of the safety/relief valves out of service for Cycle 6 and somewhat later.

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Attachment 7 provides the summary of our reevaluation of the scram which occurred on July 19, 1985. As discussed in Inspection Report 85-22, our evaluation at the time in 1985 was based on prior experience, especially the scram on January 17, 1983.

Attachment 8 provides a summary of this 1983 event and SRV operation.

We believe that Attachments 3 - 6 support the fact that no safety issue exists with the present Target Rock safety/relief valves installed at FitzPatrick. In addition, the Authority maintains that reactor vessel pressure indication cannot accurately be used to determine whether an SRV actuation occurs at the technical specification limits. As such, we recommend that Inspection Items 85-022-01 and 83-04-03 be closed.

The Authority continues to support and participate in the BWR Owners' Group activities in resolving the setpoint drift problem associated with Target Rock two-stage SRVs. The Authority agrees with G.E. that no safety problem exists; however, based on the recent high setpoint value of pilot valve Serial Number 1056, (112% of nominal setpoint) the Authority is pursuing the following interim courses of action as presented in LER 87-004-01:

a) Perform setpoint testing of all SRVs each cycle, rather than one half of the valves each cycle, until the problem is considered resolved.

b) Pursue a Technical Specification change to expand the permissible setpoint tolerance to values recognized within the industry as being acceptable.

RADFORD J. CONVERSE
RESIDENT MANAGER

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Attachments

cc: NRC Region 1 Office
Attention: William F. Kane
NRC Resident Inspector
Document Control Center
WPO Records Management

Attachment 1

OVERVIEW OF TARGET ROCK SRV SETPOINT PROBLEM

A) Background

The 2-stage Target Rock Corp. (TRC) Safety Relief Valve (SRV) was developed by General Electric (G.E.) and TRC as a replacement for an earlier 3-stage design which was prone to spurious opening and failure to reclose. The 2-stage design eliminated spurious opening, but there were operating problems identified by G.E. Service Information Letters, including failure to open (SIL 196, Supp. 10), failure to close due to high pneumatic pressure (SIL 196, Supp. 8), pilot valve leakage (SIL 196, Supp. 3 and 4), flange leakage (SIL 196, Supp. 13), and setpoint drift (SIL 196, Supp. 14). The NRC is tracking these problems as part of Generic Issue B-55, "Improved Reliability of Target Rock Safety Relief Valves", (NUREG 0933). Design, maintenance, and operational improvements have corrected the problems except for high setpoint drift.

SRVs are periodically tested and recertified in accordance with Technical Specification requirements. Data taken during "as received" testing prior to recertification of the valves shows most 2-stage SRVs open 1% to 4% above nominal setpoint with a few valves opening considerably higher. Setpoint deviations were not considered a serious problem until July 1982, when all 11 SRVs on Hatch-1 exhibited setpoint drift in excess of 10% during a transient. Georgia Power (GPC), G.E., TRC, and others conducted an investigation which included special testing of the Hatch SRVs as well as valves from other plants. Because of the potentially generic nature of the problem, GPC proposed a BWR Owners' Group (BWROG) program which was approved in February 1983 and funded at that time by six of the eleven utilities using the TRC 2-stage SRV.

The SRV Setpoint Drift Committee investigation included review of field experience and as-received test data, diagnostic testing of valves during recertification, and metallurgical examination of selected SRVs. The investigation concluded that setpoint drift was caused by two unrelated phenomena: 1) binding of the pilot valve stem and 2) sticking of the pilot valve disc in its seat. The cause of pilot stem binding was determined to be inadequate clearance between the stem and its guide bushing. Pilot stem binding has not been observed on an SRV with proper clearances. Pilot disc-to-seat sticking was found to be caused by buildup of a tenacious corrosion product in the disc-to-seat interface. Recommendations resulting from the investigation included correction of low clearance between the pilot stem and guide bushing and cleaning of the corrosion product from the pilot disc during recertification of the SRV. At the end of the BWROG investigation in early

1984, available data indicated that disc sticking was sufficiently rare, and that all BWR's had adequate margin to safety, assuming occasional setpoint deviations resulting from a stuck disc. Design or material changes to correct disc sticking were not justified by information then available. A final report (Note: NEDE-30476) on the investigation was published in June 1984.

In March 1984, two of eleven Hatch-2 SRVs exhibited stuck discs (7% and 18% above setpoint) during "as-received" testing. In May 1984, two of eleven Brunswick SRVs also had stuck discs. While frequency and magnitude of sticking was considerably above that predicted by the BWROG data, there was little concern because the results could be considered anomalous based on the small population of valves, and because both Hatch and Brunswick have excess relief capacity and overpressure margin.

Subsequent to the Brunswick testing, 2 of 4 SRVs at Pilgrim had stuck discs during "as-received" testing. This was cause for concern because 50% of the normal relief capacity was compromised due to SRVs with opening pressures considerably above setpoint. Boston Edison subsequently conducted an investigation independent of the BWROG. The cause of the problem was determined to be the same corrosion phenomenon seen on other valves. Recommendations of the study were to change the material of the pilot disc from Stellite 6B to Stellite 21 and to eliminate testing of the SRVs at low reactor pressure to minimize damage to the disc when the valve recloses.

B) Subsequent Developments

The BWROG Setpoint Drift Committee appointed a Materials Selection Panel and requested it to recommend a suitable material change which would have the highest potential for resolving the oxide bonding concern and to recommend suitable test criteria and a valve sample size for in-service demonstration of the new disc material.

In November 1986 the Material Selection Panel recommended changing the disc material from Stellite to PH13-8Mo to provide a dissimilar metal combination. It was postulated that oxides from PH13-8Mo would be sufficiently different from oxides of the Stellite-6 seat such that any bonding, if it occurred, should be much weaker than a Stellite-to-Stellite bond, thus limiting the setpoint drift to an acceptably low value. As a result, several utilities have installed PH13-8Mo discs in up to one-half of their SRVs.

In mid-1986 the BWROG authorized General Electric to perform autoclave tests comparing the relative sticking of PH13-8Mo to the standard Stellite 6B discs. G.E. designed the test, obtained the samples from Target Rock, and completed a two-month exposure of the samples by 1986 year end.

A recent letter from the BWROG to the NRC (BWROG-8714 dated April 2, 1987) provides the latest status of this program. A copy of the letter is attached for general information.

C) NRC Involvement

The principle NRC contact with the BWROG Committee is Frank C. Cherny, Section B, Engineering Issues Branch, Division of Safety Reviews and Oversight. NRC notices issued to date on this subject are IE Information Notices 82-41, 83-39, 83-82, and 86-12.

D) Summary of SRV Test Results as of January 20, 1986 - (Reference letter OG6-050-11 dated June 23, 1986 from G.E. to BWR Owners' Group SRV Setpoint Drift Fix Committee Members.)

Total number of 2-stage SRVs tested	= 257
Tests with setpoint greater than 3% due to labyrinth seal problem	= 38
Tests with setpoint gr ter than 3% due to stuck disc	= 31

(According to the SRV BWROG Chairman both the NRC and the industry are more concerned with test results exceeding 3% of setpoint. Evidently all agree that 1% tolerance is too stringent.)