

AEOD ENGINEERING EVALUATION REPORT\*

UNIT: Fitzpatrick  
DOCKET: 50-333  
LICENSEE: Power Authority of the State of New York  
NSSS/AE: GE/Stone & Webster

EE REPORT NO.: AEOD/E312  
DATE: May 18, 1983  
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SUBJECT: OPERABILITY OF TARGET ROCK SRVs IN THE SAFETY MODE WITH PILOT VALVE  
LEAKAGE

EVENT DATE: July 1982

SUMMARY

During a return to power in July 1982, Fitzpatrick operating personnel observed that one Target Rock two-stage safety/relief valve (SRV) tailpipe temperature was considerably higher than normal. The "F" SRV pilot valve was found to be eroded and leaking when disassembled. Similar pilot valve leakage was observed in two two-stage SRVs at Pilgrim 1 in 1981.

Two safety concerns related to safety mode operability were considered as a result of the pilot valve leakage. They are: upward setpoint drift at low leak rates and inoperability at high leak rates. Subsequent investigation by the valve vendor, Target Rock, indicated setpoint drift was not a problem for leak rates which did not challenge SRV operability in the safety mode. Target Rock informed Fitzpatrick that SRV safety mode operability would be challenged by leakage rates over 200 pounds per hour.

The principal findings of this report are that current regulatory requirements do not adequately address SRV inoperability due to pilot valve leakage and that the limit on pilot valve leakage is not identified in existing regulatory guidance (i.e., technical specifications, generic letter, IE Bulletin, etc.) This report concludes that NRR should consider whether high pilot valve leak rates challenge SRV operability in the safety mode. If this challenge is confirmed, additional regulatory guidance would be required to quantify and document allowable pilot leakage rates and leakage detection and monitoring requirements. Any method of providing such regulatory guidance which assures long-term compliance would be acceptable.

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## DISCUSSION

### Plant & Status

During July 1982 Fitzpatrick was starting up after a forced outage when high tailpipe temperatures were encountered on the "F" SRV.

### Occurrence-Cause and Effect (Ref. 1)

During the return to power, the "F" SRV tailpipe temperatures were substantially above normal, based on historical data for that operating cycle. By late July, the "F" SRV tailpipe temperature had stabilized at about 290°F compared with the expected temperature range of 170-230°F. Analysis of the temperature data from previous cycles indicated that a correlation existed between pilot valve leakage caused by disc-seat erosion and high tailpipe temperature. Therefore, the high tailpipe temperatures were believed to be caused by a leaking pilot valve on the "F" SRV. Similar pilot valve leakage was reported on two SRVs at Pilgrim 1 in late 1981 (Ref. 2), indicating that this is a potentially generic problem.

Initial analysis at Fitzpatrick indicated that two potential concerns existed for SRVs with pilot valve leakage. These were upward safety mode setpoint drift at low leak rates and inoperable safety mode (due to pilot valve erosion) at high leak rates (Ref. 3). The setpoint drift concern was included in an ongoing BWR Owners Group (BWROG) effort on other drift related concerns. At an October 20, 1982 meeting with the BWROG and NRC, Target Rock representatives presented test data indicating that setpoint drift would not occur as a result of pilot valve leakage at leak rates less than 200 pounds per hour (Ref. 4). Accordingly, setpoint drift was eliminated as an area of concern for pilot valve leakage. The impact of high leak rates (above 200 pounds per hour) on SRV safety mode operability was not investigated by the BWROG. Information provided by Target Rock to Fitzpatrick indicated that safety mode operability could be challenged by pilot valve leak rates greater than 200 pounds per hour (Ref. 3).

### Corrective Actions

Plant technical specifications generally imposed on BWRs require an orderly shutdown if one or more SRVs are declared inoperable in the safety mode. However, with the exception of the Pilgrim 1 changes discussed below, plant technical specifications do not require that SRV tailpipe temperatures be routinely monitored nor do they define SRV operability on the basis of tailpipe temperatures. Pilgrim 1 technical specifications were modified after bench testing revealed two SRVs inoperable in the safety mode that were not discovered by routine surveillance testing. The Pilgrim 1 technical specification changes are listed below (Ref. 5).

1. At least one of two SRV tailpipe temperature thermocouples must be operable for each SRV or a shutdown is required within 31 days.
2. For any SRV where indicated temperature is greater than 212°F for over 24 hours: a) perform an engineering evaluation and issue a report justifying continued operation, b) remove the indicated SRV and perform as-found testing at the next shutdown longer than 72 hours, and c) submit the

engineering evaluation to the NRC for approval for power operation longer than 90 days.

3. Test all SRVs as-found for the next two fuel cycles.

Fitzpatrick operated under similar temporary technical specifications after declaring the "F" SRV inoperable due to pilot valve leakage. Permanent technical specification changes were not imposed on Fitzpatrick (unlike Pilgrim 1). However, the licensee committed via letter to follow the previously imposed temporary technical specifications.

As discussed above, the BWROG acted to resolve the drift concern but did not address the safety mode operability issue. Current NRC activities on two-stage SRVs are limited to monitoring the progress of the BWROG program.

### FINDINGS

This evaluation produced the following findings:

1. Fitzpatrick operated at power for several weeks in July 1982 with high pilot valve leakage on one SRV.
2. Pilgrim 1 discovered similar circumstances on two SRVs in late 1981.
3. Existing technical specifications (except at Pilgrim) do not require monitoring of tailpipe temperatures on a routine basis.
4. Pilgrim 1 technical specifications are more restrictive than those imposed on other facilities using two-stage Target Rock SRVs.
5. Existing technical specifications do not require that an SRV be declared inoperable because of identified pilot valve leakage.
6. Pilot valve leakage will not cause SRV safety mode setpoint drift for leak rates less than 200 pounds per hour.
7. SRV safety mode operability is not assured for pilot valve leak rates greater than 200 pounds per hour.

### CONCLUSIONS

The pilot valve leakage found at the Fitzpatrick and Pilgrim 1 plants discussed in this report is of minor safety significance. However, the safety mode operability of Target Rock SRVs with high pilot valve leakage rates is not being adequately addressed. There is no indication that any of the principals involved have work in progress or scheduled on operability of SRVs with high pilot valve leak rates. NRR should consider whether high pilot valve leakage can challenge operability of an SRV in the safety mode. This can be done via several appropriate methods, such as the existing BWROG setpoint drift effort. If this new safety challenge is confirmed, the NRC should quantify allowable pilot valve leakage rates, detection methods, and monitoring requirements in regulatory guidance provided to affected licensees. Several methods are

available for providing this guidance, such as a generic letter, an IE Bulletin, or a generic technical specification modification. Any of the available methods which provides a high degree of assurance for long-term compliance would be acceptable. Regardless of the results of these activities, there is no apparent technical basis for Pilgrim 1 technical specifications to be more rigorous than those imposed on other licensees using Target Rock two-stage SRVs.

REFERENCES

1. Fitzpatrick (Docket 50-333) LER 82-037, Rev. 0
2. Pilgrim 1 (Docket 50-293) LER 81-062, Rev. 1
3. NRC IE Inspection Report No. 50-333/82-15
4. NRC October 20, 1982 Meeting Minutes; issued November 10, 1982;  
Accession No. 8211160068
5. NRC Pilgrim 1 Operating License Amendment No. 56, issued March 20, 1982