REPORT ON MAIN STEAM LINE ISOLATION VALVE TESTING

INTRODUCTION

In accordance with the letter from G. H. Ritter to P. A. Morris dated December 24, 1969, Oyster Creek Unit No. 1 started their scheduled shutdown on January 31, 1970, for the purpose of testing all four main steam isolation valves and to establish conformance with applicable provisions of the Technical Specifications.

This report contains a summary of the test results as well as pertinent observations and recommendations relating to these valves. A testing chronology associated with the main steam isolation valves is also attached to this report as Appendix 1. In addition, Figure 1 shows the main steam line piping schematic.

SUMMARY OF TEST RESULTS

The main steam isolation valves, as they existed after the shutdown on January 31, 1970, leaked to such an extent that the reactor could not be pressurized to 20 psig by the service air system. Based on later measurements, it is estimated that this system can deliver approximately 9000 CFH to the reactor vessel in the manner in which it was piped up. It is believed that the air delivered to the reactor leaked past NS03B and NS04B causing a pressure build up in the down stream steam line and header piping due to an external force on NS03B caused by its hanger support and externally induced stresses on NS04B from its hanger and pedestal support. As the pressure built up in the steam header, the air leaked back through NS04A, which was under similar stresses to those on NS04B. This air flow

SUMMARY OF TEST RESULTS (con't)

path gave an initial indication that air was leaking through NS03A and NS03B into the cavity between valves and out through the flow metering device.

The pressure decay test that was performed on NS03A and NS04A after the valves had cooled down indicated that one of these valves might be tight, since the total leakage measured through both valves was only 20.8 CFH. After minor repair work was completed on NS03B, a leak rate test showed that NS03B was back within the Technical Specification limits at this time.

After lapping the seats on valves NS04A and NS04B, relieving the tension on the hangers attached to each valve operator and relieving the pedestal support loading on NS04A and NS04B valve bodies, a leak rate test showed that all four isolation valves satisfied the Technical Specification leak rate criteria of less than 11.5 CFH at 20 psig test pressure.

The final test results indicated the following leak rates.

NS03A < 0.1 CFH	NS04A < 0.3 CFH
NS03B < 0.1 CFH	NS04B < 0.3 CFH

The above values reflect the minimum sensitivity of our measuring methods.

OBSERVATIONS

1. One rather signigicant observation is that NS03A was in spec when the plant shutdown, giving strong evidence that the valves can perform as required at Oyster Creek Unit No. 1.

2. There is no real indication that the valve leakage observed was due to damaged seating surfaces. This, therefore, causes one to look external to the valve for the source of the problem.

OBSERVATIONS (con't)

There is a strong possibility that excessive hanger tension in the case of NS03B interferred with the valve operator's ability to exert maximum closing force on the valve. In the case of NS04A and B, the possibility exists that the pedestal support caused a slight distortion in the seating surface and that under hot conditions this distortion increased.

RECOMMENDATIONS

In light of the fact that these valves have experienced considerably more operation due to, first, the preoperational testing to satisfy final specification requirements, and secondly, as a result of the start-up test program, one would not logically expect the valve condition to change as drastically or as quickly again. Also, since a real possibility exists that this problem is a result of external influences on the valves, which have been corrected, there is no reason to believe that they will not be in specification at the plant's next refueling outage. This would be the next scheduled testing period for these valves. In the interest of always taking a safe and conservative approach to plant operations, it is out intent to test the valves at the next opportunity, that is, should the plant have to be scheduled for shutdown and cool down any time prior to our first refueling outage, the MSIV would be retested in order to increase our confidence in their ability to meet their operating requirements.

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APPENDIX 1

CHRONOLOGY - MAIN STEAM LINE ISOLATION VALVE TESTING

February 1 (Sunday - PM)

Reactor Conditions: Reactor Shutdown, All Rods Inserted

Vessel Level: 120 Inches

Vessel Water Temperature: 140° F.

Vessel Flange Temperature: 205° F.

Air was supplied to the vessel through the head cooling line from the service air system. With the two outside MSIV's closed and the inner valves open, it was possible after one hour to pressurize the system to approximately 1 psig. The inside valves were closed and the air flow continued. One hour later the reactor pressure had increased to 2 psig. With the reactor pressure at approximately 1.5 psig, a leakage rate of 18 CFH was measured between each set of valves (Note: Later flow tests showed that the bubbler in the flow measuring circuit was acting as a flow restricter at this time).

Next, at the suggestion of Mr. Boyd Brooks (General Electric representative), an attempt was made to pressurize between the isolation valves. No water leg was established on the inner valves at this time. With a 55 CFH air flow supplied between the A set (north) MSIV, the pressure increased to 4.6 psig. On the B (south) line, no pressure build up was obtained after supplying the 240 CFH for approximately 15 minutes.

February 2 (Monday -AM)

A final attempt was made to pressurize the reactor with all MSIV's closed. After approximately 3 hours, the reactor pressure had reached 4 to 5

APPENDIX 1 (con't)

psig. In order to check the warm-up bypass valves (V-106 and V-107) for leakage, V-110 was dismantled. A steady air flow was found coming from the downsteam side of the MSIV and both V-106 and -107 were determined to be tight. About this time, it was discovered that the steam header drain was open. Upon closing this valve, the reactor pressure built up to approximately 6 psig and indicated continuing buildup. Based on this information, it was decided to begin with the disassembly of NS03B.

Maintenance Observations - NS03B

After dismantling the valve, the valve seat, valve poppet and pilot valve were checked for damage. A lapping tool was placed against the body seat and lightly rubbed with fine compound. The seat was then checked and found to be true. The valve poppet was chucked in a lathe and the seat dial indicated the poppet seating to be true so it was then cleaned and polished. The pilot valve seat was checked with blueing and found to be true. Finally, the valve seat to body seal weld was dye penetrant inspected and no indications were found.

After the valve was reassembled, the support hanger was measured for an indication of how far the valve operator dropped when the hanger was released. The estimated drop in height was 3/4 inches, which was three times as large as the change in the other valves.

An attempt was again made to pressurize between the A line valves. The valve body was now cool to the touch. It was possible to pressurize to 20 psig and test the valves with air (pressure - no water seal) on the upsteam side of the inner valve. Based on pressure decay data, a leak rate of 20.8 CFH was indicated.

APPENDIX 1 (con't)

February 3 (Tuesday - AM)

John Festa, the Atwood-Morrill representative, said that the valves were designed to operate without control mechanism supports. He indicated that the support hangers might be causing some binding in the valve operator thereby reducing its effectiveness in closing the valve. Leak rate tests were done on the A line valves (NS03A and NS04A) with and without hanger supports. Just prior to removing the hangers, the leak rate was 21.8 CFH. When the hangers were released, NS03A dropped 1/4 inch, NS04A 1/8 inch and NS04B 1/4 inch. NS03A and NS04A were cycled twice, and a leak rate between them resulted in 17.5 CFH. This was not considered a great change from earlier measurements. After the hanger was released from NS04B, it appeared to travel more freely.

February 4 (Wednesday - AM)

After reassembling NS03B, the reactor was pressurized to 20 psig. No inner valve leakage was observed based upon monitoring a bubbler set up for 15 minutes. The reactor water level was raised with NS03A and NS03B closed to flood the lines. A pressure decay test was done on NS04A resulting in a 23.0 CFH leak rate. A soap test showed leakage all around the NS04A bonnet. An attempt was made to pressurize between NS03B and NS04B. No pressure build up could be obtained (Note: this might void the tightness results obtained on NS03B due to the test assumption that all leakage through this valve is measured by way of the drain line and negligible air leaks through the outside valve).

February 5 (Thursday)

NS04B was disassembled and one side of pedestal support bracket

was ground free on each of the outside valves (NS04A and NS04B).

Maintenance Observations - NS04B

The valve seat was out of round but did not appear to be physically damaged. After a considerable amount of lapping, the valve seat was ground true. The seat to body seal weld was dye penetrant inspected and no indications found.

The valve poppet was found to be concentric by the use of a preformed tool, but the poppet cylinder was found to be badly galled. It was repaired by stoning and polishing the cylinder.

The valve stem was placed between centers in a lathe and indicated 0.055" total indicator run out. Some scoring had to be cleaned off the stem.

The pilot valve seat was lightly lapped to make it true. The valve was reassembled with a new bonnet gasket and a repacked stem.

The removal of the support hanger resulted in a 1/4 inch drop in the valve operator.

February 7 (Saturday - PM)

Valve NS04B was reassembled and a pressure decay test conducted without water against the inner valve, indicated a leak rate of 0.5 CFH. Valve NS04A was disassembled.

Maintenance Observations - NS04A

The valve seat was out of round but did not appear to be physically damaged. After a considerable amount of lapping, the valve seat was ground true. The seat to body weld was dye penetrant inspected and no indications

were found.

The valve poppet was found to be concentric by the use of a preformed tool. The poppet cylinder was not marked.

The valve stem was placed between centers in a lathe and indicated 0.050" total indicator run out. Some scoring had to be cleaned off the stem.

The pilot seat was checked and found to be true.

The valve was reassembled with a new bonnet gasket and a repacked stem.

The removal of the support hanger resulted in a 1/8 inch drop in the valve operator.

It was not found necessary to work on valve NS03A.

February 8 (Sunday - PM)

Finished reassembling NS04A. Pressure decay tests between valves indicated no measurable leakage on the B line and a 1CFH leak rate on the A line without water against the inner valves. The reactor vessel was pressurized to 20 psig, and no leakage was detected from the inner valves by the bubbler method over a 15 minute observation period.

February 9 (Monday - PM)

In accordance with instructions from the regional compliance office, Mr. Caphton was called and notified that the main steam isolation valves were going to be tested for record. Mr. Caphton indicated he was not coming down to witness the test as originally planned. Final testing commenced in the afternoon. The reactor was pressurized to 20 psig with air, all four isolation valves closed. A manometer and bubbler were set up and tied into the system at the location shown on Figure 1. No change in manometer readings

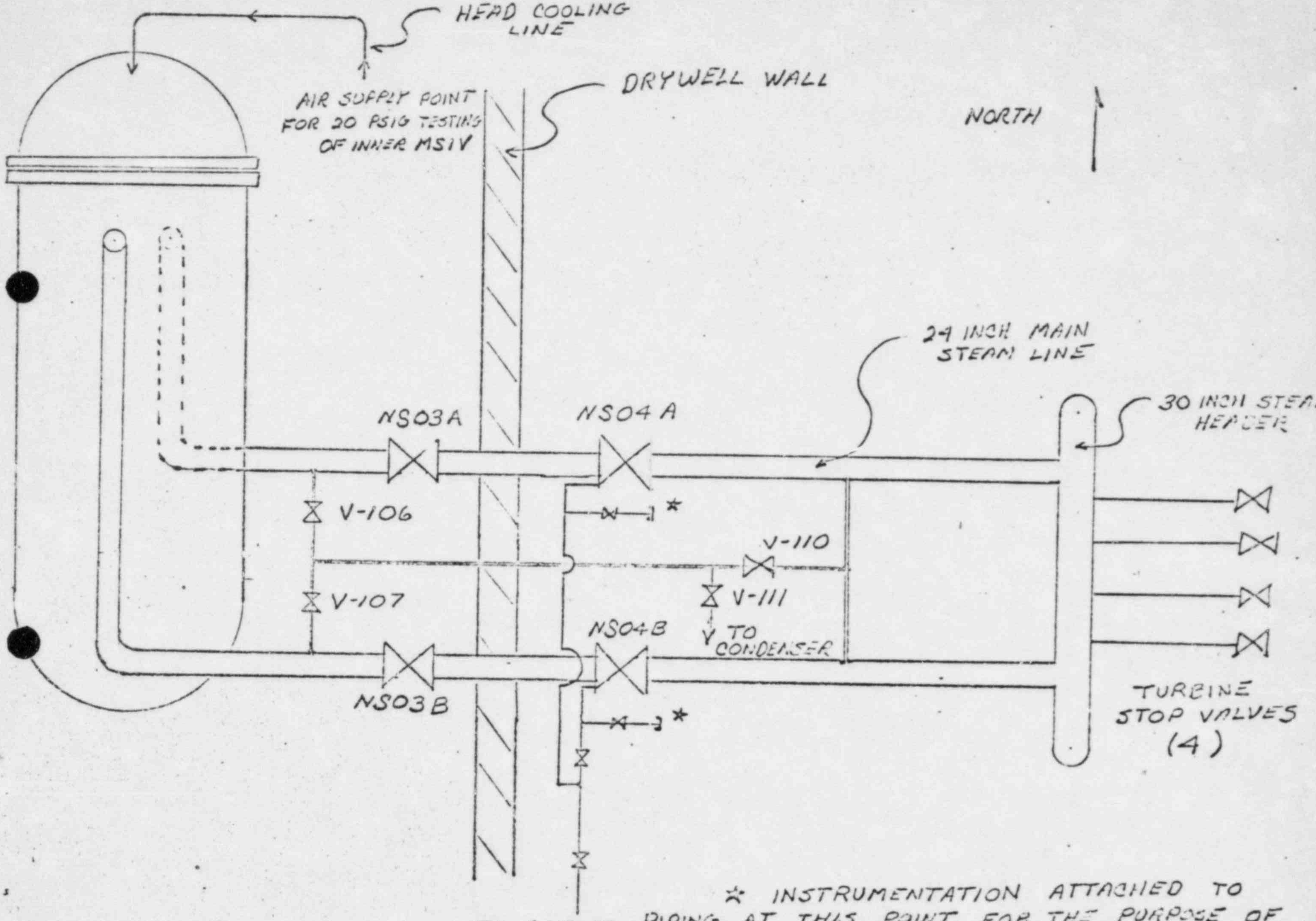
and no bubbles were detected after monitoring for one hour. Next, the reactor was vented and the steam lines from the vessel to NS04A and NS04B were flooded with water. The volume between the isolation valves was pressurized to approximately 21 psig. This pressure was monitored for one hour without detecting any change. The following leak rates are based on the minimum sensitivities of the measuring systems.

NS03A < 0.1 CFH

NS04A < 0.3 CFH

NS03B < 0.1 CFH

NS04B < 0.3 CFH



* INSTRUMENTATION ATTACHED TO PIPING AT THIS POINT FOR THE PURPOSE OF VALVE LEAKRATE MEASURMENTS