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SUBJECT: Special rept:on 930726,offgas recombiner trains A & B isolated on low flow shortly after valving in steam to SJAE B.Suspects isolation caused by passing slug of water from SJAE B train.Operating Procedure N2-OP-9 will be revised.

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NIAGARA MOHAWK

NINE MILE POINT—UNIT 2/P.O. BOX 63, LYCOMING, NY 13093

John H. Mueller
Plant Manager-Unit 2
Nuclear Generation

September 1, 1993
NMP88389

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

RE: Nine Mile Point Unit 2
Docket No. 50-410
NPF-69

Subject: ***Special Report***

Gentlemen:

In accordance with Nine Mile Point Unit 2 (NMP2) Technical Specification 3.11.2.4, "Gaseous Radwaste Treatment System," ACTION Statement (a.), Niagara Mohawk Power Corporation is submitting the following Special Report concerning the discharge of main condenser Offgas without treatment for greater than 7 days.

Event Description

On July 26, 1993, operators were shifting from the "A" Steam Jet Air Ejectors (SJAE) to the "B" SJAE to perform maintenance on a steam valve in the "A" SJAE train. At 0453 hours, shortly after valving in steam to the "B" SJAE, both the "A" and "B" Offgas (OFG) recombiner trains isolated on low flow, causing main condenser vacuum to degrade. It is suspected that the isolation was due to a passing slug of water from the "B" SJAE train. It appears that the slug of water quenched the recombiner catalyst in both trains and OFG hydrogen/oxygen recombiner temperatures dropped below 260 degrees Fahrenheit at which point recombination ceased. At this point, operators secured steam to the "B" SJAE. At 0459 hours, operators unisolated the "A" and "B" OFG trains to mitigate the degrading condenser vacuum condition. After unisolating the OFG system, operators reported hearing a loud bang from the charcoal adsorber area. The cause for the noise could not be identified and no immediate abnormalities were observed. By 0530 hours, main condenser vacuum and the OFG system parameters had stabilized.

Between 0800 and 2200 hours on July 26, 1993, the temperatures for the first two charcoal adsorber beds in each adsorber train (1A and 1E - see attached drawing) rose from a nominal 60 to 70 degrees Fahrenheit to 99 and 121 degrees Fahrenheit, respectively. At 2200 hours, operators investigating the temperature rise in the 1A and 1E charcoal beds found the vessel shell at the top of the 1A and 1E beds very warm to the touch. At 0200 hours on July 27, 1993, charcoal vessel top temperatures were measured at 250 degrees Fahrenheit for bed 1A and 286 degrees

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Fahrenheit for bed 1E. At this time, Niagara Mohawk Power Corporation (NMPC) contacted an industry expert on OFG systems with specific knowledge of the NMP2 system and received feedback on possible causes. With the present parameters, the possible causes were a charcoal fire or an exothermic water-charcoal reaction. The decision was made to commence a power reduction and by 0740 hours that morning the charcoal adsorbers were bypassed. Technical Specification Limiting Conditions for Operation (LCO) 3.11.2.4 was entered due to the release of untreated SJAE exhaust. Also at this time, temporary modifications and procedure changes were being developed to confirm whether a fire existed and to extinguish it.

At 2015 hours on July 27, 1993, Offgas process flow was initiated via a temporary bypass line, which allowed the charcoal adsorbers to be fully isolated. It was decided that the charcoal beds would be purged with nitrogen gas and on July 28, 1993, a temporary nitrogen purge header and nitrogen gas supply were connected to the charcoal adsorbers. Also, a carbon monoxide (CO) monitor was installed to determine whether the charcoal bed had ignited. At 0100 hours on July 29, 1993, the nitrogen purge was initiated and CO levels were measured at greater than 2,000 parts per million (ppm). The CO level confirmed that a fire had occurred and as the nitrogen purge continued, charcoal bed shell temperatures began dropping.

On August 2, 1993, CO levels in the 1A and 1E charcoal beds were less than 5 ppm. The 100 percent nitrogen purge was modified to a 20 percent air/80 percent nitrogen mixture. Within two hours the CO levels in the 1E charcoal bed were 100 ppm and rising. The 1E charcoal bed was inerted with pure nitrogen and isolated. The CO levels in the 1A charcoal bed were 0 ppm and remained less than 10 ppm as the air dilution continued.

At 0740 hours on August 3, 1993, the OFG charcoal adsorbers had been bypassed for seven days. Because main condenser air ejector exhaust had been discharged for greater than 7 days without treatment, Technical Specification 3.11.2.4 ACTION Statement (a.) requires submission of this Special Report to the U.S. Nuclear Regulatory Commission within 30 days.

At 1900 hours on August 3, 1993, the purge of the 1A charcoal bed was modified to 50 percent air/50 percent nitrogen. CO levels remained less than 10 ppm, and at 0800 hours on August 4, 1993, the 1A charcoal bed was purged with 100 percent air. CO levels still remained below 10 ppm, indicating a readiness for return to service. The nitrogen purge was recommenced on the 1E charcoal bed.

At 1000 hours on August 5, 1993, the "A" train charcoal adsorber was returned to service, treating the OFG system process flow. Because of the continued offnormal OFG system line-up, the Technical Specification LCO was not exited at this time even though OFG process flow was being treated. OFG process flow was discharged untreated for 9 days 2 hours and 20 minutes.

At 0800 hours on August 9, 1993, the 100 percent nitrogen purge on the 1E charcoal bed was modified to 20 percent air/80 percent nitrogen and CO levels remained below 5 ppm. At 1400 hours, the mixture was increased to 50 percent air/50 percent

nitrogen and at 1900 hours the 1E bed was purged with 100 percent air. The CO levels remained below 5 ppm and at 0900 hours on August 10, 1993, the air purge was secured.

On August 13, 1993 at 1345 hours, the "B" charcoal adsorber train was returned to service and Technical Specification LCO 3.11.2.4 was exited.

Cause of Event

The OFG system process flow was discharged without treatment because the charcoal adsorbers required isolation and bypassing in order to extinguish the fire in the 1A and 1E charcoal beds. The cause of the fire was determined to be a hydrogen deflagration igniting charcoal in the 1A and 1E beds. When the "B" SJAE train was started, a slug of water quenched the Offgas hydrogen recombiners and caused a low flow isolation. These two events allowed excessive hydrogen to accumulate downstream of the recombiners. When flow was restored, the hydrogen deflagration occurred. The root cause has been determined to be inadequate implementation of previous industry experience.

The recommendation of General Electric Service Information Letters (GE SILs) 150 and 497 were not adequately evaluated and implemented. These documents discussed industry experience and methods to ensure the SJAEs were properly manipulated to prevent Offgas charcoal train hydrogen detonation. Because industry experience was not properly implemented, precautionary actions to prevent this event were not incorporated into the NMP2 Operating Procedures.

Actions to Prevent Recurrence

The following corrective actions to prevent recurrence are presently completed or planned:

- The Deviation/Event Reporting (DER) process implemented in April of 1991 provides a vehicle for management to assure the appropriate evaluation and implementation of corrective actions based upon the review of industry operating experience. The original industry event review process had a non-technical individual review the event and gather the technical information. The DER process, however, places the technical review with the department most involved with the details of the event. With this present review method in place, an inadequate review is much less likely to occur.

- Presently, NMPC's Safety Assessment Department reviews past industry event evaluations based upon recurring significant events identified by the Institute for Nuclear Power Operations (INPO). This self-assessment will help identify any other inadequately implemented industry experience.

- Operating Procedure N2-OP-9, "Condenser Air Removal," will be revised to have the SJAE intercondenser drains open at all times and to require the pre-cooler drains to be opened prior to placing the SJAE in service. The procedure will also be revised to ensure the OFG system is placed in startup when shifting SJAEs to prevent low flow isolations.

- Operating Procedure N2-OP-42, "Offgas System," will be revised to require the OFG system be in startup when shifting SJAEs to ensure dilution flow is not isolated. Also, steps to monitor hydrogen/oxygen recombiner temperatures during OFG manipulations will also be added to these procedures. Lastly, a precaution will be added such that adsorber temperatures of greater than 100 degrees Fahrenheit will be considered an indication of a charcoal fire.

- A Lessons Learned Transmittal will be issued to communicate the specifics of this event to the appropriate site personnel.

- The details of this event will be included in the operators' continuing training program.

Very truly yours,

John H. Mueller
Plant Manager - NMP2

JHM/RLM/lmc

xc: Mr. Thomas T. Martin, Regional Administrator, Region I
Mr. Wayne L. Schmidt, Senior Resident Inspector

ATTACHMENT 1