U.S NUCLEAR REGULATORY COMMISSION
REGION I

DOCKET/REPORT NOS. 50-220/93-05
50-410/93-05

LICENSE NOS. DRP-63
NPF-69

LICENSEE: Niagara Mohawk Power Corporation
301 Plainfield Road
Syracuse, New York 13212

FACILITY NAME: Nine Mile Point Nuclear Station, Units 1 and 2

INSPECTION AT: Scriba, New York

INSPECTION DATES: March 29 - April 2, 1993

INSPECTORS: A. L. Della Greca — 5/14/93
A. L. Della Greca, Sr. Reactor Engineer — Date
Engineering Branch, DRS

A. L. Della Greca / LMK — 5/14/93
L. M. Kay, Reactor Engineer, Engineering Branch, DRS — Date

APPROVED BY: W. H. Ruland — 6/2/93
W. H. Ruland, Chief, Electrical Section — Date
Engineering Branch, DRS

Areas Inspected: Routine, announced safety inspection to review the quality of the instrument air supplied to safety-related components and to follow-up on corrective actions performed by the licensee to resolve previously identified issues.

Results: The inspectors' evaluation of the instrument air systems of both Units identified no areas of concern at Unit 2, but identified two areas which need further evaluation and appropriate action by the licensee at Unit 1. These include control of as-built documents and allowable size of contaminant particles. Corrective actions for two previously identified issues were reviewed and found acceptable.

DETAILS

1.0 INSTRUMENT AIR SYSTEM

1.1 Introduction

The results of NRC operating nuclear power plant studies in NUREG-1275, "Operating Experience Feedback Report-Air Systems Problems," indicated that the performance of air-operated safety-related components may not be in accordance with their intended safety function due to inadequacies of the instrument air system. The inadequacies show up in the design, installation and maintenance of the instrument air system. As a result of the operating experience feedback, the NRC issued Generic Letter 88-14 titled, "Instrument Air Supply System Problems Affecting Safety-Related Equipment." This letter requested the licensees to perform a design and operations verification of the instrument air system.

Niagara Mohawk Power Corporation (NMPC) completed and provided a plan and schedule to address the NRC request for the Nine Mile Point Nuclear Station, Units 1 and 2 (NMP1 and NMP2). The NRC acknowledged NMPC's certification.

1.2 System Description

The NMP1 and NMP2 instrument air systems are designed to be available under all operating conditions, but are not essential to emergency reactor shutdown, containment isolation, reactor core cooling, or containment heat removal. Most air-operated equipment connected to the instrument air supply required to support emergency operating conditions are designed to fail in a safe position, in the event of loss of instrument air. At NMP1, the critical portions of the system are considered to be safety-related with air supplied by a 2000 ft^3 air receiver, normally used for containment spray system testing. This receiver has sufficient capacity to support instrument air demand for at least fifteen minutes. Redundant air compressors, supplied by emergency power, can be manually restarted after an accident. The capability of shutting down the plant, in the event of instrument air failure, was analyzed in Chapter XV of the FSAR, section 3.22. At NMP2, the pneumatic demand for safety-related components required to operate following an accident is met by safety-related accumulators capable of supplying the required quantities of air. For the automatic depressurization system, the pneumatic supply is derived from the safety-related nitrogen system.

The NMP1 instrument air system consists of three oil-free compressors with intercoolers and aftercoolers, moisture separators, air receivers, air dryers with bypass capability, and dual final stage particle filters. The system also includes a cross-connection to the conventional plant air system to automatically inject service air at a point upstream of the dryers and particle filters, if the instrument air system pressure drops below 90 psig. A check valve is provided to prevent reverse flow. The system air demands are normally met by the largest

of the three compressors, rated for 729 standard cubic feet per minute (scfm). The other two compressors, 485 scfm each, are considered as safety-related. They are on standby duty and actuate on dropping system pressure.

The NMP2 instrument air system is not safety-related and is supplied by three oil-air compressor assemblies, consisting of an intercooler, an aftercooler and a receiver tank, connected in parallel trains to a common discharge header. Drying, filtering, and storage is provided downstream of the discharge header by two refrigerant-type driers with pre-filters and after-filters and a 250 ft^3 air receiver tank. The discharge header also supplies compressed air to the service air systems, but the branch is automatically isolated if the header gage pressure drops below 85 pounds per square inch (psig). Each compressor is capable of providing the required instrument air and can be selected for lead, lag, or standby operation. Lag and standby compressors are automatically initiated on dropping pressure. Safety and nonsafety-related instrument and control components located inside the primary containment are independently supplied with instrument air quality nitrogen gas from the nitrogen system.

1.3 Purpose and Scope

The subject inspection was conducted to verify that the design, installation, testing, operation, maintenance of the NMP1 and NMP2 instrument air system, as well as personnel training, met the intent of Generic Letter 88-14. For this purpose, the inspectors reviewed selected design and operation documents. These included FSARs and drawings; surveillance, test, calibration, and maintenance procedures; in-service valve testing; normal/off-normal operating procedures; alarm procedures; training lesson plans; operator qualification program; maintenance history; LERs; and reports and letters. The documentation was used to determine air quality requirements, design adequacy, requirements for safety-related components supplied by the instrument air system, adequacy of air sampling and control, and adequacy of operations and maintenance personnel training. The inspection also included a review of the installed instrument air equipment and interviews of the engineering, operations, maintenance, and training staff. The details of this portion of the inspection are described in the paragraphs below.

1.4 Air Quality

Air quality limits have been established to preclude malfunctions of equipment supplied by air systems. The materials and small clearances of internal moving parts of pneumatic equipment require clean, dry, and oil-free air for reliable system operation. The acceptable level of contamination at which pneumatic equipment performance degrades or fails is dependent on the equipment design specifications. The American National Standard Institute (ANSI) has established standard ISA-S7.3-1975 to specify requirements for dew point, oil or hydrocarbon content, and particle size within air systems. These requirements assure high quality instrument air for safety-related and nonsafety-related equipment.

At Nine Mile Point Units 1 and 2, the sampling of the instrument air system is performed by the chemistry department on a quarterly basis. Procedures N1-CTP-091, Revision 2, and N2-CTP-IAS-Q633, Revision 1, specify the acceptance criteria and sample areas for Unit 1 and Unit 2, respectively. The inspectors reviewed the installed design and completed surveillance tests of air quality samples for both units. Results of these reviews are discussed in the following three sections.

1.4.1 Dew Point Requirements

Instrument air system dew point requirements and monitoring acceptance criteria are the same for both units at Nine Mile Point. Dew point requirements, specified in terms of a minimum temperature to which the system is subjected, were defined in the individual instrument air design basis documents and appropriately reflected in the surveillance procedures for sampling of the system. The dew point temperature used by the licensee (35°F at line pressure) was consistent with the one specified in ANSI Standard ISA-S7.3 for instrument air systems that are contained completely indoors. This temperature is a value at which water vapors condense and should be at least 18°F below the minimum temperature to which any part of the system may be exposed at any season of the year. The inspector compared the minimum temperatures presented in the FSAR for the buildings housing the instrument air systems with the minimum temperature requirement for which the system may be exposed. No discrepancies were identified.

Dew point was sampled and analyzed from six locations at Unit 1 and four locations at Unit 2. The inspectors' review of dew point test results indicated no accumulation of moisture in the instrument air system. The inspectors also noted that the calibration of the hygrometer used to measure dew point was verified prior to each sampling.

1.4.2 Particle Size Requirements and Monitoring

The chemistry technical procedures for instrument air sampling and analysis, Nos. N1-CTP-0921 and N2-CTP-IAS-0633, for NMP1 and NMP2 respectively, specify an acceptance of particle sizes of up to 40 microns entrained in the system. This value exceeds the 3 microns maximum size specified in the NMP1 FSAR and in the ANSI standard invoked by the NMP2 FSAR.

Discussions with the licensee regarding the particulate size discrepancies determined that reviews performed in response to an industry operating experience report, for Unit 1, and a 10 CFR 50.59 safety evaluation, for Unit 2, had resolved instrument air quality needs for safety-related components and found particulates of up to 40 microns to be acceptable and not detrimental to the pneumatic equipment. The inspectors also determined that the acceptability of 40 micron particles already had been reflected in the NMP2 system design

basis document (SDBD) and that an FSAR change request had been prepared. However, section 2.2.2.3 of the NMP1 SDBD did not clearly specify the acceptability of the 40 micron particles. Instead, the issue was considered to be an open item (OI-506-S029).

The inspector identified one additional discrepancy in the NMP1 SDBD regarding filter size. According to Tables 3.4-26 and -27, the mesh size specified for the filters at the outlet of instrument air dryers No. 11 and No. 12 was 5 microns and 5 to 10 microns, respectively. The equivalency of 5 microns to the FSAR requirement (3 microns) had been justified in the licensee's response to the Generic Letter 88-14, but not the acceptability of 10 microns.

The acceptability of the filter used with air drier No. 12 and the adequacy of the acceptance criteria for particulate size in the surveillance procedures are unresolved pending full evaluation by the licensee and appropriate revision of design, testing, and licensing documents (Unresolved Item 50-220/93-05-01).

The FSARs of both units require that particle sampling be done on an annual basis. The inspectors review of licensee records revealed that the instrument air system was tested for particulate contamination every three months at various system locations.

1.4.3 Hydrocarbon Content Requirement and Monitoring

As found in the design basis documents of both units, the maximum amount of oil or hydrocarbons in the system should not exceed one part per million (ppm). This requirement was found to be consistent with the ANSI standard. The licensee's acceptance criterion for hydrocarbons and oil sampling was less than one ppm.

The Nine Mile Point 1 and 2 instrument air systems are sampled and tested for hydrocarbons on a quarterly basis, in lieu of the FSAR commitment to sample annually. A review of test results indicated that the hydrocarbon content had not exceeded the established maximum requirements. The inspectors had no further questions in this area.

1.5 Filter Replacement

The licensee's preventive maintenance procedures for the instrument air equipment were reviewed. The inspectors determined that the requirements for filter inspections and necessary replacements were incorporated into the preventive maintenance procedures. These filter inspections were performed on a regular basis and in addition to the monitoring of differential pressure across the filters. High differential pressure measurements of several filters, indicative of particulate build-up, are annunciated in the control rooms.

1.6 Availability of Alternate Air Supplies

The inspectors reviewed the adequacy of the back-up air supplies for the safety-related components that are required to operate following an accident. As indicated above, the Unit 1 instrument air system is considered safety-related and the licensee relies on the large containment spray system tank to support the post-accident needs. For Unit 2, accumulators were provided.

No areas of concern were identified regarding sizing and surveillance testing of the Unit 2 alternate supplies. However, for Unit 1, the inspectors expressed a concern that a failure of the nonsafety-related service air system might cause the automatic valve between this system and the safety-related instrument air system to open on a dropping pressure and result in the loss of the stored air supply. Discussions with the licensee indicated that the scenario already had been addressed by Deviation/Event Report No. 1-92-3926. The analysis showed that a passive failure of nonsafety-related piping, resulting from a seismic event concurrent with a loss of coolant accident, was not credible and outside the original design basis of the plant. The capability of the plant achieving and maintaining a safe shutdown condition, in the event of a loss of air during plant operation, had been evaluated in section 3.20 of Appendix E of the original FSAR (current section XV - 3.22). A similar issue, acceptability of nonsafety-related loads on the safety-related instrument air system, was last evaluated on December 14, 1989, in Safety Evaluation No. 89-037. This evaluation also concluded that safe shutdown of the unit would be achieved with nonsafety-related loads being supplied by the safety-related instrument air system. Consequences of a complete loss of instrument air under full power operation and post-accident conditions were originally addressed in response to NRC question 5, supplement 4, in 1968 of the preliminary safety analysis report (PSAR).

Discussions with the licensee also indicated that they were planning further enhancements to the system. The planned modifications would downgrade a portion of the system, but enhance the reliability of critical components by installing safety-related pneumatic accumulators. These enhancements are the result of studies conducted in conjunction with the system design basis reconstitution program and of commitments made in response to Generic Letter 88-14. Installation of modifications is currently scheduled for the next refueling outage (RFO-13). The inspectors had no further concerns in this area.

1.7 Safety-Related Valve Failure Positions

Generic letter 88-14 requested that an analysis be performed of the failure positions of components on loss of instrument air, and that the failure positions be verified as correct in ensuring the required safety functions.

A review of the system design basis documents for both plants showed that the failure position of automatic valves had been identified and evaluated. A failure mode and effects analysis was also provided. Failure positions were verified during preoperational tests. Operability of the safety-related valves is regularly verified as part of the in-service inspection program or as part of the period surveillance testing. No concerns were identified in this area.

1.8 Design Discrepancies

The inspectors' review of the NMP1 system design basis document, SDBD-506, showed that the system reconstitution effort had identified numerous discrepancies. These discrepancies had been summarized as open items in Appendix C of the SDBD. A detailed evaluation was performed by the licensee of the listed items and determined that the majority involved drawing discrepancies resulting from lack of or inadequate translation of construction drawings and data into design documents. Many items involved nonsafety-related components and most drawing discrepancies had been resolved through walkdowns conducted prior to and during the last refueling outage (RFO-12). The items, whether involving analyses or specific corrective actions, had been evaluated, assigned priorities, and were being processed according to design basis reconstitution guideline No. DBRG-012, DBR Discrepancy Evaluation Guideline.

No specific safety significant issues were identified during the current review, but the verification process was still ongoing and several issues listed in the SDBD Appendix C were still open. Correctness of design documentation is important to the proper operation of the system under all plant modes and for the correct response to abnormal events. The importance of having up-to-date system drawings available to plant operations was also discussed in an NRC letter, dated March 23, 1993, responding to the licensee's letter of February 17, 1993. In this letter, NMPC had informed the NRC of the current schedule for completing Phases II and III of the NMP1 instrument air system activities and provided December 31, 1994, as a date for updating or developing required system drawings. The letter had also identified the end of RFO-13 as the schedule for evaluating the operators capabilities to respond to a total/partial loss of instrument air in a timely manner. The NRC found the schedule for completing these two items unacceptable in the SER and requested that it be reevaluated. In view of the above, the adequacy of the instrument air design documentation is unresolved pending completion of corrective actions by the licensee (Unresolved Item 50-220/93-05-02).

1.9 Training

The inspectors reviewed the instrument air system lesson plans for licensed and non-licensed operators and special operating procedures, including simulator scenarios involving loss of instrument air, for licensed operators. The learning objectives presented in the lesson plans addressed system indications, operation and purpose of components.

The inspectors considered the lesson plans to contain a good level of detail and to be presented in a logical sequence. The significance of a loss of instrument air and the potential for contaminants to result in the common mode failure of plant equipment were stressed. The lesson plans also included class exercises involving evaluation and discussion of industry events and their applicability to the Nine Mile Point station.

Based on this review, the inspectors concluded that the licensee had adequately established training materials for plant operators and that lesson plan content was consistent with each unit licensing basis. The inspectors had no further questions in this area.

1.10 Operations

The standard operating procedures, the off-normal operating procedures and the alarm response procedures associated with the instrument air system were reviewed for technical adequacy and were found acceptable. Interviews of licensed reactor operators showed that they had adequate knowledge of the instrument air system and of the actions required in response to a loss of instrument air. The inspectors had no further questions in this area.

2.0 STATUS OF PREVIOUSLY IDENTIFIED ITEMS

(Closed) Unresolved Item (50-220/92-18-01) Pertaining to Licensee Identified Instrument Air Open Items

During a July/August 1992 safety inspection of the instrument air system, the NRC reviewed the licensee's response to Generic Letter 88-14 and the 29 open items that had been generated as a result of the system reconstitution effort. Based on the information submitted to the NRC, four of the 29 items identified by the licensee appeared to be significant and were considered to have a potential impact on the operation and testing of the system. These items were identified as OI-506-S020 (lack of design basis information for safety relief valve set points), -S021 (unable to determine cooling water requirements for instrument air compressor), -S022 (pipe and pipe support design loads and stress analyses do not exist), and -S027 (lack of analysis of the instrument air capability under a 50% duty cycle).

To address these issues, a deviation/event report, DER No. 1-92-3738 was initiated by Niagara Mohawk. Closure of the DER involved a review of all observation and design discrepancies by the evaluation engineer and by the discipline safety evaluation review team engineer. The four items identified by the NRC as potentially significant were closed by the licensee as follows: item -S021 was closed, based on information obtained from the equipment vendor; items -S022 and -S027 were closed because of the previous decision of downgrading the instrument air system to nonsafety-related (with appropriate design modifications); and item -S020 was considered closed on the basis that system pressure relief valve setpoints would be evaluated as part of the ongoing instrument setpoint program. The

the ongoing instrument setpoint program. The licensee's resolution of the issues considered their safety significance, current and original design requirements, and system licensing basis. This item is closed based on licensee evaluations and proposed corrective actions and NRC review and acceptability of issue resolutions.

3.0 PREVIOUSLY IDENTIFIED INCIDENT INVESTIGATION TEAM (IIT) CONCERNS

On August 13, 1991, the NMP2 main transformer failed, resulting in degraded voltage and a simultaneous loss of five nonsafety-related uninterruptible power supplies (UPS). Following this event, the NRC dispatched an Incident Investigation Team to identify the event probable causes. The IIT findings and conclusions were published in NUREG-1455, on October 19, 1991. Most of the licensee's corrective actions to address the concerns identified in the IIT report were reviewed by the NRC previously in inspection report 50-410/92-21 and 92-27 and found acceptable. One remaining issue, pertaining to the licensee's resolution of an action required by IE Bulletin 79-27, was reviewed during the current inspection.

Action 2 of Bulletin 79-27 required the development of emergency procedures to be used by the operators in response to a loss of power to each Class 1E and non-Class 1E bus supplying power to safety and nonsafety-related instrument and control systems. As stated in section 6.1.3 of the NUREG, the licensee deferred action on this requirement because of the prelicensing status of the plant at the time of the original response to the bulletin. A failure modes and effects analysis, addressing the loss of any single bus, had recognized the importance of the uninterruptible power supplies, but no procedural improvements were made that could have enhanced operators' performance, following the loss of five UPS buses.

The licensee's re-review of the plant procedures for mitigating the effects of loss of power was completed in December 1992, in conjunction with their development of station blackout procedures. Inspector review of these system operating procedures, N2-SOP-01, -02, and -03, showed that the review had been completed. Inspector review revealed no technical concerns. Therefore, this issue is closed.

4.0 UNRESOLVED ITEMS

Unresolved Items are matters about which additional information is necessary to determine whether they are acceptable or they constitute a violation. Two unresolved items are discussed in detail under sections 1.4.2 and 1.8.

5.0 EXIT MEETING

The inspectors met with the licensee's personnel denoted in Attachment 1 of this report at the conclusion of the inspection period, on April 2, 1993. At that time, the scope of the inspection and the inspection results were summarized. The licensee concurred with the inspection findings.

Attachment: Persons Contacted

ATTACHMENT 1

PERSONS CONTACTED

Niagara Mohawk Power Company

* P. Collins	Technical Support, Unit 1
R. Cover	Operations Support General Supervisor. Unit 1
* K. Dahlberg	Plant Manager, Unit 1
R. Deuvall	Mechanical Design Supervisor, Unit 2
* L. Fletcher	System Engineering
P. Francisco	Design Basis Reconstitution Supervisor
* M. J. Friedman	Mechanical Design, Unit 1
J. H. Harvey	Mechanical Design, Unit 1
D. Hawretty	Project Engineer, Unit 2
* D. A. Kazyaka	IAS System Engineer, Unit 2
T. Key	Operations Training, Unit 1
R. Kittelsen	Mechanical Design Engineer
* T. Lee	Mechanical Design Supervisor, Unit 1
J. Loveland	Design Basis Reconstitution Lead Engineer
* T. McCarthy	Lead System Engineer, Unit 2
R. T. Norway	ISEG
* R. Olek	Design Basis Reconstitution, Unit 1
* J. T. Pavel	Licensing
* K. Sweet	Technical Support Manager, Unit 1
* M. M. Tadjalli	Plant Evaluation
J. Toothaker	Operations Training, Unit 2
L. A. Vavra	MAB, Inc.

* Indicates personnel present at the exit meeting of April 2, 1993.