U.S. NUCLEAR REGULATORY COMMISSION
REGION I

Report No. 50-220/84-14

Docket No. 50-220

License No. DPR-63 Priority - Category C

Licensee: Niagara Mohawk

Facility Name: Nine Mile Point Unit 1

Inspection At: Scriba, New York

Inspection Conducted: July 30 - August 3, 1984

Inspectors: Marie Miller — Oct. 15, 1984 (date)
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Marie Miller for — 10-15-84 (date)
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Inspection Summary:
Inspection on July 30 - August 3, 1984 (Report No. 50-220/84-14)

Areas Inspected: Special, announced safety inspection of the licensee's implementation and status of the following task actions identified in NUREG-0737: Post-accident sampling of reactor coolant and containment atmosphere; increased range radiation monitors; post-accident effluent monitoring; containment radiation monitoring; and in-plant radioiodine measurements. The inspection involved 214 hours on site by four region-based inspectors and two contractors from Brookhaven National Laboratory.

Results: Several areas requiring improvement were identified relative to post accident sampling and accident monitoring. In addition five unresolved items were identified. No violations were identified.

Details

1.0 Persons Contacted

Niagra Mohawk Power Corporation

1.1 During the course of the inspection, the following licensee personnel were contacted or interviewed:

*J. C. Aldrich	Operations Supervisor
*D. Balduzzi	Superintendent, Nuclear Records Management
H. Barrett	Asst. Supervisor, Site Tech Support Group
*J. Blasiak	Supervisor, Chemistry & Radiation Protection
*M. Boyle	Nuclear Computing and Verification
K. Carter	Supervisor of Records Management
T. J. Chwalek	Emergency Coordinator
W. Connally	Supervisor of Quality Assurance
*J. Duell	Supervisor, Chemistry & Radiation Protection
E. Dundon	Technical Service Engineer-Nuclear Operation
M. Hedrick	Supervisor, Radiation Protection, General and Emergency Training
W. James	Asst. Instrument and Control Supervisor
*J. Jerowek	Project Manager, Equipment Qualification
*E. W. Leach	Superintendent, Chemistry & Radiation Mgmt.
D. Lesinski	Radiation/Chemistry Technician
R. Leuenberger	Radiation/Chemistry Technician
*L. Price	Environmental Engineer (Consultant)
C. Senska	Radiation/Chemistry Technician
M. Sereno	Radiation/Chemistry Technician
W. Thomson	Training Supervisor Radiation Protection and Chemistry
*P. Volza	Supervisor, Radiological Support
C. Ware	Radiation/Chemistry Technician

Other members of the licensees staff were also contacted and/or participated in a walk through of the post accident and effluent monitoring systems during this inspection.

*Denotes attendance at exit interview on August 3, 1984.

2.0 Purpose

The purpose of this inspection was to verify and validate the adequacy of the licensee's implementation of the following task actions identified in NUREG-0737, Clarification of TMI Action Plan Requirements:

Task No.	Title
II.B.3.	Post Accident Sampling Capability
II.F.1-1	Noble Gas Effluent Monitors
II.F.1-2	Sampling and Analysis of Plant Effluents
II.F.1-3	Containment High-Range Radiation Monitor
III.D.3.3.	Improved Inplant Iodine Instrumentation under Accident Conditions

3.0 TMI Action Plan Generic Criteria and Commitments

The licensee's implementation of the task actions specified in Section 2.0 was reviewed against criteria contained in the following documents.

- NUREG-0737, "Clarification of TMI Action Plan Requirements."
- "Generic Letter 82-05," Letter from Darrell G. Eisenhut, Director, Division of Licensing (DOL), to all Licensees of Operating Power Reactors, dated March 14, 1982.
- NUREG-0578, "TMI-2 Lessons Learned Task Force Status Report and Short-Term Recommendations," dated July 1979.
- "Letter from Darrell G. Eisenhut, Acting Director, Division of Operating Reactors, NRC," to all Operating Power Plants, dated October 30, 1979.
- Letter from Darrell G. Eisenhut, Director, Division of Licensing, NRR to Regional Administrators "Proposed Guidelines for Calibration and Surveillance Requirements for Equipment Provided to Meet Item II.F.1, Attachments 1, 2, and 3, NUREG-0737" dated August 16, 1982.
- Order "Confirming License Commitments on Post-TMI Related Issues Nine Mile Point Nuclear Station, Unit No. 1", dated March 18, 1983.
- Regulatory Guide 1.3 "Assumptions Used for Evaluating Radiological Consequences of a Loss of Coolant Accident for Boiling Water Reactors".
- Regulatory Guide 1.4, "Assumptions Used for Evaluating Radiological Consequences of a Loss of Coolant Accident for Pressurized Water Reactors."
- Regulatory Guide 1.97 Rev. 3, "Instrumentation for Light-Water-Cooled Nuclear Power Plants to Assess Plant and Environs Conditions During and Following an Accident."
- Regulatory Guide 8.8, Rev. 3, "Information Relevant to Ensuring that Occupational Radiation Exposure at Nuclear Power Station will be As Low As Reasonably Achievable."

4.0 Post Accident Sampling System, Item II.B.3

4.1 Position

NUREG-0737, Item II.B.3, specifies that licensees shall have the capability to promptly collect, handle, and analyze post accident samples which are representative of conditions existing in the reactor coolant and containment atmosphere. Specific criteria are denoted in commitments to the NRC relative to the specifications contained in NUREG-0737.

Documents Reviewed

The implementation, adequacy and status of the licensee's post-accident sampling and monitoring systems were reviewed against the criteria identified in Section 3.0 and in regard to licensee correspondence, memoranda, drawings and station procedures as listed in Attachment 1.A

The licensee's performance relative to these criteria was determined by interviews with principal personnel associated with post-accident sampling, a review of associated procedures and documentation, and the conduct of a performance test to verify hardware, procedures and personnel capabilities.

4.2 Findings

Within the scope of this review, the following items were identified:

4.2.1 PASS Performance Testing

Reactor coolant and drywell samples were collected during a drill and operational test which was witnessed by the NRC Inspection Team on August 1, 1984. This test included a comparison of normal sampling results with those obtained during the drill, and an analysis of spiked samples. The tests and a drill performed by licensee personnel verified the integrated ability to collect and analyze a sample within the time and dose constraints of NUREG-0737, II.B.3.

4.2.2 Sampling

4.2.2.1 Reactor Coolant

The reactor coolant sampling system is designed to obtain samples of liquids and dissolved gases during all modes of operation. The ability to obtain representative samples within the stated commitments was satisfactorily demonstrated, with the following exceptions:

- The license plans to modify the dissolved gas collection portion of the system to improve its collection capability. Components for the modification have been ordered.

- The system purge time has not been determined on the basis of an analysis of the line volume and flow rate. The line used for the "fast purge" cycle does not contain instrumentation to indicate the flow rate. The remainder of the flow paths rely on radiation detectors and conductivity meters to indicate that a representative sample can be obtained. These devices may not always be valid indicators of the representativeness of the sample; particularly under stable coolant conditions, high background, and residual contamination buildup.

Based on the above findings, the following item should be accomplished:

- Establish a task completion date, after receipt of the components, for modifying the dissolved gas system.

In addition to the above, the following item should be considered for improvement:

- Determine the purge time required to obtain a representative sample, based on the system flow rate and line volume.

These items will be reviewed in a subsequent inspection. (220/84-14-01)

4.2.2.2 Containment Air

Air samples can be obtained from the Drywell and the Reactor Building. The performance of the critical orifice which is used to regulate the flow through the iodine cartridge assembly under all possible flow conditions is questionable. There were no data available to demonstrate the orifice's performance characteristics above and below atmospheric pressure.

The sampling lines were heat traced to 60° C. Typically, systems are heat traced to temperature above 100° C, to prevent moisture from condensing in the lines.

Based on the above finding the following items should be accomplished:

- Document the performance characteristics of the critical flow orifice above and below atmospheric pressure.

In addition to the above, the following item should be considered for improvement:

- Increase the heat trace temperature on the containment sample line to at least 100° C.

These items will be reviewed in a subsequent inspection. (220/84-14-02)

4.2.3 Analytical Capability

4.2.3.1 Chloride

Chloride analysis was conducted using a specific ion electrode and a spectrophotometer. The licensee had previously acknowledge interference problems when using the specific ion electrode in the presence of iodine. The spectrophotometric method and an off-site laboratory would be used as a back-up in cases where iodine interference was expected.

The licensee satisfactorily demonstrated the capability to analyze chloride within the stated degree of accuracy. The results of the analyses of spiked chloride samples are set forth in Attachment II.

4.2.3.2. Boron

A Carminic Acid Method is used for determining the concentration of boron in samples.

Based on the results of spiked sample analyses, the licensee satisfactorily demonstrated the ability to conduct boron analyses within its stated range and accuracy. The results of the analysis of the spiked samples are contained in Attachment II.

4.2.3.3 pH

A flat surface electrode was used for pH analyses. The licensee satisfactorily demonstrated the ability to conduct pH analyses. The results of the analyses are contained in Attachment II.

4.2.3.4 Gross Activity and Isotopic Analyses

The gross activity and isotopic analyses capability were satisfactorily demonstrated. The results of the comparison of the PASS sample and normal sample are contained in Attachment II.

4.2.3.5 Hydrogen

The licensee demonstrated the operability of the gas chromatograph used for analyzing hydrogen grab sample.

4.2.4 Additional Findings

The training program for the operation of the PASS was under revision and the records of some individuals who have received hands-on training were incomplete. The training in core damage assessment was being conducted at the time of the inspection.

Based on the above findings, the following item should be accomplished:

- Complete and document all training in core damage assessment and the hands-on operation of the PASS. (220/84-14-03)

5.0 Noble Gas Effluent Monitor, Item II.F.1-1

5.1 Position

NUREG-0737, Item II.F 1-1 requires the installation of noble gas monitors with an extended range designed to function during normal operating and accident conditions. The criteria, including the design basis range of monitors for individual release pathways, power supply, calibration and other design considerations are set forth in Table II.F.1-1 of NUREG-0737.

Documents Reviewed

The implementation, adequacy, and status of the licensees monitoring systems were reviewed against the criteria identified in Section 3.0 and in regard to licensee correspondence, memoranda, drawings and station procedures as listed in Attachment 1.B.

The licensee's performance relative to these criteria was determined by interviewing the principal persons associated with the design, testing, installation and surveillance of the high range gas monitoring systems, reviewing associated procedures and documentation, examining personnel qualifications and direct observation of the systems.

5.2 Findings

Within the scope of this review, the following was identified:

5.2.1 Description and Capability

The licensee has purchased and installed a Radioactive Gaseous Effluent System (RAGEMS), Model 400, which was designed and fabricated by Science Applications, Inc. (SAI). It obtains a sample from a probe in the plant stack, which would be the sole effluent release point under accident conditions. RAGEMS was installed and made functional shortly prior to the startup of Cycle 7 on May 1983.

This system is designed to provide for the on-line analysis of noble gases over the range of concentrations from normal low-level emissions up to the highest levels stipulated in NUREG-0737, II.F.1-1.

A high purity intrinsic germanium (Ge) detector and a Canberra Series 85 Multi-Channel Analyzer (MCA) are utilized. The data are then interpreted by a Digital Equipment Corporation PDP 11/34A computer, the terminal and display for which are located in the licensee's Chemistry Laboratory. There is at present no direct readout of the isotopic analysis data or other information from RAGEMS in the NMP Unit 1 Control Room, where the site meteorological information is available and when off-site dose assessment would ordinarily be performed.

In order to provide the wide dynamic range, the gaseous detection channel utilizes automatic control of analysis times, of the routing of the gas stream alternatively through a 6 liter or a 30 cm^3 shielded detection chamber and the dilution of high concentrations of radiogases in the inlet sampling stream by successive factors of approximately 1/150.

This is accomplished automatically by the utilization in the RAGEMS software of the signal from a ratemeter which continuously senses the integrated count rate from the Ge detector for the gaseous sample chamber. Although there is a local readout of this ratemeter, its indications are not reproduced elsewhere, either at the computer console or at the Control Room.

Cognizant licensee personnel indicated that the minimum time which the RAGEMS could achieve for the upper limit concentration was 10 minutes. However, this was not substantiated by calculation and/or test under appropriate simulated conditions.

The licensee supplied calculations, based on the response of the gas monitoring channel of RAGEMS to known solid sources, to document the maximum activity permitting isotopic analyses of the upper range required by NUREG-0737, II.F.1-1.

5.2.2 Operational Status

RAGEMS has been utilized by the licensee for compliance with the requirements of NUREG-0737, II.F.1-1, since May, 1983. However, it was established that as of this inspection, it was still in "pre-operational" status with regard to the licensees acceptance of RAGEMS from SAI. Two comprehensive preoperational tests have been performed, one in May 1983 and the second in November 1983. The first disclosed a number of hardware and software deficiencies. The second test revealed some remaining deficiencies, relative to the ability of RAGEMS to meet the licensees purchase specifications. Additional un-anticipated problems, primarily attributed to software imperfections, have been encountered during the routine operation of RAGEMS by the licensee.

The availability to date of RAGEMS could not readily be established from the licensee's log books in which its operational problems have been recorded.

Cognizant licensee personnel estimated that, although it had been utilized for only about 60% of the time since its installation, the system could have been made available for the monitoring of effluent radiogases, within 24 hours for about 99% of the time, should it have been needed for this purpose while it was down for debugging and/or modification.

Provision is made locally to the gas detector-shield unit of RAGEMS for the manual context of the alternative routing of the sampling stream (to the 6-1 or to the 30 cm^3 chamber) and for the acquisition of a spectrum of the contained radionuclides by the MCA. However, this feature does not provide for the manipulation of the dilution streams, upon which RAGEMS is critically dependent to reach the upper range of the concentration of radiogases required by NUREG-0737, II.F.1.1. Backup for RAGEMS is available, in that the pre-existing low-range gaseous stack effluent monitor is routinely operational and is valved in series, downstream in the return line from RAGEMS to the stack. This monitor remains in operations when RAGEMS is valved off-line. Also, the interim provisions for a high range stack monitor, in the form of a modified Teletector and procedure for its use remains available.

A review was made of the licensee's correspondence with the vendor concerning problems that have been encountered during the testing and operation of RAGEMS. It disclosed that the vendor had, on one or more occasions, made changes in the software without the licensee's prior knowledge and agreement and without promptly informing the licensee of the full nature of these changes. Shortly preceding this inspection, the licensee appears to have arrived at an understanding with the vendor, whereby the latter would seek prior approval before making such changes. An internal approval protocol for such changes has also been instituted by the licensee.

5.2.3 Procedures and Training

During the inspection, it became apparent that except for an elementary level procedure, the licensee is dependent upon vendor supplied manuals for detailed instruction about its operation and maintenance.

While RAGEMS has been in preoperational status, only two licensee personnel have acquired an in-depth knowledge of its function and operation. A sufficient number of the licensee's Chemistry staff have been informally trained in the command and interrogation of RAGEMS, so as to provide one such qualified individual on each shift who could be assigned to the RAGEMS console under accident conditions. A lesson plan, which is intended to provide more formal and comprehensive training, has been drafted and is being reviewed for implementation by the licensee's Training Group.

Beyond the procedures which have been devised for preoperational tests, the licensee has not yet developed formal procedures for the routine maintenance and calibration of RAGEMS.

5.2.4 Other

There is no installed illumination immediately adjacent to the base of the stack, where the manually operated valves which control the flow to the

RAGEMS and/or to the low-range monitor are located. The only visual aid the technicians who perform the desired alignment have is a diagram that one of them improvised.

5.3 Acceptability

Provided that the licensee can satisfactorily document that RAGEMS can be made capable of obtaining readings of the concentrations of gaseous effluents at least every 15 minutes during and following an accident, it is an acceptable system within the requirements of NUREG-0737, II.F.1-1.

5.4 Recommendations for Improvement

5.4.1 Operational Status

- The necessary tests to move RAGEMS from a pre-operational to an operational status should be completed to assure the maximum reliability and availability of the system.

  The licensee has proposed 1/1/85 as the date when this would be accomplished. (220/84-14-04)

5.4.2 Capability

- An additional read-out of the information available from RAGEMS, such as system status, release concentrations and stack flow rate should be established in the Control Room. The licensee is considering doing so by establishing a link between RAGEMS and the Meteorological computer, which has a terminal in the Control Room, once that the current software problems with RAGEMS have been cleared up.

- In order to provide a prompt indication and a record of abrupt changes in the concentration of gases in the effluent stream, a duplicate readout and recording of the indications of the rotameter which monitors the count from the Ge detector for the gas sample should be provided in the Control Room.

- Since the successful function of the dilution system is essential to the ability of RAGEMS to achieve the upper range requirements of NUREG-0737, II.F.1-1, the implementation of the previous recommendation should be accompanied by the installation of pilot lights to verify immediately that it has activated at the appropriate gas chamber counting rate(s).

- The licensee should establish records from which the utilization (time actually on-line) and the availability of RAGEMS for the monitoring of radiogases in high concentrations can be readily established. "Backup" procedures should be devised from sampling of effluent radiogases analyses in the event that one or more critical sub-elements of RAGEMS are not functional during an accident.

- In order to preserve the integrity of the software of RAGEMS, which is critical to its function, the licensee should insist upon full control of any modifications in it by the vendor and should develop a formal procedure for "in-house" changes to it. (220/84-14-05)

5.4.3 Procedures and Training

- Procedures dealing specifically with the capabilities and utilization of RAGEMS under accident conditions should be developed and appropriate training accomplished. An in-depth understanding of RAGEMS should be provided for additional licensee staff. (220/84-14-06)

5.4.4 Other

- Adequate illumination and a legible flow diagram should be installed adjacent to the sampling line valves at the base of the stack. (220/84-14-07)

No violations were identified.

6.0 Sampling and Analyses of Plant Effluents, Item II.F.1-2

6.1 Position

NUREG-0737, Item II.F.1-2, requires the provision of a capability for the collection, transport, and measurement of representative samples of radioactive iodines and particulates that may accompany gaseous effluents following an accident.

The criteria including the design basis shielding envelope, sampling media, sampling considerations, and analysis considerations are set forth in Table II.F.1-2.

Documents Reviewed

The implementation, adequacy and status of the licensee's sampling and analysis system and procedures were reviewed against the criteria identified in Section 3.0 and in regard to licensee correspondence, memoranda, drawings and station procedures as listed in Attachment 1.B.

The licensee's performance relative to these criteria was determined by interviewing the principal persons associated with the design, testing, installation, and surveillance of the systems for sampling and analysis of high activity radioiodine and particulate effluents, by reviewing associated procedures and documentation, by examining personnel qualifications, and by direct observation of the systems.

6.2 Findings

Within the scope of the review, the following items were identified over and above those contained in paragraphs 5.2.1 to 5.2.3 which are also relevant to Item II.F.1-2.

6.2.1 Descriptions and Capability

The RAGEMS, Model 400, is an acceptable system within the requirements of NUREG-0737, II.F.1-2. This system provides for the automatic insertion of individual standard sized particulate and iodine sampling cartridges into the sample line in series ahead of the gas module. They are then allowed to collect activity for a specified but variable amount of time (through computer control) depending on the level of activity sensed by the gas sample ratemeter. They are then automatically removed from the sample line and directed into shielded counting chambers for measurement of the collected particulate iodine radioactivity by their detectors. The counting time is also computer controlled on the basis of the amount of activity contained in the immediately preceding sample.

The computer controlled dilution system as described in Paragraph 5.2.1, is located in series ahead of the particulates and iodine sampling modules. It is essential to the ability of RAGEMS to achieve the upper range sensitivity called for in NUREG-0737, II.F.1-2.

The MCA and PDP 11/34, which were discussed in Paragraph 5.2.1, are also utilized for the analysis of particulate and iodine samples. The latter supplies control command to the local processor which actuates the hardware of the particulate and iodine modules. There is no built-in provision for local manual override and control of these modules.

6.2.2 Availability and Backup

Since RAGEMS has no installed provision for the local manual control of its particulate and iodine sampling and analyses modules, it has been less available for these functions then as a gas monitor. Cognizant licensee personnel estimated that it had been available within 24 hours for about 90% of the time since its installation. Again, documentation to support their statements could not readily be established from the licensee's log books.

RAGEMS is critically dependent upon the successful functioning of its dilution feature, in order to limit the activity collected on a sampling cartridge to that which can be analyzed in the installed Ge detectors.

Since RAGEMS contains no shielding, aside from that for the Ge detector and associated sample counting chamber, this functioning is essential to providing a sample which could not readily be transported and counted in the Laboratory or elsewhere. There is no other installed remote and/or shielded sampling station which could serve as a backup to RAGEMS for the collection of a sample at the upper ranges of the concentrations required in NUREG-0737, II.F.1-2.

6.2.3 Representativeness

The representativeness of the particulate and iodine samples which RAGEMS could collect under accident conditions is questionable on several grounds. The sample line to RAGEMS was tied into the line to the pre-existing low range monitor and sampling positions by means of a right angle tee just outboard of the base of the stack. From there, it makes about a 200' horizontal run through an off-gas tunnel and another 90° turn (which was not observed due to high radiation fields and contamination levels in the tunnel) before it reaches the head-end dilution module of RAGEMS. While the routine flow through the dilution unit is a straight path through all stainless steel piping, the dilution paths are quite tortuous, with several right angle bends and/or fittings.

6.3 Recommendations for Improvement

In addition to the recommendation of Paragraphs 5.4.1 to 5.4.4, which are also relevant to Item II.F.1-2, the following specific recommendations are made:

- An analysis should be provided of the licensee's ability to obtain, to handle and to analyze the levels of particulate and iodine activity anticipated during accident conditions and in the event that RAGEMS were partially or fully disabled by hardware and/or software malfunction.

- The licensee should demonstrate that RAGEMS and its associated sampling lines meets the stipulation of Footnote 14 of Regulatory Guide 1.97, namely that it provides "the best sample practicable."

  The licensee should make an empirical determination of line losses or deposition, so as to establish appropriate correction factors to be applied. (220/84-14-08).

  No violations were identified.

7.0 In-Containment High Rad Monitors, Item II.F.1-3

7.1 Position

NUREG-0737, Item II.F.1-3, specifies that high range containment radiation monitors be installed. The specific requirements are set forth in Table II.F.1-3.

Documents Reviewed

The implementation, adequacy, and status of the licensee's monitoring systems were reviewed against the criteria identified in Section 3.0 and in regard to licensee correspondence, memoranda, drawings and station procedures as listed in Attachment 1.C.

The licensee's performance relative to these criteria was determined by interviewing the principal persons associated with the design, testing, installation and surveillance of the containment high range monitoring systems and by reviewing associated procedures and documentation.

7.2 Findings:

Within the scope of this review the following was identified:

Two GA ion chamber detectors with extended ranges of 10^1 - 10^8 R/hr had been installed with appropriate separation in containment. Calibration and functional tests had been performed. However, based on review of equipment qualification tests and documentation, adequate information was not available to determine if the detectors and associated equipment were qualified for the harsh accident environment they might be subjected.

The licensee submitted additional information with regard to the concern on August 28, 1984. Presently this item remains unresolved pending further review and subsequent inspection (220/84-14-09).

8.0 Improved In-Plant Iodine Instrumentation Under Accident Conditions, Item III.D.3.3

8.1 Position

NUREG-0737, Item III.D.3.3 requires that each licensee shall provide equipment and associated training and procedures for accurately determining the airborne iodine concentration in areas within the facility where plant personnel may be present during an accident.

The implementation, adequacy, and status of the licensee's inplant iodine monitoring under accident conditions was reviewed against the criteria in Section 3.0 and in regard to the documents referenced in Attachment I.D.

The licensee's performance was evaluated by interviews with cognizant licensee personnel, review of applicable calibration and surveillance documentation, direct observation during a walk-through, and verification of equipment availability and storage.

Documents Reviewed

8.2 Findings

Within the scope of this review, the following was observed:

The licensee demonstrated satisfactory monitoring and measurement capabilities for accurately quantifying airborne iodine concentrations in areas where plant personnel may be present during an accident. The vital areas observed were the control room, technical support center, and operations support center. Examination of available iodine monitoring components and instrumentation (PING-1A, portable high volume Radeco air samplers, Eberline RO-2, E-140N with HP-210T probe, RM-14, SAI CP-100 radioiodine and silver zeolite cartridges) indicated the licensee had sufficient sampling media and equipment to effectively monitor airborne radioiodine levels within these areas.

Sample counting and analysis can be performed in the field if a gross count is desired or transported to an on-site low background, low contamination counting lab for Geli analysis.

Procedures associated with personnel training for operation and calibration of radioiodine monitoring equipment and counting instrumentation are in place. A post sampling purge of the SAI CP-100 radioiodine sampling cartridge was required to maximize iodine detection capability.

Recommendations for Improvement

- It was recommended to the licensee that an alternative sample collection method for the PING sample monitor located in the TSC be adopted. The current sample collection technique utilizes an eight foot length of tygon tubing for the sample line. This line should be as short as possible and composed of a material which limits iodine plate-out in the walls of the tube. (220/84-14-10)

No violations were identified.

9.0 Quality Assurance & Design Review

As part of the inspection effort a review was performed to verify and validate the adequacy of the licensee's design and quality assurance program for the installation of the Post Accident Sampling System.

9.1 Documents Reviewed

9.1 The inspector reviewed pertinent work and quality assurance records for the design, construction and installation of the Post Accident Sampling System to ascertain whether the records reflect work accomplishments consistent with NRC requirements in the areas of receipt inspection, equipment qualification, installation and inspection.

9.1.1 Documents reviewed for this determination include:

- -- Drawing No. C-18041-C, sheets 2, 7 & 8 entitled "Post Accident Sampling Station P&ID."
- -- Drawing No. C-18015-C, entitled "Reactor Vessel Instrumentation P&ID."
- -- Drawing No. C-19859-C, entitled "Reactor Protection System Vessel Isolation-Elementary Wiring Diagram."
- -- Procedure No. NI-PSP-13, entitled "Sampling and Analysis of Reactor Water and Containment Gas using the PASS" Revision 3.
- -- Drawing No. C-26949-C, Revision 5, entitled "Primary Containment Atmosphere H2-O2 Monitoring System."
- -- Nine Mile Point Safety Evaluation for PASS (TMI Work Package #7 dated 17, 1981
- -- Safety Related As-Built Drawings Nos.
  C-23292-C sheet 2, Revision 5
  C-23292-C sheet 5, Revision 4
  C-34180-C sheet 7, Revision 5
  C-27116-C - Revision 14
  C-27102-C sheet 1, Revision 0
- -- As Built Electrical Drawings Nos.
  C-34843-C sheet 4, Revision 2
  C-34845-C sheet 3, Revision 2
  C-34861-C sheet 2, Revision 5
- -- Process Survey Procedure No. N1-PSP-13 Revision 0
- -- Cable Megger Test Report Nos.
  167-207, 167-208, 167-216, 167-218
  167-220, 167-221, 167-222 and 1F-141
- -- Preoperational Test Procedure No. 169 Revision 1
- -- Hydro Test of PASS high pressure piping No. HYP-122 Revision 0
- -- Pneumatic Test of PASS No. 122.1 dated April 21, 1983

-- Sample Line Heat Traceing Drawing C-27037-C sheet 7

-- Weld History Period for PASS Exhaust Line per procedure No. 1-1-13A-101 (ref. drawing no. C-34946-C)

-- Procedure No. APN-9 entitled "Document Control and Instructions."

-- Project File for Major Order No. 1850, work package #7, Index #3-N2.1 510 Book #01 and N024.

-- Piping Specification No. 122 and 122.1 dated May 29, 1981

-- PAS System Index #3-N2.1-512 "D"

-- Purchase Requisition PR-603496 for valves.

-- Product Quality Certification (PQC-Primary Vendor quality assurance record for equipment/components).

-- Project notebook no. N002 revision 1 dated April 21, 1980

9.2 Findings

9.2.1 The inspector noted that the PASS Piping index No. 3-N2.1-512 "O" calls for Type 316 (ASME SA-213) seamless tubing. In a memo to the modification coordinator the maintenance supervisor performing the PASS installation stated that the 316 material was changed to 304 stainless steel. Justification and/or authorization for the material change was not available for NRC review during the inspection. This item is unresolved pending NRC review of licensee's evaluation and basis for the material change. (220/84-14-11)

10. Instrument/component---Quality Record Review

10.1 Criterion 3 of the Safety Evaluation by the Office of Nuclear Reactor Regulation of the NRC required that valves not accessible after an accident be environmentally qualified for the conditions in which the PASS must function. In addition, parts of the PASS interface with the Safety Related system (such as control circuits, solenoid valves and limit switches associated with the isolation valve) must also be environmentally qualified.

10.2 Findings

10.2.1 The inspector requested qualification data for associated safety related solenoid valves and limit switches for valve Nos. IV-122-03, BV-122-04 and BV-122-05. The licensee indicated these items were not qualified and that they are scheduled for replacement during the week of August 27, 1984.

This item is unresolved pending NRC verification of licensee corrective action. (220/84-14-12)

10.2.2 The inspector requested environmental qualification data for safety related control switch No. RMS-122-03D. The licensee indicated this switch has been environmentally qualified, however, the data was not available for verification. This item is unresolved pending NRC verification of licensee environmental qualification data for control switch No. RMS-122-030. (220/84-14-13).

11.0 PASS Design

In reviewing correspondence regarding PASS problems for engineering design review (internal memo - File Code NMP-7014 dated August 16, 1983), the inspector noted that fourteen PASS Problems had been identified.

Discussions with the licensee indicate all but six of the identified problems have been resolved.

The remaining problems consist of the following:

-- Sample port position switches - frequently unreliable. Three of five switch mechanism have fallen apart.

-- Pressure Instrumentation (PT662) is designed for dry environment. During depressurization of secondary liquid loop the transducer can become wet and short-out.

In addition, the Nine Mile Point I&C department was unable to span out the pressure indicator (662) in the 0-50 psig range during last annual calibration.

-- The flow element 664 is designed for 500 psig. One of the BWR owners group member using the General Electric PASS reported failures at less than 1000 psig. In addition, both the FET 664 and the Flow Control Valve (FCV621) contain teflon components and are not environmentally qualified.

-- "A dead leg" exists in the secondary liquid loop which results in (a) inadequate circulation of the liquid before gas strip-out and (b) development of gas pocket in V-610 during fill of secondary liquid loop resulting in substantial error during the dissolved gas analysis.

-- Tubing between valve 662 and 610 does not provide for drainback of water which may effervesce with the dissolved gas section of the system. (Two of the BWR owner's group member users of the GE PASS system have experienced substantial amounts of water in the dissolved gas vial as a result of this problem).

-- Adequacy of the PASS dissolved gas measurement.

This item is unresolved pending NRC review of licensee corrective action. (220/84-14-14)

Attachment I.A

Documentation for NUREG-0737, II.B.3

Nine Mile Point Nuclear Station Emergency Plan Procedures

-- EEP-9 "Determination of Core Damage Under Accident Conditions", Rev. 0, dated March 1984.

-- EPP-15, "Health Physics Procedure", Rev. 4, dated April 23, 1984.

Nine Mile Point Nuclear Station Special Procedure

-- IV.A.16 "Operation and Calibration of the Orion Model 701A Digital ph/mv Meter", Rev. 0, November 1981.

-- IV.A.22 "Operation and Calibration of the Carle Instrument Analytical Gas Chromatograph", Rev. 1, June 1984.

-- V.A.7-N "Operation and Calibration of the Geli-1 and Geli-2 Gamma Spectroscopy Systems", Rev. 1, January 1983.

-- S-RTP-79 "Calibration and Operation of the Post Accident Sampling Station Radiation Monitors", Rev. 9, October 1983.

-- N1-RTP-38 "Testing and Analysis of HEPA and Charcoal Bed Filters", Rev. 1, May 1983.

-- Pre-Operational Test Procedure No. 169, "Major Order 1850 Post-Accident Sampling System", Rev. 1, January 1982.

Nine Mile Point Nuclear Station Chemistry Procedures

-- S-CAP-8 "Boron Analysis (Reactor Water)", Rev. 1, February 1985.

-- S-CAP-11 "Chloride Ion Analysis in Water", Rev. 2, July 1980.

-- S-CAP-60 "Dilution of Liquid and Gas Samples of High Activity", Rev. 2, July 1984.

-- S-CAP-63 "Chloride Analysis with Iodide Interference", Rev. 0, December 1983.

Licensee Correspondence

-- D.P. Dise, V. P. Engineering, NMPC to T.A. Ippolito, Chief Br., No. 2, DOL, dated August 10, 1981.

-- D.P. Dise, V. P. Engineering, NMPC to D.G. Eisenhut, Dir., DOL, dated December 31, 1981.

-- Letter from D.P. Dise, V.P. Eng, NMPC to D.G.Eisenhut, DOL, dated February 1, 1982.

-- D.P. Dise, Eng. NMPC to D.G. Eisenhut, Dir. DOL, dated April 1, 1982.

-- T.E. Lempges, VP Nuc. Gen., NMPC to D.G. Eisenhut, DOL, dated April 16, 1982.

-- C.V. Mangan, Nuc. Eng. and Lic., NMPC to D.B. Vassallo, DOL, dated August 18, 1982.

-- D.B. Vassallo, Chief, Br. No. 2, to D.P. Dise, Eng. NMPC, dated July 26, 1983.

-- C.V. Mangan, Nuc. Eng. and Lic. to D.G. EIsenhut, Dir, DOL, dated December 20, 1982.

-- C.V. Mangan, Nuc. Eng. and Lic. to D.G. Eisenhut, Dir. DOL, dated December 30, 1982.

-- C.V. Mangan, Nuc. Eng. and Lic. NMPC to D.G. Eisenhut, Dir. DOL, dated May 11, 1983.

-- D.B. Vassallo, Chief, Br. No. 2, DOL, to G.K. Rhode, Sr. NMPC, dated January 12, 1984.

-- C.V. Managan, VP Nuc. Eng. and Lic. NMPC to D.B. Vassallo, Chief OR Br. No. 2, DOL, NRC, dated March 8, 1984.

-- D.B. Vassallo, Chief, OR Br. No. 2, DOL to G.K. Rhode, Sr. VP, NMPC, dated April 17, 1984.

Licensee Memoranda

-- J. Blasiak to file, "Person-Motion Studies of Post Accident Sampling and Analysis Tasks", dated December 19, 1983.

NRC Memoranda

-- W.V. Johnson, Asst. Dir. Mat, Chem. and Env. Technol, DOE to G.C. Lainas, Asst. Dir. OR, DOL, dated February 23, 1984.

-- R. J. Pasternak to Licensing File, "NRC Telecon: Shutdown Cooling System Isolation Valves, Outstanding NRC Letters, Post Accident Sampling System", dated March 28, 1984.

-- W.V. Johnston, Asst. Dir. Mat., Chem. and Env. Technol, DOL to G. Lainas, Asst. Dir. OR, DOL, of Licensing, dated April 2, 1984.

-- W.V. Johnston, Asst. Dir. Mat., Chem and Env. Technol, DOL to G. Lainas, Asst. for OR, DOL, dated April 5, 1984.

-- T.A. Green, Mgr. Serv. and Aux. Equip. Retrofits, GECO to T.H. Wyllie, Mgr. Brunswick Eng. and Constr. CPLC, dated April 6, 1984.

-- B.J. Youngblood, Chief, Lic. Br. No. 1, DOL, to R.E. Hall, Chief, Tech. Prog. Br. Region IV, dated May 31, 1984.

Nine Mile Nuclear Station Reports

-- Report No. 83-20, Nine Mile Point Nuclear station, Unit 1, conducted July 21 and July 25-August 26, 1983.

-- Request for Additional Information, "EEQ, Review of Licensees' Resolution of Outstanding Issues from NRC Equipment Environmental Qualification Safety Evaluation Reports and TMI Action Plan Installed Equipment", dated December 30, 1981 and May 17, 1982.

Nine Mile Point Nuclear Station Drawings

-- C-19409-C "One Line Diagram, Auxiliary System (Power Boards), Rev. 1, dated March 30, 1981.

-- C-19859-C "Elementary Wiring Diagram, RPS, Vessel Isolation", Sheet 10, Rev. 17, dated March 15, 1984.

-- C-26949-C "Primary Containment Atmosphere H2-O2 Monitor System 11", Rev. 5, dated June 9, 1982.

-- C-19859-C "Elementary Wiring Diagram, Reactor Protection System, Vessel Isolation", Sheet 10, Rev. 17, dated March 15, 1984.

-- C-18041-C "Sampling Points, Reactor Vessel, Post Accident P and I Diagram", Sheet 7, Rev. 4, dated December 17, 1982.

-- C-18014-C "Drywell and Torus Leak Rate and Analyzer System, T.I.P. sys. electrical Pen and N2 Supply P and I Diagram", Sheet 2, Rev. 14, dated December 17, 1972.

-- C-18041-C "Sampling Points, Liquids-Shutdown Cooling, Fuel Pool, Clean-up and Liquid Poison Systems P and I Diagram", Sheet 2, Rev. 3, dated February 1, 1982.

-- C-18009-C "Reactor Clean-Up system, P and I Diagram". Sheet 1, Rev. 18, dated December 20, 1983.

-- C-18015-C "Reactor Vessel Instrumentation P and I Diagram", Rev. 14, dated February 28, 1981.

Attachment I.B.

Documentation for NUREG-0737, II.F.1-2

Nine Mile Point Nuclear Station Emergency Plan

-- Section 6.0 "Emergency Measures", dated December 1982.

-- Section 7.0 "Post Accident Assessment", Rev., dated December 1982.

Nine Mile Point Nuclear Station Emergency Procedures

-- EPP-6 "In Plant Emergency Surveys", dated June 24, 1983.

Nine Mile Nuclear Power Station Operating Special and Procedures

-- NI-CRP-2A/3A "RAGEMS Stack Isotopic and Release Rates", Rev. 0, May 1983.

__ NI-PSP 12 "Interim High Range Stack Monitor Procedures", dated October, 1980.

-- NI-RTP-11 "Operation and Calibration of Teletector - 6112", Rev. 3 dated March, 1983.

Nine Mile Nuclear Power Station Test Procedures

-- No. 188 "Major Order 1852 Radioactive Gaseous Effluent Monitoring System (RAGEMS), Rev. 1, dated May 24, 1983.

-- No. 188 "Major Order 1852 Radioactive Gaseous Effluent Monitoring System (RAGEMS), Rev. 2, dated November, 1983.

Vendor Manuals

-- SAI Documents 754-0261 "Radioactive Gaseous Effluent Monitoring System, Model 400" Vol. 1, "Hardware", Vol. 2, "Software", Vols. 3, and "Components," Vol. 4.

Nine Mile Point Nuclear Station Units #1 Drawings

-- C-18641-C, "Gases" OH Gases, Heating and Ventilating, P&I Diagram, Sheet 5 of 6, dated June 11, 1982.

-- C301130M, "Stack Monitor, Sample Flow Schematic, RAGEMS-Nine Mile Point 1", dated February 25, 1982.

-- 301128F, "Piping Diagram, RAGEMS III, Niagra Mohawk", dated April 18, 1982.

NRC Memoranda

-- W.E. Kreger, Asst. Dir. DSI to G.C. Lainas, Asst. Dir. DOL, dated October 26, 1981.

-- W.E. Kreger, Asst. Dir. DSI to G.C. Laines, Asst. Dir. DOL, dated December 11, 1983.

Licensee Correspondence

-- D.P. Dise, VP NMPC to D.G. Eisenhut, Dir. DOL, dated March 3, 1983.

-- D.P. Dise, NMPC to D.G. Eisenhut, Dir. DOL, dated July 7, 1981.

-- D.P. Dise, VP NMPC to T.A. Ippolito, Chief Br. No 2 OR, DOL, dated August 10, 1981.

-- D.P. Dise, VP NMPC to D.G. Eisenhut, Dir. DOL, dated Setptember 22, 1982.

-- D.P. Dise, VP NMPC to D.G. Eisenhut, Dir. DOL, dated December 31, 1981.

-- T.A. Ippolito, Chief Br No. 2 OR, DOL to D.P. Dise, VP NMPC, dated January 14, 1982.

-- T.P. Lempges, VP NMPC to D.G. Eisenhut, Div. DOL, dated April 16, 1982.

-- C.V. Mangen, VP NMPC to D.G. Eisenhut, Div. DOL, dated November 29, 1982.

-- R.J. Williams, NMPC to G. Reynolds SAI, Open Items Concerning SAI RAGEMS, dated June 8, 1983.

-- J.P. Blasiak, NMPC to G. Reynolds, SAI, RAGEMS Problems, dated February 16, 1984.

-- J.P. Blasich, NMPC to G. Reynolds, SAI, Update on problems with RAGEMS, dated May 15, 1984

Licensee Internal Memoranda

-- T.W. Ramen to S. Wilczek, "Valve Additions/Replacements in the RAGEMS", dated November 26, 1983.

-- J. Blasiak to File, MAPIA (Maximum Activity Permitting Isotopic Analysis) for the RAGEMS, dated April 16, 1984.

Attachment I.C.

Documentation for NUREG-0737, II. F.1-3

Nine Mile Nuclear Power Station Procedures

-- N1-RTP-77, Rev. 0, "The Use and Routine Calibration of the General Atomic High Range Gamma Radiation Monitoring System."

-- N1-ISP-201.7, Rev. 1, "High Range Gamma Radiation System."

Licensee Correspondence

-- D. P. Dise, VP-NMPC to D.G. Eisenhut, Dir. DOL, dated February 1, 1982

-- P. J. Polk, PM, DOL to D. P. Dise, VP-NMPC, dated February 12, 1982

-- H. P. Smith, General Atomic (GA) to NMPC, dated December 4, 1981

-- E. W. Leach, Supt. Chem/Rad, NMPC to M. T. Miller, Rad Specialist, NRC RI, dated August 28, 1984

Other

-- GA Test Report E-254-960

-- E.Q. Work Package No. 201.7-1, dated May 5, 1984

-- Energy Response Test and Dose Rate Calibration of the Model RD-23 High Range Radiation Monitor Detector, General Atomic, February 13, 1981.

-- High-Range Gamma Radiation Monitoring System Operation and Maintenance Manual, General Atomic, August 1980.

Attachment I. D.

Documentation for NUREG-0737, III.D.3.3

Nine Mile Nuclear Power Station Procedures

-- Radiation Protection Technical and Analytical Procedure S-RTP-30, Calibration of ARM Portable Calibration Unit, (Rev. 2)

-- Radiation Protection Procedure RP-3, Performance of Radiological Surveys, (Rev. 2)

-- Counting Room Procedure N1-CRP-1, Air Sample Analysis (Rev. 0)

-- Radiation Protection Technical and Analytical Procedure N1-RTP-75, Operation and Calibration of RadeCo High Volume and Battery Operated Air Samples Model #809, (Rev. 0)

-- Radiation Protection Technical and Analytical Procedure S-RTP-76, Operation and Calibration of the Eberline Model Ping-1A Particulate - Iodine - Noble Gas Monitor, (Rev. 0)

-- Radiation Protection Technical and Analytical Procedure S-RTP-52, Operation and Calibration of the Eberline Ion Chamber, Model RO-2A, Beta - Gamma Dose - Rate Instrument, (Rev. 1)

-- Emergency Plan and Procedure EPP-14, Emergency Access Control, (Rev. 5)

-- Emergency Plan and Procedures EPP-15, Health Physics Procedure, (Rev. 4)

-- Emergency Plan and Procedure EPP-6, In-Plant Emergency Surveys, (Rev. 8)

-- Emergency Plan Maintenance Procedure EPMP-3, Review and Revisions of Site Emergency Plan and Procedures, (Rev. 0)

-- Operator Surveillance Test Procedure N1-ST-M9, Control Room Air Treatment System Operability Test, (Rev. 4).

Attachment II
Comparison of Analytical Results

A. Chemical Analysis
Boron

The test data were:

Standard	Analyses Results	Error	NUREG-0737 Requirements	Licensee Commitment
100	67 ppm	33 ppm	+/-50 ppm	+/- 50 ppm
200	130 ppm	70 ppm	+/-50 ppm	+/- 50 ppm
500	477 ppm	23 ppm	+/-50 ppm	+/- 50 ppm
1000	816 ppm	184 ppm	+/-50 ppm	+/- 50 ppm

Chloride

The test data were:

Standard	Analyses Results	Error	NUREG-0737 Requirements	Licensee Commitment
1.0	0.75 ppm	0.25 ppm	+/-10%	+/-1 ppm
2.0	2.25 ppm	0.25 ppm	+/-10%	+/-1 ppm
5.0	6.00 ppm	1.00 ppm	+/-10%	+/-1 ppm
10.0	10.75 ppm	.75 ppm	+/-10%	+/-1 ppm

pH

Standard	Analyses Results	Error	NUREG-0737 Requirements	Licensee Commitment
4.01	3.99 pH	.02 pH	+/- 0.3 pH	+/-0.2 pH
9.18	9.20 pH	.02 pH	+/- 0.3 pH	+/-0.2 pH

Dissolved Hydrogen

The operability of the gas chromatograph was tested.

Containment Hydrogen

The operability of the gas chromotograph was tested.

B. Gross Activity and Isotopic Analysis

The following is an isotopic comparison of th enormal and PASS sample results for selected radionuclides:

Isotope	PASS uCi/ml	Normal uCi/ml	%Error
I-134	1.23E-02	1.36E-02	- 9.5%
I-132	4.83E-03	4.54E-03	+ 6.4%
I-135	1.94E-02	2.31E-03	-17.4%
Mn-56	9.05E-03	9.51E-03	- 5.5%
Tc-99M	2.57E-03	2.11E-03	+21.8%