NIAGARA MOHAWK POWER CORPORATION

NINE MILE POINT NUCLEAR STATION

02-LOT-001-223-2-06 Revision 2

TITLE: CONTAINMENT ATMOSPHERIC MONITORING SYSTEM

	SIGNATURE	DATE
PREPARER	Glen D. Sherman	5-17-91
TRAINING AREA SUPERVISOR	F M White	5/29/91
TRAINING SUPPORT SUPERVISOR	J. Lyd for J. LeClair	6-4-91
PLANT SUPERVISOR/ USER GROUP SUPERVISOR	[illegible]	6/24/91

Summary of Pages

(Effective Date: 6/24/91)

Number of Pages: 14

Date	Pages
May 1991	1 - 16

TRAINING DEPARTMENT RECORDS ADMINISTRATION ONLY:

VERIFICATION: _____

DATA ENTRY: _____

RECORDS: _____

ATTACHMENT 6
LESSON PLAN TEMPORARY/PUBLICATION/ADDENDUM CHANGE FORM

The attached change was made to:

Lesson plan title: CONTAINMENT ATMOSPHERIC MONITORING SYSTEM

Lesson plan number: 02-LOT-001-223-2-06 REV. 2

Name of instructor initiating change: CLIFFORD N CROASMUN

Reason for the change: CORRECT OF NUMBERING, PG. 4

CORRECT POWER SUPPLY LETTERING PG 15

Type of change:

1. Temporary change ____
2. Publication change ✓
3. Addendum change ____

Disposition:

✓ 1. Incorporate this change during the next scheduled revision.

____ 2. Begin revising the lesson plan immediately. Supervisor initiate the process.

____ 3. To be used one time only.

Approvals:

Instructor: Clifford N Croasmun /Date 6/27/91

Training Area Supervisor (or designee): [signature] /Date 6/27/91

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Reason for the change: ADD DELIVERY NOTES PG 7,14

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Approvals:

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Training Area Supervisor (or designee): [signature] /Date 6/27/91

I. TRAINING DESCRIPTION

A. Title of Lesson: Containment Atmospheric Monitoring System |2

B. Lesson Description: This lesson contains information pertaining to the Containment Atmospheric Monitoring System. The scope of this training is defined by the learning objectives and in general covers the knowledge required of a Licensed Control Room Operator.

C. Estimate of the Duration of the Lesson: 1.5 Hours

D. Method of Evaluation, Grade Format, and Standard of Evaluation: Written exam, passing grade of 80% or greater.

E. Method and Setting of Instruction: This lecture should be conducted in the classroom.

F. Prerequisites:

1. Instructor:
   a. Certified in accordance with NTP-16.
2. Trainee:
   a. Initial License Candidate - In accordance with the eligibility requirements of NTP-10.
   b. Licensed Operator Requal - In accordance with the requirements of NTP-11.

G. References:

1. Technical Specifications:
   a. 3/4.3.2, Isolation Actuation Instrumentation
   b. 3/4.3.7.5, Accident Monitoring Instrumentation
   c. 3/4.5.3, 3/4.6.2.1, Suppression Pool
   d. 3/4.6.1.2, Primary Containment Leakage
   e. 3/4.6.1.6, Drywell Average Air Temperature
   f. 3/4.6.3, Primary Containment Isolation Valves
   g. 3/4.6.6.2, Drywell and Suppression Chamber Oxygen Concentration
2. Procedures:
   a. N2-OP-82, Containment Atmospheric Monitoring System
3. NMP-2 FSAR
   a. Design Bases, Vol. 14, Chapter 6.2

II. REQUIREMENTS

1. AP-9.0, Administration of Training
2. NTP-10.0, Training of Licensed Operator Candidates
3. NTP-11.0, Licensed Operator Requalification Training
4. NTP-12.0, Unlicensed Operator Training

III. TRAINING MATERIALS

A. Instructor Materials:

1. Classroom
2. Lesson Plan
3. TR
4. Transparency package
5. Overhead projector
6. Applicable references
7. Trainee handouts
8. Course Evaluation sheets

B. Trainee Materials:

1. Handouts (can include text, drawings, objectives, procedures, etc).
2. Pens, pencils, paper
3. Course Evaluation

IV. EXAM AND MASTER ANSWER KEYS

A. Exams will be generated and administered as necessary.

B. Exams and master answer keys will be on permanent file in the Records Room.

V. LEARNING OBJECTIVES

A. Terminal Objectives: |2

Upon completion of this lesson, the trainee will demonstrate the knowledge to:

TO-1.0 Line up the Containment Atmospheric Monitoring System and monitor for proper operation (2239220101).

TO-2.0 Manually isolate Containment Atmospheric Monitoring (2239490101).

TO-3.0 Shutdown one division of Containment Atmospheric Monitoring System (2239230101).

B. Enabling Objectives:

EO-1.0 Explain the purpose and function of the Containment Atmospheric Monitoring System.

EO-2.0 Describe the purpose and function of each of the following major components of the Containment Atmospheric Monitoring System.

a. Air Temperature
b. H_2/O_2 Monitoring
c. System Isolation Valves
d. Radiation Monitors
e. Suppression Pool Temperature
f. Pressure Indicators
g. Suppression Pool Level
h. Humidity Analyzer

EO-3.0 Describe the interrelationship between the Containment Atmospheric Monitoring System and the following list of systems:

a. Electrical distribution
b. Primary Containment Isolation System

EO-4.0 Explain the basis for each precaution and limitation listed in ~~N2-OP-92~~. N2-OP-82. | 2 | Affected Worksheet 6/26/91

EO-5.0 Determine and use the correct procedure to identify the actions and/or locate information related to the following Containment Atmospheric Monitoring System operations.

a. Startup

b. Shutdown

c. Normal Operations

d. Off-Normal Operations

e. Annunciator Responses

EO-6.0 Describe how the Containment Atmospheric Monitoring System is utilized during the performance of the EOPs.

EO-7.0 Determine the appropriate bases, limiting conditions for operation, and limiting safety system setting, and/or action statement as applicable given the NMP2 Technical Specifications and a set of plant conditions.

LESSON CONTENT	DELIVERY NOTES	OBJECTIVES/ NOTES	
I. INTRODUCTION			2
A. Introduction			
1. Have students fill out TR.	Distribute TR for completion.		
2. Explain purpose of Course Evaluation and how to use it.	Distribute Course Evaluation Forms and describe their use.		
3. Explain method of evaluation.	Describe daily quizzes/weekly exams.		
4. Review student learning objectives.	Review learning objectives with the class.		
5. Course agenda	List the agenda on a flipchart or white board or provide handout and review.		
B. Purpose			
The purpose is to supply information concerning containment parameters during normal and post accident conditions.		EO-1.0	2
C. General Description			
1. Monitors containment parameters during normal operations and post-accident conditions.			
a. Parameters monitored			
1. Drywell			
a. Air Temperature			
b. H_2/O_2 Conc.			
c. Gaseous and particulate radiation levels			
d. Pressure			

2. Suppression Chamber
   a. Air Temperature
   b. H_2/O_2 Conc.
   c. Pressure
   d. Pool level
   e. Pool temperature

2. Monitors parameters during "Type A" testing.
3. All lines which penetrate the containment are heat traced to prevent condensation formation.

II. DETAILED DESCRIPTION

A. Air Temperature

1. Drywell
   a. Six Div I and Six Div II RTD's used.
   b. Highest readings and lowest reading for each Div. displayed in the Control Room.
   c. Input to computer and recorder.
2. Suppression Chamber
   a. Three Div I and three Div II RTD's used.
   b. Highest reading and lowest reading display in Control Room.

B. H_2/O_2 Monitors

1. Two independent systems.
2. Each monitors three drywell and two suppression chamber locations.

Point out that the SPDS only provides averaged values. Limits are reached based on individual meter readouts.

EO-2.0a |2
EO-2.0b |
EO-2.0c
EO-2.0d
EO-2.0e
EO-2.0f
EO-2.0g
EO-2.0h

3. Rotates sample points every 12 minutes, so entire containment is sampled once/hour.
   a. Sequence timer opens and closes valves for sample and return points.
   b. Can be manually aligned to a single sample point.

NORMAL OPERATION IS IN MANUAL (WITH SAMPLE PATH ON THE DRYWELL) DUE TO THE AMOUNT OF TIME FOR SAMPLE GAS TO STABILIZE AND PROVIDE AN ACCURATE SAMPLE. CAW 6/26/91

C. Containment Isolation Valves
   1. Each division provided with containment isolation valves.

Point out that SPDS identifies the PCIS groups and whether or not all associated isolation valves are closed.

   2. Isolate on:
      a. High Drywell Pressure (1.68 psig)
      b. Double Low Level (Lvl II, 108.8")
   3. Part of Group 8 isolations.
   4. Can be overridden open using LOCA bypass switches.
   5. Sample connections for Post Accident Monitoring are provided.

WHEN IN RX. MODE 1, 2, AND 3 USE OF THE LOCA BYPASS SWITCH(S) REQUIRES ENTRY INTO TECH. SPEC. LCO 3.6.3 OR 3.0.3 CAW 6/26/91

D. Radiation Monitors
   1. Two systems (Div I and Div II)
   2. Use same sample lines as H_2/O_2 samplers.
   3. Monitor containment gaseous and particulate radiation levels.

CMS-10A-1 (gaseous)
CMS-10A-2 (particulate)
CMS-10B-1 (gaseous)
CMS-10B-2 (particulate)
(Tech Spec monitors)

E. Suppression Pool Temperature
   1. Uses 14 dual element RTD's per Div I and Div II, one element is an installed spare.
   2. 10 RTD's per Div. at 199' elevation in Suppression Pool

a. Provides signals to alarm functions, computer points.
b. Can select indication on Panel 601.

3. 4 RTD's per Div at 197' Elev. in Suppression Pool
   a. Signals provided to:
      1. Post Accident Monitoring
      2. Computer Points
      3. Indication on Panel 601, through selector switch
      4. Temp. recorders on Panel 898 (NOTE: Refer to instrumentation section.)

90°F SP bulk temp requires entry into EOPs.

110°F SP bulk temp reqires reqctor scram initiation (manual).

F. Pressure Indication
   1. Drywell Pressure
      a. Monitored by two Div I pressure transmitters, one Div I pressure switch, and the Div II pressure transmitters.
      b. One pressure transmitter per Div monitors upper portion of drywell, one per Div lower portion of drywell.
   2. Suppression Chamber
      a. Monitored by two pressure transmitters
      b. One per division.

Two ranges
1. Narrow
   -5 psig to + 5 psig
2. Wide
   0 psig to 150 psig

c. Div I supplies indication in Control Room. (On P601 is Div I indicator)

d. Div II supplies a Control Room chart recorder. (On P898 is Div II recorder)

G. Suppression Pool Level

a. Monitored by two level transmitters per Div.

b. Div I supplies Control Room indication and computer points.

c. Div II supplies

1) Control Room indication (P601)

2) Control Room recorder (P898)

H. Humidity Analyzers

1. Used only for "Type A" Leak Rate Testing.

2. Permanent brackets exist, detectors installed temporarily.

III. INSTRUMENTATION, CONTROL, AND INTERLOCKS

A. Instrumentation

1. Air Temperature

a. Drywell

1) Highest and lowest of six RTD's displayed on P873 (Div I) and P875 (Div II).

2) Alarms on P873, P875 at 150°F

b. Suppression Chamber.

1) Highest and lowest of three RTD's displayed on P873 (Div I) and P875 (Div II).

2) Alarm at 83.5°F on respective panel.

2. Radiation Monitoring

a. Two monitors (Div I and Div II).

b. Each monitor samples two elevations in Drywell for gaseous and particulate radiation.

c. Indications on P880 in Control Room.

d. Alarms on P851 when setpoints exceeded.

3. H_2/O_2 Analyzer

a. Samples drywell and suppression chamber in 5 locations on a rotating basis.

Point out that the H_2/O_2 can be selected to monitor one point only. (Non-rotating)

b. Two monitors (Div I/Div II).

c. H_2 Conc.

1) Div I indication on P601 (0-30%).

2) Div II recorder on P898.

3) Alarm on P873 (Div I) and P875 (Div II) at > 3.7% (+ .1).

The two monitor systems are divisioned. One is located on P873; the other is located on P875.

4) Each division supplies computer points.

d. O_2 Conc.
   1) Div I indication on P601 (0-10%).
   2) Div II recorder on P898.
   3) Alarm on P873 (Div I) and P875 (Div II) at > 3.5% (+ .1).
   4) Each Div. supplies computer points.

4. Suppression Pool Temperature
   a. 199' Elevation
      1) 10 RTD's for each Div.
      2) Indicated on P601 through a selector switch.
      3) Alarms on P601
         a) High at 82.5°F
         b) High/High at 101°F
   b. 197' Elevation
      1) Post Accident Monitoring.
      2) 4 RTD's for each Div.
      3) Indication on P601 through a selector switch.
      4) Div II supplies recorders on P898.
      5) Causes no alarms.

5. Pressure Indication
   a. Drywell Pressure
      1) Narrow Range (-5 to +5 psig)

High DW pressure (1.68#) requires entry into EOPs.

a. Div I supplies:
   1) Indication on P601.
   2) Alarm on P873 at 1.5 psig.
   3) Computer points.
b. Div II supplies:
   1) Indication on P601.
   2) Recorder on P898.
   3) Alarm on P875 at 1.5 psig.
   4) Computer points.

2) Wide Range (0-150 psig)
   a. Div I supplies:
      1) Indication on P601.
      2) Computer points.
   b. Div II supplies:
      1) Recorder on P898.
      2) Computer points.

b. Suppression Chamber
   1) Narrow Range (-5 to +5 psig). Div I and II supply indication on P601.
   2) Wide Range (0-150 psig)
      a. Div I supplies indication on P601.
      b. Div II supplies a recorder on P898.

LESSON CONTENT

6) Suppression Pool Level
   1) 2 Level Transmitters per Div.
   2) Narrow Range (198'-202') Div I/II indicate on P601.
   3) Wide Range (197' - 217')
      a. Div I indicates on P601.
      b. Div II supplies a recorder on P898.

B. Controls
   1. Containment Isolation Valves
      a. Div I controlled from P873.
      b. Div II controlled from P875.
      c. Manual isolation buttons on P602 for each division, arm and depress type with amber ind. light.
      d. LOCA override switches for each Division located on respective panel for post accident sampling capability.
   2. H_2/O_2 Sample Systems can be manually aligned for single-stream sampling at P873 (Div I) and P875 (Div II)

IV. SYSTEM OPERATION

A. Normal Operation
   1. Monitoring parameters throughout the containment.

EO-4.0 |2
EO-5.0a |
EO-5.0b
EO-5.0c
EO-5.0d
EO-5.0e

2. H_2/O_2 samplers rotate sample points every 12 minutes to sample entire containment once per hour. To monitor for a possible explosive concentration existing in the containment, especially during a LOCA.
3. Review precautions and limitations of N2-OP-82.

B. Post Accident Monitoring
1. LOCA override switches enable operation to supply containment for H_2/O_2 and radiation levels.
2. Suppression Pool Temperature provided at 197' level to P898.

C. System startup and shutdown (OP-82).

D. Abnormal Separation
1. Post LOCA containment atmosphere monitoring
2. Changing sample sources
3. Div. I/II manual isolation
4. Post accident sampling

E. Annunciator/Alarm Response
1. Section I of N2-OP-82

F. EOPs
1. Using N2-EOP-PCC, show the procedure guidance for using ~~CAMS~~ CONTAINMENT ATMOSPHERIC MONITORING SYSTEM during EOP conditions. CAW 6/27/91

NORMAL OPERATION IS IN MANUAL (WITH SAMPLE PATH ON THE DRYWELL) DUE TO THE AMOUNT OF TIME FOR SAMPLE GAS TO STABILIZE AND PROVIDE AN ACCURATE SAMPLE, CAW 6/26/91

2

2

ALSO SEE N2-EOP-6 ATTACH. 23 AND 27 AND N2-OP-82 SECT. H. CAW 6/27/91

EO-6.0

LESSON CONTENT

V. SYSTEM INTERRELATIONS

A. Electrical Distribution

1. Solenoid operated isolation valves powered from 2SCM*PNL102A (2EJS*US1) for Div I and 2SCM*PNL302B (2EJS*US3) for Div II.
2. H_2/O_2 analyzers powered from:
   a. 2A 2SCV*PNL101A
   b. 2B ~~2SCV*PNL301A~~ 2SCV*PNL301B

B. Primary Containment Isolation System Provides isolation signals to the containment isolation valves.

DELIVERY NOTES

RADIATION MONITORS 2CMS*10A/B EACH HAVE TWO POWER SOURCES, THEY ALSO NEED DIV I AND DIV II POWER AVAILABLE TO OPERATE THEIR CONTAINMENT ISOLATION VALVES.

~~Following isolation of CAMS, both divisional power sources must be available to bring back either H_2/O_2 monitor in service.~~

CAN 6/27/91

OBJECTIVES/ NOTES: EO-3.0a |2, EO-3.0b

VI DETAILED SYSTEM REFERENCE REVIEW

Review each of the following referenced documents with the class:

OBJECTIVES/ NOTES: EO-7.0 |2

A. Technical Specifications

1. 3/4.3.2, Isolation Actuation Instrumentation
2. 3/4.3.7.5, Accident Monitoring Instrumentation
3. 3.5.3, 3/4.6.2.1, Suppression Pool
4. 3/4.6.1.2, Primary Containment Leakage
5. 3/4.6.16, Drywell Average Air Temperature
6. 3/4.6.3, Primary Containment Isolation Valves
7. 3/4.6.6.2, Drywell and Suppression Chamber Oxygen Concentration.

B. Procedures

1. N2-OP-82, "Containment Atmospheric Monitoring System"

C. NMP-2 FSAR

Design Basis, Volume 14, Chapter 6.2

VII. RELATED PLANT EVENTS

A. SER 18-81 high failure recurrence rate Containment Atmospheric Monitoring System. |2

B. IEN 83-23 Inop Containment Atmospheric Sensing Systems

VIII. SYSTEM HISTORY

A. N/A |2

IX. WRAP-UP

A. Review the student learning objectives.

1 [illegible] NSAC 11-Mar-81 2:27 PM

S. [illegible] EVENT REPORT 18-81

UBJECT: HIGH FAILURE RECURRENCE RATE - CONTAINMENT ATMOSPHERIC MONITORING SYSTEM (CAMS)

NIT:	BRUNSWICK 1
OC NO/LER NO:	50-325/80-066
ATE:	08/24/80
SS/A.E.:	GE/UE&C

EVENT DESCRIPTION:

DURING NORMAL SURVEILLANCE, THE CONTAINMENT ATMOSPHERIC MONITOR (CAM) OXYGEN ANALYZER FAILED. SIMILAR EVENTS INVOLVING THIS MONITOR HAVE BEEN REPORTED IN THE PAST.

THE MONITOR OXYGEN ANALYZER INDICATED UP SCALE DUE TO LOSS OF SAMPLE FLOW CAUSED BY EXCESSIVE MOISTURE IN ANALYZER AIR DRYER. DRYER WAS DRIED OUT AND RETURNED TO SERVICE.

DUE TO A HISTORY OF SIMILAR MOISTURE PROBLEMS AND OTHER HARDWARE PROBLEMS I[illegible]VING THIS TYPE OF MONITOR, PLANT MODIFICATIONS ARE PLANNED TO INSTALL A [illegible] MONITOR.

C[illegible] ENT:

DURING THE PAST SEVERAL YEARS, A SIGNIFICANT NUMBER OF LERS HAVE BEEN ISSUED REGARDING CAM SYSTEM FAILURES. WHILE EACH INDIVIDUAL LER HAS BEEN EVALUATED AS INSIGNIFICANT, THE ACCUMULATION OF LERS FROM MANY PLANTS INDICATES THAT CHRONIC OPERATING AND MAINTENANCE PROBLEMS EXIST AT BOTH BWR AND PWR PLANTS. FURTHERMORE, THE SAFETY SIGNIFICANCE OF THE CAM SYSTEM, CONSISTING OF CONTAINMENT RADIATION MONITORS, HYDROGEN MONITORS, AND FOR SOME PLANTS OXYGEN MONITORS, IS INCREASING AS NRC REQUIREMENTS (I.E., REGULATORY GUIDE 1.97 REVISION 2) EMERGE FROM THE TMI-2 INCIDENT. THESE INCREASING REQUIREMENTS SUGGEST THAT IMPROVED CAMS PERFORMANCE IS NECESSARY AT OPERATING PLANTS IN THE FORM OF IMPROVED SYSTEM AVAILABILITY, REDUCED MAINTENANCE DEMAND, AND REDUCED FREQUENCY OF LER SUBMITTALS TO NRC.

FOR THE LAST THREE YEARS, THE NUMBER OF CAM FAILURES REPORTED BY LER IS DISTRIBUTED AS FOLLOWS:

	1_9_7_8_	1_9_7_9_	1_9_8_0_	T_O_
GE BWR PLANTS (24)	53	58	68	179
W_ PWR PLANTS (27)	37	25	31	93
CE PWR PLANTS (8)	5	11	5	21
B&W PWR PLANTS (9)	_1_9_	_2_0_	_ _0_	_ _3_
TOTAL	114	114	104	332

THIS SUBJECT IS BEING FURTHER REVIEWED BY NSAC/INP[illegible].