NINE MILE POINT NUCLEAR STATION

UNIT II OPERATIONS

LESSON PLAN

POST ACCIDENT SAMPLING

02-REQ-ØØ1-295-2-Ø1

Prepared by: Unit #2 Training Department

APPROVALS	SIGNATURES	DATE AND INITIALS REVISION 4
Training Supervisor Nuclear-Unit #2 G. L. Weimer	G L Weimer	1/16/89
Assistant Training Superintendent-Nuclear R. T. Seifried	R. T. Seifried	1/19/89 RTS
Superintendent Operations-Unit #2 R. G. Smith	R G Smith	1/23/89 RGS

Summary of Pages

Revision: 4 (Effective Date: 1/23/89)

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THIS LESSON PLAN IS A GENERAL REWRITE

NIAGARA MOHAWK POWER CORPORATION

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Attachment "A"

OBJECTIVE APPROVAL

Author: UNIT II OP's TRAINING

Training Dept: Unit II OPS.

Lesson Title: Post Accident Sampling

Lesson Plan #: NZ-OLP-63

Training Setting(s): Classroom

Purpose: INSTRUCTOR shall present information for the student to meet each Student Learning Objective. Additionally, he shall provide sufficient explanation to facilitate the student's understanding of the information presented.

Trainee Job Title: LICENSED OPERATOR CANDIDATE
NON-LICENSED OPERATOR TRAINING
LICENSED OPERATOR REQUALIFICATION

Approvals/Review	Signatures	Date
Training Supervisor	[signature]	1/16/89
Plant Supervisor	[signature]	1/20/89
Training Analysts Supervisor	[signature]	1-12-89

When complete, attach this form to the master lesson plan.

I. TRAINING DESCRIPTION

A. Title: N2-OLP-63, Post Accident Sampling

B. Purpose: In a lecture presentation, the instructor shall present information for the student to meet each Student Learning Objectives. Additionally, he shall provide sufficient explanation to facilitate the student's understanding of the information presented.

C. Estimated Duration: Approximately 1 hour

D. Training Methods:

- Classroom Lecture
- Assign the Student Learning Objectives as review problems with the students obtaining answers from the text, writing them down and handing them in for grading.

E. References:

1. Technical Specifications

   None

2. Procedures

   a. N2-CSP-13, "Post Accident Monitoring"

3. NMP-2 FSAR

   a. Vol. 2, Section II.B.3, Page 1.10-60

II. REQUIREMENTS AND PREREQUISITES

A. Requirements for Class:

1. AP-9, Rev. 2, "Administration of Training"
2. NTP-10, Rev. 4, "Training of Licensed Operator Candidates"
3. NTP-11, Rev. 5, "Licensed Operator Retraining and Continuing Training"
4. NTP-12, Rev. 3, "Unlicensed Operator Training"

B. Prerequisites:

1. Instructor

   a. Demonstrated knowledge and skills in the subject, at or above the level to be achieved by the trainees as evidenced by previous training or education, or

b. SRO license for Nine Mile Point Unit Two or a similar plant, or successful completion of SRO training including simulator certification at the SRO level for Nine Mile Point Unit Two.

c. Qualified in instructional skills as certified by the Training Analyst Supervisor.

2. Students

a. Meet eligibility requirements per 10CFR55, or

b. Be recommended for this training by the Operations Superintendent or his designee or the Training Superintendent.

III. TRAINING MATERIALS

A. Teaching Materials:

1. Transparency Package
2. Overhead Projector
3. Whiteboard and Felt Tip Markers
4. N2-OLP-63
5. N2-OLT-63
6. See Section I.E.1
7. See Section I.E.2

B. Student Materials

1. N2-OLT-63
2. See Section I.E.1
3. See Section I.E.2

IV. EXAMINATIONS, QUIZZES AND ANSWER KEYS

A. Will be generated and administered as necessary. They will be on permanent file in the Records Room.

V. STUDENT LEARNING OBJECTIVES FOR MAIN TURBINE

Upon completion of this chapter, mastery of the required system knowledge will be demonstrated by performing the Enabling Objectives listed below.

63-1 State the purpose of the Post Accident Sampling System (PASS) and the plant conditions under which it is designed to function.

63-2 List the sources from which the PASS can take samples.

63-3 Briefly describe how the PASS Liquid sampling unit collects the following samples:

a. Small volume liquid sample

b. Large volume liquid sample

c. Dissolved gas sample

63-4 Briefly describe how the PASS gas sampling unit collects the following samples.

a. Iodine/Particulate

b. Gaseous grab sample

VI. LESSON CONTENT Activity	Text Ref. Page	Text Ref. Fig.	S.L.O.
I. INTRODUCTION			
Student Learning Objectives	i		
A. System Purpose	1		1
The Post Accident Sampling System has the capability to collect small volume, highly radioactive reactor coolant and containment atmosphere samples for radiological and chemical analysis under post-LOCA conditions.			
B. General Description			
The Post Accident Sampling System (PASS) is a system designed to collect representative liquid and gas samples from the reactor pressure vessel, the suppression pool, and the primary containment atmosphere following a loss-of-coolant accident. The system can also provide useful samples from these locations under all plant conditions ranging from cold shutdown to full power operation.			1,2
Post-accident Samples are collected in a liquid and gas sampling station located outside the secondary containment in the Radwaste Sample Room. Analysis of post-accident samples is conducted in the Unit 1 chemistry laboratory and counting room.			

Activity	Text Ref. Page	Text Ref. Fig.	S.L.O.
II. DETAILED DESCRIPTION			
A. Sampling Equipment			
1. Piping station			
a. Located in Reactor Building at elev. 250 ft.	2		
b. Includes sample point control valves and sample coolers			
2. Sample station			
a. Located in Radwaste Sample Room at elev. 261 ft.			
b. Contains the liquid sampling and gas sampling units.			
c. Lower portion (liquid sampler) shielded with 6" lead			
d. Upper portion (gas sampler) shielded with 2" lead			
e. Drain collection sump at bottom of cabinet returns drainage to suppression pool.			
f. Two PASS control panels are located in the Radwaste sample room, about 10 ft from sample station			
3. Chemical and Radiolytic Analysis equipment is located in the Unit 1 Chemistry laboratory and counting room on elevation 261.			

Activity	Text Ref. Page	Text Ref. Fig.	S.L.O.
a. Liquid samples analyzed for	2		
1) Chloride concentration			
2) Boron concentration			
3) pH			
4) Conductivity			
5) Gamma activity			
b. Gas samples analyzed for			
1) Hydrogen			
2) Oxygen			
3) Iodine			
4) Gaseous activity			
5) Particulate activity			
B. Liquid Sample Sources		1	3
1. Reactor Pressure Vessel			
a. Two jet pump flow-sensing instrument lines from below core plate used for sample points			
2. Residual Heat Removal			
a. Downstream of the RHS HX A and B.			
1) When in the shutdown cooling mode, these sample points can be used to draw Rx coolant sample.			

Activity		Text Ref. Page	Text Ref. Fig.	S.L.O.
	2) When in the Suppression Pool cooling mode, these sample points can obtain suppression pool water samples.	2	1	3
C.	Liquid Sample Collection	3		
	1. Utilize Figure 1 to discuss the following flow paths for sampling.			
	2. Rx coolant sample passes thru 2 sample coolers-cooled by RBCLCW.			
	3. RHS sample only passes thru the second sample cooler.			
	4. Two different sample volumes can be collected-small (0.1 ml) and large (10 ml).			
	5. All samples are injected into evacuated sample bottles by hypodermic needles.			
	6. Small volume samples are mixed with 10 ml demin water from a syringe.			3a
	7. This provides 100:1 dilution of the highly radioactive liquid.			
	8. Large volume sample initially collected in the 70 ml holdup cylinder			3b,c
	a. This sample volume can be circulated and depressurized into gas expansion cylinder.			

Activity	Text Ref. Page	Text Ref. Fig.	S.L.O.
b. A gas is added to strip gases from the coolant sample.	3		
c. 15 ml of stripped gases is then collected in the dissolved gas sample bottle.			
d. 10 ml of liquid from the holdup cylinder is collected in the large volume sample bottle for offsite analysis.			
9. Demin water flush capability on nitrogen purge provided to reduce sample station radiation levels when it is not in use.			
D. Gas Sample Collection	4	2	4
1. Gas samples can be taken from the drywell, suppression chamber, or Rx building atomospheres.			
2. The gas sample lines are heat traced along their full length to prevent precipitation of moisture and the resultant loss of iodine from the sample gas.			
3. Use Figure 2 to explain the following flow paths for sampling.			

Activity		Text Ref. Page	Text Ref. Fig.	S.L.O.
4.	The four-position five-ported selection valve is used to select sample location: The drywell, suppression chamber, or Rx building atmosphere.	4	2	4
5.	Positive displacement pumps are used to draw sample thru the sample station.			
6.	Particulate and iodine sample cartridges are installed in the sample lines to permit airborne particulate or iodine activity measurement.			4a
7.	A 15 ml grab sample of the bypassed sample is taken in an evacuated sample bottle for lab analysis of gaseous activity and isotopic composition.			4b
8.	Nitrogen purge is used to sweep the sample, unit of gases before and after sampling, reducing sample line radiation level and preventing cross-contaminating of samples.			
9.	Pumps are flexible-diaphragm type positive displacement pumps. Either pump can be used to draw the sample through the sampler piping.			
10.	Pump P1 is also used to take suction on the dissolved gas sampling line of the liquid sampling unit.			

Activity	Text Ref. Page	Text Ref. Fig.	S.L.O.
11. P1 discharges into Rx Bldg atmosphere (Secondary Containment); P2 discharges into the suppression chamber atmosphere.	4		4b
III. INSTRUMENTATION, CONTROLS AND INTERLOCKS			
A. Control Devices	5		
The operation of the sampling station is controlled and sequenced from the main control panel in the radwaste sampling room. A nitrogen cylinder with a 100 psig regulator is used as the source of pressure for the pneumatically operated valves of the PASS.			
B. Instrumentation			
All instrumentation for the PASS is located on the two control panels in the radwaste sampling room.			
1. Pressure			
a. Within the liquid sampler system, pressure is sensed (in units of psig or inches Hg vacuum) on the inlet to the sampler cabinet and in the dissolved gas expansion cylinder.			
b. In the gas sampler unit, pressure is sensed at the sampler inlet, just downstream of the four-position, five-ported valve. It is also sensed on the outlet of the iodine cartridges and within the gas sample bottle while the needle is inserted in the bottle.			

Activity	Text Ref. Page	Text Ref. Fig.	S.L.O.
2. Temperature Sample temperature is sensed in degrees Farenheit on the inlet to the liquid sampler unit.	5		
3. Conductivity In the normal liquid sampling lineup, the sample flows past a conductivity cell with a range of 0.1 to 1000 micromhos/cm.			
4. Radioactivity Three radioactivity monitors are used in the PASS.	6		
a. One for monitoring the radiation level of the iodine cartridge.			
b. A second monitors flow in the liquid sampler outlet line to the suppression pool.			
c. The third monitors radiation levels adjacent to the sample cabinet.			

IV. SYSTEM OPERATION

A. PASS is designed to collect small volume, highly radioactive liquid and gas samples after a Loss of Coolant Accident.

B. PASS can be used to obtain reactor vessel and suppression pool water samples and atmospheric samples during normal operation as well.

Activity	Text Ref. Page	Text Ref. Fig.	S.L.O.
C. All PASS samples must be transported to the Unit 1 chem lab and counting room for analysis.	6		

V. SYSTEM INTERRELATIONS

A. Reactor Vessel Instrumentation (RVI)
The Post Accident Sampling System utilizes jet pump flow sensing instrument lines as a sample point for reactor vessel water.

B. Residual Heat Removal (RHS) 7
The interconnection between the Post Accident Sampling System and the Residual Heat Removal System permits the PASS to sample the reactor vessel water (with the vessel depressurized) or the suppression pool water.

C. Primary Containment (PSC)
PASS can draw atmospheric samples from the primary containment drywell and the suppression chamber. The liquid sampler unit directs all of the water flushed through its sample piping into the suppression pool. The discharge of one of the two gas pumps of the gas sampler unit is directed into the suppression pool as well. The sample cabinet sump is drained to the suppression pool.

Activity	Text Ref. Page	Text Ref. Fig.	S.L.O.
D. Secondary Containment (SCS) The PASS gas sampler has the capability to take an atmospheric sample from the secondary containment. One of the gas sample pumps returns the gas sample to the secondary containment.	7		
E. Service Water (SWP) The service water system provides cooling water to the liquid sample coolers.			
F. Vital AC Power Supply (VBA) The uninterruptable power supply provides power to the PASS control panel.			
G. 125 VDC Battery System (BYS) The 125 VDC Station battery system provides power to the PASS isolation valve control panel.			
VI. DETAILED SYSTEM REFERENCE REVIEW Review each of the following referenced documents with the class. A. N2-CSP-13 Post Accident Monitoring	8		
VII. RELATED PLANT EVENTS A. Refer to Addendum "A" and review related events with class, (if applicable).			

VIII. SYSTEM HISTORY

A. Refer to Addendum "B" and review related modifications with class, (if applicable).

IX. WRAP-UP

A. Review the Student Learning Objectives.