NINE MILE POINT NUCLEAR STATION

UNIT II OPERATIONS

02-REQ-001-222-2-00-4

LESSON PLAN

DRYWELL COOLING SYSTEM

Prepared By: Unit 2 Training Department

APPROVALS	SIGNATURES	DATE AND INITIALS REVISION 4
Training Supervisor Unit #2 G. L. Weimer		4/8/88
Asst. Superintendent Training-Nuclear R.T. Seifried	R.T. Seifried	4/11/88
Superintendent of Operations Unit #2 R. Smith		4/12/88

Summary of Pages

Revision: 4 (Effective Date: 4/12/88)

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NIAGARA MOHAWK POWER CORPORATION

13pp

5/4/72

Attachment "A"

OBJECTIVE APPROVAL

Author: R. BROWN

Training Dept: Unit 2 Ops Trng

Lesson Title: DRYWELL COOLING SYSTEM

Lesson Plan #: U2-OLP-20

Training Setting(s): NLOT, LIC CLASS, REQUAL

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

Trainee Job Title: PLANT OPERATOR

Approvals/Review	Signatures	Date
Training Supervisor	[signature]	4/2/88
Plant Supervisor	[signature]	4/12/88
Training Analysts Supervisor		

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

Attachment "A"

OBJECTIVE APPROVAL

Author: R. Brand

Training Dept: Unit 2 Ops Trng

Lesson Title: Reviews Exams

Lesson Plan #: U2-OLP-20

Training Setting(s): NLOT, LIC CLASS, REQUAL

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

Trainee Job Title: PLANT OPERATOR

Approvals/Review	Signatures	Date
Training Supervisor		
Plant Supervisor		
Training Analysts Supervisor	MA Bramante	5-19-88

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

I. TRAINING DESCRIPTION

A. Title: Drywell Cooling System

B. Purpose: In a lecture presentation, the 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.

C. Estimated Duration: Approximately 1.5 hours

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 Specification
   a. 3/4.6.1.7, Drywell Average Air Temperature
2. Operating Procedures
   a. N2-OP-60, Drywell Cooling
   b. N2-OP-13, Reactor Building Closed Loop Cooling
3. NMP-2 FSAR
   a. Design Basis Vol. 20, Ch. 9.4, Pg. 9.4-20 |4

II. REQUIREMENTS/PREREQUISITES

A. Requirements for Class:

1. AP-9, Rev. 2, Administration of Training
2. NTP-10, Rev. 3, Training of Licensed Operator Candidates
3. NTP-11, Rev. 4, Licensed Operator Retraining and Continuing Training |4
4. NTP-12, Rev. 2, 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 II, or a similar plant, or successful completion of SRO training including simulator certification at the SRO level for Nine Mile Point Unit II, and

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 Operations Superintendent, his designee, or Training Superintendent.

III. TRAINING MATERIALS

A. Instructor Materials

1. Transparency Package
2. Overhead Projector
3. Whiteboard and Felt Tip Markers
4. N2-OLP-20 |
5. N2-OLT-20 |4.
6. See Section I.E.1 |
7. See Section I.E.2 |

B. Student Materials

1. N2-OLT-20
2. Section I.E.1 |4
3. 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. OBJECTIVES

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

20-1 State the purpose of the Drywell Cooling System.

20-2 State the three areas that are cooled by the Drywell Cooling System.

20-3 Describe the normal operation of the Drywell Cooling System.

20-4 State the interlock between the Drywell Cooling Unit Coolers and the Reactor Building Closed Loop Cooling Water system isolation valves.

20-5 State the function/operation of the Drywell Unit Cooler Group 1/2 LOCA Override and Drywell Unit Cooler Div. I/II Water LOCA Override switches as they pertain to Drywell Unit Cooler operation.

20-6 Given a diagram of the Drywell Cooling System trace the normal flowpath for the three areas cooled.

20-7 State the purpose of the following components:

a. Discharge damper on UC3A and 3B (DMP 1A and 1B)
b. Balancing dampers on area supply ducts
c. Loop seal in unit cooler drains to Drywell Floor Drain System

20-8 List the power supplies to the drywell unit cooler fans.

20-9 Given N2-OP-60, Drywell Cooling, use the procedure to identify the appropriate actions and/or locate information related to:

a. Startup
b. Normal operation
c. Shutdown
d. Off-Normal operations
e. Procedures for correcting alarm conditions

*20-10 (SRO Only) Given the Technical Specifications identify the appropriate actions and/or locate information relating to limiting conditions for operation, bases, and surveillance requirements for the Drywell Cooling System.

VI. LESSON CONTENT

Activity	Text Ref. Page	Text Ref. Fig.	S.L.O.
PRESENTATION			
I. INTRODUCTION			
A. Student Learning Objectives	i,ii		
B. System Purpose	1		1
The purpose of the Drywell Cooling System (DRS) is to condition the air inside the Drywell area and maintain this area within acceptable environmental limits for equipment operation and personnel safety.			
C. General Description			
1. DRS provides temp. control and air circulation for 3 areas in the drywell:		1	2
a. Reactor Vessel top head area (UC 3A and 3B)			
b. Reactor Vessel area (UC 1A thru 1D)			
c. General Drywell area (UC 2A thru 2D)			
2. All cooling coils of the drywell unit coolers are supplied from the Reactor Building Closed Loop Cooling System (CCP).			
II. DETAILED DESCRIPTION			
A. Reactor Vessel Top Head Area Cooling			
1. UC3A and 3B cool the area located above the refueling floor. One unit normally running with the second unit in standby.			
a. Air drawn from top area of drywell.			
b. Suction source: vessel top head suction duct.			6
c. Discharge: vessel top head area			
2. CCP provides the coolant to cooling coils.	2	1	

Activity		Text Ref. Page	Text Ref. Fig.	S.L.O.
3.	Backdraft dampers (DMP 1A and 1B) prevent reverse flow through a fan that is not operating.	2	1	7a
4.	Two individual ducts combine into one common discharge duct.			
5.	Common discharge duct branches into three distribution ducts.			
6.	Each distribution duct has balancing damper to adjust air flow for proper heat removal capacity.			7b
7.	Suction duct may be removed so as not to interfere with any operation when the reactor vessel head is removed.			
B.	Reactor Vessel Area Cooling			
1.	UC1A, 1B, 1C, and 1D cool the reactor vessel area.			
a.	Suction taken from the upper areas of the drywell.			6
b.	Discharge to:			
1)	Reactor Pedestal			
2)	Control Rod Drive Area			
3)	RRS Pump Area			
4)	Annular space between Reactor Vessel and Biological Shield Wall.			
2.	CCP provides the coolant to cooling coils			
3.	Branch distribution ducts to the CRD area and vessel support skirt contain balancing dampers.			
4.	Air supplied to the annular space travels up the annual space inside the shield wall and exhausts into the upper drywell area.	2	1	

Activity	Text Ref. Page	Text Ref. Fig.	S.L.O.
5. Air supplied to the pedestal and CRD area exhausts into the lower drywell area through exhaust ducts in the pedestal.	2	1	
C. General Drywell Area Cooling	3		
1. UC2A, 2B, 2C and 2D unit coolers are:			
a. Nonducted			
b. Create a turbulent mixing action to ensure temperature statification doesn't occur in the upper drywell area.			6
2. Cooled by CCP.			
D. Unit Cooler Condensate Drains			
1. The condensate formed on the cooling coils is routed to the Drywell Floor Drains.			
2. Loop seal provide in drain to prevent drawing air into drywell from drain system.			7c
III. INSTRUMENTATION, CONTROLS AND INTERLOCKS			
A. Instrumentation			
1. Two 12-point recorders located on Drywell cooling and Primary Containment Purge Panel (PNL873) in the Main Control Room display inlet/outlet air temp for each drywell cooler.			
2. Unit coolers discharge air flow is monitored and inputs low flow alarm on PNL873 when cooler is operating and air flow is low.	3	1	
3. UC3A and B are monitored for fan vibration.			

Activity	Text Ref. Page	Text Ref. Fig.	S.L.O.
B. Controls			
1. Unit Cooler Control Switch			
a. P873			
b. START, NORMAL AFTER, STOP positions			
c. Red indicating light - on when fan operating			
d. Green indicating light - on when fan stopped			
2. LOCA Override Switches			
a. Drywell Unit Cooler Group 1/2 LOCA Override			
1) OVERRIDE and RESET positions			
2) Key removable in RESET only			
3) P873			
b. Drywell Unit Cooler Div. I/II Water LOCA Override			
1) OVERRIDE and RESET positions			
2) Key removable in RESET only			
3) P873			
C. Interlocks			
1. CCP isolation valve interlock			4
a. Trips a running unit fan or prevents starting of a unit fan if all isolations are not full open.			
2. Drywell Unit Cooler Group 1/2 LOCA Override			5
a. Allows restart of unit fans without CCP to coolers			
3. Drywell Unit Cooler Div. I/II LOCA Override			5

Activity	Text Ref. Page	Text Ref. Fig.	S.L.O.
a. Allows reopening of CCP isolations with a LOCA signal sealed in.			
4. A motor overload will cause a drywell unit cooler to trip.			
IV. SYSTEM OPERATION			
A. Normal Operation	4	1	
1. All unit coolers fans operating with the exception of one vessel top head area cooling fans. (2DRS-UC3A or 3B)			3 |4 |
2. Avg. temp of drywell - <150°F			
3. RBCLCW temp - 95°F			
4. Temperature regulation of the drywell is accomplished by the number of cooling fans operating.			
5. Relative humidity is maintained between 20 and 50 percent			
B. Emergency Operation			
1. On receipt of a LOCA signal, CCP inboard and outboard isolation valves will close, thus causing the fans to trip unless the Drywell Unit Cooler Group 1/2 LOCA override keylock on Panel 873 is in OVERRIDE			5
2. CCP can be restored to the drywell unit coolers by operation of an additional set of LOCA override switches at Panel 873 which allows the CCP isolation valves to be opened with a LOCA signal sealed in.			

Activity	Text Ref. Page	Text Ref. Fig.	S.L.O.	
V. SYSTEM INTERRELATIONS	5			
A. Plant Electrical System			8	
600AC power is supplied from 2NHS-MCC011 and MCC012 to operate the drywell unit cooler fan motors				
B. Reactor Building Closed Loop Cooling Water System				
The cooling medium to the drywell unit coolers is provided by CCP.				
C. Drywell Floor Drains Systems				
The drain path for Unit Cooler condensate drains is provided by the Drywell Floor Drain System.				4
VI. DETAILED SYSTEM REFERENCE REVIEW				
Review each of the following referenced documents with the class.				
A. Technical Specifications:			10	
1. 3.6.16 Drywell Average Air Temperature				
B. Procedures:			9	4
1. N2-OP-60 Drywell Cooling				
2. N2-OP-13 Reactor Building Closed Loop Cooling				
VII. RELATED PLANT EVENTS				
A. Refer to Addendum A and review related events with class (if applicable).				4
VIII. SYSTEM HISTORY				
A. Refer to Addendum B and review related modifications with class (if applicable).				4
IX. WRAP-UP				4
A. Review the Student Learning Objectives.				