ATTACHMENT 3: LESSON PLAN TEMPORARY/PUBLICATION CHANGE FORM

Ø7-191-91

The attached change was made to:

Lesson plan title: Control Room ENVIRONMENTAL Control

Lesson plan number: 02-REQ-ØØ1-288-2-Ø2

Name of instructor initiating change: Eric D Perry

Reason for the change: Typo in the list of Objectives. Objective 70-4 should read 'Control Building Ventilation' vice 'Control Room Ventilation'.

Type of change: Temporary change ____ Publication change X

Disposition:

X 1. Incorporate this change during the next scheduled revision. The change does not alter the intent of the lesson plan.

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

Approvals:

Instructor: R Magnan /Date 11/1/90

Senior Instructor: Eric D Perry /Date 11/1/90

Supervisor: Lawrence G Gill /Date 11/1/90

NINE MILE POINT NUCLEAR STATION

UNIT II OPERATIONS

LESSON PLAN



62-REQ-001-288-2-02-4

# CONTROL ROOM ENVIRONMENTAL CONTROL SYSTEM

Prepared by: Unit #2 Training Department

| APPROVALS | SIGNATURES | DATE AND INITIALS REVISION 4 |
|---|---|---|
| Training Supervisor Nuclear-Unit #2 G. L. Weimer | G L Weimer | 1/20/89 |
| Assistant Training Superintendent-Nuclear R. T. Seifried | R. T. Seifried | RTS 1/23/89 |
| Superintendent Operations-Unit #2 R. G. Smith | R G Smith | 1/23/89 RGS |

Summary of Pages

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

Number of Pages: 14

| Date | Pages |
|---|---|
| January 1989 | 1 - 14 |

THIS LESSON PLAN IS A GENERAL REWRITE

NIAGARA MOHAWK POWER CORPORATION

Attachment "A"

## OBJECTIVE APPROVAL

Author: UNIT II OP's TRAINING

Training Dept: Unit II OPS.

Lesson Title: Control Room Environmental Control System

Lesson Plan #: NZ-OLP-70

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] | 1/24/89 |
| Plant Supervisor | [signature] | 1/23/89 |
| Training Analysts Supervisor | [signature] | 1-12-89 |

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

I. TRAINING DESCRIPTION

A. Title: N2-OLP-70, "Control Room Environmental Control System"

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 1.5 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 Specifications
   a. 3/4.7.3, Control Room Outdoor Air Special Filter Train
   b. 3/4.3.7.1, Radiation Monitoring Instrumentation
2. Procedures
   a. N2-OP-53A, "Control Room Ventilation System"
   b. N2-OP-53B, "Relay Room Ventilation System"
   c. N2-OP-53C, "Control Building Chilled Water System"
   d. N2-OP-53D, "Control Building Special Filter Train"
3. NMP-2 FSAR
   Design Bases Volume 20, Chapter 9

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-70
5. N2-OLT-70
6. See Section I.E.1
7. See Section I.E.2

B. Student Materials

1. N2-OLT-70
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 THE CONTROL ROOM ENVIRONMENTAL CONTROL SYSTEM

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

70-1 State the purpose of the Control Room Environmental Control System.

70-2 List the areas included in the Control Room Envelope.

70-3 Describe the purpose of the major system components.

70-4 Given N2-OP-53A, "Control ~~Room~~ Building Ventilation", identify the appropriate actions and/or located information related to:

a. Start-Up
b. Normal Operations
c. Shutdown
d. Off Normal Operations
e. Procedures for Correcting Alarm Conditions

70-5 SRO ONLY

Given Technical Specifications, identify the appropriate actions and/or locate information relating to Limiting Conditions for Operation, Bases, and Surveillance requirements for the Control Room Environmental Control System.

| VI. LESSON CONTENT | Text Ref. Page | Text Ref. Fig. | S.L.O. |
|---|---|---|---|
| I. INTRODUCTION | | | |
| Student Learning Objectives | i | | |
| A. Design Considerations | | | |
| 1. Purpose | 1 | | 1 |
| The purpose of the Control Room Environmental Control System is to maintain the quality of the control room environment to ensure that the plant operators can remain in the control room to safely operate the plant under normal conditions and maintain the plant in a safe condition under all accident conditions. | | | |
| B. General Description | | | |
| 1. Main Control Room Envelope | | 1 | 2,3 |
| a. The main control room envelope or pressure boundary consists of all the rooms in the main control room and the relay room of the control building. | | | |
| b. The main control room envelope is separated from the rest of the plant by air tight doors and contains all instrumentation and controls necessary for safe shutdown of the plant. | | | |
| c. The control room envelope contains all supplies and facilities needed by a team of six (6) people for 30 days. | | | |
| 2. Control Building Air Conditioning System | | | |
| a. The control room air conditioning system (HVC) supplies conditioned outside air to the control room envelope. | | | |

| Activity | Text Ref. Page | Text Ref. Fig. | S.L.O. |
|---|---|---|---|
| b. On high airborne radioactivity level or a LOCA signal, the air conditioning system will automatically divert the supply air through the special filter trains. The special filter trains consist of an electric heater to control humidity, a prefilter, a high efficiency air particulate (HEPA) filter, an active charcoal filter for removal of radioactive iodine, and a second HEPA filter and a booster fan. | 1 | | |
| c. Smoke detectors and a separate smoke removal system are provided for control room envelope. | 2 | | |
| II. DETAILED DESCRIPTION | | | |
| A. Main Control Room Envelope | | 1 | 2,3 |
| 1. Envelope | | | |
| a. The main control room envelope or pressure boundary contains all controls and instrumentation necessary for a safe shutdown of the plant and is limited to areas requiring operator access during and after a DBA. | | | |
| b. The construction of the main control room envelope ensures that the control room can continue to operate during a safe shutdown earthquake, a tornado, or the design flood. | | | |
| c. The reinforced concrete walls of the envelope provide the control room operators with radiation shielding. | | | |
| B. Control Room Envelope HVAC Supply and Exhaust | | | |
| 1. Control room air is recirculated through the Control Room HVAC System for filtering and cooling. | | 2 | |
| a. Outside air for system makeup is drawn in through a missile protected air inlet with tornado dampers and a bird screen. | | | |

| Activity | Text Ref. Page | Text Ref. Fig. | S.L.O. |
|---|---|---|---|
| b. The purpose of mixing the outside air with the inside air is to preclude the buildup of airborne radioactivity within the control room. | 2 | 2 | 3 |
| c. Air flows through the normal supply duct work and bypasses the special filter trains through bypass valves. | | | |
| d. Radiation levels are monitored by radiation monitors. | | | |
| e. On high radiation level or a LOCA signal the bypass valves close and air is directed through the special filter trains. | 3 | | |
| f. Booster fans (FN2A/B) are used to compensate for the pressure drop across the filter train and exhaust the air to the normal supply duct. | | | |
| 2. Two exhaust fans (FN1 and FN7) continuously discharge a small amount of the control room envelope air from the kitchen and toilet. | | | |
| C. Control Room Air Conditioning Units | | | |
| 1. Two redundant 100 percent capacity air conditioning units are used to cool and condition the air. | | | |
| a. Each unit is provided with a filter. | | | |
| b. Air exits the filter unit and enters the air conditioning unit where it is cooled by cooling coils supplied by control building chilled water. | | | |
| c. A fan discharges the cooled air through an air operated damper to the air distribution ducts. | | | |

| Activity | Text Ref. Page | Text Ref. Fig. | S.L.O. |
|---|---|---|---|
| 2. Local heating is provided by unit heaters in the air conditioning equipment room and the Division 2 and 3 cable chase, and by base-board heating in the corridors and training rooms. | 3 | 2 | 3 |
| 3. Other areas are heated by electric duct mounted heaters. | | | |
| 4. Return air from all areas of the control room envelope at elevation 306 feet, except the kitchen and toilet, is routed to the ventilation chases. | | | |
| 5. Supply capacity exceeds the exhaust capacity to ensure a positive pressure is maintained in the control room envelope. | | | |
| D. Relay Room Air Conditioning Units | 4 | | |
| 1. Two 100% capacity redundant air conditioning units are used to cool the relay room loads. | | | |
| a. The A/C unit takes a suction from the relay room ventilation chase and discharges it to the relay room loads through air operated damper. | | | |
| b. Two 100% capacity computer room A/C units are used to cool the computer room. | | | |
| 1) Two makeup air fans supply makeup air from the outside air ductwork. | | | |
| c. Return ventilation is routed by ductwork to the ventilation chases. | | | |
| E. Fire Dampers and Smoke Removal | | | |
| 1. The ductwork and natural ventilation paths between control room areas are equipped with fire dampers to enable a fire to be isolated. | | | |

| Activity | Text Ref. Page | Text Ref. Fig. | S.L.O. |
|---|---|---|---|
| 2. A separate system ties into the return duct-work with air operated dampers to provide smoke removal. | 4 | 2 | 3 |
| a. A smoke removal fan discharges through air operated dampers to an exhaust outlet. | | | |
| b. This system must be aligned by the operator. | | | |
| F. Control Building Chilled Water System | | | |
| 1. The control building chilled water system consists of two independent, redundant closed loops. | | | |
| 2. Chilled water circulating pump pumps water from the loop discharge collection header to the control building chiller where the water is cooled by refrigerant. | | | |
| 3. The supply header downstream of the chiller distributes the water to the following loads: | 5 | | |
| a. Cooling coils in the Relay Room A/C Unit | | | |
| b. Cooling coils in the Computer Room A/C Unit | | | |
| c. Cooling coils in the Control Room A/C Unit. | | | |
| 4. The Control Room and the Relay Room A/C cooling coils utilize temperature control valves to control the cooling flow. | | | |
| 5. Computer room A/C cooling coils do not have a temperature control valve, however, they do have a solenoid isolation valve to provide component isolation. | | | |
| 6. Loop expansion tank provides a volume for makeup water supplied from the makeup water system. | | | |

| Activity | Text Ref. Page | Text Ref. Fig. | S.L.O. |
|---|---|---|---|
| III. INSTRUMENTATION AND CONTROL | 5 | | |
| A. Instrumentation | | | |
| 1. Level - The chilled water expansion tank level (measured in inches) in each loop is monitored and provides: | | | |
| a. Local indication | | | |
| b. Automatic closure signal to the computer room supply valves on low level. | | | |
| 2. Radioactivity - The activity of the makeup air is used to automatically shift the makeup air supply from the normal supply to the special filter trains a high radioactivity level | | | |
| 3. Pressure | | | |
| a. Differential pressures across the system Oilters and filter units provide local indication of a clogged filter. | | | |
| b. The pressure in the chiller compressor condenser is monitored and used to promptly secure the compressor if abnormal conditions occur. | | | |
| c. Differential pressure gauges in the control room and relay room supply indication of the difference between atmospheric and envelope pressure. | | | |
| 4. Flow - System flows are measured and are used to start the redundant standby component in the event of low flow through an operating unit. | 6 | | |

| Activity | Text Ref. Page | Text Ref. Fig. | S.L.O. |
|---|---|---|---|
| 5. Temperature - Temperature in the various spaces are monitored and used to control system heaters and air conditioners. The control room and relay room A/C units temperature control valves use an auctioneered (highest) signal of room temperature and room humidity to maintain optimum room conditions. | 6 | | |
| 6. Smoke detectors are provided in the system supply and return lines to aid in the prompt detection of fires. | | | |
| B. Controls | | | |
| 1. Major system components use a 4 position (PULL TO LOCK-STOP-NORMAL AFTER-START) control switch. The switch spring returns to NORMAL AFTER from STOP or START with mechanical target flags to indicate the previous positions (red-START, green-STOP). | | | |
| C. System Interlocks | | | |
| 1. Special Filter Train Booster Fan | | | |
| a. Starts - when the following conditions are met. | | | |
| 1) Fan control switch in NORMAL AFTER with booster fan flow low and control building air supply radiation is high | | | |
| b. Trips | 7 | | |
| 1) Filter train charcoal absorber temperature high. | | | |
| 2) Fan flow low | | | |
| 2. Supply Valves Automatic Clousre Close on control room supply air high radiation or LOCA (High Drywell Pressure 1.68 psig or Low-low level 108.8") is present. | | | |

| Activity | Text Ref. Page | Text Ref. Fig. | S.L.O. |
|---|---|---|---|
| 3. Fan Outlet Dampers<br>Outlet Dampers for control room air conditioning units and relay room air conditioning units auto open when unit is started and auto close when unit trips or stops. | 7 | | |

IV. SYSTEM OPERATION

A. Normal Operations

1. During normal operation, outside air is drawn in to supply makeup air to the ventilation system.
2. A single control room air conditioning unit, relay room air conditioning unit and computer room air conditioning unit are in service with the second air conditioning unit of each pair in standby.
3. All of the A or B components will be operating together with the single chiller loop (A or B) required for component cooling in operation.
4. The computer room booster fans are in operation and the kitchen and toilet exhaust fans are running.

V. SYSTEM INTERRELATIONS 8

A. Plant Electrical System

The plant electrical system provides electrical power to operate components required to maintain the control room envelope and provides power for the control room indications and controls.

B. Instrument Air System (IAS)

The intrument air system provides air for control room envelope instrumentation and operation of system air operated dampers.

| Activity | Text Ref. Page | Text Ref. Fig. | S.L.O. |
|---|---|---|---|
| C. Makeup Water System (MWS)<br>The makeup water system provides makeup water to the control building chilled water loops. | 8 | | |
| D. Service Water System (SWP)<br>The service water system normally cools the control building chilled water chillers and can be lined up by the operator to provide cooling water to the control building envelope air conditioning units on a loss of control building chilled water. | | | |
| VI. DETAILED SYSTEM REFERENCE REVIEW<br>Review each of the following referenced documents with the class. | 9 | | |
| A. Technical Specifications | | | 5 |
| 1. 3/4.7.3 Control Room Outdoor Air Special Filter Train | | | |
| 2. 3/4.3.7.1 Radiation Monitoring Instrumentation | | | |
| B. Procedures | | | 4 |
| 1. N2-OP-53A Control Room Ventilation System | | | |
| 2. N2-OP-53B Relay Room Ventilation System | | | |
| 3. N2-OP-53C Control Building Chilled Water System | | | |
| 4. N2-OP-53D Control Building Special Filter Train | | | |

VII. RELATED PLANT EVENTS

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

VIII. SYSTEM HISTORY

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

IX. WRAP-UP

A. Review the Student Learning Objectives.