

07-189-901

NINE MILE POINT NUCLEAR STATION

UNIT #2 OPERATIONS

LESSON PLAN

MASTER CONTROLLED DOCUMENT

CONTAINMENT ATMOSPHERIC MONITORING SYSTEM (CMS)

02-REQ-001-223-2-06-0

Prepared By: Unit #2 Training Department

DATE AND INITIALS

APPROVALS

SIGNATURES

REVISION 0

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Summary of Pages

Revision: 0 (Effective Date: 12/8/88)

Number of Pages: 14

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Pages

May 1988

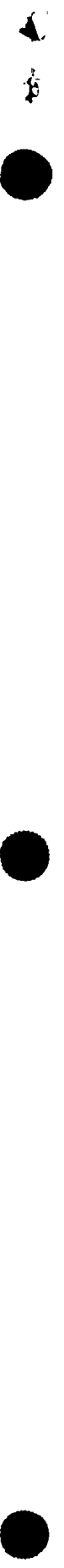
1 - 14

NIAGARA MOHAWK POWER CORPORATION

CONTROLLED DOCUMENT

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OBJECTIVE APPROVAL

Author: UNIT II OP's TRAINING

Training Dept: Unit II OPS.

Lesson Title: CONTAMINANT MONITORING SYSTEM

Lesson Plan #: NZ-OLP-23C

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]

12/4/88

Plant Supervisor

[Signature]

12/6/88

Training Analysts Supervisor

MA Beaumont

5-20-88

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



I. TRAINING DESCRIPTION

A. Title: Containment Atmospheric Monitoring 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. Total Time: 1.5 Hours

D. Teaching 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

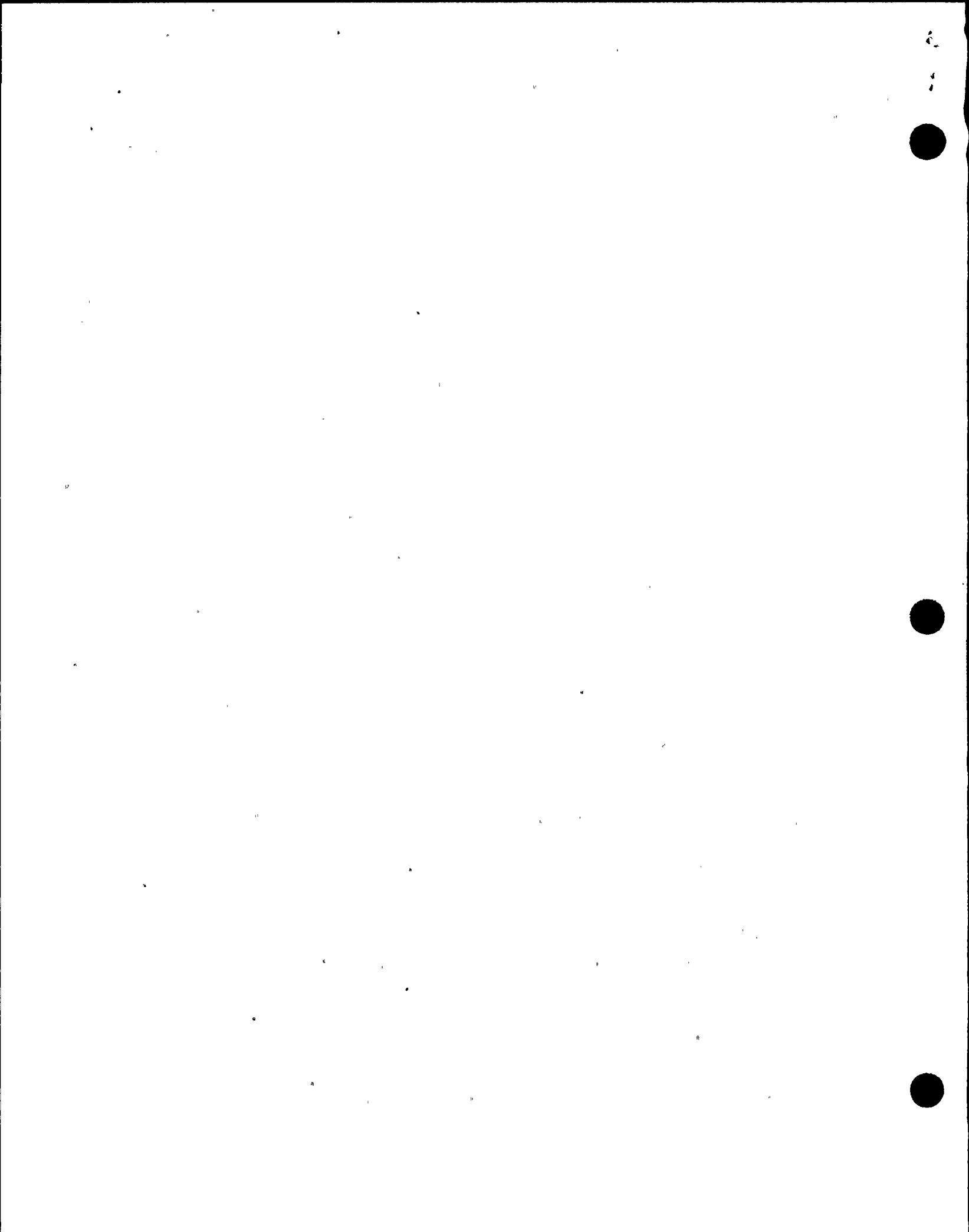
- a. 3/4.3.2 Isolation Actuation Instrumentation
- b. 3/4.3.7.5 Accident Monitoring Instrumentation
- c. 3/4.5.3, 3/4.6.2.1 Suppression Pool
- d. 3/4.6.1.2 Primary Containment Leakage
- e. 3/4.6.1.6 Drywell Average Air Temperature
- f. 3/4.6.3 Primary Containment Isolation Valves
- g. 3/4.6.6.2 Drywell and Suppression Chamber Oxygen Concentration

2. Procedures

- c. N2-OP-82 "Containment Atmospheric Monitoring System"

3. NMP-2 FSAR

- a. Design Bases, Vol 14, Chapter 6.2



II. REQUIREMENTS AND 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. 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 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-23c
5. N2-OLT-23c
6. See Section I.E.1
7. See Section I.E.2

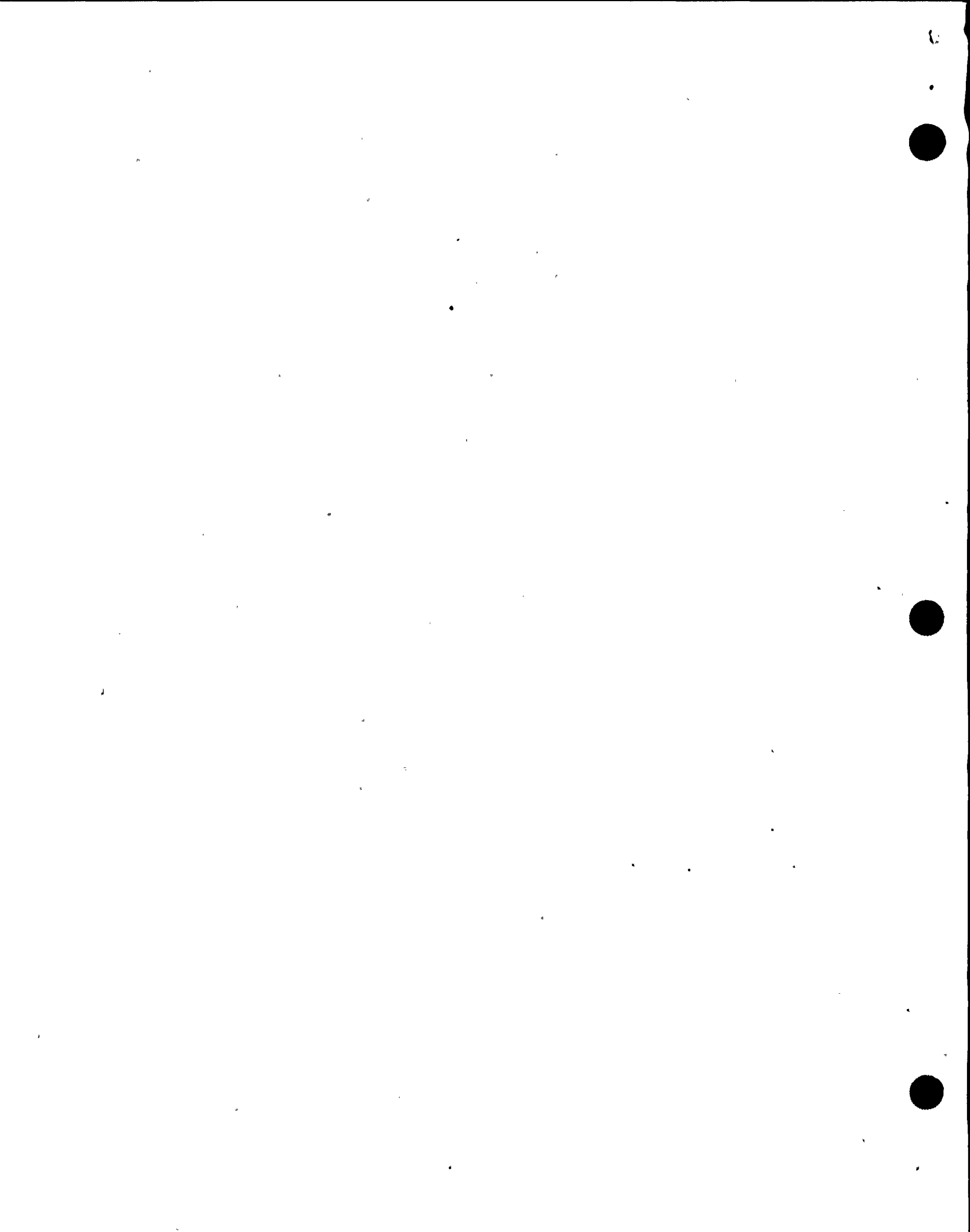


B. Student Materials:

1. N2-OLT-23c
2. See Section I.E.1
3. See Section I.E.2

IV. QUIZZES, TESTS, EXAMS AND ANSWER KEYS

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



V. STUDENT LEARNING OBJECTIVES FOR CONTAINMENT ATMOSPHERIC MONITORING SYSTEM

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

23c-1 State the purpose of the Containment Atmospheric Monitoring System.

23c-2 State the purpose of the following features of the CMS System and explain how they accomplish their purpose:

- a. Hydrogen/Oxygen Analyzers
- b. Containment Isolation Valves
- c. Radiation Monitors

23c-3 State the power supplies to:

- a. CMS Containment Isolation Valves
- b. H₂/O₂ Analyzers

23c-4 State the parameters monitored by the Containment Atmospheric Monitoring System, and where these parameters may be read.

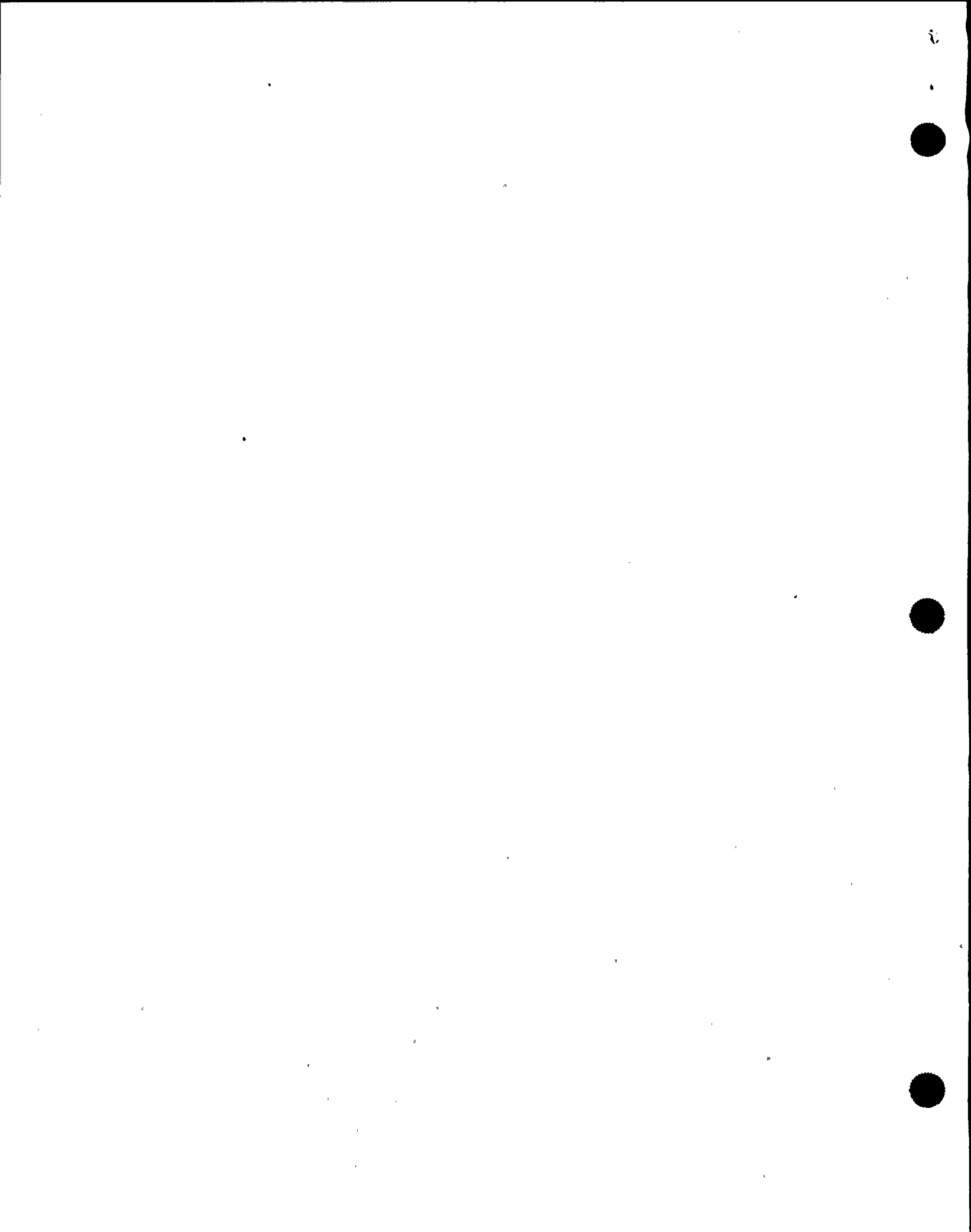
23c-5 Explain why continuous H₂/O₂ sampling is performed.

23c-6 State the setpoint(s) for the following alarms:

- a. High Drywell Temperature
- b. High O₂ Concentration
- c. High H₂ Concentration
- d. High Suppression Pool Temperature
- e. High Drywell Pressure

23c-7 Given N2-OP-82, "Containment Atmospheric Monitoring System", identify the appropriate actions and/or locate information related to:

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



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23c-8 Given Technical Specifications, identify the appropriate actions and/or locate information relating to Limiting Conditions for Operation, Bases and Surveillance Requirements for the CMS System.



VI. LESSON CONTENT

<u>Text</u>	<u>Text</u>	
<u>Ref.</u>	<u>Ref.</u>	
<u>Page</u>	<u>Fig.</u>	<u>S.L.O.</u>

Activity

I. INTRODUCTION

Student Learning Objectives

A. Purpose

1

The purpose is to supply information concerning 1 containment parameters during normal and post accident conditions.

B. General Description

1. Monitors containment parameters during normal operations and post-accident conditions.

a. Parameters monitored

1. Drywell

- a. Air Temperature
- b. H₂/O₂ Conc.
- c. Gaseous and particulate radiation levels
- d. Pressure

2. Suppression Chamber

- a. Air Temperature
- b. H₂/O₂ Conc.
- c. Pressure
- d. Pool level
- e. Pool temperature

2. Monitors parameters during "Type A" testing.

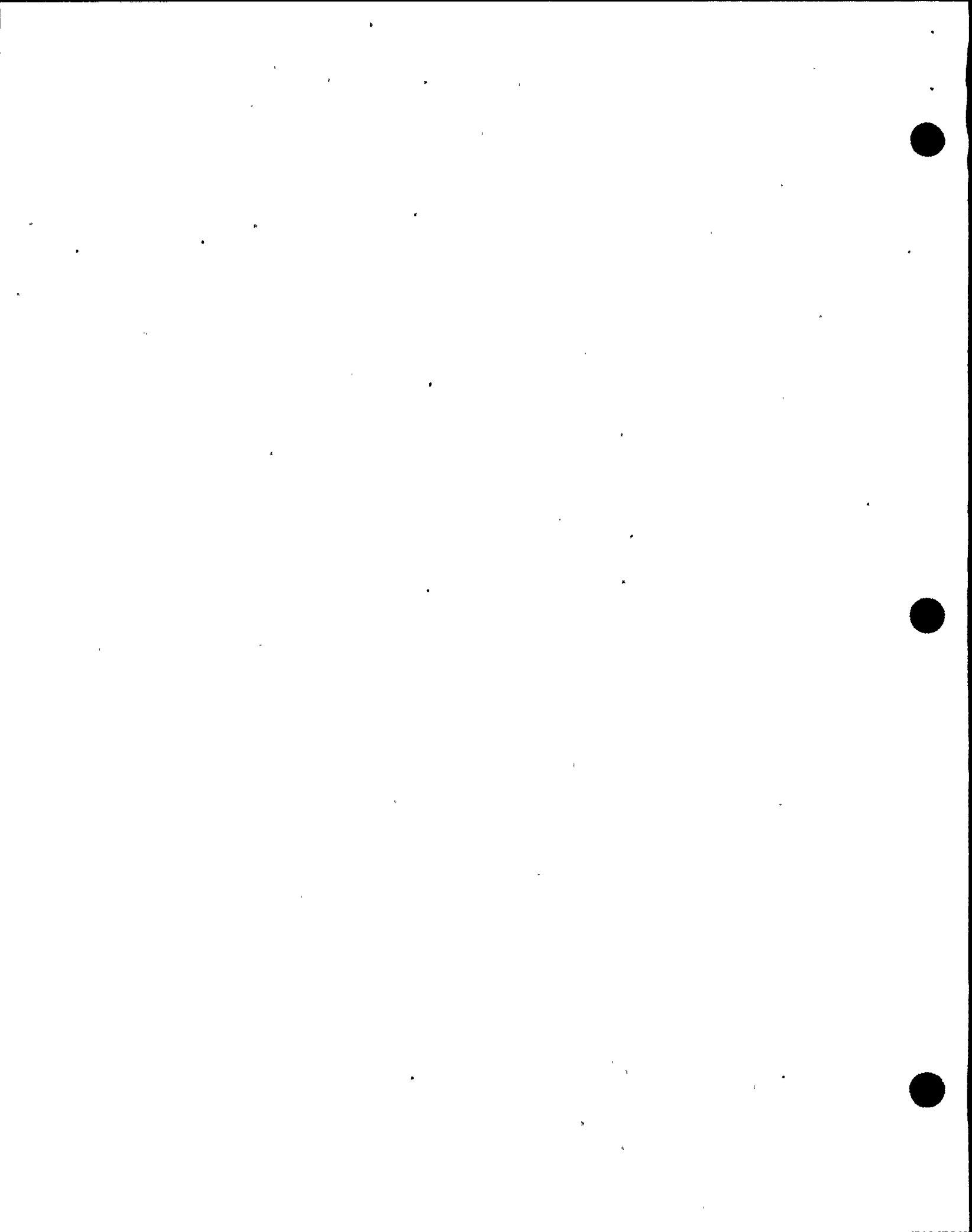
3. All lines which penetrate the containment are heat traced to prevent condensation formation.

II. DETAILED DESCRIPTION

A. Air Temperature

1. Drywell

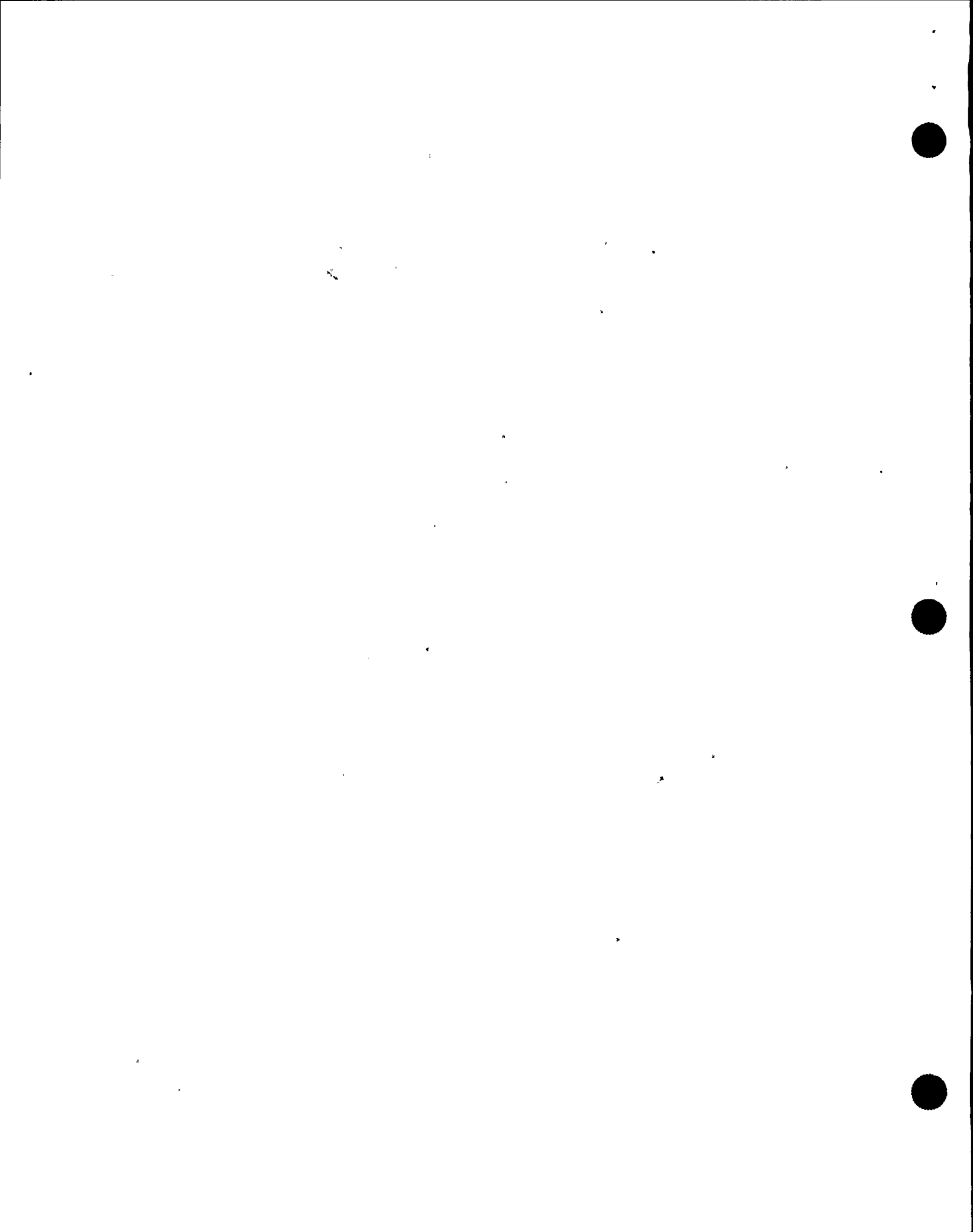
- a. Six Div I and Six Div II RTD's used.
N2-OLP-23c -6 May 1988



VI. LESSON CONTENT

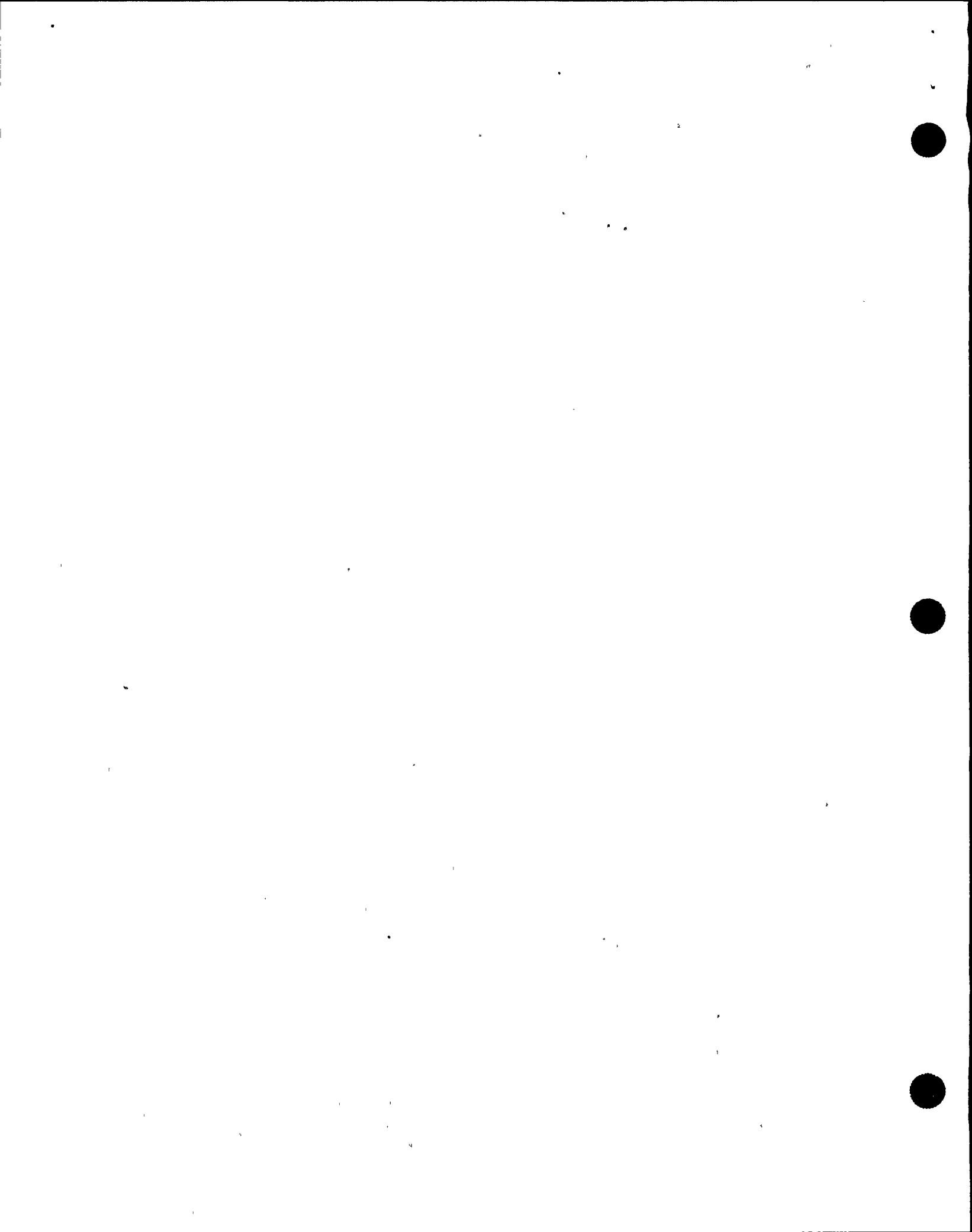
<u>Activity</u>	<u>Text Ref. Page</u>	<u>Text Ref. Fig.</u>	<u>S.L.O.</u>
3. Monitor containment gaseous and particulate radiation levels.			
E. <u>Suppression Pool Temperature</u>	3		
1. Uses 14 dual element RTD's per Div I and Div II, one element is an installed spare.			
2. 10 RTD's per Div. at 199' 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.)			
F. <u>Pressure Indication</u>			
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.			

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VI. LESSON CONTENT

<u>Activity</u>	<u>Text Ref. Page</u>	<u>Text Ref. Fig.</u>	<u>S.L.O.</u>
<ul style="list-style-type: none"> b. Highest readings and lowest reading for each Div. displayed in the Control Room. c. Input to computer and recorder. 			
<ul style="list-style-type: none"> 2. Suppression Chamber <ul style="list-style-type: none"> a. Three Div I and three Div II RTD's used. b. Highest reading and lowest reading display in Control Room. 			
<p>B. <u>H₂/O₂ Monitors</u></p> <ul style="list-style-type: none"> 1. Two independent systems. 2. Each monitors three drywell and two suppression chamber locations. 3. Rotates sample points every 12 minutes, so entire containment is sampled once/hour. <ul style="list-style-type: none"> a. Sequence timer opens and closes valves for sample and return points. b. Can be manually aligned to a single sample point. 	2		2a
<p>C. <u>Containment Isolation Valves</u></p> <ul style="list-style-type: none"> 1. Each division provided with containment isolation valves. 2. Isolate on: <ul style="list-style-type: none"> 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. 			2b
<p>D. <u>Radiation Monitors</u></p> <ul style="list-style-type: none"> 1. Two systems (Div I and Div II) 2. Use same sample lines as H₂/O₂ samplers. 			2c



VI. LESSON CONTENT

<u>Activity</u>	<u>Text Ref. Page</u>	<u>Text Ref. Fig.</u>	<u>S.L.O.</u>
c. Div I supplies indication in Control Room.			
d. Div II supplies a Control Room chart recorder.			
G. <u>Suppression Pool Level</u>	4		
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			
2) Control Room recorder			
H. <u>Humidity Analyzers</u>			
1. Used only for "Type A" Leak Rate Testing.			
2. Permanent brackets exist, detectors installed temporarily.			

III. INSTRUMENTATION, CONTROL, AND INTERLOCKS

4,6

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).

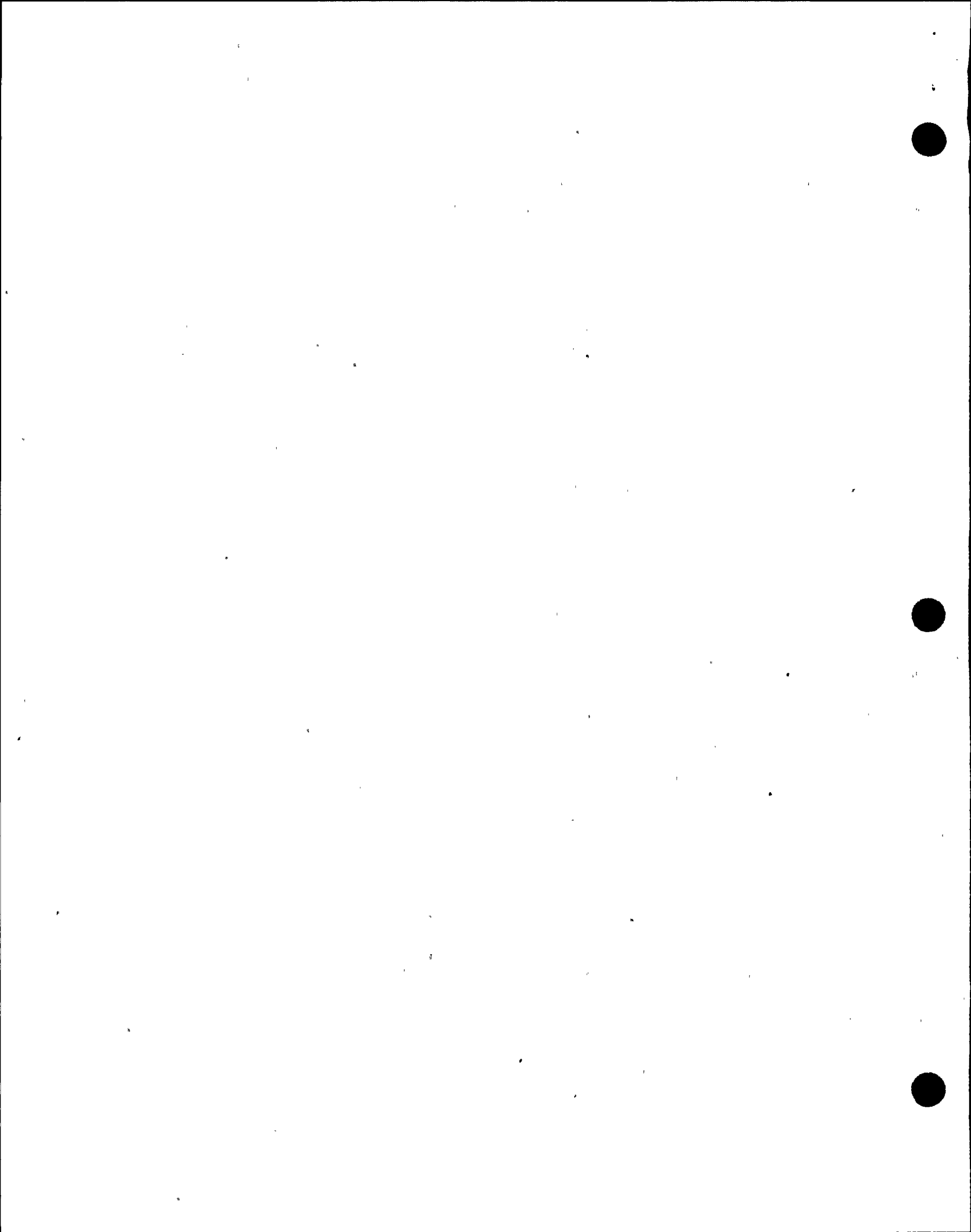
2) Alarm at 83.5°F on respective panel.

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4,6



<u>Activity</u>	<u>Text Ref. Page</u>	<u>Text Ref. Fig.</u>	<u>S.L.O.</u>
2. <u>Radiation Monitoring</u>	5		
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. <u>H₂/O₂ Analyzer</u>			
a. Samples drywell and suppression chamber in 5 locations on a rotating basis.			
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% ($\pm .1$).			
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% ($\pm .1$).			
4) Each Div. supplies computer points.			
4. <u>Suppression Pool Temperature</u>			4,6
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			



VI. LESSON CONTENT

<u>Activity</u>	<u>Text Ref. Page</u>	<u>Text Ref. Fig.</u>	<u>S.L.O.</u>
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. <u>Pressure Indication</u>	6		
a. Drywell Pressure			
1) Narrow Range (-5 to +5 psig)			
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.			



VI. LESSON CONTENT

<u>Activity</u>	<u>Text Ref. Page</u>	<u>Text Ref. Fig.</u>	<u>S.L.O.</u>
2) Wide Range (0-150 psig)			
a. Div I supplies indication on P601.			
b. Div II supplies a recorder on P898.			
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. H₂/O₂ Sample Systems can be manually aligned for single-stream sampling at P873 (Div I) and P875 (Div II)

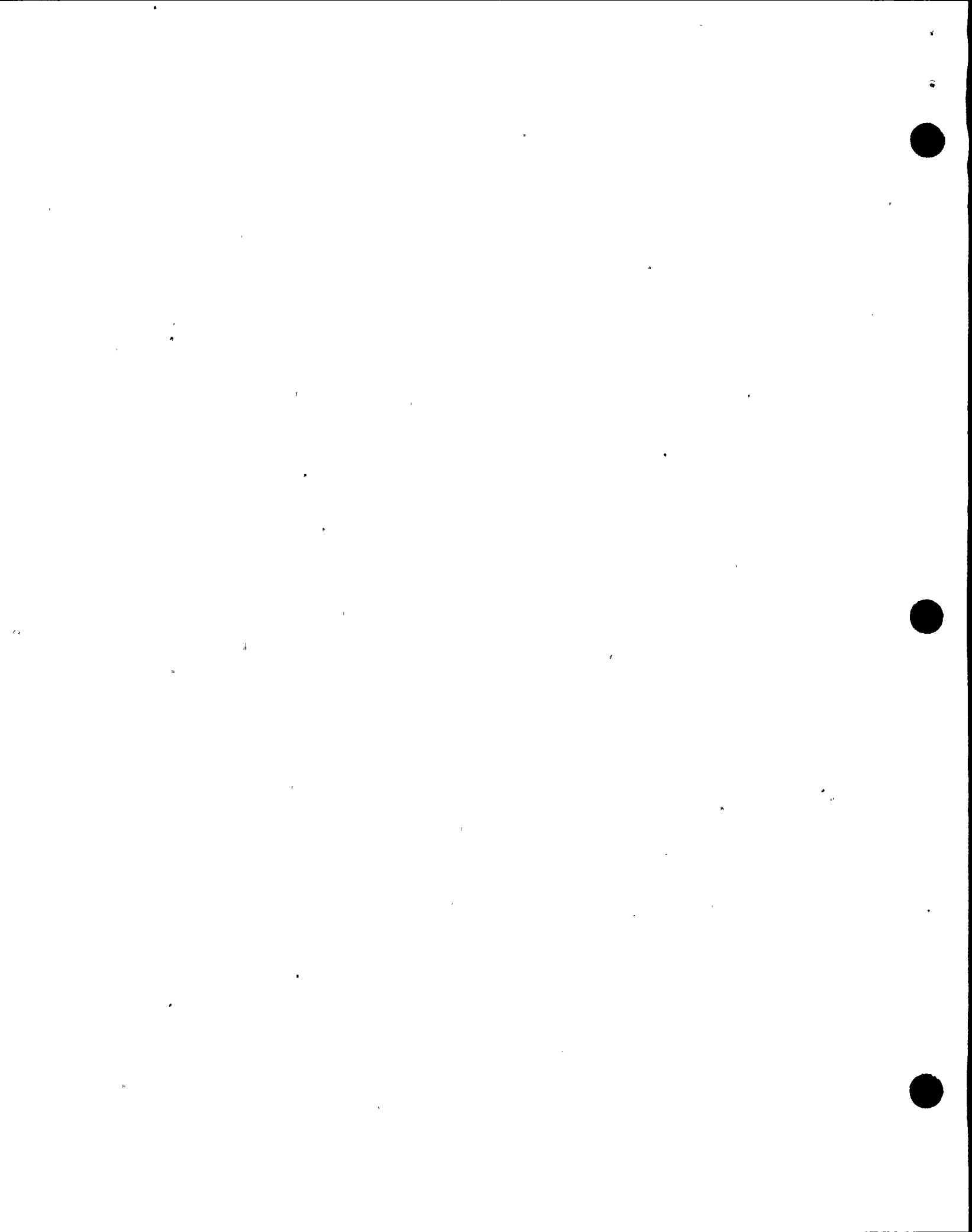
IV. SYSTEM OPERATION

A. Normal Operation

7

5

1. Monitoring parameters throughout the containment.



VI. LESSON CONTENT

<u>Text Ref. Page</u>	<u>Text Ref. Fig.</u>	<u>S.L.O.</u>
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Activity

2. H₂/O₂ 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.

B. Post Accident Monitoring

1. LOCA override switches enable operation to supply containment for H₂/O₂ and radiation levels.
2. Suppression Pool Temperature provided at 197' level to P898.

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. H₂/O₂ analyzers powered from:
 - a. 2A 2SCV*PNL101A
 - b. 2B 2SCV*PNL301A

3

B. Primary Containment Isolation System

Provides isolation signals to the containment isolation valves.

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VI. DETAILED SYSTEM REFERENCE REVIEW

Review each of the following referenced documents with the class:

A. Technical Specifications

1. 3/4.3.2, Isolation Actuation Instrumentation
2. 3/4.3.7.5, Accident Monitoring Instrumentation

8

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1. 1944

2. 1945

3. 1946

4. 1947

5. 1948

6. 1949

7. 1950

8. 1951

9. 1952

10. 1953

11. 1954

12. 1955

13. 1956

14. 1957