NIAGARA MOHAWK POWER CORPORATION

NINE MILE POINT NUCLEAR STATION

Ø7-188-91

02-LOT-001-295-2-01 Revision 6

TITLE: POST ACCIDENT SAMPLING SYSTEM

	SIGNATURE	DATE
PREPARER		5/21/91
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TRAINING SUPPORT SUPERVISOR	for J. LeClair	5-23-91
PLANT SUPERVISOR/ USER GROUP SUPERVISOR	FOR JB HEILMAN	5/29/91

Summary of Pages

(Effective Date: 5/29/91)

Number of Pages: 14

Date	Pages
May 1991	1 - 14

TRAINING DEPARTMENT RECORDS ADMINISTRATION ONLY

VERIFICATION:

DATA ENTRY:

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18pp

5/3/387

I. TRAINING DESCRIPTION

A. Title of Lesson: Post Accident Sampling System

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

C. Estimate of the Duration of the Lesson: Approximately 2 hours

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

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

F. Prerequisites:

1. Instructor:

a. The instructor shall be familiar with the lesson materials and have achieved the necessary instructor certification in accordance with NTP-16.

2. Trainee:

a. In accordance with eligibility requirements of NTP-10.

G. References:

1. N2-CSP-13, Post Accident Monitoring
2. USAR, Volume 2, Section II.B.3, Page 1.10-60

II. REQUIREMENTS

A. AP-9, Administration of Training

B. NTP-10, Training of Licensed Operator Candidates

III. TRAINING MATERIALS

A. Instructor Materials:

1. Training Record
2. Instructor's working copy of the lesson plan.
3. Whiteboard and markers
4. Overhead projector
5. Transparencies as needed
6. Flip Chart (if necessary)
7. Copy of trainee handouts
8. Trainee Course Evaluation Forms

B. Trainee Materials:

1. Handouts
2. Paper or notebook
3. Pen or pencil

IV. EXAM AND MASTER ANSWER KEYS

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

V. LEARNING OBJECTIVES

Upon completion of this training the trainee will have gained the knowledge to: 6

A. Terminal Objectives:

TO-1.0 Analyze indications to determine the cause of an off-normal event. (3440410303)

B. Enabling Objectives:

EO-1.0 State the purpose of the Post Accident Sampling System (PASS) and the plant conditions under which it is designed to function.

EO-2.0 List the sources from which the PASS can take samples.

EO-3.0 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

EO-4.0 Describe how the PASS gas sampling unit collects the following samples.

a. Iodine/Particulate
b. Gaseous grab sample

LESSON CONTENT	DELIVERY NOTES	OBJECTIVES/ NOTES
I. INTRODUCTION	Preliminary Activities 1. Introduce self to trainees. 2. Distribute TR 3. Distribute Course Evaluation Forms 4. Discuss Method of Evaluation	6
A. System Purpose 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.	Discuss Learning Objectives	
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. 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.	Discuss the eleven criteria for compliance to NUREG-0737. (Ref. 2)	EO-1.0 6

II. DETAILED DESCRIPTION

A. Sampling Equipment

1. Piping station

a. Located in Reactor Building at elev. 250 ft.

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.

   a. Liquid samples analyzed for — Discuss the reasoning for these samples and the time requirements. | 6 |

      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. Reactor Pressure Vessel

   a. Two jet pump flow-sensing instrument lines from below core plate used for sample points — EO-2.0 | 6

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.
      2) When in the Suppression Pool cooling mode, these sample points can obtain suppression pool water samples.

C. Liquid Sample Collection

1. Utilize Figure 1 to discuss the following flow paths for sampling.

Show TP of Figure 1 and discuss the sampling process.

EO-3.0a | 6 |

2. Rx coolant sample passes through 2 sample coolers-cooled by RBCLCW.
3. RHS sample only passes through the second sample cooler.

Use Fig. II.B.3-2 (control panel) to show controls.

| 6 |

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.
7. This provides 100:1 dilution of the highly radioactive liquid.

8.	Large volume sample initially collected in the 70 ml holdup cylinder a. This sample volume can be circulated and depressurized into gas expansion cylinder. b. A gas is added to strip gases from the coolant sample. 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.	Use TP of Figure 1 Discuss sampling process.	EO-3.0b |6
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		
1.	Gas samples can be taken from the drywell, suppression chamber, or Rx building atmospheres.	Use Figure 2 to show sampling process.	EO-3.0c |6
2.	The gas sample lines are heat traced along their full length to pre-vent 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.			
4.	The four-position five-ported selection valve is used to select sample location: The drywell, suppression chamber, or Rx Building atmosphere.	Use the USAR to explain why these locations were chosen.		|6
5.	Positive displacement pumps are used to draw sample through the sample station.			
6.	Particulate and iodine sample cartridges are installed in the sample lines to permit airborne particulate or iodine activity measurement.		EO-4.0a	|6
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.		EO-4.0b	|6
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.
11. P1 discharges into Rx Bldg atmosphere (Secondary Containment); P2 discharges into the suppression chamber atmosphere.

III. INSTRUMENTATION, CONTROLS AND INTERLOCKS

A. Control Devices

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.

Show Figure II.B.3-2 and discuss controls. |6

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.

2. Temperature

Sample temperature is sensed in degrees Fahrenheit on the inlet to the liquid sampler unit.

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.

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.

C. All PASS samples must be transported to the Unit 1 chem lab and counting room for analysis.

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)
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.

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.

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.

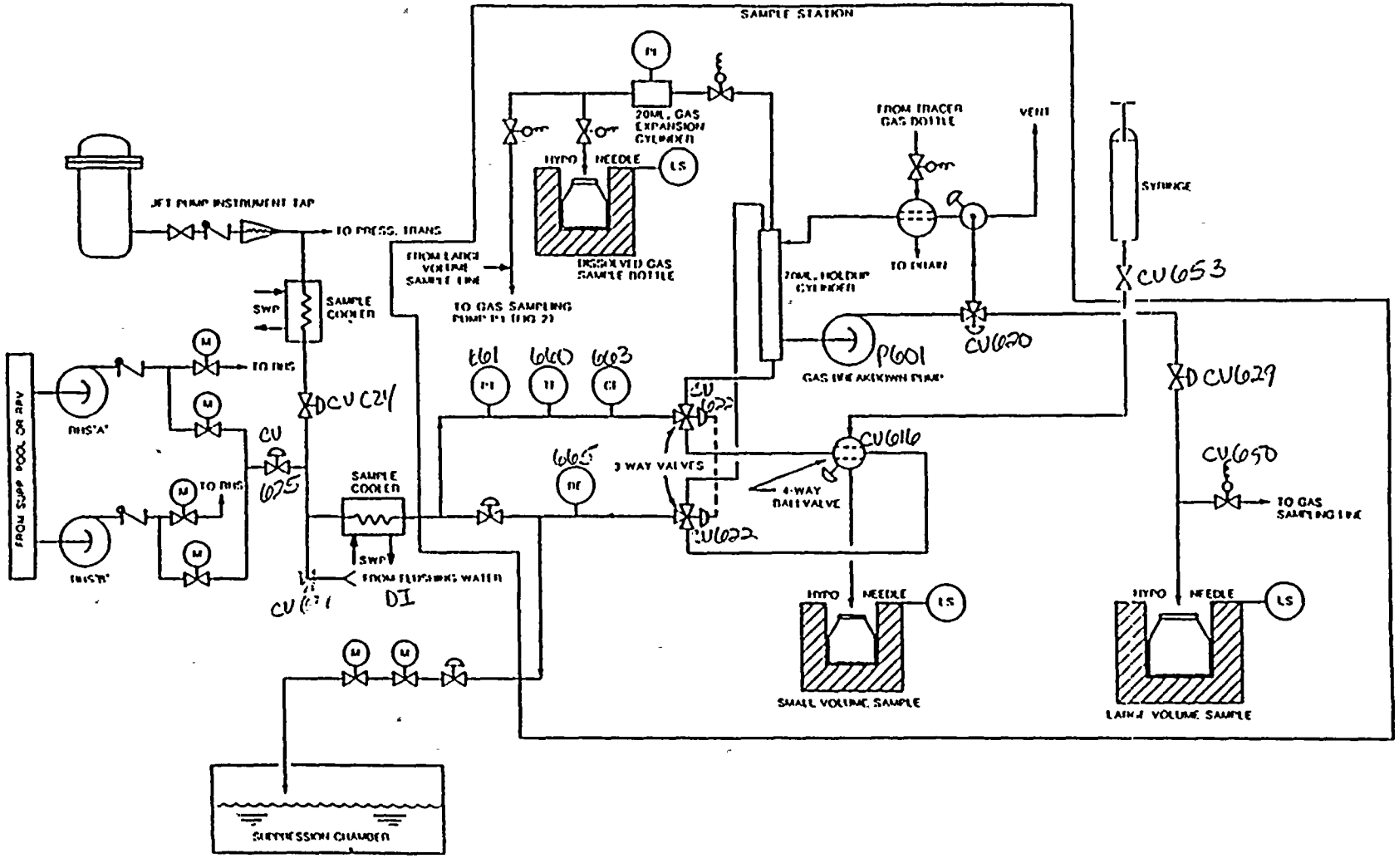
G. 125 VDC Battery System (BYS)

The 125 VDC Station battery system provides power to the PASS isolation valve control panel.

EPA 1-01

LESSON CONTENT	DELIVERY NOTES	ECTIVES/ NOTES
VI. DETAILED SYSTEM REFERENCE REVIEW Review each of the following referenced documents with the class. A. N2-CSP-13, Post Accident Monitoring	Explain that the USAR supplies much information about why we have a PASS.	|6 |
VII. RELATED PLANT EVENTS A. Refer to: N/A		|6
VIII. SYSTEM HISTORY A. Refer to: N/A		|6
IX. WRAP-UP A. Review the Student Learning Objectives.		

FROM SWAPTIME
BOOK EXCHANGE



Unit 2 Fig 55

Figure 1	Rev. 2
Title: POST-ACCIDENT LIQUID SAMPLING	

GAS SAMPLING
POST-ACCIDENT

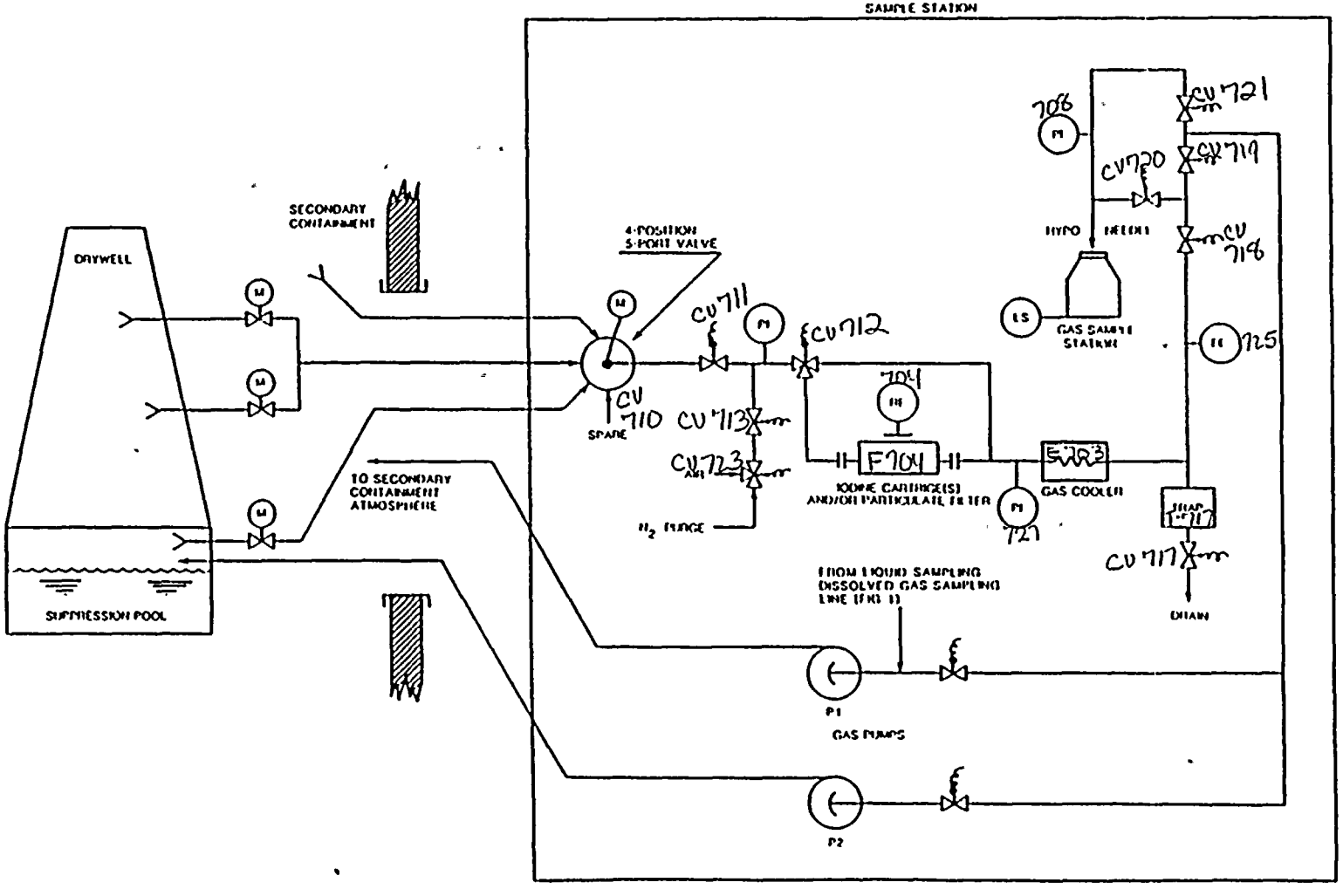


Figure 2	Rev. 2
Title: POST-ACCIDENT GAS SAMPLING	

Unit 2 #35

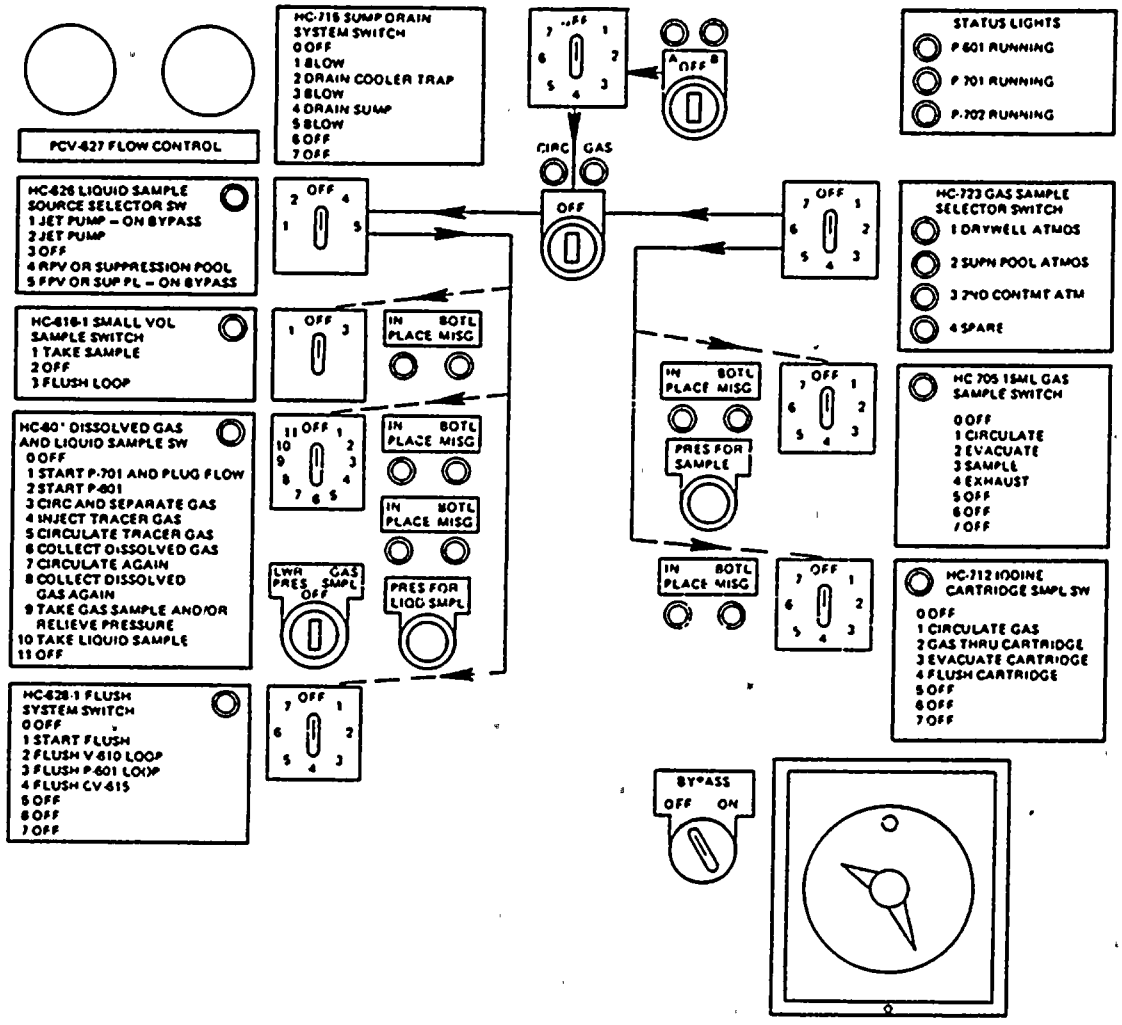


FIGURE II.B.3-2

MAIN CONTROL PANEL

NIAGARA MOHAWK POWER CORPORATION
NINE MILE POINT-UNIT 2
FINAL SAFETY ANALYSIS REPORT

OBJECTIVES/

LESSON CONTENT	DELIVERY NOTES	NOTES
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