(7-77)

LICENSEE EVENT REPORT

CONTROL BLOCK: | | | | | | | (1) (PLEASE PRINT OR TYPE ALL REQUIRED INFORMATION)

| 0 | 1 | C O F S V 1 (2) 0 0 - 0 0 0 0 0 - 0 0 (3) 4 1 1 2 0 (4) | | (5)

LICENSEE CODE 9–14; LICENSE NUMBER 15–25; LICENSE TYPE 26–30; CAT 57–58

CON'T

| 0 | 1 | REPORT SOURCE L (6) 0 5 0 0 0 2 6 7 (7) 1 1 1 5 7 7 (8) 1 0 0 5 7 8 (9)

DOCKET NUMBER 61–68; EVENT DATE 69–74; REPORT DATE 75–80

EVENT DESCRIPTION AND PROBABLE CONSEQUENCES (10)

| 0 | 2 | During normal operation on November 15, 16 and 22, 1977, the reactor was operated

| 0 | 3 | with an average core outlet temperature greater than 1,200°F and the sum of water,

| 0 | 4 | carbon monoxide and carbon dioxide primary coolant impurities in excess of 10 ppm by

| 0 | 5 | volumn. This event constitutes operation in a degraded mode permitted by LCO 4.2.10.

| 0 | 6 | There was no effect on the health or safety of the general public.

| 0 | 7 |

| 0 | 8 |

| 0 | 9 | SYSTEM CODE: C B (11) CAUSE CODE: A (12) CAUSE SUBCODE: A (13) COMPONENT CODE: V A L V E X (14) COMP. SUBCODE: F (15) VALVE SUBCODE: D (16)

(17) LER/RO REPORT NUMBER: EVENT YEAR 7 7 — SEQUENTIAL REPORT NO. 0 3 6 / OCCURRENCE CODE 0 3 REPORT TYPE L — REVISION NO. 1

ACTION TAKEN: H (18) FUTURE ACTION: Z (19) EFFECT ON PLANT: Z (20) SHUTDOWN METHOD: Z (21) HOURS (22): 0 0 0 0 ATTACHMENT SUBMITTED: Y (23) NPRD-4 FORM SUB.: N (24) PRIME COMP. SUPPLIER: Z (25) COMPONENT MANUFACTURER: Z 9 9 9 (26)

CAUSE DESCRIPTION AND CORRECTIVE ACTIONS (27)

| 1 | 0 | Cause of event of November 15, 1977, was operator error by failing to close valve

| 1 | 1 | resulting in excess helium circulator buffer flow and water ingress into the primary

| 1 | 2 | coolant. Cause of event of November 22, 1977, was operator error in isolating liquid

| 1 | 3 | nitrogen supply to the on line low temperature adsorber. Both operators were

| 1 | 4 | reinstructed.

| 1 | 5 | FACILITY STATUS: E (28) % POWER: 0 5 0 (29) OTHER STATUS (30): N/A METHOD OF DISCOVERY: A (31) DISCOVERY DESCRIPTION (32): Operator observation

| 1 | 6 | ACTIVITY RELEASED: Z (33) CONTENT OF RELEASE: Z (34) AMOUNT OF ACTIVITY (35): N/A LOCATION OF RELEASE (36): N/A

PERSONNEL EXPOSURES

| 1 | 7 | NUMBER: 0 0 0 (37) TYPE: Z (38) DESCRIPTION (39): N/A

PERSONNEL INJURIES

| 1 | 8 | NUMBER: 0 0 0 (40) DESCRIPTION (41): N/A

LOSS OF OR DAMAGE TO FACILITY (43)

| 1 | 9 | TYPE: Z (42) DESCRIPTION: N/A

7810300313

PUBLICITY

| 2 | 0 | ISSUED: N (44) DESCRIPTION (45): N/A NRC USE ONLY

NAME OF PREPARER J. W. Gahm PHONE: (303) 785-2253

GPO 917-928

FORT ST. VRAIN NUCLEAR GENERATING STATION
PUBLIC SERVICE COMPANY OF COLORADO
P. O. BOX 361
PLATTEVILLE, COLORADO 80651

REPORT NO. 50-267/77-36/03-L-1

Supplement: Complete Revision

IDENTIFICATION OF OCCURRENCE:

On November 15, 16, and 22, 1977, the reactor was operated with an average core outlet temperature greater than 1,200°F and the sum of water, carbon monoxide, and carbon dioxide primary coolant impurities in excess of 10 ppm by volume.

This resulted in operation under a degraded mode permitted by LCO 4.2.10 and is reportable per Fort St. Vrain Technical Specification AC 7.5.2(b)2.

EVENT DESCRIPTION:

Between 1025 hours on November 15, 1977, and 1300 hours on November 16, 1977, and between 0445 hours on November 22, 1977, and 1400 hours on November 24, 1977, the reactor average core outlet temperature exceeded 1,200°F as the result of power operation. During these times the chemical impurity concentrations in the primary coolant for the sum of water, carbon monoxide, and carbon dioxide exceeded 10 ppm (by volume), which is a degraded mode of operation permitted by LCO 4.2.10.

CAUSE DESCRIPTION:

1. Event of November 15/16, 1977

On November 8, 1977, the primary coolant system was being depressurized. When the pressure reached 100 psia, preparations were begun to supply helium circulator buffer helium makeup from the helium storage system. Figure 1 shows the arrangement of both normal and alternate buffer helium makeup.

During normal operation buffer helium makeup is supplied from the purified helium header. Isolation valve HV-2366-1 is open and HV-2366-2 is closed. Bypass valves V-23220 and V-23221 are also closed. Pressure differential transmitter PDT-2367 senses the difference between the buffer helium makeup pressure and reactor primary coolant pressure and outputs a signal proportional to this difference to PDC-2367. Pressure differential controller PDC-2367 is set to maintain 4 to 5 pounds by opening or closing PDV-2367-1 and PDV-2367-2 as required, although only PDV-2367-1 is actually controlling pressure and thereby flow.

CAUSE
DESCRIPTION (continued):

1. Event of November 15/16, 1977 (continued)

During operation to depressurize the reactor and primary coolant pressure is reduced to 75 psia, the purified helium compressors which supply the purified helium header, must be taken out of service and buffer helium makeup supplied from the high pressure helium supply tank.

During operation with buffer helium makeup supplied from the high pressure helium supply, HV-2366-1 is closed and HV-2366-2 is opened. V-23220 and V-23221 remain closed. Control of helium supply is by means of PV-2456 and pressure indicating controller PIC-2456 with V-2454 closed and V-24122, V-24121, and V-2475 closed. Pressure indicating controller PIC-2456 is set to control the high pressure helium, which can be as high as 1,100 psig, to 88 psig in order to provide sufficient pressure for buffer helium makeup.

During a depressurization of the primary coolant, at 100 psia V-2454 is closed and V-23224 is opened. At 75 psia, HV-2366-1 is closed and HV-2366-2 is opened. On November 8, 1977, the operator omitted the closing of V-2454 so that when HV-2366-2 was opened high pressure helium was supplied to the buffer helium system before PDC-2367 could close and maintain the desired 4 to 5 pound differential. The sudden surge of buffer helium caused 1B and 1D helium circulators to trip and inject water into the primary coolant from the bearing water system.

The peak primary coolant moisture level caused by this event was 790 ppmv. By 2000 hours on November 11, 1977, the moisture had been reduced by the purification system to 28 ppmv, when heat up of the reactor began. During heat up, moisture trapped in the thermal barrier and core and reflector graphite outgassed into the primary coolant as reactor temperature was increased. With average core outlet temperature of 929°F, a maximum moisture concentration of 67 ppmv was reached at 0000 hours on November 13, 1977, and the sum of water, carbon monoxide, and carbon dioxide, 71.1 ppmv. After this time, the total oxidant concentration was reduced by the purification system and to a small extent, by chemical reaction with hot graphite. By 1000 hours on November 15, 1977, the moisture concentration had decreased to 4 ppmv while the sum of the oxidants was 12.2 ppmv.

Since LCO 4.2.10 allows operation at 100 ppmv for up to 10 days and the total contaminant level showed a downward trend, it was decided to continue the reactor power escallation to 50% with total oxidant levels in excess of 10 ppmv. The increase in primary coolant temperature caused additional outgassing which reached a maximum of 17.4 ppmv total oxidants at 0200 hours on November 16, 1977, at an average core outlet temperature of 1,241°F.

The downward trend in contaminent level was re-established and total oxidants decreased to 16.3 ppmv by 1200 hours on November 16, 1977.

CAUSE
DESCRIPTION (continued):

1. Event of November 15/16, 1977 (continued)

As the result of a surveillance test problem, it was decided to reduce reactor power which resulted in the average core outlet temperature being reduced below 1,200°F and return to compliance with LCO 4.2.10.

2. Event of November 22, 1977

On November 20, 1977, the liquid nitrogen system was in an abnormal condition because all four nitrogen recondensers were out of service for maintenance.

The liquid nitrogen system provides refrigeration for the low temperature equipment of the helium purification system and for the moisture monitors. Liquid nitrogen is vaporized by heat exchange with the helium purification system and the nitrogen supply tanks for the moisture monitors, and the vapor liquified by the recondensers for recycle.

Figure 2 is a simplified diagram of the nitrogen system. During normal operation, nitrogen vapor with entrained liquid nitrogen from low temperature adsorbers of the helium purification system, flows to the liquid nitrogen surge tank, where liquid is seperated from vapor. The liquid is returned to the low temperature equipment by gravity. The vapor, including vapor from the moisture monitor nitrogen supply tanks, is recondensed by the nitrogen recondensers. The liquid formed flows by gravity back to the low temperature absorber, moisture monitor supply tanks, and the surge tank.

With no recondensers operable, all vapor produced by the system is vented to atmosphere and the liquid inventory of the system is maintained by makeup to the storage tank from a temporary storage tank located outside the reactor building. Makeup to the surge tank, required to supply the moisture monitor supply tanks, is from the storage tank via the low temperature adsorbers.

Referring to Figure 2, the normal valve lineup and the lineup in use on November 20, 1977, are listed below:

Valve	Normal Position	Position on November 20, 1977
1	Closed	Open
2	Open	Open
3	Closed	Closed
4 *	Closed	Closed
5	Closed	Open
6	Open	Open
7	Closed	Closed
8 *	Closed	Closed
9	Open	Open
10	Closed	Closed
11	Open	Open
12 - 15	Open	Open
16 - 23	Open	Closed

* Valves (4) and (8) are small bypass valves used during cooldown.

CAUSE
DESCRIPTION (continued):

2. Event of November 22, 1977 (continued)

On November 20, 1977, when the surge tank had been filled with liquid nitrogen from the storage tank the operator closed valve (11) . A few minutes later a second operator noticing the high level in the surge tank and being aware of the abnormal valve lineup used to fill the surge tank, closed valve (5) . With both sources of liquid nitrogen isolated, the low temperature adsorber began to warm up. When the operator realized that the low temperature adsorber cooling was shut off, he opened valve (11) and re-established cooling.

During the time the liquid nitrogen flow was interrupted, the low temperature adsorber temperature increase released some of the gaseous impurities previously removed from the primary coolant. As a result, a small quantity of the oxidants trapped in the low temperature adsorber were released to the primery coolant system, causing an increase of total oxidant concentration to 50 ppmv. As soon as cooling was re-established an immediate downward trend in primary coolant total oxidants was noted. On November 22, 1977, the total oxidant level had reached 11.3 ppmv and it was decided to proceed with the power escallation. The power escallation resulted in an average core outlet temperature exceeding 1,200°F, and an increased oxidant level to 14 ppmv due to some additional graphite outgassing. A downward trend was re-established by the helium purification system and total contaminents remained below 10 ppmv after November 24, 1977.

CORRECTIVE
ACTION:

1. Event of November 15/16, 1977

The error in valve operation of November 8, 1977, was discussed with the operator involved and all Reactor Operators were directed to review the applicable procedures.

2. Event of November 22, 1977

Total primary coolant oxidants were reduced by the helium purification system to below 10 ppmv following return of liquid nitrogen cooling to the low temperature adsorber. The error in operation of November 22, 1977, was discussed with the operator involved.

No further corrective action is planned or required.

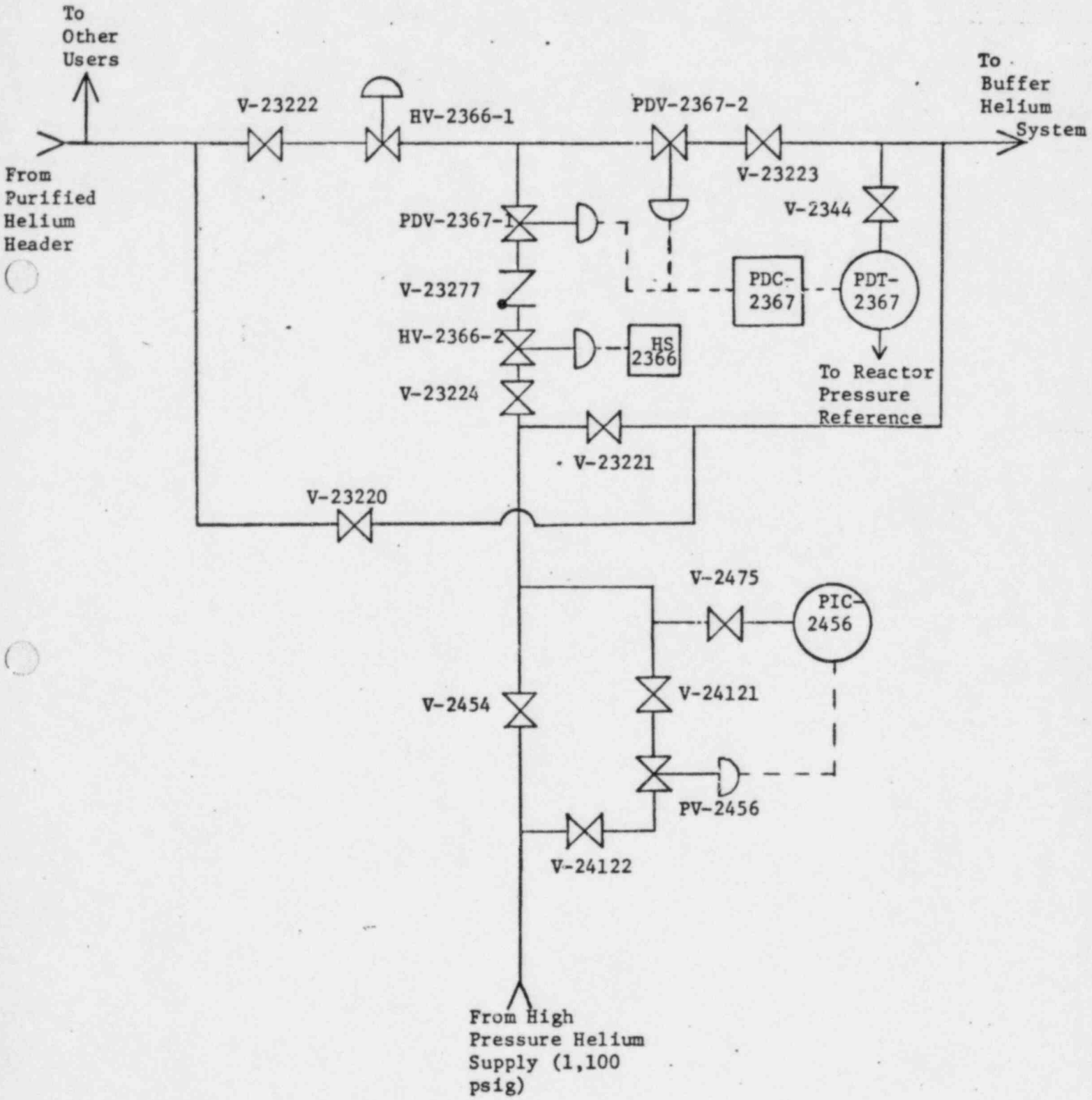
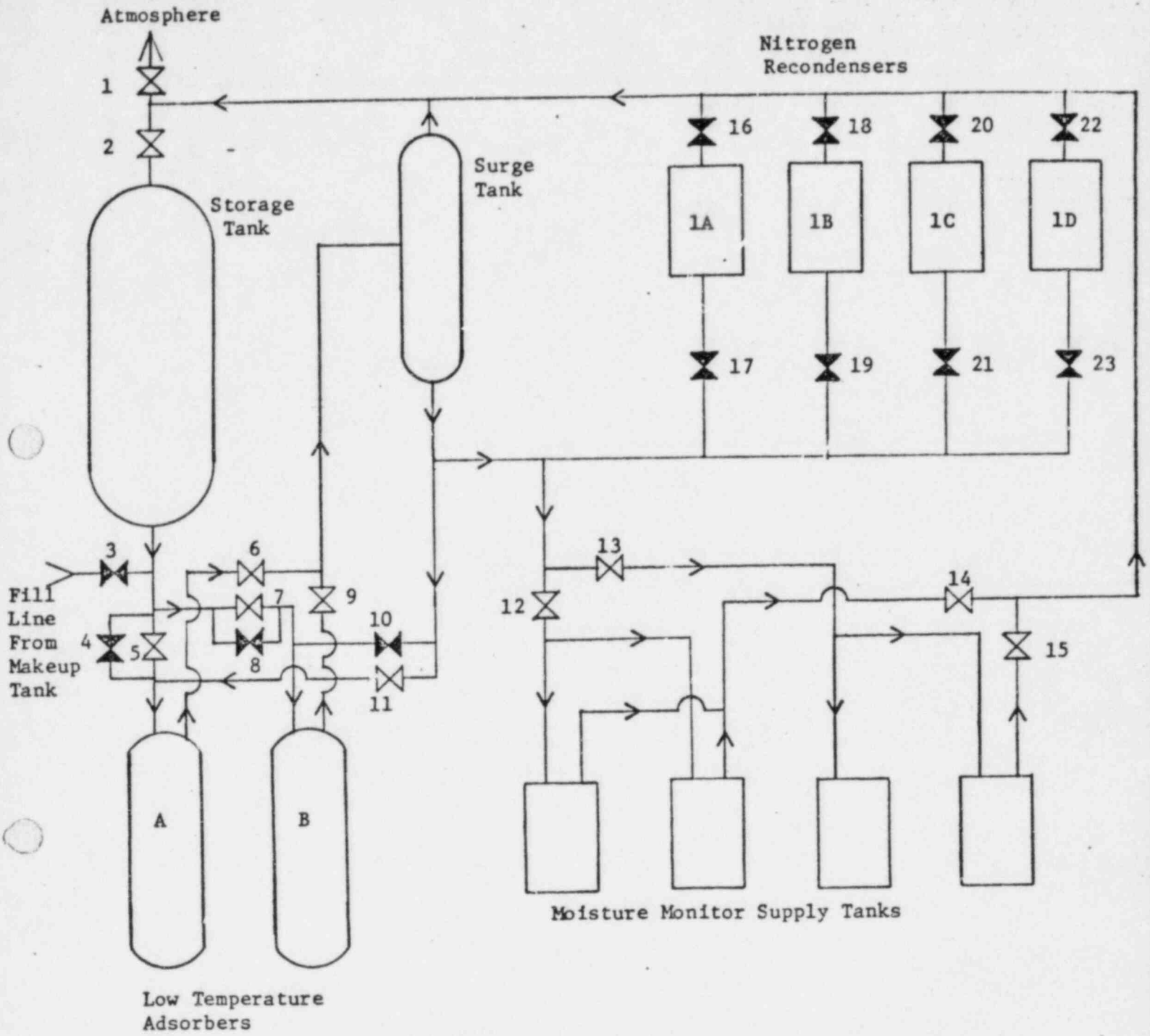

To
Other
Users
V-23222
HV-2366-1
PDV-2367-2
To
Buffer
Helium
System
From
Purified
Helium
Header
V-23223
V-2344
PDV-2367-1
V-23277
PDC-
2367
PDT-
2367
HV-2366-2
HS
2366
To Reactor
Pressure
Reference
V-23224
V-23221
V-23220
V-2475
PIC-
2456
V-24121
V-2454
PV-2456
V-24122
From High
Pressure Helium
Supply (1,100
psig)

FIGURE 1



NOTE: Valves shown in position prior to event of November 20, 1977

FIGURE 2

LIQUID NITROGEN SYSTEM

Prepared by: Richard R. Frost
Richard R. Frost
Technical Services Technician

Reviewed by: J. W. Gahm
J. W. Gahm
Technical Services Supervisor

Reviewed by: F. M. Mathie
Frank M. Mathie
Superintendent, Operations

Approved by: Don Warembourg
Don Warembourg
Nuclear Production Manager