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October 26, 1984

U. S. Nuclear Regulatory Commission
Office of Inspection and Enforcement
Region V
1450 Maria Lane, Suite 210
Walnut Creek, California 94596-5368

Attention: Mr. John B. Martin, Regional Administrator

Dear Sir:

Subject: Docket Nos. 50-361 and 50-362
San Onofre Nuclear Generating Station
Units 2 and 3

In IE Bulletin No. 84-03: "Refueling Cavity Water Seal" Southern California Edison (SCE) was requested to evaluate the potential for and consequences of a refueling cavity water seal failure and to provide a summary report of these actions. This letter provides the SCE response to IE Bulletin 84-03 for San Onofre Units 2 and 3.

At San Onofre Units 2 and 3 it has been determined that part of the seal between the reactor vessel flange and the refueling cavity is a passive, solid double O-ring and that there are a total of three areas in the plant where pneumatic water seals are used during refueling operations:

1. Refueling cavity between the reactor vessel flange and the seal ring.

2. Spent fuel pool between (a) the spent fuel cask handling pool and (b) the fuel transfer/upender pool.

3. Steam generator nozzles.

These pneumatic water seals are conservatively designed and are all dual, independent, 100% redundant seals. Descriptions of these solid O-ring and pneumatic seals are provided in Enclosure 1.

From the SCE evaluation of these pneumatic seals in response to IE Bulletin 84-03 it was determined that it would be prudent to provide permanent redundant seal pressurization systems for these seals to ensure their continuous operation. Accordingly, SCE will install the independent,

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redundant pressurization systems for each pneumatic seal prior to use of each seal as a fluid restraining boundary to ensure water shielding over spent fuel. These permanent, redundant pressurization systems, described in Enclosure 1, are similar to a temporary system which was used when the refueling cavity was flooded during plant start-up testing.

Based on the above, SCE believes that it is not credible to postulate a leak in the pneumatic water seals which could exceed the normal makeup capacity to the refueling cavity or the spent fuel pool from the refueling water storage tank which is 150 gpm. Therefore, the consequences of failure of the above listed pneumatic seals are not provided.

In addition, operating procedures are being reviewed and will be revised as appropriate prior to spent fuel movement in containment to ensure appropriate action in the unlikely event of failure of a pneumatic seal.

If there are any questions regarding the above or enclosed information, please contact me.

Subscribed on this 26th day of October, 1984.

Very truly yours,

BY: M. O. Medford
M. O. MEDFORD

Subscribed and sworn to before me this 26th day of October, 1984.

OFFICIAL SEAL
C SALLY SEBO
NOTARY PUBLIC - CALIFORNIA
LOS ANGELES COUNTY
My comm. expires APR 14, 1986

C. Sally Sebo
Notary Public in and for the County of Los Angeles, State of California

Enclosure

cc: R. J. Huey (USNRC Senior Resident Inspector, Units 1, 2 and 3)
U.S. Nuclear Regulatory Commission
Document Control Desk (Original)

PNEUMATIC WATER SEALS USED DURING FUEL HANDLING

SAN ONOFRE UNITS 2 AND 3

REFUELING CAVITY WATER SEALS

Each refueling cavity water seal consists of a 24' 4 1/2" OD, 17' 7" ID (40 3/4" wide) seal ring (Figure 1) which is bolted to the refueling cavity floor (36 bolts, Item 1 in Figure 2) with a passive, solid double O-ring seal (Item 2 in Figure 2) between the seal ring and the refueling cavity floor (outer seal) and two independent pressurized rings (Items 3 and 4 in Figure 2) which provide redundant seals between the seal ring and the reactor vessel flange (inner seal).

The solid double O-ring outer seal is vulcanized into one piece and is held in place along the entire seal length by 14 seal retainers which are held in place by 56 flat head screws.

Each redundant pressurized inner seal ring is constructed of heavy radiation resistant reinforced fabric which is vulcanized into one piece, and each seal has an additional 40 durometer EPDM elastomer surface for heavy duty service. Each inner seal ring is held in place along its entire length by 14 pairs of seal retainer extrusions which are held in place by 112 socket head cap screws. These inner seals have a normal operating pressure of 60 ± 2 psig.

SPENT FUEL POOL WATER SEALS

The spent fuel storage pool has two water seals that separate the spent fuel storage area and the (1) spent fuel cask handling pool and, (2) fuel transfer/upender pool. Each spent fuel storage pool water seal consists of a 3'5" wide by 28'7 1/2" high bulkhead gate (Figure 3, Item 1) with two independent pressurized bladders (Items 2 and 3, Figure 3) which provide redundant seals between the bulkhead gate and the spent fuel pool walls. These pressurized seals are constructed of heavy radiation resistant reinforced fabric. Both seals on each gate are held in place by a total of 174 two inch wide clips. 87 of these clips are welded to the gate, and 87 clips are held in place by 174 screws. Normal seal operating pressure is 20 psig.

STEAM GENERATOR NOZZLE DAMS

The steam generator primary heads may be isolated from the primary system by installation of isolation dams or seals in the steam generator nozzles. Two, redundant, independent dams are installed in series (Figure 4). The dam structure is a 30" diameter (cold leg) or 42" diameter (hot leg) shallow spherical dome with reinforcement ribs (Figure 5). Each dam is supported by locking pins (6 pins in the cold leg and 8 pins in the hot leg) which are inserted transverse to the axis of the nozzle (Figure 6). Each dam has a continuous flexible diaphragm which has two (2) radiation resistant elastomer material pneumatic seals mounted in series on its periphery (Figure 7). These peripheral seals are actuated by the internal pressure which expands the seal radially against the inside diameter of the nozzle. Normal operating pressure for these pneumatic seals is 30 psig. An isolation check valve is provided at each seal on each dam, and a telltale drain is provided to indicate leakage past the wet dam.

PNEUMATIC SEAL PRESSURIZATION

The previously existing pressurization source for the refueling cavity and spent fuel pool pneumatic seals is shown in Figure 8. Either the plant compressed air system or an independent, redundant cylinder gas pressurization system is now used as the primary pressurization source for the pneumatic seals with the other pressurization system acting as backup. The redundant cylinder gas pressurization system for each pneumatic seal will be installed prior to use of each seal as a fluid restraining boundary to ensure water shielding over spent fuel. The new, redundant, separate and independent pressurization systems are isolated from original equipment by check valves. Both the instrument and service air systems are part of the plant compressed air system. The instrument air system is a source of pressurization for the refueling cavity seals, and the service air system is a pressurization source for the spent fuel pool water seals and the steam generator isolation dams. The independent cylinder gas pressurization system for each refueling cavity and spent fuel pool individual seal bladder consists of two 200 SCF high pressure cylinders with separate dual stage regulators (Figure 9). The independent cylinder gas pressurization system for each steam generator consists of two 200 SCF high pressure cylinders with a dual stage regulator (Figure 10). Each cylinder (either N_2 or compressed air, as appropriate) provides at least 20 times the volume needed to inflate each pneumatic seal in the refueling cavity, spent fuel pool, and steam generator nozzle, and the bottles are held in place by Seismic Category I supports. The compressed air system is supplied by three 100% capacity air compressing trains with each compressor unit powered from a separate non-1E electrical bus (See FSAR Section 9.3.1). An equivalent temporary compressed air supply system may be used. The instrument air system is also supplied by N_2 backup from a common storage tank of liquid N_2, with greater than an equivalent of 108,000 SCF of N_2. The service air does not have N_2 backup. The internal to containment instrument air system which supplies pressure to refueling cavity seals is subject to single failure from closure of the containment isolation valve.

High and low pressure protection is provided to assure continuous seal pressurization. High pressure protection is provided by a relief valve. Audible and visual local low pressure alarms are set to indicate less than normal operating pressure. Check valves prevent the rapid loss of a seal if its primary pressurization system fails. Upon loss of the primary pressurization system the backup pressurization system is automatically placed in service.

The pressurization systems described above provide independent and redundant pressurization sources to the reactor cavity seals, the spent fuel pool seals, and the steam generator nozzle dams.

OPERATOR ACTION

Primary and backup pressure supplies will be monitored once per shift during refueling operations when seals are in use as a liquid restraining boundary.

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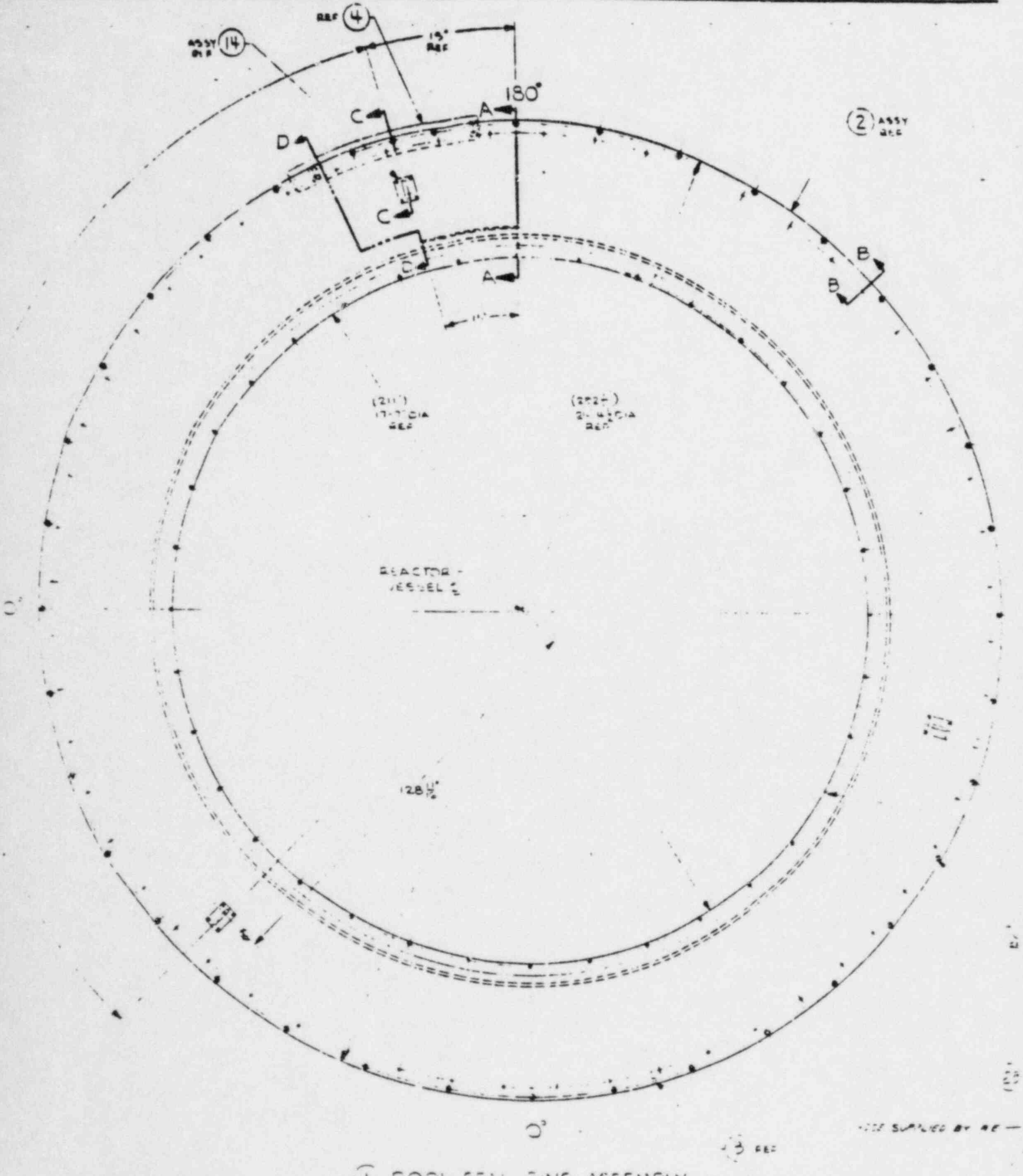
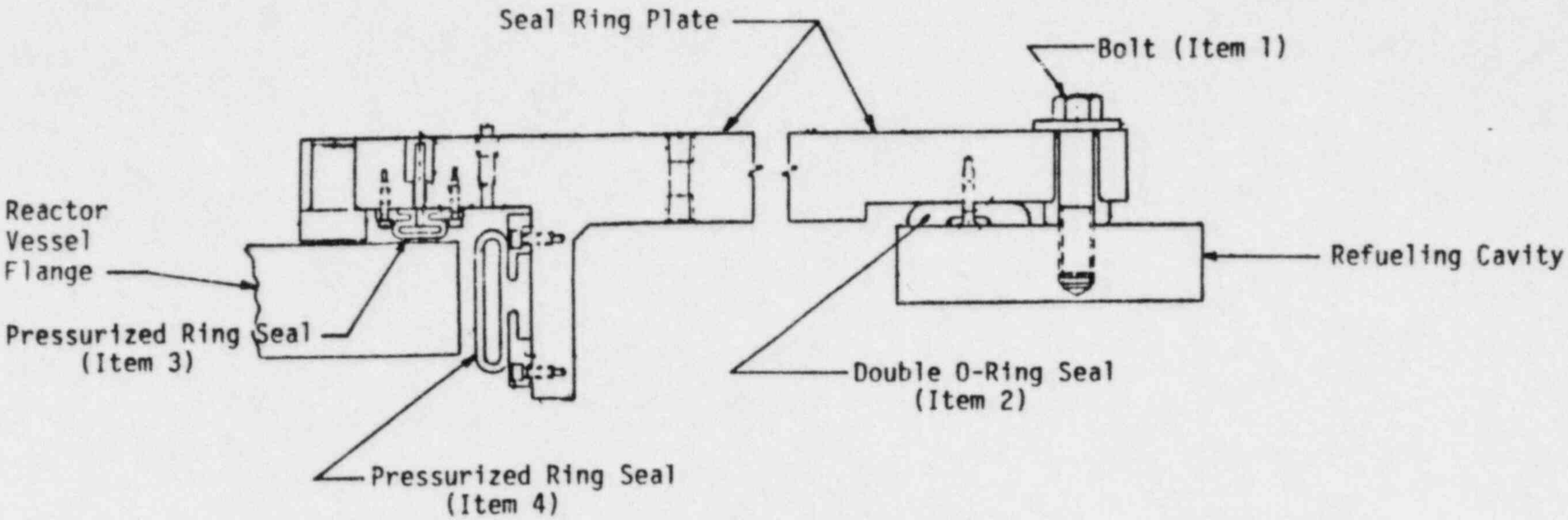


1 POOL SEAL RING ASSEMBLY

DRAFT 1

FIGURE 1

DRAFT 1
Received by Station 10/16/84



SEAL RING DETAIL

FIGURE 2

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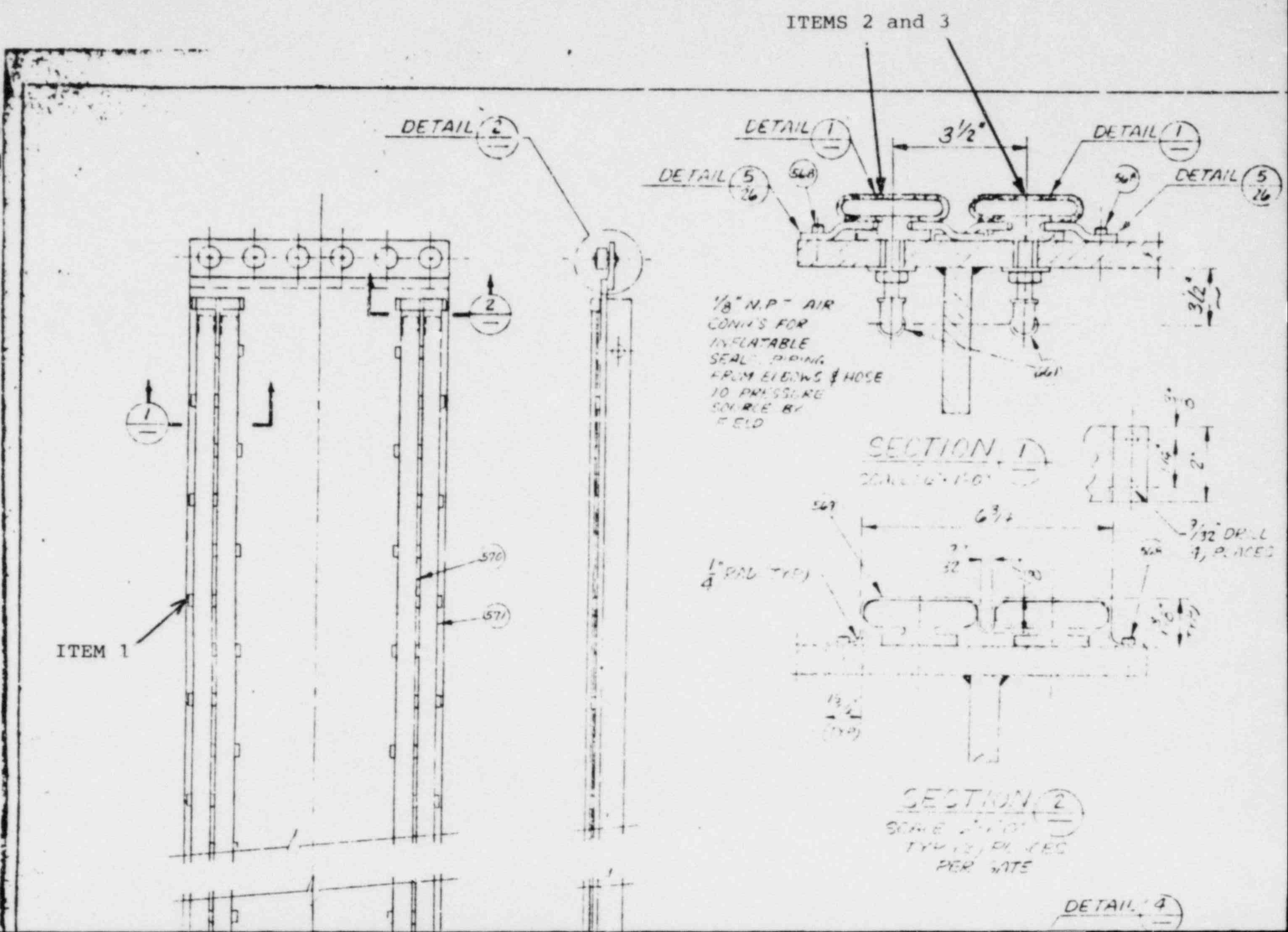
ITEMS 2 and 3
DETAIL 2
DETAIL 1
DETAIL 1
DETAIL 5/26
DETAIL 5/26
3½"
3½"
1/8" N.P.T. AIR
CONN'S FOR
INFLATABLE
SEAL. PIPING
FROM ELBOWS & HOSE
TO PRESSURE
SOURCE BY
FIELD
SECTION 1
6¾
9/32" DRILL
4 PLACES
1/4" RAD. (TYP)
SECTION 2
TYP. (2) PLACES
PER GATE
ITEM 1
DETAIL 4

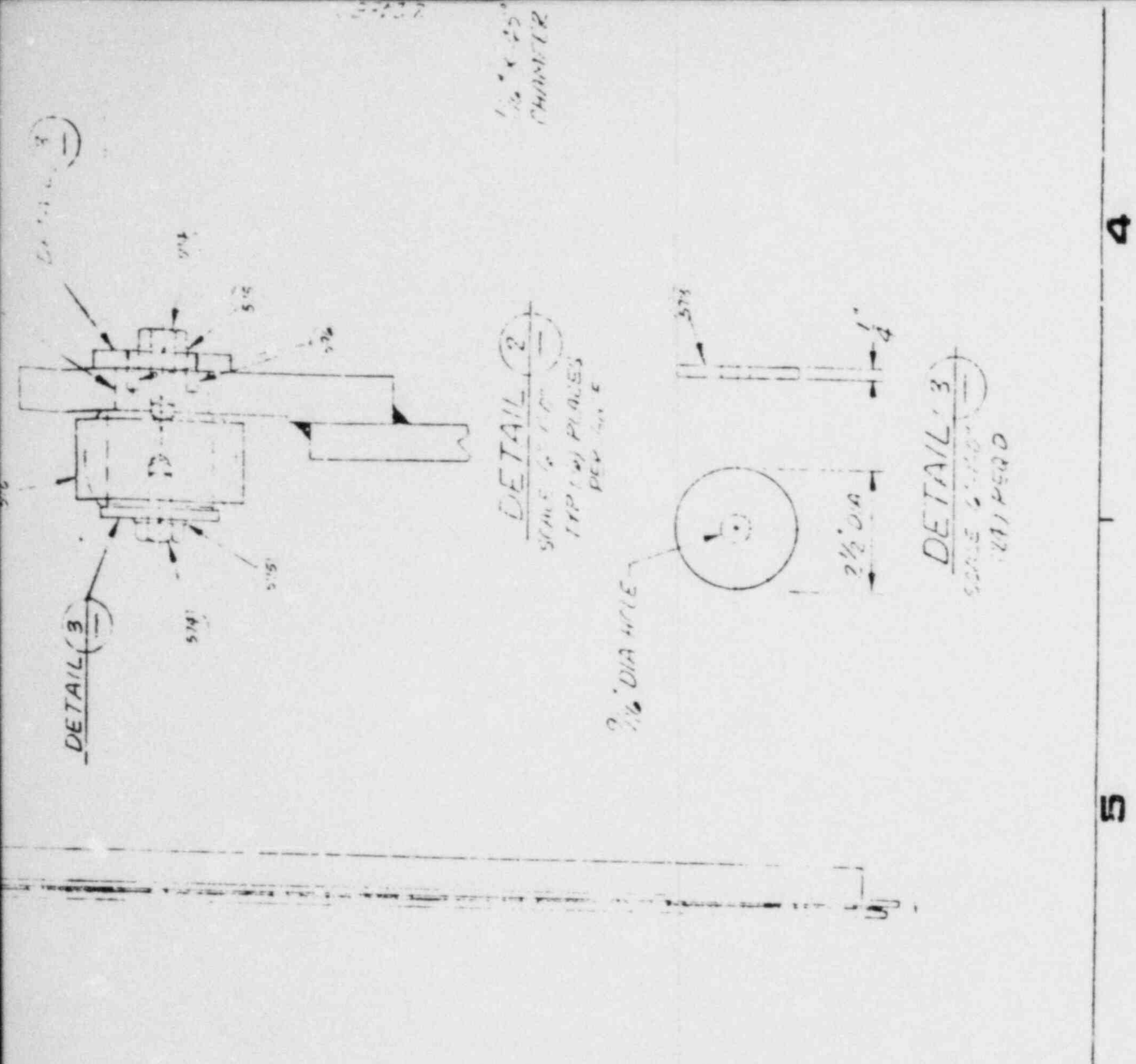

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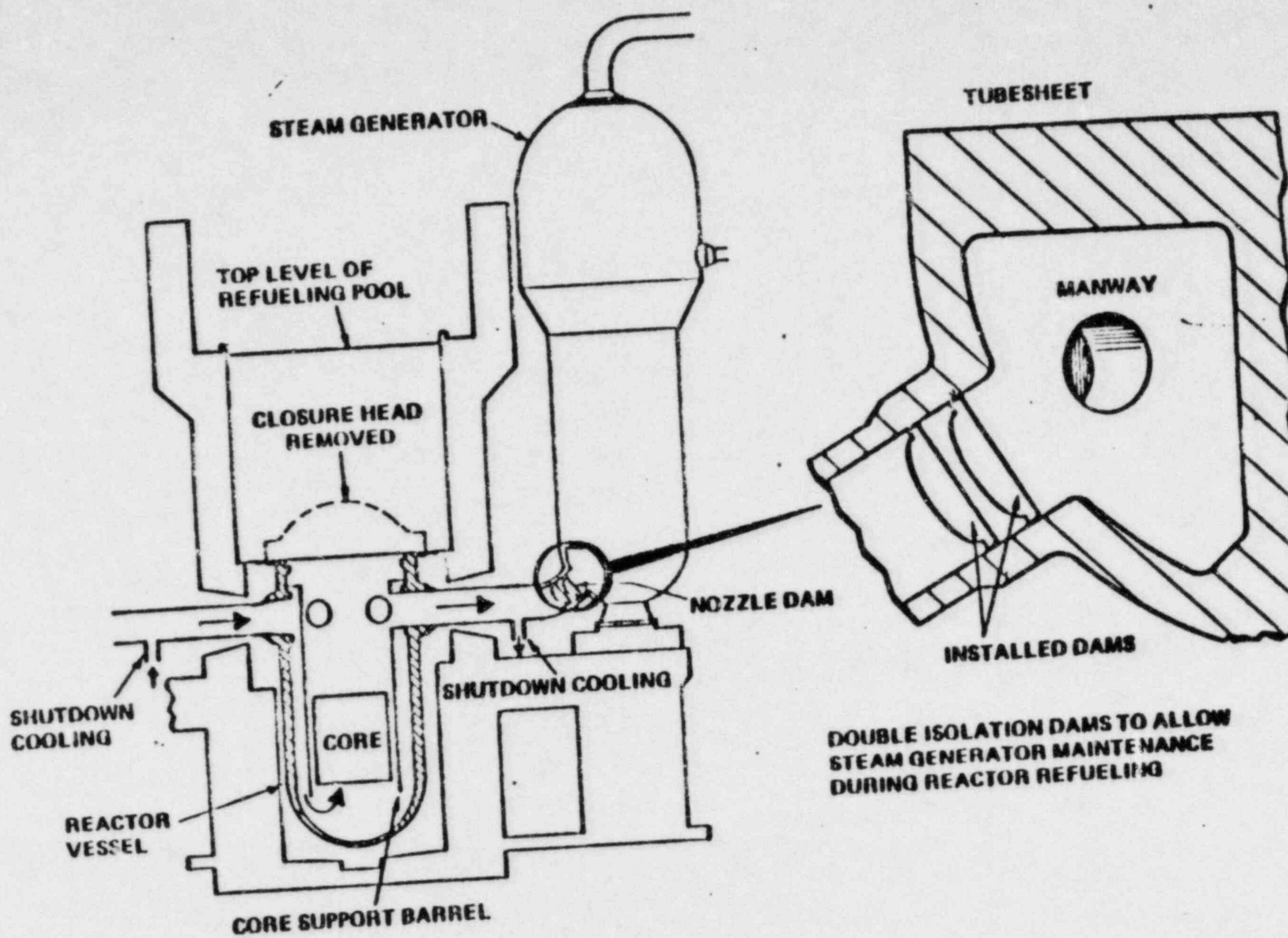
FIGURE 3

FIGURE 4

STEAM GENERATOR NOZZLE DAMS



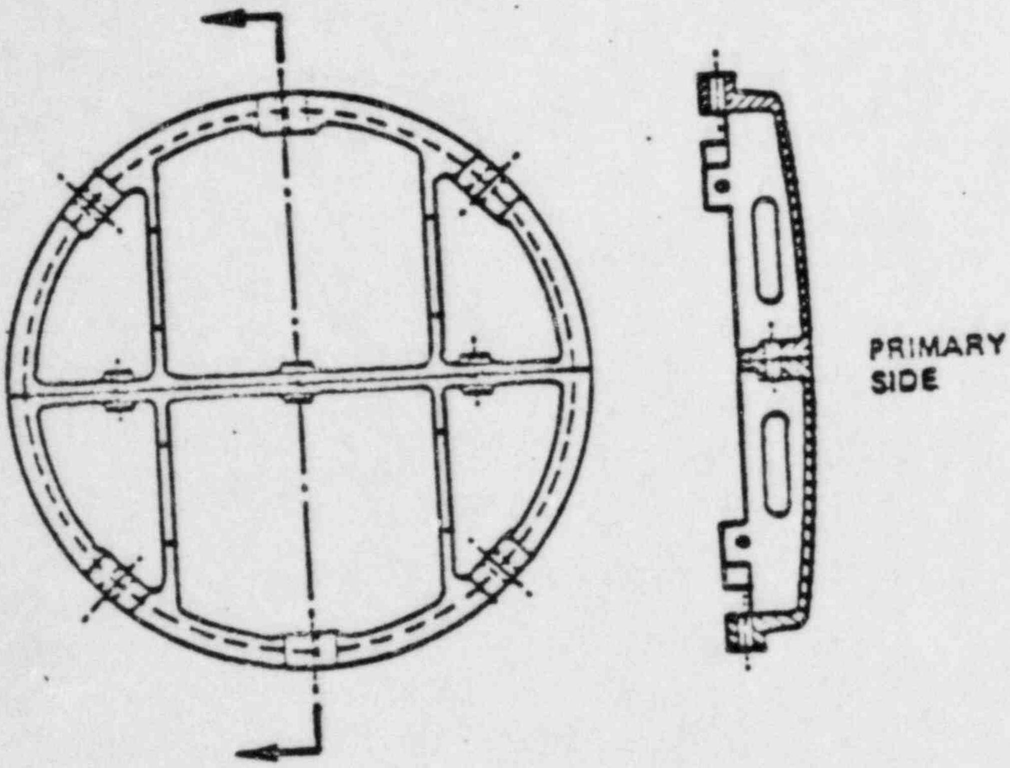
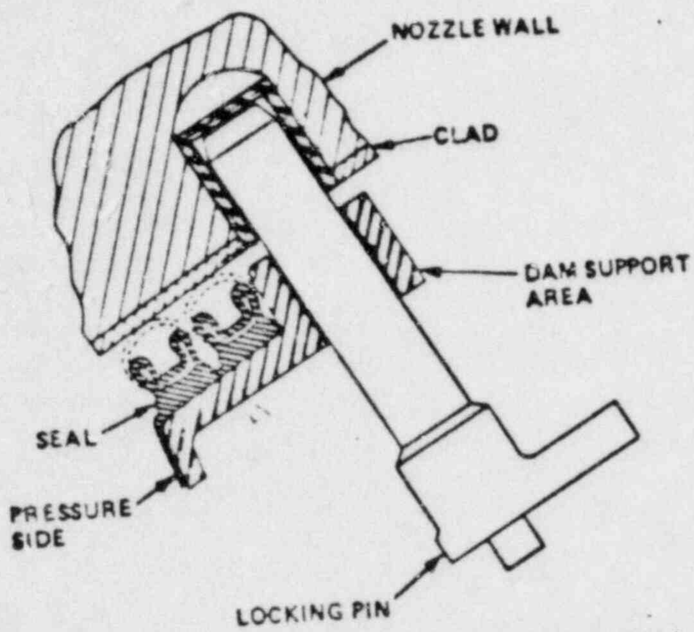


FIGURE 5

NOZZLE DAM STRUCTURE



DETAILS OF SEAL AND LOCKING PIN

FIGURE 6

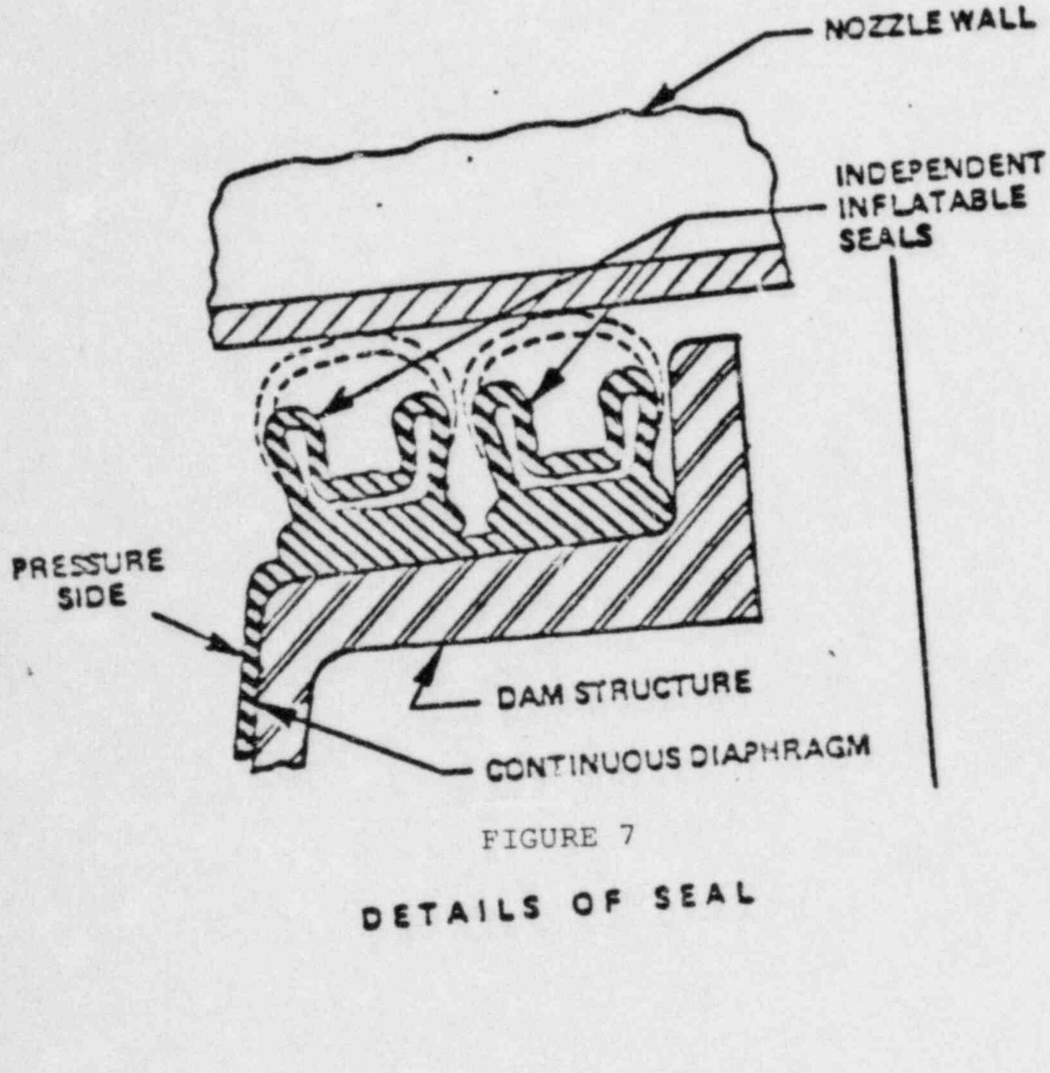


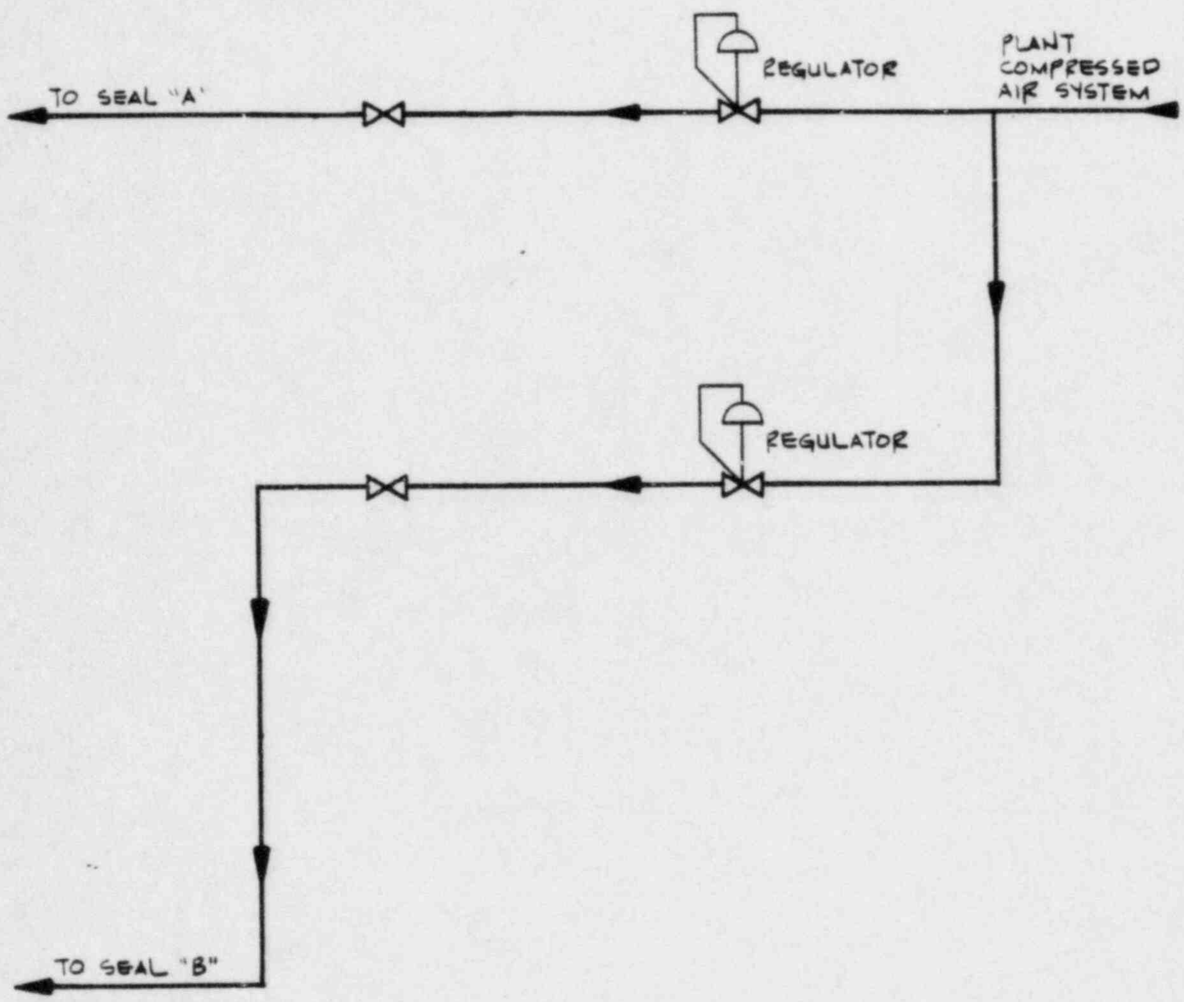
FIGURE 7

DETAILS OF SEAL

FIGURE 8

TYPICAL FOR REFUELING CAVITY AND SPENT FUEL POOL

(PREVIOUSLY EXISTING)



TYPICAL FOR REFUELING CAVITY AND SPENT FUEL POOL (NEW)

FIGURE 9

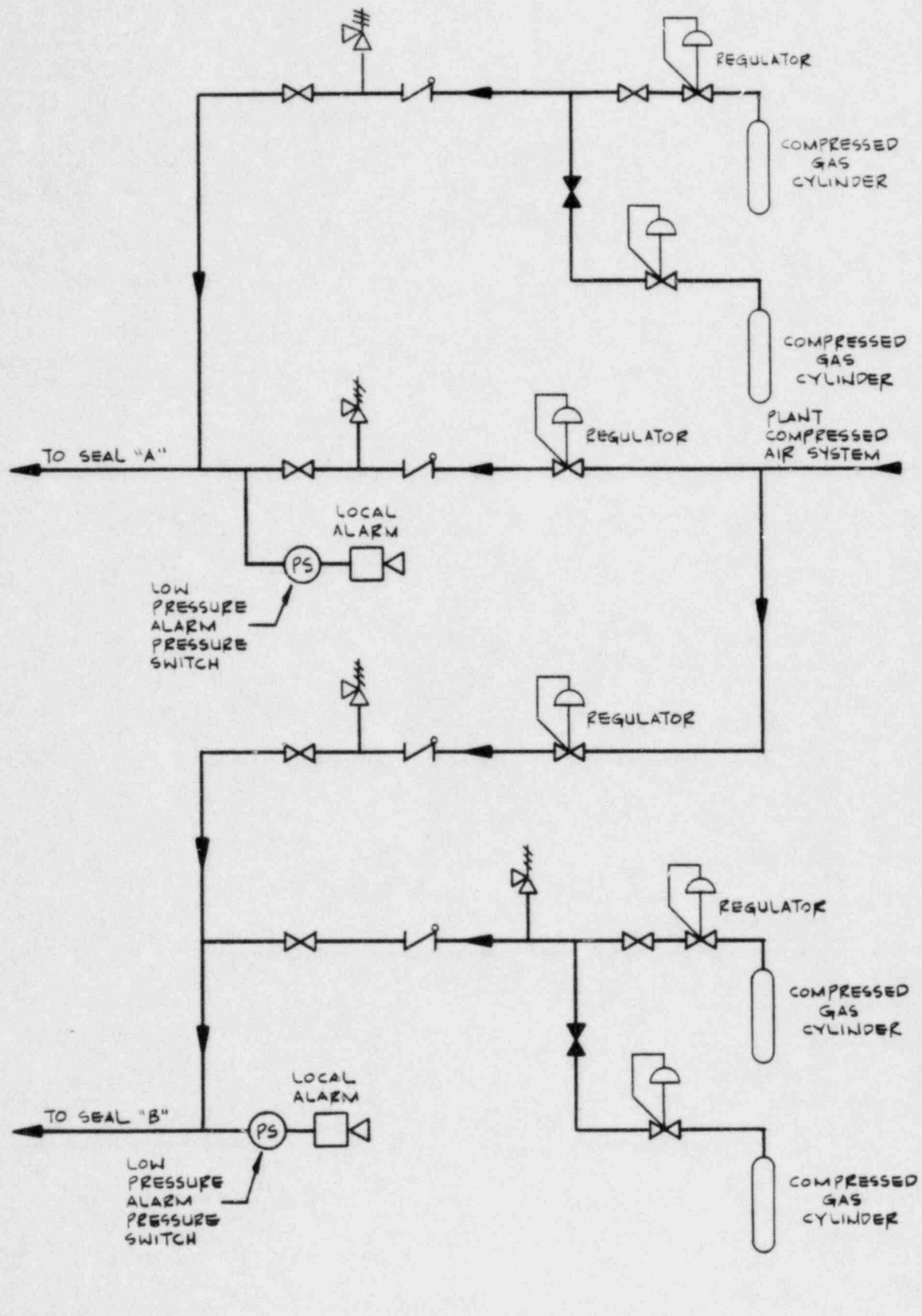


FIGURE 10

STEAM GENERATOR NOZZLE DAMS

(TYPICAL EACH GENERATOR)