September 5, 1979

MEMORANDUM FOR: M. P. Morrell, GPU Engineering

FROM: J. T. Collins, Deputy Director, TMI-Support

SUBJECT: NRC COMMENSS ON TMI-2 PENETRATION R626 EXPERIMENT - SAFETY EVALUATION REPORT

In response to your request of August 21, 1979 we have reviewed the subject document and our comments are attaehed. The NRC does not concur in the Safety Evaluation Report as written. We are prepared to meet with you at your convenience to resolve our conee rns.

J. T. Collins, Deputy Director
TMI-Support

cc w/encl:
R. C. Arnold, Met-Ed
J. G. Herbein, Met-Ed
J. Lee
W. Raymond

cc w/o encl:
R. Vollmer
R. Corsti

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TMI-2 Support

JTCollins:jb

9/ /79

PROCEDURE COMMENT SHEET

Procedure No./Title Safety Evaluation Report / Penetration R-626, Experiment

Review Group NRC / NRR

Name/Date Jay Lee / Aug. 29 1979.

Para.	Comment	Resolution
General Safety Precautions	State the provision to monitor 1 CFM positive air flow into the containment when the isolation gate valves are opened.	
Phase 1 Hole Drilling	You propose not to utilize glove box during hole drilling phase. We concur with you provided that (1) positive pressure will be maintained and monitored in top hat assembly throughout drilling operation and (2) positive air flow into the containment is also maintained and monitored during this operation.	
	Specify how you inspect for internal contamination through the removal of the pipe plug. Swiping techniques may provide better sensitivity for internal contamination.	
	Describe a rotary shaft seal on the boring bar.	
	Working area plastic tent air should be monitored continuously during all modes of operation	

PROCEDURE COMMENT SHEET

Procedure No./Title Safety Evaluation Report / Penetration R-626

Review Group NRC / NRR

Name/Date Jay Lee 8/29/79

Para.	Comment	Resolution
	Approximately half of the core decay heat is transferred to the steam generators and the other half to water, walls, and floor at the present time	
Phase II Secondary Boundary Installation	Provide Burns & Roe reference on maximum allowable loads on penetration pipe.	
Phase III Containment Surveillance	In addition to mock-up tests performed at B&W, a complete rehearsal of step by step procedure at Penetration R-626 is ~~desirable~~ essential (except insertion of equipment).	
	Gas sampling assembly complete with pump, filters, and tubing should be pressure tested.	
Figure 4	Update drawing showing a pressure guage and a valve in upstream of V-2.	

PROCEDURE COMMENT SHEET

Procedure No./Title ______________________________

iew Group ______________________________

Name/Date ______________________________

Para.	Comment	Resolution
Phase II	Metal glove box should be vacuum tested to prevent collapsing of the box during boring bar withdraw.	
	Fuel Handling Bldg pressure relative to containment bldg pressure should be monitored.	

PROCEDURE COMMENT SHEET

Procedure Number/Title Penetration R-626 Cutting Procedure

Review Group NRC Telephone Ext.

Name/Date RAYMOND 8/31/79

Section	Comment	Resolution	Accept	Reject	Reason
7.20	ADD A NOTE TO THIS STEP TO USE "CHIPPING TECHNIQUE" WHILE PERFORMING CUT OF FLANGE TO AVOID formation of long strands of cut metal, which could get lodged in gate valve seat.				
8.0.	SINCE A glove box will not be used during the cut, include in Section 8.0 a contingency plan for the detection of gross amounts of contamination/airborne activity during the removal of the boring tools.				

ack Crawford Lee Porter

①

PROCEDURE COMMENT SHEET

Procedure Number/Title Penetration R626 Experiment - Safety Evaluation Report

Review Group NRC Telephone Ext. 782-3957

Name/Date RAYMOND

Section	Comment	Resolution	Accept	Reject	Reason
PHASE I - HOLE DRILLING RG1.143 (15)	PRIOR TO DRILLING, PLAN IS TO INSPECT INSIDE OF PENETRATION 626 FOR CONTAMINATION VIA A REMOVAL PIPE PLUG AND THEN CUT OFF OUTBOARD FLANG. THE PENETRATION SHOULD ALSO BE LOCAL LEAK RATE TESTED USING STATION PROCEDURES, AS WAS DONE FOR R605 & R401, TO ENSURE LEAK TIGHTNESS OF INBOARD FLANGE, PRIOR TO REMOVAL OF OUTBOARD FLANG. LEAK TEST SHOULD BE A PRESSURE DROP TEST TO (75 psig) WITH PRESSURE HELD FOR 30 MIN, WITH NO LEAKAGE ALLOWED AS THE ACCEPTANCE CRITERIA.	Being Carried as open item on OPS P.O.D LIST — OK ALSO COVERED BY R626 Drill Proc.	OK		
PHASE I & II	IT IS UNCLEAR FROM THE WRITE-UP WHETHER THE GATE VALVES WILL BE INSTALLED WITH SEATING FACES INWARD OR OUTWARD WITH RESPECT TO CONTAINMENT - PLEASE CLARIFY	BOTH VALVES - SEAT OUT	OK		
PHASE I	IF NO GLOVE BOX WILL BE USED DURING DRILLING OPERATION, THEN PROCEDURE SHOULD REQUIRE CONTINUOUS, SMALL AIR FLOW INTO RB DURING DRILLING, WITH ABILITY PROVIDED TO APPLY AIR FROM BOTH SIDES OF GATE VALVE.	COVERED BY R626 DRILL PROC	OK		

(2)

PROCEDURE COMMENT SHEET

Procedure Number/Title: A626 JOB

Review Group: ______________________ Telephone Ext. ______________

Name/Date: RAYMOND

	Section	Comment	Resolution	Accept	Reject	Reason
(4)	PHASE I - RB ENERGY SOURCES	PLEASE PROVIDE FURTHER DETAILS OF CALCULATIONS WHICH SHOW THAT MAXIMUM EXPECTED RB INTERNAL PRESSURE FROM INTERNAL ENERGY SOURCES IS ≤ 15 psig. FROM THE DISCUSSION PRESENTED, IT IS NOT OBVIOUS THAT TOTAL CORE DECAY HEAT WOULD RAISE RB PRESS. < 1.0 psi SINCE THE RB COOLERS REMOVE ONLY RADIATIVE HEAT LOSSES FROM THE RCS TO THE RB ATMOSPHERE (EITHER DIRECTLY TO AIR OR VIA COLD LEG LOSSES TO RB BASEMENT WATER). THE DISCUSSION DOES NOT ADDRESS THAT FRACTION OF DECAY HEAT (≈50%) REMOVED BY THE "A" OTSG NOR THE AMOUNT OF ENERGY STILL HELD IN THE REACTOR COOLANT THAT COULD BE DEPOSITED IN RB ATMOSPHERE SHOULD A BREACH IN RCS BOUNDARY OCCUR.				
(5)	PHASE II - SECONDARY BOUNDARY INSTALLATION	PLEASE PROVIDE BASIS FOR SELECTING 2 PSIA AS THE TEST PRESSURE USED TO ENSURE LEAK TIGHTNESS. INCLUDE CONSIDERATIONS ASSOCIATED WITH RESOLUTION TO COMMENT (4) ABOVE.	EXPECTED INCREASE IN RB PRESS OVER A TWO HOUR PERIOD → INTERVAL WITHIN W[illegible] ACTIONS CAN BE TAKEN [illegible] CLOSE INBOARD ISOLATION VALVE.	OK		

③

PROCEDURE COMMENT SHEET

Procedure Number/Title: R626

Review Group: ______ Telephone Ext.: ______

Name/Date: RAYMOND

	Section	Comment	Resolution	Accept	Reject	Reason
⑥	PHASE II	PLEASE PROVIDE REFERENCE(S) BY WHICH BURNS & ROE DETERMINED THE ALLOWABLE LOADS FOR THE PENETRATION PIPING, (ie, 28,000 lbs & 10,600 FT-lbs)	Dwg 4041 ?			
⑦	TABLE I	SHOULD NOT THE FIRST COMPONENT LISTED BE THE SPOOL PIECE USED TO MOUNT THE FIRST GATE VALVE TO R626? PLEASE REVISE LOAD CALCULATIONS ACCORDINGLY	ALL BOLTED CONNECTIONS - NO SPOOL PIECE REQ'D	OK		
⑧	TABLE I Item 6	PLEASE LIST THE MAJOR COMPONENTS CONSIDERED UNDER "EQUIPMENT". INCLUDE, SPECIFICALLY, THE WEIGHTS FOR: DRILL BIT, STEADY REST, BORING BAR, AIR MOTOR				
⑨	TABLE I	PLEASE SPECIFY REFERENCE/SOURCE OF ASSUMED PEAK SPECTRA ACCELERATIONS OF 2.0 g's AND 1.33 g's.				

PROCEDURE COMMENT SHEET

Procedure No./Title: R 626 Safety Evaluation

[...]ew Group: NRC

Name/Date: White

Para.	Comment	Resolution
General phase III	See attached sheet: The question is, for ~~[illegible]~~ methods of sampling to assess dose rates inside RB, was sufficient considerations given to presence of tritiated gas, which will not be identified by bubbling technique.	
Cutting, setup & sampling procedures	→ each procedure for this job should require as an H.P. precaution that continuous air monitors be used to trend/detect activity in tent area.	

inserted through the penetration. The gas is first drawn through a particulate filter and then through a series of charcoal filters designed to trap various species of iodine. The filtered air sample is drawn through tygon tubing to the glove box wall. From the glove box wall through the gas sample panel, the gas sample is drawn through stainless steel tubing which will have been pressure tested for leakage. After having been drawn through the sample panel, the gas will then be pumped back into the glove box where it can be purged back into the containment.

All the sampling operations are performed in those portions of the system that will be subatmospheric to eliminate the chances for out-leakage. As a further precaution, the sample panel will be located near the glove box tent exhaust fan in the event that gases were to escape. Prior to breaching any portion of the sample system, the tubing will be purged into the containment, by a self-contained supply of inert gas.

Two basic types of samples will be taken. The first will be to evaluate the tritium content by bubbling gases through a bottle of demineralized water. The second sample is to be drawn with a hypodermic needle through a rubber septum seal and transferred to an evacuated bottle for evaluation of the noble gases.

This sample method will only identify the HTO component. (tritiated water vapor) Is there sufficient basis to believe that the HT component ~~is not~~ (tritiated gas) is not of concern?

J. Lee For Review

Inter-Office Memorandum

GPU Service

Date: August 21, 1979

Subject: TMI-2 Penetration R626 Experiment

To: Distribution

Location: TMI-2

The attached safety evaluation report is forwarded for your use in reviewing the procedures associated with the subject task.

Mike Morrell
M.P. Morrell

cc: R.C. Arnold
J. Collins (NRC)
J.G. Herbein
R.F. Wilson (w/o)

TMI-II CONTAINMENT SURVEILLANCE
SAFETY EVALUATION REPORT

By
T. A. Brandsberg
Fluid and Mechanical Systems

Approved By: [signature] 8/17/79
Special Products Design

GPU Contract No.
B&W Contract No.

Prepared for:
General Public Utilities
By
BABCOCK & WILCOX
Power Generation Group
Nuclear Power Generation Division
P. O. Box 1260
Lynchburg, Virginia 24505

TMI-II CONTAINMENT SURVEILLANCE
SAFETY EVALUATION REPORT

1. Abstract

2. Introduction/Background

3. Basic Methods & Equipment

4. Detail Safety Considerations and Equipment Evaluation

5. Conclusions

6. Figures

    1. Penetration Details
    2. " "
    3. " "
    4. Boring Equipment
    5. Secondary Boundary
    6. Purge Air System Diagram
    7. Gas Sample Panel
    8. Gas Sample System Diagram

ABSTRACT

Babcock & Wilcox, working in conjunction with General Public Utilities (GPU), is developing methods, equipment, and procedures for gaining access to the TMI-2 containment for remote surveillance. It is intended that the direct measurement of conditions and inspections of equipment within the containment building will allow focusing of actions required for plant repair and recovery programs.

This report discusses the methods and equipment to be used and evaluates how the equipment and design procedures have been developed and tested to meet the environmental requirements.

INTRODUCTION/BACKGROUND

As a result of the March 28, 1979, loss of feed water transient at the Three-Mile Island-2 Reactor, the containment building was contaminated with significant amounts of radioactive materials and gases. As one of the activities needed to recover the use of the reactor containment building, Babcock & Wilcox is developing the methods, equipment, and procedures to insert surveillance equipment through a containment penetration.

It is anticipated that the surveillance equipment would allow a detailed study of:

1. The radioactivity levels and sources,
2. The potential effectiveness of proposed decontamination techniques, and
3. The physical condition of some of the equipment in the containment.

This report describes the methods to be used for the first containment surveillance program and just how these methods will ensure safe use of this equipment.

METHODS AND EQUIPMENT

It is proposed that the containment surveillance program utilize TMI-2 Reactor Containment Building Penetration No. R-626 as shown in Figures 1, 2, & 3. This penetration consists of a 12" O.D. pipe with a 1" thick wall which presently is sealed inside and out with blind flanges. With suitable precautions (as will be discussed in Section 4) the outside blind flange will be removed and machinery inserted into the interior blind flange and a 9" hole cut through into the containment atmosphere. Through this hole it is intended to insert various pieces of equipment such as television cameras, lights, and instrumentation for analysis of radioactivity levels and sources. Samples of the gases and surface contamination will be taken, and the shielding effectiveness of various garments that might be worn into the containment will be evaluated.

The various pieces of equipment will be inserted and withdrawn using long-reach rods which will be manipulated from the glove box shown in Figure 4 and/or from the fuel storage building.

To provide long-term isolation of the containment environment, two gate valves with elastomer sealing surfaces are to be installed in place of the outside blind flange. From the containment up to, and including these valves, the system is designed to withstand the stresses associated with deadweight, seismic, and thermal loads. Siesmic loads on the secondary containment components were evaluated to ascertain their effect on the penetration piping and valves. The supports and connections of the secondary containment are desiged to preclude excess loads being transmitted to the penetration.

DETAIL SAFETY CONSIDERATIONS
AND
EQUIPMENT EVALUATION

The equipment and procedures to be used for the surveillance program has two main objectives. These objectives are to maintain the integrity of the containment isolation boundary and to minimize the radiation exposure to the individuals working on or near the surveillance equipment.

To demonstrate how these objectives are met, each stage of the surveillance program will be discussed along with the specific precautions that are unique to each stage. There are several safety aspects that will be considered throughout this program which will be discussed first.

GENERAL SAFETY PRECAUTIONS

During the surveillance program operations the release of radioactive materials and gases that are airborne in the containment will be virtually eliminated by procedures and equipment that will at all times maintain at least one leak-tight barrier between the containment building interior and the external environment. That leak-tight barrier will vary during the operations as discussed further on in this section.

According to all procedures that involve direct RB access through the penetration, one prerequisite will be that the containment atmosphere be maintained at a subatmospheric condition. This will ensure no flow of airborne radioactivity out of the containment boundary components. Local containment pressure monitoring equipment will provide the surveillance operators with a direct indication of pressure. Although the requirement for negative pressure may be extreme and perhaps unnecessary for a well sealed pressure boundary, it does provide significant added confidence, and margin for error.

Again, according to all procedures that involve direct RB access through the penetration, one prerequisite is to maintain a small (~1SCFM) positive flow of air into the containment when the isolation gate valves are opened. This positive inflow will tend to discourage the migration of airborne radioactivity into the penetration pipe and the secondary boundary components. It has been calculated that a total of 120 hours of 1SCFM air flow would not cause the RB to increase by more than 0.05psi. It is anticipated that no more than about 25 hours of operation with this purge will be required to complete the work outlined herein.

In addition, prior to opening, and after shutting the containment gate valves, the secondary boundary atmosphere will be purged back into the penetration pipe, thus ensuring that small amounts of airborne radioactivity which does leave the containment will not be released during transfer of equipment in and out of the secondary pressure boundary.

PHASE I-HOLE DRILLING

During the first phase of the surveillance program the inner seal plate of the penetration is to be cut through with a 9" trepan cutter as shown in figure 4. Prior to starting this cutting operation, a positive air pressure will be maintained on the penetration to ensure immediate flow of air into the containment when the seal plate is first breached. This purging air flow is to be maintained at all times until the cutter is withdrawn back into the top hat, the gate valve closed, and the valve seal integrity verified. Prior to the removal of the blind flange outside of the containment building, the penetration pipe will be inspected for internal contamination through the removal of the pipe plug in the face of the exterior blind flange. Following confirmation that this area is devoid of harmful amounts of radiation, then the blind flange will be removed and a twelve inch (12") gate valve installed. This gate valve will become the primary boundary for the containment. Both this valve, and another to be mounted later on this pipe will have an elastomer seal for the valve seat to ensure tightness. Prior to the use of these valves, they will be tested to ensure their integrity under pressure and modified as needed to ensure leak tightness.

The equipment to be used to drive a hole through the blind flange located inside the containment building is designed such that a leak tight seal is provided during the whole operation. The equipment shown figuratively in Figure 4 maintains a seal by use of a top hat arrangement attached to the gate valve on the penetration pipe. The boring bar being driven by the air motor outside of this top hat is provided with a rotary shaft seal. Boring operations will be performed with the containment pressure less than the ambient so that any leakage past the seal will be into the containment.

The boring bar air motor will have the air discharge port ducted to a point outside of the area of potential contamination to avoid the spread of contamination products.

Following the completion of the boring operation, the cutting tool will be withdrawn into the top hat to allow the gate valve to be closed and sealed. During the drilling operations, the area will be enclosed in a plastic tent to insure that the small amount of gases which may be present inside the top hat will not be released to the environment.

The procedures for the hole cutting operations are provided with specific contingency plans for various abnormal conditions. These conditions and contingencies as follows:

1. Failure to maintain the containment subatmospheric: withdraw boring equipment and seal penetration.

2. Failure to meet leak rate acceptance criteria: open and close gate valve with a positive flow of air into the containment across the valve to blow chips from the valve seat.

3. Failure to maintain cutting action due to binding: loosen cutter by reversing the air motor drive; if cutter continues to bind in the hole, withdraw cutter and seal penetration.

4. Difficulty in withdrawing boring bar: the cutting bar can be forcefully withdrawn knowing that with sufficient force the bar will separate at one of the joints. These joints are splined to allow withdrawal following the shearing of the joint retaining pin. Following the removal of the bar segment, the gate valve can be closed to seal the penetration.

The hole cutting operations will be virtually identical to those used to cut the water sampling hole at Penetration 401. The procedures were developed from those actually used for the water sample hole cutting operations. Recommendations from these operations were incorporated.

One difference to be noted between the procedures used on the R401 penetration and the R626 penetration is the pressure to which the penetration pipe and isolation valves are tested. The design pressure for the electrical connector spool piece is 5psig based on the connector manufacturer's recommendations. However, this pressure has been found to be more than sufficient considering the sources of energy available to heat the containment atmosphere and cause pressure build up.

This is confirmed each time the RB coolers are put into operation. Although the heat removal capability of one RB cooler loop is several times greater than the decay heat production in the TMI-II core (as of August, 1979), it can only draw down the RB pressure less than 1psi. From this it is obvious that the total core decay heat would cause an RB pressure increase of much less than 1psi, even if that heat were totally transferred to the RB atmosphere (rather than through the water, walls and floor of the containment structure).

PHASE II - SECONDARY BOUNDARY INSTALLATION

Following the hole drilling operations and the cleanup of the area, work will begin for installation of the secondary pressure boundary components. These installation activities are to be performed with the isolation gate valve closed so that they do not pose an environmental or radiological risk. To prevent the accumulation of possible trace amounts of radioactive leakage, the tent air exhaust will remain functional.

The pressure boundary equipment is designed and tested to ensure the capability to remain leak tight at pressures up to 2 psig. The major components include the following as shown in figure 5:

PN 17 - glove box
PN 42 - 12" gate valves
PN 43 - electrical connector spool piece
PN 46 - mounting flange
PN 7 - extension pipe
PN 1 - extension pipecover

Also, part of the surveillance system components are valves, regulators, and tubing to be used for purging the secondary boundary component atmosphere.

Most of these components and the surveillance tools were assembled and tested prior to shipment to the site and found to be compatible with the operations described in the procedure for the surveillance activities.

To further enhance the usefulness of the glove box equipment, two 12" gate valves are provided for penetration sealing. Between them is provided a spool piece with the electrical connector needed for the TV camera equipment and the permanent radiation monitor. With this arrangement, one or the other valve may be closed to maintain the containment boundary whether this equipment is in. rted or withdrawn.

The secondary components have been evaluated to determine what loads will be applied to the containment pipe. Table 1 shows the results of these calculations and demonstrates a significant margin of acceptability based on allowable loads provided by the piping designer, Burns & Roe.

The calculations and tabulated results assume that the weight of the glove box is supported by the penetration piping when in fact, the work platform is designed to hold it. Despite this conservatism, the RB penetration pipe is far from overloaded.

PHASE III - CONTAINMENT SURVEILLANCE

Following the installation of the secondary pressure boundary components and the completion of the exterior connections for TV, communications, and radiation monitors, the surveillance activities will commence. Prior to the opening of the containment isolation valve(s), the pressure boundary components will be tested to confirm leak tightness.

The surveillance activity sequence of events will be as follows:

1. Glove box radiation survey and penetration pipe cleanup.
2. Insertion of TV camera and video survey.
3. Containment radiation survey.
4. Containment air sample.
5. Containment surface swipe samples.
6. Containment relative humidity survey.
7. Installation of permanent radiation monitor.

The secondary boundary will be breached to install and/or remove equipment prior to Step 1, above, and between Steps 1 & 2 and 2 & 3 and after Step 7. During these periods, the containment boundary is maintained by the 12" gate valve. By minimizing the number of times that equipment is moved in and/or out of the secondary containment, the chances of inadvertantly spreading radioactive contamination from the glove box will be minimized.

As a further precaution, both of the areas around the glove box and the extension pipe cover will be surrounded by a work tent. The tent around the glove box shall be provided with an exhaust fan that is ducted to a suitable air filter system. By procedure, anytime the extension pipe cover is to be removed, the glovebox viewport will also be opened to draw air through the extension pipe, from the fuel handling building, and through the exhaust system. This precaution will discourage the migration of contamination out of the extension pipe into the fuel handling building.

The procedures for the surveillance activities include consideration of various abnormal operating conditions which might be encountered. These abnormal conditions and the contingency plans are as follows:

1. Leakage during pressure testing: Procedure would identify methods to be used to identify and seal leakage paths.

2. Large radiation increase during tool withdrawal: Stop tool withdrawal until HP can evaluate acceptable increases in radiation and plan accordingly.

3. Failure to control containment pressure subatmospheric: Withdraw tools and close a 12" gate valve. Re-evaluate the need for subatmospheric containment based on experiences to that time.

4. Damage to glove: Withdraw hand from damaged glove and inspect that hand for contamination. Cover glove port and continue if possible.

5. Inability to withdraw tool(s): Examine with TV or with the mirror in the glove box. If this doesn't provide enough information for withdrawal, push tool into penetration and close gate valve. If necessary, disassemble reach rod section or cut through with a saw if needed.

6. Increasing Airborne Activity in the glove box tent: Put on airmasks, withdraw tools, close a 12" gate valve and exit the work tent. Contact HP to detect the source of activity.

Not satisfactory

The equipment to be used for the surveillance program has been assembled and demonstrated to function as expected during mock-up tests performed at B&W's Research Center. The operators have also demonstrated their capability to function in a glove box with a negative pressures similar to those which have been observed within the TMI-II containment. Prior to shipment to the site, all the pressure boundary components will have been tested to their respective design pressure, ie., 15psig for the spool piece and the two valves, and 2 psig for the glove box and extension pipe.

With the exception of the containment gas sample, all the surveillance work will be performed within the confines of the previously described glove box. Since the gas sampling procedure will bring a small amount of the containment atmosphere outside of the pressure boundary, it is warranted to describe these activities in further detail.

The gas sample panel, shown pictorally in Figure 8 is provided with a vacuum pump to draw gas samples from the containment through the sample tubing inserted through the penetration. The gas is first drawn through a particulate filter and then through a series of charcoal filters designed to trap various species of iodine. The filtered air sample is drawn through tygon tubing to the glove box wall. From the glove box wall through the gas sample panel, the gas sample is drawn through stainless steel tubing which will have been pressure tested for leakage. After having been drawn through the sample panel, the gas will then be pumped back into the glove box where it can be purged back into the containment.

All the sampling operations are performed in those portions of the system that will be subatmospheric to eliminate the chances for out-leakage. As a further precaution, the sample panel will be located near the glove box tent exhaust fan in the event that gases were to escape. Prior to breaching any portion of the sample system, the tubing will be purged into the containment, by a self-contained supply of inert gas.

Two basic types of samples will be taken. The first will be to evaluate the tritium content by bubbling gases through a bottle of demineralized water. The second sample is to be drawn with a hypodermic needle through a rubber septum seal and transferred to an evacuated bottle for evaluation of the noble gases.

6. CONCLUSIONS

The preceding sections have discussed the equipment and methods by which it is proposed that the TMI-II containment be initially surveyed. It has been demonstrated that these procedures and equipment will reduce personnel exposure to low levels and will maintain the containment integrity to ensure no danger of environmental impact.

TABLE 1

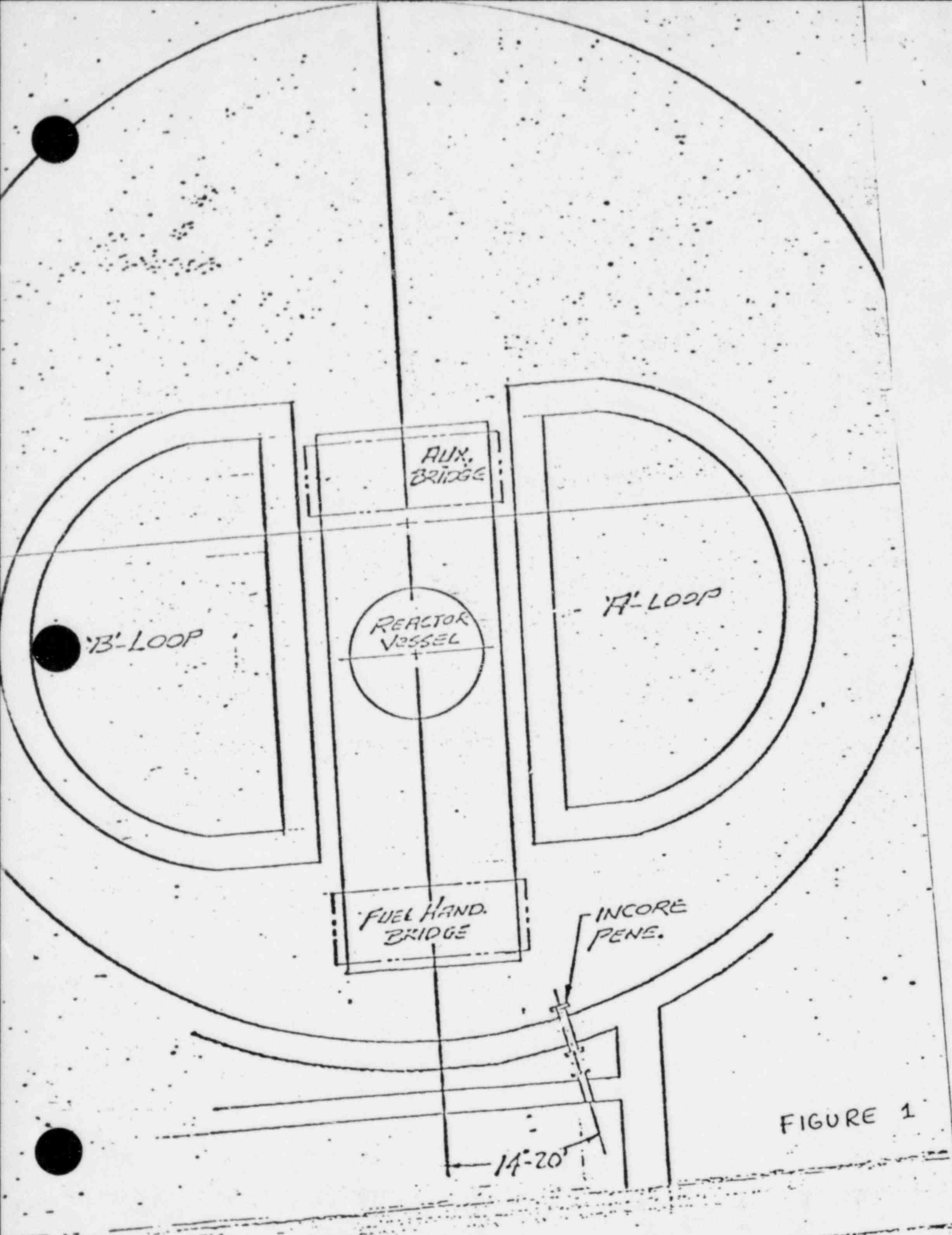
RB PENETRATION PIPE LOADS

Component	Weight of Component (Lbs)	CG Distance From wall (inches)	Moment Load (Ft-Lb)
1. 1st Gate Valve	300	13½	337.5
2. Spool Piece	<100	17	141.7
3. 2nd Gate Valve	300	20½	512.5
4. Mounting Flange	50	25	104.2
5. Glove Box	200 (1)	38	633.3
6. Men & Equipment	500	38	1583.3
Total Dead Weight	1450		3313 Ft-Lb
Dead Weight + Seismic (2)	3480		7957 Ft-Lb
Allowable	28,000		10,600 Ft-Lb

(1) ½ of Glove Box weight is supported by the extension pipe

(2) Assuming a rigid body and using the peak spectra accelerations of 2.0 g's horizontal and 1.33 g's vertical total moment load was multiplied by $\sqrt{1.33^2 + 2.0^2} = 2.40$

Note: Because of the rubber glove box seals, there will be no appreciable thermal loads.



AUX.
BRIDGE
'B'-LOOP
REACTOR
VESSEL
'A'-LOOP
FUEL HAND.
BRIDGE
INCORE
PENE.
14'-20'

FIGURE 1

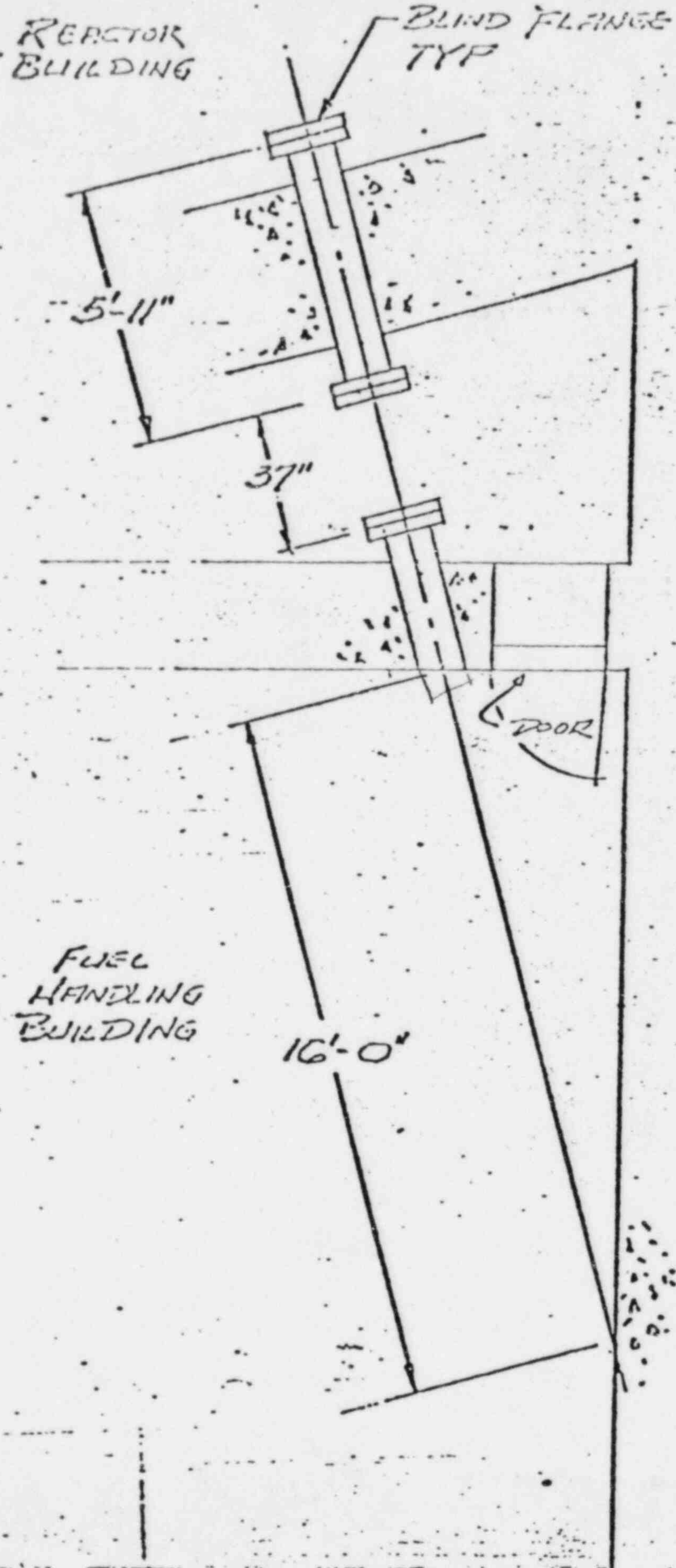

REACTOR BUILDING
BLIND FLANGE TYP
5'-11"
37"
DOOR
FUEL HANDLING BUILDING
16'-0"

FIGURE 2

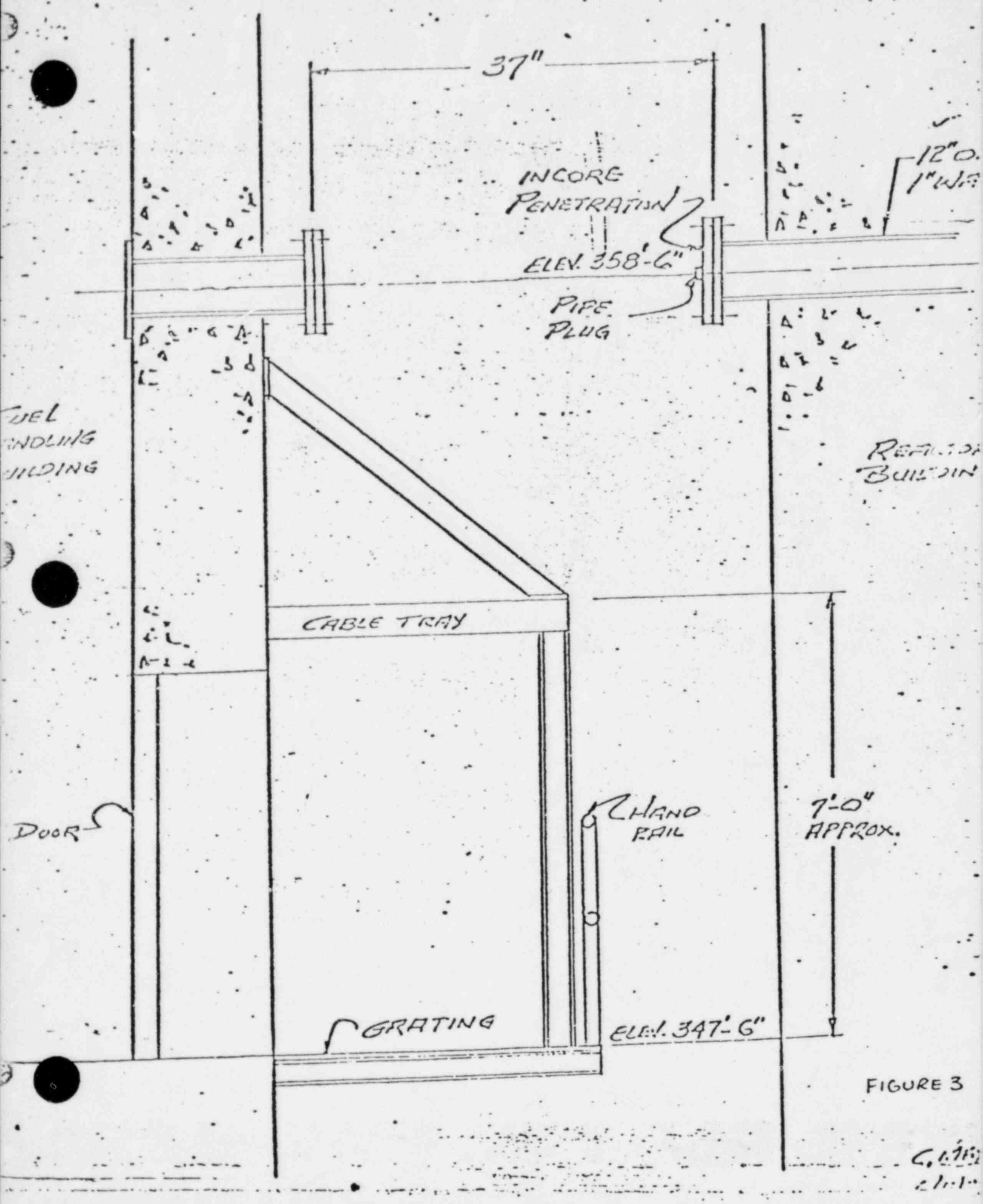
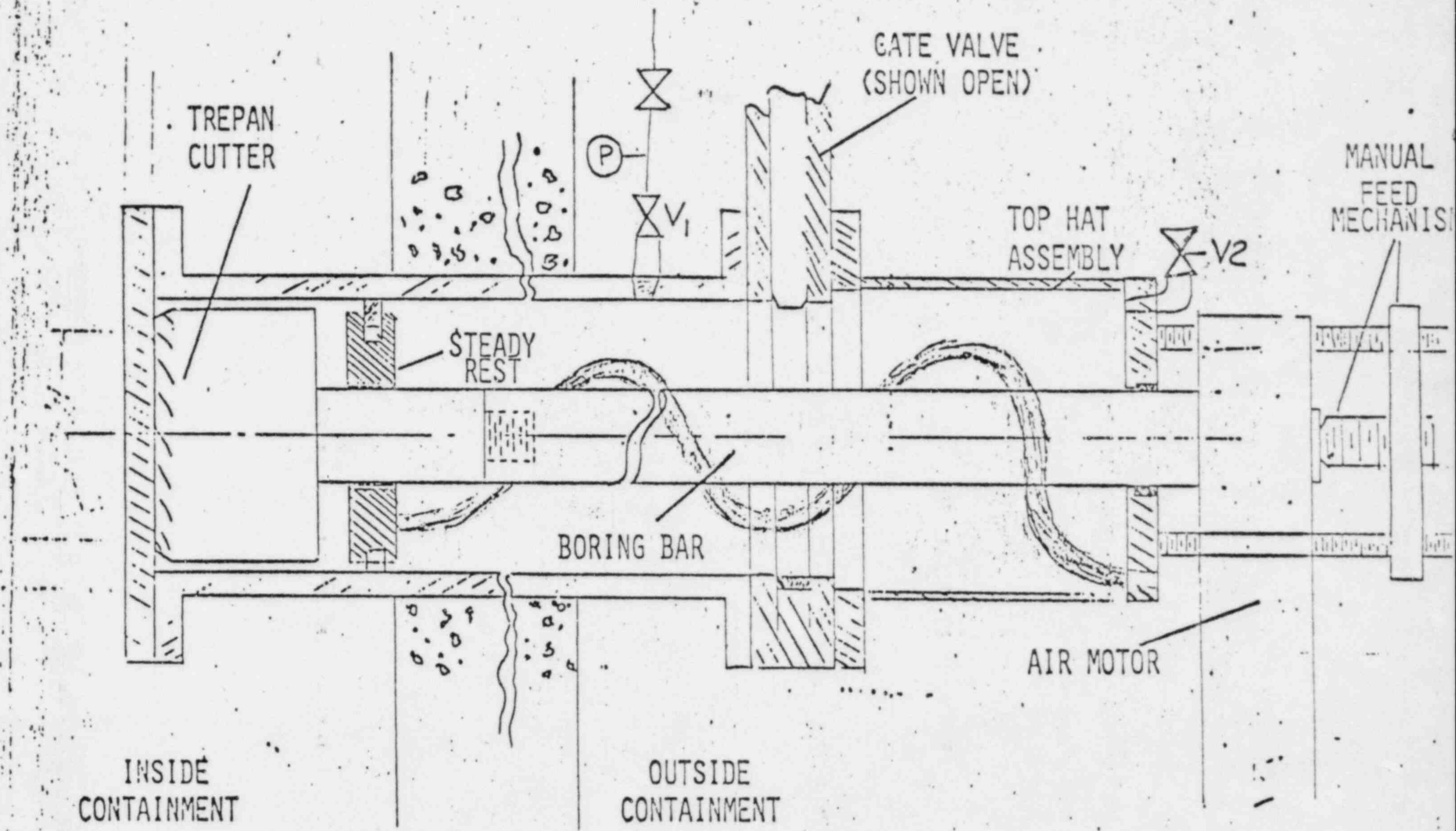
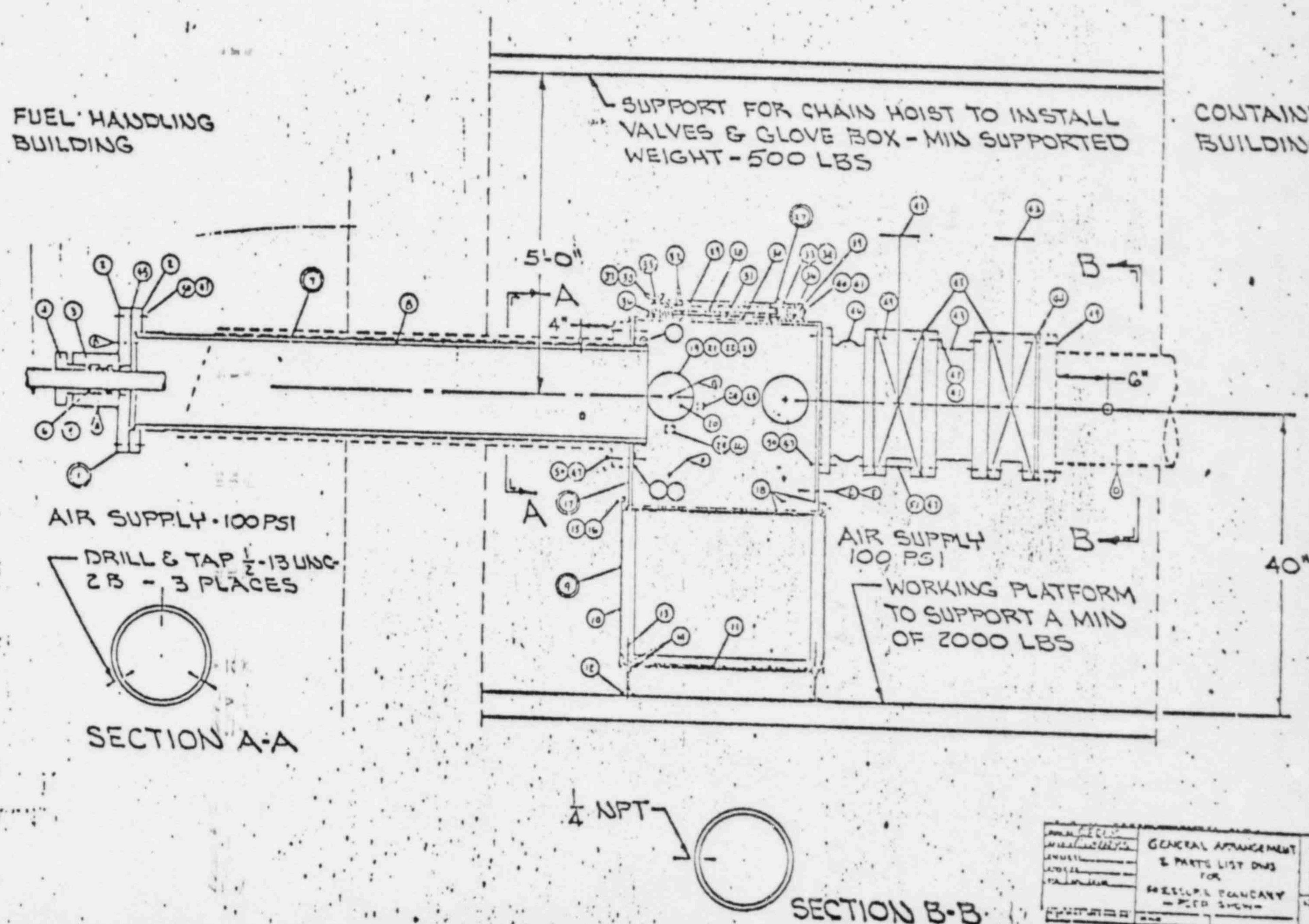

37"
INCORE PENETRATION
ELEV. 358'-6"
PIPE PLUG
12"
CABLE TRAY
DOOR
HAND RAIL
7'-0" APPROX.
GRATING
ELEV. 347'-6"

FIGURE 3

1. Positive P1
2 Cont air flow



SCHEMATIC OF BORING TOOLS



FUEL HANDLING BUILDING
CONTAINMENT BUILDING
SUPPORT FOR CHAIN HOIST TO INSTALL VALVES & GLOVE BOX - MIN SUPPORTED WEIGHT - 500 LBS
5'-0"
4"
6"
40"
A
B
AIR SUPPLY - 100 PSI
DRILL & TAP 1/2-13 UNC-2B - 3 PLACES
SECTION A-A
AIR SUPPLY 100 PSI
WORKING PLATFORM TO SUPPORT A MIN OF 2000 LBS
1/4 NPT
SECTION B-B
GENERAL ARRANGEMENT & PARTS LIST DWG FOR

FIGURE 5

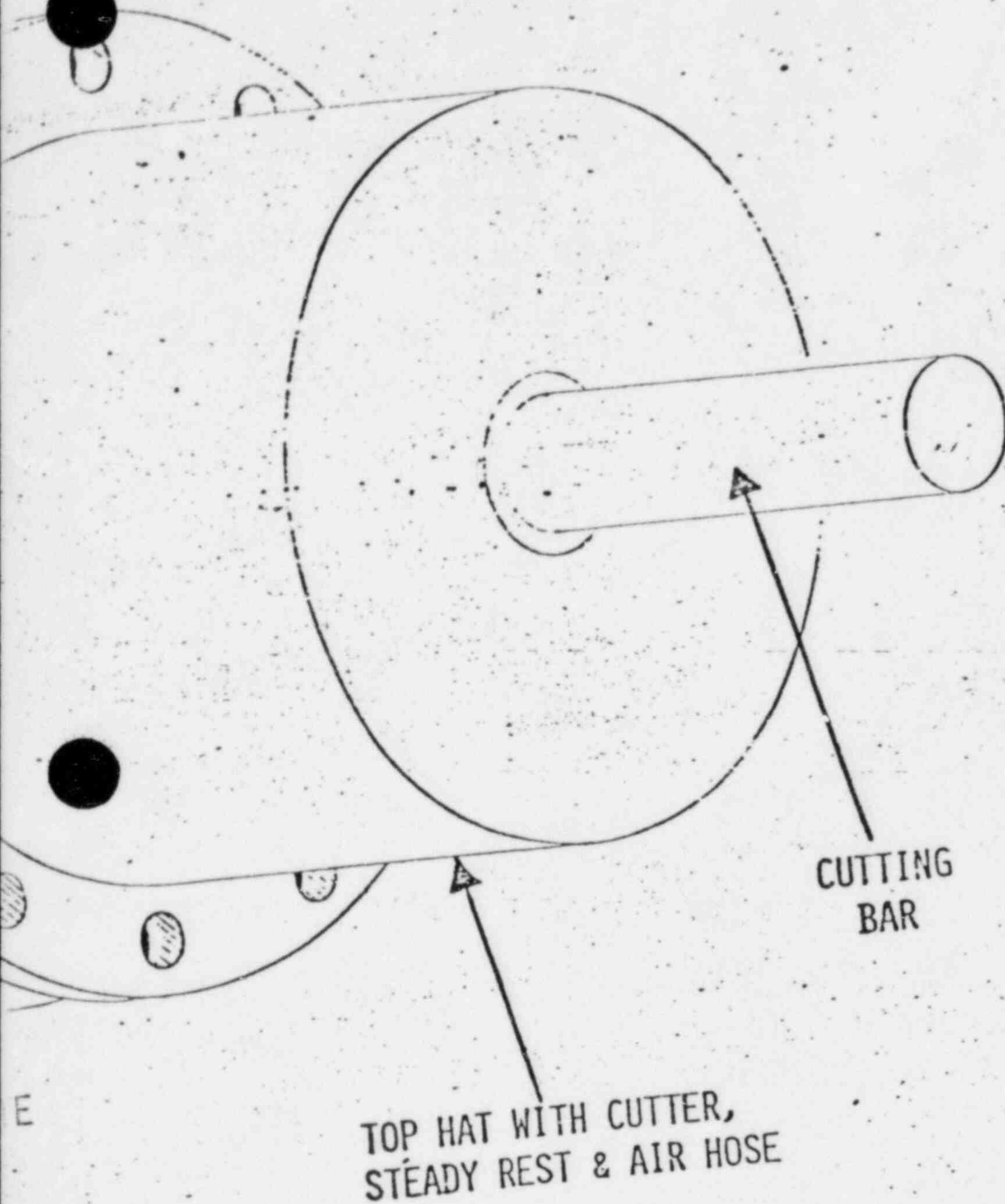


FIG. 6

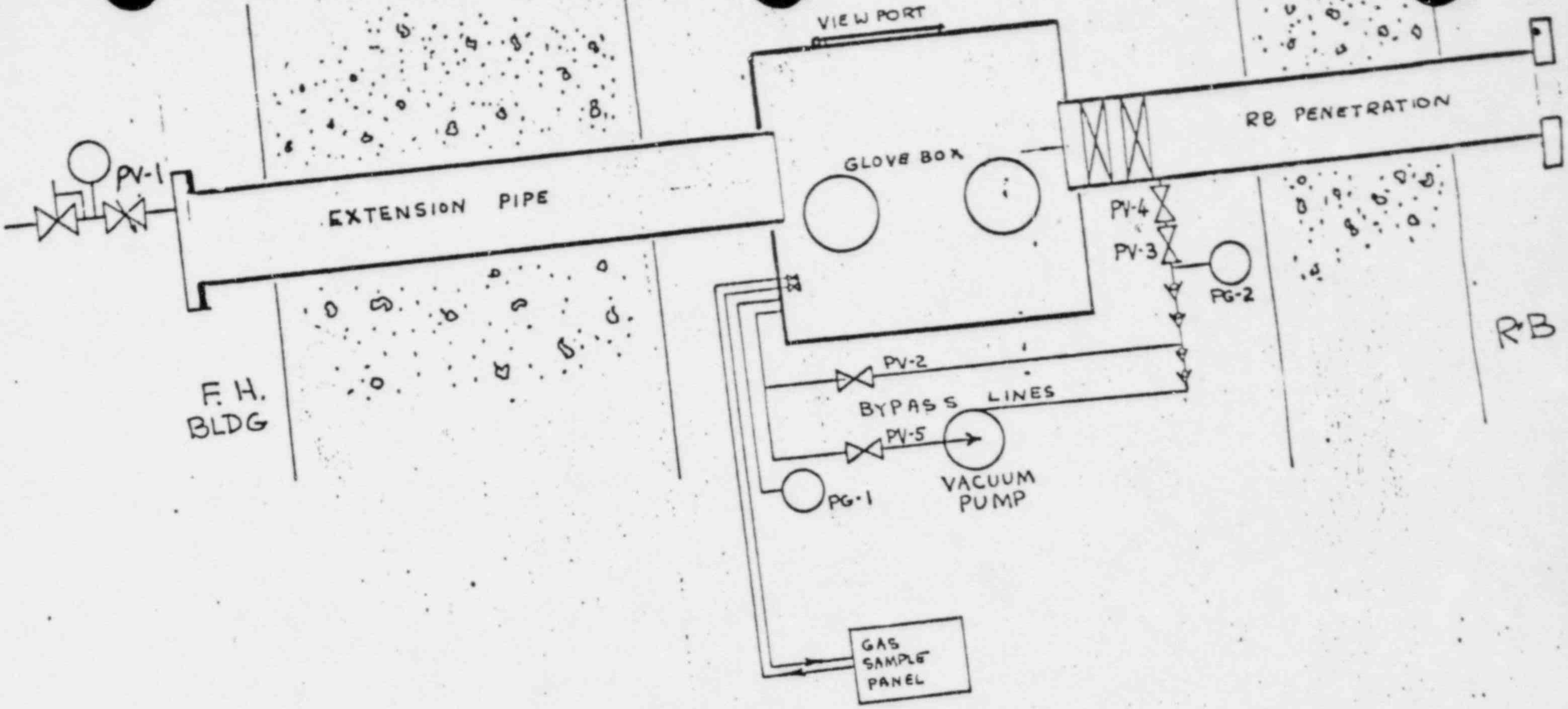
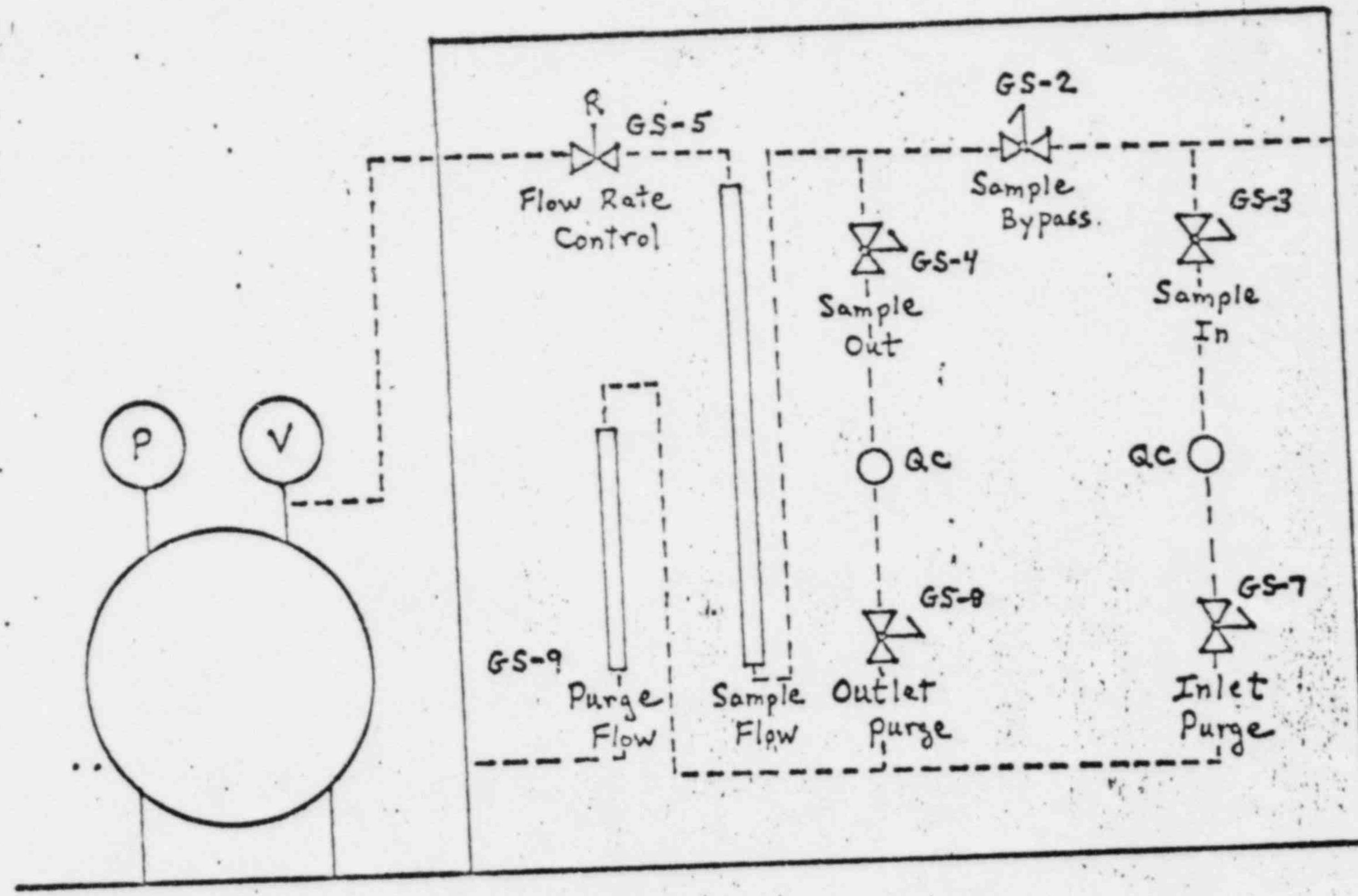
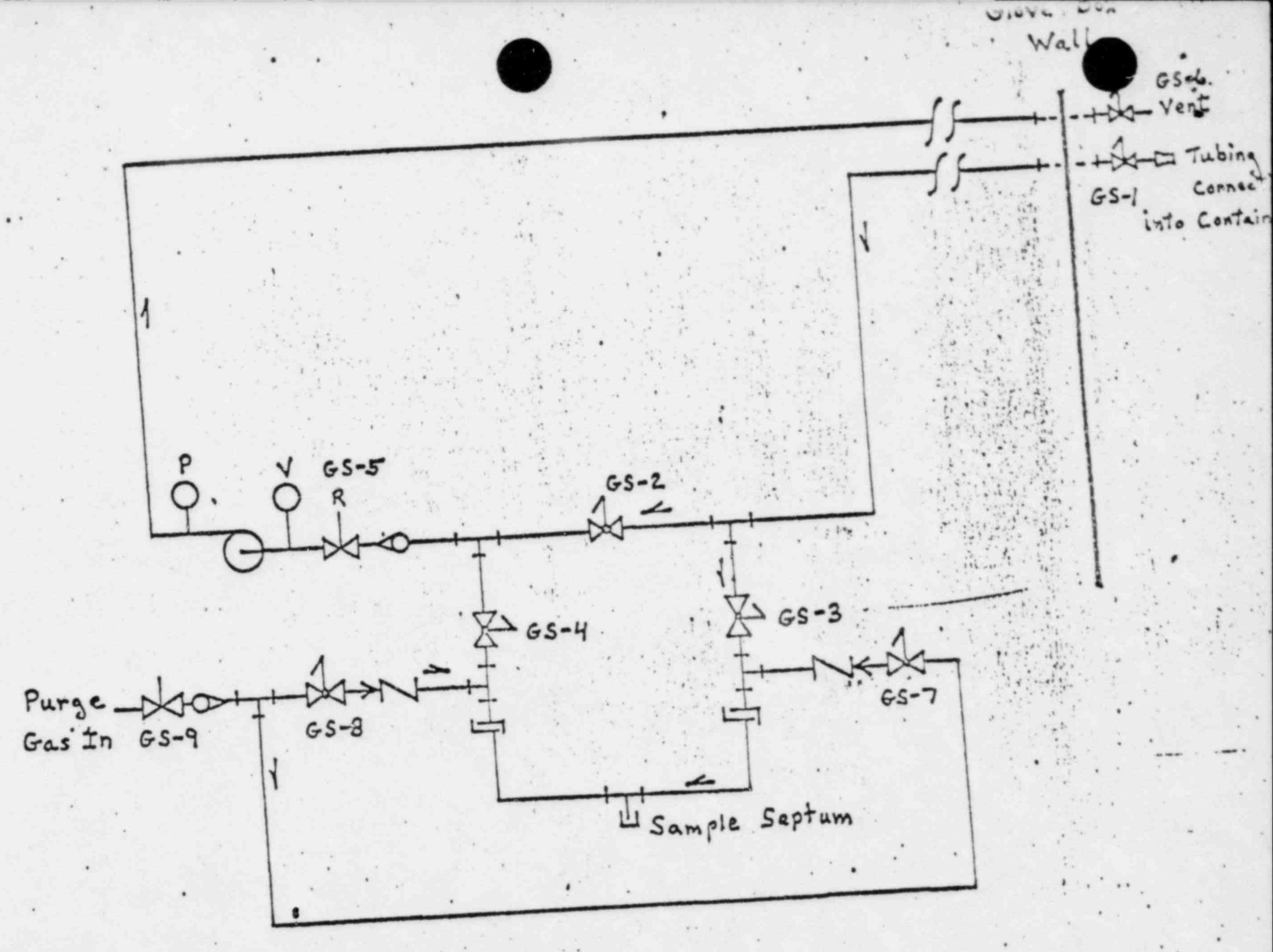


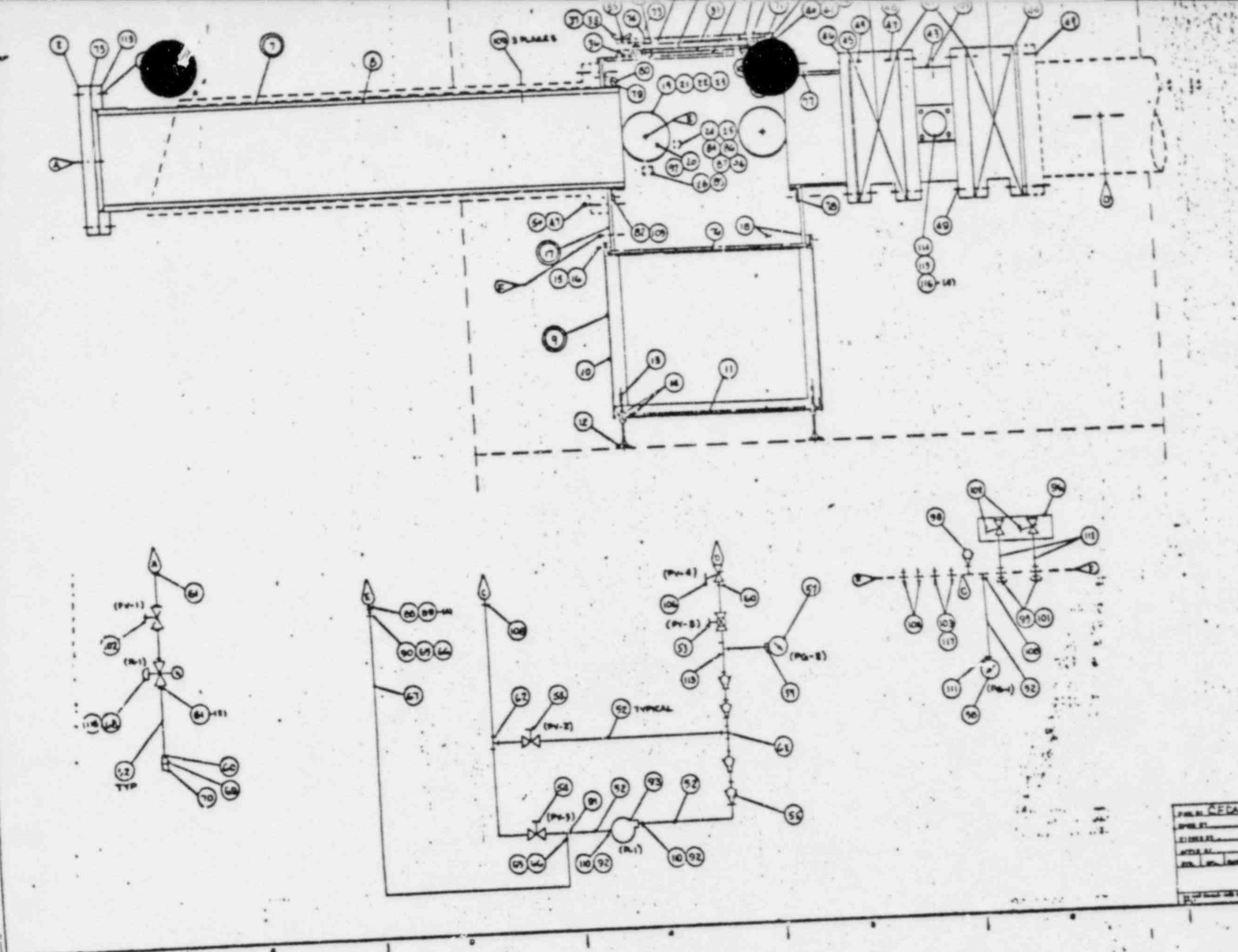
FIG. 7 PURGE AIR SYSTEM



R
GS-5
Flow Rate
Control
GS-2
Sample
Bypass.
GS-3
GS-4
Sample
Out
Sample
In
P
V
QC
QC
GS-8
GS-7
GS-9
Purge
Flow
Sample
Flow
Outlet
Purge
Inlet
Purge

JKS
7/5/79


Wall
GS-6
Vent
Tubing
GS-1
into Contain
P
V
GS-5
R
GS-2
GS-3
GS-4
GS-7
GS-8
GS-9
Purge
Gas In
Sample Septum
JKS
7/5



GENERAL ARRANGEMENT
& PARTS LIST DWG
FOR
PRESSURE BOUNDARY
-PEED SHOW-

SK-CFD-719