REGULATORY INFORMATION DISTRIBUTION SYSTEM (RIDS) mA/4

ACCESSION NBR:8004080648 DOC.DATE: 80/03/31 NOTARIZED: NO DOCKET #
FACIL:50-261 H. B. Robinson Plant, Unit 2, Carolina Power and Ligh 05000261
AUTH.NAME AUTHOR AFFILIATION
UTLEY,E.E. Carolina Power & Light Co.
RECIP.NAME RECIPIENT AFFILIATION
DENTON,H.R. Office of Nuclear Reactor Regulation

SUBJECT: Forwards suppl to 791231 response to Lessons Learned Task Force short-term requirements.

DISTRIBUTION CODE: A039S COPIES RECEIVED:LTR 1 ENCL 1 SIZE: 50
TITLE: Resp to Lesson Learn Task Force - Westinghouse

NOTES:

	RECIPIENT ID CODE/NAME	COPIES LTTR	COPIES ENCL	RECIPIENT ID CODE/NAME	COPIES LTTR	COPIES ENCL
ACTION:	10 BC ORB#1	7	7			
INTERNAL:	01 REG FILE	1	1	02 NRC PDR	1	1
	05 OLSHINSKI,J.	1	1	06 KERRIGAN,J.	1	1
	07 BURDION,J.	1	1	08 WILLIS,C.	1	1
	17 I & E	2	2	20 CORE PERF BR	1	1
	21 ENG BR	1	1	22 REAC SFTY BR	1	1
	23 PLANT SYS BR	1	1	24 EEB	1	1
	25 EFLT TRT SYS	1	1	ANDERSON,N.	1	1
	FIELDS,M.	1	1	O'REILLY,P.	1	1
	OELD	1	0	TELFORD,J.T.	2	2
EXTERNAL:	03 LPDR	1	1	04 NSIC	1	1
	26 ACRS	16	16			

APR 10 1980

T

TOTAL NUMBER OF COPIES REQUIRED: LTTR 45 ENCL 44

CP&L
Carolina Power & Light Company

March 31, 1980

File: NG-3514(R)   Serial No.: NO-80-502

Mr. Harold Denton, Director
Office of Nuclear Reactor Regulation
United States Nuclear Regulatory Commission
Washington, D. C. 20555

H. B. ROBINSON STEAM ELECTRIC PLANT UNIT NO. 2
DOCKET NO. 50-261
LICENSE NO. DPR-23
LESSONS LEARNED SHORT TERM REQUIREMENTS

Dear Mr. Denton:

On December 31, 1979, Carolina Power & Light Company (CP&L) filed a submittal with your staff documenting the implementation of Short Term Lessons Learned requirements at H. B. Robinson. On March 13, 1980, members of the NRC Lessons Learned Task Force met with our staff at H. B. Robinson to review the implementation of the Short Term items. Based on that review, and as requested by the Task Force, the attached additional documentation is supplied as a supplement to our December 31, 1979 submittal. As in our original submittal, item numbers are based on the numbers assigned in NUREG-0578 and your letter of October 30, 1979.

We trust this information is suitable to meet your request.

Yours very truly,

E. E. Utley
Executive Vice President
Power Supply and Customer Services

JJS/jc (894-931)
Attachment

cc: Mr. J. D. Neighbors (NRC)

A039
S
1/1

411 Fayetteville Street ∘ P. O. Box 1551 ∘ Raleigh, N. C. 27602

8004080648

Additional Information Concerning
IMPLEMENTATION OF SHORT TERM LESSONS LEARNED ITEMS AT
H. B. ROBINSON

NRC Request

Item 2.1.1

PORVs - Document the description of the air supply

Pressurizer Level - Clarify and document power supplies

CP&L Response

Item 2.1.1

A. The normal source of motive power for the PORVs is the instrument air system. The alternate source of motive power is nitrogen filled accumulators provided with each PORV. Each accumulator allows 100 cycles of operation of its respective PORV following a loss of instrument air.

B. Pressurizer Level - The power supplies for the pressurizer level instruments are as follows:

Channel I - Receives power from instrument Bus No. 1 which is powered from emergency bus No. 1 through MCC 5. As such, Channel I is capable of being powered from off-site or the emergency diesel generators.

Channel II - Receives power from instrument Bus No. 2 which is powered from 125 VDC bus MCC "A". As such, Channel II is capable of being powered from Station Battery "A" or emergency bus No. 1 through Inverter "A".

Channel III - Receives power from instrument bus No. 3 which is powered from 125 VDC bus MCC "B". As such, Channel III is capable of being powered from Station Battery "B" or emergency bus No. 2 through Inverter "B".

NRC Request

Item 2.1.3a

PORV Indication - PORV limit switch does not alarm. Commitment required to alarm indication.

- Document seismic qualification of limit switch.

- Document that an Emergency Procedure exists for interpreting the indication.

CP&L Response

Item 2.1.3a

A. The PORV position indication will be modified to include an alarm which will alert the operator that the PORV does not indicate fully shut. This modification will be completed prior to September 1, 1980.

B. The limit switches which provide position indication for the PORVs are seismically qualified.

C. Abnormal Procedure AP19, "Malfunction of RCS Pressure Control System," and the annunciator procedures for PORV, "Relief Line High Temperature, Safety Relief Valve Open Alarms," provide interpretation for indications that the PORVs and/or SRVs are open.

NRC Request

Item 2.1.3b

Subcooling Meter

A. Clarify if wide range sensors are being upgraded to safety grade and when.

B. Investigate whether <1700# narrow range sensors will generate erroneous signals.

C. The instrument is not in a seismically qualified rack. Document plans to upgrade.

D. Clarify if the alarm function is looking at the RTDs, the thermocouples, or both.

E. Document that loss of the plant computer does not affect the meter.

CP&L Response

Item 2.1.3b

A. The wide range pressure sensors which supply a pressure signal to the subcooling meter will be upgraded to safety grade prior to September 1, 1980.

B. At pressures below 1700 psig, the narrow range pressure sensors will not generate erroneous signals as the microprocessor is programmed to block Narrow Range Pressure Indications below that pressure.

C. Proposed Revision 2 to Regulatory Guide 1.97 does not require the subcooling meter to be qualified seismically. Therefore, Carolina Power & Light Company does not currently plan to install the subcooling monitor in a seismically qualified cabinet.

D. The alarm function of the subcooling meter is independent of whether the RTD or Thermocouple inputs are selected for indication on the subcooling meter panel front. The alarm circuit selects the Auctioneered High of the RTD and Thermocouple inputs as its input.

E. The subcooling meter operates independent of the plant computer and, therefore, a loss of the plant computer will not result in a loss of the subcooling monitor.

NRC Request

Item 2.1.4

Containment Isolation

Action

1. Modifications should be made such that the valves associated with the following systems do not automatically reopen upon removal of the isolating signal:

   a. SG blowdown and sample
   b. Instrument air
   c. Containment atmosphere monitors

2. An automatic isolation valve should be added to the N_2 to PRT penetration.

3. Those penetrations with "normally closed" isolation valves should be locked closed and administratively controlled such that at any time they are open during plant operation, a dedicated person will be assigned to close it immediately in the event of an emergency or when the operation is complete.

Documentation Required

1. Provide a schedule for completion of modifications discussed in action items 1 and 2.

2. For those valve control switches which control the operation of more than one containment isolation valve, describe how electrical independence is maintained (e.g., distance between contact blocks, insulating barriers between contact blocks).

3. Identify any valve control switch (and the associated penetrations) which controls valves in more than one penetration.

4. Discuss the "override" capability of the containment isolation reset.

CP&L Response

Item 2.1.4

1. Modifications will be developed and implemented such that the containment isolation valves in the Steam Generator Blowdown and Sample, Instrument Air, and Containment Atmosphere Monitor Systems will not automatically reopen upon removal of the isolating signals. Additionally, an automatic isolation valve will be added to the Nitrogen Supply Line of the Pressurizer Relief Tank. These modifications will be completed during the scheduled 1980 refueling outage (currently scheduled for May - June 1980).

   An administrative program which controls the operation of normally closed, manually operated containment isolation valves will be implemented by May 5, 1980. This procedure will require that any time a normally closed, manual isolation valve is opened, a dedicated person will be assigned to close it in the event of an emergency.

2. Control switches which control the operation of more than one containment isolation valve are grouped into two categories: those which incorporate separate contact blocks for each train (Gemco-Rotary Actuated Crossbar or Oiltight-Push Button Actuated Cross Bar) and those which use the same contact block for each train (Gemco-Rotary Actuated Crossbar).

   Those switches which incorporate a separate contact block for each train maintain their electrical independence by totally enclosing each switch contact in a nonconducting case. The contact blocks for each train are then ganged together through a nonconducting shaft. As a

suitable barrier is provided between each train, the switches which incorporate separate contact blocks for each train are single failure proof. Those containment isolation valves which incorporate a switch of this type are as follows:

Penetration No.	Valve No.	Function
3	519A and 519B	Makeup Water Supply to the PRT
29	956A and 956B	RCS Sample (Pressurizer Steam Space)
30	956C and 956D	RCS Sample (Pressurizer Liquid Space)
31	956E and 956F	RCS Sample (Loops 2 and 3)
60	956G and 956H	Safety Injection Accumulator Sample

The second category of switch is that which uses a single set of contacts for both trains. Normally, this would be unacceptable as the switch would not be single failure proof. However, when the switch is wired in series with the Train "A" and Train "B" containment isolation relay contacts, the logic system which controls the isolation valve is single failure proof and, therefore, acceptable. To ensure that a single failure of the switch contacts do not allow the isolation valves to automatically reopen following the reset of Phase "A" containment isolation, this type switch will be replaced with the single failure proof switch by September 1, 1980. Penetrations which presently make use of this type switch are:

Penetration No.	Valve No.	Function
35	RMS 1 and 2	Containment Atmosphere Sample to R-11/R-12 Monitor
36	RMS 3 and 4	Containment Atmosphere Sample Return From R-11/R-12 Monitors

3. A single control switch controls the position of valves RMS 1, 2, 3, and 4. These valves isolate Penetrations 35 and 36 which provide the containment atmosphere sample supply and return lines for containment atmosphere radiation monitor.

   A single control switch controls the position of valves V12-6, V12-7, V12-8, and V12-9. These valves isolate Penetrations 37 and 38 which provide the supply and exhaust paths for the containment purge system.

4. The containment isolation logic circuitry incorporates a retentive memory; therefore, the containment isolation signal may be reset even though the initiating signal is still present. To reestablish the containment isolation signal, the initiating signal must be cleared then reestablished, or a manual containment isolation signal must be inserted. This applies to both Phase "A" and Phase "B" containment isolation circuits.

NRC Request

Item 2.1.5

Containment Purge - Document that filters downstream of H_2 control vent will maintain their integrity.

- Verify that downstream piping is pipe and not duct work.

CP&L Response

Item 2.1.5

A. The integrity of the filters in the Post Accident Hydrogen Vent System is maintained by limiting the maximum system pressure. Procedurally the Post Accident Hydrogen Vent System cannot be used if containment pressure exceeds 3.0 psig. Additionally, the pressure regulating valves upstream of the filters limit the maximum inlet pressure of the filters to 1 psig. Therefore, the filters should see a maximum ΔP of 1 psid, well within the 2 psid rating of the filters.

B. The Post Accident Hydrogen Purge System downstream piping is piping and not duct work. A small section of heavy duty duct work forms the transition piece between the three-inch pipe and inline filter.

NRC Request

Item 2.1.6a

System Integrity

A. Need to institute a regular surveillance program.

B. Document list of systems excluded and justification why.

C. Leakage criteria should be as low as practical.

D. Document testing system for gas systems.

E. Document administrative controls in effect.

CP&L Response

Item 2.1.6a

A. A regular surveillance program was instituted prior to January 1, 1980 as the continuing leak reduction program was incorporated into the Plant Operating Manual as a Periodic Test.

B. The following systems were excluded from the Periodic Leak Test Program because they are closed systems inside containment and do not communicate directly with the primary system or containment atmosphere:

a. Main Steam
b. Main and Auxiliary Feedwater
c. Steam Generator Blowdown and Sample
d. Component Cooling Water
e. Service and Cooling Water

The following systems were excluded from the Periodic Leak Test Program because they are nonessential systems which automatically isolate on a containment isolation signal. In addition, these systems are not designed to process highly radioactive fluids of the postulated accident scenario:

a. Nitrogen Supply Lines
b. Demineralized Water Lines
c. Accumulator Sample Lines
d. Fuel Transfer Tube
e. Containment Pressure Relief
f. Containment Vacuum Relief
g. Dead Weight Tester
h. Supply and Return Lines to the R-11 and R-12 Radiation Monitors
i. Instrument and Service Air

C. All leakage which was discovered by the Immediate Leak Reduction Program was evaluated with respect to being "as low as practical." The Continuing Leak Reduction Program will be revised to include the criteria by which an inspector can evaluate the "as left" leakage with respect to being as low as practical. As was the case with the Immediate Leak Reduction Program, any leakage which is identified as not being "as low as practical," and cannot be corrected by the inspector, will be identified on a trouble report. This will ensure further evaluation and/or repairs. These revisions will be completed by May 5, 1980.

D. The Waste Gas System was tested by placing the system in service using the normal system pressure and process media. Each component was then tested using a soap solution. The acceptance criteria for this system was no detectable leakage.

E. The Continuing Leak Reduction Program is an approved Periodic Test which is part of the Plant Operating Manual. These periodic tests are performed by the Shift Operating personnel, and the results are indicated on the test procedure, including the notation of whether the results were within the prescribed criteria. The Shift Foreman reviews the test results and compares the results to the acceptance criteria. If the results are satisfactory, the Shift Foreman signs and dates the acceptance criteria sheet and forwards it to the Operating Supervisor for review and approval. If the results are not satisfactory, the test is performed again. If necessary, the Shift Foreman initiates a Trouble Report. If the repeat test does not meet the acceptance criteria, the Operating Supervisor is advised and the cause of the discrepancy is investigated.

Following review and approval by the Operating Supervisor, the test form and the acceptance criteria sheet are forwarded to the Administrative Supervisor for posting on the Periodic Test Status Board and filing.

NRC Request

Item 2.1.6b

Shielding

A. Document evaluation of environmental qualification.

B. Document handling of gas waste system and why it is not a source.

C. Document all vital areas addressed.

D. Provide a list of all continuous occupancy areas.

E. Provide a list of modifications planned and required.

CP&L Response

Item 2.1.6b

A. The H. B. Robinson Plant will complete an evaluation of the effects of the postulated accident radiation fields on vital plant equipment located outside containment by April 15, 1980. Modifications which are determined to be necessary to prevent vital plant equipment from being unduly degraded in these radiation fields will also be identified at that time.

B. The Waste Gas and Chemical and Volume Control Systems are nonessential systems which are automatically isolated on a Phase "A" containment isolation signal. Since these systems are not intended for post accident use, they will remain isolated until containment isolation has been reset.

C. All areas for which access or occupancy would be required to mitigate the consequences of the postulated accident of Regulatory Guide 1.4 were designated vital areas. Each of these areas were evaluated in the radiation shield design review to ensure that they were accessible to perform the necessary post accident operations without overexposing any individual.

D. The following areas have been designated as continuous occupancy areas:

a. Control Room

b. Technical Support Center

c. Hot Chemical Laboratory

Throughout the postulated accident of Regulatory Guide 1.4, each of these areas is subject to a maximum of 15 mrem/hour.

E. The only modification currently planned as a result of the radiation shield design review is in the area of the primary sample sink. This area will be modified such that a Reactor Coolant Sample and a Containment Atmosphere Sample can be drawn and analyzed within a three-hour period without any individual receiving greater than 3 rem whole body or 18-3/4 rem to extremities. Options which the Robinson Plant are evaluating include a Hot Cell, in line monitoring techniques, and a special post accident sample sink. The H. B. Robinson Plant will select a particular option prior to April 15, 1980.

NRC Request

Item 2.1.7b

AFW Flow Indication - Document use of Steam Generator level as backup to flow indication.

CP&L Response

Item 2.1.7b

A. As was indicated in our December 31, 1979 response to NUREG-0578, the Auxiliary Feedwater Flow indications are backed up by the Steam Generator level instrumentation as an alternate means of verifying flow to the steam generators.

The power supplies for the steam generator level instruments are as follows:

Channel I - Receives power from instrument Bus No. 1 which is powered from emergency bus No. 1 through MCC 5. As such, Channel I is capable of being powered from off-site or the emergency diesel generators.

Channel II - Receives power from instrument Bus No. 2 which is powered from 125 VDC bus MCC "A". As such, Channel II is capable of being powered from Station Battery "A" or emergency bus No. 1 through Inverter "A".

Channel III - Receives power from instrument bus No. 3 which is powered from 125 VDC bus MCC "B". As such, Channel III is capable of being powered from Station Battery "B" or emergency bus No. 2 through Inverter "B".

NRC Request

Item 2.1.8a

Sampling - Provide an interim method of sampling and document its existence

CP&L Response

Item 2.1.8a

As discussed in our meeting of March 13, 1980, H. B. Robinson will develop by April 15, 1980, procedures to obtain and analyze an unpressurized reactor coolant sample within 24 hours without over-exposing any individual. Procedures for obtaining and analyzing a containment atmosphere sample within an hour will also be developed by April 15, 1980.

NRC Request

Item 2.1.8b

Effluent Monitors

A. Provide a real time method of measuring noble gas release from the steam reliefs.

B. Document the range of noble gas monitors.

C. Provide a description of methods for measuring Iodine and particulates.

CP&L Response

Item 2.1.8b

A. An interim method for providing real time measurements of noble gas releases from the steam reliefs has been developed. The basis for determining effluent release rates (Ci/sec) through the relief valves combines the data collected from an Eberline Teletector Model 6112 held adjacent to a main steam line, and a series of curves to be developed for various primary to secondary leak rates and post LOCA source strength spectrums. The procedure is basically the following:

1. Indications of substantial core damage are confirmed (t = 0 sec).

2. Relief valves open and the time and duration of atmospheric steam release are noted.

3. An RC&T technician, using a teletector, proceeds to a location one level below the main steam lines as indicated by reference point A on Attachment No. 1. The teletector is extended approximately 11' and positioned adjacent to the low point of steam line A. The dose rate is noted and the procedure is repeated for steam lines B and C.

4. The RC&T technician relates to the control room operator the dose rate information and the time the measurements were taken.

5. The control room operator locates the appropriate post LOCA steam line activity concentration curve (u Ci/cc vs. m Rem/hr) based upon:

   a. the most recent information on primary to secondary leak rates (i.e., latest steam generator blowdown sample analysis).

   b. time after core damage.

6. Knowing the contact dose rate of each steam line (step no. 3) a determination of the activity concentration (u Ci/cc) in each steam line is made using the curves.

7. Knowing the rated flow rates of the relief valves (cc/sec), and the number of reliefs that have opened (visual inspection), the activity release rate is calculated as follows:

   Activity Release Rate (u Ci/sec) = Steam Line Activity Concentration (u Ci/cc) x Discharge Rate (cc/sec)

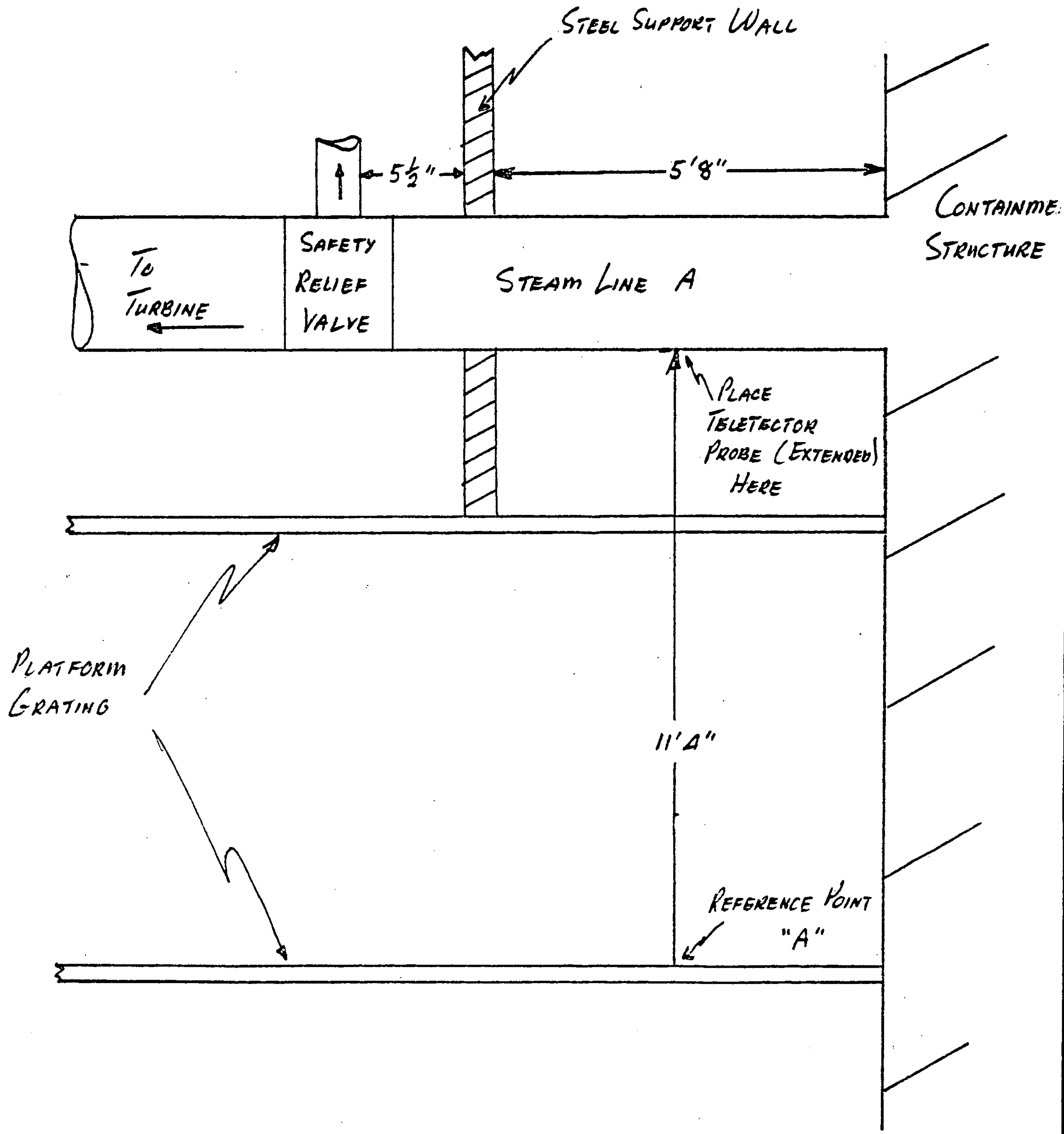
Equipment for achieving the above dose rate measurements is presently on site and operational. Post LOCA steam line activity concentration curves (step no. 5) will be prepared using the QADMOD computer code. Procedures, calculations, and curves will be completed prior to April 15, 1980.

Once again, it should be noted that the above procedure is only an interim solution. Permanently mounted "adjacent-to-line" steam monitors, and the ability to draw steam generator blowdown samples at the proposed emergency sampling facility will be provided at H. B. Robinson prior to January 1, 1981.

B. A detailed description of the interim noble gas monitors for the Plant Vent Stack and Fuel Handling Building Basement Exhaust and their associated ranges is documented in our report "System Description for the Proposed Post Accident Radiation Monitoring System for H. B. Robinson Unit No. 2" (pp 2-3). This report was presented to the NRC and discussed during our meeting in Bethesda, Maryland on February 5, 1980. An additional copy of this report is provided in Attachment No. 2. Ranges of these monitors are also indicated on the mR/hr -Ci/sec conversion curves which have been included in Volume 15 of the Plant Operating Manual. Copies of these curves are also included in Attachment No. 2 for your reference. Both monitors are presently capable of detecting noble gas release rates of 10,000 Ci/sec.

Documentation for the range of instrumentation used for the steam relief valves will be provided prior to April 15, 1980.

C. Descriptions of interim methods for measuring iodines and particulates at the Plant Vent Stack and Fuel Handling Building Basement Exhaust are provided in Attachment No. 3. Releases of iodines and particulates from the safety relief valves are considered to be negligible due to the partitioning of iodines and particulates in the steam generators.



Attachment No. 1

Sketch

Real Time Measuring of Releases from Steam Reliefs

Attachment No. 2

Documentation for the Range of Noble Gas Monitors

SYSTEM DESCRIPTION FOR THE

PROPOSED

POST ACCIDENT RADIATION MONITORING SYSTEM

FOR

H.B. ROBINSON UNIT NO. 2

(Designed to meet the Requirements of NUREG 0578 Section 2.1.8.b)

J. R. Lockridge

J. R. Lockridge
Project Supervisor
NUREG 0578, Section 2.1.8
February 4, 1980

TABLE OF CONTENTS

Contents | Page No.

1.0 General

This system description provides; (1) a review of the plant modifications completed at H.B. Robinson to meet the 1/1/80 interim requirements of NUREG 0578, Section 2.1.8.b; (2) a general overview of the proposed radiation monitoring system designed to satisfy the 1/1/81 Requirements of NUREG 0578, Section 2.1.8.b and (3) brief descriptions of each of the monitors which will comprise the proposed monitoring system.

The basis behind the design of this proposed radiation monitoring system is not to replace the radiation monitoring systems installed to meet the 1/1/80 requirements as described herein, but to supplement these interim monitors with additional monitors and/or capabilities to satisfy the 1/1/81 requirements. A basic premise for the design of this system is that post accident instrumentation should reflect:

1. Simplicity of design (eg. on-line duct mounted monitors in preference to off-line monitoring systems, if possible).
2. A high degree of reliability with minimal maintenance
3. A proven and tested design
4. Avalability of equipment and spare parts
5. Ability for plant personnel to operate, maintain and calibrate equipment.

2.0 Review of Plant Modifications Completed to Meet the January 1, 1980 Requirements

2.1 High Range Noble Gas Effluent Monitors

There are three potential high-level release paths at the H.B. Robinson Unit No. 2 site; namely, the plant vent stack, the ventilation exhaust from the basement of the Fuel Handling Building and the steam safety valves and atmosphere steam dump valves. For the interim, the following actions have been taken.

2.1.1 Plant Vent Stack

The plant vent stack combines exhaust effluents from the Reactor Auxiliary Building, the condenser air ejector (on initiation of high alarm), the upper levels of the Fuel Handling Building, and the Containment purge.

At present the noble gases from the plant vent stack are monitored by the Plant Vent Gas Monitor (R-14) which consists of four thin-walled GM tubes mounted on a horizontal probe within the stack. The instrument sensitivity ranges from 5×10^{-7} uCi/cc to approximately 5×10^{-2} uCi/cc.

In order to monitor potential noble gas releases from the vent stack in the magnitude of 10,000 Ci/sec (or 4.3×10^{2} uCi/cc), a high range monitor has been designed, constructed and installed on the plant vent stack in the vicinity of the existing R-14 monitor.

2.1.1.1 Instrumentation (See Sketches No. 2,3,4 of Section 5.0)

The high range vent stack monitor consists of a gamma sensitive GM tube, set in a 3" lead shielded collimator and positioned facing the vent stack so as to "see" a small volume of the vent stack. The GM tube has a range of 1 mR/hr to 1×10^{5} mR/hr and energy dependence of 100 kev to 10 Mev. Calibration will be accomplised via (1) an electronics calibration, (2) a standard area monitor calibration with known sources, and an "in place" calibration with (3) three radioactive sources of known energies and strengths, reflective of the postulated accident source spectrum. A calibration will be conducted during each refueling, and in conjunction with the calibration of the normal radiation monitoring system.

2.1.1.2 Monitoring/sampling location

The high range vent stack monitor is located on a section of stack which is 5 stack diameters downstream from the closest substream, as in accordance with the quidelines set forth in ANSI N13.1. Three inches of lead, shield the sides and back of the detector from postulated high background activity, and provide a minimum source to background difference of 100.

2.1.1.3 Access to Radiation readings

Continuous readout in the control room and in the vicinity of the detector has been provided. Readout at both locations is in mR/hr.

2.1.1.4 Source of power

The high range vent stack monitor receives its power from the vital instrument bus. In the vent of a loss of power, the plant diesel generator will provide an alternate back-up power supply.

2.1.1.5 Procedures for conducting all aspects of the measurements/analysis.

i) Occupational exposures have been minimized by providing a continuous monitor readout in the Control Room. During an accident, access to the detector itself is not required.

ii) A calculational method for converting instrument readings (mR/hr) into release rates (ci/sec) has been developed using standard volume source calculations. The calculation (Attachment No. 8 of Plant Modification No. 505), assumes an isotopic mix which would be representative of the postulated accident, and an exhaust air flow equal to that of that of the Reactor Auxiliary Building and Containment purge.

iii) A curve for converting the instrument readings (mR/hr) into release rates (Ci/sec) has been derived from ii (above). For ease of dissemination of information, the curve has been placed in Volume 15 of the Plant Operating Manual. Procedures concerning its use have been added to the plant's emergency instructions.

iv) Procedures for calibration are discussed in detail in Attachment No. 10 of Plant Modification No. 505.

2.1.2 Fuel Handling Building Basement Exhaust

The Fuel Handling Building basement exhaust sweeps areas of the lower-level of the Fuel Handling Building including the spaces for the liquid waste hold-up tanks and waste gas decay tanks.

At present, noble gases from the Fuel Handling Building basement exhaust are monitored continuously by an offline monitor (R-20) located at a point near the atmospheric discharge. The instrument sensitivity ranges from 3×10^{-6} uCi/cc to 1×10^{-1} uCi/cc.

In order to monitor potential noble gas releases from the Fuel Handling Building Basement Exhaust in the magnitude of 10,000 Ci/sec (or 2.1×10^{3} uCi/cc), a high range monitor has been installed adjacent to the basement exhaust duct in the vicinity of the existing R-20 monitor.

The instrumentation, shielding, source of power, procedures and ease of accessibility and dissemination of information are identical to those of the Plant Vent Stack High Range Radiation Monitor.

2.1.3 Steam Safety Valves and Atmospheric Steam Dump Valves

A calculational method has been developed for the interim to quantify release rates of up to 10,000 Ci/sec for noble gases and iodines released from steam safety valves and atmospheric steam dump valves. The calculational method is based upon Regulatory Guide 1.4 releases of fission products and the maximum allowable primary to secondary leak rate for continued reactor operation. A curve for estimating the total activity released (Curies) as a function of time for which the valves are open has been added to Volume 15 of the Plant Operating Manual. Procedures concerning the use of the curve have been added to the plant's emergency instructions.

This calculational method is to serve only as an interim solution until high range main stream line radiation monitors can be procured and installed.

2.2 Assessing Radioiodine and Particulate Effluents

2.2.1 Plant Vent Stack

A review of both the existing equipment and procedures for assessing radioiodine and particulate releases has been conducted. The sample media can be obtained and handled during accident conditions providing that good health physics practices of time, distance, and shielding are employed. Existing instrumentation and procedures for analyzing the radioiodine/particulate sample media are adequate. Recommendations for reducing personnel exposures and increasing the accuracy of the sample media analysis have been made.

2.2.2 Fuel Handling Building Basement Exhaust

A modification has been made to the existing Fuel Handling Building Exhaust low-range monitor (R-20) to provide intermittent particulate/iodine sampling. Methods and procedures for analyzing the sample media during accident conditions are identical to those of the Plant Vent Stack.

2.2.3 Steam Safety Valves and Atmospheric Steam Dump Valves

At present, there is no capability of sampling the main steam lines for particulates and iodines during a Design Basis Accident. However, based on the calculation performed for Section 2.1.3 of the report, "Steam Safety Valves and Atmospheric Steam Dump Valves", iodine releases are estimated to be less than one percent of the total released from the steam safety valves and atmospheric steam dump valves.

3.0 Proposed Radiation Monitoring Stytem to Meet the January 1, 1981 Requirements (Refer to Sketch No. 1 , Section 5.0)

3.1 Plant Vent Stack Radiation Monitoring System

The proposed plant vent stack monitoring system will consist of the following three major components (1) the stack mounted high range interim monitor as described in Section 2.1.1 of this report. This monitor will provide "mid-range" monitoring of noble gases; (2) a "high range" monitor, similar in design to the "mid range" monitor yet altering the detector-collimator geometry to increase the detector's range and (3) an Eberline PING-2 radiation monitoring system for on-line continuous collection and monitoring of particulates and iodines, as well as providing "low range" monitoring of noble gases. Each of the three monitors is physically independent of the others such that a failure of one monitor (such as loss of flow in the low range noble gas monitor) will not affect the operation of the other two monitors.

3.2 Fuel Handling Building Basement Exhaust Radiation Monitoring System

The proposed Fuel Handling Building Radiation Monitoring System will consist of two major components: (1) the duct-mounted high range interim noble gas monitor as described in Section 2.1.2 of this report: and (2) a particulate and radioiodine sample panel. The particulate and radioiodine sample panel will consist of (1) a sample pump and isokinetic nozzle for withdrawing a representative exhaust air sample, (2) a fixed particulate filter and holder, (3) a charcoal or silver zedite cartridge for collection of radioiodines, and (4) a flow meter and flow totalizer for determining total sample volume flow between filter changes. Since the interim noble gas monitor for this effluent release point now satifies the requirments of Table 2.1.8.b.2 of NUREG 0578, an additional monitor will not be procured.

3.3 Steam Safety Valves and Atmospheric Steam Dump Valves

Determination of secondary side effluent releases through the steam safety valves and atmospheric steam dump valves will be accomplished by (1) installing main steam line monitors upstream of the valves to indicate gross steam acticity by looking through the steam pipe walls, & (2) providing the ability to sample the steam space of each steam generator via the proposed emergency sampling facility. A correlation will be made between the activity concentrations and source spectrum of the steam condensate sample, and the output of the main steam line monitors. Release rates will then be estimated based upon the number of safety or relief valves which lift and the approximate duration of steam release.

3.4 Containment Atmosphere Radiation Monitoring System

The containment atmosphere will be monitored via 3 area monitors - two in-containment monitors quialified for operating in a LOCA environment, and a third area monitor which will "view" the containment atmosphere through the personal access hatch. For this monitor a correction factor curve will be determined to

account for the attenuation of gammas through the access hatch door. A "spare" in-containment monitor will be procured in order that one in-containment monitor can be removed and calibrated in the manufacturer's shop during each outage. Thus, by rotating the monitors each monitor will be shop calibrated on an annual basis.

3.5 Recording and Display

Each of the aforementioned detectors will provide continuous display and recording in both the control room and technical support center.

3.6 Calculational Method for Converting Detector Output (mR/hr) to Release Rate (uCi/sec) or Activity Concentration (uCi/cc)

The QADMOD computer code will be utilized in both the design and output conversion (mR/hr to uCi/sec or uCi/cc) of the mid range and high range noble gas monitors. Since the isotopic mix of the noble gas source changes considerably as a function of time after a LOCA, a series of curves will be developed for each detector. Source terms used for the calculation will be the same as those used for the shielding analysis of NUREG 0578, Section 2.1.6.b. The results of this method are compatable with the assumption of a Regulatory Guide 1.4 release of fission products. To assume that all noble gases are Xe 133 (as some equipment manufacturers propose) would be misleading especially in the early phases of a LOCA when short lived isotopes dominate.

4.0 Advantages of the Proposed Monitoring System

4.1 Reliability.

a. Each monitoring subsystem (such as the Plant Vent Stack) consists of several independent monitors such that the failure of one major component will not result in the loss of total monitoring capability at any given release point. For example a loss of flow to the PING 2 stack monitoring system will not affect either the mid or high range noble gas monitoring of the stack effluents.

b. The output (display and recording) of each monitoring system will be independent of any other system. Thus, for example,the failure of the plant stack recorder will not affect the recording capability for the main steam line monitors, containment monitors, or Fuel Handling Building Basement Exhaust monitors. Furthermore redundancy of display and recording for each monitor will be provided in the Technical Support Center.

c. Each of the mid or high range monitors consists of basically a detector and adequate shielding. There is no pumping system, sophisticated microprocessor circiutry or complex sample flow path with solenoid operated valves that could fail in an accident environment. With the exception of the in-containment high range monitors, all of the detectors are of proven design with a considerable history of operation in an operating plant environment.

4.2 Availability

Since each of the monitoring systems consists of monitors that are either already on-site, or easily procured, it is anticipated that installation of the entire system will be complete within 6-8 months. Furthermore since the shielding design and fabrication of several monitors will be performed on site, manufacturing delays are minimized.

4.3 Custom-design

Of the radiation monitoring equipment vendors surveyed few,if any,provide variations in equipment or shielding design to meet a plant's specific requirements. However, since the design and fabrication of this proposed monitoring system is within the scope of H.B. Robinson site personnel, each monitor will be custom designed for a particular application and reflect adequate shielding for a given location and radiation background.

4.4 Minimal Cost

It is anticipated that the proposed monitoring system when complete will reflect a total additional cost of less that $200,000 including equipment, cable, installation and engineering support services. Considerable savings is achieved by maximizing the use of monitors designed to meet the 1/1/80 NUREG 0578 requirements,and minimizing the need for costly more sophisticated monitoring systems.

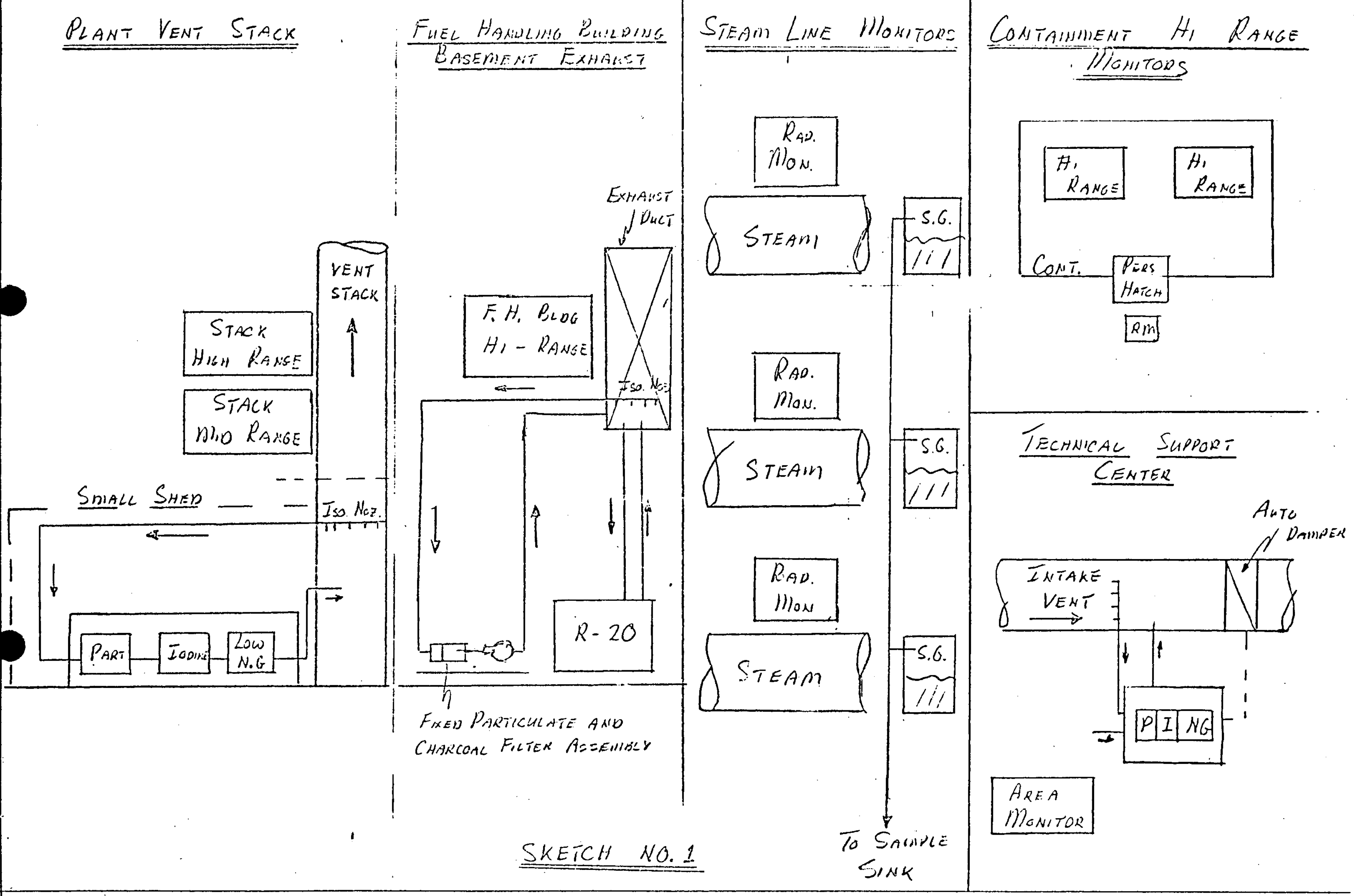
4.5 Calibration and Maintenance

With the exception of the in-containment hi-range monitors all of the components of the proposed monitoring system can be calibrated and maintained by plant personal. Maintenance problems should be minimal due to the simplicity of design of most monitors. Furthermore, detectors for the mid and high range noble gas monitors (and possibly the steam monitors) are interchangeable and could be replaced with minimal cost.

SECTION 5.0

SKETCHES

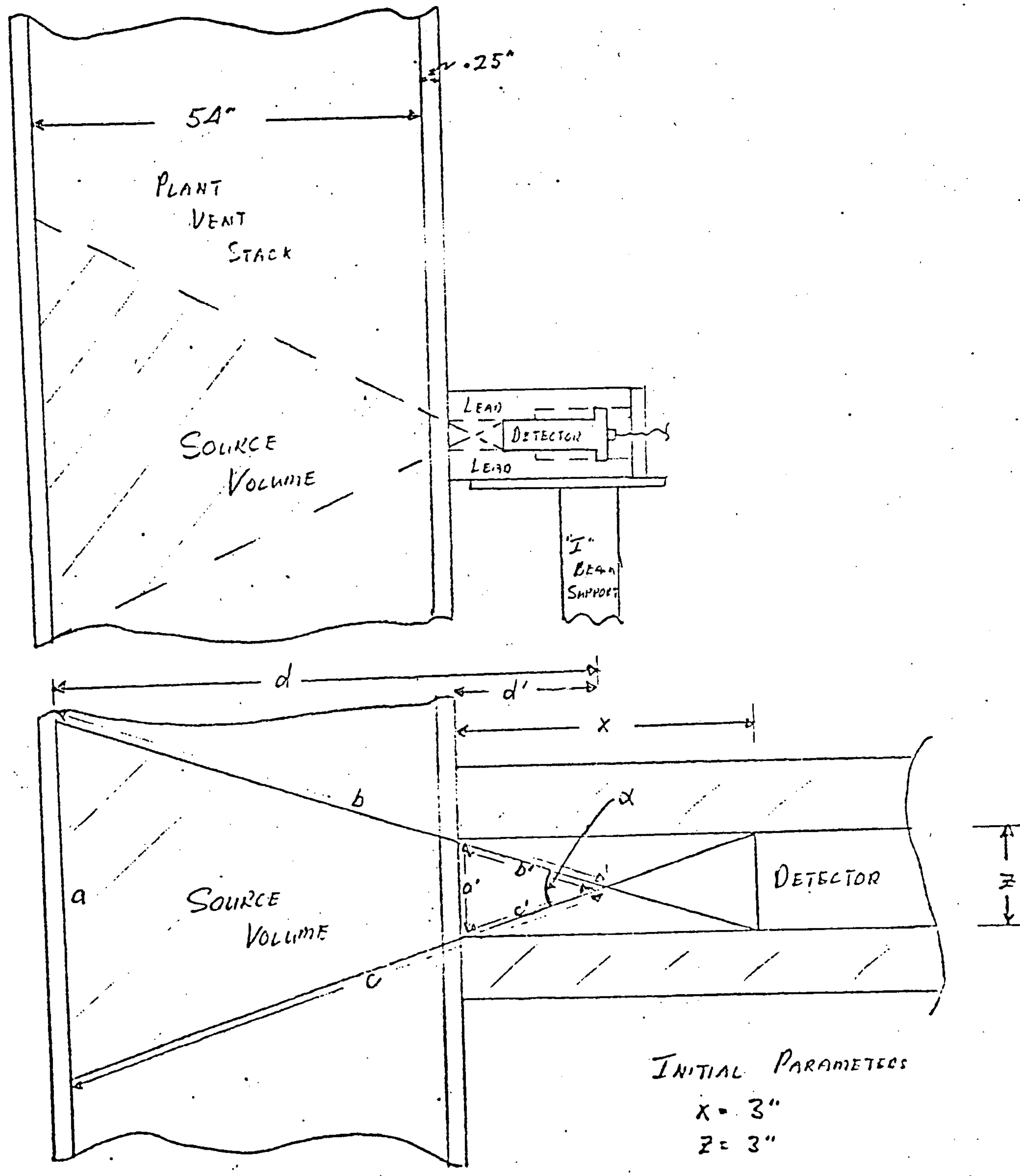
Radiation Monitoring System



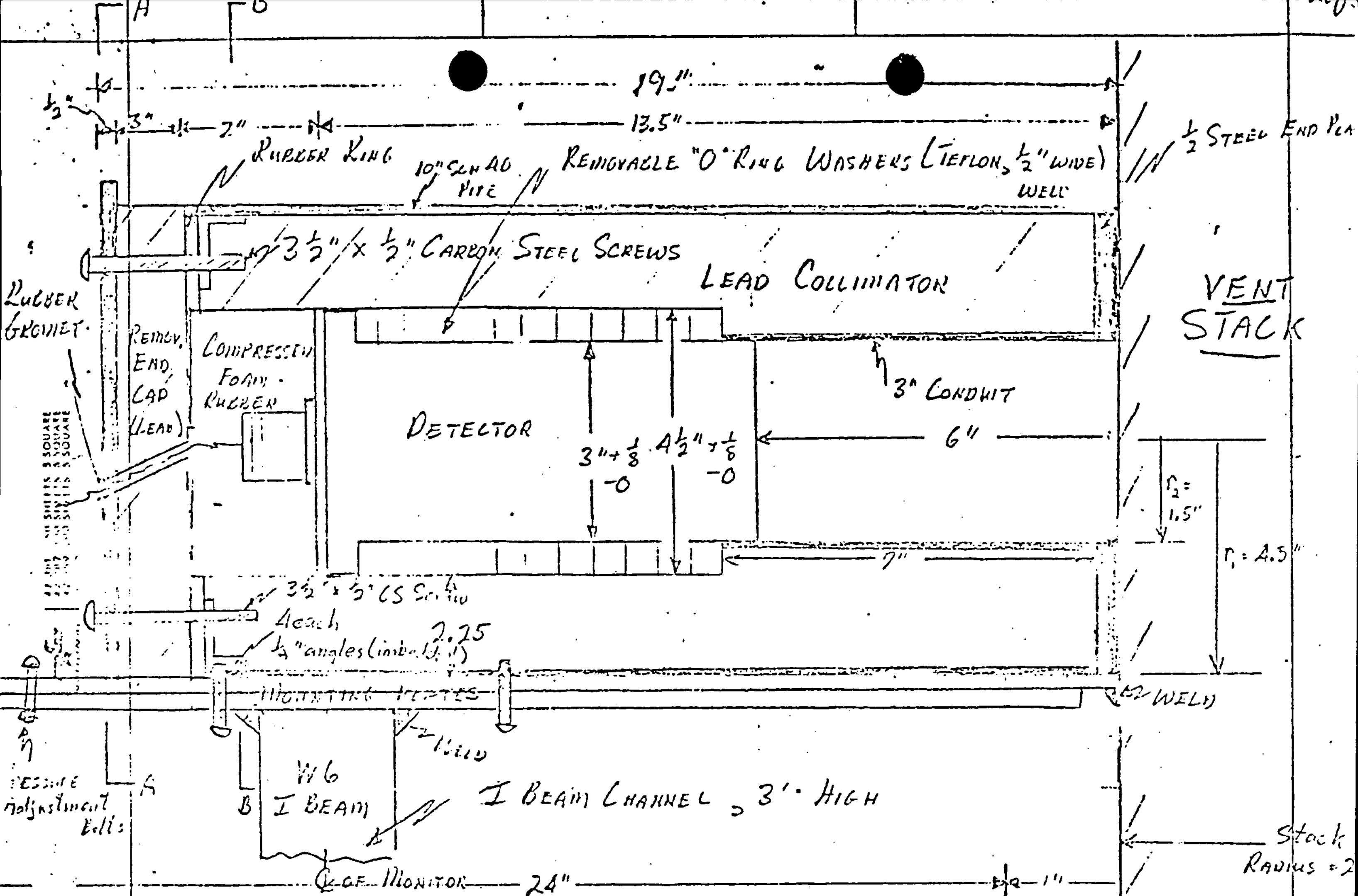
SKETCH NO. 1

MODEL

The detector - source geometry used in the design of the mid & high range noble gas monitors.



Sketch No. 2



THE APPROX. WEIGHT OF THE COLLIMATOR IS,

$$V = \pi r_1^2 l_1 - \pi r_2^2 l_1 + \pi r_1^2 l_2$$

$$= \pi l_1 (r_1^2 - r_2^2) + \pi r_1^2 l_2$$

$$= \pi\, 15.5" (4.5^2 - 1.5^2) + \pi (4.5^2) 3"$$

$$= \pi\, 15.5" (18\ in^2) + \pi (20.25) 3"$$

$$= 877\ in^3 + 191\ in^3$$

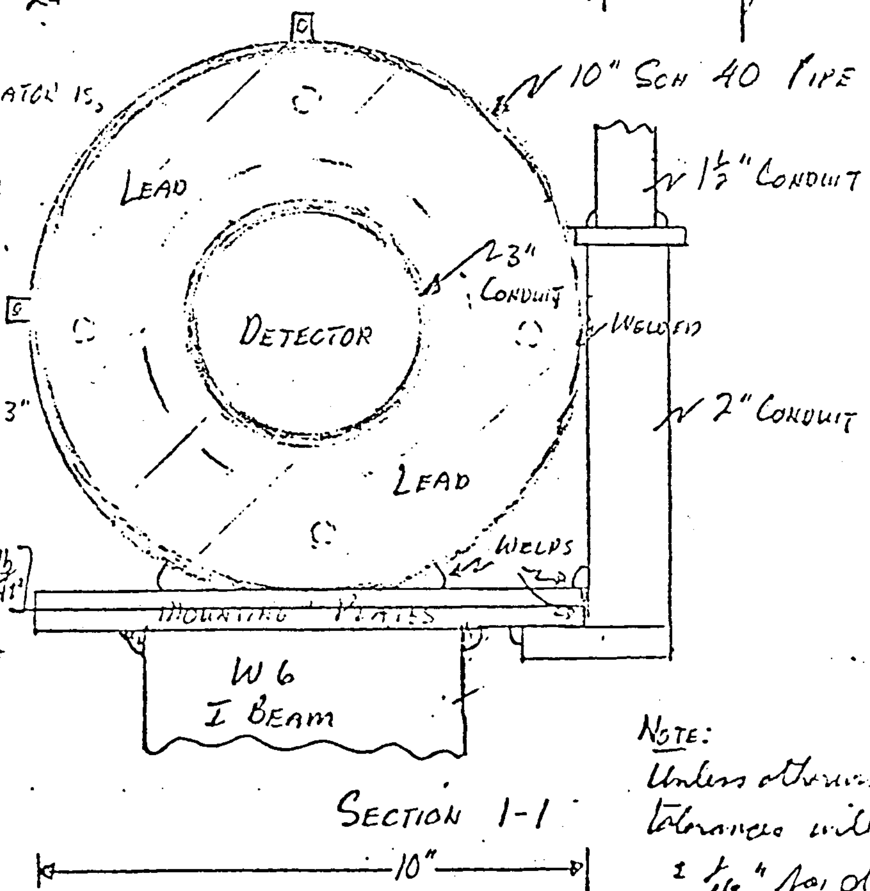
$$W_T = \left[\frac{1068\ in^3}{1728\ in^3/ft^3}\right]\left[707.6\ \frac{lb}{ft^3}\right]$$

W_T = 437 lbs (TOTAL)

W_T OF END PIECE IS,

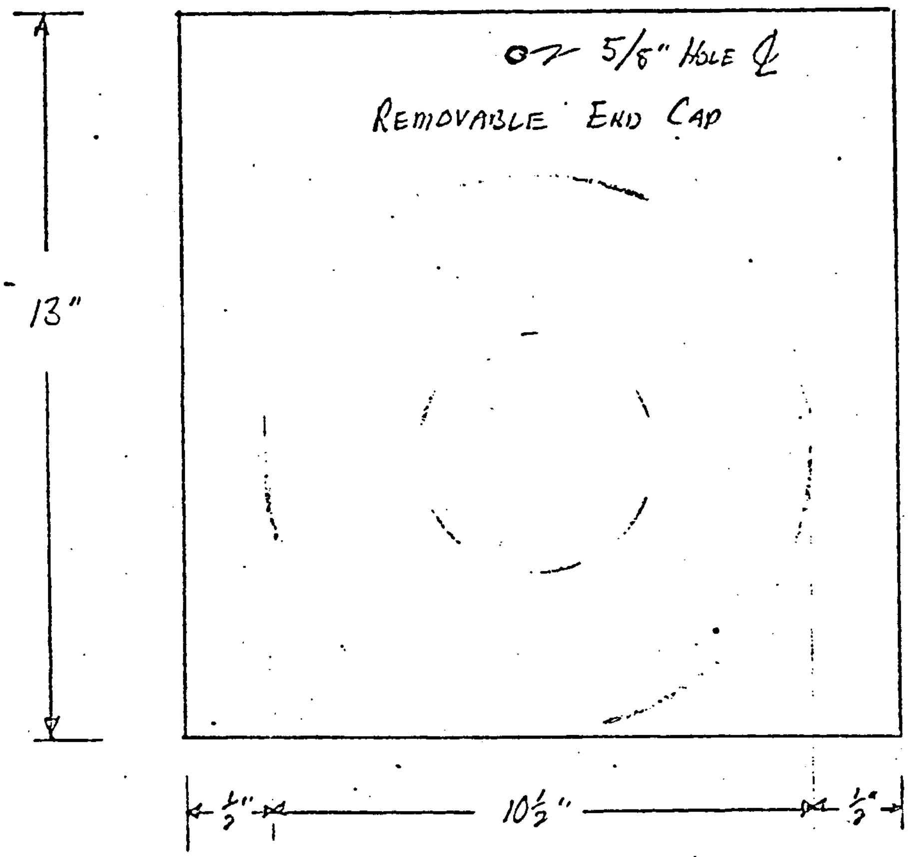
$$= \frac{191\ in^3}{877\ in^3}(437\ lbs)$$

W_T = 95 lbs (END PIECE)

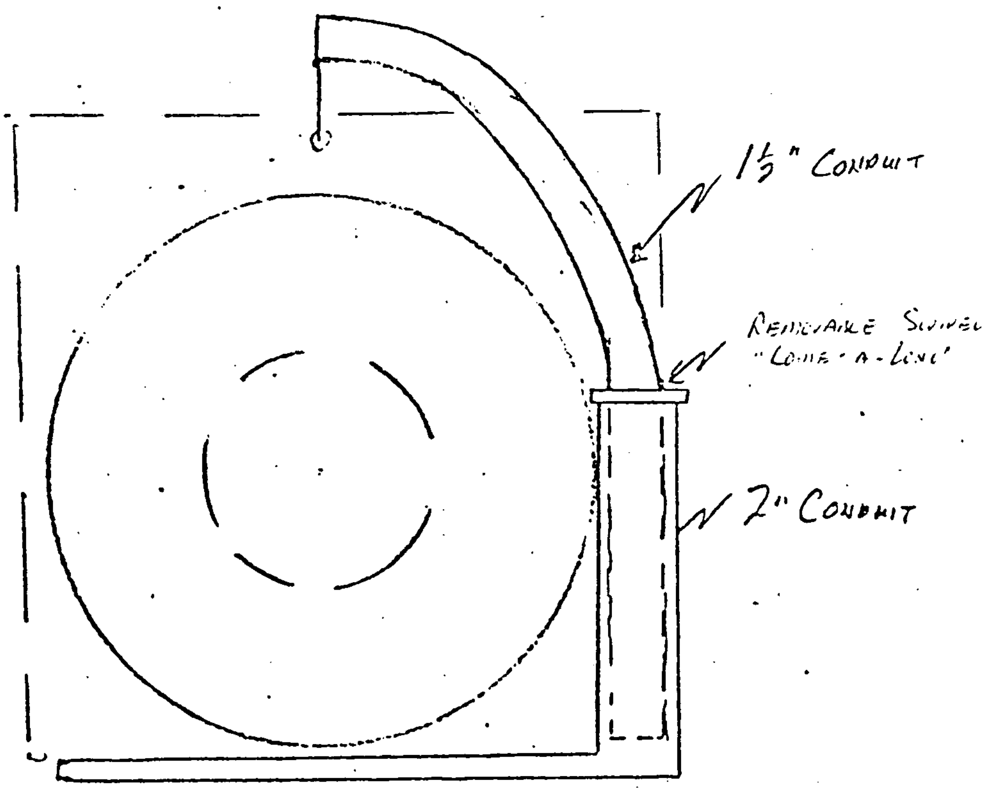


NOTE:
Unless otherwise stated tolerances will be
± 1/16" for d ≤ 1"
± 1/8" for d > 1"

Sketch No. 3
Detail of Mid & High Range Noble Gas Monitors



Section A-A (Sketch No. 3)



Section B-B

Sketch No. 4

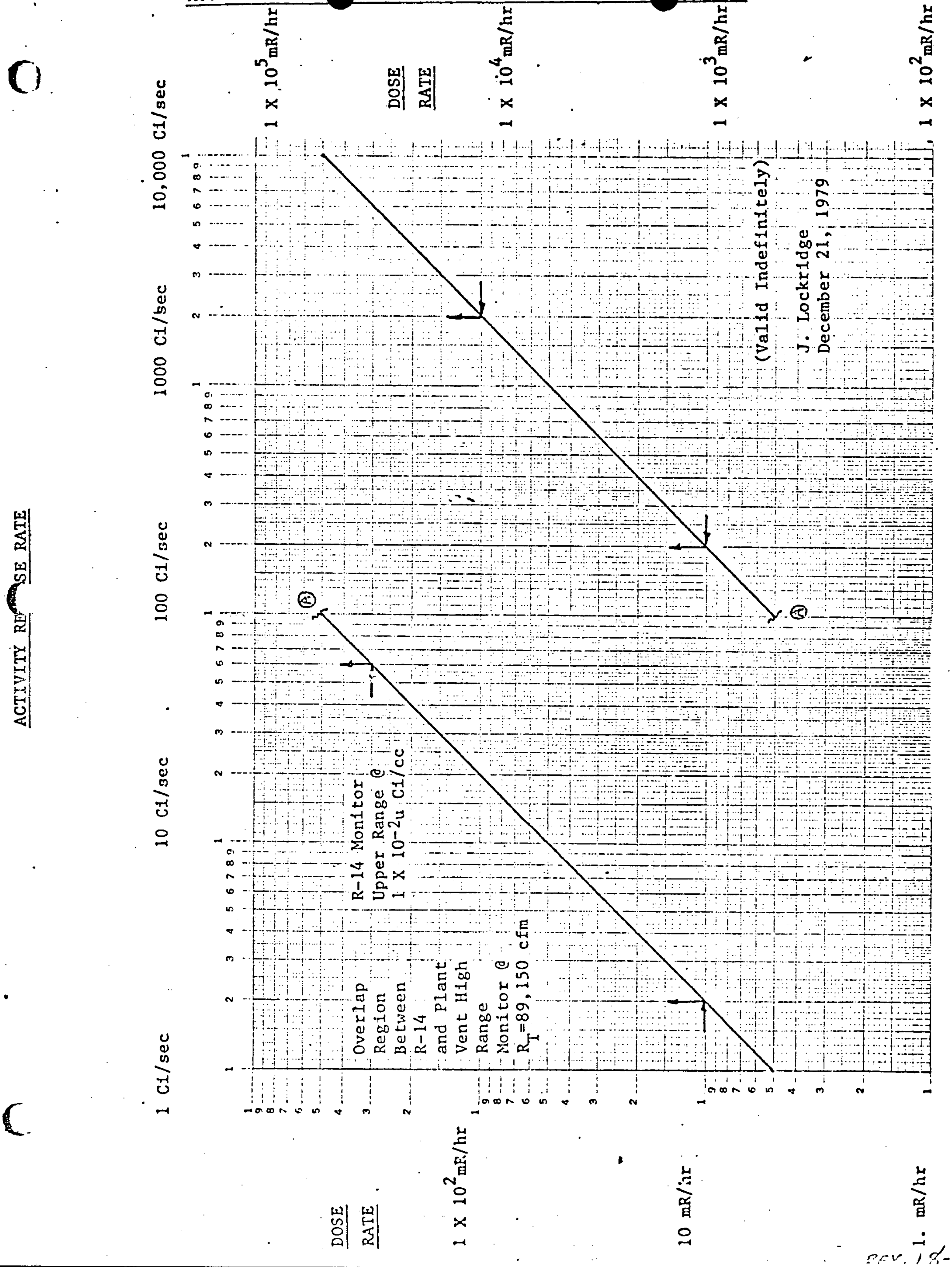
Details of Mid & High Range Noble Gas Monitors

Attachment 8

FIGURE 6.11

PLANT VENT HIGH RANGE RADIATION MONITOR

ACTIVITY RELEASE RATES (Ci/sec) vs. DOSE RATE (mrem/hr)



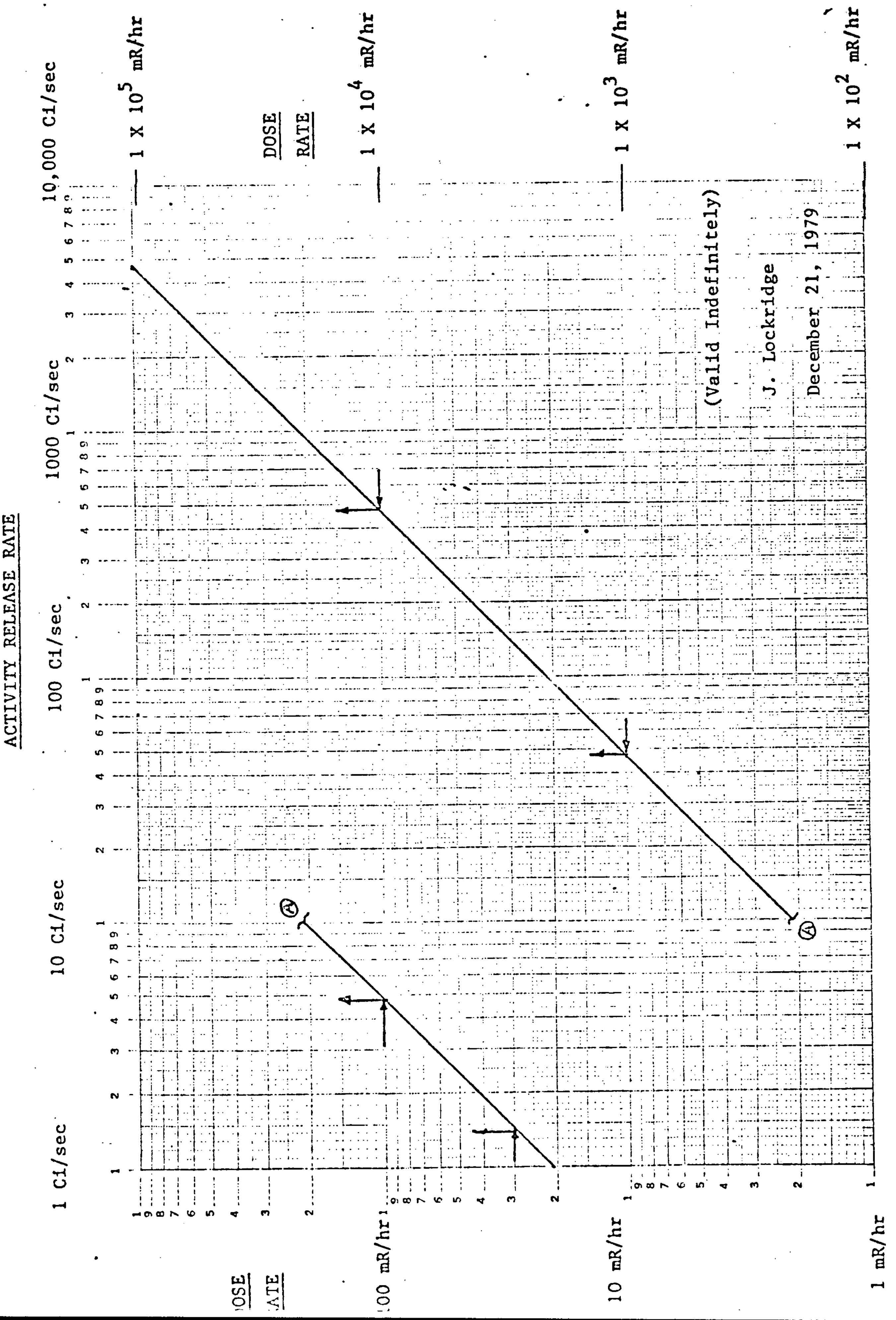
REV. 18

Mod #M-506
Attachment 8

FIGURE 6.12

FUEL H DLING BUILDING BASEMENT EXHAUS

HIGH RANGE RADIATION MONITOR



REV. 18

Attachment No. 3

Methods for Measuring Iodines and Particulates

Post LOCA Monitoring of Radioiodines and Particulates

at

The Plant Vent Stack

Submitted by

Charles Witt

December 21, 1979

I. Purpose

To determine the capability for effluent monitoring of radioiodines and particulates at the Plant Vent Stack during a loss of coolant accident, as required by NUREG 0578 (1/1/80 Requirements).

II. Scope

The method to be used for quantifying radioiodine and particulate releases in the presence of high background radiation from noble gases is reviewed. The method of sample drawing and counting is discussed, as is the procedure for conducting the analysis. Personnel and instrumentation precautions, and existing methods for accomplishing the analysis are identified. Appropriate recommendations are included.

III. Discussion

A. System/Method Description

1. Instrumentation. The currently installed Plant Vent Continuous Air Monitor will be used to sample for effluent radioiodine and particulates. The only changes to present methods that may be necessary is to ensure that proper health physics practices are observed while handling the sample cartridges, and that the charcoal filters are desiccated to preclude interference from noble gases.

   Silver zeolite cartridges that have a retention efficiency for xenon of less than 5×10^{-6} percent are present on the market. It is recommended that charcoal filters be replaced with silver zeolite cartridges, as a final solution for quantifying radioiodine releases. Five silver zeolite cartridges are now on site for post accident monitoring.

2. Sample location. The Plant Vent Continuous Air Monitor is located adjacent to the Containment Vent Filters in the RAB. The predicted post-accident dose rate in the area is 240 R/hr after 5 minutes, 120 R/hr after 1 hour, and less than 2 R/hr after one week. These levels will saturate the direct reading meter, and make retrieval of the filters difficult. However, by minimizing the time required to collect and change the filters and allowing for sufficient time for the source to decay, it would be possible to retrieve the filters within 24 hours after the accident. It should be noted again that this is only an interim solution. A new sampling location has been proposed to meet the 1/1/81 requirements.

3. Retrieval and handling of sample media. The filter cartridges should be retrieved for analysis as soon as radiation levels in the RAB are permissable. If good health physics practices are followed, personnel exposure from the filters can be kept to a minimum. For example:

   1. Transport the cartridge to the counting room in a proper container, such as a shield tool box.

2. Utilize remote handling equipment whenever possible.

3. Utilize personnel that are familiar with the continuous air monitor.

4. Shield the analysis and desiccating equipment.

Use of the silver zeolite filters as previously recommended will help to minimize occupational exposure.

4. Data Analysis. The existing procedure for gaseous effluent accountability should be used for data analysis of individual radionuclides. If necessary, the sample can be desiccated using existing methods. Shielding should be used whenever possible during analysis to minimize personnel exposure. Since the background level in the area of counting equipment is expected to be only 1 mr/hr 5 minutes after the accident, it will be possible to utilize the existing counting lab equipment.

If the silver zeolite cartridges are used instead of the charcoal filters, the analysis would be greatly simplified. Desiccating for xenon would probably not be necessary, nor would there be the problems inherent in handling and analyzing the charcoal filters activated with noble gases.

5. Alternate power supply. Neither the Plant Vent Continuous Air Monitor nor the equipment used for analysis are supplied by emergency power. If power were lost to the RAB, it would be necessary to supply power via extension cords from Unit 1 to operate both the analysis equipment and the continuous air monitor. (These extension cords are available.)

Since the analysis equipment would not be needed for several hours after the accident, the time required to run extension cords would not be critical. However, the ability to draw the sample for radioiodines would be lost during the time from when power is lost until extension cords are run. If the power is lost before a sample can be drawn, one should be drawn as soon as possible and a release rate calculated. This release rate can be extrapolated back to estimate the total radioiodine release.

B. Procedures for conducting measurement analysis.

1. Minimizing occupational exposure.

Exposure received in obtaining and analyzing radioiodine and particulate effluent samples from the plant vent continuous air monitor will come from two sources; the background in the RAB, and from the sample cartridges themselves. Good health physics practices will keep the occupational exposures to low levels. The exposure received while retrieving the cartridges from the RAB can be minimized by:

a. Allowing sufficient time for the background levels in the RAB to decay off before retrieving the sample.

b. Minimizing time in the RAB when retrieving the sample.

The exposure received from the cartridges can be minimized by:

a. Minimizing handling time

b. Making maximum use of portable shielding during handling and analysis.

2. Calculational methods for determining release rates. Existing procedures for using the plant vent continuous air monitor cartridges to calculate radioiodine and particulate release rates are adequate and will be used.

3. Dissemination of info: Information will be disseminated in accordance with the Emergency Plan.

4. Calibration frequency and technique: Existing procedures for calibration frequency and techniques for the plant vent continuous air monitor and analysis equipment are adequate and will be used.

IV. Recommendations

1. As an interim solution, continue using the plant vent CAM charcoal cartridge for radioiodine analysis and identification. For January 1, 1981, purchase and implement continuous usage of silver zeolite cartridges, and provide an alternate sampling location.

2. Do not make any changes to existing procedures or methods in order to comply with 2.1.8.b.2 of NUREG 9578 for the January 1, 1980 deadline. In the event of an accident, the requirements of 2.1.8.b.2 will be met by using present procedures and practices, common sense, and good health physics principles.

CP&L

H. B. ROBINSON
SEG PLANT

TITLE

H. B. ROBINSON STEAM ELECTRIC PLANT

UNIT NO. 2

HEALTH PHYSICS PROCEDURE - HP - 34

FOR INSTALLING AND USING

THE FUEL HANDLING BUILDING BASEMENT EXHAUST

PARTICULATE AND IODINE SAMPLER ASSEMBLY

JANUARY 3, 1980

REV.	APPROVED BY	DATE	REV.	APPROVED BY	DATE	REV.	APPROVED BY	DATE

Recommend By: Stan Crocker 1-28-80
DATE

Approved By: ____________________ ____________
DATE

gm

1.0 PURPOSE

1.1 To provide a method and system description for determining radioiodine and particulate release rates from the Fuel Handling Building basement exhaust on an intermittent basis.

2.0 DISCUSSION

2.1 At present, noble gas effluents from the basement of the Fuel Handling Basement are continuously monitored by an offline gas monitor (R-20) located near the point of exhaust discharge to the atmosphere. The R-20 monitor does not have the capability of monitoring for radioiodines or particulates, even on an intermittent basis, as required by Section 2.1.8.b of NUREG 0578.

2.2 Therefore, in order to expand the present capabilities of the R-20 monitor to sample for radioiodines and particulates, a radioiodine/particulate sample cartridge assembly has been constructed and attached to the side of the R-20 chassis. The sampler assembly consists of two basic components:

1. An aluminum canister for housing a charcoal (or silver zeolite) filter cartridge and a particulate filter paper.

2. Associated short lengths of rubber hose, hose clamps and an expansion fitting for adapting the canister to fit into the existing R-20 flow path.

3. Two flexible plastic "ties" for attaching the samples assembly to the side of the R-20 monitor when not in use.

The sampler assembly and its positioning in the R-20 monitor flow path are depicted in Figure 1 attached to this procedure.

2.3 This procedure provides instructions for the installation and use of the sampler assembly. Analysis of the filter paper and charcoal cartridge will be done in accordance with existing procedure P5701 "Determination of Particulate - Iodine Activity from the NMC AM-21 Filters."

3.0 SYSTEM DESCRIPTION/INSTALLATION (Refer to Figure 1)

3.1 It should be noted that the sampler assembly can be inserted into the flow path of the R-20 monitor without detaching the sampler assembly from its mounting.

3.2 The sampler assembly is to be inserted into the R-20 monitor flow path at the inlet of the R-20 detector as depicted in Figure 1.

3.3 The sampler assembly is to be installed whenever particulate and iodine release rates from the Fuel Handling Building basement exhaust are to be determined.

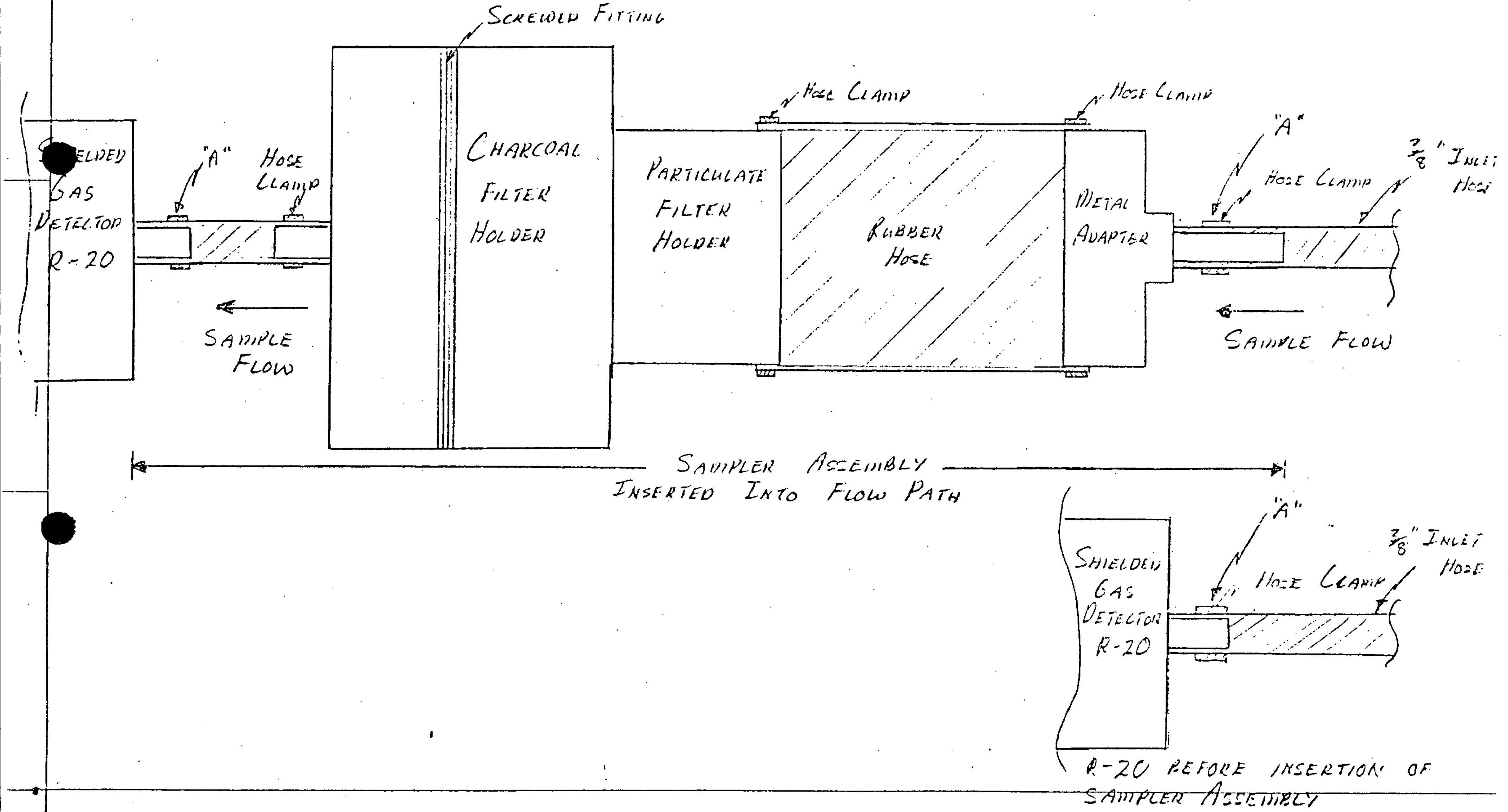
4.0 METHOD FOR INSTALLATION AND USE OF THE SAMPLER ASSEMBLY

4.1 Obtain permission from the operating shift foreman to turn-off the R-20 monitor.

gm

FIGURE NO. 1

INTERMITTENT PARTICULATE / IODINE SAMPLER ASSEMBLY



NRC Request

Item 2.2.1b

Shift Technical Advisor (STA) - Revise plant administrative procedures to define duties and responsibilities of the STA.

CP&L Response

Item 2.2.1b

The plant administrative procedures have been revised to define the duties and responsibilities of the STA.

NRC Request

Item 2.2.2b

Technical Support Center - Document method of transmission of plant parameters to temporary Technical Support Center

CP&L Response

Item 2.2.2b

An intercom phone line is installed between the temporary Technical Support Center and the Control Room. This intercom is backed up by the bell system phones and a plant public address system. In the event of an accident, plant parameters will be transmitted from the plant control room to the temporary Technical Support Center via one of these communications lines. The site emergency plan will be revised prior to April 15, 1980 to designate an individual responsible for ensuring that this communication line is manned.