

GPU Nuclear Corporation
Post Office Box 480
Route 441 South
Middletown, Pennsylvania 17057-0191
717 944-7621
TELEX 84-2386
Writer's Direct Dial Number:

May 11, 1984
5211-84-2105

Mr. Richard W. Starostecki, Director
Division of Project and Resident Programs
U. S. Nuclear Regulatory Commission
Region I
631 Park Avenue
King of Prussia, PA 19406

Dear Sir:

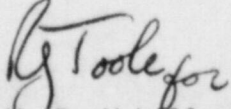
Three Mile Island Nuclear Station, Unit 1 (TMI-1)
Operating License No. DPR-50
Docket No. 50-289
Inspection Report 84-03 (Post Accident Sampling and Monitoring)

Our letter of March 8, 1984 provided the list of actions GPUN is pursuing in regard to post accident sampling along with commitment dates targeted for completion of each item. Responses to certain of those items were shown to require additional submittals.

This letter transmits GPUN's response to several outstanding items and indicates those items which have been completed since our last submittal.

Attachment 1 is an update to our list of outstanding items. Attachment 2 (GPUN Response) and Attachment 3 (TDR-494) provide responses to several of these items as indicated in Attachment 1. Those items for which responses have been provided are not included in this submittal.

Sincerely,


H. D. Hukill
Director, TMI-1

HDH:RK/kl
attachments

cc: R. Conte

8406260019 840608
PDR ADOCK 05000289
Q PDR

POST ACCIDENT SAMPLING AND MONITORING (IR 84-03)
OUTSTANDING ITEMS

IR Item No.	Inspection Report Item	GPUN Action No.	GPUN Action	Targeted Completion Date (Note 1)
84-03-01	RCS SAMPLING			
I.a	Provide the capability to obtain an RCS sample under all accident conditions and modes of operation.	I.a.1	Revise the EPIP involved in taking the Post Accident RCS sample (1004.15) to include, as an option, the taking of a sample from the Pressurizer rather than the RCS cold leg. (Exposure would be the same as taking a loop sample.)	Complete. (Note 2)
		I.a.3	Complete modification of post accident sampling system to tie in decay heat sample lines with the shielded reactor coolant sample line in the nuclear sampling room.	10/01/84
		I.a.4	Revise procedure to include taking a post accident sample from the decay heat system in the present system configuration. Cautions are to be included to define the need to determine plant conditions and radiation levels prior to obtaining authorization from the Emergency Director to obtain a Decay Heat sample.	Complete. (Note 2)
		I.a.5	Revise TDR 494 to include additional exposure considerations for taking a decay heat sample after 24 hours in the present system configuration.	Complete. See Attachment 3 (Section III.1.)

POST ACCIDENT SAMPLING AND MONITORING (IR 84-03)
OUTSTANDING ITEMS

IR Item No.	Inspection Report Item	GPUN Action No.	GPUN Action	Targeted Completion Date (Note 1)
84-03-02	CAS			
2.a	Modify CAS to permit sampling after containment Isolation. Provide temperature and pressure indications at the gas sample bomb. Develop procedures to quantify the sample including temperature and pressure corrections.	2.a.1	Revise procedures to enable override of containment Isolation above 30#.	Complete. (Note 2)
		2.a.2	Review the design of the Containment Atmosphere Sampling System and provide a schedule for completion of any modifications. Address the need for: 1) Additional heat tracing and/or insulation 2) Elimination of the flowmeter 3) Elevation of the sample bomb 4) Shielding the sample bomb	Complete. See Attachment 2
		2.a.3	Provide a writeup to describe operation of the Containment Atmosphere Sampling System including any modifications.	Complete. See Attachment 2
		2.a.4	Modify procedures to quantify the sample including temperature and pressure corrections.	06/01/84
		2.a.5	Complete modification of Containment Atmosphere Sampling System as described in GPUN response to item 2.a.2.	10/01/84
2.b	Evaluate sample representativeness in regard to possible condensation and Iodine plateout in the gas sample bomb.	2.b.1	Describe the design of the Containment Atmosphere Sampling System to obtain a representative sample in regard to possible condensation and Iodine plateout in the gas sample bomb.	Complete. See Attachment 3 (Section III.H.)
2.c	Perform error analysis to estimate the sample losses attributed to sample transfers called for in the procedures.	2.c.1	Describe sample transfers, perform error analysis and describe acceptability of the Containment Atmosphere Sampling System equipment.	Complete. See Attachment 2

POST ACCIDENT SAMPLING AND MONITORING (IR 84-03)
OUTSTANDING ITEMS

IR item No.	Inspection Report Item	GPUN Action No.	GPUN Action	Targeted Completion Date (Note 1)
		2.c.2	Investigate the need for special precautions which might need to be taken to prevent unnecessary failure of the syringe used in obtaining the containment atmosphere sample and incorporate any necessary procedural changes.	Complete. See Attachment 2
84-03-03	OTHER			
3.c	Establish a formal preventive maintenance and surveillance program for the CAS system.	3.c.1	Describe formal preventive maintenance and surveillance programs for the Containment Atmosphere Sampling System, and provide a schedule for implementation.	Complete. See Attachment 2
		3.c.2	Incorporate procedural changes required to implement the program described in 3.c.1.	Complete. (Note 2)
3.d	Address the dose received by personnel transporting the sample to the counting room.	3.d.1	Develop a revised process for collecting and transporting the sample using a portable pig, proceduralize the process, and perform time and motion studies. (See 3.e.1 and 4.2.1)	Complete. (Note 2)
		3.d.2	Revise TDR 529 to include the dose received by personnel transporting the sample to the counting room (See 4.2.1). Consider dose contribution from hydrogen recombiners.	06/01/84*
3.e	Address the possibility of high airborne radioactivity while collecting the CAS and the need to wear a respirator.	3.e.1	Revise the procedure to require a respirator to be worn.	Complete. (Note 2)

POST ACCIDENT SAMPLING AND MONITORING (IR 84-03)
OUTSTANDING ITEMS

IR Item No.	Inspection Report Item	GPUN Action No.	GPUN Action	Targeted Completion Date (Note 1)
84-03-04	SHIELDING			
4.1	Revise shielding study (RCS sampling) to include the following contributors: a - Sink drain trap and drain line. b - Undiluted coolant in the sink. c - Scattered radiation. d - Unshielded auxiliary lines. e - Residual contamination during subsequent sample attempts. f - Airborne radioactivity originating from sink.	4.1.a	Perform dose rate calcs and revise TDR 494 to include contributors listed in 4.1 for as-built configuration and specify source terms.	Complete. See Attachment 3
		4.1.c	Revise procedure to verify in-flow of air into the sample hood prior to initiation of RCS sample flow in order to minimize airborne radioactivity originating from the sink. The determination of air flow will be based on visually checking that ribbons attached to the bottom of the hood door are pulled into the hood.	Complete. (Note 2)
		4.1.d	Revise EPIP 1004.15 to require Radiological Assessment Coordinator and Emergency Director concurrence prior to initiating flow through auxiliary systems which might introduce high activity water through unshielded auxiliary lines located in the chemistry lab/sample sink area.	Complete. (Note 2)
		4.1.e	Provide temporary shielding for the sample sink drain line and revise procedure to verify shielding is in place prior to initiation of RCS sample flow.	06/01/84
4.2	Conduct a shielding study on the as-built system for collecting and transporting the CAS.	4.2.1	Revision to TDR 529 described in 3.d.2 will include shielding studies for collecting and transporting the Containment Atmosphere Sample (see 3.d.2).	06/01/84*

POST ACCIDENT SAMPLING AND MONITORING (IR 84-03)
OUTSTANDING ITEMS

IR Item No.	Inspection Report Item	GPUN Action No.	GPUN Action	Targeted Completion Date (Note 1)
84-03-05	ANALYTICAL CAPABILITY			
5.a	Develop procedures for use of fluoroborate probe and pH miniprobe.	5.a.2	Complete the necessary procedural modifications for performing the Chloride, Boron, and pH analysis using permanent equipment dedicated for use at TMI-1. (Lower minimum range for Boron analysis is 500 ppm.)	Complete. Note 2
		5.a.3	Resolve the problem regarding fluoroborate analysis for Boron concentrations below 500 ppm or justify a lower minimum range for Boron analysis of 500 ppm.	07/01/84
5.b	Provide the results of demonstration of chemical analysis capability for Chloride, Boron, and pH using the intended instrumentation and procedures.	5.b.1	Perform demonstrations onsite using TMI-1 procedures to confirm the results transmitted to NRR on 2/29/84 in preparation for Inspector followup demonstrations.	Complete.
5.c	Revise procedures to address analysis of fission gases stripped from the RCS sample for determining gross activity.	5.c.2	Provide a complete response to 5.c.	06/01/84*

POST ACCIDENT SAMPLING AND MONITORING (IR 84-03)
OUTSTANDING ITEMS

IR Item No.	Inspection Report Item	GPUN Action No.	GPUN Action	Targeted Completion Date (Note 1)
84-03-06	NOBLE GAS EFFLUENT MONITOR			
6.a	Provide conversion factors from CPM to $\mu\text{Ci/cc}$ for monitor readouts.	6.a.2	Complete the modifications to the computer program for offsite dose calculations as described in GPUN response of March 8, 1984.	06/01/84
84-03-07	SAMPLING AND ANALYSIS OF PLANT EFFLUENTS (MAP-5)			
7.a	Develop procedures for collection of representative plant effluent samples including provisions for handling and analyzing high dose rate samples.	7.a.1	Investigate the collection, handling, and analysis of high dose rate samples as described in 7.a, make the necessary procedural modifications, and perform time and motion studies for the resultant process.	07/01/84
		7.a.2	Provide dose calculations based on the time and motion studies for the process which results from 7.a.1.	07/01/84*
84-03-08	SAMPLING AND ANALYSIS OF PLANT EFFLUENTS (MAP-5)			
8.a	Install shields around all MAP-5 cartridges.	8.a.1	Complete installation of shields described in 8.a.	06/01/84
8.b	Document followup action taken on IEN-82-49.	8.b.1	Document followup action taken on IEN-82-49 in regard to MAP-5, e.g., provide flow meter correction curves and complete the necessary procedural modifications.	06/01/84

POST ACCIDENT SAMPLING AND MONITORING (IR 84-03)
OUTSTANDING ITEMS

IR Item No.	Inspection Report Item	GPUN Action No.	GPUN Action	Targeted Completion Date (Note 1)
Other PASS Commitments				
		9.a	Complete installation of seismic rack for bottled air to serve as backup air for eductor in the Containment Atmosphere Sampling System.	06/01/84
		9.b	In order to insure that sufficient volume remains in the makeup tank to receive the volume of reactor coolant sample which will be discharged, revise procedures to specify a 15 minute purge time and add a prerequisite to ensure a sufficient volume remains available in the makeup tank as freeboard.	Complete. (Note 2)
		9.c	Determine the effect on Aux. Bldg. habitability of the sink drain containing reactor coolant sample from the accident being flushed to the sump (consider both the drains from the liquid and stripped gas samples).	Complete. See Attachment 3 (Section III.G.)
		9.d	Verify the adequacy of the existing calculational method for analysis of the RCS gas sample.	Complete. (Note 2)
		9.e	Verify the accuracy of the pressure gauge used for collection of the RCS gas sample.	Complete. See Attachment 2
		9.f	Perform exposure analysis for obtaining a noble gas sample at RMA-5 under post accident conditions.	Complete. See Attachment 2

NOTE 1 - Completion dates which show an asterisk indicate that an additional submittal to NRC is required.

NOTE 2 - This procedure is available at the site for inspection.

POST ACCIDENT SAMPLING AND MONITORING (IR 84-03)
OUTSTANDING ITEMS

GPUN
ACTION
NO.

GPUN RESPONSE

- 2.a.1 Sampling above 30 psig is within the current capability of the Containment Atmosphere Post Accident Sampling System (CATPASS). Therefore, EP 1004.31 has been revised to delete the 30 psig sampling limitation.
- 2.a.2 The Containment Atmospheric Post Accident Sampling System (CATPASS) will be modified to improve its operation in order to obtain a more representative sample. Basically, this will be accomplished by minimizing changes in flow rate and temperature. Modification of the CATPASS will include the following changes (See Figure 1):
- i. Insulation will be added to all tubing at the sample station to minimize heat loss.
 - ii. The sample bomb will be replaced by a septum. The sample will be obtained from the septum and transported in a syringe. Removal of the sample bomb will eliminate a change in velocity of the sample stream due to the change in cross sectional area and will reduce the internal surface area of the system at the sample point. This will reduce the possibility of condensation and plateout of iodine.
 - iii. The sample point (septum) will be located as close as possible to the point where heat tracing ends in order to minimize heat loss at the sample point. The septum will be orientated in such a manner as to prevent any condensation which might be present in the tubing lines from entering the sample. Pressure tests on the septum will be required in accordance with the CATPASS System Design Description to evaluate leakage characteristics and to establish the pressure rating and replacement requirements for the septum.
 - iv. The following will be eliminated from the system: solenoid valves (CM-V12 & 13), pressure reducing valve (CM-V25), pressure switches (PS-998 & 999), pressure indicator (PI-997), flow indicator (FI-837) and isolation valves (CMV-11, 34, 35, 36 & 37). This will eliminate heat sinks and points of possible condensation.
 - v. Porcelain insulators will be added to the tubing supports to minimize heat loss through the supports.
 - vi. A condensate drip leg will be added downstream of the sample point to remove any condensation which might be present.

POST ACCIDENT SAMPLING AND MONITORING (IR 84-03)
OUTSTANDING ITEMS

GPUN
ACTION
NO.

GPUN RESPONSE

GPUN Action No. 2.a.5 has been added to Attachment 1 to address this modification.

2.a.3 The following is a description of the operation of the CATPASS on completion of the modifications described in 2.a.2:

Post accident containment atmosphere will be sampled using the existing sample and return lines for radiation monitor (RM-A2). Three-way valves will valve out RM-A2 and direct the sample through heat traced tubing lines to the sampling station. Control of these valves will be from the local control panel. An eductor pump, using either plant instrument air or bottled air/nitrogen, will provide the motive force for obtaining the sample. Instrument air or bottled air/nitrogen will also be used for purge and pressure test.

The sample station will be provided with a temperature indicator, high range pressure gauge, low range pressure gauge, septum, condensate drip leg, and drain valves. The pressure gauges and septum will each be provided with isolation valves.

Sample flow will be directed from recirculation to the sample station by three-way valves controlled from the local control panel. Sample temperature and flow indication will be provided at the local control panel. When flow to the sample station has been established for sufficient time to ensure a representative sample, the sample will be withdrawn from the septum using a syringe and transported to the laboratory for analysis.

2.c.1 The following steps describe the sample transfer evolution by a
and technician from time of sampling to time of sample preparation.

- 2.c.2
1. Withdraw a 3 cc sample from the Catpass bomb using a 5 cc Pressure-Lok Series A-2 syringe.
 2. After sampling, lock valve on syringe will be depressed and the needle removed from syringe body.
 3. Place the needle and syringe body into the shielded syringe carrier.
 4. After Catpass system has been secured, transport the syringe carrier to the sample preparation area (Radio Chem Lab).

The syringe which would be used to obtain a post accident sample of the containment atmosphere is a 5 cc Pressure-Lok Series A-2 syringe manufactured by Precision Sampling Corporation.

POST ACCIDENT SAMPLING AND MONITORING (IR 84-03)
OUTSTANDING ITEMS

GPUN
ACTION
NO.

GPUN RESPONSE

This syringe maintains the integrity of the sample through a pushbutton valve assembly which permits storage of liquid or gaseous samples under vacuum or elevated pressures up to 250 psig. The capability exists for prepressurization of the sample prior to transfers or chromatograph analysis if desired. Vacuum leakage rate is less than $9.3 \times 10^{-5}\%$ per hour, or less than 2.8×10^{-3} $\mu\text{l/hr}$ for a 3cc sample.

The Pressure-Lok syringe contains a low dead volume. When the plunger is fully depressed practically no compressible dead volume remains.

A positive rear flange plunger stop prevents the plunger from blowing out of barrel at elevated pressures, protecting against accident sample loss or possible operator injury. The plunger tip, fabricated of virgin Teflon, is stress formed to stay leak tight and self lubricating for smooth operation.

Based upon the above specifications and the expected pressure of a post accident containment atmosphere sample (< 50 psi), GPUN does not anticipate failure of the Pressure-Lok syringe to be a problem. Special procedural precautions do not appear to be needed. Syringes of this type will be placed into the emergency equipment cabinet and inventoried quarterly per AP 1053. Procedure changes will be made specifying the use and operation of the Pressure-Lok Series A-2 syringe by name to avoid the use of a lower quality syringe.

- 3.c.1 Functional test and leak check of the Containment Atmosphere Post Accident Sampling System (CATPASS) are included in the TMI-1 preventive maintenance program (procedure IC-132). Instrument calibration is included in MTX-168. Modifications to the CATPASS may result in changes to the maintenance program as necessary. Maintenance procedures are available at the site for inspection.
- 9.e GPUN has reviewed the accuracy of the pressure gauge for the RCS gas sample collection. Based on our calculations, the error introduced by the pressure gauge would result in an uncertainty of $\pm 1.4\%$ in the determination of hydrogen or total gas. Since that is a small portion of the 10% uncertainty estimated for this analysis, the existing gauge is considered to be acceptable. This calculation will be maintained on file at the site for review.

POST ACCIDENT SAMPLING AND MONITORING (IR 84-03)
OUTSTANDING ITEMS

GPUN
ACTION
NO.

GPUN RESPONSE

9.f GPUN has performed an exposure analysis for obtaining a noble gas sample at RMA-5 under post accident conditions.

A time and motion study was performed. Those times were increased by 25% to account for the encumbrance of a breathing apparatus. The computer code ISOSHLD II was used to evaluate the exposure rate.

A source term of 100 $\mu\text{Ci/cc}$ from RMA-5 was utilized. This assumption was based on the maximum design basis given in Table II.F.1-1 of NUREG-0737. In order to evaluate the source term, 100 percent of noble gases and one tenth of the 25 percent of iodine core inventory for 310 effective full power days at rated power level of 2535 MWT, were normalized to 100 $\mu\text{Ci/cc}$.

Two cases were analyzed: (1) using a marinneli beaker to carry the sample and (2) using the 25 cc bulb. Total exposure results for the two cases analyzed were as follows:

	Whole Body (Rem)	Extremities (Rem)
marinneli beaker	5.5 (-2)	9.9 (-2)
25 cc bulb	2.5 (-2)	8.5 (-3)

CONTAINMENT ATMOSPHERE POST ACCIDENT SAMPLING

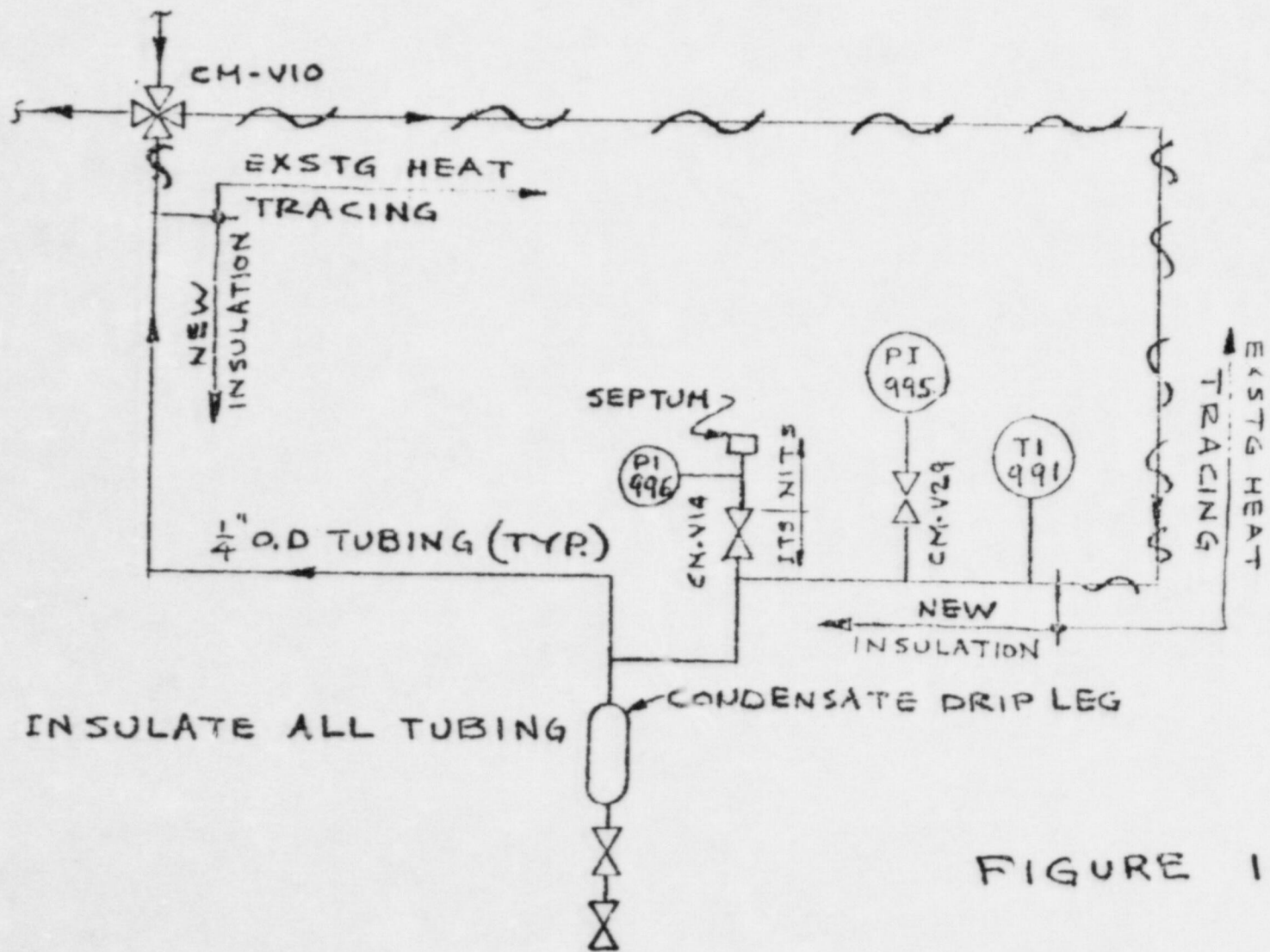


FIGURE 1

Document Release Form

(Refer to EMP-008)

Date May 10, 1984Page 1 of 1

Release Action		
To: <u>Distribution</u>	<input type="checkbox"/> Review/Comment	<input type="checkbox"/> Construction
	<input type="checkbox"/> As-Builts	<input type="checkbox"/> Procurement
	<input checked="" type="checkbox"/> Record	<input type="checkbox"/> Operations/Maintenance
		<input type="checkbox"/> Hold Construction

Originator <u>Tae Y. Byoun</u> <i>(GPB)</i>	Home Base <u>5412</u>	Tel <u>2232</u>
Unit <u>TMI-1</u>	Budget Activity # <u>125403</u>	WO/SO # <u>5400-41711</u>

List of Released Items				
Company	Document No.	Sheet	Rev.	Title
GPU	TDR 494	41	2	"Post-Accident Sampling Radiological Analysis"

Special Instructions

This TDR closes Action Items: LIC A/I #84-9091, 84-9102, 84-9106, and 84-9115.

References/Attachments

Approved *A.R. Bond* Date 5-10-84

CC SEE ATTACHMENT