



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

May 26, 1983  
4410-83-L-0100

TMI Program Office  
Attn: Mr. L. H. Barrett  
Deputy Program Director  
US Nuclear Regulatory Commission  
c/o Three Mile Island Nuclear Station  
Middletown, PA 17057

Dear Sir:

Three Mile Island Nuclear Station, Unit 2 (TMI-2)  
Operating License No. DPR-73  
Docket No. 50-320  
Underhead Characterization SER - Core Topography Addendum

Attached for your approval is an addendum to the Underhead Characterization Safety Evaluation that covers the proposed Core Topography System. This document should be considered an addendum to both versions of the SER's previously submitted for your approval.

This document demonstrates that the proposed acoustic survey of the TMI-2 core can be accomplished without undue risk to the health and safety of the public.

It is GPUNC's intention to perform this activity following the completion of the Underhead Characterization Study, as presented to you in the previously submitted SER.

If you have any questions, please contact Mr. J. J. Byrne of my staff.

Sincerely,

*B. K. Kanga*  
B. K. Kanga  
Director, TMI-2

8305310156 830526  
PDR ADOCK 05000320  
P PDR

BKK/RBS/jep

Attachment

CC: Dr. B. J. Snyder, Program Director - TMI Program Office

U.S. NUCLEAR  
REGULATORY COMMISSION  
13 JUN 27 AM 9 13

0009  
11

Safety Evaluation Report for Radiation  
Characterization Under the Reactor  
Vessel Head - Addendum I -  
Core Topography

1.0 Purpose and Scope

1.1 Purpose

The purpose of this addendum to the Safety Evaluation Report for Radiation Characterization Under the Reactor Vessel Head is to demonstrate that conducting an acoustic survey of the core cavity can be accomplished without presenting undue risk to the health and safety of the public.

The objective of this characterization program is to provide data on the present status of the core components. This information will be used to assist in the planning for plenum and fuel removal. The data and information to be obtained will include:

- The radial and axial extent of the core cavity.
- The location of supported and unsupported fuel assembly end-fittings.
- The core cavity limits with respect to structurally intact fuel assemblies.

1.2 Scope

This addendum to the Radiation Characterization Under the Reactor Vessel Head Safety Evaluation represents further continuation of efforts to better determine the extent of damage within the reactor vessel. In this case, the acoustical survey of

the core cavity represents one part of and is a continuation of this effort. This addendum covers activities related to this acoustical survey.

## 2.0 Description of the Core Cavity Acoustical Survey

The tasks related to the core cavity acoustical survey will be performed in accordance with detailed, approved procedures. The description below will provide a general overview of these activities.

After the reactor coolant system has been depressurized and the level lowered to permit removal of the CRDM closures, access to the vessel interior is available. This will permit further investigations into the space below the plenum cover in a manner similar to that done previously in the "Quick Look" program. One of these investigative programs is to provide data which would provide measurements relating to the shape, diameter, depth, and location of the in-core cavity created during the TMI-2 accident.

These measurements will be obtained using an acoustical device referred to as the TMI-2 Core Topography System (CTS). The CTS is an ultrasonic device that will be lowered into the TMI-2 core cavity. The search head consists of twelve acoustic transducers pointing at five different angles which will be lowered into the core cavity. The search head is attached to a forty-foot long, small diameter control tube which has the capability of being lowered through a CRDM pressure tube after leadscrew removal or the manipulator tube used in the underhead surveillance program.

The search head will be deployed by a mechanical drive system mounted on top of the CRDM or manipulator tube housing. The system is to be manually installed, but operated remotely from outside the reactor building.

The reactor coolant system will remain open to the containment atmosphere during all phases of the CTS program. Containment integrity requirements will remain as stated in the previously submitted Underhead Characterization SER.

### 3.0 Radiological Considerations

#### 3.1 External Exposures

All individuals entering the reactor building will be monitored for external exposures in accordance with radiological control procedures to ensure personnel exposures are maintained within 10 CFR 20 dose equivalent guidelines. Administrative control points in accordance with the procedures will be used in order to assure specified dose limits are not exceeded. Extremity monitoring will be performed in accordance with existing procedures.

The CTS program may be performed at any time after access to the reactor vessel is available. With the RCS at 321'-6", the greatest potential for increased radiation levels in the area of the service structure exists. As described in the SER for underhead characterization, the increase in the dose rate above background at the top of the service structure is less than 20 mrem/hr. This increase is relatively small in comparison with the present general radiation levels on the service structure of 50 to 150 mrem/hr.



The total exposure for installing, operating, and removing the CTS is estimated to be 2 person-rem. This estimate is based on approximately 20 person-hours in a 100 mrem/hr area. Due to the uncertainty of the radiation levels at the top of the service structure over the RCS water level has been lowered, the total exposure could vary  $\pm$  50 percent.

### 3.2 Internal Exposures

The CTS program will not increase the airborne activity level in the reactor building as demonstrated by previous investigative programs into the core cavity area. Therefore, a safe and manageable condition of airborne activity will exist.

### 3.3 Measures Taken to Reduce Occupational Exposure to As Low As Reasonably Achievable (ALARA) Levels

The measures taken to minimize occupational exposure will be the same as those used in the Underhead Characterization Program.

## 4.0 Safety Concerns

A review of the activities associated with the CTS program has not revealed any additional safety considerations not previously considered in the Underhead Radiation Characterization Program.

The following potential concerns were considered:

- decay heat removal
- criticality
- radioactivity releases
- hydrogen evolution
- pyrophoricity
- boron dilution

The CTS program also consists of activities similar to those performed during the camera insertion into the reactor vessel which was safely performed previously. It is, therefore, concluded that the CTS program will not present any undue risk to the health and safety of the public.

5.0 10 CFR 50.59 Evaluation for Underhead Radiation Characterization Changes, test, and experiments, 10 CFR 50, Paragraph 50.59, permits the holder of an operating license to make changes to the facility or perform a test or experiment, provided the change, test, or experiment is determined not to be an unreviewed safety question and does not involve a modification of the plant technical specifications.

A proposed change involves an unreviewed safety question if:

- a) The possibility of occurrence or the consequences of an accident or malfunction of equipment important to safety previously evaluated in the safety analysis report may be increased; or
- b) The possibility for an accident or malfunction of a different type than any evaluated previously in the safety analysis report may be created; or
- c) the margin of safety, as defined in the basis for any technical specification, is reduced.

The following paragraphs are the results of the 50.59 review that was performed for the Core Topography Program activities.

The planned activities will not increase the probability of occurrence or the consequences of an accident or malfunction of equipment important to safety previously evaluated. This is based on the work being performed in accordance with approved procedures, measures to be taken for the prevention of an RCS boron dilution event, and that potential disturbances of the core are within previously evaluated bounds.

The Core Topography Program will not create the possibility of an accident or malfunction of a different type than any evaluated previously. This is based on the only accidents identified being the inadvertent dropping of an instrument onto the rubble bed in the core. As stated in Section 4, these are enveloped by previous analyses.

The tasks will not reduce the margin of safety as defined in the basis for any technical specification. This is based on operating systems and equipment covered by the technical specification in accordance with approved procedures. Also, the releases of radioactivity to the environment have been shown to be within technical specification limits.

Therefore, it is concluded that performance of underhead radiation characterization does not involve an unreviewed safety question as defined in 10 CFR Part 50, Paragraph 50.59.

## 6.0 Conclusion

Based on the radiological and safety evaluations considered for the core topography program, the activities may be accomplished without presenting undue risk to the health and safety of the public.