

U.S. NUCLEAR REGULATORY COMMISSION
OFFICE OF INSPECTION AND ENFORCEMENT

Region I

Report No. 50-320/80-16
Docket No. 50-320
License No. DPR-73 Priority -- Category C
Licensee: Metropolitan Edison Company
100 Interpace Parkway
Parsippany, New Jersey 07054

Facility Name: Three Mile Island Nuclear Station Unit 2 (TMI-2)

Inspection at: Middletown, Pennsylvania

Inspection conducted: September 15 - October 27, 1980

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Inspection Summary:

Inspection on September 15 - October 27, 1980, (Inspection Report No. 50-320/80-16).
Areas Inspected: Special announced inspection at Three Mile Island (TMI) to verify licensee status of management plan for radiation protection program implementation as submitted in the licensee quarterly progress reports (QPR).
Results: Of 47 individual licensee commitments made, 33 were considered complete by the licensee, 3 require NRC action, 6 commitment dates have not yet passed and 5 commitment dates have passed but the committed action is not considered complete by the licensee. Of the 33 commitments considered complete by the licensee, the NRC site staff had not as yet concurred in 15 of the implementing procedures.

Details

1. Persons Contacted

- *M. Beers, Quality Assurance (General Public Utilities (GPU))
- *J. Brasher, Manager, Radiological Controls (GPU)
- *S. Chaplin, Unit 2 Licensing (GPU)
- *R. Fenti, Quality Assurance (GPU)
- *M. Grieco, Radiological Controls Training (Met-Ed)
- *J. Hildebrand, Supervisor, Radiological Support (GPU)
- *G. Kunder, Supervisor, Technical Specification Compliance (Met-Ed)
- *D. LeQuia, Quality Assurance (QA)
- R. McGoey, Radioactive materials Control (GPU)
- T. Mulleavy, Supervisor, Radiological Control Training (Met-Ed)
- O. Perry, Acting Supervisor, Dosimetry (GPU)
- *B. Presgrove, Process Support (GPU)
- *J. Schmidt, Engineer Dosimetry (GPU)

*Denotes those individuals attending the exit interview on October 27, 1980.

The inspector contacted several other licensee employees and contractors including members of the radiological controls, operations, and quality assurance (QA) site personnel.

2. General

By mid-September 1979, uncertainty of the adequacy of the radiation safety program at TMI prompted the Director of the Office of Nuclear Reactor Regulation (NRR), NRC, to create a special panel to provide an independent review of the radiation protection program at TMI. As a result of the report of the special panel (NUREG-0640), Met-Ed developed the TMI-2 management plan which identified actions to implement the recommendations of the NRC Special Panel. Five recovery QPRs on the progress made to upgrade radiation protection programs at TMI were submitted to the NRC.

The purpose of this inspection effort was to verify licensee status of management plan implementation as submitted in the licensee QPR. Several items were incomplete or unverified by the inspectors and will require further NRC review and inspection (Inspector Followup Items). These items are designated as "open" in the report.

3. Management Commitment in Support of Radiation Safety Program

a. Policy statement session

The senior vice president was to hold a policy statement session with all TMI managerial, supervisory and radiological personnel. This action was reported complete by the licensee in the fifth QPR submitted to the NRC on October 15, 1980.

However, this item remains open pending NRC review of documentation of the above session and/or assessment of the effectiveness of this corrective measure (50-320/80-16-01).

b. Restructure of radiological control department

The radiological control department was to be restructured under a manager reporting directly to the senior vice president of the company. The licensee reported this action was completed.

The inspector verified that the radiological control department was restructured by review of NRC letter, dated September 15, 1980, to Met-Ed which approved the reorganization of the General Public Utilities Nuclear Group (GPUNG). This restructure was incorporated into radiological controls procedure (RCP) 4010, Revision 1, dated September 30, 1980, "Department Organization and Responsibilities."

The inspector noted that this organization does not have the Manager, Radiological Controls, Unit-2, reporting directly to the Senior Vice President (Chief Operating Executive, GPUNG). There exists an intermediate individual, Director Radiological and Environmental Control (a corporate position). This Director is responsible for the radiological and environmental programs for the nuclear reactor units in GPUNG. The inspector determined that the intent of the Special Panel finding in this area was met, in that the new organization structure would provide for the removal of the radiological controls personnel from the operations department to avoid technician and foreman decisions in situations "dominated by operational pressures." The inspector had no further comments in this area.

c. Radiological assessment group

An independent radiological assessment group was to be created to monitor the radiological control program. The licensee reported that this was completed.

The inspector reviewed an informal document which addressed the existence of this group which reported to the Director, Radiological and Environmental Control. It appears this group is in a position which will allow for making independent assessments.

This area remains open pending review of documentation supporting the formal establishment and delineation of responsibilities and authority of this group and its effectiveness (50-320/80-16-02).

d. Radiation protection plan

A radiation protection plan was to be implemented which outlined the philosophy, basic objectives, and policies relating to the radiological control program. The licensee reported that the plan was submitted to the NRC initially in January 1980, and has been periodically revised to incorporate NRC comments.

Presently the NRC is reviewing the licensee's proposed radiation protection plan in conjunction with the Unit-2 radiological controls program review. The licensee intends to formally implement this plan by incorporation into a radiological controls department procedure which is expected to be issued December 31, 1980.

This area remains open pending NRC approval of the radiation protection plan (50-320/80-16-03).

e. On-the-job supervisors

Technician foremen were to be assigned exclusively to on-the-job supervisory duties for additional job support and direction. The licensee reported this action was completed.

The effectiveness of this measure continues to be reviewed by NRC (50-320/80-16-04).

f. Establishment of a supervisory and management development training program

Although the licensee committed to the establishment of a supervisory and management development training program by December 31, 1980, no action had been initiated as of the fifth QPR. The inspector discussed with the licensee's training staff, the organization plans for establishing a supervisory and management development training program. The licensee stated that formal plans were not issued for such a training program. The inspector stated that the licensee has committed to implement a supervisory and management training program by December 1980, as submitted to the NRC in the QPR. The inspector noted, through discussion with the licensee and examination of training records, that no evidence, plans, or procedures were available for developing a supervisory and management training program. This item will remain open pending completion and implementation of a supervisory and management training program (50-320/80-16-05).

4. Organization Structure

a. Reorganization of radiological controls department

The radiological controls department was to be reorganized. The licensee reported this action was completed. The inspector verified the reorganization was completed as noted in section 3.b.

b. Radiological controls department organization and responsibility procedure

A procedure defining the radiological department organization and responsibilities was to be issued. The licensee reported that this action was completed. The inspector verified the licensee's action by review of RCP 4010, Revision 1, dated September 30, 1980, "Department Organization and Responsibilities."

The inspector noted that the procedure lacked specificity for delineation of responsibilities for technician, engineer, and foreman level personnel. The licensee representative indicated that specific job descriptions would complement this area of procedure 4010.

This item remains open pending NRC review of job descriptions including the delineation of responsibilities for corporate level radiological controls personnel and pending review of the effectiveness of these corrective measures (320/80-16-06).

c. Use of only trained radiological control technicians and foremen

The inspector reviewed the licensee's QPRs and noted that the licensee had committed to utilize only radiological control technicians and foremen who were trained in accordance with a revised training program to provide radiological control coverage for work at TMI-2. The completion due date of this training program was July 31, 1980, as reported to the NRC in the fifth QPR.

Examination of the licensee's training records showed that radiological control technicians and foremen have successfully completed a forty hour training course. The training was conducted in accordance with a training plan. The inspector noted that the licensee did not have written and approved procedures for conducting the radiological control technician and foremen training. The licensee stated that the written procedure to upgrade the training program (4022) is still in a draft form pending licensee's management review and approval. The inspector stated that, since written approved procedures constitutes a significant portion of an integrated training program, this area will remain open pending review and approval of this training procedure (50-320/80-16-07). (Details, Paragraph 6.a).

5. Technical Depth of Radiation Safety Program

Recruiting programs for technical/supervisory expertise

The licensee was to initiate a recruiting program to reinforce the technical/supervisory expertise within the radiological controls department. The licensee reported that this action was initiated and that it was a continuing task.

A significant development in this area was the appointment of a Manager, Radiological Controls, TMI-2, during August 1980. The NRC will review the qualification records for existing personnel in the radiological controls department along with an assessment of current staffing levels. This item remains open pending completion of NRC review and evaluation (320/80-16-08).

6. Training

NUREG-0640 identified inadequate understanding of risk of low level radiation by radiation safety and operations personnel. In addition, specific training deficiencies were identified in: (1) operation of radiation safety instrumentation by field personnel, (2) understanding of the radiological hazards associated with the recovery activities, (3) familiarization with plant systems, and (4) radiation and contamination control measures.

The TMI-2 management plan for the radiological controls program, submitted to the NRC in the quarterly status reports identified the following actions to be implemented to meet recommendations of the NRC Special Panel:

a. Establishment of a radiological training group

A radiological controls training group reporting directly to the Manager of Radiological Controls was to be established. This training group was to be charged with developing a formal training program for radiological control technicians and foremen. The program for this training was to state required minimum acceptable knowledge, understanding, practical abilities and experience standard for qualified individuals. All assigned radiological control technicians and foremen were to be qualified or be restricted in their assignments prior to July 31, 1980.

The program in place consists of a Unit-2 radiological control technician/foreman orientation guide and checklist which is used to insure the completion of basic familiarization with the plant prior to a new technician being scheduled for the radiological control technician qualification course. The qualification course, following completion of the orientation checklist, is approximately a 40 hour training course conducted per lesson plan control number HPQ-R2. An examination covering the course material is administered and a given grade commensurate with assigned responsibilities is required for qualification. Also satisfactory completion of an oral examination and completion of practical factors demonstration is required prior to qualification of the individual.

All of the field operations radiological control technicians have completed the above qualification program except for newly assigned personnel. The newly assigned personnel are being restricted in their assignments until they have completed the technician qualification program.

Although the radiological control technicians were trained or restricted by the action due date of July 31, 1980, the training program to be used has not been formalized because the training sequence and material is not controlled by approved procedures. A draft RCP 4022 has been prepared to

formalize and control the above training program. This draft procedure is undergoing management and union review/discussion prior to submittal to the procedure and operations review committee (PORC) for approval. No estimated date for PORC approval could be provided by licensee representatives. The formalization of the radiological control technician/foremen training program remains an open item (50-320/80-16-07).

The actual training program for radiological control technicians was not audited by the inspector, although a general lesson plan was reviewed. The revision of the radiological control technician training program to satisfy specific training deficiencies identified by the NRC Special Panel remains an open item (50-320/80-16-09) pending NRC verification of actual instruction and assessment of subsequent technician qualifications.

The above training commitment is for radiological control technicians only. No formal training program has been developed for radiological technical support (RTS) personnel (particularly as low as is reasonably achievable (ALARA) engineers), radiological services personnel, dosimetry personnel, and radiological training personnel. Draft outlines for formal training programs within dosimetry and radiological services are presently being prepared. Formal training programs for all staff members of the radiological controls department is an open item (50-320/80-16-10).

b. Review of radiological safety training by supervisor-radiological control training

Radiological safety training for all personnel employed at TMI-2 is to be performed by the Met-Ed Training Department. The responsibility to assure the training meets the minimum standards for safe radiological work in the TMI-2 environment was to be assigned to the Supervisor of Radiological Controls Training. The Supervisor of Radiological Controls Training has been directed to review, change as necessary, and approve course material examinations, presentations and practical factor performance. The action due date was May 1, 1980, for changes to the radiological safety training.

The review and necessary changes to the radiological safety training will be an ongoing process. The inspector determined, through discussion with the licensee, that the May 1, 1980, date for implementation of major improvements in the training has been completed. However, the procedure formalizing the radiological safety training has not been approved. Approval of the radiological safety training procedure is considered an open item (50-320/80-16-11).

c. Use of special training

In addition to radiological safety training, the licensee committed to the use of special training such as mock-ups, walk-through exercises, and detailed worker briefings for major evolutions and those tasks which may result in unusual

or uncertain radiological environments. The RTS group was to establish the guidelines for making determinations of which tasks require additional special training by July 1, 1980.

Special training has been used for several "high risk tasks" performed, such as the reactor building entries and makeup filter removal, however, on other occasions adequate special training for "high risk tasks" (i.e. valve alley entry, October 6, 1980) was not provided. These inconsistencies in the licensee's program could be attributed to lack of established guides or criteria needed to alert him to provide such special training.

The inspector noted, through discussion with the licensee, that action was not initiated by the licensee in this area and, at present, criteria for jobs which require special training have not been established. Licensee representatives indicated that the criteria will be developed by December 1, 1980. Development of criteria for special training is an open item (50-320/80-16-12).

7. Radiological Audit Program

NUREG-0640 identified deficiencies in the resolution of licensee audit findings. In the fifth QPR submitted to the NRC on October 15, 1980, the licensee stated that 11 corrective measures had been completed by April 15, 1980.

a. Audit response procedures

The licensee issued procedure 4076 "Audit Response Procedure" on June 4, 1980. The procedure incorporated all previous licensee commitments:

- (1) Audit findings from NRC, QA, or internal audits are assigned by the audit coordinator and distributed to management individuals responsible for action and to RTS for tracking evaluation and analysis.
- (2) The above audit findings are reviewed by RTS for evaluation and trend analysis.
- (3) A commitment record/status file is maintained by RTS documenting the corrective actions, due date, and individual responsible. The individual responsible receives a form which contains the above information.
- (4) Corrective actions are followed up by RTS to evaluate completion and acceptability of action prior to the item being closed out.
- (5) For management review and assessment, a monthly status report of all open action items from these audits is given to the Manager of Radiological Controls.

The inspector verified that these actions were completed.

b. Assign responsibility for corrective action on NRC and QA audit findings

At the time of the inspection, the licensee had assigned responsibility and due dates for corrective action response. The assigned persons responded, and corrective action had been completed. In all but a few cases the corrective actions had been re-audited by QA to check for completion and acceptability. Licensee corrective action was completed as of February 15, 1980.

c. Re-evaluate previous audit findings

It was verified that audit items have been assigned and responses received from the persons assigned responsibility for corrective action. Licensee corrective action was completed as of March 1, 1980.

d. Establish an in-house deficiency reporting system

The licensee has two in-house deficiency reporting systems each covered by a separate procedure. RCP 4006 covers radiological deficiencies and reports (RDR); RCP 4005 covers radiological investigations and reports (RIR).

The RDR system enables any worker to identify radiological deficiencies, which the licensee defines as "any act or situation which is not in compliance with established radiological procedures and instructions or a radiological work practice which can and should be improved." The RDR system provides for (after deficiency identification) assignment of responsibility for corrective action, review of corrective action, and analysis for trends.

The RIR system is primarily designed to provide investigations and analyses of events which have occurred which demonstrate potential radiological controls weaknesses. The investigation may uncover radiological or other items needing correction or improvement. These items are assigned to "action addressees" for corrective action and are tracked by the RTS group.

This licensee corrective action was completed as of April 15, 1980.

8. Preparation and Implementation of Procedures

NUREG-0640 identified that many Met-Ed procedures are written in such a manner that strict compliance is not possible.

The TMI-2 management plan for the radiological control program identified the following actions to be implemented to meet recommendations of the NRC Special Panel:

a. RCP manual

The format for all radiological control associated procedures was to be restructured to achieve verbatim compliance. These procedures are to be incorporated in a RCP manual, separate from the TMI site procedures. The following five procedures were listed as priority procedures:

- (1) Radiation work permit (RWP) use.
- (2) Investigative reports.
- (3) ALARA Review.
- (4) Administrative procedure.
- (5) Administrative exposure guidelines.

These five procedures were due to be revised by April 1, 1980, and the following status was reported in the fifth QPR submitted to the NRC on October 15, 1980: Two of the initial procedures were issued (investigative report procedures and administrative exposure guidelines); the remaining procedures have been developed and are currently in the approval cycle.

Completion of a RCP manual is due by December 1, 1980. The fifth QPR listed the procedures as a continuing effort based on the priority list as issued on January 22, 1980.

At the present time only two procedures (investigative reports and administrative exposure guidelines) have been approved. The other three procedures are in the process of being approved. The licensee representatives indicated the remaining three priority procedures along with all of the RCPs would be approved by December 1, 1980. Completion of a RCP manual is considered an open item (50-320/80-16-13).

b. Use of action sign off steps

Action sign off steps are to be added to all work procedures for work on major evolutions during the procedure review performed by ALARA engineers. A procedure defining the use of sign off steps was to be implemented by August 1, 1980. The status in the QPR submitted to the NRC on October 15, 1980, stated that a draft procedure is being prepared.

Action sign off steps were used for several major evolutions such as makeup filter changeout and reactor building entry.

However, at present the draft procedure establishing the criteria for the use of action sign off steps has not been completed. The licensee representative stated this procedure will be approved by December 1, 1980. Approval and implementation of a procedure establishing action sign off step criteria is considered an open item (50-320/80-16-14).

c. Technical specification change to expedite review of RCP

A revision to the TMI-2 technical specifications to expedite implementation of procedures and procedure changes for RCPs was to be evaluated by the licensee. The status listed in the QPR is that the due date for this item is open and awaiting NRC resolution.

A proposed technical specification change has been submitted to the NRC. This proposed technical specification change will remain an open item (50-320/80-16-15) pending resolution by NRR.

9. External Dosimetry

Several inadequacies in the licensee's external dosimetry program were identified by the NRC Special Panel and reported in NUREG-0640. In response to the NRC Special Panel findings the licensee committed to certain improvements in his external dosimetry program. These commitments were submitted to the NRC in a licensee QPR dated February 8, 1980. Subsequently, the licensee submitted four QPRs giving the status of the licensee management plan to upgrade this area. The inspector reviewed the licensee's action plan, completion due dates and current status in these reports including the third QPR for 1980 which was submitted to the NRC in October 1980. Items examined in this area included the following:

a. Evaluation of dosimetry for reactor building re-entry

The licensee committed to evaluate the dosimetry requirements for the TMI-2 reactor building entry by February 15, 1980. The licensee reported that action in this area is complete.

The inspector examined the licensee dosimetry requirements for the initial re-entry into the TMI-2 reactor building. Prior to the initial reactor building re-entry, the licensee conducted several dosimetry experiments to evaluate the types of radiation, dose rates, and to determine appropriate dosimetry requirements for the re-entry team. Data needed for the evaluation were collected by the licensee from experiments, calculations and radiation measurements. The data including reactor building sump activity and reactor building air samples acquired through containment penetrations R-605, R-626 and reactor building equipment hatch experiments.

The Harshaw 700 thermoluminescent dosimeters (TLD) were placed into the TMI-2 containment through containment penetrations and under different experimental conditions to evaluate the adequacy of the TLD with regard to measurements of beta and gamma radiation doses. The general radiation dose rates were calculated with some conservative assumptions and the beta dosimetry problem was compensated for by using adequate protective clothing. An NRC task force was established to evaluate the

licensee re-entry operation. The task force has concluded that the licensee should be granted approval for the initial reactor building entry, however, subsequent entries into the TMI-2 reactor building should be evaluated on a case-by-case basis. This item is closed.

b. Evaluation of TLD system and implementation of modifications

The licensee committed to evaluate his TLD system and implement needed modifications by December 1, 1980. The licensee reported that evaluation of the TLD system was initiated, however, action was not completed.

The inspector examined the licensee's TLD system with regard to accuracy of beta measurements and determined through review of the licensee's Quality Control (QC) tests data that beta radiation measurements continued to be a problem. The licensee has initiated dosimetry studies of commercially available and experimental TLDs. The results of these studies would assist the licensee in making a decision with regard to upgrading his current TLD system. The inspector found, through discussion with the licensee and examination of the licensee's TLD evaluations, that delays in taking corrective action resulted because certain problems were encountered including availability of calibration sources, defective TLD holder materials, availability of experimental TLDs and TLD systems compatibility. The inspector stated that this area will remain open pending completion of the TLD system evaluation and upgrading the TLDs accuracy of response to different beta energies and mixed beta-gamma radiation fields (50-320/80-16-16).

c. Coordination and direction of contracted services

The licensee committed to coordinate and direct contracted technical expertise in the assessment of external exposures by February 1980. The licensee reported that the technical expertise for assessment of external exposures is currently being coordinated and directed by the Manager of RTS. The organization and responsibility procedure (RCP-4010) defining the current organization was issued in May 1980 and the committed action in this area was completed.

The inspector reviewed certain aspects of the licensee's external dosimetry assessment and determined that significant parts of this assessment are still being performed by a contractor. The inspector noted, through discussion with the licensee/licensee contractor, that no mechanism to perform external dose assessment by the contractor was established. The inspector stated that this area will remain open pending establishing a mechanism (i.e. written instructions or procedures) for the contractor to perform external dose assessment (50-320/80-16-17).

d. QA program for TLD system

The licensee committed to develop a QA program for TLD system by April 30, 1980. The licensee reported that action in this area was completed.

The inspector examined the licensee QA program for TLD system and noted that necessary procedures for program implementation were prepared and approved by the licensee's management (primarily procedure number 4220), however, the procedures were not implemented. The inspector reviewed certain QA data for the licensee's current TLD system and noted that, for gamma response, a negative bias was evident from the examined data. Dosimetry accuracy problems for mixed beta-gamma field radiation continued. The licensee's studies are continuing in order to resolve this problem (see Paragraph 9.b). The inspector stated that this area will remain open pending implementation of procedure number 4220 and resolution of TLD response problems to mixed field radiation, (i.e. β/γ and different energies on β) (50-320/80-16-18).

e. Computerized exposure tracking by work group and major task

An exposure tracking system capable of tracking personnel exposures by work groups and by major tasks was to be implemented by April 1, 1980. The fifth QPR listed the status of this commitment as action complete.

The licensee currently has a computer system which tracks exposure from RWP documentation. All RWP exposure data is entered into the computer system on a periodic basis. The data entered is stored by the RWP for capability of tracking by major task. The data is also entered into the individuals record, and since the program can sort individual exposures by major work group (i.e., contractor, Met-Ed maintenance, Met-Ed operations, etc.) the system is capable of tracking by work group. The commitment for exposure tracking by work group and major task is considered complete.

f. Computerized exposure tracking by specific tasks

A system capable of tracking exposures by specific tasks is due to be implemented by December 31, 1980. The QPR submitted to the NRC on October 15, 1980, listed the status of this commitment as actions in progress to meet the committed date.

Presently to gather all of the exposure data associated with a specific task, all of the RWPs associated with the specific job would need to be accessed individually. The new program will assign an ALARA number to jobs and allow access to the exposure data on many RWPs by use of the ALARA number. This commitment remains an open item (50-320/80-16-19) pending verification and implementation of the new computer program.

10. Internal Dosimetry Program

NUREG-0640 identified several specific technical deficiencies with evaluations performed in determining internal dose. In addition, no assessment to demonstrate adequate procedures to detect Sr-90 based upon Cs-137 internal levels was evident.

The TMI-2 management plan for the radiological control program identified the following actions to be implemented to improve the internal dosimetry program as a result of the NRC Special Panel review:

a. Evaluation of internal exposure monitoring results

The efforts to evaluate results obtained from the internal exposure monitoring program were to be coordinated and managed by the RTS group of the radiological control department. The status as reported in the fifth QPR submitted to the NRC on October 15, 1980, stated that action has been completed. The inspector verified that this reorganization to include responsibility for coordination and management of internal evaluations by the RTS group has been completed.

However, at the present time no formal procedural requirement exists for what evaluations should be considered based upon observed action levels during internal bioassay. Such suggested evaluations as required by Code of Federal Regulations (10 CFR 20) and ANSI standards should be listed. This item remains open (50-320/80-16-20).

b. Bioassay program formalization

The bioassay program was to have been revised to formalize the basis for bioassays under both routine and non-routine circumstances by April 1, 1980. Under the revised program all measurements which require dose assessments and evaluations of internally deposited radionuclides are to be referred to the RTS group. The status reported in the fifth QPR stated the procedure defining the program has been developed and has been issued and action is complete.

A revised Unit-2 RCP 4238 bioassay program was approved by PORC on July 25, 1980. The revised program establishes requirements for both routine and non-routine whole body counts, provides guidance for further evaluation based upon measured uptake, and requires review by the Manager of RTS.

The inspector reviewed measures taken to correct specific technical deficiencies listed for Internal Dosimetry in the NRC Special Panel Report NUREG-0640. The specific problems indicated are those associated with the internal assessment of uptake, fractional transport and effective half-life for radioiodine. These specific problems have been corrected. An assessment of an action level of 150 nCi of Cs-137 uptake as

measured by whole body counting for requiring Sr-90 bioassay was reviewed by the inspector. The assessment was based upon a Sr-90 to Cs-137 ratio of 0.13 and since ratios of 1 to 1 have been observed, the licensee indicated the 150 nCi action level would be reevaluated based upon the higher actual ratios being observed.

While reviewing the bioassay program, the inspector noted that several program deficiencies still exist. The draft RCP 4239 implementation and QA of Bioassay Program has not been approved and issued. No criteria for acceptance of daily source checks was provided to the operator of the whole body counter. The method the licensee will use to review and approve the use of contractor, Radiation Management Corporation (RMC), supplied procedures has not been determined. The implementation of an improved QA program and the approval of RMC operating procedures is considered an open item (50-320/80-16-21).

11. Instrumentation Program

NUREG-0640 indicated a possible lack of sufficient professional input into selection, installation, calibration, and maintenance of radiation protection instrumentation.

The TMI-2 management plan for the radiological control program identified the following actions to be implemented to upgrade the radiation protection instrumentation program:

a. Instrumentation coordination by radiological support services

All instrumentation selection, installation, calibration, and maintenance was to be coordinated by the radiological support services group in the radiological control department. This commitment was due March 1, 1980, and the status as listed in the fifth QPR was action complete.

The licensee has an individual in charge of the instrumentation repair and calibration facility. This person reports to the Supervisor of Radiological Support Services. This commitment is considered complete.

b. Reactor building re-entry instrumentation

Selection of instrumentation for the reactor building re-entry program was to have been made by March 1, 1980, and the status from the fifth QPR was action complete.

The licensee has available an instrument for measurement of high level energetic beta fields associated with undiluted post accident primary coolant. Beta fields encountered in accessible areas of the reactor building were found to be such that use of this instrument in the reactor building will not be required until decontamination of the sump or opening of the primary system.

This same instrument with minor modifications was believed to be acceptable for use within the Kr-85 environment of the reactor building. Due to the purge of the reactor building atmosphere prior to entry, Kr-85 environment is no longer a concern.

Selection of a high range beta instrument is complete.

c. Radiological instruments QA program

To ensure that all portable instrumentation used at TMI-2 is properly calibrated, a QA program for radiological instruments was to be developed by July 1, 1980. The status as listed in the fifth QPR submitted October 15, 1980, was action complete.

RCP 4261 QA program for radiological instruments was approved on September 9, 1980. However, the new procedure has not been in use for sufficient time to assess implementation. In addition, as discussed in the section on training (section 6 of this report), a formal training and retraining program for radiological instrumentation maintenance and calibration technicians has not been established to further improve the QA aspects of the radiological instrumentation program. Implementation of the RCP 4261 QA program for radiological instruments along with development and implementation of a formal training and retraining program for radiological instrumentation maintenance and calibration technicians is an open item (50-320/80-16-22).

d. Instrument maintenance and calibration facility

A new TMI instrument maintenance and calibration facility was to have been operational prior to expanding decontamination activities into the reactor building. In the fifth QPR the due date was listed as December 31, 1980, and the status was action complete.

The present radiological instrument repair and calibration facilities have been substantially upgraded. Although no new facilities are now planned, the present upgraded facilities should be adequate to meet requirements when decontamination activities expand into the reactor building. The commitment for a new instrument and calibration facility is considered complete.

e. Health physics counting lab improvements

Recommendations for health physics counting lab improvements were to have been made by February 18, 1980. The fifth QPR lists the recommendations as submitted and action complete. Improvement of capabilities for contamination analysis, isotopic analysis, and low energy beta analysis was to have been completed by June 1, 1980. The fifth QPR lists these improvements as action not complete.

Improvements to be accomplished in the health physics counting equipment have been recommended by the RTS group. Internal proportional counters for simultaneous alpha and beta counting were received at the site, but due to technical problems have been sent back to the manufacturer. The ability for isotopic analysis, low energy beta analysis, and contamination analysis by the chemistry group on site has been improved. The facilities of the chemistry group are available to the health physics group where needed. The analysis capabilities now appear adequate and this commitment is considered complete.

f. Constant air monitoring equipment

Area air monitoring equipment to constantly monitor the airborne activity levels in the general work spaces and placed in specific work areas for operations were to have been installed throughout the TMI-2 auxiliary and fuel handling buildings. The fifth QPR listed this commitment as action complete.

Continuous air monitors have been placed in specific general areas throughout the TMI-2 auxiliary and fuel handling buildings. These units are also being moved to specific job sites to assess airborne activity during work which has a potential for creating airborne contamination. The commitment for improved continuous air monitoring equipment is considered complete.

g. Air sampling frequencies

Portable air sampling frequencies were to have been increased. For work evolutions which are identified as having a potential for generating airborne contamination, portable air samples were to be taken at the start, during, and after work. The fifth QPR submitted October 15, 1980, listed the status as action complete.

Assessment of current air sampling practices is not complete at this time. Portable air sampling practices will remain an open item (50-320/80-16-23) pending further inspector evaluation of work activities and adequacy of the current sampling practices.

h. Radioiodine sampling and analysis

The ability to sample and analyze for radioiodines, although still present on site, is no longer a limiting factor for recovery operations. The status listed in the fifth QPR was action complete.

Sufficient capability to sample and analyze for radioiodine appears to be present on site at this time based upon predicted radioiodine levels. This commitment is considered complete.

i. Survey frequency schedule

A new schedule for survey frequencies was to have been implemented by February 1, 1980. The fifth QPR listed the status as schedule developed and incorporated into procedure and is currently in the approval cycle.

This item will remain an open item pending further inspector review of survey frequencies for various areas of the site (50-320/80-16-24).

12. Radioactive Material Shipping

The licensee's radiological control management program objective in the area of radioactive material shipping was to "Improve TMI-2 radioactive material shipping and labelling procedures." To achieve this objective the licensee took two actions: revising all the procedures concerning radioactive material packaging, handling, shipping and receipt, and developing guidelines for curie estimates. The fifth QPR listed the status of procedure revision as action complete. The inspector verified the licensee's actions were complete, however, certain inadequacies were identified by the inspector (details, Paragraph 12.a).

a. Procedure revision

- (1) The licensee revised the following procedures regarding radioactive material shipping handling, packaging and receiving:
 - (a) Health physics procedure (HPP) 1618A "Radioactive Material Shipping,"
 - (b) RCP 1618B "Receipt of Radioactive Material,"
 - (c) HPP 1618C "Radioactive Material Handling,"
 - (d) HPP 1618D "Packaging of Radioactive Material,"
 - (e) Operating procedure (OP) 1618F "Non-compactable Packaging (LSA Boxes),"
 - (f) RCP 1620 "Radiological Controls for Processing Radioactive Solid Waste," and,
 - (g) OP 2104-4.13 "On-Site Transfer of Radioactive 6' x 6' Resin Liners from Unit #1."
- (2) The inspector observed that the procedures adequately addressed the performance of several areas but that procedural inadequacies still existed. Examples of these include the following:

- (a) RCP 1620, Revision 7, indicated in step 5.5.3.2 that the fraction of Sr^{90} in certain waste is to be estimated as 0.001. The licensee's current practice is to use a much more accurate estimate of a Sr^{90} fraction of 0.06.
- (b) Hittman HN-100 series casks are used for shipment of greater than type A shipments of radioactive material. These shipments must adhere to all the requirements in the certification of compliance for that cask. Neither HPP 1618A nor HPP 1618D provide and identify a list of the certificate of compliance requirements and the means to verify and document that they have been met.
- (c) The procedures contain many generalized statements which advocate good practices but in many cases specific guidance for the person carrying out the procedure is lacking. HPP 1618D, attachment 4, states "Radiation levels are within the limitations for the mode of transport" no values nor references to a table of authorized radiation levels or checklist containing authorized levels are given. Compliance with 49 CFR and 10 CFR 71 is mentioned many times, in itself this is not a bad practice, using it in lieu of specific guidance is not a good practice unless the individuals utilizing the procedure have 49 CFR and 10 CFR 71 committed to memory. The licensee is continuing to revise his shipping procedures. This area will be reviewed in a subsequent inspection. This item is open (50-320/80-16-25).

b. Guidelines for curie estimations

The guidelines for curie estimations were to be developed by April 1, 1980. The fifth QPR stated that action in this area is complete.

The licensee's guidelines for curie estimation for TMI-2 radioactive material shipments are contained in several memoranda and RCP 1620. The inspector reviewed the methodology and assumptions used in the development of the estimation factors and formulas with personnel from the RTS group. Results obtained from the licensee's methods were also reviewed. No discrepancies, irregularities or inconsistencies were noted for TMI-2 curie estimations. This item is considered complete.

The estimation factors and isotopic mix are periodically reviewed by the licensee based upon isotopic analyses of samples taken inside radiologically controlled areas (primarily the TMI-2 auxiliary building).

c. Radioactive material shipment training

The review of radioactive material shipment training included three areas: training of technicians, training of personnel having responsibilities for adequacy of shipments, and retraining. Training for health physics technicians has been incorporated into their cyclic training.

The inspector selected several individuals who had responsibility for the adequacy of shipments and compliance with regulations and reviewed their training records. All had received and passed the radioactive material shipping regulations course. The licensee has an annual retraining interval. The annual retraining had not been formalized and documented but no one had passed the point in time where he was due for retraining. The inspector noted that the licensee's retraining program is being developed.

13. Decontamination

The objective stated in the radiological controls management program was to "Improve decontamination procedures for equipment and tools." The fifth QPR listed the status of this commitment as action complete. Routine decontamination facilities, equipment, personnel and procedures were reviewed. This review did not encompass decontamination of the TMI-2 reactor building or sump; since this topic is covered in NUREG-0683, "Draft Programmatic Environmental Impact Statement Related to Decontamination and Disposal of Radioactive Wastes Resulting from March 28, 1979, Accident, TMI Nuclear Station, Unit 2."

At the time of the inspection the licensee had in use a rented electrolytic decontamination unit and a licensee owned freon decontamination unit for tools and small components. These units have been temporarily located in a trailer outside the TMI-2 auxiliary building but were being relocated inside the building. The licensee had been using contractor supplied hydrolasers. The licensee currently has one hydrolaser on order. The licensee was in the process of switching from a largely contractor supplied decontamination workforce to an in-house decontamination workforce.

The licensee had a decontamination procedure in the review cycle to cover overall administration of the decontamination program and interface with other site personnel. Procedures internal to the decontamination organization, primarily instructions on equipment operation, are under development.

The current organization and equipment available has been sufficient to perform the decontamination workload. This is, in part, due to a reduced workload in the interval between the major decontamination efforts in the auxiliary building and the future effort in the reactor building. This period of reduced activity gave the licensee the opportunity to make the transition to an in-house work force, develop new procedures, refine existing procedures, and make equipment changes and relocations. Procedures were currently in effect for:

- Operation of the ultrasonic cleaning unit (freon unit).
- Operation of the electro-con unit (electrolytic unit).
- Operation of the solid waste compacting unit.

14. Implementation of a Program to Reduce Personnel Exposure to ALARA

As a result of the NRC Special Panel examination of this area the licensee has committed to the implementation of a program which emphasizes the reduction of personnel exposure to ALARA including the following specific actions:

a. Implementation of a radiation protection plan in conformance with ALARA

The licensee committed to the implementation of a radiation protection plan which stresses TMI-2 commitment to a strong radiological control program within the concept of ALARA. The licensee reported that an ALARA program is now in effect, however, the radiation protection plan is awaiting NRC approval.

The inspector noted through discussion with the licensee and observations of certain radiological operations at TMI-2, that no formal ALARA program exists for evaluation of certain radiological operations, recommendations on the reduction of personnel exposure, projected man-rem goals and evaluation of risk benefit ratios for radiological tasks. Discussion with the licensee indicated a lack of understanding of ALARA concepts. The inspector noted that no written procedures were used by the licensee to establish ALARA review and documentation. The inspector stated that this area will remain open pending implementation of an adequate ALARA program in accordance with written detailed procedures (50-320/80-16-26).

b. Implementation of a program for exposure tracking

To aid in radiation exposure reduction, man-rem goals were to be established for each major task each year. Information from the computerized exposure tracking system are to be used to perform trend analysis to assess progress while the job is being performed. The reports will be issued to the responsible supervisors in order for them to monitor the effectiveness of their performance. The procedure for implementation of the program was to be ready following the implementation of the computerized exposure tracking system. The due date for this commitment was listed as September 1, 1980. The licensee's fifth QPR listed the status as action not complete. The program is being integrated into a revised work tracking program being developed at the corporate level.

No progress was observed in the institution of this proposed program. Licensee representatives were unable to estimate a

date when this commitment will be completed. Use of man-rem goals and exposure tracking for jobs is considered an open item (50-320/80-16-27).

c. Issuance of exposure reports to supervision

Computerized exposure reports are to be issued to all Met-Ed/GPU and contractor supervision to ensure that radiation exposures received by individuals reporting to them are as low as reasonably achievable. These reports are also to be used as an aid in identifying operations which may need ALARA engineering reviews to reduce personnel exposures. No due date is given for this item in the fifth QPR and the status listed states this is a continuing effort upon implementation of the exposure tracking program.

The inspector determined that presently the exposure listings, alphabetically by individuals, are available to all supervisors. They can review the exposures of each individual reporting to them. However, looking up the exposures of a group of workers from a list of over a thousand is a tedious job and is not done routinely. A computer program to provide lists to a supervisor of exposures for individuals reporting to that supervisor is being developed. No date for completion of this commitment could be provided by licensee representatives. Issuance of exposure reports to supervision is considered an open item (50-320/80-16-28).

15. Personnel Accountability for a Strong Radiological Control Program

The management plan for the radiological control program states that individuals must be made accountable for the actions they take in order to have a strong radiological control program. Individuals must understand their responsibilities and expectations in achieving a sound radiological control program. The following actions were to be implemented to ensure everyone at TMI understands their responsibilities to achieve a strong "radiological control program:"

a. Delegation of audit findings

Responsibility for corrective actions performed to satisfy audit findings are to be delegated to supervising personnel responsible for the area of operations in which the deficiency occurred. The fifth QPR listed the status of this commitment as continuing since initiated in February 1980.

The licensee has approved procedure 4076 "Audit Response Procedure" on June 4, 1980. This procedure requires audit findings to be assigned and distributed to management individuals responsible for a given area. Implementation of the procedure appears to be adequate. The commitment for delegation of audit findings is considered complete. This item is further discussed in Paragraph 7.

b. Action sign off steps

Action sign off steps are to be added to all work procedures for work on major evolutions during the procedure review performed by ALARA engineers. A procedure defining the use of sign off steps was to be implemented by August 1, 1980. (Details, Paragraph 8.b).

c. Guidelines for conductance of critiques

A procedure presenting the guidelines and criteria for conducting a critique of unusual radiological occurrences is to be prepared by the RTS group and incorporated into the RCP manual by December 1, 1980. The licensee's fifth QPR stated that these guidelines were incorporated into the RCP manual 4005 "Radiological Investigative Reports" and action is complete. (Details, Paragraph 7.d).

The commitment for guidelines for conductance of critiques is considered complete.

16. Exit Interview

The inspector met with the licensee management (denoted in Paragraph 1) at the conclusion of the inspection on October 27, 1980, at the TMI site. The inspector summarized the inspection findings. The licensee management acknowledged the inspection findings.