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THREE MILE ISLAND NUCLEAR STATION

STATION ADMINISTRATIVE PROCEDURE 1003

RADIATION PROTECTION MANUAL

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THREE MILE ISLAND NUCLEAR STATION

Radiation Protection Manual

Units #1 and #2

THREE MILE ISLAND NUCLEAR STATION

RADIATION PROTECTION MANUAL

UNITS #1 AND #2

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SECTION:

THREE MILE ISLAND NUCLEAR STATION

RADIATION PROTECTION MANUAL

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RADIATION PROTECTION MANUAL

Introduction

This manual describes the standards, policies, and instructions for providing radiation protection at the Three Mile Island Nuclear Station.

The primary purpose of the Metropolitan Edison Radiation Protection Program is to maintain the radiation exposure as low as reasonably achievable and to provide for the protection of plant personnel and visitors against unnecessary exposure to radiation and radioactive materials. These objectives are best achieved through administrative exposure control procedures, adequate work planning, and safe practices in all activities related to plant operations and maintenance.

All standards expressed in this manual are in accordance with specific provisions of the Code of Federal Regulations and the recommendations of the ICRP; International Commission of Radiation Protection.

It is intended that this manual be used for Three Mile Island Nuclear Station Units 1 and 2.

RADIATION EXPOSURE POLICY

Metropolitan Edison Company will institute the policy to keep personnel radiation exposure within the Nuclear Regulatory Commission and Pennsylvania State Regulations, and beyond that, to keep the exposures as low as reasonably achievable. In addition, Three Mile Island Nuclear Station will discharge radioactive effluents, liquid and gaseous, within the limits of the NRC and Pennsylvania State Regulations and will keep releases of radioactive material as low as reasonably achievable. Administrative control procedures are adopted to serve this end. These procedures are generally based on the conditions prevailing during routine plant operations. They serve three important functions:

1. To control the individual's accumulated radiation exposure.
2. To distribute the exposure among plant personnel as evenly as practical.
3. To use the Rad-Waste Treatment facilities to ensure compliance with Federal and State regulations.

Each individual is required to keep his radiation exposure as low as practicable consistent with discharging his duties, and to observe all rules adopted for his safety and that of others. The ultimate success of the radiation protection program depends in a large measure on the degree of cooperation that can be expected from station personnel. Radiation Safety is everybody's responsibility and as such is a cooperative effort involving every member of the station organization.

1.0 RADIOLOGICAL CONTROLS, LIMITS AND PRECAUTIONS

This section prescribes the maximum permissible external and internal radiation exposure as set forth in the NRC regulations "Standards for Protection Against Radiation" (10CFR20) and regulations of the State of Pennsylvania Part 433. The exposure limits and regulations in this manual shall be applicable to all persons within the restricted area bounded by the security fence of Metropolitan Edison Company's Three Mile Island Nuclear Station.

1.1 Maximum Permissible Exposure

The maximum permissible occupational radiation exposure for individuals 19 years of age or older will be limited to the following:

1.1.1 The maximum quarterly exposure to the whole body, head and trunk, blood forming organs, gonads, and lens of the eye shall be limited to 1¼ rem.

1.1.2 The maximum quarterly exposure to the skin of the whole body shall be limited to 7½ rem.

1.1.3 The maximum quarterly exposure to the hands and forearms, feet and ankles shall be limited to 18 3/4 rem.

1.1.4 Met-Ed may permit an individual in a restricted area to receive a dose to the whole body greater than that permitted in paragraph 1.1.1 provided:

1. During any calen ar quarter the dose to the whole body from radioactive material and other sources of radiation in the licensee's possession shall not exceed 3 rem; and
2. The dose to the whole body, when added to the accumulated occupational dose to the whole body, shall not exceed 5 (N-18) rem where "N" equals the individual's age in years at his last birthday; and

3. Metropolitan Edison Company has determined the individual's accumulated occupational dose to the whole body, on Form NRC-4, or on a clear and legible record containing all the information required in that form.

1.1.5 Exposure to Minors

Metropolitan Edison Company shall not possess, use or transfer licensed material in such a manner as to cause any individual within a restricted area, who is under 19 years of age, to exceed 10 percent of the limits specified in paragraph 1.1.1, 1.1.2 and 1.1.3. Metropolitan Edison Company shall not possess, use or transfer licensed material in such a manner as to cause any individual within a restricted area, who is under 19 years of age to be exposed to airborne radioactive material possessed by the licensee in an average concentration in excess of the limits specified in Appendix B, Table II of 10CFR20. For purposes of this paragraph, concentrations may be averaged over periods not greater than seven consecutive days.

1.2 Administrative Exposure Limits

1.2.1 In order to maintain the occupational exposure of personnel within the limits established in 10CFR20, it is necessary to apply certain restrictions to the rate of dose accumulation over the period for which the limits are applicable.

1.2.2 The weekly administrative exposure limit (seven consecutive days, Monday through Sunday) established for this purpose is:

1. Exposure of the whole body and critical organs shall be limited to 300 MREM/week. (Seven consecutive days)
2. A whole body exposure about 300 MREM in any week (seven consecutive days) will require authorization from the Radiation Protection Supervisor/Foreman.

1.2.3 The calendar quarterly (3 month period of time) expsoure limit is:

1. As specified in paragraph 1.1.
2. A whole body exposure above 1000 mrem in any calendar quarter will require written authorization from the Radiation Protection Supervisor to assure compliance with paragraph 1.1.4.
3. A whole body exposure above 2000 mrem in any quarter will require written authorization from the Radiation Protection Supervisor and Unit Superintendent to assure compliance with paragraph 1.1.4.

1.3 Maximum Permissible Concentrations in Air

1.3.1 Exposure to airborne radioactive materials shall not exceed the exposure that would result from inhalation for 40 hr/week for thirteen (13) weeks at uniform concentrations of radioactive

material in air specified on Appendix B, Table I, Column I, 10CFR20.

1.3.2 For radioactive materials designated "Sub" in the "Isotope" column of Appendix B, Table I, Column 1 of 10CFR20, the concentration value specified shall be based upon exposure to the material as an external source. Individual exposures to these materials shall be accounted for as part of the limitation on individual dose in 10CFR20.101.

1.3.3 Credit will be taken for use of respiratory protective equipment as a part of the respiratory protective program. The program will be conducted in accordance with the requirements of section 1.8 of this manual.

1.4 Emergency and Accidental Exposure

1.4.1 Although an emergency situation transcends the normal requirements of limiting exposure, there are suggested levels for exposure which may be accepted in emergencies. It is considered that an emergency dose of 100 rem to the whole body for saving a life and 25 rem to the whole body for saving equipment may be acceptable under unusual circumstances. It should be pointed out that every reasonable effort must be made to minimize exposure, even in emergencies.

1.5 Classification of Areas

1.5.1 Restricted Area

A restricted area is defined as any area access to which is controlled by the licensee for purposes of protection of individuals from exposure to radiation and radioactive materials. "Restricted Areas" shall not include any area used as residential

quarters, although a separate room or rooms in a residential building may be set apart as a restricted area.

1.5.2 Unrestricted Area

A unrestricted area is defined as any area access to which is not controlled by the licensee for purposes of protection of individuals from exposure to radiation and radioactive materials, and any area used for residential quarters.

1.5.3 Clean Area

An area is considered to be a clean area if it has contamination levels less than those of a contaminated area. See paragraph 1.6.2.

1.5.4 Controlled Area

The controlled area shall encompass all plant areas where radiation or contamination has a potential for existing in the amounts above the limits set forth for a clean area. Personnel monitoring devices are to be worn by all individuals entering the area. Normal entry to the controlled area is through the Access Control Points.

1.5.5 Contaminated Area

A contaminated area is that area with contamination levels, both fixed and loose surface exceeding the limits set forth for a clean area (see paragraph 1.6). Contaminated areas are controlled by the Radiation Protection Department through applicable departmental procedures.

1.5.5 Radiation Area

Areas accessable to personnel where there exists radiation, originating in whole or in part within licensed material such

that a major portion of the body could receive in any one (1) hour a dose in excess of five (5) mrem or in any five consecutive days a dose in excess of one hundred (100) mrem are classified Radiation Areas.

1.5.6 High Radiation Area

Areas accessible to personnel in which there exists radiation at such levels that a major portion of the body could receive in any one hour a dose in excess of one hundred (100) mrem are classified as High Radiation Areas.

Any area in which radiation levels are 1.0 rem/hr or greater shall be locked to prevent unauthorized entry.

1.5.7 Airborne Radioactivity Area

An Airborne Radioactivity Area is any area in which airborne radioactive materials exist in concentrations in excess of the limits for restricted areas as tabulated in Appendix B, Table 1, Column 1, 10CFR20, or in which concentrations exist which averaged over the number of hours in any one week during which individuals are in the area exceed 25% of these values.

1.5.8 Access Control Point

The access control point serves as a boundary line between the clean and the controlled areas of the plant. This point is located in the Nuclear Services Area, elevation 306' for Unit I and in the Service Building, elevation 305' for Unit II. Radiation Detection monitors are located here to be used, for the detection of contamination, by all individuals leaving the controlled area.

1.6 Area Contamination Limits

1.6.1 Contaminated Area

Loose surface contamination Beta-Gamma $\geq$ 1000 DPM/100cm^2

Alpha $\geq$ 100 DPM/100cm^2

Fixed Contamination $\geq$ .4 mr/hr

1.6.2 Clean Area

Loose surface contamination Beta-Gamma < 1000 DPM/100cm^2

Alpha < 100 DPM/100cm^2

Fixed Contamination < .4 mr/hr

1.6.3 Controlled Area

Same as that of a clean area except where contaminated areas exist.

1.7 Equipment Control

All equipment used within the confines of the Controlled Area shall be monitored for contamination prior to being released from the controlled area. If the equipment is less than or equal to the clean area limits, paragraph 1.6.2 the Radiation Protection Department personnel will place a "green tag" on the equipment according to H.P. Procedures and the equipment may be taken from the controlled area.

All equipment that is greater than the limits set aside for a clean area, paragraph 1.6.2, will be marked according to applicable H.P. Procedures and retained within the confines of the controlled area until decontaminated.

1.7.1 Regulated Equipment

Equipment of a portable nature, such as hand tools, small pumps and motors of such design which makes decontamination

impractical may be considered regulated equipment and may be routinely stored in areas set aside for control of contaminated equipment. The control and use of regulated equipment will be governed by the Radiation Protection Department through Health Physics Procedures.

1.8 Respiratory Protection

The control and supervision of the use of respiratory equipment is the responsibility of the Radiation Protection Department. Respiratory protective devices may be required in any situation arising from plant operations where any airborne radioactivity conditions are potential or existent. In such cases the air will be monitored by Radiation Protection Personnel and the necessary protection devices specified according to the concentration and type of airborne contaminents present. It is the responsibility of the individual and his supervisor to notify Radiation Protection Personnel when working with radioactive materials that are likely to become airborne. Every precaution should be taken to keep the air contamination to a minimum through use of proper plant ventilation equipment and prior decontamination of equipment and work areas.

1.8.1 Training

Appropriate persons shall initially receive adequate instruction in respirator use prior to such use in an Airborne Radioactive Area.

1.8.1.1 Respiratory training shall include the instruction that each respiratory user may leave the area at any time for relief from respirator use in case of equipment malfunction, physical or psychological discomfort, or any other condition that might cause reduction in the protection afforded the wearer.

1.8.1.2 A respiratory protection program shall be maintained which will be adequate to assure that the requirements of this section and the requirements of 10CFR20 are met. The program is outlined as follows:

a. Procedures for adequate Air Sampling and surveys sufficient to identify the hazard and to permit proper selection of respiratory protective equipment.

b. Written procedures for training personnel in the proper use of respiratory equipment.

c. Written procedures for maintenance to assure full effectiveness of respiratory protective equipment, including testing, issuance, cleaning and decontamination, inspection, repair and storage.

d. Protection factors for Respiratory Equipment will be as specified in the Technical Specifications.

e. Bio-Assays and/or whole body counts of individuals and other surveys, as appropriate, to evaluate individual exposures.

1.8.2 The licensee will use respiratory equipment tested and certified by the Bureau of Mines/National Institute for Occupational Safety and Health.

1.9 Medical and Bio-Assay Examinations

1.9.1 Medical Procedures

All prospective full-time Met Ed employees must pass the regular company medical examination. In addition all personnel of the Three Mile Island full time operating staff who have occasion to work in the Restricted Area of the Nuclear facility

will be given a base line Bio-Assay examination as well as medical and Bio-Assay examinations upon termination of employment. The results of these examinations will be compiled in each individuals medical record.

1.9.2 The Three Mile Island Bio-Assay and Whole Body Examinations are detailed in Health Physics Procedure 1628.

1.10 Exemptions to Title 10CFR20

1.10.1 The Radiation Protection program shall comply with the requirements of 10CFR20 with the following exception:

1. Paragraph 20.203 - "Caution signs, labels and signals." In lieu of the "control device" or "alarm signal" required by paragraph 20.203 (c) (2), each High Radiation Area (100 MREM/hr or greater) in which the intensity of radiation is less than 1000/MREM/hr shall be barricaded and conspicuously posted as a High Radiation Area and entrance thereto shall be controlled by requiring issuance of a Radiatic Work Permit (refer to paragraph 2.10) and an individual or a group of individuals permitted to enter such areas shall be provided with a radiation monitoring device which continuously indicates the radiation dose rate in the area.

In addition to the above procedure, each High Radiation Area in which the intensity of radiation is greater than 1000 MREM/hr will have locked barricades to prevent unauthorized entry into these areas. The keys to these locked barricades shall be maintained under the administrative control of the Radiation Protection Supervisor and the Shift Foreman on duty.

2.0 MONITORING PROCEDURES

All individuals who are subject to occupational radiation exposure and while within the Three Mile Island Control Areas are required to have in their possession personnel monitoring devices capable of measuring the dose received from external sources of ionizing radiation.

2.0.1 Responsibility

It is the responsibility of the Radiation Protection Department to establish and maintain the personnel monitoring program consistent with the requirements of 10CFR20. It is the responsibility of the individual to wear the Thermo Luminescent Dosimeter (TLD) and the self reading dosimeter in the prescribed manner and assure their safe keeping. The loss or damage of any personnel monitoring device will require the immediate notification of the Radiation Protection Department.

2.0.2 The official and permanent record of accumulative external dose received by individuals will be obtained principally from the interpretation of the TLD. The direct reading dosimeter will provide day to day indication of external radiation exposure.

2.1 Film Badge and/or TLD Issue

Any person who enters the control area under such circumstances that he receives, or is likely to receive a does in any calendar quarter in access of 25 percent of the applicable value specified in-section 1.1.1 through 1.1.3 will be issued Beta-Gamma ($\beta\gamma$) TLD to wear at all times while in Control Area. A neutron sensitive device in addition to the Beta-Gamma ($\beta\gamma$) sensitive TLD will be

issued to personnel whenever a significant neutron exposure is possible.

2.2 Dosimeter Issue

A self reading dosimeter will be worn by all personnel when entering the controlled areas of the plant. Dosimeters will be read, recorded and re-zeroed regularly by each individual. A form for recording individual dosimeter readings will be kept at the Access Control Point. Dosimeter records will furnish the exposure data for the administrative control of radiation exposure. Any individual whose dosimeter indicates an off scale reading shall report his event to the Radiation Protection Department immediately.

2.3 Wearing of Personnel Monitoring Devices

The Personnel Monitoring Devices are to be worn on the front of the clothing adjacent to each other and in a plainly visible position. It shall be required that each individual examine his dosimeter periodically while in a radiation area. No individual should allow the 0-200 mr dosimeter reading to exceed 175 Mr, regardless of any prescribed exposure allowance without having his dosimter recharged and the readings recorded. Precautions should be taken to prevent the contamination of personnel monitoring devices when entering contaminated areas.

2.3.1 In the event that any person loses, misplaces, or damages his TLD or self reading dosimeter, the person involved shall immediately contact H.P. and complete a Lost or Damaged Dosimeter Report, to document the investigation of unknown exposure. A replacement dosimeter and TLD will be issued as required.

2.4 TLD Processing Frequency

The TLDs will normally be processed at monthly intervals. The TLD of any individual will be processed immediately if an over exposure has occurred or is suspected.

2.5 Personnel Exposure Investigations

Whenever a situation occurs involving the suspected or known exposure of personnel to radiation in excess of permissible limits specified in Title 10CFR Part 20, the incident shall be promptly investigated and personnel exposures evaluated. This may require special Bio-Assays, Whole Body Count, Radiation Surveys, Air Samples and TLD Analysis. Reporting requirements shall be in accordance with 10CFR20.

Personnel involved in a radiation incident and whose exposure is not known shall not be assigned to Control Area work until their exposures have been evaluated.

2.6 Protective Clothing

All personnel entering a contaminated area are required to wear certain items of protective clothing. These items to be worn will depend on the duties of the individual and on existing plant conditions, and will be specified on the Radiation Work Permit. Protective clothing should not be worn outside of the controlled area.

2.7 Protective Clothing

2.7.1 Whenever loose surface contamination is encountered above the limits specified for a clean area, some form of protective clothing is required to be worn by those working in or on the affected area. Protective clothing will only be used as authorized by the Radiation Protection Department.

2.7.2 The type of protective clothing that is required to be worn will be specified by the Radiation Protection Department on the radiation work permit issued for that area. Substitutions for the required clothing may not be made by an individual without the concurrence of the Radiation Protection Department.

2.7.3 All protective clothing will be provided, by the Radiation Protection Department, at pre-determined locations in the controlled area.

2.7.4 Specific methods required for the dressing, wearing and removal of protective clothing are specified in Health Physics Procedures.

2.8 Laundered Protective Clothing

Protective clothing laundered on site shall be surveyed by the Radiation Protection Department for the following acceptable limits of contamination.

2.8.1 The fixed Beta-Gamma ($\beta\gamma$) activity shall not exceed a general reading of 0.5 Mr/hr at one inch.

2.8.2 Clothing in excess of the above limits may be retained for limited use in highly contamined area. This clothing will not be available for general use.

2.9 Radiation Work Permit (RWP)

All work or entry for surveillance purposes in radiation areas that could cause exposure to radiation in excess of the following limits will require a Radition Work Permit.

5 mrem/hr.

100 Mr for a 40 hour work week (5 consecutive days)

3×10^{-10} μCi/cc Airborne Radioactivity, provided that no Alpha (α) activity is present.

Greater than or equal to 1000 DPM/100cm^2 Beta-Gamma ($\beta\gamma$)

Greater than or equal to 100 DPM/100cm^2 Alpha (α)

It shall be the duty of the Radiation Protection Supervisor, Shift Foreman and/or the job foreman to insure initiation of Radiation Work Permits and to see that all radiation controls are enforced while work is in progress. In addition, it is the responsibility of the personnel involved to adhere to instructions listed on the Radiation Work Permit. Individuals entering RWP areas must have obtained at least "RWP" clearance or be provided with a qualified escort.

2.9.1 Initiation of Radiation Work Permits

Anyone may initiate an RWP. All Radiation Work Permits (RWPs) (except standing RWPs) will automatically terminate on the day following the issue day or as specified by the Radiation Protection Supervisor/Foreman. If the job must continue beyond the termination date a new RWP will be issued.

2.9.2 Standing Radiation Work Permit (SRWP)

These permits in general are for routine jobs where possible radiological hazard exists, but where the individual's familiarity with the job and H.P. knowledge of the situation indicates repeated H.P. checkouts are not required for reasonable safety. Standing Radiation Work Permits will be issued at the discretion of the Radiation Protection Supervisor. It will be indicated under block 6 that the permit is a standing radiation work permit. SRWPs will be issued for a period of time specified by the Radiation Protection Supervisor.

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2.10 General Rules for Work in Controlled Area

2.10.1 All work is to be conducted in a practical manner consistent with maintaining a minimum of radiation exposure to personnel.

2.10.2 TLDs and Dosimeters shall be worn at all times. Dosimeters should be read periodically when working in a radiation area or high radiation area.

2.10.3 The required items of protective clothing shall be worn by all personnel while in the Controlled Area. Refer to section 2.8.

2.10.4 Eating and drinking are prohibited in the Controlled Area. Smoking is not permitted in Contaminated Areas.

2.10.5 Personnel without "RWP" on their photo identification badge or equivalent will require an escort when entering RWP areas.

2.10.6 Personnel leaving the Controlled Area shall monitor themselves for contamination at the Access Control Point before leaving the area. If a person is found to be contaminated, the Radiation Protection Department shall be notified.

2.10.7 Personnel shall notify the Radiation Protection Department of the malfunctioning of any Radiation Protection Equipment.

2.11 Personnel Decontamination

2.11.1 With careful adherence to established radiation protection practices contamination of personnel will be kept to a minimum. For those times that decontamination does become necessary the following will be performed.

2.11.2 Upon detecting contamination levels above 1000 DPM/100 cm^2 Beta-Gamma and 100 DPM/100 cm^2 Alpha the individual is to immediately notify the Radiation Protection Department.

2.11.3 Personnel from the Radiation Protection Department will determine the extent of contamination and supply directions as to the decontamination method to follow for proper decontamination of the individual.

2.11.4 If contaminants are detected in the facial area of the individual nasal swabs will be taken to determine the possibility, if any, of internal contamination.

2.11.5 After decontamination efforts have been completed the Radiation Protection Department personnel will monitor the individual again and continue decontamination efforts according to department procedures until decontamination is complete.

2.11.6 In all personnel contamination cases Heatlh Physics will complete a Contamination/Expose Report Form found in HP 1612.

2.12 Removal of Material and Equipment from the Controlled Area

2.12.1 Any component, item of equipment or tools having been used in the Controlled Area, will require a Beta-Gamma ($\beta\gamma$) dose rate and contamination survey prior to removal from the Controlled Area.

2.12.2 Release Limits

Material and equipment will be given an unconditional release for use outside the boundary of the controlled area if removable surface contamination is less than 1000 DPM/100cm^2 Beta-Gamma ($\beta\gamma$) and 100 DPM/100cm^2 Alpha (α) and radiation levels at one inch are less than 0.4 mr/hr.

2.12.2.1 Removal of material and equipment from the Controlled Area with radiation and contamination levels in excess of those limits specified for unconditional release must be approved

for "conditional" release by Radiation Protection Supervisor/ Foreman.

2.12.2.2 Any item approved for conditional release shall be packaged and sealed to prevent the release of any contamination and labeled with a properly executed Radioactive Material Tag.

2.13 Personnel Monitoring at the Control Area

2.13.1 The main ingress and egress to the Control Area, (Auxiliary Building, Reactor Building and Fuel Handling Building) shall be at the "Access Control Point" located in the Nuclear Services Area, elevation 306'-0" for Unit #1 and elevation 305'-0" of the Service Area for Unit #2.

2.13.2 When a person enters the Control Area via the "Access Control Point" he will do the following:

2.13.2.1 Pick up his personnel monitoring devices.

2.13.2.2 Follow the instructions on the applicable Radiation Work Permit or notify the Radiation Protection Department if he needs special Radiation Protection coverage.

2.13.3 When a person leaves the Control Area via the Access Control Point he will monitor himself and his personal clothing at the Hand and Foot and Portal Monitors located at the Access Control Point. If no contamination is present, he will exit the Control Area. If contamination is detected, he will notify the Radiation Protection Department.

2.13.4 After monitoring himself he will read his dosimeter and place his Personnel Monitoring Devices Film Badge Rack located at the Access Control Point.

2.14 Respiratory Protection - Administrative Limits

2.14.1 In such cases where any airborne radioactivity condition is potential or existent, the air will be monitored by the Radiation Protection Department and the necessary respiratory protection will be provided according to the concentrations and type of airborne contaminants.

2.14.2 Respiratory protection will be required if the following limits are exceeded:

Unidentified mixed particulate beta-gamma activity $\geq 3 \times 10^{-10}$ µci/cc

Identified isotopes and known concentrations = MPC_a as specified in 10CFR20.

3.0 TRAINING AND INDOCTRINATION OF RADIATION PROTECTION

The scope of the Radiation Protection Training Programs for all personnel working at Three Mile Island shall be such that all individuals will have cognizance of, and indoctrination in elementary radiation effects and basic Radiation Protection procedures to the degree required for the efficient performance of their work. Additionally, the Training Program shall include special instruction in Radiation Protection and practical instruction in the use of standard Radiation Protection Equipment for selected personnel groups.

3.1 Basic Radiation Protection Training

3.1.1 Basic I Radiation Protection Training

Given to people who are continuously escorted while within the restricted area and are expected to remain for 1 day or less. The course is brief in nature and consists of reading material.

3.1.2 Basic II Radiation Protection Training

Given to people who are expected to have access to the restricted area outside the controlled area for a period of more than one day. Specific exceptions may be detailed in approved Heatlh Physics procedures.

3.1.3 Basic III Radiation Protection Training

Given to people who normally perform their work assignments outside the controlled area; i.e., office and warehouse personnel. It is also given to temporary personnel whose work assignment in the controlled area is expected to exceed a time duration of one (1) day.

3.2 Intermediate Radiation Protection Training

The training of Met Ed and Contractor Personnel will enable the worker to be aware of the Radiation Protection practices that will enable him to work in controlled areas. This course shall be composed of the following subjects.

1. Fundamentals of Radioactivity
2. Introductions to Radiation Protection
3. Radiation and Radiation Effects
4. Radiation Dose Units and Biological Effects
5. Maximum Permissible Exposures
6. Principles of Radiological Safety
7. Personnel Monitoring
8. Contamination and Contamination Control
9. Protective Clothing and Respirators
10. Radiation Work Permits

Individuals who have satisfactorily completed this level of training will be permitted unescorted access to areas controlled by Radiation Work Permits (RWP) in accordance with a specific RWP. These individuals will be identified by "RWP" labels on their photo-identification badges.

3.3 Training of Auxiliary Operators in Radiation Protection. (Advanced Radiation Protection Training)

The Auxiliary Operator Training will be assigned to the Radiation Protection Department. Their training will incorporate the following topics.

1. Personnel Monitoring
2. Contamination and Contamination Control
3. Respiratory Protection
4. Protective Clothing Use
5. Radiation Exposure Limits (10CFR20)
6. Inverse Square Law and Work Time Calculations
7. Air Activity Determination
8. Survey Techniques
9. Regulations, Records and Reports
10. Scaler Operation and Counting Techniques
11. Laboratory Instrumentation
12. Radiation Work Permit
13. Portable Radiation Instruments

These individuals will be called on to provide Heatlh Physics support for Maintenance and Operations evolutions. These individuals will be identified by the letters "HP" on their photo-identification badges.

3.4 Radiation Protection Training for Radiation Protection Technicians (Comprehensive Radiation Protection Training)

The Radiation Protection Technician Training will be more intense and of a longer duration than that for other personnel. These individuals will be identified by the letters "HP" on their photo-identification badges. The training and qualifications of each Technician will be reviewed by the Radiation Protection Supervisors.

3.5 Access to work areas within the Controlled Area under the control of Radiation Work Permits will be in accordance with the following criteria which is based on an individual's training and experience. Security requirements are different from Radiation Protection requirements and are addressed in the Security Procedures. The level of access an individual has attained will be indicated by the appropriate label on his photo-identification badge. The levels of access are defined as follows:

Level III

HP LABEL (Applies to Yellow and Blue Badges only): This label is issued primarily to Radiation Protection and Operations personnel. These individuals have completed at least Advanced Health Physics training or equivalent. These individuals are permitted unescorted access within RWP areas and can be assigned to provide Health Physics support for maintenance and operations evolutions. The requirement for this level of escort will be noted on specific RWP's as deemed appropriate by the Radiation Protection Supervisory staff. These individuals are not exempt from Radition Work Permit (RWP) procedural requirements.

Level II

RWP LABEL (Applies to Yellow and Blue Badges only): This label is issued to maintenance, engineering, and contractor personnel. These individuals have completed Intermediate Health Physics training or equivalent. They are permitted unescorted access to areas under the control of RWP's in accordance with existing Health Physics Procedures and the requirements of the specific RWP. These individuals may act as escorts in RWP areas. HP qualified escorts will be required within RWP areas as specified on the applicable RWP when deemed appropriate by the Radiation Protection Supervisory staff based on radiological conditions within the plant.

Level I

NO LABEL (Applies to all Badge Colors): All individuals must receive Basic Health Physics training prior to receiving a photo-identification badge. Individuals issued Blue or Yellow badges do not require any escort outside of Security restricted areas and RWP areas. Individuals with any color badge without a label require at least an RWP qualified escort in an area requiring an RWP for entry. Individuals with a white badge require an escort at all times within the controlled area.

4.0 RADIOLOGICAL SURVEYS AND RECORDS

The Radiation Protection Program shall include radiation surveys for airborne activity, removal surface contamination and radiation levels. These surveys shall be conducted at regular intervals and in specified areas. Special surveys shall be conducted to evaluate radiological conditions arising from situations not covered in any routine survey procedure.

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An important function of Radiation Protection is to maintain complete, meaningful, and accurate records. Report of conditions showing no radiation exposure and/or negative results are as important as the records of positive exposure conditions.

4.0.1 Responsibility

Radiation surveys shall be conducted by Radiation Protection personnel or personnel whose assigned duties require the performance of radiation surveys. The Radiation Protection Supervisor/Foreman will review surveys and recommend measures to be taken to control radiation expsoure. These control measures will be of two basic kinds:

Physical and Procedural.

A. The physical measures include such items as shielding, ventilation, respiratory protection and protective clothing.

B. The procedural measures include access control, time limitations and use of correct working procedures.

4.1 Radiation Surveys

Beta-Gamma ($\beta\gamma$) dose rate, surface contamination and air surveys, as appropriate, will be conducted at regular intervals in the following areas as determined by the Radiation Protection Supervisor.

Unit #1	Unit #2
1. Axuiliary Building	1. Auxiliary Building
2. Reactor Building	2. Reactor Building
3. Fuel Handling Building	3. Fuel Handling Building
4. Specific areas in the Turbine Building	4. Specific areas in the Turbine Building

5. Service Building
6. Control Tower

5. Service Building
6. Control Tower

4.1.1 All area dose rate surveys will be taken at waist level except for specified contact readings at points of interest. When unusual conditions are detected in the performance of either a routine or special survey, these shall immediately be brought to the attention of the Shift Foreman and the Radiation Protection Supervisor.

When conducting a survey, personnel should note any observed deviation from standard practices relating to the following:

1. Identification and posting of Control Areas
2. Wearing of TLDs and Dosimeters
3. Handling and storage of radioactive material
4. Wearing of protective clothing and respiratory equipment

4.2 Records

Records and reports required to show compliance with Federal and State regulations will be maintained on permanent file. All information from routine and special radiological surveys will be recorded on appropriate survey forms. Radiation protection program records whether considered primary, secondary, or supporting records will be retained for appropriate length of time.

4.2.1 Items Permanently Retained:

1. Records of radiation exposure of all plant personnel, including all contractors and visitors to the plant who enter radiation control area.
2. Records of radioactivity in liquid and gaseous wastes released to the environment.

3. Records of radiological environmental program.

4. Records of plant radiation and contamination surveys.

5. Radiation Work Permits

5.0 RADIOACTIVE WASTE DISPOSAL

5.0.1 The release of all plant radioactive effluents shall be subjected to the applicable regulations specified in 10CFR20, 10CFR50, and the conditions found in the Stations Technical Specifications. Shipments of waste for off site disposal shall be in accordance with NRC and Department of Transportation Regulations and the conditions of the contractor's license.

5.0.2 Responsibility

5.0.2.1 It is the responsibility of the Chemistry and Radiation Protection Department to analyze the radioactive content of all reactor plant effluents.

5.0.2.2 The Radiation Protection Department shall maintain complete records of all radioactive waste released to the environment and shipments for off-site disposal in accordance with the NRC Regulatory Guide 1.21.

5.0.2.3 It is the responsibility of the Shift Supervisor/Shift Foreman to review the Radioactive Waste Discharge Permit and the operational aspects of any release of radioactive effluents and to insure the proper line up of tanks, valves and discharge pumps.

5.0.2.4 Calculations, which form the basis for gaseous and liquid radioactive waste release rates, will be attached or included in the Radioactive Waste Discharge Permits.

5.1 Solid Radioactive Waste

5.1.1 Solid radioactive waste containers made of metal, properly designated, are to be located at convenient points throughout the Controlled Area. Each container will have a plastic bag to prevent the spread of contamination. These containers will be routinely monitored and emptied when full or when the Gamma (γ) radiation level due to the container exceeding the posted radiation level, or causes a significant increase in exposure to personnel in that area.

5.1.2 Large solid waste articles shall be wrapped, sealed, painted, or otherwise treated to further confine any remaining contamination before moving or storing as contaminated solid waste.

5.1.3 All solid radioactive waste will be processed and packaged in accordance with DOT and NRC regulations. The drummed radioactive waste will be held in a designated waste drum storage area until released for disposal through a licensed contractor.

5.2 Liquid Radioactive Waste

5.2.1 The release of radioactive liquid waste to the Susquehanna River will be kept as low as practicable and, in any event, will be within the limits of 10CFR20, 10CFR50, and the Technical Specifications.

5.2.2 Radioactive liquids, such as pails of water used in decontamination work, etc., must only be disposed of in sinks and drains that go to the radioactive liquid waste disposal system. Therefore, radioactive liquids must only be disposed of in the Controlled Area of the station and must not be released into the sanitary

system commodes, urinals or into storm drains or spilled onto the ground.

5.3 Gaseous Radioactive Waste

5.3.1 All radioactive gaseous waste from the plant stack shall be continually monitored upstream of the point of discharge in accordance with Technical Specifications.

5.3.2 The scheduled discharge of all radioactive gaseous waste shall be in accordance with the specific provisions stated in the Technical Specifications.

5.3.3 All gaseous discharge from the gaseous waste storage tanks will be batch sampled prior to discharge in accordance with Technical Specifications.

6.0 CONTROL AND ACCOUNTABILITY OF RADIOACTIVE MATERIAL

This section prescribes radioactive material control and accountability procedures to assure compliance with all applicable Federal and State Regulations regarding the transfer, possession and use of by-produce and special nuclear material.

6.1 Receipt of Radicactive Material

Upon receipt of any material, component or equipment with a radiation warning label attached, the Radiation Protection Supervisor or his designee will be promptly notified. A Radiation Chemistry Technician or other suitable qualified personnel will monitor the shipment and advise as to handling or storage.

6.1.1 Upon receipt or shipment of Special Nuclear Material the Nuclear Engineering Department should be notified.

6.2 Storage of Radioactive Material

All radioactive waste material that could be considered as storable, will be stored in a Solid Radioactive Waste Storage Area.

6.2.1 Storage or Radioactive Sources

All licensed calibration radioactive sources will be stored and locked in the calibration facilities area located in the Heat Exchanger Vault, elevation 271' of Unit I. All locks will be under the administrative control of the Radiation Protection Department. Small radioactive check sources used for counting instrumentation will be stored in the Radiation Protection Laboratory.

6.3 Transportation of Radioactive Material

6.3.1 General

6.3.1.1 Authority of Various Governmental Agencies

The Nuclear Regulatory Commission, Department of Transportation, and other Federal Agencies have jurisdiction over the transportation of radioactive materials.

The transportation of radioactive material in interstate commerce by rail, highway, water and air is controlled by the Department of Transportation, the U.S. Post Office, the U.S. Coast Guard, the Nuclear Regulatory Commission and the Civil Aeronautics Board. All the regulations reflect the standards set by Department of Transportation, since the materials usually have to be handled by ground transportation at one time or another.

The transportation of radioactive material in intrastate commerce is controlled by the Public Utility Commission of the

various states. In Pennsylvania, transportation is controlled by the Pennsylvania Hazardous Substances Transportation Board. In general, these regulations follow the standards set forth by the Department of Transportation. In addition to the Federal and State Regulations governing the transportation of radioactive material, there are regulations imposed by various city, county, turnpike, and port authority bodies, etc.

6.3.1.2 Regulations

The Sources of Federal Regulations for shipment of radioactive material are found in the following publications:

Title 49 Department of Transportation's Hazardous Materials Regulations, Parts 100-199

Title 10 Code of Federal Regulations, Part 71

Title 39 Postal Service, U.S. Postal Service Regulations, Part 123

6.3.1.3 All shipments of radioactive material under the jurisdiction and control of Metropolitan Edison Company will comply with DOT Regulations, NRC Regulations, and the regulations of other pertinent federal, state and local agencies. The Radiation Protection Supervisor/Foreman shall be advised of all shipments and will determine that regulations are met and that proper shipping forms and accountability records are made. The Radiation Protection Supervisor/Foreman will also be advised of the arrival of radioactive shipments. Such shipments will be surveyed upon arrival and the appropriate transportation, storage and use procedures will be prescribed.

6.4 Licensed Radioactive Material

Licensed radioactive sources will be handled by or under the supervision of those individuals named on the NRC by-product material license. Radiation Protection will assure compliance with provisions of 10CFR20, 10CFR30, and any conditions of the by-product material license.

A complete inventory will be maintained by the Radiation Protection Department of all licensed radioactive sources on site. All such sources will be inventoried at specified intervals. Records will be kept of all receipt, transfer, disposal leak tests, and any other information pertinent to by-product licensed material. All sealed sources will be leak tested in accordance with Technical Specifications.

6.5 New Fuel Handling and Storage

The receipt, handling and storage of new fuel assemblies shall be in accordance with the provisions of Title 10 Code of Federal Regulations, Part 70, "Special Nuclear Material." All handling operations shall be consistent with approved procedures related to the safe handling of special nuclear material.

6.5.1 Radiation Protection shall be notified and shall survey new fuel for radiation and contamination levels prior to or during unpacking and storage.

6.6 Spent Fuel Shipment

The shipment of spent fuel assemblies will be in accordance with provisions of the facility license and applicable sections of regulation 10CFR71 "Transport of Licensed Material."

6.6.1 Prior to shipment of spent fuel from the plant site, Radiation Protection Personnel shall survey the transport cask for radiation and contamination levels. Records will be maintained for each shipment of spent fuel assemblies.

7.0 RADIATION INCIDENTS: PROCEDURES AND REPORTING

7.0.1 This section describes the sequence of actions to be taken following a radiation incident in order to minimize the radiation exposure to plant personnel and the general public. This section discusses several types of credible radiation incidents. The actual condition encountered after an incident may differ in some respects from those incidents upon which planning was based. Deviation from basic plans is to be expected and should be made as required to meet the actual need. Each situation must be separately evaluated as it occurs.

7.0.2 Responsibility

7.0.2.1 It is the responsibility of all plant personnel to become sufficiently familiar with the Radiation Emergency Plan and Procedures, so that, in the event of an emergency the individual can render effective assistance in controlling the emergency.

7.0.2.2 It is the responsibility of Radiation Protection to maintain adequate supplies of emergency monitoring equipment and to routinely inspect and test all such equipment for proper operation.

7.1 Radioactive Spills

7.1.1 Radioactive material inadvertently released to the environment will pose specific situations depending upon the magnitude of the release. There are, however, a set of basic rules that may be followed in any release situation.

a. Stop the spill if possible.

b. Notify the Radiation Protection Department and the Control Room.

c. Keep all individuals not involved in the spill away from the area.

d. Remove all individuals involved in the spill from the immediate area if possible to reduce further exposure.

e. Administer to the injured.

7.1.2 Specific guidelines relating to control of contaminated spills may be found in Heatlh Physics and Emergency Procedures.

7.2 Injuries to Personnel in Radiation Controlled Areas

7.2.1 All individuals who work within the radiation controlled area are urged to conduct their work as safely as possible to avoid injury.

7.2.2 If, in the event, an individual is injured while working in the controlled area Standard First Aid rules may be followed for immediate aid to the victim.

a. Check for breathing

b. Stop bleeding

c. Treat for shock

d. Notify Shift Supervisor/Foreman

7.2.3 First aid shall take precedence over decontamination if decontamination is going to delay treatment necessary to avoid additional stress to the victim.

7.2.4 Medical aid may be made available both on and off site and reference to details may be found in the TMI Radiation Emergency Plan.

7.3 Reporting

Formal notifications of various governmental agencies will be required in the event of a serious radiation incident or emergency. All communications with Federal, State and outside agencies shall be handled by the Station Superintendent or his designated alternate or by those persons specifically assigned such duties in the plant "Emergency Plan" (Appendix I). Notification shall provide complete and accurate information concerning the events and progress of the recovery operation.

7.3.1 Federal Government

The Region I, Director of Inspection and Enforcement, U.S. Nuclear Regulatory Commission, King of Prussia, Pennsylvania, shall be notified in accordance with 10CFR20, paragraphs 20.403 and 20.405 and the Tech. Specs. whenever an accident involving radioactive material occurs.

7.3.1.2 Commonwealth of Pennsylvania

The Commonwealth of Pennsylvania, Bureau Radiological Health, shall be notified in the same manner of any incident which required notification per their regulation 433.

7.3.1.3 Individuals

In any case where it is required to report to the Federal or State Government the exposure of an individual to radiation or concentrations of radioactive material such individuals shall also be notified of the nature and extent of the exposure. A copy of the report shall be put in the individuals exposure record.

7.3.1.4 Reports on Employee Exposure History

1. The NRC regulations require that Metropolitan Edison Company give the individual a written report if he receives an exposure in excess of any applicable limit as set forth in the regulations of 10CFR20 or in the license. The basic limits for exposure to employees and visitors are set forth in Sections 20.101, 20.103, and 20.104 of the Part 20 regulation. These sections specify limits on exposure to radiation and exposure to concentrations of radioactive material in air.

2. If an individual works where personnel monitoring is required pursuant to 10CFR20, section 20.202, Metropolitan Edison must advise the individual annually of the exposure received if it is requested. Metropolitan Edison must also supply the employee with a written report of radiation received within 90 days after termination.