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GPU Nuclear Corporate  
Policy and Procedure Manual

Number  
1000-PLN-4010.01

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## List of Effective Pages

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	/s/ J. F. Wilson	Corp. Counsel & Secretary	5/30/91
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## 1.0 BASIS FOR GPU NUCLEAR RADIOLOGICAL CONTROLS PROGRAM

- 1.1 The GPU Nuclear Corporation (GPUNC) Radiation Protection Policy 1000-POL-4010.01 sets forth the philosophies and basic policy guidelines for the Radiological Controls Programs at TMI and Oyster Creek Nuclear Generating Stations. The GPUNC Radiation Protection Plan 1000-PLN-4010.01 implements the policy by following these objectives:
  - 1.1.1 Minimize individual exposure to radiation and radioactive material so that the risks are consistent with those commonly accepted in our daily lives.
  - 1.1.2 Prevent any significant internal exposure.
  - 1.1.3 Minimize collective radiation exposure.
  - 1.1.4 Minimize contamination of personnel, areas and equipment.
  - 1.1.5 Minimize the production of solid radioactive waste.
  - 1.1.6 Minimize exposure to the public.
- 1.2 These philosophies, policies, and objectives are based on and implement the regulations of the Nuclear Regulatory Commission (NRC) as contained in Title 10 of the Code of Federal Regulations, Parts 19, 20, 30, 50, and 71, and appropriate Regulatory Guides, specifically 1.8 Rev. 2, 8.8 Rev. 3 (1978), 8.10 Rev. 1-R (1975), 8.13 Rev. 1 (1975), and 8.15 (1976). The GPUN Radiation Protection Plan is based on these references; therefore, they are not repeated in this document.
- 1.3 GPUNC is committed to incorporating the philosophies and guidelines found in the Institute for Nuclear Power Operations (INPO) document "Guidelines for Radiological Protection at Nuclear Power Stations," where applicable.
- 1.4 Specific details as to how the GPUNC Radiation Protection Plan is implemented shall be promulgated in the plant specific Radiological Controls procedures (RCPs). These procedures shall

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include those applicable areas addressed in Reg. Guide 1.33, Rev. 2 (1978), App. A, paragraph 7, and paragraphs 8a, 8b(1)(aa) and (bb), and 8b(2)(aa) and (bb). This GPUNC Radiation Protection Plan is to be used in conjunction with the RCPs.

- 1.5 The GPUNC Radiation Protection Plan and RCPs are written to implement and increase the effectiveness of the Radiological Controls Program. Procedures shall provide adequate guidance and specify appropriate methods or techniques to ensure that the performance of each activity is in accordance with sound radiological controls principles, and is in compliance with applicable regulatory provisions. Strict compliance with RCPs is required so that work will be done according to pre-determined work practices. If strict compliance is not possible, the work shall stop and supervision shall be consulted to resolve the problem. The RCPs shall be prepared, reviewed, approved, and controlled as described in the appropriate GPUNC Administrative procedures.
- 1.6 The GPUNC Radiological Controls Program is to be fully integrated into all aspects of operations at TMI-1, TMI-2 and Oyster Creek. The Radiological Controls Program when carried out as specified will assure that the operation of the GPUNC Plants will be performed in accordance with the as low as reasonably achievable (ALARA) philosophy discussed in Section 2.0.
- 1.7 Line management from all departments as well as each individual worker shall take an active role in radiological controls including radiation exposure and radioactive waste reduction. The performance of each manager and supervisor must demonstrate support and commitment to corporate management for implementing a strong and effective Radiological Controls Program.
- 1.9 Radiation protection records shall be prepared using high standards of accuracy, traceability and legibility to meet the requirements of regulatory agencies and company procedures. Records shall be collected and retained in such a manner that they are legible and retrievable in accordance with corporate procedure 1000-ADM-1210.02 entitled Records Management. Appropriate radiation exposure, medical and personnel information shall be obtained for company and contractor personnel assigned to work in radiologically controlled areas.

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## 2.0 ALARA PROGRAM

- 2.1 The policy of GPUNC is to ensure that those risks that result from ionizing radiation exposures associated with nuclear activities are maintained as low as reasonably achievable (ALARA). Responsibility for the Radiological Controls and ALARA Programs resides with the Director, Radiological & Environmental Controls. The responsibility for assuring the implementation of these programs resides with the Radiological Controls Director at each site.
- 2.2 Radiological Controls is also an individual responsibility. GPUNC requires each employee or contractor employee working at GPUNC facilities to maintain individual and collective radiation exposures to workers and the public and the generation and release of radioactive materials as far below regulatory limits as is reasonably achievable. Achievement of excellence in radiological protection requires a level of performance well above minimum regulatory requirements. It is not sufficient to judge performance in radiological protection by a lack of regulatory action. Willful or habitual violation of Radiological Controls procedures will result in disciplinary action.
- 2.3 GPUNC is committed to operating and maintaining its nuclear stations in a manner that will minimize risks to employees, contractors, visitors and the public from exposure to radiation and radioactivity while allowing efficient conduct of operations. GPUNC has implemented a radiation protection program to ensure compliance with regulatory requirements and the ALARA objective. The basic elements of the GPUNC ALARA Program include the following:
  - 2.3.1 Organizational responsibility and commitment.
  - 2.3.2 Training programs.
  - 2.3.3 Incorporation of ALARA considerations in the initial design and modification of facilities, processes and equipment.
  - 2.3.4 Consideration of ALARA concepts in procedural development and reviews.

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2.3.5 Radiological reviews of all RWP work with specific review by Radiological Engineers for work with significant dose is required.

2.3.6 Establishment of radiological goals.

2.3.7 Dose trending and performance assessment.

2.3.8 In-house audit system to evaluate ALARA program effectiveness and correct deficiencies.

2.3.9 Feed-back system for workers (e.g. Awareness Reports)

2.4 Each GPUN site shall utilize and incorporate, by practice and/or procedure, management systems to ensure that the commitment to ALARA is met. The functions to be performed by the person or persons responsible for the ALARA program are to assure that ALARA elements are considered in all applicable phases of operations involving exposure to workers. They also evaluate the effectiveness of ALARA actions by comparing actuals with goals which are established on an annual basis. From the evaluation results, recommendations for improvements are provided to senior management.

The extent of these functions is determined by the nature of the site activities and by the direction of senior management as may be promulgated by policy or procedure. Persons or committees responsible for ensuring that the ALARA commitment is met shall have direct access to senior plant management. Senior management is made aware of the company's commitment to the ALARA philosophy through company policies, (e.g., Radiation Protection Policy, Radiation Protection Plan) and interaction with Radiological Controls management. The philosophies and concepts are strengthened through general employee and special training program (e.g., ALARA Awareness Training).

Senior management is kept aware of the workings of the ALARA program on a continual basis through staff feedback, a monthly Radiological Controls report, the Radiological Assessment Reports,



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Radiological Awareness Meetings, Radiological Performance Committee Meetings, Awareness Reports, QA and Radiological Engineering audits, and through direct line with the Radiological Controls Director.

- 2.5 The GPUNC procedures are designed to maintain personnel radiation exposures in accordance with the ALARA objective. These procedures reflect the operating philosophy contained in this plan and shall, as a minimum, establish requirements for pre-job planning, record keeping, use of special equipment, post-job evaluation, and other requirements as may be necessary to accomplish the ALARA objective. Task supervision as well as radiological controls surveillance is required for such jobs to ensure adherence to procedures, that precautions are observed, and potential problems, which may develop during job performance, are identified and resolved as quickly as possible.
- 2.6 Those work activities with significant radiological consequence shall have post-job evaluations and shall be documented to serve as the basis for future job planning, procedure or equipment modification in order to achieve ALARA. Activities involving the design and construction of new systems or facilities, or the modification of existing systems or facilities which may result in radiological concerns shall incorporate the ALARA concepts.
- 2.7 In order to achieve the goal of reduced radiation exposure, it is essential that all personnel properly implement radiological protection techniques by understanding their individual responsibility for radiological controls, as well as the responsibility of GPUNC. To gain this understanding, training and retraining programs in the principles of radiological controls, the risk of low level radiation exposure and the ALARA concept are conducted for all employees who may be involved in radiological activities.

## 3.0 RESPONSIBILITIES OF WORKERS

- 3.1 Each individual working in a Radiologically Controlled Area must remain aware of the potential for radiological problems. Because individual actions directly affect exposure and contamination levels, each individual is responsible for maintaining his or her exposure as low as reasonably achievable (ALARA).

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The following rules shall be followed by individuals to minimize radiological problems:

- 3.1.1 Obey promptly "stop-work" and "evacuate" orders of Radiological Controls personnel.
- 3.1.2 Obey posted, oral, and written radiological controls instructions and procedures, including instructions on Radiation Work Permits (RWP).
- 3.1.3 Wear TLD and self reading dosimeter where required by signs or by Radiological Controls personnel. Immediately report loss or unexpected exposure and offscale dosimeter to the Radiological Controls Department.
- 3.1.4 Keep track of personal radiation exposure status to ensure that exposure limits are not exceeded.
- 3.1.5 Remain in as low a radiation area as practicable to accomplish work.
- 3.1.6 Do not loiter in radiation areas.
- 3.1.7 Do not smoke, eat, drink, or chew in Radiologically Controlled Areas unless specifically authorized by Radiological Controls.
- 3.1.8 Wear anti-contamination clothing and respiratory protection properly and wherever required by signs or by Radiological Controls personnel.
- 3.1.9 Remove anti-contamination clothing and respiratory protection properly to minimize spread of contamination.
- 3.1.10 Survey or be surveyed for contamination when leaving a contaminated area or a radiological control point. Notify Radiological Controls personnel if contamination is found.
- 3.1.11 For a known or possible radioactive spill, minimize its spread and notify Radiological Controls personnel promptly.



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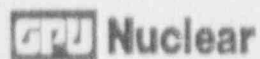
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- 3.1.12 Do not unnecessarily touch a contaminated surface or allow clothing, tools, or other equipment to do so.
- 3.1.13 Place contaminated tools, equipment and solid waste on disposable surfaces (e.g., sheet plastic) when not in use and inside plastic bags when work is finished.
- 3.1.14 Limit the amount of material that has to be decontaminated or disposed of as radioactive waste by only bringing necessary tools and equipment into the RCA.
- 3.1.15 Notify Radiological Controls personnel of faulty or alarming radiation protection equipment.
- 3.1.16 Report the presence of open wounds to Radiological Controls and medical personnel prior to work in areas where radioactive contamination exists and exit immediately if a wound occurs while in such an area.
- 3.1.17 Notify Radiological Controls personnel prior to treatment if possible or upon returning to the site after medical administration of radiopharmaceuticals.
- 3.1.18 Assure a mentally alert and physically sound condition for performing assigned work.
- 3.1.19 Ensure that your activities do not create radiological problems for others and be alert for the possibilities that the activities of others may change the radiological conditions to which you are exposed.
- 3.1.20 Supervisors must recognize their responsibility to be at the work site to ensure that radiological controls practices and procedures are enforced. Supervisors should encourage suggestions for exposure reduction during and after work is completed.

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3.1.21 In order to initiate voluntary participation in, or obtain additional information about the control of occupational exposure during the periods in which an individual is pregnant, believes she might be pregnant, or intends to become pregnant, the individual must notify the Medical Department of the pregnancy or the possibility of being pregnant or the intent to become pregnant.

## 4.0 AUDITS, REVIEWS AND REPORTS ON THE GPUNC RADIOLOGICAL CONTROLS PROGRAM

4.1 To ensure the requirements of the GPUNC Radiological Controls Program are being met and to assist all site personnel in understanding and complying with these requirements, a system of audits and reviews shall be established including criteria for timely and appropriate corrective action. The following audits and reviews shall be used:

4.1.1 Radiological Controls technicians shall monitor and aid the performance of workers insofar as radiological work practices are concerned.

4.1.2 The Radiological Engineering section shall provide audits of the Radiological Controls Program. Radiological Engineering also performs audits of ALARA programs developed by GPUNC and contractor vendors.

4.1.3 Radiological assessments shall be conducted throughout the Radiological Controls Program on a continuous basis. This assessment function shall report directly to the Director, Radiological & Environmental Controls. A radiological assessment shall be prepared and issued at least monthly.

4.1.4 The Radiological Controls Program is subject to the provisions of the Corporate Quality Assurance Plan.

4.1.5 The GPUNC Radiation Protection Plan, Radiological Controls procedures and changes thereto shall be reviewed in accordance with Corporate Procedure 1000-ADM-1218.02, "Document Change Request Procedure."

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- 4.1.6 In addition to these reviews and audits, a system shall be employed to allow any individual to identify radiological controls deficiencies and/or suggest improvements. A radiological controls deficiency is defined as either a deviation from an established procedure or a practice which could and should be improved. The purpose of this system is to identify those items, the correction of which will result in an improved Radiological Controls Program. These deficiencies/suggestions shall be evaluated by Radiological Engineering for desirable or necessary corrective action. The Radiological Engineering group shall prepare a monthly report summarizing the radiological deficiencies.
- 4.1.7 The Nuclear Regulatory Commission (NRC) also inspects and reviews the Radiological Controls Program. The Radiation Protection Plan and any changes thereto shall be submitted to the NRC for information.
- 4.1.8 Investigations shall be conducted to determine the causes of significant radiological incidents to determine the corrective actions and improvements necessary to prevent recurrence.
- 4.1.9 The Radiological and Environmental Controls Department shall review equipment and practices which affect radiological effluents in order to minimize dose to the public. In addition, the site Radiological Controls Departments will concur in the methods used for sample collection, sample analysis and documentation of radioactive releases.

## 5.0 RADIOLOGICAL CONTROLS TRAINING

- 5.1 Radiological Controls training shall be given to ensure each person who requires unescorted access to the nuclear sites or who may be involved with radiological activities understands his responsibility to minimize his own exposure to radiation and to comply with radiological controls procedures.

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- 5.2 Category I training is for individuals who require access to a GPUNC nuclear site in other than visitor status and do not require unescorted access to "RWP required" areas. This category requires individuals to pass a written examination initially and annually thereafter.
- 5.3 Category I training shall include, but not be limited to:
  - 5.3.1 Effect of radiation and risks associated with radiation exposure
  - 5.3.2 Individual response to a radiation emergency
  - 5.3.3 Prenatal radiation exposure (Reg. Guide 8.13)
  - 5.3.4 Radiologically controlled areas and recognition of the associated postings
  - 5.3.5 ALARA philosophy and concepts
- 5.4 Category II training is radiation worker training for individuals who require unescorted access into "RWP required" areas. This category requires individuals to pass a written examination and receive training on practical abilities initially, and annually thereafter.
- 5.5 Category II training shall include, but not be limited to:
  - 5.5.1 Effect of radiation and risks associated with radiation exposure
  - 5.5.2 Compliance with procedures
  - 5.5.3 Use of dosimetry
  - 5.5.4 Personnel frisking techniques
  - 5.5.5 Anti-contamination clothing
  - 5.5.6 Response to unusual situations
  - 5.5.7 Exposure and contamination control

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### 5.5.8 ALARA philosophy and concepts

- 5.6 Special briefings and extra training including use of mockups, where applicable, shall be conducted for work involving higher than usual exposures to radiation.
- 5.7 Radiological Controls Technicians (RCTs) and their Group Radiological Control Supervisors (GRCSs) shall receive theoretical and practical training and training for unusual situations. Training shall also be given for changes to procedures, equipment and programs. They shall pass both written and oral examinations and complete an examination of practical abilities consistent with their job classification. Biennial requalification shall be required including both written and oral examinations.
- 5.8 Respiratory Protection training is available for persons who need to use respiratory protection devices. Individuals are required to pass a written examination on the core course and to be trained on each device specified. Individuals are required to pass a written examination and attend device training on an annual basis.

## 6.0 CONTROL OF EXTERNAL EXPOSURE

- 6.1 To aid in exposure reduction, administrative radiation exposure control levels shall be established. The GPUNC annual limit is 5 rem. Collective (i.e., person-rem) exposure goals shall be established. Also, collective exposure goals for major work shall be established. Work involving radiation exposure shall be preplanned.
- 6.2 Major exposure jobs shall require that radiological controls be incorporated in the design, written instructions be prepared, and pre-job briefings be conducted prior to commencing work and post-job debriefings conducted for lessons learned.
- 6.3 Each person entering a radiologically controlled area with radiation levels greater than 0.6 mr/hr shall be provided with a primary dosimetry device (thermoluminescent dosimeter) capable of measuring the worker's whole-body exposure. Also, those entering a radiation or high radiation area shall be provided with a self-indicating, dose-integrating device.



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- 6.4 Personnel access to radiologically controlled areas shall be defined, and controlled, according to Radiological Controls procedures.
- 6.4.1 Each high radiation area (i.e., greater than 0.1 rem per hour at one foot) shall be barricaded and conspicuously posted as a "High Radiation Area." Personnel desiring entrance shall obtain a Radiation Work Permit. Any individual or group of individuals entering a high radiation area shall (a) use a continuously indicating dose rate monitoring device, or (b) use a radiation dose rate integrating device which alarms at a preset dose level or (c) assure that a Radiological Controls Technician provides positive control over activities within the area and periodic radiation surveillance with a dose rate monitoring instrument.
- 6.4.2 Any area accessible to personnel where a major portion of the body could receive in any one hour a dose in excess of one rem at one foot shall be locked or guarded to prevent unauthorized entry. The keys to these locked high radiation areas shall be maintained under the administrative control of the Group Radiological Control Supervisor or with those specifically authorized by the Radiological Controls Director.
- 6.5 To evaluate radiological conditions, radiological surveys shall be conducted for airborne activity, removable surface contamination and external radiation at regular intervals. Surveys are performed in order to (a) monitor the suitability of control measures, (b) evaluate the need for additional controls, (c) evaluate trends for ALARA purposes. Surveys outside of radiologically controlled areas are provided to insure the effective control of radioactive material. Unusual conditions detected in the performance of radiological surveys shall immediately be brought to the attention of Radiological Controls Field Operations Management. Records of surveys shall be maintained. Radiation survey instruments will be calibrated to assure an accurate, consistent, reliable and predictable response to radiation levels.



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### 7.0 Control of Internal Exposure

- 7.1 The GPUNC policy is to minimize internal exposure to personnel from radioactivity associated with GPUNC operations or activities. For personnel exposed to radioactive material during their work, this means that no one should receive from internal radioactivity more than one tenth of the quarterly allowable internal exposure (i.e., 52 MPC-hours per quarter).
- 7.2 The following controls are utilized to minimize internal exposure from airborne radioactivity:
  - 7.2.1 Engineering and personnel access control shall be applied to the maximum extent practicable so work in radiologically controlled areas does not create conditions where an individual may breath airborne concentrations in excess of those listed in NRC regulations. When no other controls are practicable, and ALARA considerations have been made, respiratory protective equipment may be used. Those who may need to use respirators shall meet the qualifications set-forth in the Corporate Radiation Protection Policy (1000-POL-4010.01). They shall be trained, medically qualified and successfully complete a fit test for each device used annually.
  - 7.2.2 Airborne radioactivity shall be measured regularly in areas where personnel may be exposed. Taking representative samples of air the person is breathing shall be performed to supplement periodic measurements during work which has the potential for the generation of significant airborne radioactivity exposure to individuals.
- 7.3 Internal radioactivity shall be measured prior to assignment and at least annually in each person who works in an area requiring a Radiation Work Permit; this includes each person who wears respiratory protection.

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Internal radioactivity shall be measured promptly in each person who receives significant radioactive contamination on his skin above the neck, and in each person who is suspected of inhaling sufficient radioactivity to cause measurable internal radioactivity. Each measurement of internal radioactivity shall be reviewed.

## 8.0 CONTROL OF RADIOACTIVE CONTAMINATION

8.1 Radioactive surface contamination shall be controlled in order to minimize possible inhalation or ingestion of radioactivity and to minimize buildup of radioactivity in the environment. Measures to contain radioactivity and to minimize the number and extent of areas contaminated shall be taken in order to minimize personnel radiation exposure, to simplify subsequent personnel and area or facility decontamination, and to minimize the need to rely on protective clothing.

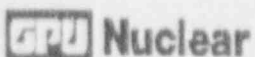
8.2 The surface contamination limits for unrestricted release of materials and equipment are as follows:

<u>Removable</u>		
Radiological controls areas, equipment, tools and materials	Beta/Gamma	<1000 dpm/100 cm <sup>2</sup>
	Alpha	<20 dpm/100 cm <sup>2</sup>
<u>Total (fixed plus removable)</u>		
Radiological controls areas, equipment, tools and materials	Beta/Gamma	<5000 dpm/100 cm <sup>2</sup>
	Alpha	<300 dpm/100 cm <sup>2</sup>

8.3 Personnel are considered contaminated when any portion of the body exceeds 100 counts/min (cpm) above background using a pancake GM detector and a count rate meter. Other instrumentation of equal or greater sensitivity may be used.

8.4 Each station shall maintain procedures which address the identification and control of radioactive contamination (including hot particles) for personnel, areas, equipment and tools.

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- 8.5 Emphasis in planning, training and working shall be placed on minimizing the occurrences of radioactive surface contamination of a person's skin or on areas not controlled for radioactive surface contamination. Occurrences of skin contamination shall be reviewed and documented in accordance with the RCPs.
- 8.6 Hot particle controls shall be implemented in areas where these particles exist or there is a high potential for their existence. These controls are designed to provide a method for dealing with the particles when their presence cannot be immediately eliminated and work activities must continue.

### 9.0 CONTROL OF RADIOACTIVE MATERIALS

- 9.1 A radioactive material control system shall be established to ensure radioactive material is not lost or misplaced in a location where personnel could unknowingly be exposed to radiation and to prevent the uncontrolled spread of radioactivity to areas where the public might be affected. This system shall include the following requirements:
  - 9.1.1 The number of areas in which radioactive materials are stored shall be minimized.
  - 9.1.2 Any new radioactive material storage area shall be approved before use by the Radiological Controls Director.
  - 9.1.3 The numbers of radioactive items and the amount of radioactivity in storage shall be minimized to the extent practicable.
  - 9.1.4 All items having a potential for loose or fixed surface contamination shall be surveyed as they are removed from radiologically controlled areas.
  - 9.1.5 Radioactive materials removed from the protected security area or removed from a restricted area outside the protected security area shall be controlled in accordance with an accountability procedure which ensures the materials are not lost or improperly handled during transfer or subject to unauthorized removal. This accountability procedure shall require inventory of radioactive materials which remain outside such areas.

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9.1.6 Each incoming or outgoing shipment of radioactive material shall be handled in strict compliance with written procedures.

9.2 Each case in which radioactive material is lost or unaccounted for shall be reviewed to determine the potential radiation exposure personnel might receive, to correct deficiencies, and to improve control of radioactive materials.

## 10.0 RADIOLOGICAL CONTROLS ORGANIZATION

10.1 A Radiological Controls program cannot be strong and effective if left solely to the Radiological Controls Department. Each worker and supervisor has the responsibility for radiological controls; consequently, the organization for each of the GPUN sites represents the organization for the Radiological Controls Program.

10.2 Each Radiological Controls Director is responsible for ensuring that a high quality Radiological Controls program is established and maintained. It is the responsibility of the Radiological Controls Department to evaluate radiological conditions and recommend precautionary measures.

10.3 At times when demands upon the Radiological Controls Department are sufficiently heavy to require a temporary increase in staff, qualified contractor personnel will be used. These personnel will be fully integrated into the department under the direction of the Radiological Controls Director. Support services (instrument calibration, respiratory protection, bioassay, TLD/dosimetry, and training) will be provided by other GPUNC organizations. These support services will be administered by procedures which define the organizational interface required to insure the quality of services provided meet the commitments of the Radiation Protection Plan.

10.4 Qualifications for the key radiological directors/managers specified in Regulatory Guides will be met as far as practicable. Where the combination of strong manager and experience in radiological controls and formal technical training cannot practicably be obtained in the same person, either the director/manager or a designated subordinate will meet the requirements.

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10.5 The respective TMI and Oyster Creek Radiological Controls organizations are depicted in the GPU Nuclear Organizational Plan.

## 11.0 REFERENCES

- 11.1 Radiation Protection Policy, 1000-POL-4010.01.
- 11.2 Title 10 Code of Federal Regulations.
- 11.3 Regulatory Guides 1.8, 1.33, 8.8, 8.10, 8.13, and 8.15.
- 11.4 Records Management Procedure, 1000-ADM-1218.02.
- 11.5 Quality Assurance Plan, 1000-PLN-7200.01.
- 11.6 Document Change Request Procedure, 1000-ADM-1218.02.
- 11.7 Respiratory Protection Program, 1000-ADM-4020.01.