



## CORPORATE RADIATION ADMINISTRATIVE CONTROL

## 1.0 SCOPE

- 1.1 The radiation controls and procedures set forth in this document are designed to protect not only the radiographic personnel who, by the nature of their work, may be exposed to radiation, but to assure that all personnel are protected from the hazards of radiation while they are at field construction sites of Foster Wheeler Constructors, Inc. and to conduct radiographic operation with a radiation level as low as reasonably achievable (ALARA).
- 1.2 Radiation, in common with toxic chemicals, combustible materials, and high voltage electricity, as well as other potential hazards, is capable of inflicting bodily harm if used improperly and without due regard for safety. In some measure, radiation is more of a hazard in that it cannot be seen, felt, heard, or smelled.
- 1.3 The Radiation Administrative Control, Operating and Emergency Procedures contained herein are in conformance with the provisions of the following Federal and State Agencies.
  - A) U.S. Nuclear Regulatory Commission
  - B) States that have entered into an agreement with the NRC (Agreement States) transferring regulatory authority over by-product materials to the state.
  - C) Rules and regulations of Nonagreement States pertaining to radiation protection.
  - D) U. S. Department of transportation.
- 1.4 The radiation Safety Personnel Organization Charts for FWCI sites is shown on page 7.

## 2.0 DEFINITIONS

The following are definitions of terms, as used in the Manual:

- 2.1 *By-Product Material* means any radioactive material (except special nuclear material) yielded in or made radioactive by exposure to the radiation incident to the process of producing or utilizing special nuclear material.
- 2.2 *Collimator* is a device used to reduce radiation levels and/or to produce a directional radiation beam.
- 2.3 *Curie* is a unit of activity for measuring the quantity of radioactive material. One (1) curie yields  $3.7 \times 10^{10}$  (37 billion) disintegrations per second.
- 2.4 *High Radiation Area* means any area 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 100 MREM.



- 2.5 *Monitoring* is the act of surveying or measuring with instruments, pocket dosimeters, film badges, or thermoluminescent dosimeters (TLD's) the amount of radiation an individual has been exposed to.
- 2.6 *Permanent Radiographic Installation* means a shielded installation designed and/or intended for radiography in which the requirements for a temporary area are not required.
- 2.7 *Physical Survey* is the act of measuring radiation intensities at various locations in an area where radiation exists.
- 2.8 *Prolonged Storage* any period of time in excess of three (3) months of an item of equipment which has not been used and/or maintained.
- 2.9 *Construction Personnel* means all employees of the Foster Wheeler Constructors, Inc. not directly concerned with radiographic operations or any other personnel who may be at a plant or construction site.
- 2.10 *Radiation* means any or all of the following: Alpha Rays (Particle), Beta Rays (Particle), Gamma Rays and X-Rays.
- 2.11 *Radiation Area* means any area where radiation exists at such levels that a major portion of the body could receive in any one hour a dose in excess of 2 MREM.
- 2.12 *Radiographic Exposure Device* means any device that is NRC or Agreement State approved and is designed to contain a sealed source which may be moved or otherwise changed from a shielded to unshielded position for making a radiographic exposure.
- 2.13 *Radiographic Personnel* means all monitored personnel directly connected with radiographic operations.
- 2.14 *REM* is a measure of the dose of radiation to body tissue in terms of its estimated biological effect relative to a dose of one (1) Roentgen of X-Rays. A dose of one (1) Roentgen of X or Gamma Rays is considered to be equivalent to a dose of one (1) REM. (One (1) millirem (MREM) = 0.001 REM).
- 2.15 *Restricted Radiation Area* is an area under the control of FWCI personnel for the purpose of protecting unmonitored persons from radiation exposure during radiographic operations.
- 2.16 *Roentgen (R)* is the unit of measurement of X-Rays and Gamma Rays absorbed in air. It is a measure for the absorption of X-Rays and Gamma radiation in the same sense that feet or inches are a measure of length.
- 2.17 *Sealed Source* means a radioactive material that is encased in a capsule designed to prevent leakage or escape of the radioactive material.
- 2.18 *Shipping/Storage Containers* means any device that is NRC or Agreement State approved and is used to store a sealed source or to contain a sealed source during transport in accordance with DOT regulations.



2.19 *Temporary Radiation Area* means a restricted radiation area in which ropes, or other temporary barriers, and/or constant visual surveillance are used to control access to the area.

2.20 *ALARA* means as low as reasonably (a radiation level which is) achievable.

### 3.0 RESPONSIBILITIES

3.1 The "*Responsible Management Official*" will be responsible for assuring that equipment deviations and non-compliances are evaluated and that defects and non-compliances that could cause a substantial radiation safety hazard are reported to the NRC as required by 10CFR, Part 21, or as required by State regulations.

3.2 The Corporate Radiation Safety Office will be responsible for inspecting the activities of Radiographic personnel at FWCI construction sites to assure compliance with the applicable regulations and procedures. He shall also:

3.2.1 Act as the FWCI liaison officer with the NRC and State Agencies on all license matters.

3.2.2 Develop and maintain current Operating and Emergency Procedures.

3.2.3 Establish, conduct and/or supervise the training programs for Radiographic personnel.

3.2.4 Examine and determine the competency and qualifications of Radiographic personnel.

3.2.5 Investigate the cause of incidents and determine necessary preventative action.

3.2.6 Evaluate instances of excessive personnel radiation exposure, equipment deviations, or procedure, license or regulation non-compliance to determine if such instances are required to be reported to the applicable regulatory agency pursuant to 10 CFR, Parts 20 or 21, or the applicable State Regulations, and to make such reports if required, as designated by the "*Responsible Management Official*".

3.3 The construction site "*Radiation Safety Officer (RSO)*" will be responsible for the enforcement of the rules, regulations and procedures involving the safe handling and use of by-product materials and X-Ray generating equipment at his respective location and will be responsible for the activities of the Radiographic personnel under his supervision pertaining to Radiation Safety. He will also:

3.3.1 Maintain control of procurement and disposal of licensed by-product material.

3.3.2 Maintain the personnel monitoring program.

3.3.3 Procure and maintain adequate radiation survey instruments.

3.3.4 Maintain adequate storage facilities.



- 3.3.5 Maintain exposure devices and related equipment.
  - 3.3.6 Take leak test swabs to be forwarded to the laboratory for radio assay and maintain leak test records.
  - 3.3.7 Conduct by-product material quarterly inventories.
  - 3.3.8 Monitor utilization logs.
  - 3.3.9 Maintain the survey instrument calibration program.
  - 3.3.10 Maintain the record keeping system at the location and review radiation records not kept by himself.
  - 3.3.11 Assume control and institute corrective action in emergency situations.
  - 3.3.12 Supervise source replacement and receipt, shipment or transfer.
  - 3.3.13 Notify the Corporate RSO concerning instances of radiographic equipment deviations or items of procedure, license, or regulation noncompliance noted at his site.
  - 3.3.14 The Construction Site RSO will report directly to the Corporate RSO in all matters pertaining to Radiation Safety and Radiation Safety requirements.
  - 3.3.15 Notification by the Site Construction RSO to the Corporate RSO shall be by telephone. After review by the Corporate RSO instructions shall be given to the Construction Site RSO. Reference: Procedure 7, Section II, Emergency Procedures.
- 3.4 The *Radiographer* will be responsible for the safe use and handling of by-product materials and X-Ray generating equipment while performing a radiographic assignment. He will also:
- 3.4.1 Ascertain that all regulations and procedures pertaining to Radiation Safety are strictly adhered to prior to, during, and after a radiographic exposure. Any deviation from written procedure is strictly forbidden.
  - 3.4.2 Personally supervise (watch) any Assistant Radiographer under his charge while that Assistant is using radiographic exposure devices or conducting surveys after an exposure.
  - 3.4.3 Notify the Corporate RSO concerning instances of radiographic equipment deviations or items of procedure, license, or regulation noncompliance noted at his site.
- 3.5 The *Assistant Radiographer* will be responsible for the proper use of radiographic exposure devices and survey instruments while performing a radiographic assignment *while under the personal supervision of a Radiographer*.
- 3.5.1 Notification by the Radiographer to the site RSO shall be by telephone (when RSO is not at site). The site RSO shall evaluate the circumstances and notify the four steps to be taken in reference to Procedure 7, Section II, Emergency Procedures.



#### 4.0 PERSONNEL MONITORING RECORDS AND REPORTS

- 4.1 Film and/or TLD badge monitoring records will be retained indefinitely.
  - 4.1.1 Construction records will be retained by the office of the Quality Assurance/Quality Control Manager (RSO Files).
- 4.2 Within the first quarter of each calendar year, a personnel monitoring report indicating the total number of individuals for whom monitoring was provided during the previous calendar year will be issued in accordance with 10 CFR 20.407 (or the corresponding paragraphs of State regulations where applicable).
- 4.3 When an individual terminates employment or is transferred out of the department performing radiographic inspection, a personnel monitoring report will be issued in accordance with 10 CFR 20.408 (or the corresponding paragraphs of State regulations where applicable).
- 4.4 Upon the request of an employee or former employee, a radiation exposure record will be provided in accordance with 10 CFR 19.13 (or the corresponding paragraphs of State regulations where applicable).

#### 5.0 EDUCATIONAL AND EXPERIENCE REQUIREMENTS

- 5.1 Corporate Radiation Safety Officer
  - 5.1.1 Completion with a passing grade of at least two (2) years of engineering or science study in a university, college, or technical school; or has received technical school training, examination and tested for Certification in the safe handling of by-product materials under Title 10 CFR.
  - 5.1.2 A minimum of approximately ten (10) years experience in areas of radiographic practice with a minimum of 40 hours of formal radiation safety training.
  - 5.1.3 related past experience in Operating and Emergency Procedure preparation.
  - 5.1.4 Related past experience in on-site radiation safety audits for plants and construction sites.
  - 5.1.5 Shall have complete understanding as specific State and Federal regulations associated with industrial radiographic practices.
  - 5.1.6 Shall have a complete understanding of FWCI Operating and Emergency Procedure Manual.
  - 5.1.7 The above outlined Education and Experience requirements may be added to or substituted at the discretion of FWCI based on responsibilities and compliance with State and Federal regulations along with FWCI Operating and Emergency Procedure Manual.

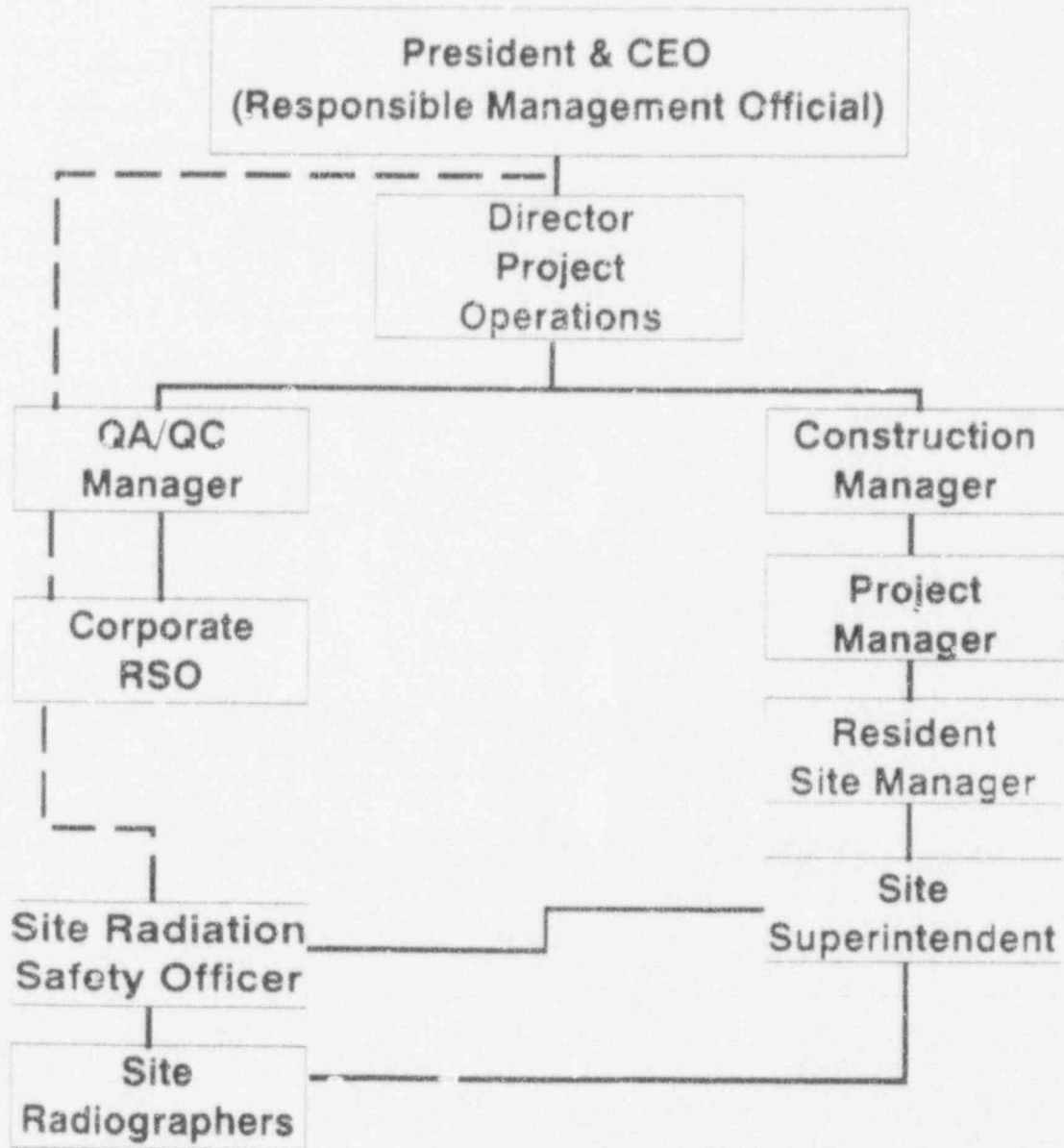


5.2 Site Radiation Safety Officer

- 5.2.1 High School graduate or equivalent.
- 5.2.2 A minimum of approximately three (3) years experience in areas of industrial radiographic practices with a minimum of 20 hours of formal radiation safety training.
- 5.2.3 Has successfully demonstrated during the three (3) years experience competence in:
  - A) Use of radiation sources
  - B) Use of related handling tools
  - C) Use of survey instruments
  - D) FWCI Operating and Emergency Procedures
  - E) personnel monitoring control
  - F) Security
  - G) Posting
  - H) Radiation surveys and survey records
  - I) Special requirements for radiography employing radiation equipment (when applicable).
- 5.2.4 The above outlined education and experience requirements may be added to or substituted at the discretion of FWCI based on responsibilities and compliance with State and Federal regulations along with FWCI Operating and Emergency Procedure Manual.



ORGANIZATION CHART  
RADIATION SAFETY



- - - - - Radiation Safety Functional  
 \_\_\_\_\_ Administrative

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