

ArcelorMittal Steelton, LLC  
c/o Health Physics Associates, Inc.  
1005 Old 22  
Lenhartsville, PA 19534

  
ArcelorMittal

December 10, 2007

Materials Security and Industrial Branch  
US Nuclear Regulatory Commission - Region 1  
475 Allendale Road  
King of Prussia, PA 19406-1415

P-2

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REGION 1  
2007 DEC 11 PM 1:11

03006029  
X

re: License renewal, license number 37-01861-01, ArcelorMittal Steelton, LLC

Gentlemen:

This is a request for a renewal of the referenced license with modifications to reflect the fact that the Burns Harbor plant is obtaining their own license from Region 3. Please coordinate with Region 3 to remove the use locations at the Burns Harbor Plant in Chesterton, IN and the Burns Harbor Plate West in Gary, IN, as well as the following sources once a license is issued by Region 3 to Burns Harbor. } AMEND 1/4/19

Attached are two copies of NRC Form 313 and Addendum, and the plant's Policies Governing the Use of Ionizing Radiation.

The sources to be removed from this license include items 6, 7, 8 and 9, sub-items A through I, and K through P, leaving only sub-item J – cobalt 60, sealed sources, Berthold model numbers P-2651-201 and –202, not to exceed 30 mCi per source, for use in Berthold Systems, Inc. model LB300ML or –MLT series for density/level measurements.

We continue to request the authorization to perform installation, relocation and removal from service, initial surveys of fixed radiation devices, maintenance of detectors, and the calibration of gauging systems, to be performed by Messrs. Davis, Spooner and LaMastra.

The possession limits exclude applicability of both financial assurance for decommissioning and Increased Controls.

If you have any questions, please contact me accordingly at 610-756-4153 or by e-mail at [alamastra@enter.net](mailto:alamastra@enter.net).

Sincerely,



Anthony LaMastra  
RSO

cc: D.P. Wirick, Plant Manager  
Jack Davis

141422

NMSS/RGN1 MATERIALS-002

**APPLICATION FOR MATERIAL LICENSE**

**INSTRUCTIONS: SEE THE APPROPRIATE LICENSE APPLICATION GUIDE FOR DETAILED INSTRUCTIONS FOR COMPLETING APPLICATION. SEND TWO COPIES OF THE ENTIRE COMPLETED APPLICATION TO THE NRC OFFICE SPECIFIED BELOW.**

**APPLICATION FOR DISTRIBUTION OF EXEMPT PRODUCTS FILE APPLICATIONS WITH: IF YOU ARE LOCATED IN:**

DIVISION OF INDUSTRIAL AND MEDICAL NUCLEAR SAFETY  
 OFFICE OF NUCLEAR MATERIALS SAFETY AND SAFEGUARDS  
 U.S. NUCLEAR REGULATORY COMMISSION  
 WASHINGTON, DC 20555-0001

ILLINOIS, INDIANA, IOWA, MICHIGAN, MINNESOTA, MISSOURI, OHIO, OR WISCONSIN, SEND APPLICATIONS TO:

MATERIALS LICENSING BRANCH  
 U.S. NUCLEAR REGULATORY COMMISSION, REGION III  
 2443 WARRENVILLE ROAD, SUITE 210  
 LISLE, IL 60532-4352

**ALL OTHER PERSONS FILE APPLICATIONS AS FOLLOWS:**

**IF YOU ARE LOCATED IN:**

ALABAMA, CONNECTICUT, DELAWARE, DISTRICT OF COLUMBIA, FLORIDA, GEORGIA, KENTUCKY, MAINE, MARYLAND, MASSACHUSETTS, MISSISSIPPI, NEW HAMPSHIRE, NEW JERSEY, NEW YORK, NORTH CAROLINA, PENNSYLVANIA, PUERTO RICO, RHODE ISLAND, SOUTH CAROLINA, TENNESSEE, VERMONT, VIRGINIA, VIRGIN ISLANDS, OR WEST VIRGINIA, SEND APPLICATIONS TO:

ALASKA, ARIZONA, ARKANSAS, CALIFORNIA, COLORADO, HAWAII, IDAHO, KANSAS, LOUISIANA, MONTANA, NEBRASKA, NEVADA, NEW MEXICO, NORTH DAKOTA, OKLAHOMA, OREGON, PACIFIC TRUST TERRITORIES, SOUTH DAKOTA, TEXAS, UTAH, WASHINGTON, OR WYOMING, SEND APPLICATIONS TO:

LICENSING ASSISTANCE TEAM  
 DIVISION OF NUCLEAR MATERIALS SAFETY  
 U.S. NUCLEAR REGULATORY COMMISSION, REGION I  
 475 ALLENDALE ROAD  
 KING OF PRUSSIA, PA 19406-1415

NUCLEAR MATERIALS LICENSING BRANCH  
 U.S. NUCLEAR REGULATORY COMMISSION, REGION IV  
 611 RYAN PLAZA DRIVE, SUITE 400  
 ARLINGTON, TX 76011-4005

03006029

PERSONS LOCATED IN AGREEMENT STATES SEND APPLICATIONS TO THE U.S. NUCLEAR REGULATORY COMMISSION ONLY IF THEY WISH TO POSSESS AND USE LICENSED MATERIAL IN STATES SUBJECT TO U.S. NUCLEAR REGULATORY COMMISSION JURISDICTIONS.

1. THIS IS AN APPLICATION FOR (Check appropriate item) 2. NAME AND MAILING ADDRESS OF APPLICANT (Include ZIP code)

- A. NEW LICENSE
- B. AMENDMENT TO LICENSE NUMBER
- C. RENEWAL OF LICENSE NUMBER 37-01861-01

3. ADDRESS WHERE LICENSED MATERIAL WILL BE USED OR POSSESSED 4. NAME OF PERSON TO BE CONTACTED ABOUT THIS APPLICATION

**ANTHONY LAMASTRA**  
 TELEPHONE NUMBER  
**610-756-4153**

SUBMIT ITEMS 5 THROUGH 11 ON 8-1/2 X 11" PAPER. THE TYPE AND SCOPE OF INFORMATION TO BE PROVIDED IS DESCRIBED IN THE LICENSE APPLICATION GUIDE.

5. RADIOACTIVE MATERIAL a. Element and mass number; b. chemical and/or physical form; and c. maximum amount which will be possessed at any one time. 6. PURPOSE(S) FOR WHICH LICENSED MATERIAL WILL BE USED.

7. INDIVIDUAL(S) RESPONSIBLE FOR RADIATION SAFETY PROGRAM AND THEIR TRAINING EXPERIENCE. 8. TRAINING FOR INDIVIDUALS WORKING IN OR FREQUENTING RESTRICTED AREAS.

9. FACILITIES AND EQUIPMENT. 10. RADIATION SAFETY PROGRAM.

11. WASTE MANAGEMENT. 12. LICENSE FEES (See 10 CFR 170 and Section 170.31)  
 FEE CATEGORY **3P** AMOUNT ENCLOSED \$ **N/A**

13. CERTIFICATION. (Must be completed by applicant) THE APPLICANT UNDERSTANDS THAT ALL STATEMENTS AND REPRESENTATIONS MADE IN THIS APPLICATION ARE BINDING UPON THE APPLICANT.

THE APPLICANT AND ANY OFFICIAL EXECUTING THIS CERTIFICATION ON BEHALF OF THE APPLICANT, NAMED IN ITEM 2, CERTIFY THAT THIS APPLICATION IS PREPARED IN CONFORMITY WITH TITLE 10, CODE OF FEDERAL REGULATIONS, PARTS 30, 32, 33, 34, 35, 36, 39, AND 40, AND THAT ALL INFORMATION CONTAINED HEREIN IS TRUE AND CORRECT TO THE BEST OF THEIR KNOWLEDGE AND BELIEF.

WARNING: 18 U.S.C. SECTION 1001 ACT OF JUNE 25, 1948 62 STAT. 749 MAKES IT A CRIMINAL OFFENSE TO MAKE A WILLFULLY FALSE STATEMENT OR REPRESENTATION TO ANY DEPARTMENT OR AGENCY OF THE UNITED STATES AS TO ANY MATTER WITHIN ITS JURISDICTION.

CERTIFYING OFFICER -- TYPED/PRINTED NAME AND TITLE SIGNATURE DATE  
**ANTHONY LAMASTRA RSO** **12/10/07**

**FOR NRC USE ONLY**

TYPE OF FEE	FEE LOG	FEE CATEGORY	AMOUNT RECEIVED	CHECK NUMBER	COMMENTS
			\$		
APPROVED BY				DATE	
					<b>141422</b>

**ADDENDUM - BYPRODUCT MATERIAL LICENSE RENEWAL APPLICATION  
ARCELORMITTAL STEELTON PLANT**

**December 10, 2007**

**Item 2** Please change the name on the license to ArcelorMittal Steelton,LLC, reflecting a recent merger; however, all personnel and programs at the Steelton Plant remain the same.

**Item 3** All radioactive material will be used at:

ArcelorMittal Steelton  
215 South Front Street  
Steelton, PA 17113

**Items 5&6** Cobalt 60, sealed sources Berthold model numbers P-2608-100 and P-2608-101, no source to exceed 30 millicuries, three (3) sources, for use in Berthold Systems, Inc. model LB300ML or MLT series density/level measurements. All other sources currently listed on this license are used at the Burns Harbor plant.

**Item 7** Mr. LaMastra remains as the RSO for this license.

Authorized users for this license include Messrs. LaMastra, Jack Davis and Wade Spooner.

Mr. Davis is the Superintendent of Quality Assurance and Metallurgical Services at the Steelton plant. He successfully completed a 40 hour comprehensive radiation safety training course, December 6 – 10, 1976 (description attached), and has worked as an authorized user under this license for the plant's former industrial radiography program and the present gauges.

Mr. Spooner is a Quality Assurance Foreman at the Steelton plant working under the direction of Mr. Davis. He has worked under Mr. LaMastra and Mr. Davis since 1994. He successfully completed a 40 hour comprehensive radiation safety training course presented by Mr. LaMastra in October 1994, course description attached.

**Item 8**

- (a) Personnel who work directly with the radiation producing devices shall be given training meeting the requirements of section 8.4 of the attached Policies Governing the Use of Ionizing Radiation. These personnel have been performing these activities under license number 37-01861-01. All training is documented and the records are maintained by the department possessing the sources.
- (b) Personnel operating or performing maintenance on the equipment on which radiation producing devices are installed (but not directly handling the radiation producing devices) or who work in areas in which radiation producing devices are located shall view the training video, "Radiation Safety & Security" upon initial assignment into such a group and annually thereafter. Contractor personnel are instructed in the location of source housings, the radiation levels in their area, and who to contact in case of any questions.

It is our intention to keep radiation fields below the limits for restricted areas in order to eliminate the need for designating restricted areas, whenever possible.

**Item 9** This facility is a steel manufacturing plant in which fixed process control gauging devices are installed to measure density and level. Non-employee access to the plant is limited to a single gate that is manned by security personnel at all times and all visitors are required to be issued visitor's passes, approved by a responsible employee before gaining access to the plant. We will ensure that the location of each fixed gauge meets the criteria in the section entitled 'Facilities and Equipment' in NUREG-1556, Vol. 4, 'Consolidated Guidance about Materials Licenses: Program-Specific Guidance about Fixed Gauge Licenses', dated October 1998.

From past radiation monitoring records of personnel working with these devices, there is little likelihood of personnel radiation exposures in excess of 100 millirem per year. In addition, all such devices are reviewed by Mr. LaMastra with respect to external dose rates, proposed location and use, closeness of personnel, and environmental conditions in the area. Every attempt is made to restrict radiation dose rates so that they do not exceed 2 millirem in one hour at 18 inches from any outer accessible surface of the source housing enclosure, with the source in an "off" position. In addition, the potential for radiation exposure to nearby workers and recommended measures that might be required to maintain such doses as low as reasonably achievable are also evaluated.

Caster mold level gauges have routine work stations within about 3 to 6 feet of the source or detector. Repeated surveys have shown exposure rates at these locations to be below 0.02 mR/hr. The following are estimates of worst case calculated personnel exposures to both operating and maintenance personnel from gauging devices. The assumptions used are:

- Caster tundish operators spend 6 hours per day, 220 days per year, 3 to 6 feet from a gauging device. The combined leakage and scatter radiation field at these distances are less than 0.02 mR/hr.

Tundish Operator Exposure - 26.4 mR/year

- Caster personnel could spend 2 hours per month, 2 feet from the source housing when they are being turned off and on and during removal from the mold, transport to the storage box and reinstallation into the mold. The combined leakage and scatter radiation field at 2 feet is less than 2 mR/hr. It is assumed for the purpose of this calculation that the same person performs all handling.

Caster Personnel Exposure - 48 mR/year

### **Item 10**

Please refer to the attached **Policies Governing the Use of Ionizing Radiation** for a description of the general radiation control program. We will not use fixed gauges at temporary job sites.

Surveys pursuant to 10 CFR 20.1501 will be performed by either of Messrs. Davis, Spooner or LaMastra. We will use survey instruments that meet the Criteria in the section entitled 'Radiation Safety Program - Instruments' in NUREG-1556, Vol. 4, 'Consolidated Guidance about Materials Licenses: Program-Specific Guidance about Fixed Gauge Licenses,' dated October 1998. Each survey meter will be calibrated by the manufacturer or other person authorized by the NRC or an Agreement State to perform survey meter calibrations.

Physical inventories will be conducted at least every 6 months or at other intervals approved by the NRC, to account for all sealed sources and devices received and possessed under the license.

Past surveys have shown that it is not likely for any personnel to receive, in one year, a radiation dose in excess of 10% of the allowable limits in 10 CFR Part 20. Should the plant choose to offer personnel radiation dosimeters to select workers we will provide dosimetry that meets the Criteria in the section entitled 'Radiation Safety Program - Occupational Dosimetry' in NUREG-1556, Vol. 4, 'Consolidated Guidance about Materials Licenses: Program-Specific Guidance about Fixed Gauge Licenses,' dated October 1998.

Operating and emergency procedures will be developed, implemented, maintained and distributed, and will meet the Criteria in the section entitled "Radiation Safety Program – Operating and Emergency Procedures," in NUREG-1556, Vol. 4, dated August 1998. The plant has an existing Lock Out/Tag Out procedure that applies to all hazardous devices, including fixed gauging devices. Please refer to section 13 for emergency procedures.

Leak tests will be performed at intervals approved by the NRC or an Agreement State and specified in the Sealed Source and Device Registration Certificate. Leak tests will be performed using leak test kits supplied by Health Physics Associates, Inc., license number 37-28246-01, and according to guidance supplied by the device manufacturer or Health Physics Associates, Inc. Records of leak test results will be maintained.

Routine maintenance is performed by the manufacturer's representative.

**Non-routine maintenance:** We request the authorization to perform the following tasks using plant personnel. Each described task will describe the personnel performing and supervising the task and reference their training. These tasks have been performed using the same personnel under this license.

- Installation and removal of the source housings following the closing and locking of the shutter, shall be performed by personnel who have had the initial training described in Section 8.4 of the attached Policies Governing the Use of Ionizing Radiation. The shutter can be opened or closed while the source housing is in place in the mold, using the Berthold supplied tool. This activity will be performed by personnel who have had the initial and refresher training described in Section 8.5 of the attached Policies Governing the Use of Ionizing Radiation.

- Initial surveys shall be conducted by either Messrs. Davis, Spooner or LaMastra.
- Caster sources –

**Inventory:** A semi-annual inventory will be maintained by Mr. Davis listing all devices received, their status as to whether they are installed or in storage, the device manufacturer, model and serial number, the isotope and activity, the source manufacturer and model number, and the location.

**Portable Radiation Survey Instruments:** The following instruments are available at the plant for radiation surveys. They may be used by the RSO or by Caster personnel who have received training described in sections 8.3 and 8.4 of the attached Policies Governing the Use of Ionizing Radiation.

<b>Radiation Instrument</b>	<b>Range Number</b>	<b>Window Detected</b>	<b>(mR/hr)</b>	<b>(mg/cm<sup>2</sup>)</b>	<b>Use</b>
Bicron model 2000 with Bicron EWGM probe	2	Alpha, beta, gamma	0 – 2000	1.5	Survey
Bicron MicroAnalyst	2	Gamma	0 – 5	N/A	Survey

**Item 11** Licensed devices will be transferred to an approved radioactive waste disposal facility or to an entity licensed to receive the specific sources when they are no longer wanted.

**POLICIES GOVERNING  
THE USE OF  
IONIZING RADIATION**

**SEPTEMBER 2007**

**ARCELORMITTAL STEELTON, LLC**

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## 1. INTRODUCTION

1.1 These regulations reflect the latest changes in Federal and State regulations governing ionizing radiation. They can be obtained from the radiation safety coordinator (RSC) at extension 2503.

1.2 Purpose -- These regulations are for the purpose of promoting the safe use of ionizing radiation, the maintenance of personnel doses as low as reasonably achievable, and general compliance with applicable governmental regulations and the requirements of the authorizing license.

1.3 Scope -- These regulations shall apply to the acquisition, possession, utilization, storage and disposal of all ionizing radiation sources and their related operation by or on behalf of the Steelton plant of ArcelorMittal Steel USA.

## 2. DEFINITIONS

**Accelerator Produced Material:** Any material made radioactive by irradiating it in a particle accelerator.

**Access Point:** Any opening through which an individual could gain access to a radiation producing device or a radiation area or high radiation area without dismantling any barrier or protective device.

**Agreement State:** Any State with which the US Nuclear Regulatory Commission (NRC) and/or the U.S. Department of Labor has entered into an effective agreement whereby the State has assumed certain licensing and regulatory responsibilities formerly vested in the Nuclear Regulatory Commission (NRC) and/or the U.S. Department of Labor relative to the possession and use of specified radiation sources.

**ALARA (As Low As Reasonable Achievable):** Making every effort to maintain exposures to radiation as far below the annual dose limits as is practical consistent with the use and taking into account the state of technology and the economics of dose reduction in relation to the benefits to be derived from such reductions.

**Becquerel (Bq):** The unit of activity in the International System of units, equal to 1 disintegration per second (dps).  $3.7 \times 10^{10}$  Bq equal 1 curie (Ci).

**By-product Material:** Naturally occurring radioactive material or material made radioactive by irradiating it in a nuclear reactor or high energy accelerator or radioactive material (except special nuclear material or source material) resulting from the fissioning of fuel in a nuclear reactor.

**Controlled Area:** An area outside of a restricted area but inside the facility, access to which is limited by management for a reason other than radiation safety.

**Coulomb per Kilogram (C/kg):** In the International System of units, the quantity of ionization produced in air by X and gamma rays.  $2.58 \times 10^{-4}$  C/kg equals 1 roentgen (R).

**Curie (Ci):** A unit of measurement of radioactivity in the U.S. system. One curie (Ci) is that quantity of radioactive material that decays at the rate of  $3.7 \times 10^{10}$  disintegrations per second (dps). One Ci also equals  $3.7 \times 10^{10}$  Bq.

**Declared Pregnant Woman:** A woman who has voluntarily informed management, in writing, that she is pregnant and the estimated date of conception.

**Deep Dose Equivalent:** Whole body external dose equivalent at a depth in tissue of 1 cm.

**Dose:** The quantity of ionizing radiation energy absorbed per unit mass of a material. The unit of dose is the RAD or gray (Gy). One RAD equals 0.01 joule per kilogram or 0.01 Gy.

**Dose Equivalent:** Expresses on a common scale for all ionizing radiations, a measure of the estimated biological effect on tissue relative to one RAD (or 0.01 Gy) of X or Gamma rays. The unit of dose equivalent is the rem or sievert (Sv). For purposes of these regulations, dose equivalent will be referred to as simply "**DOSE**".

**Effective Dose Equivalent:** Sum of the products of the dose equivalent to an organ and the weighting factors applicable to that organ.

**Exempt Quantity:** The quantity of radioactive material that may be possessed and used without licensed authorization.

**Exposure:** The quantity of ionization produced in air by X or gamma radiation. For radiation protection purposes, the exposure may be considered to be numerically equivalent to the dose. The special unit of exposure is the **ROENTGEN or C/kg**. (See **Radiation Exposure** for the use of the word "exposure" in a manner normally encountered in industrial hygiene.)

**External Radiation:** Ionizing radiation originating outside the body.

**Extremity:** Hand, elbow, arm below the elbow, foot, knee or leg below the knee.

**Eye Dose Equivalent:** Dose equivalent to the lens of the eye at a depth of 0.3 cm ( $300 \text{ mg/cm}^2$ ) from external radiation.

**Failsafe:** A protective or safety device that is designed so that should it fail, the failure will not result in the radiation exposure of personnel.

**Gray (Gy):** The unit of dose in the International System of units. One Gy is equal to 1 joule per kilogram (J/kg) and 100 rads.

**Half-value Layer:** The thickness of a material which will reduce a given radiation intensity to one half the original intensity.

**Health Physics Consultant:** A person retained by the plant who, by training and experience, is qualified to evaluate and control radiation exposure and contamination problems associated with the possession and use of radiation sources.

**High Radiation Area:** Any area, accessible to personnel, in which radiation exists so that a major portion of the body could receive a dose, in any one hour, in excess of 100 millirem at 30 cm from the radiation source or from any surface that the radiation penetrates.

**Installation:** Any room, area or facility in which one or more radiation sources are present. Areas or rooms in which radiation machines are stored in such a manner that the devices are not connected to a power supply and are not capable of generating or liberating ionizing radiation do not constitute an installation.

**Ionizing Radiation:** X and gamma rays, alpha and beta particles, high speed electrons, neutrons, protons and other nuclear particles capable of producing ion pairs, directly or indirectly, as the result of interaction with matter. For purposes of these regulations, ionizing radiation will be referred to as simply "RADIATION".

**License:** A permit issued by the Nuclear Regulatory Commission or by an Agreement State authorizing the possession and use of by-product, accelerator-produced, special nuclear, source or naturally occurring radioactive material.

**Maximum Permissible Accumulated Dose:** The maximum dose of ionizing radiation, which is not expected to produce discernible biological effects, if accumulated during the working lifetime of an individual.

**Maximum Permissible Dose:** The maximum dose of ionizing radiation that an individual may receive to the body or any specified part of the body during a stated period of time, usually one year.

**NARM (Naturally Occurring and Accelerator Produced Radioactive Material):** The term is a subset of by-product material but does not include source or special nuclear material.

**Natural Radioactivity:** Radioactivity from nuclides, which occur naturally in the environment or the body.

**Non-Stochastic Effect:** Health effects where severity varies with the dose and for which a threshold is believed to exist. Radiation caused skin burns are an example of a non-stochastic effect.

**NORM (Naturally Occurring Radioactive Material):** A nuclide, which is radioactive in its natural physical state (i.e., not man-made), but does not include source or special nuclear material.

**NRC (U.S. Nuclear Regulatory Commission):** The federal agency, which has been given primary regulatory authority over radioactive materials.

**Occupationally Exposed (Occupational Radiation Exposure):** Radiation exposure to an individual in a restricted or controlled area, or when the individual's assigned duties involve exposure to radiation or to radioactive materials. Exposure to background radiation, radiation resulting from medical practices or from non-job related activities is not included in occupational radiation exposure.

**Particle accelerator:** A machine capable of accelerating electrons to an energy of 1 MeV or more, or heavier particles to an energy of 0.1 MeV or more.

**Personnel Monitoring:** The estimation of radiation dose to an individual by means of dosimeters worn by the individual.

**Protective Barrier:** Any material or object such as a shield or barrier which is placed or located around a restricted area with the purpose of reducing the radiation intensity at a particular point outside the restricted area to an acceptable level, or preventing access into the restricted area.

**Quality Factor:** A modifying factor used to calculate the dose equivalent in rem or sieverts from the exposure in roentgens or the dose in rads or grays. For the purpose of these regulations, quality factors are as follows.

X, gamma or beta radiation	1
Neutrons, high energy protons	10
Alpha particles	20

**Rad:** Special unit of dose. See Dose.

**Radiation Area:** Any area, accessible to personnel, in which radiation exists so that a major portion of the body could receive a dose in excess of 5 millirem in any one hour at 30 cm from the radiation source or from any surface that the radiation penetrates.

**Radiation Safety Coordinator (RSC):** A person named by management and who has the training and experience in radiation safety necessary to be named on a license as an authorized user or approved by a state regulatory agency for x-ray producing equipment.

**Radiation Safety Officer (RSO):** A person named by management and who has the training and experience in radiation safety necessary to be named as such on a license authorizing the possession and use of radioactive materials or approved by a state regulatory agency for x-ray producing equipment. The health physics consultant is the RSO for this facility.

**Radiation Exposure:** The absorption of ionizing radiation by any part of the body as a result of the presence of an external field of ionizing radiation or the deposition of radioactive material within the body.

**Radiation Machine:** Any device, not containing radioactive materials as the primary source of radiation, which produces ionizing radiation when energized.

**Radiation Source:** Any radioactive material or any radiation machine, which emits ionizing radiation.

**Radiation Worker:** Someone who receives occupational radiation exposure, who routinely works with radiation producing devices or with equipment on which radiation devices are installed, and who has been given training in the source(s) of radiation exposure, biological effects and risks from radiation exposure, safe operating and emergency procedures, and methods of protection.

**Radioactive Material:** Any material that spontaneously emits ionizing radiation.

**Rem:** The special unit of dose equivalent in the U.S. systems of units, which is equal to the dose in rads or exposure in roentgens multiplied by the quality factor from any type of ionizing radiation. For the purposes of these regulations, any of the following are considered to be equivalent to a dose of one rem:

- 1.0 roentgen of x or gamma radiation
- 1.0 rad of x, gamma or beta radiation
- 0.1 rad of neutron or high energy proton radiation
- 0.05 rad of alpha radiation

**Restricted Area:** Any area to which access is limited by the plant for the purpose of protecting personnel from excessive radiation exposure.

**Roentgen (R):** The special unit of exposure in the U.S. system of units defined for x and gamma radiation in air. One roentgen equals  $2.58 \times 10^{-4}$  coulomb per kilogram of air.

**RSO:** See radiation safety officer.

**Scattered Radiation:** Radiation, which has been deviated in direction or reduced in energy as a result of interaction with matter.

**Sealed Source:** Radioactive material encapsulated or otherwise enclosed in a matrix in such a manner as to prevent the release or dispersal of the material under normal conditions of use.

**Shallow Dose Equivalent:** The dose at a depth of .007 cm (7 mg/cm<sup>2</sup>) averaged over an area of 1 cm<sup>2</sup>.

**Shielding:** Material used to reduce the intensity of a radiation beam.

**SI:** The International System (Système Internationale) of measurement units.

**Sievert (Sv):** The unit of dose equivalent in the International System of units, equal to the dose in Gy multiplied by the quality factor for the radiation.

**Source Material:** Any physical or chemical form of uranium or thorium or their ores, which contain 0.05% or more of uranium, or thorium, except Special Nuclear Material.

**Special Form:** A designation used by the US Department of Transportation for a radioactive material source. Sealed sources are usually Special Form. All other sources are termed "other than Special Form or Normal Form.

**Special Nuclear Material (SNM):** Quantities not sufficient to form a critical mass of uranium enriched in U-233, U-235 or plutonium of any mass number.

**Stochastic Effect:** Health effects that occur randomly and for which the probability of the effect occurring rather than its severity is assumed to be a linear function of dose without a threshold. Cancer and leukemia induction and genetic effects from ionizing radiation exposure are examples of stochastic effects.

**Survey:** Evaluation of radiation hazards incidental to the production, use or existence of radiation sources. These evaluations include, but are not limited to, tests, physical examination and measurement of radiation intensities or concentrations of radioactive materials, proximity of radiation sources to work stations and the degree of occupancy, determination of radiation source workloads, and determination whether restrictions on the use of the radiation source are necessary.

**Total Effective Dose Equivalent:** The sum of the deep dose equivalent for external radiation exposure and the committed effective dose equivalent for internal radiation exposure.

**Weighting Factor:** The proportion of the risk of stochastic effects resulting from the irradiation of an organ to the total risk of stochastic effects when the whole body is irradiated uniformly. The values for various weighting factors for calculating the effective dose equivalent are as follows:

<b>Organ</b>	<b>Weighting Factor</b>
Gonads	0.25
Breast	0.15
Red Bone Marrow	0.12
Lung	0.12
Thyroid	0.03
Bone Surfaces	0.03
Remainder	0.3
Whole Body	1.0

**Whole Body Exposure:** Deep exposure to the head, trunk, arms above the elbows, or legs above the knee.

### 3. RADIATION CONTROL RESPONSIBILITY

3.1 The immediate responsibility for maintaining radiation exposures as low as is reasonably achievable, compliance with applicable rules and regulations, and the safe use of radiation sources rests with the management of the department possessing and/or using the radiation source. Such responsibility shall include, but not necessarily be limited to, the following items.

3.1.1 The promotion and maintenance of compliance with all applicable rules and regulations pertaining to radiation protection on the part of plant employees and outside contractor personnel.

3.1.2 The termination of use of any source of ionizing radiation if such source or activity poses an imminent threat to the health or safety of personnel or a member of the general public or a violation of governmental regulations.

- 3.1.3 Arranging for the adequate training of personnel in the safe and proper use of radiation sources and equipment, operating and emergency procedures, and related rules and regulations, as required.
- 3.1.4 Arranging for the adequate training in the meaning of informational and warning signs and signals, and how to maintain their doses as low as reasonably achievable, for personnel who have occasion to work around, but not directly with, sources of radiation.
- 3.1.5 Arranging with the RSC or the health physics consultant for the installation, removal, initial survey, and safe storage of all radiation sources.
- 3.1.6 Arranging with the RSC or the health physics consultant for periodic surveys or tests to assure that radiation intensities are within acceptable levels.
- 3.1.7 Preparing written, safe working and emergency procedures and assuring that all appropriate personnel are instructed in the procedures and that personnel working with radiation sources are made aware of and understand the content of the procedures.
- 3.1.8 Defining and posting restricted areas, radiation areas or high radiation areas.
- 3.1.9 The judicious use of personnel radiation monitoring dosimeters as recommended by the RSC or the health physics consultant.
- 3.1.10 The investigation of all accidental exposure incidents, damage to or loss of radiation sources, or the circumstances surrounding lost personnel radiation monitoring dosimeters.
- 3.1.11 The accountability and security of all radiation sources during storage or use.
- 3.1.12 The reporting of all existing or potential radiation control problems to the RSC and the health physics consultant.
- 3.1.13 The notification of all anticipated applications and planned acquisitions of new radiation sources to the RSC and the health physics consultant.
- 3.1.14 Assistance in achieving compliance with Sections 3.1.1 through 3.1.13 shall be provided by the RSC or the health physics consultant.
- 3.2 The RSO has the responsibility of liaison between the plant and the Nuclear Regulatory Commission and other governmental agencies regulating radiation sources.
- 3.3 Liaison between the health physics consultant and the plant shall be through the RSC.
- 3.4 All personnel working with radiation sources or frequenting restricted areas shall immediately consult their supervisor when there is a question regarding radiation control or protection, performance of radiation devices, radiation control procedures or other such situations.
- 3.5 In the event of an emergency, such as an accident involving radioactive materials, supervisory personnel shall be notified immediately and shall take prompt action to protect personnel and property, minimize radiation exposure, and restrict access to the area of concern. The RSC shall apprise the health

physics consultant of the situation as soon as possible. Source recovery and decontamination, if necessary, shall be accomplished by or under the direct supervision of the health physics consultant.

3.6 The RSC shall maintain a copy of the following or know where they can be obtained:

3.6.1 All reports (including file memoranda) of initial surveys, device relocation surveys and radiation exposure incidents, the license authorizing radioactive material sources or registration of x-ray producing devices, required inventories of x-ray and radioactive material sources, training records, safe operating procedures, and personnel dosimetry data.

3.6.2 Internal facility procedures written to implement these regulations.

3.6.3 New or revised procedures written to instruct personnel in the safe methods of working with or around radiation sources.

3.7 The RSC shall be empowered and shall recommend to management the termination of use of any source of ionizing radiation, if such source or activity poses an imminent threat to the health and safety of personnel or members of the general public or a violation of governmental regulations.

#### **4. RADIATION SOURCE PROCUREMENT**

4.1 All proposed uses of ionizing radiation, including radioactive materials and industrial and medical x-ray machines, shall be reviewed with the RSC and the health physics consultant during the initial planning stages. This applies to:

- Radiation sources which are intended for outright purchase by the plant.
- Radiation sources purchased or leased under the manufacturer's general license.
- Instrumentation packages where the instrumentation supplier must buy a radiation source to incorporate into his package.
- Radiation sources involved in turnkey projects.
- Leased radiation sources.
- Radiation sources provided by a vendor to the plant for testing purposes.
- New applications of outside vendor radiography services and all other vendor services utilizing radiation sources in the plant.

4.2 The purpose of this early notification is to alert the RSC and the health physics consultant of new locations of radiation usage and to permit sufficient time for input of necessary radiation control considerations. It will also allow adequate lead time to secure any necessary license amendments and permit better coordination of delivery time.

4.3 In order to properly review a proposed application of radiation usage, the RSC and the health physics consultant should be supplied with the following information as early in the planning stage as possible.

4.3.1 A description of the device(s), including the name of the manufacturer or vendor, model number, type of radiation source, the source size in curies (or maximum kilovolts and milliamperes for x-ray machines), and in the case of radioactive material sources, a copy of the full Source and Device Registration, a copy of the manufacturer's license showing the manufacturer is authorized to distribute the device(s), and a copy of the source's Special Form Certificate.

4.3.2 A description of the intended uses of the device(s) and the area in the plant in which the device(s) will be located, including a sketch showing where the device(s) will be installed on equipment.

4.3.3 Environmental conditions in the immediate area, which could have an impact on radiation safety, such as routine temperatures above 150 degrees Fahrenheit, excessive dust, high moisture, corrosive atmospheres, etc.

4.3.4 The frequency of entry into and the duration of stay by personnel in the immediate area of the device(s) for routine, transient and maintenance purposes.

4.4.5 The name and phone number of a person at the plant who can be contacted for further technical information.

4.5 The acquisition of each radiation source is to be approved by the RSC and the health physics consultant prior to placing the order. This is to allow time for input as described in 4.1 and 4.2 above.

4.6 Manufacturers are prohibited by the NRC and the DEP from shipping a radioactive source or a device containing a radioactive source to a recipient until the manufacturer receives a copy of the recipient's license, authorizing the possession of the source. The RSO will forward the necessary license copies to the manufacturers.

4.7 All purchase orders for radioactive materials shall contain the clause:

"As a condition of the purchase order, the device manufacturer shall agree to receive the source/source holder/source housing at the end of its useful life, as determined by ArcelorMittal Steelton"

4.8 The buyer shall include, as one of the purchase conditions, that the manufacturer is to mark the outside of the shipping container housing the radioactive source with the following standard wording:

**CONTAINS RADIATION SOURCE**

**NOTIFY Jack Davis OF RECEIPT AT EXTENSION 2503**

4.9 It shall be a condition of the purchase order that the manufacturer or supplier of radioactive material sources shall contact the RSC prior to shipment and arrange for the receipt of the shipment at the plant

4.10 Turnkey contractors are to be advised in the purchase contract that the plant will take physical possession of all isotope radiation sources upon delivery to the job site, and will provide storage until such time as they are to be installed. Possession will then be returned to the contractor at the time of installation, provided a person licensed to supervise the installation of sources is present. Purchasing shall include the following clause as a part of the specifications on the invitation to bid and as a part of the purchase order.

"Any radiation source shipped to our plant as part of this order (turnkey job / contract / purchase order) must be received and stored by ArcelorMittal Steelton under the jurisdiction of plant's RSC"

4.10.1 Should this not be acceptable to the turnkey contractor, he shall be advised that he will have to obtain a radioactive material license, and the applicable radioactive materials shall be stored and installed under his own specific radioactive material license.

4.11 Any department anticipating the use of radiation sources by an outside contractor while working in the plant shall bring it to the attention of the RSC and the purchasing department. Examples are vendor radiography, internal pipe inspections and soil moisture and compaction tests. The purchase requisition shall specify that the contractor is to familiarize himself with these regulations and comply with all applicable provisions. This specification shall be made a condition of the purchase order and a copy of these regulations shall be sent to the contractor (a supply is available through the RSC).

4.12 The RSC shall arrange with Receiving to obtain a legible copy of the vendor's shipping papers, and for the secure storage of the radiation source(s).

4.13 Receipt of packages containing radioactive material shall be examined using the following procedures.

4.13.1 The RSC shall notify Receiving that such a package is expected and advise the Gate and Receiving of the person to contact upon arrival of the delivery vehicle.

4.13.2 The truck shall be met at the Gate by the RSC or a delegate and brought to a location where the device(s) can be safely unloaded from the vehicle. The external security seal shall be inspected for integrity before unloading the package(s). The condition of the external package should be intact and not show signs of damage, which could affect the safety or containment of the radioactive material.

4.13.2.1 If the security seal is not intact or the shipping package is physically damaged, a radiation survey and a wipe test shall be made of the package(s). If the device must be unpacked, extra care shall be exercised during unpacking, to assure that radiation safety is not compromised.

4.13.3 The external radiation levels shall be measured. Radiation levels exceeding the following may indicate a failure of the internal shielding. This information shall be immediately made known to the health physics consultant.

**White I Label:** Less than 0.5 mR/hr at contact with the package and no reading exceeding background at 1 meter from the surface.

**Yellow II Label:** Less than 50 mR/hr at contact with the package and no reading exceeding 1 mR/hr at 1 meter from the surface.

**Yellow III Label:** Between 50 and 200 mR/hr at contact with the package and no reading exceeding 10 mR/hr at 1 meter from the surface.

4.13.4 If the external radiation levels exceed the above limits, the device shall be secured in a locked and restricted area, and the health physics consultant immediately notified.

4.13.5 Once the package is found to be acceptable, the RSC shall update the inventory and forward the surface wipes to the health physics consultant.

## 5. LICENSING AND REGISTRATION

5.1 The acquisition, possession and use of radioactive materials must be authorized by a license issued by the Commonwealth of Pennsylvania, Department of Environmental Protection (DEP). License applications or amendment applications to existing licenses for all radioactive materials shall be prepared and submitted by the RSC. A copy of the application and the license shall be sent to the health physics consultant for his file.

5.2 As required, radiation sources, especially x-ray equipment, shall be registered with the DEP by the RSC. A copy of the registration should be forwarded to the health physics consultant for his file.

## 6. RESTRICTED AREAS

6.1 All fixed radiation sources shall be installed in such a way to physically prevent the head, trunk, arms above the elbows, or legs above the knees from receiving a dose exceeding 0.5 millirem in one hour at three feet from any accessible surface on the radiation source housing or the equipment to which it is attached, unless the source is enclosed in a restricted area.

6.2 All fixed radiation source installations in which it is possible for a part of the body, other than the hands or feet, to be exposed to 0.5 millirem in one hour or more at three feet from the closest accessible surface, shall be contained in a defined restricted area that limits the exposure to 0.5 millirem in one hour at the boundary of the restricted area. The boundary of the restricted area shall be posted with a sign(s) warning of the presence of the radiation source and who to contact to lock out the source shutter if work has to be performed inside the restricted area.

6.3 All fixed radiation source installations (non-maintenance positions) in which it is possible for a part of the body, other than the hands or feet, to be exposed to 100 millirem or more in one hour (high radiation area) shall be enclosed in a restricted area that has the following:

- A barrier that reasonably prevents access into the high radiation area and which is posted with signs warning of a high radiation area.
- All access points to the interior of the restricted area shall have a device which terminates the high radiation area upon opening or entry through the access point or activates an audible and visual signal that can be seen by the person entering the high radiation area and a person responsible for the radiation source.
- Signal lights that clearly indicate the position of the source shutter at all access points to the interior of the restricted area and at locations inside the restricted area where they can be readily seen by personnel approaching the high radiation area.

6.4 For temporary installations or during maintenance activities, direct personal surveillance may be used to prevent entry into a high radiation field as a substitute for the requirements of 6.3.

6.5 All gauge installations shall be posted with a sign warning that a radiation producing device is installed in the area, and such other radiation warning signs as may be required by Section 12.

## **7. PERSONNEL RADIATION EXPOSURE**

7.1 The maximum permissible dose for an occupationally exposed individual shall be considered to include all occupational exposure from internal and external radiation sources, from all types and energies of ionizing radiation, whether delivered simultaneously or successively to the region of interest during the period of measurement. Every effort is to be made by management of the facility using the radiation sources to avoid all unnecessary radiation exposure of personnel, and to maintain personnel radiation exposure as far below the listed dose limits as is reasonably achievable through good radiation protection planning and practices.

7.2 As part of the plant's effort to maintain radiation exposures as low as reasonable achievable, the health physics consultant will perform an annual ALARA audit. These radiation safety audits will review existing plant radiation control programs, personnel radiation exposures, radiation source location and operating procedures. Recommendations will be made with respect to improving plant radiation control policy, operating procedures and radiation source location so as to maintain personnel exposure as low as reasonably achievable.

7.3 Occupational radiation exposure from radiation sources being used or stored by the plant shall be limited to not more than the quantities in 7.3.1.

7.3.1

<b>AREA OF BODY</b>	<b>ANNUAL DOSE (REM)</b>
Penetrating exposure of the head, trunk, arms above elbows, or legs above knees	5 <sup>(1, 2)</sup>
Lens of the eye	15
Skin, each hand, each forearm, each foot, and each leg below the knees	50
Fetus in a declared pregnant worker	0.5 <sup>(3)</sup>

- (1) A maximum of 3 rem to these areas during a single calendar quarter in a year is permitted provided that the total annual dose does not exceed 5 rem.
- (2) The 5 rem per year limit is the sum of both external and internal exposure.
- (3) The 0.5 rem dose limit applies to the mother's dose and is for the term of the pregnancy. In the case of a worker having a total dose of 0.45 rem or more by the time the pregnancy is declared, the worker shall be limited to an additional 0.05 rem (50 millirem) for the remainder of the pregnancy.

7.4 All plant owned, controlled or contracted radiation sources shall be used or stored in such a manner as to maintain external radiation levels in unrestricted areas as low as reasonably achievable. In no case are they to exceed levels, which will result in penetrating exposures to the head and trunk, arms above the elbows, and legs above the knees of personnel in unrestricted areas exceeding 100 millirem in a calendar year or 2 millirem in any one hour.

7.5 In order to assure that a fetus does not receive more than 0.5 rem during the term of the pregnancy, the plant has developed a Fetal Radiation Protection Program.

7.5.1 The plant shall post notices describing the Fetal Radiation Protection Program in areas where they may be seen by personnel who are occupationally exposed to radiation.

7.5.2 A copy of the Fetal Radiation Protection Program shall be given to all women upon hiring.

7.5.3 Pregnant, occupationally exposed women are encouraged to declare their pregnancy, in writing, to the Human Resources Department in order for the protective provisions of the program to be instituted.

7.5.3.1 Upon declaration in writing of being pregnant, a woman subject to occupational radiation exposure shall be issued an assigned radiation dosimeter in accordance with the procedures in Section 9, and the corporate health physics consultant shall be notified to determine if a wearing period shorter than 3 months is necessary.

7.5.3.2 A copy of the statement addressing the risks to the fetus from ionizing radiation shall be given to the woman.

## 8. TRAINING

8.1 The health physics consultant shall meet one of the following criteria: (1) a health physicist certified by the American Board of Health Physics, (2) have a master's degree in health physics or radiation protection, or (3) have a bachelor's degree in science and at least 10 years professional experience as an RSC with radiation sources commonly used in the steel industry.

8.2 The RSC shall have successfully completed at least a 40-hour course in radiation protection and have at least three years experience in making surveys under the direction of someone authorized to perform these functions.

8.3 Authorized users and personnel performing initial and relocation surveys or supervising the installation or removal of radiation devices at a local facility shall have a minimum of a 20 hour course in radiation protection and at least 3 years experience in performing radiation surveys and supervising the installation or removal of radiation devices under the direction of someone authorized to perform these functions.

8.4 Personnel handling source housings, maintaining detectors or calibrating gauging devices shall be given a minimum of four hours of initial training covering the topics listed below. These personnel shall also be given refresher training every three years. This training is available from the health physics consultant. The initial training shall consist of the following:

- The types of sources to be encountered and likely levels of radiation.
- Potential hazards and biological effects.
- Methods of protection.
- Applicable rules and regulations, and plant policies.
- Safe working, operating and emergency procedures, including Tag Out/Lock Out procedures.

8.5 Personnel operating or performing maintenance on equipment on which radiation producing devices are installed or who work in areas in which radiation protection equipment is located (mechanical and electrical maintenance, laborers, etc.) shall view the training video, "Radiation Safety" upon initial assignment into such a group and annually thereafter. This includes both plant employees and employees of contractors hired by the facility for capital construction projects or for long term services in the plant.

8.7 All training shall be documented by the plant and a copy maintained by the RSC.

## 9. PERSONNEL MONITORING AND EXPOSURE RECORDS

9.1 Personnel (employees or visitors) meeting one or more of the criteria listed below shall be required to wear a whole body radiation dosimeter supplied by a vendor that is approved by the National Voluntary Laboratory Accreditation Program (NAVLAP) for ionizing radiation personnel dosimetry.

- Enter a high radiation area or a restricted area in which radiation levels exceed 5 millirem per hour.
- Commonly work in areas in which there is a reasonable likelihood of receiving a dose to a major portion of the body in excess of 0.1 rem in a year.
- A declared pregnant employee who works within 5 feet of a radiation source or who is likely to receive more than 100 millirem during the pregnancy.

9.2 Personnel whose work causes their hands to be in such proximity to radiation sources that (1) there is a reasonable likelihood of their hands receiving a dose of 0.3 rem in any calendar quarter or 0.5 rem in any calendar year, or (2) who routinely work with open beam x-ray diffraction, spectrographic or manually fed x-ray emission apparatus, or (3) who maintain x-ray diffraction, x-ray spectrographic, x-ray emission apparatus, or electron microscopes while the x-ray tube or electron emitter is energized, shall wear finger radiation dosimeters while working on such energized equipment.

9.3 The RSC or health physics consultant may determine from time to time that certain individuals or classes of individuals should wear radiation dosimeters in order to determine the likelihood of radiation exposure for either a limited period or on a permanent basis.

9.4 Each person shall wear the specifically assigned radiation dosimeter during a wearing period. The dosimeter shall not be transferred to another person or worn by a different person during a wearing period.

9.5 In the case of a lost or damaged dosimeter, the loss shall be immediately reported to the supervisor and a proper replacement (spare or unassigned) dosimeter issued before resuming work. The replacement dosimeter shall be worn for the remainder of the wearing period. A "Lost Badge" report shall be forwarded to the RSO.

9.6 Each person shall wear the radiation dosimeter (and pocket, finger or wrist dosimeter if required) in such a manner as to accurately reflect the actual exposure.

9.7 The permanent record of the cumulative radiation dose for all personnel monitored for external radiation exposure shall be maintained by the RSO.

9.8 All personnel issued radiation dosimeters may review their radiation exposure history by contacting the plant RSC. A written record of his or her accumulated dose shall be forwarded annually to each worker having been issued a radiation dosimeter.

9.9 It is the responsibility of the department to which an employee is assigned to assure that all personnel monitoring employee information possessed by the vendor is accurate and current and that radiation dosimeters are being properly used.

9.10 A radiation dosimeter is not to be taken outside of plant property unless the employee is engaged in job-related radiation work off site. Each department where employees are issued radiation dosimeters shall establish procedures to assure that dosimeters are used only for company-related work.

## **10. RADIATION SOURCE INSTALLATION, REMOVAL, RELOCATION, PHYSICAL SURVEYS, ENVIRONMENTAL SAMPLING AND SURVEY EQUIPMENT**

10.1 The RSC, health physics consultant or, as indicated in 10.2, an authorized delegate, must be present for the installation, removal or relocation of any fixed device containing a radioactive source. This individual shall also make an initial survey of all such installations or relocations whether they contain isotope or x-ray sources, unless those functions have been specifically limited to a person authorized by the license. Arrangements for installations and surveys should be made through the RSC at least two weeks in advance.

10.2 This responsibility may be delegated by the RSO to plant personnel who have successfully met the requirements of section 8.3. Outside courses may not be substituted without the prior approval of the RSC, and then following the attendance at a training session in which the requirements of the plant's license and plant procedures are presented.

10.3 An initial survey shall be performed by or under the supervision of the RSC, health physics consultant or a plant representative specifically designated by the RSC as in Section 10.2.

10.4 An initial survey shall be performed prior to the use of all new radiation sources or after significant modification or relocation of existing equipment. The purpose of the initial survey is to evaluate radiation hazards and operating procedures associated with the subject radiation source. Records of all initial surveys shall be maintained by the RSC, with a copy forwarded to the health physics consultant, and shall contain the following information:

- Identity of the radiation source (manufacturer, model, serial number, radionuclide and activity or kVp and mA, and intended use).
- Intended use and workload (minutes per week, hours per month).
- Location of routine workstations and the occupancy rate.
- Location of walkways close to the radiation source.
- Identity of the survey meter (manufacturer, model, serial number, calibration date and due date).
- Exposure rates created by the radiation source at contact with the source housing, at 1 foot from the source housing, at 3 feet from the source housing, in routinely occupied areas, and in nearby walkways.
- Location of warning signals (audible/visible) and a description of the signals.
- Location of warning and/or informational signs and a description of signs posted.
- If entry controls are in place or are required, and a description of the controls.
- Any operating restrictions imposed on the use of the radiation source, such as beam direction, hours of use, etc.
- Recommendations made to maintain radiation doses ALARA.
- Description of written safe working procedures.
- Description of written emergency procedures.

10.5 Radiation protection surveys include all surveys in which the radiation exposure or dose rate is determined for the purpose of: (1) protecting personnel; (2) informing personnel of the intensity of a radiation field or the quantity of radioactive material in a particular location; (3) assuring that a radiation source is "off" or the beam shuttered and locked and tagged out prior to entry into an area; (4) determining personnel radiation dose; or (5) surveys of packages containing radioactive material that are being received or shipped.

10.5.1 Radiation protection surveys shall be performed by or under the supervision of the RSC, the health physics consultant, or someone meeting the requirements of Sections 10.2 and approved by the RSC.

10.5.2 Surveys made to assure that a radiation source is "off" or that a radiation beam shutter is closed and locked and tagged out may be performed by personnel who meet the requirements of Sections 8.1, 8.2, 8.3, or 8.4.

10.6 A permanent record of initial surveys shall be maintained by RSC.

10.7 Survey meters and equipment used for surveys described in 10.4 to 10.6 shall be approved by the health physics consultant prior to purchase to assure that the model selected is acceptable for the intended use.

10.8 Personnel who use survey meters shall be instructed in their proper use by the health physics consultant or the RSC prior to using radiation survey equipment.

10.9 Survey meters used within the plant shall be recalibrated on a frequency not to exceed 12 months, or following major repairs to the instrument that affect its response (repair of the circuit board, meter assembly, detector, or the use of longer or shorted cable connecting the detector to the electronics).

10.10 A record of survey meter calibrations shall be maintained by the RSC from at least the time of the last inspection by a regulatory agency.

## **11. ACCOUNTABILITY RECORDS**

11.1 A semi-annual physical inventory shall be made of each radiation source. Records of such inventories shall be maintained by the RSC. The record shall show the date of the inventory, the location of the device, the manufacturer, model, and serial number, the isotope and quantity for radioactive material sources or the maximum kilovolts and milliamperes if an x-ray source.

11.2 In addition to Section 12.1, up-to-date records shall be maintained which show the amount of each radioactive material received and from whom. These records shall also show the amount of each radioactive material transferred, decayed in storage or use, and released for disposal when such sources are transferred or disposed of. Each source shall reference the manufacturer, model and serial number.

11.3 Up-to-date records shall be maintained which show the receipt, transfer or disposal of all x-ray equipment.

## 12. POSTING OF NOTICES, WARNING SIGNS AND LABELING

12.1 Required warning signs and labels, unless otherwise specified, shall bear the standard radiation symbol and appropriate wording in the conventional colors of magenta or purple on a yellow background. Devices purchased from European countries are likely to use a black on yellow color scheme, which is also acceptable.

12.2 All access points into restricted and radiation areas shall be conspicuously posted with a sign or signs bearing the words, **CAUTION - RADIATION AREA**.

12.3 All access points into high radiation areas shall be conspicuously posted with a sign or signs bearing the words, **CAUTION - HIGH RADIATION AREA**.

12.4 All radiation-producing machines shall be posted with a label bearing the words, **CAUTION - THIS EQUIPMENT PRODUCES RADIATION WHEN ENERGIZED**. Such labels shall be affixed on the control panel near the switch, which energizes the tube. Caution or warning signs, in addition to the above label, shall be posted in the vicinity of the radiation producing tubes if such tubes are significantly remote from the control panel. Such signs may be worded in a manner appropriate to the installation and may be in colors other than those of the conventional radiation warning signs if such is permitted by applicable regulations.

12.5 All gauging devices in which it is possible to insert any part of the body shall be posted with a warning sign(s) alerting personnel of the potential presence of a radiation beam in the air gap. The sign or signs shall be visible from the normal avenues of approach to the gauging device.

12.6 All x-ray diffraction and x-ray spectrographic devices shall have a label bearing the words, **CAUTION - HIGH INTENSITY X-RAY BEAM** attached to the exposure chamber or apparatus enclosing the primary and secondary radiation beams.

12.7 All areas or rooms in which radioactive materials are used or stored in amounts exceeding 10 times (100 times in the case of natural uranium and natural thorium) the quantities specified in **Appendix C, Title 10, Code of Federal Regulations, Part 20, Standards for Protection Against Radiation**, shall be conspicuously posted with a sign or signs bearing the words, **CAUTION - RADIOACTIVE MATERIALS**.

12.7.1 However, areas or rooms are not required to be posted as described in 12.7 if the radioactive material is in the form of a sealed radioactive material source, and, if the radiation intensity at a distance of 12 inches from the surface of the source container does not exceed 5 millirem per hour and the container is adequately labeled with the name of the manufacturer, the device model and serial numbers, the activity of the source and date of assay, radionuclide and the standard radiation symbol.

12.8 Copies of NRC or PA DEP form, **Notice to Employees**, shall be posted, if required, in such a manner and in sufficient locations so that all employees who work in restricted areas may observe a copy.

12.9 The plant's Notice to Employees and Fetal Protection Notice shall also be posted in such a manner and in sufficient locations so that all employees who work in restricted areas may observe a copy.

12.9.1 The plant Notice To Employees sign shall include a statement that a copy of the license and registration form, regulatory agency regulations, company policies and safe working practices, and emergency procedures are available from the RSC, the location of the RSC and the RSC's phone extension

### 13. EMERGENCY PROCEDURES

13.1 The RSC or health physics consultant shall determine the external radiation exposure for all radiation sources and the safe approach distances in the event of a credible emergency incident and also in the event of the loss of all shielding of the source.

13.2 An up-to-date list of the names, office and home telephone numbers of personnel qualified to cope with radiation emergencies shall be kept on file by the RSC and Plant Protection. The list shall contain the name and phone numbers of the health physics consultant.

13.3 The RSC should arrange with fire fighting personnel (in-plant or community) to plan for combating fires in areas which contain radioactive materials or in which radioactive materials may be involved. Such planning should include the evaluation of possible hazards.

13.4 Rooms or areas in which radioactive materials are stored should be inspected at least annually by the RSC and the Fire Department.

13.5 It shall be the responsibility of all personnel to immediately report any emergency involving radioactive materials to the RSC or, if he is unavailable, to plant protection. In the absence of the RSC, Plant Protection shall notify the personnel listed under 13.2.

13.6 Should an emergency occur, radiation sources located in the affected area should be turned off if an x-ray machine, or returned to their shielded position if a radioactive material source, provided such action does not jeopardize the safety of personnel.

13.6.1 Likely emergencies are:

- Fire
- Device struck by moving equipment
- Device struck by a falling object
- Process gauge struck by product being measured

13.6.2 The immediate area in which the radioactive material is located shall be evacuated and roped off to a distance which will insure that dose rates beyond the restricted area do not exceed 2 millirem in any one hour.

13.7 Should a shutter on a radiation producing device fail to operate as intended, a determination shall be made by the RSC as to whether the device can continue to be safely used. If it can be safely used, warning signs shall be posted on the device and all access points into bins or conduits on which the device is installed. The signs shall alert personnel that the shutter is not operating properly and that the RSC is to be notified prior to any work being performed on the device or prior to any entry into a bin or conduit on which the device is installed.

13.7.1 All such shutter failures shall be immediately brought to the attention of the health physics consultant and a report made to the NRC or PA DEP.

13.8 Supervision of a department possessing radiation producing devices has the responsibility of insuring that emergency plans are provided for all equipment under their control. This would include requesting restricted area distances for their particular sources from the RSC.

13.9 Only personnel trained to respond to radiation emergencies, meeting the requirements of Sections 8.1 through 8.3, and in possession of a properly operating and calibrated survey meter and radiation dosimeter badges shall be permitted to enter the restricted area.

13.9.1 Upon arrival of qualified personnel, appropriate steps shall be taken to confine the radioactive materials; warn other personnel who might be in the area; take immediate measures to decontaminate personnel if such is required; and by the use of available survey instruments, redefine the boundaries of the area to be restricted. Further corrective action, unless otherwise dictated by the circumstances of the emergency, shall await the arrival or recommendations of the health physics consultant.

13.10 Personnel present in an area in which a radioactive material source has been severely damaged shall be surveyed for contamination, and decontaminated if such action is required prior to leaving the facility.

13.11 Where there is a likelihood of significant airborne radioactive materials, personnel entering such areas shall wear respiratory protective equipment and anti-contamination clothing as recommended by the health physics consultant. The health physics consultant and the RSC shall recommend the selection of all respiratory protection equipment prior to its use. Appropriate respiratory protective equipment shall be used in accordance with plant procedures.

13.12 In the event of an accident involving radioactive materials while they are being transported outside of company property, personnel referred to in Section 13.2 shall be notified immediately. Immediate measures shall be taken to contain the material and to prevent exposure of employees or the general public, whenever possible. Dependent on the type and quantity of material being transported and the contamination and exposure potential, appropriate State authorities and/or the Nuclear Regulatory Commission and the U.S. Department of Transportation shall be notified regarding the accident. Reporting shall be through the RSC.

## 14. TRANSPORTATION OF RADIOACTIVE MATERIALS

14.1 Due to the complexity and changing requirements for the transportation of hazardous materials, the health physics consultant or the device manufacturer shall be contacted whenever radioactive materials have to be shipped from the plant.

14.2 **General Package Requirements:** There are general requirements for any packaging used to contain a hazardous material, of which radioactive materials are one type. There is a general performance specification for packages used for the shipment of radioactive materials typically used in gauging devices: Type 7A. The specifications require that the packaging not be substantially damaged or the contents released to the environment under the normal conditions of transportation. Other requirements are:

- The device containing the radioactive material shall be securely closed to prevent accidental opening during transport.
- The outer package shall have a security seal that is not easily breakable and is capable of showing that the package has not been opened. The health physics consultant can supply seals or guidance in sealing packages as required.
- Packages cannot have any dimension smaller than 4 inches, and internal bracing has to be provided to prevent the shifting of the device or inside container within the outer shipping package

14.3 The outer shipping container shall be free of removable contamination in excess of 22 dpm/cm<sup>2</sup> for gamma emitting gauge sources and 2.2 dpm/cm<sup>2</sup> for alpha emitting sources. To determine removable contamination, wipe an area on the outside of the package of at least 300 cm<sup>2</sup> (7" X 7") and check the wipe using the guidance in 15.5, except that the envelope should be marked "**Shipping Wipe -- Immediate Analysis Requested**". The health physics consultant will notify the facility of the analysis results.

14.4 **Postal shipments** may be made through the mail **only if**:

- No alpha, beta or neutron radiation is detected on, or through, the package surface.
- Gamma radiation levels must be below 0.05 mR/hr.
- The package does not contain special nuclear or source material, or more than 0.002 microcurie of other radioactive material.

14.5 **Excepted Packages:** Some radioactive materials may be shipped in unmarked outer packages. Contact the health physics consultant for applicable materials and quantities and internal labeling of the packages.

14.5.1 FedEx will usually accept these packages without any hazardous material declarations. UPS requires special packaging labels.

14.6 **Package Shipping Labels:** Three types of shipping labels are used for radioactive material packages. The health physics consultant can supply needed labels and guidance in completing the labels.

- **RADIOACTIVE I (WHITE)** – Any package having a surface radiation level not exceeding 0.5 mR/hr and no measurable radiation above background at 1 meter from the package.
- **RADIOACTIVE II (YELLOW)** - Any package having a surface radiation level of greater than 0.5 millirem/hr but not greater than 50 millirem/hr. The radiation measurement at 1 meter (Transport Index) has to be 1.0 or less.
- **RADIOACTIVE III (YELLOW)** -- Any package having a surface radiation level of greater than 50 millirem/hr but not exceeding 200 millirem/hr and a transport index greater than 1.0 but less than 10. **VEHICLES TRANSPORTING PACKAGES BEARING RADIOACTIVE III LABELS MUST BE PLACARDED.** The health physics consultant can supply required placards.

14.6.1 **No package can be shipped with a surface radiation level greater than 200 mR/hr or a Transport Index greater than 10!**

14.6.2 **The total of the Transport Indices of all packages in a shipment cannot exceed 50.**

14.7 A Shipper's Certification is to be completed for all shipments containing radioactive materials, even when private or company vehicles are used. This applies even when a company standard Bill of Lading is completed for common carriers. The health physics consultant can supply copies of a shipper's certification. The Shipper's Certification form must contain an emergency phone number that is answered 24 hours a day, 7 days per week, and where immediate Hazmat response information can be given over the phone. The health physics consultant can provide guidance and the emergency information in this matter. The certification must be signed.

14.7.1 If a placard is required, indicate; "**PLACARD--RADIOACTIVE**", or other special handling instructions, such as "**FOR CARGO AIRCRAFT ONLY**" on the Shipper's Certification..

14.7.2 If the material is being shipped via cargo aircraft, an additional form is required and may be obtained from the carrier. The requirements for air transport are international and tend to change periodically. It has been found that FedEx is the best shipper to use for air transport, international shipments and even ground shipments within the U.S. If the package is shipped via FedEx (even if not shipped by air) or by another carrier via air transport, a label indicating: "**FOR CARGO AIRCRAFT ONLY**" must be attached to the outer package and also marked on the Shipper's Certification form. These can be supplied by the health physics consultant or by FedEx. A different certification statement is also required.

14.7.3 Sufficient copies of the shipper's certification must be given to the driver of the first vehicle so that a copy can be passed on to each succeeding vehicle. A copy must also accompany the shipment if it is made using a private vehicle or company vehicle. One of the shipper's certification shall also be attached to the package.

14.8 When arranging for a common carrier, the carrier is to be told that the shipment will contain radioactive materials and if vehicle placards are required. **(All packages having a Radioactive III label require placards.)** If placards are required, the shipper is to have placards available if needed by the carrier. These may be obtained from the health physics consultant. Four placards are needed (both sides, front and back).

14.9 When radioactive materials are to be transported over public roadways by company or private vehicles, the following conditions shall be observed in addition to those previously listed.

14.9.1 The container shall be secured in **a closed** transporting vehicle in such a manner that its position will be maintained under conditions normally incident to transportation. A tarp over a pickup or over the top of a stake body truck is considered a closed vehicle if it fully encloses the cargo area.

14.9.2 The vehicle shall be surveyed after loading. External radiation levels on the outer surface of the vehicle shall not exceed 2 millirem per hour at 1 meter from the vehicle. The vehicle shall be placarded, if required, in accordance with Section 14.8.

14.9.3 A responsible person at the intended destination shall be notified of the departure of the shipment and the estimated time of arrival. Acknowledgement of receipt of the shipment shall be made to the originating plant by telephone.

14.9.4 The driver of the vehicle shall be given instruction in radiation safety and the pertinent aspects of the transportation of radioactive materials. The driver shall also be instructed to notify the responsible person at the shipment origin and destination should unusual delays be encountered en-route.

14.9.5 The driver shall have a copy of the Shipper's Certification listing the contents.

14.9.6 In the event of an accident en-route, the responsible person at the shipment origin shall immediately initiate the appropriate measures of Section 13, EMERGENCY PROCEDURES, upon notification by the driver. The RSC shall be immediately notified.

14.9.7 Should the transporting vehicle be overdue at its destination and unreported for a period of two hours or more, an immediate search shall be initiated. The RSC shall be immediately notified.

14.10 In the case of radioactive materials being shipped for disposal at a licensed low-level radioactive waste disposal site or those sources being returned to a manufacturer, the shipper shall request immediate notification of the receipt of the shipment by the receiving company. If notification of receipt is not received within 20 days, an investigation shall be initiated by the RSC. The health physics consultant shall be notified.

14.11 There are specific requirements for the packages used to ship radioactive materials. Any container used to ship a hazardous material must be tested against U.S. Department of Transportation (USDOT) specifications and it is required that the shipper have a copy of the test results. The health physics consultant can provide container guidance and copies of test results, and required package markings.

14.12 **Radiation Training of Transportation Personnel.** The US Department of Transportation requires shippers who are likely to cause an annual dose in excess of 100 millirem to an employee of a common carrier to provide radiation safety training to such personnel. A determination was made by Bethlehem Steel Corporation that this is not likely based on Bethlehem's past experience with shipping radioactive materials. This has not changed following the purchase by ISG and Mittal Steel, or under ArcelorMittal Steel.

14.12.1 If any package requires a Radioactive III label or more than five shipments are made in a year of packages requiring a Radioactive II label, the corporate health physics consultant is to be notified to make sure the training requirements have not been exceeded.

## 15. LEAK TESTING

15.1 Sealed radiation sources shall be leak tested prior to initial use and every six months thereafter or at intervals specified by applicable regulations or licenses. The testing is for the purpose of detecting faulty or damaged containment capsules, which may permit the escape of radioactive material to the environment.

15.2 Leak test wipes shall be taken by personnel meeting the requirements of either Sections 8.1 through 8.4 in accordance with the procedures in this Section. The health physics consultant will supply wipe test kits.

15.3 Analyses of leak test samples shall be performed by the health physics consultant, unless otherwise authorized by the radioactive material license.

15.4 The sensitivity of analytical procedures shall be capable of detecting a minimum activity of 0.001 microcurie.

15.5 Immediately following sampling, the wipes shall be checked with a thin window Geiger survey meter as follows:

15.5.1 Move away from all sources of radiation, turn the meter to its lowest scale and make a background reading. It should not exceed 0.025 mR/hr. If it does, move farther away and reread.

15.5.2 Place the wipe near the probe window of the Geiger counter and measure. The reading should not exceed 0.05 mR/hr. If higher readings are obtained, or if you cannot obtain a reasonable background reading, call the health physics consultant.

15.5.3 If the wipe meets the above limits, place it in the labeled envelope making sure all information is completed, other than the last line on the label. Close the envelope by tucking in the flap. **DO NOT LICK ENVELOPE.** If corrections are required to the information, mark them on the label. **DO NOT OBLITERATE THE ORIGINAL SERIAL NUMBER.**

15.5.4 Should the radiation levels exceed .05 milliroentgen per hour at a point in close proximity to the sample, place wipe in the labeled envelope and the labeled envelope in a plastic bag (Ziploc is

acceptable), seal the bag and place it in envelope and seal the envelop. **DO NOT LICK ENVELOPE.** Radiation levels on the outer surfaces of the envelope **cannot exceed 0.05 mR/hr**. If they do, notify the health physics consultant.

15.5.5 Send the envelope(s) to:

A. LaMastra  
Health Physics Associates, Inc.  
1005 Old Route 22  
Lenhartsville, PA 19534

15.5.6 Following completion of testing, wash your hands.

15.6 Should a leak test reveal the presence of transferable activity of 0.005 microcurie or more, the health physics consultant shall immediately inform the RSC who shall initiate steps to have the device immediately withdrawn from service, decontaminated, repaired or disposed of. This is a reportable incident and a report to the DEP must be made within 5 days of notification.

15.7 Leak testing shall be accomplished by one of the following methods depending on the type of device or source. In all cases the person making the wipe should wash his hands following testing. **DO NOT, UNDER ANY CIRCUMSTANCES, BRING YOUR HANDS WITHIN 6 INCHES OF AN UNSHIELDED SOURCE CAPSULE.**

15.7.1 **Sources Used In Gauging Devices** - Gauging devices are constructed in such a manner that there are only a few areas where the radioactive material can escape to the environment if the source capsule should leak. Sealed radiation sources contained in devices for the measurement of liquid and solid level, density or thickness and other equipment in which the source is permanently mounted in a shielded position are included in this category.

15.7.1.1 The primary hazard associated with the leak testing of this type of sealed source is the possibility of radiation exposure from those gauge systems having an accessible radiation beam between the source housing and detector.

15.7.1.2 At the time of the initial survey, the person performing the initial survey shall determine the areas where leak test wipes should be made on the gauge housing.

15.7.1.3 The same gauge housing areas shall be wiped during subsequent leak tests. The resulting wipe shall be surveyed for excessive contamination as described in Section 15.5 and placed in an envelope.

15.7.1.4 At the time the leak test is made, the person making the test shall operate, or have operated, the shutter mechanism on all gauging systems having a shutter. Any malfunction or difficulty in moving the shutter is to be noted on the leak test envelope, and also brought to the attention of the operating department responsible for the gauge system. Operating departments shall be notified beforehand that the shutter will be temporarily closed for testing.

15.7.2 **"Free Air" Sources** - "Free Air" sources are those, which are not incorporated in remote handling devices or shielded source holders. The sources may exist as individual source capsules, source capsules attached to a pole or threaded rod, tongs, or handled by tongs or remote handling tools.

15.7.2.1 The primary hazard associated with the leak testing of "free air" sources is that of external radiation exposure. The test should be performed as rapidly as possible in a manner which makes maximum use of available shielding, such as the source storage container or lead or refractory bricks.

15.7.2.2 The source shall be removed from the storage container using an approved handling tool and wiped with a cotton swab. **DO NOT PICK UP THE SOURCE CAPSULE WITH YOUR HANDS**, unless it is an exempt source used to check survey meter operation. The wipe shall then be surveyed for excessive contamination as described in 15.5 and placed in the accompanying labeled envelope.

15.7.2.3 After wiping, the source shall be immediately returned to the storage container.

## **16. RECEIVING AND STORAGE OF RADIATION SOURCES AND DEVICE SECURITY**

16.1 All radioactive materials shall be stored in a manner that will not present a radiation exposure hazard. The method of storage shall preclude unauthorized access, removal or handling and maintain personnel exposures as low as reasonably achievable.

16.2 When notified by the manufacturer that a source is being shipped, The RSC shall notify the Receiving Department that a radioactive shipment is anticipated and that the RSC is to be notified upon its receipt or the arrival of the truck at the gate.

16.3 All storage areas shall be capable of being locked. Access shall be controlled by the RSC. All incoming shipments containing radioactive materials shall be placed in this locked storage area upon receipt. This includes materials purchased by a turnkey contractor.

16.4 All shipments containing radioactive sources should be marked, by the manufacturer, with the standard wording as described in Section 4.8. This is to alert receiving personnel of the need to notify the facility's RSC.

16.5 Upon receipt of a shipment containing a radiation device, the Receiving Department shall immediately notify the RSC.

16.5.1 If it is not possible for receiving to contact the RSC or an alternate designated by the RSC, then Receiving is to contact the health physics consultant (610) 756-4153 for instructions on how to handle the shipment.

16.6 All incoming radioactive material shipments shall be examined by the RSC or an authorized delegate to see if the radioactive material security seal is intact. If the seal is missing or broken, the package shall be examined for obvious damage or tampering. If the package shows obvious damage or tampering, it shall be noted on the shipping papers and the health physics consultant shall be immediately notified.

16.7 All incoming packages containing radioactive material that is **not special form or exceeds 27 Ci of cesium 137, 8 Ci of cobalt 60 or 16 Ci of americium 241** shall be surveyed within 3 hours of receipt (during normal working hours), or within 18 hours if received after normal working hours.

16.7.1 The outside of the shipping container is to be monitored with a survey meter for external radiation levels at the surface and at 1 meter. The radiation level should not exceed 200 mrem/hr against the package surface or 10 mrem/hr at 1 meter (3.3 feet) from any surface. If it does, contact the health physics consultant immediately.

16.7.2 This survey can be made with an ionization chamber meter or a Geiger counter. Sources containing beryllium or lithium incorporated with an alpha emitter such as americium, plutonium, polonium or radium, emit neutrons, which must also be included in the survey results. The health physics consultant has surveyed common neutron emitting gauges used in the steel industry and prepared a generic survey report. If a gamma survey is taken of the same gauge model, it can be compared to the gamma intensities listed in the generic survey for the same model performed by the health physics consultant. In this way, a correction factor can be obtained to arrive at a total dose rate including both gamma and neutron components, using only an initial gamma reading.

16.7.3 For those packages meeting the dose rates in 16.7.1, wipe the outer surfaces of the shipping package, especially around the seams, with a cotton tipped swab. (It is not necessary to wipe the device itself unless the source housing serves as the shipping package.) Cotton swabs are available from the dispensary on short notice, or they can be provided by the health physics consultant if notified ahead of time.

16.7.4 Check each wipe with a thin end-window GM meter as in 15.5. Other detectors will not be sensitive enough for this type of check.

16.7.5 Indicate on the envelope, "**Receipt Wipe--Immediate Analysis**" and send the envelope(s) for final analysis to:

A. LaMastra  
Health Physics Associates, Inc.  
1005 Old Route 22  
Lenhartsville, PA 19534

16.7.6 Wash your hands after making the wipe test.

16.7.7 If the shipment is intended for immediate use and the package meets the specification in Section 16.7.1 through 16.7.4, the RSC can then release it for use. If it is not to be used or installed immediately, the shipment is to be securely stored.

16.8 Special form sources are not required to be leak tested unless they exceed 27 Ci for cesium 137, 16 Ci for americium 241 or americium-beryllium, or 7 Ci for cobalt 60.

16.9 The RSC should receive a copy of the shipping papers and a copy of the manufacturer's leak test report. The RSC shall also update his source inventory to show receipt of the new source and the date received. If no leak test report is provided by the manufacturer, one will have to be taken before the

device can be installed or placed into service. The appropriate procedures in Section 15 should be followed.

16.10 Radiation sources may not be removed from storage without notifying and receiving the approval of the RSC.

## **17. DISPOSAL OF RADIATION SOURCES**

17.1 Disposal or transferal of radioactive materials is to be made through the RSC.

17.2 The health physics consultant can assist in arranging for the disposal of all radioactive materials and advise the plant on packaging and manifesting requirements.

17.2.1 A copy of all shipping papers and radioactive material disposal records shall be maintained by the RSC.

17.3 X-ray equipment may be scrapped as desired. Any x-ray machine to be scrapped shall be so altered that it cannot be re-energized. A memorandum describing the method of disposal and date is to be maintained by the RSC.

17.3.1 Normally, the x-ray tube and any cooling oil, if used, does not contain PCBs; however, for older equipment (pre-1970), an inquiry of the manufacturer is advisable. Most analytical x-ray tubes have beryllium windows to permit the transmission of low energy (< 30 keV) x-rays. The window is solid beryllium, typically less than 2 centimeters in diameter and less than 1 millimeter in thickness, with a mass of less than 0.4 gram. This should not pose a disposal problem because of the low quantity of beryllium. However, it is advisable to inquire from the state agency regulating solid waste if there is a quantity that is "below regulatory concern" for beryllium before disposing as normal trash.

17.4 If an x-ray machine is to be transferred to another facility, a formal letter of transfer shall be written to the recipient with a copy maintained by the RSC.

## **18. INDUSTRIAL RADIOGRAPHY**

18.1 Industrial radiography shall be considered to include all non-destructive testing of materials for the examination of such macroscopic physical characteristics such as the incidence of cracks, holes or inclusions, by methods or procedures utilizing radiation sources, except that operations, procedures and methods employing radiation sources in laboratory analyses (for example, x-ray diffraction), thickness and coating thickness gauges, level indicators or controls, density gauges or other similar applications, and medical diagnostic radiography (which are covered in Sections 19, 20 and 21) shall not be classified as industrial radiography.

18.2 The following policies apply to all industrial radiographic operations in the plant by vendors contracted to perform industrial radiography. These regulations shall be made a part of the service contract.

18.2.1 Radiography shall only be performed by persons or firms currently licensed by the NRC or by a State agency having jurisdiction, using currently licensed or registered equipment.

18.2.2 No radiography shall be performed unless calibrated and operable survey instrumentation having a range of two milliroentgens per hour through at least 1000 milliroentgens per hour is available and used.

18.2.3 All open shop radiography shall be conducted within a restricted area, which shall be enclosed by some means of area definition. Such barriers or restrictions shall be located so as to enclose the entire area where radiation levels exceed 2 millirem in any one hour. No plant worker shall enter the restricted area unless he is wearing a personnel radiation monitoring dosimeter and an alarming dosimeter or is carrying a survey meter having an over-range alarm feature. The boundary of the restricted area shall be posted with signs bearing the words, "**CAUTION--RADIATION AREA.**"

18.2.4 Within each restricted area, signs bearing the words, "**CAUTION--HIGH RADIATION AREA,**" shall be conspicuously placed in the area surrounding the collimator or guide tube exposure tip so that approaching persons may be warned of the location of the radiation source and surrounding high radiation area.

18.2.5 Whole body exposures of non-radiography personnel working in unrestricted areas shall not exceed 2 millirem in any one hour or 100 millirem in a year, and when practical shall be maintained as low as reasonably achievable. Guidance on permissible exposure rates is provided in the following tables.

18.2.5.1 Person exposed for 20 hours or less in a year.

Maximum Exposure Time In Minutes in Each Hour	Maximum Radiation Intensity At Restricted Area Barrier (mR/hr)
No Limit	2
24	5
12	10
6	20

18.2.5.2 Person exposed for more than 20 hours in a year.

Maximum Exposure Time In Minutes in Each Hour	Maximum Radiation Intensity At Restricted Area Barrier (mR/hr)
No Limit	0.05
24	0.13
12	0.25
6	0.50

18.2.6 All radiographic sources shall be continually attended by a radiographer or assistant radiographer with an operating and calibrated survey meter whenever the radiographic source is in an exposed position.

18.2.7 All unlocked doors, roping and other temporary restricted area boundaries shall be under the direct surveillance of a radiographer or assistant radiographer immediately preceding and during the time that the radiographic exposures are in progress.

18.2.8 When radiography is to be performed in any area other than that in which it is normally done, the RSC and Plant Patrol shall be notified as to the location of the proposed radiographic area, the approximate time and duration of the work, the type of radiation source to be used, the period of time the source will be in the area and the name of the responsible radiographer.

18.2.9 All radioactive material sources shall be securely locked in their shielded containers when not attended by a radiographer. During periods when such sources are not required for radiography, they shall be stored within locked enclosures meeting the requirements of the NRC's Increased Controls Order. Security precautions shall be such as to prevent unauthorized contact with the source, unauthorized exposure of the source, or removal of the container. The storage area shall be restricted in such a manner so as to prevent radiation intensities in unrestricted areas in excess of 2 millirem in any one hour and shall be conspicuously posted with a radioactive material warning signs. X-ray machines shall be electrically disconnected and placed in a locked container when not in use and secured against unauthorized use or removal.

18.2.10 All portable x-ray machines shall be equipped with a cone or collimator. The cone or collimator should be matched to the size film being used, when practical. Both the cone and collimator shall be attached flush to the x-ray machine.

18.2.11 Whenever a remote controlled exposure device is used, the radiation intensity at the operator's position shall be continuously measured during the extension and retraction of the source to insure that it has not become immobile in the source guide tube.

18.2.12 Following each radiographic exposure, whether with an isotope or x-ray source, the source shield or x-ray tube port shall be surveyed to insure that the source has been returned to the shielded position or, for an x-ray machine, to insure that the radiation exposure has terminated.

18.2.12.1 In the case of radioactive sources, this survey shall include the exposure device, guide tube(s) and collimator, if used. Additionally, the source shall be locked following its return to the shielded position after each exposure.

18.2.13 When radiation sources are used in an “open shop” mode, a survey of the radiation levels at the unrestricted area boundary shall be made by the radiographer or assistant radiographer immediately following exposure of the source or the energizing of the radiation machine. Roping, barricades or other means of area definition shall be repositioned, if necessary, to properly enclose the restricted area as required in 18.2.5. Surveys between individual exposures are not necessary when a number of similar exposures are to be made of the same material, thickness, beam orientation, and no change is made in the radiation source, such as an increase in x-ray voltage or current or a change in sealed source strength. Spot surveys may be made to periodically confirm adequate restricted area definition. The radiographer or the assistant radiographer shall record all initial boundary surveys. If the exposure time is too short to affect an adequate boundary survey, a test exposure shall be made for the purpose of determining the boundary exposure rates and readjusting the boundary if necessary. During the test exposure, no ArcelorMittal personnel shall be near the restricted area boundary unless they have an operating survey meter.

18.2.14 At the conclusion of a radiography assignment employing a sealed source or before moving the source shield, a radiation survey shall be made by the radiographer or the assistant radiographer to assure that the source is in the shielded position. Another survey shall be made upon securing the device in its storage location or in the transport vehicle. Records shall be kept of these surveys.

18.3 The RSC shall be notified by plant purchasing or the department requesting the radiography of all jobs involving vendor radiography. This notification shall include:

- The vendor's name, address and phone number;
- The vendor's NRC or state license number;
- The types of items to be radiographed;
- The location of the restricted area;
- The time of day radiography is to be performed;
- The intended sources and strengths;
- The length of the service contract.

18.4 Vendors shall provide a minimum of two trained radiographers to perform contracted radiographic operations. Both shall have been instructed in and understand the safe method of returning the radioactive source to an adequately shielded container or how to turn off the x-ray machine, should the radiographer become unable to do so; and how to make proper radiation protection surveys and interpret the results.

18.5 It is the vendor's responsibility to provide personnel monitoring dosimeters to all non-ArcelorMittal Steel personnel entering a restricted area. In the event the vendor fails to provide dosimeters to outside inspectors, dosimeters will be provided by the RSC. All plant employees shall be provided dosimeters by the RSC.

18.6 Inspectors, either ArcelorMittal Steel employees or contractor employees, required to enter a restricted area will be given instruction by the vendor radiographer or the plant RSC that:

18.6.1 They are not to enter a restricted area during an exposure.

18.6.2 They may enter the restricted area only after they personally observe that the radiographer has returned the source to its shielded position and has made a survey of the collimator, guide tube and source shield.

18.6.3 All inspectors are to have an operating survey meter whenever they enter a restricted area. Meters are available on loan from the RSC. Instructions will be provided in the proper use of the meter by the RSC.

18.7 All vendors performing radiography for the plant shall be given a copy of these regulations and shall govern their operations in accordance with these regulations and the regulations of the applicable regulatory agency.

## 19. GAUGING DEVICES

19.1 **General Requirements:** All gauging systems shall comply with these requirements as applicable.

19.1.1 All maintenance and calibration shall be performed by personnel meeting at least the training requirements of Section 8.4 and who are familiar with the equipment and the correct procedures to be followed.

19.1.2 All personnel who routinely maintain radiation producing gauges shall wear radiation personnel monitoring devices as required by Section 9.

19.1.3 During external calibration, standard samples shall be inserted into the primary radiation beam by means of a device that keeps the hands out of the primary measurement beam, unless the gauge shutter has been placed in the beam path.

19.1.4 X-ray tubes shall not be energized unless installed in a shielded tube enclosure except for testing purposes by trained maintenance personnel, and only when adequate external shielding is provided or when performed in a restricted area posted with appropriate radiation warning signs.

19.1.5 All safety features such as shutters, warning lights and interlocks shall be tested at least annually for reliable performance, and the date and test results documented.

19.1.6 The area near the tube housing of all x-ray gauges as well as the control panel is to contain a warning sign alerting personnel to existence of an ionizing radiation beam when energized.

19.1.7 Gauging devices in which it is possible to insert any part of the body shall be posted with a warning sign(s) alerting personnel of a radiation beam in the air gap. The sign(s) shall be visible from the normal avenues of approach to the gauging device.

19.1.8 All gauges containing radioactive materials shall be equipped with a durable label which bears the words, **CAUTION--RADIOACTIVE MATERIAL**, the kind and quantity of the radioactive material contained, the date on which the material was assayed, the device manufacturer, the model number and the serial number of the device. These labels shall be replaced when worn.

19.1.9 Bins, cupolas or conduits large enough to permit a person to enter shall have a warning sign posted at all access points. The sign(s) shall have wording similar to the following. Standard plant Lock Out/Tag Out procedures are to be followed.

**A RADIATION GAUGE IS INSTALLED ON THIS BIN**  
**CONTACT           (TITLE)           AT           (PHONE EXT.)**  
**TO LOCK OUT GAUGE SHUTTER BEFORE ENTERING**

19.1.10 Warning tags and signs shall be of durable construction and suitable for the environment in which the gauge is located.

19.1.11 Installation or relocation of the device containing the radiation source shall be performed only under the supervision of the RSC, health physics consultant or a person authorized by the license.

19.1.12 When an installation having a gauging device is to be inactive for any prolonged period of time, the shutter shall be locked in the closed position, following plant Lock out/Tag Out procedures.

19.1.13 JSAs, SOPs or other written procedures shall be prepared for personnel performing maintenance and calibration on gauging system. The procedure shall be approved by the RSC before final issue. It shall include whether radiation monitoring badges are required, precautions to be taken and methods of protection. The procedure shall also describe lock out/tag out procedures and procedures for bypassing and removing bypasses from safety systems, if necessary for maintenance and calibration. These procedures shall be reviewed with maintenance personnel prior to the beginning of the job.

19.1.14 JSAs, SOPs or other written procedures shall be prepared for electrical, mechanical, labor, or other maintenance personnel who work on or around equipment on which gauging devices are installed. The instruction shall stress the meaning of any warning signs or lights, that maintenance crews shall not enter a restricted area with the source exposed, and whom supervision of the crew is to notify to lock out and tag out the radiation source shutter when work is to be performed on or near equipment having radiation sources installed. These procedures shall be reviewed with the maintenance crew prior to beginning the job. The procedures shall be approved by the RSC prior to final issue.

19.1.15 Personnel having occasion to enter bins, cupolas or large conduits on which a radiation gauge is installed shall not enter the bin, cupola or conduit until they have arranged for the gauge shutter to be locked in the off position and tagged, and a radiation survey has been made of the interior to assure that the gauge is off.

19.1.16 Unless it is necessary for the x-ray tube to be energized during maintenance to the tube enclosure and/or the detector, the power supply to the tube shall be positively interrupted by such means as the removal of fuses and locking and tagging main disconnect switches in the "off" position.

19.1.17 An initial survey shall be made of all new installations or relocations of gauging devices. The survey is to be made by the RSC, health physics consultant or other individual authorized by the license to make an initial survey. The initial survey shall identify nearby workstations and the frequency of personnel occupancy in nearby areas. Radiation exposure rates in these areas shall be determined. Required posting of warning signs and any restriction on personnel occupancy shall also be indicated in the survey report, as well as the need for personnel dosimetry.

19.1.18 A quality control program shall be instituted to make periodic checks of all warning signs and lights to assure they are kept legible and the meaning of warning lights is clear. Additionally, the manufacturer's identification tag shall also be checked to make sure it is still legible.

## 20. X-RAY DIFFRACTION AND SPECTROSCOPY TYPE EQUIPMENT

20.1 Analytical equipment of this type is usually operated in the range of 10 to 100 kVp, and usually with minimal beam filtration. Beam currents may range from 10 to 100 mA. The resultant primary beam, therefore, has an exceedingly high radiation intensity and is capable of causing severe burns to the hands and fingers from both the primary and secondary beams. It is also possible for considerable stray radiation to result from scattering by the sample material or auxiliary equipment. The following shall be observed regarding this type of equipment.

20.2 No part of the body shall be placed in the sample area while the primary beam is present. In those cases where it is necessary to manually position the sample in the area of the primary beam, the x-ray tube shall be de-energized or the primary beam adequately attenuated during such sample positioning by means of a failsafe interlocking shutter, which prevents the entry of any part of the body into the primary beam or causes the primary beam to be shut off or adequately attenuated upon entry into its path.

20.3 Shutters, interlocks, warning lights and other safety devices shall be tested at least annually. It is good practice for the operator to check that these safety systems are functioning at least weekly. The personnel who operate or service the x-ray system shall perform such tests. The annual tests must be documented.

20.4 Unless otherwise necessary, all maintenance on the system shall be performed while the power supply to the tube is positively interrupted by such means as fuse removal or tagging and locking switches in the "off" position.

20.4.1 Should it become necessary to perform maintenance with the power supply on or with any safety system bypassed, a check list shall be developed describing the step-by-step procedures for pre-maintenance, maintenance and post-maintenance work. This checklist shall be completed by both the technician and supervisor, and approved by the RSC and signed, dated and retained. A sign stating **"SAFETY DEVICES BYPASSED"** shall be placed at the control panel and at the x-ray tube, and not

removed until the bypass is removed and the bypassed safety system restored, checked and found to be working properly. If power is required, personnel working close to the radiation beam shall wear finger dosimeters.

20.5 A label bearing the words "**CAUTION--RADIATION--THIS EQUIPMENT PRODUCES RADIATION WHEN ENERGIZED**" shall be placed near any switch, which energizes an x-ray tube.

20.6 A sign bearing the words "**CAUTION--HIGH INTENSITY X-RAY BEAM**" shall be placed immediately adjacent to each tube head and sample area. The sign shall be so located that it is clearly visible to any person having access to the primary and secondary radiation beams.

20.7 A failsafe light indicating the presence of an x-ray beam shall be provided on all "open beam" equipment, on or immediately adjacent to each tube head, and located so that it is clearly visible to any person operating, aligning or making adjustments to the apparatus, or changing samples. The light shall be adequately labeled as to its meaning.

20.8 On "open beam" equipment, indication of the status (i.e., open or closed) of every beam port shutter shall be provided and be so located that it is clearly visible to any person operating, aligning or making adjustments to the apparatus, or changing samples. The indicator shall be adequately labeled as to its meaning. Whenever feasible, the indicator shall be a light of a "fail safe" design.

20.9 Unused tube ports on "open beam" equipment shall be secured in such a fashion that accidental opening is not possible.

20.10 Radiation surveys using thin window detectors shall be performed to insure that operations are conducted safely following initial installation, on an annual frequency, whenever changes to the physical configuration of the equipment are made, following any maintenance or alignment procedure, following the addition of new components, or any time a visual inspection reveals an abnormal condition.

20.11 No person shall be permitted to operate or maintain analytical x-ray equipment unless such person has received instruction and demonstrated competence in the:

20.11.1 Safe operation of the equipment;

20.11.2 Identification of radiation hazards associated with the use of the equipment;

20.11.3 Significance of the various radiation warning and safety devices incorporated into the equipment, or the reasons they have not been installed on certain pieces of equipment and the extra precautions required in such cases;

20.11.4 Proper operating procedures for the equipment;

20.11.5 Symptoms of an acute localized exposure, and

20.11.6 Proper procedures for reporting an actual or suspected exposure.

20.12 In cases where the primary x-ray beam is not intercepted by the experimental apparatus under all conditions of operation, protective measures shall be provided, such as auxiliary shielding, to avoid exposure to the secondary x-ray beam.

20.13 All tube housings shall be interlocked so that opening the housing will interrupt current to the x-ray tube.

20.14 Records of surveys made under 21.10 or annual tests made under 21.3 shall be maintained for a minimum of 5 years.

20.15 A JSA, SOP or other written procedure shall be prepared for each normal operating, alignment or maintenance procedure used. The procedure shall be approved by the RSC before final issue. It shall specify whether personnel radiation monitoring badges shall be worn, precautions to be taken, and the methods of protection to be taken. The procedures shall also describe methods of installing and removing bypasses from the various safety systems if bypassing is necessary for alignment, maintenance or calibration. A copy shall be available to be used by operating and maintenance personnel.

## 21. ELECTRON MICROSCOPES

21.1 An initial survey shall be made of each electron microscope installation.

21.2 Radiation surveys shall be made whenever the accelerating column is dismantled and reassembled.

21.3 Each electron microscope shall have a warning tag that states, "**CAUTION - THIS EQUIPMENT PRODUCES RADIATION WHEN ENERGIZED**" placed near the switch that initiates the production of the electron beam.

## 22. INSTRUMENT CALIBRATIONS

22.1 All survey meters used for radiation protection surveys shall be calibrated at a facility approved by the RSC on at least an annual frequently, or following the replacement or repair of a major component that affects the calibration (detector, cable, integrated circuit component, etc.).

22.2 Radiation protection surveys include all surveys in which the radiation exposure or dose rate is determined for the purpose of: (1) protecting personnel; (2) informing personnel of the intensity of a radiation field or the quantity of radioactive material in a particular location; (3) assuring that a radiation source is "off"; (4) determining personnel radiation dose; or (5) surveys of packages containing radioactive material that are being received or shipped.

### 22.3 Instruments used for gamma or x-ray radiation protection surveys

22.3.1 Cesium 137 shall be the normal calibration source for instruments used for general gamma and x-ray surveys, unless the instrument is used exclusively for americium 241 or low energy x-rays below 150 keV, in which case it shall be calibrated to the 60 keV photons of americium 241.

22.3.2 For those instruments used primarily to survey devices containing americium 241 or x-ray energies below 150 keV, but also used to survey devices containing cesium 137 sources, the primary calibration shall be to the 60 keV photon of americium 241 and the secondary calibration to cesium 137.

22.3.3 For those instruments used to survey devices containing cobalt 60 or high energy gamma or x-rays exceeding 1000 keV, either exclusively or along with other radioactive materials, the instrument shall be calibrated to cobalt 60 photons. If the instrument is exclusively or primarily used for cobalt 60, the primary calibration shall be to cobalt 60, with the americium 241 and/or cesium 137 being the secondary or tertiary calibrations.

### 23. REPORTING OF EXPOSURE INCIDENTS

23.1 Personnel shall immediately notify supervision of any unusual situation involving a radiation producing device.

23.2 Supervision shall immediately notify the RSC if it appears that the unusual situation could have caused unnecessary radiation exposure. If the RSC is unavailable, the health physics consultant shall be notified at (610) 756-4153 (voice) or (610) 756-0042 (FAX).

23.3 The following incidents are required to be reported to the DEP within the reporting time limit indicated. The RSC or health physics consultant shall make all reports.

23.3.1 **Immediate telephone report**--An immediate notification shall be made upon determining that one of the following situations has occurred.

23.3.1.1 Incoming shipments of radioactive materials which show excessive surface contamination, surface radiation dose rates in excess of 200 millirem per hour, or dose rates at 1 meter from the package surface in excess of 10 millirem per hour.

23.3.1.2 The theft or loss of a radiation source.

23.3.1.3 Any incident which may have caused or threatens to cause: (1) an effective dose equivalent to radiation workers of 25 rem or more; (2) a shallow dose equivalent to the skin or extremities of 250 rem or more; (3) an eye dose equivalent of 75 rem or more, (4) release of radioactive material that could cause an intake of 5 times the occupational annual limit on intakes (averaged over 24 hours), or (5) the loss of one working week or more due to damage to a radiation source or caused by a radiation source.

23.3.2 **Twenty-four hour report**--Notification within 24 hours shall be made upon determining that one of the following incidents has occurred.

23.3.2.1 Any incident, involving a radiation source, which may have caused or threatens to cause: (1) an effective dose equivalent exceeding 5 rem.; (2) a shallow dose equivalent to the skin or the extremities exceeding 50 rem; (3) an eye dose equivalent exceeding 15 rem; (4) release of radioactive material that could cause an intake exceeding the occupational annual limit on intake, or (5) the loss of one working day or more due to damage to a radiation source or caused by a radiation source.

23.3.2.2 The discovery of any event or incident that involves the malfunction, disabling or failure of shutters or other devices that control the radiation source or the radiation beam, or which would mitigate the consequences of an accident. Examples include any incident that prevented shutters from being closed, melted shielding, a fire or explosion involving the radiation source housing.

23.3.3 **Five-day report**--Notification within 5 working days shall be made upon determining that a radioactive material source capsule has lost its ability to fully contain the radioactive material (leaking source).

23.3.4 **Thirty day written report**--A written report shall be made to the applicable regulatory agency within 30 days of the discovery that a reportable incident as listed in 24.3.1 through 24.3.3 has occurred, plus any incident listed in 24.3.4.1 through 24.3.4.4.

23.3.4.1 A dose to a fetus of a declared pregnant female exceeding 0.5 rem.

23.3.4.2 Exposure of minors or the general public in excess of the annual limits for these classes.

23.3.4.3 Exposures in a restricted area exceeding any limit specified in the radioactive material license.

23.3.4.4 Radiation levels in unrestricted areas in excess of 20 mR/hr.

23.4 Notification of the incident circumstances, the assigned dose and the potential consequences of that dose shall be made to any employee exposed during any incident described in Sections 24.3.1 through 23.3.4.4. Such notification shall be in writing and be made by the RSC or the health physics consultant no later than the time the written report is sent to the regulatory agency.

23.5 All written reports shall be prepared in such a way that the name, identification number and date of birth of all exposed persons are on a separate and detachable part of the report.

## 24. REPORTING OF DEFECTS UNDER 10 CFR 21

24.1 This Section provides procedures to assure compliance with Title 10, Code of Federal Regulations, Part 21, or applicable state regulation, as it pertains to the procurement, possession and use of byproduct, source or special nuclear material; or services involving byproduct, source or special nuclear material.

24.2 The plant General Manager, is the responsible officer for the purposes of 10 CFR Part 21.21(a).

24.2.1 The plant RSC and the health physics consultant shall be responsible under this Section for:

24.2.1.1 Advising the General Manager of a failure to comply or a defect as defined in Part 21.

24.2.1.2 Notifying the U.S. Nuclear Regulatory Commission, as required by 10 CFR Part 21.21(b).

24.2.1.3 Having the necessary investigations performed to determine if a deviation is a defect.

24.2.1.4 Having suppliers notified of suspected deviations or defects through the Purchasing Department.

24.3 Assistance in achieving these tasks will be provided by the health physics consultant.

24.4 The RSO shall review these regulations with all affected Departments in the facility.

24.5 Some examples of deviations which shall be reported to the RSO and the health physics consultant are:

- Incoming shipments significantly exceeding Transport Index values.
- Incoming shipments exceeding 200 mrem/hr at the surface of the outer shipping container or 10 mrem/hr at 1 meter from the surface of the package.
- Newly purchased devices exceeding leakage rates of 5 mR/hr at 1 foot (30 cm) from the surface of the device.
- Incoming shipments exceeding the package surface contamination limits of 2200 dpm/100 cm<sup>2</sup> for beta/gamma emitting radionuclides and 220 dpm/100 cm<sup>2</sup> for alpha emitting radionuclides.
- Incidents, which could result in personnel exposures in excess of 5 rem in restricted areas or 0.1 rem in unrestricted areas.

24.6 The RSC or health physics consultant shall notify the General Manager of all failures to comply with the Atomic Energy Act of 1954, as amended, or any applicable rule, regulation, order, or license condition of the Commission relating to substantial safety hazards and all deficiencies. The RSC or health physics consultant shall also initiate an investigation to determine if a deficiency is a defect.

24.6.1 In those instances in which the RSC or the health physics consultant is not able to make this determination, the General Manager shall be advised.

24.6.1.1 The General Manager shall have the Purchasing Department notify the supplier of the defective component or service of the deviation and request assistance from the supplier in making the determination.

24.6.1.2 If the supplier is unable or unwilling to assist in the determination, the General Manager shall notify the NRC or applicable state regulatory agency of a suspected defect.

24.6.2 In those instances in which the RSC or the health physics consultant determines that a defect does exist, the General Manager shall be informed and the NRC notified by telephone within 2 days of such determination. A written report shall be submitted to the NRC within 5 days.

24.6.2.1 The information to be submitted in the written report shall include:

- Identity of the basic component or service.
- The nature of the defect or failure and the safety hazard created or that could be created by the defect or failure.
- Identity of the date the information was obtained.
- List of all locations where the basic component or service may be in use or take place.
- A description of the corrective actions taken or being taken.
- Information related to the defect or activity that has been, or will be given to personnel.

24.6.3 In those instances in which the RSC or the health physics consultant determines that a defect does not exist, a file memorandum documenting the conclusions and all supporting information shall be forwarded to the General Manager for concurrence.

24.7 All purchase orders for radioactive materials shall contain the clause:

**"The U.S. Nuclear Regulatory Commission regulation 10 CFR 21 is applicable to the device, radioactive material or service included in this purchase order."**

24.8 Records of evaluations and notifications performed under this Section shall be maintained in accordance with 10 CFR 21.51.

This is to acknowledge the receipt of your letter/application dated

12/10/2007, and to inform you that the initial processing which includes an administrative review has been performed.

RENEWAL 37-01861-01  
There were no administrative omissions. Your application was assigned to a technical reviewer. Please note that the technical review may identify additional omissions or require additional information.

Please provide to this office within 30 days of your receipt of this card

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A copy of your action has been forwarded to our License Fee & Accounts Receivable Branch, who will contact you separately if there is a fee issue involved.

Your action has been assigned **Mail Control Number** 141422.  
When calling to inquire about this action, please refer to this control number.  
You may call us on (610) 337-5398, or 337-5260.