Appendix G

FACILITIES AND EQUIPMENT

I. Introduction

Applicants must specifically identify and describe all radiographic installations at which industrial radiography will be conducted, including temporary job sites, permanent locations, field stations, and any other locations where radiographic devices may be used or stored.

II. Temporary Job Sites

A. License Requirement

A Radioactive Material License is required to perform industrial radiography at temporary work locations or fixed, permanent work locations, or a combination of both.

Industrial radiography is most commonly performed at temporary job sites throughout the State of Arkansas. During this process, the radiographic devices are stored at a permanent storage location and are transported to the job site in a specially equipped vehicle by radiographic personnel and then returned to the permanent storage location at the completion of the work. Temporary storage of the radiographic devices in the transport vehicle is typically authorized by the Radioactive Material License; however, temporary storage at the job site (outside the transport vehicle) is not permitted unless it is specifically authorized by the License. Radiographic equipment stored at temporary jobsites must be secured at a location that prevents access by unauthorized personnel. It is not acceptable for a device to be chained to a post and left unattended at the place of use during lunch, breaks, or after hours.

NOTE: Radiographic devices, source changers, or transport containers that contain radioactive material may not be stored in residential locations.

If the applicant plans to use vehicles for storage, there must be procedures and instructions to personnel about proper posting of the vehicle. Vehicles should be posted with a "Caution - Radioactive Material" sign on the entrance to the area of the vehicle were licensed material is stored. Appendix P, “Operating Procedures” addresses the specific requirements for the radiological posting of the vehicle.

In responding to the requirements of the Rules and Regulations and the Application, Item 16, the Applicant must provide a written description of the facilities and equipment and the transport vehicle, as well as provide drawings of

the facility site and storage area, and the vehicle, to support the written description.

B. Response from Applicant:

The Application must include the following information:

1. Permanent Storage Facility

   a. Submit a description and an annotated diagram of the permanent storage facility that includes the following:

      (1.) Site Plan showing the location of the permanent storage area on the facility site with appropriate labeling of buildings, security fences, access gates, all entrances and points of access, and distances to adjacent structures.

      (2.) Description of the work areas inside the facility that are occupied by ancillary personnel, including the distances from the nearest work areas to the storage area and the time spent in each work area by personnel, etc.

      (3.) Description of the storage vault materials, radiation shielding, and vault construction including the door, shielding thickness on all sides, and a general description of the security provisions (locks, alarms, etc.) for the storage area.

      (4.) Radiological posting of the facility and storage vault.

   b. If the facility is a multistory and/or multi-tenant building, identify floors above and below the storage area and their uses, including areas occupied by other tenants. Exhibit A provides a sample facility diagram.

   c. Provide evidence that the permanent storage area is capable of storing at least the maximum number of devices to be authorized by the license.

   d. Appendix H, “Security of Radiographic Devices” addresses the requirements for security measures that will be used to prevent unauthorized access to the radioactive devices and radioactive material.

e. Describe the radiological posting of the permanent gauge storage facility and confirm that the facility will always be properly posted.

f. Describe any remote handling equipment that will be available for use.

2. Transport Vehicle

a. Submit a description and an annotated diagram of the radiographic device storage container inside the transport vehicle that includes the following:

(1.) Storage container materials, radiation shielding, and container construction, including shielding thickness on all sides, a general description of how the device will be secured to the container/vehicle, bracing the device to prevent load shifting during transport, and a general description of the physical security provisions (locks, etc) for the storage container.

(2.) Radiological posting of the vehicle when the vehicle is used as a temporary storage location. Confirm that the vehicle will always be properly posted.

(3.) Radiographic device overpacks used during transportation

b. Appendix H, "Security of Radiographic Devices" addresses the requirements for security measures that will be used to prevent unauthorized access to the radioactive devices and radioactive material.

c.. Describe any remote handling equipment that will be available for use.

NOTE:	**The overnight storage of a radiographic device in a private residence or motel/hotel room or similar location, on a temporary basis is not authorized or approved.**

3. Temporary Storage Locations/Field Stations

a. Identify the location(s) of the proposed temporary storage facility and submit the same information for the temporary location as

provided for the permanent storage location in Paragraph 2.b.1, above.

b. Appendix H, “Security of Radiographic Devices” addresses the requirements for security measures that will be used to prevent unauthorized access to the radioactive devices and radioactive material.

c. Describe the radiological posting of the permanent gauge storage facility and confirm that the facility will always be properly posted.

d. Describe any remote handling equipment that will be available for use.

III. Permanent Radiographic Installation

A. Licensing requirement

1. A permanent radiographic installation is an enclosed shielded room, cell, or vault in which radiography may be performed. A facility is considered "permanent" if it is intended to be used for radiography, even if radiography is rarely performed there. The nature of the facility, rather than the frequency of use, determines a permanent radiographic installation. All radiographic operations conducted at locations of use authorized on the license must be conducted in a permanent radiographic installation, unless specifically authorized by Department. If licensees need to perform radiography at their place of business outside of a permanent facility due to unique circumstances (the item to be radiographed is too large for the facility), then the Department must authorize this method of use. In this case, two individuals must be present whenever radiographic operations occur outside of a permanent installation.

2. The one primary (and perhaps the most important) reason licensees have for conducting radiography in a permanent radiographic installation is that they can limit access restrictions imposed at a work location. In order to ensure this control a permanent radiographic installation, if located on the ground, must be enclosed by a minimum of four shielded walls (otherwise, the floor must also be shielded). The use of materials that do not realistically provide shielding, do not qualify. Areas outside of the facility generally should qualify as unrestricted areas. While the area outside of an installation should qualify as an unrestricted area (i.e., not exceed 2mr/hr), the regulation did not specify radiation limits in order to allow for design

flexibility for moving equipment into and out of the installation, or other considerations. Radiation levels slightly exceeding these levels outside of the facility should only be considered or allowed when the higher levels are due to "sky shine" or the need for equipment movement. If the roof of the facility does not qualify as a restricted area, or if no roof exists, mechanical access restrictions (fence, etc.) must be utilized and additional administrative controls must imposed to ensure that unwanted access can be gained only through extraordinary effort. All entrance ways into the facility must be interlocked with control devices, as required by the Rules and Regulations, Paragraph RH-1801.j, "Permanent Radiographic Installations". Unless all entrance ways are locked, at least one radiographer must be present at the facility whenever radiography is being conducted.

3. A field station is a facility where licensed material may be stored and/or used and from which equipment is dispatched. Radiographic operations may be conducted in a permanent radiographic installation or at the place of business in the same manner as described above.

4. A restricted area is an area that licensees limit access for the purpose of protecting individuals from undue risks from exposure to radiation and radioactive materials. A restricted area cannot include areas used as residential quarters.

5. Requirements for a permanent radiographic installation:

   a. Audible-visible signals

      (1.) Each entrance is equipped with a visible-audible signal system. The visible signal is activated by radiation whenever the source is exposed. The audible signal will sound if anyone tries to enter the installation while the source is exposed. The requirement for the visible-audible signal system is in addition to other measures that may be taken to prevent access to the installation, such as locked doors.

      (2.) As an alternative to the visible-audible alarm system, it is acceptable to use a control system that will reduce the radiation level if the entrance to a high-radiation area is opened while the source is out. The system must be automatic and independent of radiography personnel action. If this alternative is planned, provide a description of the system.

   b. Diagram depicting the shielding, layout, and audible-visual alarms

(1.). A diagram of the installation must be submitted to assist in evaluating the shielding and determining compliance with regulations regarding restricted and unrestricted areas, location of access points, and locations of audible-visible signals. Figure G-1 shows an example installation diagram.

c. Calculations or survey results of radiation levels

(1.) For a determination of installation adequacy, provide information showing that the radiation level in all directions around the installation, including the roof, will not exceed a dose of 2 mrem (0.02 mSv) in any one hour. Take into account the highest quantity of radioactive material that will be used in the installation and any limitations on source positioning in the installation. Radiation levels in all directions around the installation that are below 2 mrem (0.02 mSv) in any one hour are considered acceptable. If the radiation levels will exceed 2 mrem 2 mrem (0.02 mSv) in any one hour, then steps must be taken (use lower-activity source, use collimator, or move setup farther away) to reduce the radiation to the acceptable level.

(2.) A radiation level on the roof that exceeds 100 mrem (1.0 mSv) in one hour at 30 cm from the surface is considered a "high radiation area" and requires special precautions to control access to the area. Licensees should make efforts to lower a radiation level exceeding 100 mrem (1.0 mSv) in any one hour by using additional shielding, collimators, or other engineering controls. The roof of a fixed radiography cell is a potentially occupied area, and applicants must demonstrate that no individual member of the public could receive effective doses in excess of 0.02 mSv (2 mrem) in any one hour or 100 mrem (1 mSv) in a year.

B. Response from Applicant:

The Application must include the following:

1. If radiography is planned in a permanent radiography installation or installations (including field stations with permanent exposure cells), provide the following information for each installation:

a. An annotated sketch or drawing of the facility and its surroundings.

b. The scale to which the sketch or drawing is made. The same scale should be used for all sketches and drawings. The recommended scale is 1/4 inch = 1 foot. Drawings to this scale that do not fit on 8 ½ X 11 paper may be provided as sectional drawings.

c. The type, thickness and density of shielding materials on all sides, including the floor and the roof.

d. The locations of entrance ways and other points of access to the facility.

e. A description of the areas adjacent to the facility and the distance to these areas. Include information on areas adjacent to, above, and below the facility.

f. A description of the general location of each proposed permanent installation listed in Item 3 (e.g., located in an industrial park, an office complex, etc.) and its current use.

g. A general description of the visible-audible signal system or entrance control system and its location.

h. The results of radiation-level calculations or actual radiation measurements adjacent to, above, and below the installation. The radiation level in all directions around the installation, including the roof, should not exceed 2 mrem (0.02 mSv) in any one hour. Clearly identify the type and the amount of radioactive material in the source, and the position of the source within the installation for the calculations or measurements.

2. Variances will be considered if construction requirements preclude shielding the roof in order to meet the requirement not to exceed 2 mrem (0.02 mSv) in any one hour. Provide the following information to obtain approval for a variance:

a. Procedures for ensuring that no individual is on the roof or could gain access to the roof during radiography

b. Means of preventing access to the roof

c. A commitment that the roof will be posted with "Caution (or Danger) Radiation Area" signs

d. Steps taken to minimize radiation on the roof

e. Limitations (if needed) on positioning of sources, or type and amount of radioactive material, that may be used in the installation to ensure that areas adjacent to, above, and below the installation will be unrestricted areas during the performance of radiography

3. If radiation levels on the radiography installation roof[1] exceed 100 mrem (1.0 mSv) in any one hour, then provide the following information in addition to the items above to apply for this variance:

   a. A commitment that the roof will be posted with "Caution (or Danger) High Radiation Area" signs

   b. Evidence of constant surveillance of the roof by closed-circuit TV

   c. Fluctuation of the dose rate

   d. A description of a control device that would automatically reduce the radiation level to 100 mrem (1mSv) in any one hour at 30 cm from the radiation source if someone enters the roof.

   e. A description of a control device that activates a visible-audible signal so that both an individual entering the roof and the radiographer on duty are made aware of the entry

4. Appendix H, “Security of Radiographic Devices” addresses the requirements for security measures that will be used to prevent unauthorized access to the radioactive devices and radioactive material.

5. Describe the radiological posting of the permanent gauge storage facility and confirm that the facility will <u>always</u> be properly posted.

6. Describe any remote handling equipment that will be available for use