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United States Nuclear Regulatory Commission
Material Licensing Branch
Division of Fuel Cycle and Material Licensing
Washington, D.C. 20555

Atention: Joseph C. Wang

This letter and the attached information is in reference to your letter of April 19, 1983 requiring additional information to support Capital X-Ray Service, Inc's application for amendment to License #35-11114-01, dated April 1, 1983.

Your letter referred to Regulatory Guide 10.6, Item 6(a)c, Second Paragraph. To supply you with the necessary additional information, I will begin with this paragraph.

Reg/Guide 10.6 - Item 6(a)c, Second Paragraph - Particular attention should be given to radiation levels on the roof of the installation. If these levels may exceed two (2) milliroentgens per hour the application should show how access to the roof will be controlled. If the calculations or measurements show that radiation levels on the roof might exceed 100 milliroentgens per hour, the applicant should consider the use of collimating devices or additional shielding in the roof or ceiling.

The roof of the Shielding Radiographic Facility was not designed to incorporate any radiation shielding material, therefore, I have approached the context of the Second Paragraph of Item 6(a)c of Reg/Guide 10.6 in the respect of restricting access to the roof and to employ collimating devices during every Radiographic Exposure where a collimation device may possibly be employed.

The physical radiation level measurements that were performed and documented within the April 1, 1983 Amendment Application were repeated identically May 9, 1983 employing a 95 curie Iridium 192 Sealed Source and the identical 78 curie Cobalt 60 Sealed Source.

The radiation level measurements that were performed May 9, were performed both uncollimated and collimated, the collimator being the identical Technical Operations Model 527 lead shielding material collimator, employed with a 60^{o} directional insert and a lead 20^{o} by 360^{o} Panoramic insert.

During all of the testing, the radiation levels at all points at and outside the Restricted Area Perimeter Fencing were less than 2.0 milliroentgens per hour, but were again higher than the radiation levels measured at the outside surfaces of the shielding walls. The higher radiation levels at the fencing are, in my opinion, definitely due to scattering from the roof. The roof line ($22\frac{1}{2}^{o}$ inclined angle) terminates at those points on the Restricted Area Perimeter Fencing where the radiation levels were the highest. There were no other sources of radiation being employed in the area during these tests.

Physical radiation level measurements on the roof of the Shielded Facility could not be performed directly on the roof due to the inability to stand or to walk safely on the $22\frac{1}{2}^{o}$ inclined angle and the slick surface of the enameled steel roof exterior.

Radiation level measurements on the roof were performed by attaching a survey instrument to a 25' rod and reading the instrument as well as possible with a set of binoculars.

The radiation levels on that portion of the roof above the Radiography/High Radiation Area exceeded two (2) milliroentgens per hour during the collimated Iridium 192 and Cobalt 60 exposures employing the lead shielding material collimator.

Radiation levels on that portion of the roof above the Radiography/High Radiation Area exceeded 100 milliroentgens per hour during all uncollimated Iridium 192 and Cobalt 60 exposures.

There is only one commercial facility and two residences in the vicinity, and these lie in a West direction from the Shielded Radiographic Facility. The nearest of these facilities is a measured 250' from the Restricted Area Perimeter Fencing, and during all of the radiation attenuation testing, no radiation was measured at any of these facilities.

There is not, nor shall there ever be allowed during Radiographic Operations, any ladders, objects or debris of any type, on or near any of the outside surfaces of the shielding walls, inside the Restricted Area Perimeter Fencing, which would allow or aid an individual to climb above any of the walls to gain access to the roof. The only personnel access into the fenced Restricted Area is the Personnel/ Equipment Restricted Area Access Gates which shall be locked at all times during Radiographic Operations, but

DUE TO RADIATION LEVELS IN EXCESS OF 100 MILLIROENTGENS PER HOUR DURING SOME OF THE TESTING EXPOSURES, THE ENTIRE ROOF OF THE SHIELDED RADIOGRAPHIC FACILITY SHALL BE TREATED AS A HIGH RADIATION AREA AT ALL TIMES DURING RADIOGRAPHIC OPERATIONS.

To restrict access to the entire roof of the Shielded Radiographic Facility and to reduce radiation levels at the roof and to reduce radiation levels inside and outside of the Restricted Area Perimeter Fencing, the following items and procedures shall be amended.

I

Amendment Application Part 6(a); DESCRIPTION OF RADIOGRAPHIC FACILITIES:

Caution Posting - Shielded Radiographic Facility:

A. The 13, magenta and yellow caution placards attached to the outside of the Shielded Radiographic Facility walls, shall be changed to bear the legend: DANGER (RADIATION SYMBOL) HIGH RADIATION AREA - ON ROOF - AND INSIDE THIS FACILITY - DANGER.

II

Amendment Application Part 6e; OPERATING, CAUTION AND EMERGENCY PROCEDURES - SHIELDED RADIOGRAPHIC FACILITY:

Security Control - Restricted Area:

A. The Radiographer's visual survey of the entire inside of the Shielded Radiographic Facility and the entire Restricted Area Fenced Perimeter, prior to Radiographic Operations, shall be amended to include the visual survey of the facility's inside roofing structure and the entire outside surfaces of the roof, to assure that there are no individuals present.

B. The Radiographer shall also assure that there are no ladders, objects or debris of any type anywhere inside the Restricted Area Fenced Perimeter that could aid any individual to climb the walls to gain access to the roof.

III

Amendment Application Part 6e; OPERATING, CAUTION AND EMERGENCY PROCEDURES - SHIELDED RADIOGRAPHIC FACILITY:

Radiation Collimation - Shielding Devices:

A. Collimated Exposures:

A1: A Technical Operations, Inc. collimation device employing a DEPLETED URANIUM - 60^{o} directional beam insert and a DEPLETED URANIUM - 20^{o} by 360^{o} Panoramic beam insert shall be employed during all Iridium 192 and Cobalt 60 exposures where a collimation device may possibly be employed (minimum 90% of all Radiographic Exposures).

Note: Technical Operations, Inc. reports that the radiation reduction factors for DEPLETED URANIUM inserts versus LEAD Model 527 Collimator are:

	DEPLETED URANIUM	LEAD
Iridium 192	0.00005	0.0016
Cobalt 60	0.016	0.125

A2: A Technical Operations, Inc., TUNGSTEN, 60^{0} directional beam collimator shall be employed where physical placement is possible during those Iridium 192 and Cobalt 60 exposures where a Sealed Source must either be positioned inside the object being radiographed or outside but in contact with one wall of the object being radiographed.

Note: Technical Operations, Inc. reports that the radiation half value layer thicknesses for these small TUNGSTEN Collimators are:

Iridium 192 - 0.13"
Cobalt 60 - 0.31"

B: Uncollimated Exposures:

B1: UNCOLLIMATED EXPOSURES; IRIDIUM 192 OR COBALT 60 SHALL BE EFFECTED ONLY WHEN THE CONFIGURATION OR SIZE OF THE ITEM TO BE RADIOGRAPHED DOES NOT ALLOW FOR THE PHYSICAL PLACEMENT OF A COLLIMATOR EITHER INSIDE OR OUTSIDE BUT IN CONTACT WITH ONE WALL OF THE ITEM.

IV

Amendment Application Part 6e; OPERATING, CAUTION AND EMERGENCY PROCEDURES - SHIELDED RADIOGRAPHIC FACILITY:

Control of Access to High Radiation Area:

A. The Radiographer and Assistance Radiographer, during all Radiographic Operations, shall treat the entire roof of the Shielded Radiographic Facility as a HIGH RADIATION AREA.

B. The visual surveillance procedures for the High Radiation Area Access, Personnel/Equipment shall be amended to require visual surveillance of the entire roof of the Shielded Radiographic Facility, to assure that no individuals gain access.

B1: The entire roof of the Shielded Raiographic Facility can be visually observed by the Radiographer or Assistant Radiographer from two (2) locations within the Restricted Area Fenced Perimeter or outside the fenced perimeter.

V

Amendment Application Part 6e; OPERATING, CAUTION AND EMERGENCY PROCEDURES - SHIELDED RADIOGRAPHIC FACILITY:

Maintenance, Repair & Audible Alarm Testing:

A. The maintenance and repair procedures for the Shielded Radiographic Facility as performed only by or under the direct supervision of Capital X-Ray Services' management personnel shall be amended to include a requirement that no ladders, objects or debris of any type, that would aid an individual to climb above the walls and gain access to the roof, are allowed to remain anywhere within the Fenced Restricted Area.

Mr. Wang, I apologize for the time it has taken to supply you with this additional information but it was necessary to allow for the complete review of the Shielded Radiographic Facility structure, the April 1, 1983 Amendment Application and Regulatory Guide 10.6.

If you have any questions concerning this additional information, please contact me.

I hereby Certify that the information contained herein, is true and correct to the best of my knowledge and belief.

Sincerely

George W. Johnson
Radiation Safety Officer
Capital X-Ray Services, Inc.
2133 South 49th West Avenue
Tulsa, Oklahoma 74107

Notary Public
My commis on expires 10-4-84