

RADIATION PRODUCING EQUIPMENT NON-HUMAN USE PROJECT INSPECTION CHECKLIST

Project Number _____ Responsible Investigator _____

Review Date and Time _____ Reviewed with _____

Reviewer _____

REVIEW OF THE PROJECT FILES BEFORE VISIT

Review key authorization documents, applications, and last two inspections.

List items of non-compliance cited during last 2 inspections:

Review Special Conditions of authorization.

List project personnel.

Name	Clemson ID	Type	Date:		
			Added to project	Initial Training	Annual Refresher

Review return record of personnel monitors and TLD rings ___ Late ___ Unreturned

Current RPE inventory:

Type	Make	Model	Serial #	Location

RPE PROJECT INSPECTION VISIT

OK = Checked and found to be OK **CA** = Corrective action required **NA** = Not Applicable

ADMINISTRATIVE AND GENERAL RADIATION SAFETY

OK	CA	NA	
			P01 Key project authorization documents, applications, inspection reports, survey reports, and other records are organized in binder(s)
			P02 No changes in protocol that would impact on safety (e.g., iodinations, animal use, airborne hazards, etc.)
			P03 Project binder(s) and a copy of the X-Ray Safety Manual are accessible
			P04 Unauthorized equipment is not being used, including during collaborations with other projects
			P05 All personnel working with RPE without direct supervision had Initial X-Ray Safety training and current Annual Refresher Training
			P06 All personnel working with RPE is listed on the Project
			P07 Signs are properly posted on lab entrance(s)
			P08 DHEC <i>Notice To Employees</i> is posted
			P09 RPE is only used in authorized rooms, including storage.
			P11 RPE is secured against unauthorized removal.
			P13 Radiation levels in lab and surrounding areas are ALARA and meet regulations (2mrem in any hour, 100 mrem in a year to individuals)
			P16 Tour lab(s) and note any other problems in comments section.

Comments

X-RAY EQUIPMENT REGISTRATION

OK	CA	NA	
			R01 All RPE is registered with DHEC (RHB 2.5.1)
			R02 Registration sticker is placed on each control (RHB 2.5.1.1)
			R03 No changes of status affecting RPE (RHB 2.5.3)

Comments

GENERAL REQUIREMENTS FOR ALL ANALYTICAL X-RAY EQUIPMENT

	OK	CA	NA	
X01				Each area or room containing analytical x-ray equipment posted with a sign "Caution – X-Ray Equipment" (RHB 7.4.2)
X02				All equipment labeled with radiation symbol (RHB 7.4.3)
X03				Label "Caution – Radiation – This Equipment Produces Radiation When Energized" placed near switch (RHB 7.4.3.1)
X04				"Caution – High Intensity X-ray Beam" placed in the area immediately adjacent to each tube head (RHB 7.4.3.2)
X05				Warning light labeled "X-Ray On" located near any switch that energizes an x-ray tube, and illuminated only when the tube is energized (RHB 7.4.4)
X06				Tests of all safety devices performed annually and documented (RHB 7.4.5.2)
X07				Unused ports secured to prevent inadvertent opening (RHB 7.4.5.5)
X08				Leakage radiation at 5 cm from x-ray tube housing is <2.5 mR/h (RHB 7.4.6)

Comments

OPEN BEAM ANALYTICAL X-RAY EQUIPMENT

	OK	CA	NA	
001				Safety device preventing the entry of any portion of a body into the primary beam is provided (RHB 7.5.1)
002				If safety device not provided, alternative methods are developed, approved by DHEC and employed (RHB 7.5.1.1-7.5.1.4)
003				Operator is present at all times when equipment is in operation, or the area is locked (RHB 7.5.2)
004				When not in operation, equipment is secured to be inoperable by unauthorized persons (RHB 7.5.3)
005				Warning devices on x-ray tube status (ON/OFF) and on shutter status (OPEN/ CLOSED) are provided (RHB 7.5.4)
006				Operating procedures are available (RHB 7.5.7)
007				Operator training completed and documented (RHB 7.5.8)

Comments

ENCLOSED BEAM ANALYTICAL X-RAY EQUIPMENT (INCLUDING CABINET AND PORTABLE)

OK	CA	NA	
E01			Radiation source, sample, detector and analyzing crystal are enclosed in a chamber or coupled chambers (RHB 7.6.1)
E02			Sample chamber is interlocked with the x-ray tube high voltage supply or a primary beam shutter (RHB 7.6.2)
E03			X-ray beam cannot enter the sample chamber unless the interlock has been conspicuously and deliberately defeated (RHB 7.6.2)
E04			Interlock is of fail-safe design or administrative controls has been established to ensure unit is not operated without properly functioning interlock (RHB 7.6.2)
E05			Leakage radiation at 5 cm from the surface of an x-ray generator cabinet is <0.25 mR/h (RHB 7.4.7)
Comments			

AREA SURVEYS AND PERSONNEL DOSIMETRY

OK	CA	NA	
S71			Surveys of radiation levels performed at least once every 12 months (RHB 7.7.2.1)
S72			Survey instruments calibrated at intervals not to exceed 12 month (RHB 1.4.4.2.1). Records of calibrations are maintained (RHB 1.4.4.2.5)
S73			Survey instruments calibrated with accuracy within 20% (RHB 1.4.4.2.2)
S74			Survey instruments are checked for proper operation each day of use. Operational check records are maintained. (RHB 1.4.4.3.4)
S75			Tests and inspections of all safety devices performed at least yearly (RHB 7.7.4)
S76			Monitoring performed for all personnel likely to exceed 10% of the occupational dose limit or entering high or very high radiation area (RHB 7.10.1)
S77			Ring or wrist dosimeters provided for personnel using open beam systems not equipped with a safety device (RHB 7.10.2.1)
S78			Ring or wrist dosimeters provided for personnel performing maintenance operations requiring presence of primary x-ray beam (RHB 7.10.2.2)
Comments			

INDUSTRIAL RADIOGRAPHY APPLICATIONS

OK	CA	NA	
Z01			X-ray equipment provided with a locking device designed to prevent unauthorized or accidental production of radiation (RHB 8.2)
Z02			Radiation machines secured when in storage (RHB 8.3)
Z03			Permanent durable label indicating maximum operating current, kVp and the standard radiation symbol is present (RHB 8.5)
Z04			Permanent durable label "Caution – Radiation – This Equipment Produces Radiation When Energized" is present (RHB 8.5)
Z05			Label "Caution – Radiation – This Equipment Produces Radiation When Energized" placed near switch that controls x-ray production (RHB 8.5)
Z06			Areas in which radiography is being performed are conspicuously posted as Radiation, High Radiation or Very High Radiation Area (RHB 8.6.2)
Z07			Written operating and emergency procedures are developed (RHB 8.8)
Z08			Checks for obvious defects in radiation machines are made at the beginning of each day of equipment use (RHB 8.9)
Z09			Components associated with radiation safety of the machines inspected and repaired at least annually, records maintained (RHB 8.9.1)
Z10			RSO and operators wear personnel dosimeter at all times during radiographic operations (RHB 8.10)
Comments			

INDUSTRIAL CABINET RADIOGRAPHY

OK	CA	NA	
C01			Radiation emitted from the cabinet x-ray unit is below 0.5 mR/h at any point 5 cm from external surface (RHB 8.12.1.3)
C02			Cabinet x-ray system has permanent floor (RHB 8.12.1.4)
C03			Each door of a cabinet x-ray system has at least two interlocks, one of which physically disconnects energy supply of HV generator (RHB 8.12.1.6.1)
C04			Each access panel has at least one interlock (RHB 8.12.1.6.2)
C05			Cabinet x-ray system employs key actuated control (RHB 8.12.1.8.1)
C06			Control to initiate and terminate the x-ray generation other than interlock is provided (RHB 8.12.1.8.2)
C07			Two independent indicators when and only when x-rays are generated; one of them may be milliammeter, other legibly labelled "X-Ray On" (RHB 8.12.1.8.3)
Comments			

SHIELDED ROOM RADIOGRAPHY

	OK	CA	NA	
M01				Personnel monitoring provided and required for all individuals who operate, set-up, or perform maintenance on x-ray machine in shielded room (RHB 8.12.2.1)
M02				Physical radiation survey conducted to determine that x-ray machine is "off" before entering the shielded room (RHB 8.12.2.2)
M03				Primary and secondary barriers are sufficient to assure compliance with occupational and general public dose limits (RHB 8.12.2.3)
M04				Room shielding satisfies all requirements and is approved by DHEC (RHB 8.12.2.4, RHB 4.4)
Comments				

FIELD RADIOGRAPHY

	OK	CA	NA	
F01				Utilization logs maintained and contain description of each machine, identity of radiographer, site of use, date and number of exposures (RHB 8.12.3.1)
F02				Direct surveillance of the operation is maintained to protect from unauthorized entry into a high radiation area (RHB 8.12.3.6)
F03				Calibrated, operable survey instruments are available and used at each site where radiographic exposures are made (RHB 8.12.3.7, RHB 1.4.4)
F04				Physical radiation survey conducted to determine that x-ray machine is "off" before entry into the radiographic exposure area (RHB 8.12.3.7.1)
F05				Survey results and records of boundary locations are maintained (RHB 8.12.3.7.2)
F06				In addition to personnel monitor, a pocket dosimeter or pocket chamber is used during all radiographic operations (RHB 8.12.3.8)
F07				Pocket dosimeters or chambers are capable of measuring doses from 0 to at least 200 mR (RHB 8.12.3.8.1)
F08				Pocket dosimeters or chambers are read and doses recorded daily (RHB 8.12.3.8.2)
F09				Records of the pocket dosimeter or chamber readings are maintained (RHB 8.12.3.8.3)
F10				Pocket dosimeters checked for correct response (within 30%) at periods not to exceed 1 year. Calibration records are maintained (RHB 8.12.3.8.5)
Comments				

Name and Signature of the person performing inspection:

Name and Signature of the project representative present during inspection (if not RI):

Project's Responsible Investigator:

Project personnel comments:

RSO Reviewed _____ (*Konstantin Povod*)

Follow-up comments:

Entered Into Database By _____ Date _____