POGUE INDUSTRIES INCORPORATED

5200 Manchester
St. Louis, Mo. 63110

Radiation Safety and Control Program

10.3.H

Maintenance Procedure

Rev.	Signature	Date
0	President	7/08/85
0	Q.A. Manager	6/24/85
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CONTROL NO. 7 9368

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Maintenance Procedure

MAINTENANCE PROCEDURE

1.0 OBJECTIVE

1.1 Provide safe operating and assure sealed sources are controlled.

2.0 APPLICATION

2.1 Sealed Source

2.2 Exposure Device

2.3 Shielded Room

2.4 Survey Meter

2.5 X-Ray Equipment

2.6 Dosimeter

3.0 PROCEDURES

Equipment will be maintained in good condition by periodic inspection, test calibration.

3.1 A Maintenance-Calibration Label placed on the equipment will identify the date for the next servicing.

3.2 Sealed Sources

3.2.1 Leak Testing will be performed every six (6) months and after any equipment accident that could have caused damage to the capsule.

(a) Leak Testing will be performed by a Radiation Safety Monitor or a designated individual per the directions of Form RSC11, Leak Testing of Sealed Sources (Semi-Annual). Example of Form RSC 11 included as Appendix A.

(b) The Leak Test will be sent to a NRC approved laboratory for analysis.

(c) The Laboratory will send copies of the results and completed Form RSC 11 to the RSO.

(d) Reports which identify capsule leakage will require immediate action per the Operating and Emergency Procedure.

3.2.2 Quarterly Inventory

(a) Quarterly physical inventories of sealed sources will be conducted at the end of each calendar quarter by the Lab/Project NDE Supervisor or Radiation Safety Monitors under the direction of the RSO. Form RSC 3, Source Quarterly Inventory, will be completed. Example of Form RSC 3 included as Appendix B.

(b) Any sources which cannot be accounted for constitute a Class A Incident requiring immediate action per the Operating and Emergency System Procedure.

(c) A copy of Form RSC3 shall be forwarded to the RSO when completed.

3.3 Exposure Device

3.3.1 Daily inspections will be conducted by the Radiographer per the instructions of Form RSC 21, Exposure Device Inspection (Daily).

3.3.2 Quarterly inspection shall be conducted by the Lab/Project NDE Supervisor or designated individual at the end of each calendar quarter.

3.3.2.1 Form RSC 19, Exposure Device Inspection (quarertly), shall be used when performing the step-by-step inspection procedure.

Examples of Form RSC 19 included as Appendix C.

3.3.2.2 Inspection shall be conducted per Form RSC 19 on the following items (if applicable):

(a) Shield Assembly

(b) Source Pigtail Assembly

(c) Source Tubes and Cable Housings

(d) Crank Assembly

(e) Cable (source drive)

(f) Mechanical Compatibility of Components

3.3.2.3 Items found to be defective and/or inoperable shall be "Repaired" or "Replaced" before being returned to service.

3.3.2.4 Inoperable and/or defectiive items unable to be repaired or repalced shall be removed from service and should have a tag affixed.

3.3.2.5 Equipment shall be returned to the appropriate equipment and/or source manufacturer for maintenance and/or overhaul as required.

3.3.3 Special Inspection. Inspections will be conducted in accordance with 3.3.2 whenever equipment has been subjected to severe stress or damaged (dropping) or submersion in water). Exposure devices involved in emergencies will be inspected per the instructions of the RSO. The report shall be identified "Special Inspection" and include a description of the abnormal situation encountered.

3.3.4 Field Maintenance

(a) Servicing of the Equipment to correct minor deficiencies uncovered by the daily inspections may be performed by the Radiographer except when abnormal radiation levels are involved.
NOTE: Minor deficiencies are defined as preventive maintenances only.

(b) Units which show abnormal radiation shall be immediately removed from service and the Lab/project NDE Supervisor contacted, or Radiation Safety Monitor.

3.3.5 Source Replacement

maintenance and required overhaul should be performed prior to installation of each new source as applicable.

(a) Exposure devices containing IR-192 should be overhauled by an appropriate equipment and/or source manufacturer.

3.4 Shielded Room

Inspection of shielded room will be conducted a three (3) month intervals, or as required by applicable Agreement State Rules and Regulations byy the Radiation Safety Monitor per the instructions of Form RSC 18, Shielded Room Inspection (Annual). Example of Form RSC 18 included as Apendix D.

3.5 Survey Instruments

Maintenance will be performed, as required, prior to each calibration and after damage or malfunction. The maintenance of survey instruments will be performed by a facility that has USNRC approval.

3.6 X-Ray Equipment

3.6.1 All x-ray equipment shall be maintained in accordance with manufacturer's recommendations.

3.6.2 All x-ray equipment control panels shall be labeled with, "caution X-Rays - This Equipment Produces X-Rays When Energized" with the radiation symbol (magenta on a yellow background).

3.6.3 Daily inspections will be conducted by the Radiographer for proper operating condition.

3.6.4 Quarterly inspection shall be conducted by the Lab/Project NDE Supervisor, Radiation Safety Monitor or designated individual at the end of each calendar quarter.

3.6.4.1 Form RSC 20, X-Ray Equipment Inspection (quarterly) shall be used when performing the step-by-step inspection procedure. Form included as Appendix E.

3.6.4.2 Inspection shall be conducted per Form RSC 20 on the following items:

(a) X-Ray Tube

(b) Control Panel

(c) Control Cable

(d) Power Cable

3.6.4.3 Items found to be defective and/or inoperable shall be "Repaired" or "Replaced" before being returned to service.

3.6.4.4 Inoperable and or defective items unable to be repaired of replaced shall be removed from service and should have a tag affixed.

3.6.4.5 Equipment shall be returned to the appropriate equipment manufacturer for mainteance and/or overhaul as required.

3.7 Pocket Dosimeter Operation Check

3.7.1 The function of pocket dosimenters shall be checked at intervals not greater than one year or when dosimeter operation is in question.

3.7.1.1 Zero the dosimeter.

3.7.1.2 Expose the dosimeter(s) to a known dose. The dosimeter(s) may be exposed by utilizing x-ray or gamma radiography equipment, or by utilizing a dosimeter calibrator. When using x-ray or gamma radiography equipment, record the technique on Form RSC 22. The dose should be in the range of 50% to 80% of the dosimeter range. Example of Form RSC 22 included as Apendix F.

3.7.1.3 Read the dosimeter(s) and record the dose on Form RSC 22.

3.7.1.4 Hold the dosimeter(s) in an unrestricted area for at least 24 hours after the exposure and record the reading of the dosimeter on Form RSC 22.

3.7.1.5 Remove any dosimeter from service if the reading immediately after the exposure does not conform to plus or minus 30% of the administered dose, or if the reading after 24 hours differs by greater than 20% from the initial reading.

Appendix A

POGUE INDUSTRIES INCORPORATED

FORM RSC 11

LAB/PROJECT_____ DATE_____

ISOTOPE_____ CAPSULE S/N_____ CURIES_____

TYPE OF TEST: WET_____ DRY_____ SOLVENT_____

LEAK TEST KIT USED: MANUFACTURER_____ MODEL NO._____

CAMERA: MAKE_____ MODEL_____ S/N_____

SOURCE CHANGER: MAKE_____ MODEL_____ S/N_____

LOCATION WIPED:_____

LEAK TEST WIPE PERFORMED BY:_____

Appendix B

POGUE INDUSTRIES INCORPORATED

RADIATION SAFETY AND CONTROL PROGRAM

RADIOACTIVE MATERIAL INVENTORY (REQUIRED QUARTERLY)

DATE	MATERIAL / CAPSULE NUMBER	PROJECTOR MODEL	PROJECTOR SERIAL NO.	CURIES	LAST LEAK TEST	INSPECTION & MAINTENANCE	LOCATION	INVENTORIED BY:

Form RSC 3

POGUE INDUSTRIES INCORPORATED

FORM RSC 19

RADIATION SAFETY AND CONTROL PROGRAM

GAMMA EXPOSURE DEVICE INSPECTION

GENERAL DATA

____ QUARTERLY LAB/PROJECT ____ DUE DATE ____

EXPOSURE DEVICE ____ MODEL ____ SN. ____

____ SPECIAL LOCATION ____

SPECIAL INSTRUCTIONS ____

	ACCEPT	REPAIRED	REPLACED
SHIELD ASSEMBLY			
1. Check for excessive or abnormal radiation levels on the surface of the shield assembly.	____	____	____
2. Inspect safety plug for proper condition	____	____	____
3. Check locking mechanism for proper operation and for firm attachment to the shield assembly.	____	____	____
4. Inspect for proper alignment of "S" tube with entrance and exit ports.	____	____	____
5. Inspect carrying and holddown components for proper condition.	____	____	____
6. Inspect for proper labeling.	____	____	____
PIGTAIL ASSEMBLY			
7. Inspect connector for proper condition	____	____	____
SOURCE TUBES CABLE HOUSING			
8. Inspect for rust, dirt, or sludge buildup inside the tubes	____	____	____
9. Inspect tube connectors for proper condition.	____	____	____
10. Inspect for kinks, crushed sections, or other damage that could prevent operation.	____	____	____
CRANK ASSEMBLY			
11. Check for operating characteristics.	____	____	____
12. Inspect for excessive wear for damage to components.	____	____	____
CABLE			
13. Inspect Connector for proper condition.	____	____	____
14. Remove and inspect entire cable for flexibility, wear, rust, broken wires and length.	____	____	____
COMPONENT MECHANICAL COMPATABILITY			
15. Check connectors on source pigtail assembly and cable for proper fit and the possibility of accidental disconnection.	____	____	____
16. Check connectors on shield assembly and tubes for a proper fit.	____	____	____

INSPECTED BY: ____ DATE ____

Appendix D

POGUE INDUSTRIES INCORPORATED

FORM RSC 18

RADIATION SAFETY AND CONTROL PROGRAM

INSPECTION OF SHIELDED ROOM/X-RAY CABINET (ANNUAL)

LAB/PROJECT:_____ DUE DATE_____

LOCATION_____ ROOM NO._____ CABINET NO._____

SPECIAL INSTRUCTIONS:_____

	ACCEPT	REPAIRED	REPLACED
Door Interlocks			
1. Operative	_____	_____	_____
2. Condition	_____	_____	_____
3. Adjustment	_____	_____	_____
Equipment Interlocks			
4. Operative	_____	_____	_____
5. Condition	_____	_____	_____
Audible Condition			
6. Audible Operative	_____	_____	_____
7. Audible Condition	_____	_____	_____
8. Visual Operative	_____	_____	_____
9. Visual Condition	_____	_____	_____
10. Warning Signs Correct	_____	_____	_____
11. Warning Signs Condition	_____	_____	_____
Access Door			
12. Seals Properly	_____	_____	_____
13. Lock	_____	_____	_____
14. Key	_____	_____	_____

Radiation Levels (Source Exposed)

Side 1_____mr/hr (North)
Side 2_____mr/hr (East)
Side 3_____mr/hr (South)
Side 4_____mr/hr (West)
Ceiling_____mr/hr

REMARKS_____

_____

_____

INSPECTED BY:_____ DATE_____

Appendix E

POGUE INDUSTRIES INCORPORATED

FORM RSC 20

RADIATION SAFETY AND CONTROL PROGRAM

X-RAY EQUIPMENT INSPECTION

☐ QUARTERLY
☐ SPECIAL

LAB/PROJECT _____ DUE DATE _____

TUBE HEAD _____ MODEL _____ SN. _____

CONTROL PANEL _____ MODEL _____ SN. _____

SPECIAL INSTRUCTIONS _____

	ACCEPT	REPAIRED	REPLACED
X-RAY TUBE			
1. Check gas pressure (if applicable).			
2. Check power cord connector.			
3. Check general tube condition.			
4. Check condition of label "CAUTION X-RAYS THIS EQUIPMENT PRODUCES X-RAYS WHEN ENERGIZED."			
CONTROL PANEL			
1. Check general case condition.			
2. Check meter movement condition.			
3. Check power & control cord connectors.			
4. Check power & control cord connectors.			
5. Check X-Ray "ON" & "OFF" lights.			
6. Check key switch & lock.			
CONTROL CABLE			
1. Check both connectors.			
2. Check insulation full length.			
POWER CABLE			
1. Check connector & electrical plug.			
2. Check insulation full length.			

REMARKS: _____

INSPECTED BY: _____

Appendix F

POGUE INDUSTRIES INCORPORATED

FORM RSC 22

RADIATION SAFETY AND CONTROL PROGRAM

DOSIMETER CHECKS (Required Semi-Annually)

Serial Number	Range	Check Date	Calculated Dose	Dosimeter Reading Immediately after Exposure (Initial Reading)	Dosimeter Reading 24 Hours After Exposure

Technique:

Source: KV_____ MA_____ ISOTOPE_____ CURIES_____

Source to Dosimeter Distance:_____

Exposure Time:_____

Shielding Between Source and Dosimeter:_____

Calculated Dose:_____

Remarks: