Huntington
TESTING & TECHNOLOGY INC
1116 RT. 52
KENOVA, WV 25530
304-453-6111

MS16
P-3

March 14, 2005

Cathy Modes
US Nuclear Regulatory Commission
Region I, Division of Nuclear Materials Safety
475 Allendale Road
King of Prussia, PA 19406-1415

Subject: Document Request/Amendment Request
License No.: 47-23076-01
Docket No.: 030-20243

Dear Ms. Modes,

This letter is in response to our phone conversation on February 16, 2005 when you requested a copy of our Operating & Emergency Procedures. Enclosed are the O&E Procedures dated March 14, 2005.

I would request an amendment to Huntington Testing & Technology, Inc. NRC License Number 47-23076-01 to show myself and Donald Adkins as source retrieval personnel for this license. Certificates to support this request are with the hard copy only due to the size of the file.

Thank you for your time and consideration of these matters and should you have questions or comments please phone or email.

Sincerely,

David McCallister

David McCallister
Operations Manager/RSO

136270

SENTINEL™

hereby certifies

David A. McCallister

has successfully completed a seminar on the

"Administration of Isotope Radiography Safety Programs"

ATTESTED: 08 Feb 2005

Course Duration: 16 Hours

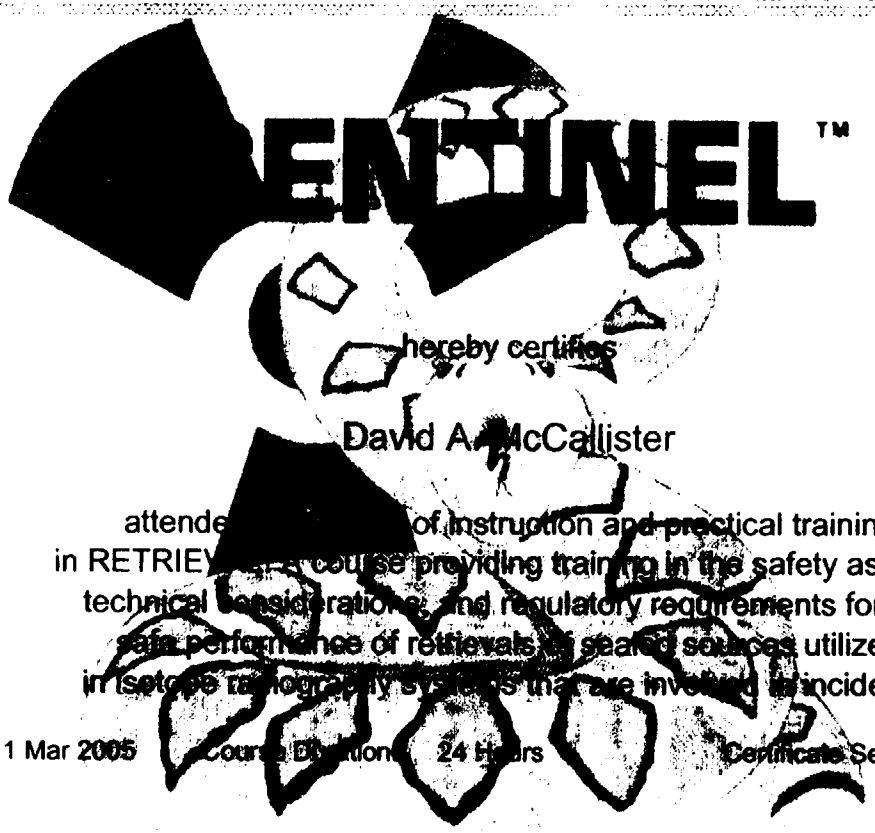
Cathleen M. Roughan

Cathleen M. Roughan
Regulatory Affairs and Quality Assurance Manager

Robert L. Kelly

Robert L. Kelly
Technical Manager

AEA TECHNOLOGY
QSA



SENTINEL™

hereby certifies

David A. McCallister

attended a course of instruction and practical training in RETRIEVAL, a course providing training in the safety aspects, technical considerations, and regulatory requirements for the safe performance of retrievals of sealed sources utilized in isotope radiography systems that are involved in incidents.

ATTESTED: 11 Mar 2005 Course Duration: 24 Hours Certificate Serial Number: 353

Cathleen M. Roughan
Regulatory Affairs and Quality Assurance Manager

Robert L. Kelly
Technical Manager

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QSA

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"Inspection and Maintenance of Industrial Radiography Equipment"

ATTESTED: 08 Mar 2005

Course Duration: 16 Hours

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Regulatory Affairs and Quality Assurance Manager

Richard W. Evans

Equipment Service & Production Manager

AEA TECHNOLOGY QSA

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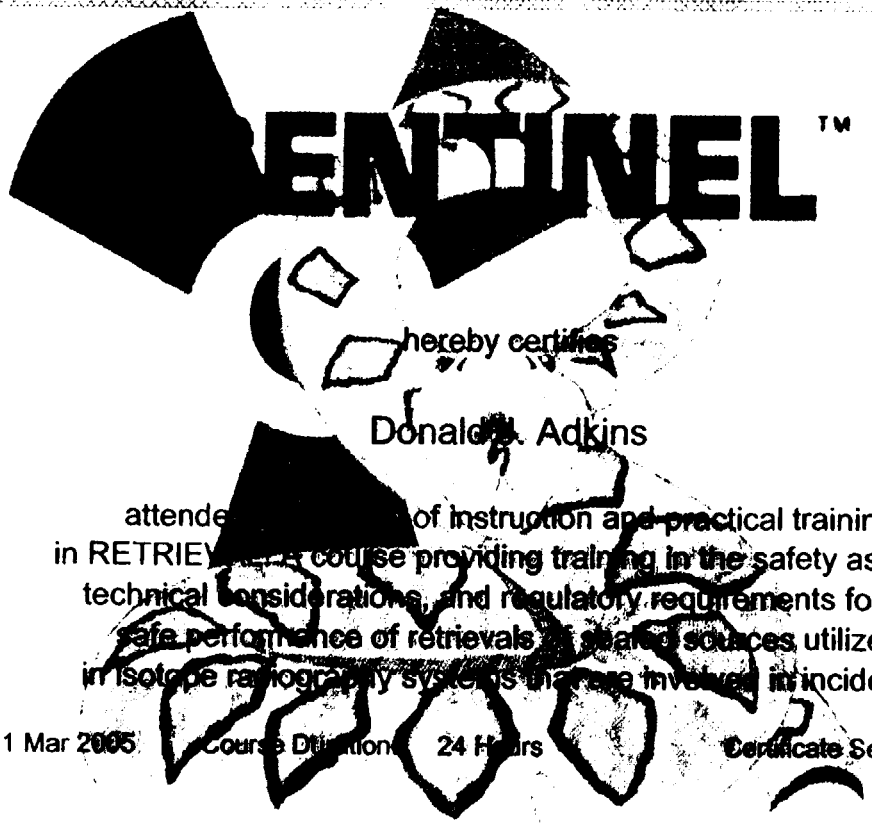

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ATTESTED: 11 Mar 2005 Course Duration: 24 Hours Certificate Serial Number: 350

Cathleen M. Roughan

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Regulatory Affairs and Quality Assurance Manager

Robert L. Kelly

Robert L. Kelly
Technical Manager

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QSA

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Richard W. Evans

Equipment Service & Production Manager

AEA TECHNOLOGY QSA

The American Society for Nondestructive Testing, Inc.

Examination Results

February 15, 2002

Donald Adkins
Huntington Testing & Tech
1116 Rt 52
Kenova, WV 25530

ASNT ID: 119244

Your IRRSP certification examination results are as follows:

Method	Date	Result
Radioactive Materials	12/21/2001	Pass

See the enclosed document *Results and Certification* to learn how your examination results affect ASNT certification. If you have failed one or more examinations, see the enclosed*Analysis of Exam Results* document(s) for details on your performance.

ASNT Technical Services Department

AMERICAN SOCIETY FOR NONDESTRUCTIVE TESTING

INDUSTRIAL RADIOGRAPHY RADIATION SAFETY PERSONNEL CERTIFICATION CARD

CERTIFICATION NO. 119244
SS# [redacted]
EXPIRATION DATE Dec 2006

NAME Donald Adkins
SIGNATURE Donald Adkins

PERSONAL INFORMATION WAS REMOVED BY NRC. NO COPY OF THIS INFORMATION WAS RETAINED BY THE NRC.

1711 Arlingate Lane • PO Box 28518 • Columbus, OH 43228-0518 • 614/274-6003 • 800/222-2768 • Fax 614/274-6899 • www.asnt.org

Amersham

hereby certifies

Donald Jeffery Adkins

has successfully completed the course:

"Radiation Safety Aspects of Isotope Radiography"

ATTESTED: 16 March 1990

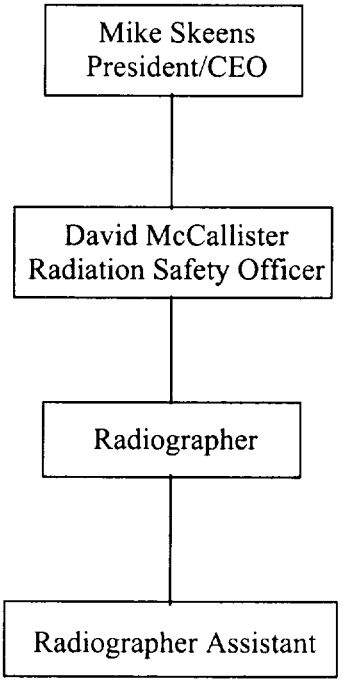
Robert L. Kelly
ROBERT L. KELLY
Instructor

Cathleen M. Roughan
CATHLEEN M. ROUGHAN
Radiation Safety OFficer

William M. McDaniel
WILLIAM M. MCDANIEL
Chairman-Radiation Protection
& General Safety Committee

HUNTINGTON TESTING & TECHNOLOGY, INC.

CORPORATE RADIATION AND ADMINISTRATIVE CONTROL


Mike Skeens
President/CEO
David McCallister
Radiation Safety Officer
Radiographer
Radiographer Assistant

2.0 SCOPE

2.1 The radiation controls and procedures set forth in this document are designed to protect not only the Radiographic Personnel who, by the nature of their work, may be exposed to radiation but to assure that all personnel at various field sites are also protected.

2.2 Radiation in common with toxic chemicals, combustible materials and high voltage electricity as well as other potential hazards are capable of inflicting bodily harm if used improperly and without due regard to safety. In some measure, radiation is more of a hazard in that it cannot be seen, felt, heard or smelled.

2.3 The Radiation Administration Control, Operating and Emergency Procedures contained herein are in conformance with the provisions of the following Federal and State Agencies:

2.3.1 U.S. Nuclear Regulatory Commission

2.3.2 States that have entered into an agreement with N.R.C. transferring regulatory authority over byproduct materials to that State.

2.3.3 Rules and regulations of non-agreement States pertaining to radiation protection.

2.3.4 U.S. Department of Transportation.

DEFINITION OF TERMS USED IN THIS DOCUMENT

3.0 DEFINITIONS:

3.1 "Byproduct Material" means any radioactive material (except special nuclear Material) yielded in or made radioactive by exposure to the radiation incident to the process of producing or utilizing special nuclear material.

3.2 "Radiation" means any of the following ... Alpha Rays, Beta Rays, Gamma Rays and X-Rays.

3.3 "Radiation Area" means an area, accessible to individuals, in which there exists radiation at levels that an individual may receive in excess of 5mr, (0.05mSv) in 1 hour at 30 centimeters from the radiation source or from a surface that radiation penetrates

3.4 "High Radiation Area" means an area, accessible to individuals, in which radiation levels may result in an individual receiving a dose in excess of 100mr, (1mSv) in 1 hour at 30 centimeters from the radiation source or from a surface that radiation penetrates.

3.5 "Curie" is a unit of activity for measuring the quantity of radioactive material. One (1) curie yields 3.7 x 10th power (3.7 billion) disintegrations per second.

3.6 "Roentgen" (R) is the unit of measurement of X-rays and Gamma Rays absorbed in air. It is a measure for the absorption of X-rays and Gamma Radiation in the same sense that feet of inches are a measure of length.

3.7 "Milliroentgen" (mR) is $\frac{1}{1000}$ of a roentgen (R).

3.8 "Survey" means measuring radiation intensities at various locations in an area where radiation exists.

3.9 "Survey Chart" is an outline or sketch of the location where a radiation survey is taken and the recording of the result of the survey

3.10 "Monitoring" is the act of surveying or measuring with instruments, pocket dosimeters or film badges, the amount of radiation present or accumulated.

3.11 "Radiation Signs" are painted magenta or purple on a yellow background with the conventional three bladed symbol conforming to AEC requirements. The degree of radiation present is indicated in the wording.

DEFINITION OF TERMS USED IN THIS DOCUMENT

3.12 "Scattered Radiation" results from the deflection of primary rays as they interact with the atoms in materials such as air, steel, concrete or lead shields and may emerge from the exposed material in any direction. That scattered in a forward direction "the direction of the primary radiation" has higher energies that scattered in the opposite (Backscatter).

3.13 "Shielding Material" is any material used to absorb or reduce radiation intensity levels.

3.14 "Radiographic Exposure Device" means any device that is AEC or Agreement State approved and is designed to contain a sealed source which may be moved or otherwise changed from a shielded to unshielded position for making a radiographic exposure.

3.15 "Sealed Source" means any byproduct material that is encased in a capsule designed to prevent leakage or escape of the byproduct material.

3.16 "Storage Container means a device in which sealed sources are stored.

3.17 "Byproduct Material Shipping Container" means a device in which byproduct materials are transported. The design and labeling of these must conform to AEC, State and U.S. Department of Transportation Requirements.

3.18 "Rem" as used in this section is a measure of the dose of ionizing radiation to the body tissue in terms of its estimated biological effect (RBE). One "millirem" = one (R) of X or Gamma Radiation.

3.19 "Plant or Construction Personnel" means all employees not directly concerned with radiation or any other personnel who may be at a plant or construction site.

3.20 "Radiographic Personnel" means all personnel directly connected with radiographic operations.

3.21 "Special Jigs and Fixtures" are devices designed to position sources for radiographic exposures where source tubes provided by the original manufacturer of a radiographic exposure device cannot be used. Any Huntington Testing manufactured device that alters or replaces any part of the original approved exposure device must have NRC or Agreement State approval prior to use.

RESPONSIBILITIES

4.0 RESPONSIBILITIES

4.1 The "Radiation Safety Officer" will be responsible for the enforcement of Rules, Regulations and Procedures involving the safe handling and use of byproduct materials and X-ray generating equipment in the possession of Huntington Testing & Technology, Inc. Records, equipment and radiographic personnel will be audited by him at frequent intervals to assure compliance with regulations and procedures pertaining to radiation safety. In addition he will be directly responsible for carrying out the following duties.

4.1.1 Procedures, equipment and records will be monitored and evaluated for compliance with the rules and regulations of Federal, State and local Agencies and Huntington Testing pertaining to the safe handling and use of byproduct materials and X-ray generating equipment.

4.1.2 He shall act as the licensee's liaison officer with the Nuclear Regulatory Commission and State Agencies on all license matters.

4.1.3 Establishes and conducts training programs for radiographic personnel.

4.1.4 Examines, determines competency and qualifies personnel to fulfill the functions described in 4.2 and 4.3 of Training Program.

4.1.5 Maintain control of procurement and disposal of licensed byproduct material.

4.1.6 Maintains personnel monitoring programs.

4.1.7 Procures and maintains adequate radiation survey instruments.

4.1.8 Maintains adequate storage facilities.

4.1.9 Maintenance of exposure devices and related equipment.

4.1.10 Takes leak test swab to be forwarded to laboratory for radio-assay and maintains leak test records.

4.1.11 Conducts byproduct material quarterly inventories.

4.1.12 Monitors utilization logs

RESPONSIBILITIES

4.0 RESPONSIBILITIES (Cont'd)

4.1.13 Maintains the survey instruments that will have a range such that two milliroentgens per hour through one roentgen per hour can be measured.

Calibrates radiation survey instruments at intervals not to exceed six (6) months in accordance with Procedure 15.

4.1.14 Review radiation records not kept by himself.

4.1.15 Assumes control and institutes corrective action in emergency situations.

4.1.16 Investigates cause of incidents and determines necessary preventative action.

4.1.17 Supervises the shipment of transfer of byproduct materials to insure compliance with the rules and regulations of the U.S. Department of Transportation.

4.2 The "Radiographer" will be responsible for the safe use and handling of byproduct materials and X-ray generating equipment while performing a radiographic assignment. He shall ascertain that all regulations, rules and procedures pertaining to radiation safety are strictly adhered to, prior to, during, and after taking a radiographic exposure. Any deviation from written procedure is strictly forbidden.

RESPONSIBILITIES

4.0 RESPONSIBILITIES (Cont'd)

4.3 PERSONNEL RADIATION RECORDS:

4.3.1 Film badge monitoring records will be retained indefinitely by Huntington Testing, Inc.

4.3.2 All radiation exposure reports that are required in "Personnel Monitoring" Procedure (Number II of Section II) will be retained in the same manner as film badge monitoring records.

4.4 MANDATORY PERSONNEL MONITORING REPORTS
10 CFR PART 19, 20

4.4.1 Within the first quarter of each calendar year a personnel monitoring report indicating the total number of individuals for whom monitoring was provided during the previous calendar year will be issued in accordance with Part 20, 20.2206.

4.4.2 When an individual terminates employment or is transferred out of the department performing radiographic inspection, a personnel monitoring report will be issued accordance with Part 19, 19.13 (c).

4.4.3 Upon the request of an employee or former employee, a radiation exposure record will be provided in accordance with Part 19, 19.13 (c).

5.0 RADIOACTIVE MATERIAL INVENTORY

5.1 SCOPE:

The following procedure describes the method of inventorying, each calendar quarter, all radioactive materials in the possession of Huntington Testing, Inc.

5.2 RESPONSIBILITIES:

It shall be the responsibility of the Radiation Safety Officer or his representative to take by-product material quarterly inventories.

5.3 INVENTORY PROCEDURE:

5.3.1 A quarterly physical source inventory will be taken of all sources received and in the possession of Huntington Testing, Inc.

5.3.2 January 1st will be considered the beginning of the first quarter of the year.

5.3.3 Source storage containers or exposure devices will be removed from their place of storage and place in an area where no radiation is present.

5.3.4 A calibrated radiation survey instrument will be positioned at the container surface and the radiation level noted.

5.3.5 Form 1-RT-4 will be used in recording the following quarterly inventory information:

Date of source inventory
Source type (i.e. Cobalt 60 or Iridium 192)
Source serial number
Source strength at day of inventory
Initial of individual taking inventory
Radiation-level at source container surface
Source container Model number
Source container Serial number
Total mass of D.U. ^{238} per container

5.3.6 Source inventory records will be retained in the files of Huntington Testing, Inc.

6.0 LEAK TESTING

6.1 SCOPE:

This procedure describes the method of taking leak tests of radioactive sources.

6.2 RESPONSIBILITIES:

It is the responsibility of the Radiation Safety Officer or his representative to perform this test and to ensure that it is done at least every six months for sealed sources and at least every year for depleted uranium of exposure devices.

6.3 EQUIPMENT:

3.1 A radiation survey instrument capable of reading .1 mR per hour or less.

3.2 AEA Technologies, Inc. Leak Test Kit Model 518.

6.4 PROCEDURE:

6.4.1 Remove plug from storage container or from source tube part of exposure device.

6.4.2 Wet the swab with EDTA solution. Remove excess solution and fully insert the swab into the hole of the container. Wipe the interior of the hole thoroughly by rotating swab holder.

6.4.3 Withdraw swab and place in plastic envelope.

6.4.4 The swab is now to be monitored by turning the radiation survey instrument to its most sensitive range. Place the survey instrument in a low background area and move the swab in its plastic envelope to the survey instrument.

NOTE: Move the swab, not the survey instrument.

6.4.5 If there is no indication on the meter, or if the indication is no more than 0.2 mR per hour above background, put the plastic envelope with the swab in the provided mailing box; mail to Technical Operations, Incorporated, Burlington, Massachusetts, with the T/O supplied leak test report form.

6.4.6 If the swab should show more than 0.2 mR per hour, DO NOT MAIL, contact AEA Technologies, Inc., for specific instructions.

7.0 RADIATION SURVEY INSTRUMENT CALIBRATION

7.1 SCOPE:

Radiation Survey Instruments shall be calibrated under authorization of USNRC #47-23076-01.

7.2 RESPONSIBILITIES:

It is the responsibility of the Radiation Safety Officer or his representative to calibrate radiation survey instruments at intervals not to exceed six (6) months or after repairs that may have affected an instrument's accuracy.

7.3 CALIBRATION PROCEDURE:

7.3.1 Radiation survey instruments will be calibrated using Technical Operations Model #773 Calibration Unit.

7.3.2 Remove case of survey instrument, exposing the calibration adjustment screws for each scale.

7.3.3A Victoreen 592-B

Turn survey meter range selector lever to "zero" position. Allow a few minutes for the survey meter to "warm up". (If indicator drifts, additional time is required for "warm up"). Adjust knob on outside of survey meter so that the indicator points to "zero". In the event that the meter fails to "zero", set screw knob at a halfway position and adjust the outside of the meter is for fine "zero" adjustments and the inside set screw is for coarser adjustments. If the meter cannot be "zeroed", the batteries may be weak and must be replaced. Then turn knob to the first scale.

7.3.3B Eberline E130G and #520

Turn instrument knob to battery check position. Needle should enter the zone so marked on the meter face, if not, change the batteries. Then turn knob to the first scale.

7.3.3C ND-2000

Exact report of 7.3.3B

7.0 RADIATION SURVEY INSTRUMENT CALIBRATION

7.4 PREPARATION FOR CALIBRATION:

7.4.1 Remove from storage area and place the calibration source container in a restricted area so that the directional port is aimed horizontally. To minimize the effects of scattered radiation, the unit should be at least 16 feet from any wall, in the direction of the primary beam.

7.4.2 Restrict access to an area 20' from the container.

7.5 SURVEY METER CALIBRATION

The following procedure is designed for a survey instrument with three scales and a range of 0-1000 mR/hr. For instruments with different ranges, the procedure will be similar but the points will differ.

7.5.1 Turn on the survey meter and allow it to "warm up" for approximately 10 minutes.

7.5.2 Determine the activity of the source on the date of calibration from the decay chart provided with the source.

7.5.3 Determine the distance from the source at which the radiation intensity would be 800mR/hr

7.5.4 Using the tape measure attached to the Model #773, place the survey meter such that the axis of the detector is located at the proper distance from the source as determined above.

NOTE: The survey meter should be located so that the center of the detector is at the correct distance and centered on the centerline of the radiation beam. The axis of the detector should be perpendicular to the centerline of the radiation beam. Depending upon the physical size of the survey instrument, it may be necessary to mount it somewhat higher than the bench surface. When the proper geometry for your instrument has been established, use the same physical arrangement consistently in future calibration operations.

At short distances, using survey instruments with large detector volumes, the radiation intensity will not be uniform across the detector. Consideration should be given to this effect when determining the radiation intensities to be checked.

CAUTION

The meter should be placed so that you can read it from a distance without exposing yourself to the primary beam.

7.0 RADIATION SURVEY INSTRUMENT CALIBRATION

7.5 SURVEY METER CALIBRATION (cont.)

7.5.5 Unlock the handle of the Model #773. Remove the shipping plate. Remove all the attenuators from the radiation beam.

7.5.6 Standing away from the radiation beam, expose the source by manually raising the source rod. Note and record the survey meter reading, return the source to the stored position. The actual intensity is 800 mR/hr. If the reading is within plus or minus 20% of the actual intensity, continue checking the instrument. If the instrument reading is not within plus or minus 20% of the actual intensity, the instrument must be adjusted and recalibrated.

7.5.7 Place the 0.25 attenuator in the beam. Repeat step 6; the actual intensity is 200 mR/hr.

7.5.8 Remove the 0.25 attenuator from the beam and place a 0.10 attenuator in the beam. Repeat step 6; the actual intensity is 80 mR/hr.

7.5.9 Place the 0.25 attenuator in the beam. Repeat step 6; the actual intensity is 20 mR/hr.

7.5.10 Remove the 0.25 attenuator from the beam and place a 0.10 attenuator in the beam. Repeat step 6; the actual intensity is 8 mR/hr.

7.5.11 Place the 0.25 attenuator in the beam. Repeat step 6; the actual intensity is 2 mR/hr.

7.5.12 Upon completion of the calibration, the source rod is to be dropped to the closed position, the locking bar inserted to prevent source movement and the lock secured. Survey the source shield and return to the storage area.

7.5.13 Survey meters which cannot be calibrated should be returned to the manufacturer for repair.

7.5.14 Fasten a label to the survey meter indication the date of calibration.

7.5.15 The results of the survey instrument calibration will be recorded on Form 1-RT-6 and retained in the files of Huntington Testing Inc.

8.0 PERIODIC INSPECTION

8.1 SCOPE

This procedure describes the method and frequency of making a periodic inspection of radiographic test equipment.

8.2 RESPONSIBILITY:

It is the responsibility of the Radiation Safety Officer to audit periodic inspection results

8.3 FREQUENCY:

Periodic inspection and maintenance will be performed at least quarterly, regardless of frequency of use or storage status. The only exception to this policy would be for equipment which has been removed from service for any reason. However, prior to returning equipment to service, the appropriate inspections and maintenance shall be performed.

8.4 AUDIT:

The audit results will be recorded on Form 1-RT-8 and shall become a part of the permanent records for each device.

9.0 AUDIT OF RADIOGRAPHIC OPERATIONS

9.1 SCOPE:

The following procedure describes the method of auditing, at intervals not to exceed six (6) months, every individual who performs radiographic operations for Huntington Testing.

9.2 RESPONSIBILITIES:

It shall be the responsibility of the Radiation Safety Officer/designee to conduct these audits.

9.3 AUDIT PROCEDURE:

9.3.1 A physical audit of all radiographic personnel will be undertaken at least once per calendar quarter.

9.3.2 January 1st will be considered the beginning of the first quarter of the year.

9.3.3 Temporary job-site will be audited for compliance with applicable procedures and instructions, and will include the following:

a. Review of all charts and reports required to be maintained as outlined in the pertinent operating procedures.

b. Review of personnel operating techniques with particular regard to compliance with source handling procedures and the posting of radiation areas.

c. Condition of equipment labels and source identification tags.

9.3.4 Form 1-RT-7 will be used to record the necessary quarterly audit information as outlined in 9.3.3 above.

9.3.5 If any area of noncompliance is found during an audit, the RSO shall initiate whatever corrective action he deems necessary to insure compliance with Huntington Testing's Operating and Emergency Procedure. Such corrective action shall be recorded in the remarks column of Form 1-RT-7.

9.3.6 These records will be retained in the offices of Huntington Testing for a period of at least three years.

10.0 QUALITY ASSURANCE PROGRAM
AS REQUIRED BY 10 CFR - PART 71

10.1 ORGANIZATION:

10.1.1 The final responsibility for the Quality Assurance Program for Part 71 Requirements rests with Huntington Testing, Inc. Design and fabrication or radioactive material shipping packages shall not be conducted under this Quality Assurance Program. The Quality Assurance Program is implemented using the attached organization chart.

10.1.2 The Radiation Safety Officer is responsible for overall administration of the program, training and certification, document control, auditing and Part 71 Quality Assurance Requirements.

10.1.3 The Radiographers are responsible for handling, storing, shipping, inspection, test, operating status and record keeping.

10.2 QUALITY ASSURANCE PROGRAM:

10.2.1 The management of Huntington Testing, Inc. establishes and implements this Quality Assurance Program. Training for all QA functions, prior to engagement in these functions, is required according to written procedures. QA Program revisions will be made according to written procedures with management approval. The QA Program will ensure that all defined QC procedures, engineering procedures and specific provisions of the package design approval are satisfied. The QA Program will emphasize control of the characteristics of the package which are critical to safety.

10.2.2 The Radiation Safety Officer shall assure that all radioactive material shipping packages are designed and manufactured under a Quality Assurance Program approved by the Nuclear Regulatory Commission for all packages designed or fabricated after 1, July 1978. This requirement can be satisfied by receiving a certification to this effect from the manufacturer.

10.3 DOCUMENT CONTROL:

10.3.1 All documents related to a specific shipping package will be controlled through the use of written procedures. All document changes will be performed according to written procedures approved by management.

10.3.2 The Radiation Safety Officer shall insure that all QA functions are conducted in accordance with the latest applicable changes to these documents.

10.0 QUALITY ASSURANCE PROGRAM
AS REQUIRED BY 10 CFR - PART 71

10.4 HANDLING STORAGE AND SHIPPING:

10.4.1 Written safety procedures concerning the handling, storage and shipping of packages for certain special form radioactive material will be followed. Shipments will not be made unless all tests, certifications, acceptances and final inspections have been completed. Work instructions will be provided for handling, storage and shipping operations.

10.4.2 Radiography personnel shall perform the critical handling, storage and shipping operations.

10.5 INSPECTION, TEST AND OPERATING STATUS:

10.5.1 Inspection, test and operating status of packages for certain special form radioactive material will be indicated and controlled by written procedures. Status will be indicated by tag, label, marking or log entry. Status of nonconforming parts or packages will be positively maintained by written procedure.

10.5.2 Radiography personnel shall perform the regulatory required inspections and tests in accordance with written procedures. The Radiation Safety Officer shall ensure that these functions are performed.

10.6 QUALITY ASSURANCE RECORDS:

10.6.1 Records of package approvals (including references and drawings), inspections, tests, operating logs, audit results, personnel training and qualifications and records of shipment will be maintained. Descriptions of equipment and written procedures will also be maintained.

10.6.2 These records will be maintained in accordance with written procedures. The records will be identifiable and retrievable. A list of these records, with their storage locations, will be maintained by the Radiation Safety Officer.

QUALITY ASSURANCE PROGRAM
AS REQUIRED BY 10 CFR - PART 71

10.7 AUDITS:

10.7.1 Established schedules of audits of the Quality Assurance Program will be performed using written checklists. Results of audits will be maintained and reported to management. Audit reports will be evaluated and deficient areas corrected. The audits will be dependent on the safety significance of the activity being audited but each activity will be audited at least once per year. Audit reports will be maintained as part of the quality assurance records. Members of the audit team shall have no in the activity being audited.

Remarks_____

BY-PRODUCT MATERIAL QUARTERLY INVENTORY RECORD

LOCATION:

Date of Inventory	Device	Device Serial #	Device Model #	DU Mass	Source Type	Source Serial #	Source Model#	Source Strength	MR/HR at Container Surface	Inventory pefromed by: Initials	Remarks

CALIBRATION RECORDS

SURVEY METER MODEL #: ND-2000
MANUFACTURER: NDS Products

Calibrated with Calibrator Model #773
Calibrated with Source Type: Cs-137
Calibrated with Source Model #773-02

Survey Meter SN:

		Scale & Position						
		X-1		X-10		X-100		
Date of Calibration	Calibration performed by:	A	B	A	B	A	B	Remarks

Quarterly Maintenance Record

Form 1-RT-8
Rev. 10/27/04

In accordance with the requirements of CFR-10, Part 34 (Para 34.31b-1 & 34.73), the following source and related storage and handling equipment was inspected as follows:

AEA Model No.: _____ **Device Serial No.:** _____

Source Type: _____

	Satisfactory	Unsatisfactory
1. Inspect cables for cuts, breaks and broken fittings.	☐	☐
2. Inspect source tubes for cuts, crushing and broken fittings.	☐	☐
3. Survey for excessive radiation levels.	☐	☐
4. Inspect shield for damage to fittings, lock, fasteners and labels.	☐	☐
5. Inspect crank for damage and loose hardware.	☐	☐
6. Check operation of cable connection.	☐	☐
7. Check operation of control for freedom of source movement.	☐	☐
8. Changes in operating characteristics.	☐	☐
9. Proper operation of source position indicator mechanism.	☐	☐
10. Proper operation of crank mechanism.	☐	☐
11. Proper operation of locking mechanism.	☐	☐
12. Source and drive cable wear or damage. (Go-No Go Gage)	☐	☐
13. Damaged or worn source and drive cable tube and connector wear and damage.	☐	☐
14. Dust, dirt or sludge build-up in the source tube.	☐	☐
15. Proper positioning of source inside the shield.	☐	☐
16. Shifting of the shield inside the projector housing.	☐	☐
17. Proper connection of all mating components.	☐	☐
18. Damage that may impair operation.	☐	☐
19. Cable and drive gearbox damage and wear.	☐	☐
20. Clean and grease drive cable if necessary according to appropriate Manual or Service memo.	☐	☐
21. Proper labeling.	☐	☐

Notes:

_____

Inspector: _____

Date: _____

INTERNAL/ALARA INSPECTION CHECK LIST

Radiographic Location:		Radiographer:	
Work Area:		Dosimeter S/N:	Calibration Due:
Date:		Rate Alarm S/N:	Calibration Due:
Time:		Assistant Radiographer:	
Inspector:		Dosimeter S/N:	Calibration Due:
		Rate Alarm S/N:	Calibration Due:

Radioisotope:	Curies:	Serial No.:	
Projector Serial No.:		Projector Model No.:	
Survey Meter Model No.:	Serial No.:	Calibration Due:	

INTERNAL

1) Was the radiographer and assistant wearing a: film badge, rate alarm and dosimeter?	☐ YES	☐ NO
2) Were other non-radiographic personnel working within the restricted boundry?	☐ YES	☐ NO
3) Was the restricted area posted with "CAUTION (or DANGER) RADIATION AREA" signs	☐ YES	☐ NO
	☐ YES	☐ NO
4) Was the restricted area properly controlled to prevent unauthorized entry?	☐ YES	☐ NO
	☐ YES	☐ NO
5) Was the high radiation area posted with "CAUTION (or DANGER) HIGH RADIATION AREA" signs?	☐ YES	☐ NO
	☐ YES	☐ NO
6) Did the radiographer have a calibrated and properly operating survey meter?	☐ YES	☐ NO
	☐ YES	☐ NO
7) Was the Utilization Log properly filled out?	☐ YES	☐ NO
	☐ YES	☐ NO
8) Did the radiographer and assistant have sufficient knowledge of the safety rules? (Ascertained by oral questioning)	☐ YES	☐ NO
	☐ YES	☐ NO
9) Was the radiographer or the assistant working with defective equipment?	☐ YES	☐ NO
	☐ YES	☐ NO
10) Did the radiographer properly survey the source projector, and source tube and take a radiation reading 1ft (0.3m) in front of the source following the radiographic exposure?	☐ YES	☐ NO
	☐ YES	☐ NO
11) Were radioactive isotopes stored properly and kept locked to prevent unauthorized removal?	☐ YES	☐ NO
	☐ YES	☐ NO
12) Was the storage area posted with "CAUTION (or DANGER) RADIATION AREA" signs?	☐ YES	☐ NO
	☐ YES	☐ NO
13) Did the radiographer posess a copy of the applicant's operating and emergency procedures, and as applicable, State or NRC rules and regulations for protection against radiation?	☐ YES	☐ NO
	☐ YES	☐ NO
14) Were there any items of noncompliance other than those listed in this form?	☐ YES	☐ NO

Inspector's Signature: _____

INTERNAL/ALARA INSPECTION CHECK LIST

ALARA

15) Were tungsten collimators used? ☐ YES ☐ NO
If no, explain;

16) If used, were collimators properly positioned? ☐ YES ☐ NO
If no, explain;

17) Was backing lead used? ☐ YES ☐ NO
If no, explain;

18) Was the source tube shielded as best as possible? ☐ YES ☐ NO
If no, explain;

19) Were exposures properly made? ☐ YES ☐ NO
If no, explain;

20) Did radiographer and assistant position themselves at the greatest allowable distance during exposures? ☐ YES ☐ NO
If no, explain;

21) Did radiographers and assistant make use of surrounded shielding as best as possible? ☐ YES ☐ NO
If no, explain;

Remarks:

Radiographer's Security Code: ☐
Radiographer's Name: 0

Assistant's Security Code: ☐
Assistant's Name: 0

Inspector's Signature:

INDEX--SECTION 2

OPERATING AND EMERGENCY PROCEDURES

INDEX--SECTION 2

OPERATING AND EMERGENCY PROCEDURES

PERSONNEL MONITORING – DOSIMETRY
Procedure 1 (Rev. 3)

1.0 SCOPE:

This procedure describes the method of charging and using dosimeters including recording of readings.

2.0 RESPONSIBILITIES:

It is the responsibility of all personnel engaged in radiography to assure themselves that their dosimeters are calibrated in accordance with Section 2, Proc. 16, and to follow this procedure without deviation.

3.0 DOSIMETER CHARGING:

3.1 Insert dosimeter into charging socket.

3.2 Turn knob clockwise to the "ON" position, when applicable

3.3 Depress dosimeter in socket firmly.

3.4 Look through dosimeter at the hairline and scale. Adjust knob so that the hairline is at zero.

3.5 Remove dosimeter from charger and read scale again by looking at a source of light to assure that the hairline indicator has not moved.

3.6 Turn charger to "OFF" position, when applicable.

4.0 DOSIMETER USAGE:

4.1 All radiographers shall be supplied with a working and calibrated dosimeter having a range from zero (0) to 200 millirem or 2 millisieverts.

4.2 Radiographic personnel shall wear dosimeters at all times while performing radiographic assignments.

4.2 Dosimeters will be recharged daily or as required at the start of each shift. The dosimeters scale readings will be recorded on form Radiographic Operations Report #1.

4.3 Dosimeters will be read several times during a shift.

4.4 In the event a dosimeter goes off scale (over 200mR), and the possibility of radiation cannot be ruled out, radiographic operations will stop immediately for the individual and his film badge or TLD sent for processing.

4.5 The film badge or TLD being worn by the radiographer at the time will be forwarded to: for immediate evaluation.

Landauer
2 Science Road
Glenwood, IL 60425

PERSONNEL MONITORING – DOSIMETRY
Procedure 1 (cont)

4.0 DOSIMETER USAGE: (Cont'd)

4.7 The radiographer or radiographer's assistant will be prohibited from performing any further radiographic operations until the magnitude of the exposure has been determined by the processing of this individual's film badge by R. S. Landauer & Co.

4.8 Dosimeters being delicate instruments can indicate high readings if jarred or dropped. Therefore, the reason for the high reading will be determined.

4.9 If the dosimeter is judged to be faulty, it will be taken out of service until repaired.

4.10 At the end of a shift, dosimeters will be read and the amount indicated on the scale recorded on Form Radiographic Operations Report #1.

PERSONNEL MONITORING - FILM BADGES OR TLD
Procedure 2 (Rev. 2)

1.0 SCOPE:

This procedure describes the use and control of film badges or TLD.

2.0 RESPONSIBILITIES:

It is the responsibility of all personnel engaged in radiography to follow this procedure without deviation.

3.0 FILM BADGE USE AND CONTROL:

3.1 "Radiographic Personnel" will wear film badges or TLD at all times while performing radiographic assignments.

3.2 Each film badge or TLD will have the person's name or identification and the period it is to be worn indicated on the badge.

3.3 film badges or TLD will be the "Monthly" type.

3.4 The Radiation Safety Officer, or his designated representative, will change the film badge inserts at the start of each monitoring period.

3.5 The Radiation Safety Officer will be responsible for filing the film badge report results.

3.5.1 If the monthly film badge report indicates a man has received radiation in excess of 400 MR the RSO will investigate the cause and take corrective action to prevent a recurrence.

3.5.2 A written explanation will be attached to any film badge report where the amount shown in the report is in excess of 400 MR for the period describing the cause and corrective action.

3.6 Film badges or TLD will be placed in "Film Badge Rack" at all times when not being worn. The Control Badge will be retained in the same rack at all times.

3.7 film badges or TLD and film will be supplied by:

Landauer
2 Science Road
Glenwood, IL 60425

POSTING OF TEMPORARY RADIATION AREAS
Procedure 3 (Rev. 2)

1.0 SCOPE:

This procedure describes the method of establishing temporary radiation areas and high radiation areas.

2.0 RESPONSIBILITIES:

The radiographer is responsible for following this procedure without deviation.

3.0 PROCEDURE:

3.1a To determine the distance to the boundary of a High Radiation Area, the following formula shall be used.

$$\frac{\text{Intensity of Radiation Source (MR/hr @ 1ft)}}{100\ \text{mR/hr}} = \frac{(D_2)^2}{1}$$

3.1b To determine the radiation intensity at the boundary of the restricted area, the following formula shall be used to determine the 2 mR per hour line:

$$\frac{\text{Intensity of Radiation Source (MR/hr @ 1ft)}}{2\ \text{mR/hr}} = \frac{(D_2)^2}{1}$$

3.2 All High Radiation Areas shall have 'CAUTION HIGH RADIATION AREA" signs posted around the boundary zone as determined in Section 3.1 of this procedure. All radiation areas shall have "CAUTION - RADIATION AREA" signs posted around the boundary zone as determined in Section 3.1 in this procedure.

3.3 Signs will be posted in such a manner that they are clearly visible to the approach of personnel from any direction.

3.4 Warning lights will be used in conjunction with the ropes and signs if gamma-ray exposure is made in an unlit area.

3.5 Signs, ropes and lights will be removed as soon as the source of radiation is returned to storage. (Caution must be employed so as not to leave signs, ropes and lights in evidence when not in use).

3.6 Restricted areas shall be established at any time a radioactive source is known to be in an exposed position, or if the position of the source is not determinable.

3.7 If radiography is performed in a lockable room or area, all entrances to the room or area shall be locked. All entrances shall also bear a sign to the approach of personnel.

POSTING OF TEMPORARY RADIATION AREAS
Procedure 3 (cont.)

3.0 PROCEDURE: (Cont'd)

3.8 Should unauthorized personnel enter a restricted area while radiography is in progress, the radiographer shall immediately return the source to the shielded position.

RADIATION SURVEYS
Procedure 4 (Rev. 2)

1.0 SCOPE:

This procedure describes the method of taking radiation surveys of temporary radiation areas established for gamma ray work.

2.0 RESPONSIBILITIES:

The radiographer using the Gamma Ray Exposure devise is responsible for following this procedure without deviation.

3.0 PROCEDURE:

3.1 Two (2) calibrated and operable Radiation Survey instrument that meet the requirements of 10 CFR Part 34.25 will be maintained at each radiographic site.

3.2 Prior to taking the exposure the radiographer will determine:

a) The boundary at which the radiation level is in excess of 100 mR/hr, and will post it with "High Radiation Area" signs.

b) The boundary at which the radiation level is in excess of 2 mR/hr. This area will be posted with "Caution Radiation Area" signs.

3.3 The radiographer will position himself in such a position that the entire high radiation area is constantly within his range of vision during the exposure.

3.4 During the exposure a physical Radiation Survey will be made to insure that the radiation level outside of the posted area does not exceed 2 mR/hr, providing that they maintain a constant visual of the high radiation area.

3.5 Upon completion of the exposure and safe retrieval of the source to it's secure position the radiographer will approach the exposure devise from the rear with a survey meter and shall survey the device in a manner to assure that the source is in the fully secured position, as well as the full length of the guide tube for signs of excessive radiation levels. Providing normal levels are encountered at the exposure devise and the auto-lock is in the green position the source will be considered secure in the exposure device.

RADIATION SURVEYS
Procedure 4 (cont.)

3.0 PROCEDURE:

3.6 A Radiation Survey chart will be made as a result of conducting a radiation survey. The chart will consist of a sketch showing the area and distance of the area boundaries. Each chart will provide the following information:

Plant or Field Location
Date
Name of Radiographer and Radiographer Assistant
Radioisotope used
Strength of Isotope
Exposure Device
Number of Exposures
Exposure Time
Distance from source to edge of restricted area
Location of Radiation warning signs.

The above information will be provided on Radiographic Operations Report No. 1.

3.7 The radiographer shall not leave the area until such time as the source is safely retrieved, returned to it's shielded and secured position, the exposure device surveyed in accordance with the requirements of Paragraph 3.5.

3.8 In the event of multiple exposures in the same general area a survey chart need not be made for each exposure. A physical survey will be made, however each time a radioisotope is moved from the shielded position of the exposure devices.

SECURITY OF RADIOACTIVE MATERIALS
Procedure 5 (Rev. 2)

1.0 SCOPE:

This procedure describes the means of insuring that radioactive materials are secured so that non-monitored and unauthorized personnel cannot be subjected to any radiation.

2.0 RESPONSIBILITIES:

The Radiation Safety Officer and Radiographers are responsible for full compliance with this procedure.

3.0 GENERAL:

All exposure devices are locked in steel or concrete storage vaults at both Huntington Testing's permanent facilities and on long-term temporary field sites. These vaults are posted with "Caution-Radioactive Material" signs as required by 10 CFR Part 20. Shielding is provided to reduce the radiation level that an individual may receive from the radiation source(s).

4.0 PROCEDURE:

4.1 All exposure devices being returned to storage will be surveyed in accordance with the applicable paragraphs of Section 2 Proc. 4.

4.2 Radiation survey results will be logged in Huntington Testing's Utilization Record on Radiographic Operations Report No.1.

4.3 All exposure devices taken out of storage vaults either in the shop or field will be surveyed and inspected on a daily basis check for physical damage and the survey results logged as required in Para 4.2.

4.4 Radiographic devices and storage vaults will be kept locked at all times when not in use.

4.5 Keys or door combinations for Radiographic devices and storage vaults will be kept in the Radiographic Office in such a manner that only qualified personnel have access to them.

SOURCE SURVEY INSPECTION AND UTILIZATION RECORDS
Procedure 6 (Rev. 2)

1.0 SCOPE:

This procedure describes the method of maintaining the source survey, inspection and utilization records.

2.0 RESPONSIBILITIES:

It is the responsibility of Radiographers to follow this procedure without deviation.

3.0 EXPOSURE DEVICE DAILY INSPECTION AND UTILIZATION RECORDS:

3.1 Radiographic Operations Report No. 1 will be filled out in detail when any source is removed from its place of storage or a periodic inspection of equipment is conducted.

3.2 Forms will clearly reflect the following information:

a. Plant or construction site location
b. Date
c. Source (type, e.g. Iridium 192, Cobalt 60, etc.)
d. Exposure Device (Manufacturer's name and model number)
e. mR/hr at the surface of exposure device
f. Results of daily inspections of exposure device, controls and source tubes
g. Name or initials of radiographer inspecting and using source
h. Results of periodic inspection
i. Name or initials of qualified person conducting periodic inspection.

EMERGENCY PROCEDURES
Procedure 7 (Rev. 3)

1.0 SCOPE:

This procedure describes emergency measures to be followed in the event of an incident affecting the security of radioactive sources or creating a radiation hazard. All personnel responsible for the security and use of radioactive sources will adhere to the following procedures in detail.

2.0 SOURCE DISCONNECTS:

2.1 Regardless of circumstance, a source disconnect shall constitute an emergency.

2.2 In the event of a source disconnect, an appropriate restricted area will be set-up and the Radiation Safety Officer shall be notified immediately.

2.3 No attempts shall be made by radiographic personnel to either retrieve or "shield-down" the source.

2.4 The Radiation Safety Officer shall access the situation and, if necessary, begin retrieval operations. Only those individuals listed on Huntington Testing's License will be permitted to perform retrieval operations.

2.5 The RSO shall make all appropriate notifications of the incident.

3.0 FIRE OR ACCIDENT IN OR NEAR RADIOGRAPHIC EXPOSURE AREA:

3.1 Return source to radiographic exposure device

3.2 Perform radiation survey of device as follows:

3.2.1 With a calibrated survey meter on scale approach device from rear.

3.2.2 Survey entire surface around the exposure device (360 degrees). Upon contact with the device the radiation level should vary from 10 mR/hr - 200 mR/hr depending on source strength. The radiation level should be checked to insure the source is in the secure position.

3.2.3 Continue survey from device and along the full length of guide tube. As distance from device increases the radiation level should decrease, indicating that source is in secure position.

3.2.4 If the radiation level increases during the guide tube survey, the source is not in the secure position and immediate steps must be taken to return source into its fully retracted position.

EMERGENCY PROCEDURES
Procedure 7 (cont)

3.0 FIRE OR ACCIDENT IN OR NEAR RADIOGRAPHIC EXPOSURE AREA: (Cont'd)

3.3 Return radiographic exposure device to storage area if possible.

3.4 In the event the radiographic exposure device cannot be removed from the danger area, set up a restricted area as outlined in Procedure No.3.

3.5 The Fire Department or the Security Officer, whichever is applicable must be notified to the presents of radioactive material.

4.0 DAMAGE TO RADIOGRAPHIC EXPOSURE DEVICES, SOURCE GUIDE TUBES OR CONTROL CABLES:

4.1 Return source to device if possible and lock device.

4.1.1 Perform survey as per instruction in 3.2 of this Procedure.

4.2 Set up restricted area as outlined in Procedure No.3.

4.3 Notify the Radiation Safety Officer.

4.4 If source cannot be returned to the device, the restricted area will be maintained until the source has been returned to the secure position. Radiation Safety Officer shall be notified immediately. No attempts shall be made by radiographic personnel to either retrieve or "shield-down" the source. The Radiation Safety Officer shall access the situation and, if necessary, begin retrieval operations. Only those individuals listed on Huntington Testing's License will be permitted to perform retrieval operations.

4.5 Radiographic exposure device will not be used again until repairs are made and the Radiation Safety Officer inspects the equipment.

4.6 The Radiation Safety Officer will determine if the incident requires notifying the regulatory authority. In the event an exposure device is damaged at a construction site, the RSO will be notified by phone and advised of the incident. The exposure device will not be returned to service until specific approval is granted by the RSO.

5.0 LOSS OF SOURCE:

5.1 In the event a source is lost, the Radiation Safety Officer will be notified immediately.

5.2 The Radiation Safety Officer will determine the last known location of the source.

EMERGENCY PROCEDURES
Procedure 7 (cont)

5.0 LOSS OF SOURCE: (Cont'd)

5.3 The area will be surveyed and roped off in accordance with Procedure No. 3.

5.4 Appropriate measures will be taken until such time as the source is returned to its place of storage.

5.5 The Radiation Safety Officer will determine if any non-monitored personnel were exposed to radiation.

5.6 The Radiation Safety Officer will determine if the incident requires notifying the appropriate regulatory authorities.

6.0 ACCIDENT INVOLVING VEHICLE UNDER CONTROL OF HUNTINGTON TESTING INC.:

6.1 If a vehicle is involved in an accident while transporting a by-product material (Source), the area surrounding the source will be roped off in accordance with Procedure No.3.

6.2 If the radiation survey instrument is inoperable, the area will be roped off at distances shown in either Table I or Table II (attached).

6.3 Notification of the accident will be carried out in accordance with the instructions listed in Paragraph 7.0.

6.4 In case of a minor accident where it can be determined that the source has not been dislodged from its container, there will be no necessity for posting a restricted area.

6.5 If no radiation hazard exists as visually determined but the radiation survey instrument is inoperable, the vehicle will not proceed until a calibrated and usable instrument is obtained.

7.0 NOTIFICATION AND REPORTS:

7.1 A written report will describe in detail any incident involving the loss, theft or an accident pertaining to by-product materials.

7.2 The Radiation Safety Officer will determine the necessity for notifying the regulatory authority.

EMERGENCY PROCEDURES
Procedure 7 (cont)

7.0 NOTIFICATION AND REPORTS: (Cont'd)

7.3. Numbers to call in case of emergency and/or an accident:

a)	David McCallister	-	Radiation Safety Officer Operations Manager	DAY NIGHT Mobile	(304) 453-6111 [redacted] [redacted]
b)	Steve Pratt	-	Scheduling Manager	DAY NIGHT Mobile	(304) 453-6111 [redacted]
c)	USNRC	-	Region II		(404) 331-4503

8.0 RETRIEVAL:

8.1 In the event that a source retrieval should become necessary, only those individuals listed on Huntington Testing's License will be permitted to perform retrieval operations.

Procedure 7 (cont)

TABLE I

COBALT - 60

Source Strength	Maximum MR/HR Level at Perimeter	Distance from Source to Perimeter
5 Ci	2	190 ft.
10 Ci	2	270 ft.
15 Ci	2	330 ft.
20 Ci	2	381 ft.
25 Ci	2	426 ft.
30 Ci	2	467 ft.
35 Ci	2	504 ft.
40 Ci	2	539 ft.
45 Ci	2	572 ft.
50 Ci	2	602 ft.
55 Ci	2	632 ft.
60 Ci	2	660 ft.
65 Ci	2	687 ft.
70 Ci	2	713 ft.
75 Ci	2	738 ft.
80 Ci	2	762 ft.
85 Ci	2	786 ft.
90 Ci	2	808 ft.
95 Ci	2	830 ft.
100 Ci	2	852 ft.

*Note: For uneven source strength values, round up to the nearest table value. Ex. source - 37 Ci use 40 Ci column.

EMERGENCY PROCEDURES
Procedure 7 (cont)

TABLE I I

I R I D I U M - 192

Source Strength	Maximum MR/HR Level at Perimeter	Distance from Source to Perimeter
5	2	121 ft.
10 Ci	2	175 ft.
15 Ci	2	210 ft.
20 Ci	2	245 ft.
25 Ci	2	271 ft.
30 Ci	2	300 ft.
35 Ci	2	320 ft.
40 Ci	2	343 ft.
45 Ci	2	364 ft.
50 Ci	2	385 ft.
55 Ci	2	402 ft.
60 Ci	2	420 ft.
65 Ci	2	437 ft.
70 Ci	2	454 ft.
75 Ci	2	470 ft.
80 Ci	2	485 ft.
85 Ci	2	500 ft.
90 Ci	2	514 ft.
95 Ci	2	528 ft.
100 Ci	2	545 ft.

*Note: For uneven source strength values, round up to the nearest table value. Ex. source - 37 Ci use 40 Ci column.

OPERATION OF AEA TECHNOLOGY
CALIBRATION UNIT MODEL #571
Procedure 8

"D E L E T E D"

REPLACEMENT OF AEA TECHNOLOGY SEALED SOURCES
Procedure 9 (Rev. 3)

1.0 SCOPE:

This procedure describes the method of replacing AEA Technology sealed by-product material sources utilizing their approved source changers Model Number 650L.

2.0 RESPONSIBILITIES:

The radiation Safety Officer or a radiographer must perform or directly supervise all source changing operations.

3.0 DESCRIPTION:

3.1 The source changers shielding consists of depleted uranium (U238) filled steel shell. Imbedded in it is a "U" shaped stainless steel source tube with both sides emerging from the shell. Midway in the "U" is a stop dividing it into two compartments, one for the new source and one for the depleted source.

3.2 The closure mechanism consists of two single caps and locking mechanisms which fasten down over the "U" tube ports to hold the source and connector firmly in a safe position.

4.0 PROCEDURE:

AEA Technology provides with each source and changer a complete operating procedure including photographs and sketches of the equipment. Prior to changing a source from the source changer to the exposure device, the instructions are to be reviewed and then followed in detail.

4.1 All the precautions used when making radiographic exposures must be followed. Personnel monitoring devices must be worn during all source changing operations. All operations will be monitored with a calibrated, operable survey meter

4.2 Model 650L Source Changer Isotope IR-192
Model 771 Source Changer Isotope Co – 60.

REPLACEMENT OF AEA TECHNOLOGY SEALED SOURCES
Procedure 9 (cont)

4.2 (Cont'd):

4.2.1 Prior to changing sources check for the following items.
a. Source Decay Chart & Leak Certificate
b. Source Identification Plate
c. Return Shipping Labels
d. Tamperproof Seals
e. Instruction Manual

4.2.2 Upon receipt of Source Changer, survey the Source Changer to insure that the source is in the proper storage position.

4.2.3 Locate the source changer and exposure device in a restricted area, locate the devices so as to avoid sharp bends in the guide tube or control housing.

4.2.4 Set the exposure device as for an exposure. Establish the perimeter of a HIGH RADIATION AREA and a RADIATION AREA as per instruction in Procedure No. 3.

4.2.5 Remove the cover from the source changer by breaking the seal wire and unbolting. Unscrew and remove the protective cap from the locking mechanism.

4.2.6 Over the source changer's empty source tube, release the threaded fitting by manually pulling back on the spring-loaded plunger located at the side of the lock assembly.

4.2.7 At the empty 650L tube, unlock the key-lock and push the lock slide away from the key-lock. This "unsecured" position will permit the source assembly to pass through the lock mechanism. Insert the nylon gauge into the source tube to ensure that no foreign objects or cropped sources are in the source changer's source tube. Ensure the scribed line of the gauge is level to or slightly below the top of the lock mechanism. This gauge is displaced above the lock mechanism greater than ½", there may be a foreign object inside of the source tube. This could cause displacement of a source assembly affecting proper securement of the source assembly and cause higher than normal radiation intensities. Call AEA Technology for assistance if the nylon gauge does not provide an empty indication.

4.2.8 After confirming the source tube is empty, insert the source guide tube (projection sheath) with the threaded fitting into the lock fitting. Gently pull the source guide tube upward to ensure the spring-loaded plunger of the lock is fully engaged into the source guide tube fitting.

NOTE: THE SOURCE CHANGER MUST REMAIN UPRIGHT AT ALL TIMES. DO NOT LAY THE SOURCE CHANGER ON ITS SIDE.

REPLACEMENT OF AEA TECHNOLOGY SEALED SOURCES
Procedure 9 (cont)

4.2 (Cont'd):

4.2.9 Set up the radiographic exposure device as for an exposure. Ensure the "restricted" area is cleared and that all access points are secured.

4.2.10 At the Exposure device Controls, crank the source from the exposure device to the source changer.

4.2.11 Approach the exposure device with the survey meter. Survey the exposure device on all sides, survey the guide tube and survey the source changer on all sides to insure the source has been properly transferred. The maximum radiation level at the source changers should be less than 200 mR/hr.

4.2.12 After confirming (by survey) the transferred source assembly is in the fully shielded position, push the lock slide towards the key-lock to secure the source assembly.

4.2.13 Push down on the key-lock to engage the lock. Engagement of the plunger key-lock will secure against any movement of the lock slide.

4.2.14 Disconnect the guide tube from the source changer with the attached threaded fitting from the lock mechanism by manual retraction of the spring-loaded plunger. Slowly pull the source guide tube away from the lock mechanism while observing the survey instrument for any sudden increase in radiation intensity. Pull the source guide tube back enough to expose the source and drive cable connectors.

4.2.15 Disconnect the drive cable connector from the source assembly connector. Remove the threaded fitting from the source guide tube. Screw the protective cap onto the threaded fitting, and then insert the threaded fitting with the protective cap into the lock mechanism. Attach the metallic source identification tag to the protective lock cap to provide a visual location of the source assembly's position within the source changer.

4.2.16 Without unlocking the locking mechanism, remove the detachable threaded fitting from the lock mechanism by retracting the spring-loaded plunger. Attach the threaded fitting onto the source guide tube.

4.2.17 Couple the drive cable to the source by depressing the lock pin, sliding the drive cable connector into the keyway, and releasing the lock pin.

4.2.18 Insert the threaded fitting into the lock mechanism. Pull up gently on the source guide tube to ensure the spring-loaded plunger of the lock mechanism is engaged into the threaded fitting.

REPLACEMENT OF AEA TECHNOLOGY SEALED SOURCES
Procedure 9 (cont)

4.2. (Cont'd):

4.2.19 Insert the key into the key-lock and rotate until the key-lock pops upward. Push the lock slide away from the key-lock to unlock.

4.2.20 At the exposure device controls, crank the source from the source changer to its storage position in the exposure device. From the exposure device, attempt to expose the source assembly from the exposure device to confirm if the source has been automatically secured.

4.2.21 Approach the exposure device with the survey meter. Survey the exposure device on all sides, survey the guide tube and survey the source changer on all sides to insure that source has been properly transferred.

4.2.22 Lock the exposure device.

4.2.23 Disconnect the source guide tube from the source changer.

4.2.24 Affix the identification plate of the new source to the exposure device and attach the identification plate of the old source to the source changer.

4.2.25 Bolt the source hold-down cap in place and seal wire.

4.2.26 Survey all exterior surfaces of the source changer to insure that the radiation level does not exceed 200 mR/hr.

4.2.27 Measure the radiation level three feet from all exterior surfaces of the source changer and insure that the radiation level is less than 10 mR/hr. The maximum radiation levels measured three feet from any exterior surface is the transport index. (Example: With a maximum radiation level of 2.2 milliroentgens per hour, the transport index is 2.2).

4.2.28 Attach the RADIOACTIVE III or RADIOACTIVE II shipping labels properly completed, to two opposite sides on the container.

4.2.29 Return the container to AEA Technology

RECEIVING AND SHIPPING OF BY-PRODUCT MATERIALS
Procedure 10 (Rev. 2)

1.0 SCOPE:

This procedure describes the manner in which by-product materials (radioisotopes) are received by and shipped from Huntington Testing or temporary jobsites.

2.0 RESPONSIBILITIES:

2.1 It is the responsibility of the Radiation Safety Officer at the plant, or his designated representative a t temporary jobsite, to insure that by-product materials are received and shipped in strict accordance with this procedure.

2.2 It is the responsibility of the supplier of by-product materials to ship radioisotopes to Huntington Testing in accordance with the rules and regulations of the U.S. Nuclear Regulatory Commission and U.S. Department of Transportation.

2.3 The supplier will use only approved shipping containers and furnish appropriate labels, safety seals or container locks to Huntington Testing for the shipment of sources.

2.4 It is the responsibility of the Radiation Safety Officer to arrange the pick-up of radioactive material from a carrier's terminal as expeditiously as possible upon receipt of notification from the carrier of its arrival.

3.0 PROCEDURE "RECEIVING":

When a shipment of by-product material is delivered, the Receiving Department will notify the Radiation Safety Officer immediately upon receipt.

3.1 The Radiation Safety Officer or a qualified radiographer shall monitor the shipment as soon as practicable, but no later than three (3) hours after receipt. The survey shall be as outlined in Procedure 10, Item 4. If the radiation levels on the external surfaces of the container are in excess of 200mR/hr on contact or in excess of 10 mR/hr at three (3) feet from the container then a restricted area will be established as outlined in Procedure 3, and appropriate remedial action taken as deemed necessary by the R.S.O.

3.2 If radiation levels in excess of those mentioned in 3.1 are found, then the final delivering carrier and the appropriate Commission Operations Regional Office shown in Appendix D of 10 CFR, Part 20, or the applicable State Agency shall be notified by telephone and telegraph.

RECEIVING AND SHIPPING OF BY-PRODUCT MATERIALS
Procedure 10 (cont)

3.0 PROCEDURE "RECEIVING": (Cont'd)

3.3 The RSO or a qualified radiographer will have the shipping container delivered to the by-product material storage area where he will inspect for evidence of unauthorized opening.

CAUTION: Receiving personnel will not open, break seals or unlock by-product material shipping containers

3.4 Complete Huntington Testing's Receiving Report Form 1-RT-12 for radioactive material.

4.0 SHIPPING OF BY-PRODUCT MATERIALS:

After a source has been secured in the source shipping container, the Radiation Safety Officer and a qualified radiographer shall prepare the container for shipment as follows:

4.1 Survey all exterior surfaces of the source shipping container to insure that the radiation level does not exceed 200 mR/hr.

4.2 Measure the radiation level three (3) feet from all exterior surfaces of the source shipping container and insure that the radiation level is less than 10 mR/hr. The maximum radiation level measured three feet from any exterior surface is the transport index. (Example: With a maximum radiation level of 2.2 milliroentgens per hour, the transport index is 2.2).

4.3 Apply the radioactive II or III shipping labels properly completed to two opposite sides of the container.

4.4 Complete Huntington Testing's Uniform Straight Bill of Lading for radioactive material.

4.5 Ship Container.

OPERATION OF AEA TECHNOLOGY MODEL 660B EXPOSURE DEVICE
Procedure No. 11 (Rev. 3)

1.0 SCOPE:

This procedure describes the operation of Radiographic Exposure Device Model 660B manufactured by AEA Technology, Inc.

2.0 RESPONSIBILITIES:

The Radiographer is responsible for operating the Radiographic Exposure Device described herein in strict accordance with this procedure. Procedures for the use of film badges or TLD, dosimeters, radiation survey instruments and the posting of radiation areas will be followed without deviation.

3.0 DESCRIPTION:

Technical Operation Exposure Device Model 660B is designed for use with Iridium 192. It has a capacity of 100 curies.

4.0 OPERATING INSTRUCTIONS:

4.1 Guide Tube Assembly. At the radiographic focal point, position and secure the snout of the master guide tube using the tripod stand and swivel clamps.

4.2 Remove the plastic dust caps and attach additional extender guide tubes, as necessary, to the master guide tube.

4.3 Determine the position of the exposure device (source shield) allowing for maximum possible operating shielding. Assuming appropriate shielding is available, the operator will be approximately twenty-five feet from the exposure device during actual operation.

4.4 Lay out the guide tubes as straight as possible directing them toward the exposure device. Note that the bend radius of the guide tubes should not be less than twenty inches. Smaller bend radii may restrict the movement of the control cable and source assembly.

NOTE: THE GUIDE TUBES SHOULD NOT BE SUBJECTED TO ANY UNDO STRESS OR ABUSE, WHICH COULD CAUSE RESTRICTION IN THE TUBES.

OPERATION OF AEA TECHNOLOGY MODEL 660B EXPOSURE DEVICE
Procedure No. 11 (Cont'd)

4.0 OPERATING INSTRUCTIONS: (Cont'd)

4.5 Remove the shipping plug from the exposure device connector and attach the last guide tube to the exposure device.

CAUTION: NEVER OPERATE THE SYSTEM WITH MORE THAN THREE GUIDE TUBE SECTIONS (INCLUDING THE MASTER).

Control Unit: Determine the operating site of the control unit. For maximum safety, the operator should be located behind a protective field.

4.7 Lay out the control cable as straight as possible, directing it toward the exposure device. Note that the bend radius should not be less than three feet. Smaller bend radii may restrict the movement of the control cable.

4.8 Attach the control cable to the exposure device in accordance with the following sequence:

4.8.1 Unlock the exposure device with the key provided and turn the connector selector ring from the LOCK position to the CONNECT position. When the ring is in the CONNECT position, the storage cover will disengage from the exposure device.

4.8.2 Slide the control cable collar back and open the jaws of the control cable connector. This exposes the male position of the swivel connector.

4.8.3 Engage the male and female portions of the swivel connector by depressing the spring-loaded locking pin toward the exposure device with the thumbnail. Release the locking pin and test that the connection has been properly made.

4.8.4 Close the jaws of the control cable connector over the swivel-type connector.

4.8.5 Slide the control cable collar over the connector jaws.

4.8.6 Hold the control cable collar flush against the exposure device connector and rotate the selector ring from the CONNECT position to the LOCK position until actual operation is ready to start.

OPERATION OF AEA TECHNOLOGY MODEL 660B EXPOSURE DEVICE
Procedure No. 11 (Cont'd)

5.0 OPERATING PROCEDURE:

5.1 Establish the post "HIGH RADIATION AREA" and "RADIATION AREA" as specified in Procedure No. 3.

5.2 Thoroughly check all cable connections and bend radii and position of the snout of the master guide tube. (This represents the radiographic focal point of the source). To operate the system, perform the following:

WARNING: OPERATE THE SYSTEM ONLY IN AREAS MONITORED WITH APPROPRIATE RADIATION MEASURING EQUIPMENT.

5.3 Unlock the exposure device connector and rotate the selector ring to the OPERATE position.

5.4 Push the GREEN MARKING laterally from left to right (as seen from behind the exposure device) until the lock slide RED MARKING fully appears on the right side of the selector ring and you feel or hear the sleeve snap into the slide. The source is now free to move.

NOTE

IF CRANKING BECOMES DIFFICULT ANY TIME DURING THE NEXT STEP, REVERSE THE DIRECTION OF THE CRANKING TO RETURN THE SOURCE TO THE STORED POSITION IN THE EXPOSURE DEVICE. FIRST MONITOR THE AREA WITH A SURVEY METER TO INSURE THAT THE SOURCE IS PROPERLY SECURE. THEN CHECK THE CONTROL AND GUIDE TUBES FOR EXCESSIVELY SMALL BEND RADII AND REPEAT THE STEP.

5.4 At the control unit, rapidly rotate the hand crank in the EXPOSE (counterclockwise) direction to move the source out of the exposure device and into the guide tubes toward the radiographic focal point. Continue to rotate the hand crank until the source reaches the snout, which serves as a mechanical stop for the source.

5.5 Specimen exposure should be figured from the time that the source reaches the stop.

5.6 To return the source to the exposure device, after the desired exposure time has elapsed, rapidly turn the hand crank in the RETRACT (clockwise) direction. Continue to turn the crank until the auto-lock is actuated and the GREEN MARKING on the slide bar is visible. Gently try to expose the source by cranking in the counter-clockwise position after the auto-lock has been actuated to insure the auto-lock has functioned properly. (Source properly secured).

OPERATION OF AEA TECHNOLOGY MODEL 660B EXPOSURE DEVICE
Procedure No. 11 (Cont'd)

5.0 OPERATING PROCEDURE: (Cont'd)

WARNING: IF THE EXPOSURE DEVICE AUTO-LOCK IS NOT IN THE GREEN POSITION, THE SOURCE HAS NOT BEEN FULLY RETRACTED.

CAUTION: AFTER AN EXPOSURE, THE EXPOSURE DEVICE AND FULL LENGTH OF THE GUIDE TUBE SHALL BE THOROUGHLY MONITORED WITH A SURVEY METER BEFORE CONTINUING.

5.7 At the exposure device, rotate the selector ring from the OPERATE position to the LOCK position to secure the auto-lock in the green position.

6.0 SPECIFIC INSTRUCTION FOR SECURING TECH/OPS. MODEL 660B EXPOSURE DEVICE WHEN NO ADDITIONAL EXPOSURES ARE REQUIRED:

6.1 Approach the exposure device with the survey meter from the control cable end of the exposure device. Survey the exposure device on all sides and the full length of the guide tube to insure that source is in secured position. Radiation levels at contact with exposure device will vary between 10 mR/hr and 200 mR.hr depending on source strength. Record results on Radiographic Operations Report No. 1.

6.2 To disconnect the control unit from the exposure device, perform the following:

6.2.1 Unlock the exposure device using the supplied key.

6.2.2 Rotate the connector selector ring from the LOCK position to the CONNECT position. When the selector ring reaches the CONNECT position the cable connector will partially disengage from the exposure device.

6.2.3 Open the connector jaws and disconnect the swivel-type connector by depressing the spring-loaded locking pin towards the exposure device with the thumbnail and separating the male and female connections.

NOTE: IF ANY DIFFICULTY IS ENCOUNTERED, REPORT TO THE RSO FOR FURTHER INSTRUCTIONS.

6.2.4 Replace the storage cover in the exposure device connector and rotate the selector ring to the LOCK position. Remove the key and engage the lock to secure the exposure device.

6.2.5 Coil the control cable in the 664 control unit and store the unit in an area where the cable will not be subjected to undue stress or abuse.

OPERATION OF AEA TECHNOLOGY MODEL 660B EXPOSURE DEVICE
Procedure No. 11 (Cont'd)

6.0 SPECIFIC INSTRUCTION FOR SECURING TECH/OPS. MODEL 660B EXPOSURE DEVICE WHEN NO ADDITIONAL EXPOSURES ARE REQUIRED: (Cont'd)

6.3 Remove device to storage area and physically secure device to prevent tampering or removal by unauthorized personnel.

OPERATION OF TECH/OPS. MODEL 684 EXPOSURE DEVICE
Procedure No. 12

"D E L E T E D"

OPERATION OF TECH/OPS. MODEL 680A EXPOSURE DEVICE
Procedure No. 13 (Rev. 3)

1.0 SCOPE:

This procedure describes the operation of Radiographic Exposure Device Model 680A manufactured by AEA Technology, Inc.

2.0 RESPONSIBILITIES:

The Radiographer is responsible for operating the Radiographic Exposure Device described herein in strict accordance with this procedure. Procedures for the use of film badges or TLD, dosimeters, radiation survey instruments and the posting of radiation areas will be followed without deviation.

3.0 DESCRIPTION:

Technical Operation Exposure Device Model 680A is designed for use with Cobalt 60. It has a capacity of 100 curies.

4.0 LIMITATIONS AND/OR OTHER CONSIDERATIONS OF USE:

Under certain conditions, restrictions of size and weight in the work environment may not permit the use of the model series 680A in its protective box (OP). Any consideration for use under these circumstances should take into account the manufacturer's injunction that model series 680A exposure device may not be hoisted or lifted for use outside of their protective box at heights greater than 4 feet above the working surface.

OPERATION OF TECH/OPS. MODEL 680A EXPOSURE DEVICE
Procedure No. 13 (Cont'd)

5.0 OPERATING INSTRUCTIONS:

5.1 Guide Tube Assembly. At the radiographic focal point, position and secure the snout of the master guide tube using the tripod stand and swivel clamps.

5.2 Remove the plastic dust caps and attach additional extender guide tubes, as necessary, to the master guide tube.

5.3 Determine the position of the exposure device (source shield) allowing for maximum possible operating shielding. Assuming appropriate shielding is available, the operator will be approximately twenty-five feet from the exposure device during actual operation.

5.4 Lay out the guide tubes as straight as possible directing them toward the exposure device. Note that the bend radius of the guide tubes should not be less than twenty inches. Smaller bend radii may restrict the movement of the control cable.

NOTE: THE GUIDE TUBES SHOULD NOT BE SUBJECTED TO ANY UNDO STRESS OR ABUSE, WHICH COULD CAUSE RESTRICTION IN THE TUBES.

5.5 Remove the shipping plug from the exposure device connector and attach the last guide tube to the exposure device.

CAUTION: NEVER OPERATE THE SYSTEM WITH MORE THAN THREE GUIDE TUBE SECTIONS (INCLUDING THE MASTER).

Control Unit: Determine the operating site of the control unit. For maximum safety, the operator should be located behind a protective field.

5.7 Lay out the control cable as straight as possible, directing it toward the exposure device. Note that the bend radius should not be less than three feet. Smaller bend radii may restrict the movement of the control cable.

OPERATION OF TECH/OPS. MODEL 680A EXPOSURE DEVICE
Procedure No. 13 (Cont'd)

5.0 OPERATING INSTRUCTIONS: (Cont'd)

5.8 Attach the control cable to the exposure device in accordance with the following sequence:

5.8.1 Unlock the exposure device with the key provided and turn the connector selector ring from the LOCK position to the CONNECT position. When the ring is in the CONNECT position, the storage cover will disengage from the exposure device.

5.8.2 Slide the control cable collar back and open the jaws of the control cable connector. This exposes the male position of the swivel connector as shown.

5.8.3 Engage the male and female portions of the swivel connector by depressing the spring-loaded locking pin toward the exposure device with the thumbnail. Release the locking pin and test that the connection has been properly made.

5.8.4 Close the jaws of the control cable connector over the swivel-type connector.

5.8.5 Slide the control cable collar over the connector jaws.

5.8.6 Hold the control cable collar flush against the exposure device connector and rotate the selector ring from the CONNECT position to the LOCK position until actual operation is ready to start.

OPERATION OF TECH/OPS. MODEL 680A EXPOSURE DEVICE
Procedure No. 13 (Cont'd)

6.0 OPERATING PROCEDURE:

6.1 Establish the post "HIGH RADIATION AREA" and "RADIATION AREA" as specified in Procedure No. 3.

6.2 Thoroughly check all cable connections and bend radii and position of the snout of the master guide tube. (This represents the radiographic focal point of the source). To operate the system, perform the following:

WARNING: OPERATE THE SYSTEM ONLY IN AREAS MONITORED WITH APPROPRIATE RADIATION MEASURING EQUIPMENT.

6.3 Unlock the exposure device connector and rotate the selector ring to the OPERATE position.

6.4 Push the GREEN MARKING laterally from left to right (as seen from behind the exposure device) until the lock slide RED MARKING fully appears on the right side of the selector ring and you feel or hear the sleeve snap into the slide. The source is now free to move.

NOTE

IF CRANKING BECOMES DIFFICULT ANY TIME DURING THE NEXT STEP, REVERSE THE DIRECTION OF THE CRANKING TO RETURN THE SOURCE TO THE SECURE POSITION IN THE EXPOSURE DEVICE. FIRST MONITOR THE AREA WITH A SURVEY METER TO INSURE THAT THE SOURCE IS PROPERLY SECURED. THEN CHECK THE CONTROL AND GUIDE TUBES FOR EXCESSIVELY SMALL BEND RADII AND REPEAT THE STEP.

6.5 At the control unit (in a shielded area), rapidly rotate the hand crank in the EXPOSE (counterclockwise) direction to move the source out of the exposure device and into the guide tubes toward the radiographic focal point. Continue to rotate the hand crank until the source reaches the snout, which serves as a mechanical stop for the source.

6.6 Specimen exposure should be figured from the time that the source reaches the snout or stop.

6.7 To return the source to the exposure device, after the desired exposure time has elapsed, rapidly turn the hand crank in the RETRACT (clockwise) direction. Continue to turn the crank until the auto-lock is actuated and the GREEN MARKING on the slide bar is visible. Gently try to expose the source by cranking in the counter-clockwise position after the auto-lock has been actuated to insure the auto-lock has functioned properly. (Source properly secured).

OPERATION OF TECH/OPS. MODEL 680A EXPOSURE DEVICE
Procedure No. 13 (Cont'd)

6.0 OPERATING PROCEDURE: (Cont'd)

WARNING: IF THE EXPOSURE DEVICE AUTO-LOCK IS NOT IN THE GREEN POSITION, THE SOURCE HAS NOT BEEN FULLY RETRACTED.

CAUTION: AFTER AN EXPOSURE, THE EXPOSURE DEVICE AND FULL LENGTH OF THE GUIDE TUBE SHALL BE THOROUGHLY MONITORED WITH A SURVEY METER BEFORE CONTINUING.

6.8 At the exposure device, rotate the selector ring from the OPERATE position to the LOCK position to secure the auto-lock in the green position.

7.0 SPECIFIC INSTRUCTION FOR SECURING TECH/OPS. MODEL 680A EXPOSURE DEVICE WHEN NO ADDITIONAL EXPOSURES ARE REQUIRED:

7.1 Approach the exposure device with the survey meter. Survey the exposure device on all sides and the source guide tube to insure that source is in stored position. Radiation levels at contact with exposure device will vary between 10 mR/hr and 200 mR/hr depending on source strength. Record results on Radiographic Operations Report No. 1.

7.2 To disconnect the control unit from the exposure device, perform the following:

7.2.1 Unlock the exposure device using the supplied key.

7.2.2 Rotate the connector selector ring from the LOCK position to the CONNECT position. When the selector ring reaches the CONNECT position the cable connector will partially disengage from the exposure device.

7.2.3 Open the connector jaws and disconnect the swivel-type connector by depressing the spring-loaded locking pin towards the exposure device with the thumbnail and separating the male and female connections.

NOTE: IF ANY DIFFICULTY IS ENCOUNTERED, REPORT TO THE RSO FOR FURTHER INSTRUCTIONS.

7.2.4 Replace the storage cover in the exposure device connector and rotate the selector ring to the LOCK position. Remove the key and engage the lock to secure the exposure device.

7.2.5 Coil the control cable in the 664 control unit and store the unit in an area where the cable will not be subjected to undue stress or abuse.

OPERATION OF TECH/OPS. MODEL 680A EXPOSURE DEVICE
Procedure No. 13 (Cont'd)

7.0 SPECIFIC INSTRUCTION FOR SECURING TECH/OPS. MODEL 680A EXPOSURE DEVICE WHEN NO ADDITIONAL EXPOSURES ARE REQUIRED: (Cont'd)

7.3 Remove device to storage area and physically secure device to prevent tampering or removal by unauthorized personnel.

OPERATION OF TECH/OPS. MODEL 616 EXPOSURE DEVICE
Procedure No. 14

"D E L E T E D"

INSPECTION AND MAINTENANCE OF RADIOGRAPHIC EXPOSURE DEVICES AND STORAGE CONTAINERS MANUFACTURED BY AEA TECHNOLOGY, INC.
Procedure No. 15 (Rev. 3)

1.0 SCOPE:

The following procedure delineates the method to be employed in the inspecting and the maintenance of all exposure devices and storage containers manufactured by AEA Technology, Inc. The procedure is broken into parts, a daily (when equipment is in use) inspection, and periodic inspections.

2.0 RESPONSIBILITIES:

2.1 It is the responsibility of the Radiation Safety Officer to instruct Radiographers in the daily inspection of gamma ray radiographic exposure equipment and he will be responsible for having all phases of the inspection and maintenance program carried out in accordance with this procedure.

2.2 Radiographers will be responsible for performing daily inspection and reporting any equipment malfunction to RSO. No attempt will be made to use any exposure equipment that is not working properly.

2.3 It is the responsibility of the Radiation Safety Officer to audit the inspection and maintenance program for compliance with the procedure detailed below:

3.0 DAILY INSPECTION PROCEDURE:

To insure safety and avoid malfunctions that could impair the productivity of this equipment daily (prior to and during use) inspection will be made and recorded on radiographic operations report No. 1.

3.1 AEA Technology Model Nos. 660B, 680A and 880 Delta/Sigma. Equipment will be inspected for completeness as follows:

3.1.1 Radiographic Exposure Device

a. Key for Lock
b. Labels
c. Source Identification
d. Shipping Plug
e. Connector Cap.

INSPECTION AND MAINTENANCE OF RADIOGRAPHIC EXPOSURE DEVICES AND STORAGE CONTAINERS MANUFACTURED BY AEA TECHNOLOGY, INC.
Procedure No. 15 (Cont'd)

3.0 DAILY INSPECTION PROCEDURE: (Cont'd):

3.2 Equipment will be inspected for serviceability as follows:

3.2.1 Radiographic Exposure Device

a. Check functioning of lock.
b. Check source exit fitting screw threads for cleanness and possible damage.
c. Check connectors for cleanness, looseness, binding, or possible damage.
d. Check general hardware for looseness or missing items.
e. Check locking sleeve actuation.

3.2.2 Accessories

a. Check source drive cable connector and first twenty-four inches of drive cable.
b. Check for cleanness.
c. Check for kinks or fraying of guide tubes.
d. Check source drive cable housing fittings, also check for kinks, dents, cuts and dirt.
e. Check crank for loose or missing hardware, damaged parts and free turning.
f. Check source guide tube fittings for clean threads and possible damage, also for kinks and flattening.

INSPECTION AND MAINTENANCE OF RADIOGRAPHIC EXPOSURE DEVICES AND STORAGE CONTAINERS MANUFACTURED BY AEA TECHNOLOGY, INC.
Procedure No. 15 (Cont'd)

4.0 PERIODIC INSPECTION AND MAINTENANCE PROCEDURE:

4.1 Devices undergoing a periodic inspection and maintenance will be given a complete disassembly, cleaning and check for wear or damage. Missing or unserviceable parts will be replaced, the device reassembled and given a final inspection. This inspection will be performed at intervals not to exceed three months.

4.2 Equipment and Material

Wrenches, screwdriver and allen keys
Basin approximately 12" diameter
2 Quarts Solvent (commercial mineral spirits)
Lubricant 2 oz. Shell "Aeroshell Grease 7" or equivalent

4.3 Control Cable

Detach from shield, eject and coil source drive cable by cranking control in EXPOSE direction. Examine cable for kinks, fraying, broken wire or rust. Minor bends in the cable may be straightened by hand. DO NOT USE PLIERS. A cable with frayed or broken wires must be replaced. Light rust may be removed by hand wire brushing. Do not use a powered brush or abrasives. Bend the connector section of control cable back towards itself and release the cable to test for flexibility or "spring" of the control cable. A cable that has been subjected to the spring test provides an indication of internal corrosion and shall be replaced.

Clean cable by immersing the coil in solvent. A heavy accumulation of dirt laden lubricant may require more than one washing. Allow drying time for all solvent to evaporate.

Examine the connector. Check for wear. Neck of ball must not be bent. Check with Tech/Ops "NOGO" Gauge Model 550. Examine cable attachment to connector for straightness and evidence of looseness. A loose attachment or bend at this point must be repaired. Do not attempt to fabricate a replacement connector or to fasten it to the cable. The connector is a special heat treated steel made to exacting tolerances and under strict metallurgical control. The attachment is swaged with special tools and proof tested.

INSPECTION AND MAINTENANCE OF RADIOGRAPHIC EXPOSURE DEVICES AND STORAGE CONTAINERS MANUFACTURED BY AEA TECHNOLOGY, INC.
Procedure No. 15 (Cont'd)

4.0 PERIODIC INSPECTION AND MAINTENANCE PROCEDURE: (Cont'd)

4.3 (Cont'd)

Order a replacement from AEA Technology. Lubricate the cable with "Aeroshell Grease" or equivalent. This is the most satisfactory lubricant for this purpose. Common greases can cause gumming and unsatisfactory operation. Take care in handling the cable to avoid picking up dirt or grit.

4.4 Control Cranks - All Models

4.4.1 Remove control cable housings by undoing fitting nuts. Remove crank unit from reel, remove crank and disassemble. Wash parts in solvent. Check inside of housing for evidence of galling wear. A deeply scored (more than .020 deep) line where the cable contacts the inner wall of the housing indicates the need for replacement.

4.4.2 Check clearance between the hubs of the wheel and the bushings. More than .005 clearance indicates replacement.

4.4.3 Examine teeth of wheel for damage.

4.4.4 Lubricate bushings with "Aeroshell Grease" or equivalent and reassemble.

4.5 Control Cable Housings

4.5.1 Examine carefully for internal damage by flexing the housings by hand. Internal damage to the reinforcing braid of flexible metallic tube will be evidenced by a crunchy feeling when the cable housing is flexed. Cut, flattened or burnt cable housings should be replaced. Superficial cuts or burns may be sealed and reinforced with tape.

INSPECTION AND MAINTENANCE OF RADIOGRAPHIC EXPOSURE DEVICES AND STORAGE CONTAINERS MANUFACTURED BY AEA TECHNOLOGY, INC.
Procedure No. 15 (Cont'd)

4.0 PERIODIC INSPECTION AND MAINTENANCE PROCEDURE: (Cont'd)

4.5 Control Cable Housings (Cont'd)

4.5.2 Clean housings by syringing a few ounces of solvent into bore and blow out with low pressure air, (not more than 20 PSI). Do not allow solvent to remain. Allow drying time for all solvent to evaporate. Check end fittings for secure attachment.

4.6 Source Guide Tubes

Check for cuts, burns or crushed tubes. Check fittings for secure attachment. Examine and test screw threads for function. Clean bore or tube with solvent and drain out promptly. Do not soak in solvent. Allow drying time for all solvent to evaporate. Check for free passage of source by holding tube vertical and dropping dummy source assembly through tube. The dummy source assembly should fall through freely.

4.7 Exposure Device

4.7.1 Check exterior for loose or missing hardware. Replace or tighten as required. Examine source exit fitting. Nut should rotate freely without excessive shake. Look into exit port and check concentricity of source tube with nut. Misalignment if found, indicates a damaged housing or shifting of the shield within the housing.

4.7.2 Examine the exposure device for complete labels and warning symbol. Replace obliterated or illegible marking. Adhesive backed replacements are available from AEA Technology.

WARNING: WHEN PERFORMING MAINTENANCE ON EXPOSURE DEVICES, LIVE SOURCES SHALL BE PLACED IN A 650L SOURCE CHANGER. AT NO TIME SHALL GUIDE TUBE CONECTOR OR LOCK/SELECTOR RING MECHANISM BE REMOVED WITH A LIVE SOURCE IN EXPOSURE DEVICE.

4.7.3 All compression springs located within the selector-ring mechanism must be replaced with new springs at 12-month intervals to insure smooth and consistent operation.

4.7.4 Items that comprise the radiographic exposure device and associated equipment that are critical for safe operation are classified as Class A items or components. Reference to AEA Technology's Operating and Maintenance Manual shall be made for replacing Class A components with "of like kind" to maintain the integrity of the exposure device. Records must be made including exposure device model and serial numbers, heat numbers of replacement parts and date of replacement.

4.7.5 Care shall be taken when reassembling the selector ring mechanism not to over tighten screws. Reference to AEA Technology's Operating and Maintenance Manual for torque values shall be made.

INSPECTION AND MAINTENANCE OF RADIOGRAPHIC EXPOSURE DEVICES AND STORAGE CONTAINERS MANUFACTURED BY AEA TECHNOLOGY, INC.
Procedure No. 15 (Cont'd)

5.0 FINAL INSPECTION:

5.1 Reassemble system, connect control cables and source guide tubes to exposure device. Operate machine several times with dummy source to be sure of proper function. Check operation of the source auto-lock system.

5.2 Examine connector of the live source while it is in the source changer. Assembly should be clean and free of grit and dirt. Check operation of the locking sleeve by pushing operating pin back. Sleeve should return when released. Check Cable to connector junction for fraying. Test engagement of connector with mating part of source drive cable. Do not use a source assembly that fails these tests.

5.3 Return live source to exposure device in accordance with the instructions contained in Section 2, Procedure 10. Radiation levels must not exceed the following:

No more than 200 mR/hr on contact with the external surfaces of the exposure device,

or

Less than 10 mR/hr at a distance of three feet from all exterior surfaces of the exposure device.

POCKET DOSIMETER CALIBRATION
Procedure No. 16 (Rev. 1)

1.0 SCOPE:

The following procedure outlines the rules to be followed and the technique to be employed during the calibration of the following dosimeters:

Victoreen Model 541R, 0-200mR
Dosimeter Corp. of America, Model #862 0-200mR
Arrow-Tech Model W138 0-200mR
Dosimeter Corp. of America, Model #611 0-200mR
Dosimeter Corp. of America, Model #608 0-10R

This procedure will only be used at 1116 Rte. 52, Kenova, WV and not on any jobsite outside this address.

2.0 RESPONSIBILITIES:

2.1 It is the responsibility of the Radiation Safety Officer and all qualified radiographers to assure themselves that all dosimeters in use are within calibration prior to the start of each job.

2.2 It is also his responsibility to ensure that dosimeters in use on long term temporary jobsites are calibrated within the required interval, or that dosimeters that are out of calibration are replaced with calibrated ones within the interval specified.

2.3 No radiographer within the employ of Huntington Testing shall work without a calibrated dosimeter being in his possession.

3.0 GENERAL REQUIREMENTS:

3.1 Pocket dosimeters shall be calibrated at intervals not exceeding 1 year or if there is reason to believe that the dosimeter is not functioning properly.

3.2 Pocket dosimeter calibration shall be performed only by a qualified radiographer under the supervision of the RSO.

3.3 Pocket dosimeter calibration shall be accomplished using a Tech/Ops. Model #773 calibration device with a Cesium 137 source.

3.4 Pocket dosimeters shall be calibrated by measuring the response to a known exposure. The dosimeters response will be checked at 25% and 75% of the full scale reading as follows:

POCKET DOSIMETER CALIBRATION
Procedure No. 16 (Cont'd)

3.0 GENERAL REQUIREMENTS: (Cont'd)

3.4 (Cont'd)

0-200mR dosimeter at 50mR and 150mR
0-5R dosimeter at 1.25r and 3.25r
0-10R dosimeter at 2.5r and 7.5r

A dosimeter will be considered in satisfactory calibration if its response is within plus or minus 20% of the known exposure. Additionally, dosimeters will be checked for leakage. If it drifts more than 2% off full scale in 24 hours it shall be considered unsatisfactory.

4.0 PROCEDURE:

4.1 Determine the points to be checked for the dosimeter to be calibrated and determine the exposure time necessary to obtain the required exposure.

4.2 Remove the Tech/Ops Model #773 fro the storage vault, survey the source shield to ensure that the source is in the stored position. (For operating instructions for Tech/Ops Model #773 calibration device, see Section 2, Procedure 22).

4.3 Position dosimeter so that the chamber is at the correct distance, and centered on the centerline of the radiation beam, and expose for the required time.

4.4 Read the dosimeter and record the reading on the Dosimeter Calibration Record Sheet, form 1-RT-10.

4.5 If the dosimeter is in satisfactory condition, a calibration tag shall be attached to it indicating the date of calibration, the due date and the technician's initials.

4.6 If the dosimeter is not in satisfactory condition, it shall be returned to the Radiation Safety Officer for further evaluation or disposal as required.

TRANSPORTATION OF RADIOACTIVE SOURCES
Procedure No. 17 (Rev. 2)

1.0 SCOPE:

The following procedure outlines the rules, regulations and precautions to be observed in the transportation of radioactive materials. The transportation of radioactive materials is governed by the rules and regulations of the U.S. Department of Transportation, which are to be found in the Title 49 CFR 170-177.

2.0 RESPONSIBILITIES:

2.1 It is the responsibility of the Radiation Safety Officer and Field Radiographer to assure that the procedure detailed below is followed without deviation.

2.2 It is also his responsibility to establish, prior to the transfer of radioactive materials from plant or construction sites, which qualified personnel are at the plant or construction site where the shipment is to be received.

2.3 It is the responsibility of common, contract or private carriers including air-carriers to assume the responsibility for adherence to Federal and State rules and regulations governing the transportation of radioactive materials whenever radioactive materials are in their possession under a shipping contract with Huntington Testing, Inc.

2.4 It is the responsibility of the Huntington Testing employee assigned to transport radioactive materials in any vehicle under the control of Huntington Testing to comply with this procedure without deviation.

3.0 PROCEDURE: SHIPPING BY COMMON, CONTRACT OR PRIVATE CARRIERS (GENERAL)

Prior to the loading of radioactive materials in any vehicle for transportation, the shipping container, source changer or exposure device will be inspected by the Radiation Safety Officer or a qualified radiographer for the following:

a. That the container has received a Certificate of Compliance from the Nuclear Regulatory Commission, Transportation Certification Branch and is approved for use and shipment under the general license provisions of 10 CFR 71.12(B) and the requirements of 49 CFR L73.393(a).

b. That the security seals are properly fastened.

TRANSPORTATION OF RADIOACTIVE SOURCES
Procedure No. 17 (Cont'd)

3.0 PROCEDURE: (Cont'd)

c. That the proper radioactive material labels are securely attached.

d. That Huntington Testing's Uniform Straight Bill of Lading is filled out for radioactive material shipments, which is an integral part of this procedure.

3.1 For Vehicles Under the Control of Huntington Testing

3.1.1 Transportation of IR-192 exposure devices (Model 660B & 880 Delta/Sigma) will be accomplished by locking them in over packs or convenient packs: located to the rear of the vehicle inside the camper. Design of the boxes are such that the exposure devices fit snug (blocked and braced), as to prevent movement during transit.

Note: Surveys conducted prior to transporting a 100 Ci, Ir-192 source in this manner indicate a radiation level of less than 2mR/hr at a distance of 18" from the closest external surface of the vehicle.

3.1.2 Transportation of Model 680A Co-60 exposure devices (100 Ci) will be accomplished by securing them in the center of the vehicle so that they will not move during transit.

3.1.3 A survey will be taken after the container is loaded and the results logged. Care shall be taken so that the driver and/or passengers will not be subject to radiation levels in excess of 2 mR/hr. Radiation levels at the outer surfaces of the vehicle shall not exceed the 2 mR/hr level. Lead or other shielding material shall be added if necessary to meet this requirement.

TRANSPORTATION OF RADIOACTIVE SOURCES
Procedure No. 17 (Cont'd)

3.0 PROCEDURE: (Cont'd)

3.1.4 The transporting vehicle shall also be posted on each side and rear with the following sign:

In Case of accident –

NOTIFY HUNTINGTON TESTING & TECHNOLOGY, INC.
Phone: (304) 453-6111
Kenova, WV

OR

USNRC
Region II – (404) 331-4503

3.1.5 When by-product materials are shipped to a field site and the transportation is under the control of Huntington Testing, the RSO will notify the appropriate personnel, at the destination, as to the route to be taken and the expected time of arrival. In the event that any unusual delay is encountered, the vehicle driver will notify the appropriate personnel and advise them of his revised arrival time.

3.1.6 A calibrated and useable survey instrument will be carried in any vehicle transporting a by-product material.

3.1.7 The driver will be furnished a film badge, dosimeter, alarm rate meter and will be instructed in the operation of the survey instrument. He shall also be instructed in Procedures 7 and 3 of Section 2 of this manual. Copies of these Procedures will be issued along with equipment already mentioned.

TRANSPORTATION OF RADIOACTIVE SOURCES
Procedure No. 17 (Cont'd)

3.0 PROCEDURE: (Cont'd)

3.1.8 When it is necessary to make an overnight stop or to park the vehicle and use it for source storage, it will be posted with "CAUTION: Radioactive Material" signs as required by 10 CFR Part 20 Subpart 20.1902(e). A radiation survey will also be taken to assure compliance with the requirements of Paragraph 3.1.1 of this procedure.

Keys for both the truck and/or lock boxes will be retained in the possession of the radiographer or the Radiation Safety Officer, whichever is applicable.

CAUTION: The transfer of any radioactive materials or radiographic exposure devices between plants or construction sites is strictly prohibited without the express authorization of the RSO.

NOTE: Certain roads, generally state thruways or turnpikes, prohibit the passage of vehicles carrying radioactive materials. Entrances to these roads are posted. No attempt will be made by Huntington Testing's controlled vehicles to use prohibited roads.

MODEL #653 COLLIMATOR OPERATION
Procedure No. 18 (Rev. 1)

1.0 SCOPE:

This procedure describes the operation of the Model #653 Collimator. It is designed for use with the AEA Technology Model 660B and 880 Delta Gamma Ray Exposure devices.

2.0 RESPONSIBILITIES:

The Radiographer shall be responsible for adhering to this procedure without deviation.

3.0 PROCEDURE:

3.1 Inspect guide tube and Collimator threads for any sign of wear or damage.

3.2 Mount Collimator on exposure stand using mounting bracket and slip collar.

3.3 Turn exposure port down so that high radiation beam will be pointing directly at the floor.

3.4 Attach Collimator to source guide tube.

3.5 Refer to Huntington Testing's Procedure No. 11 for operation of the exposure device.

3.6 Do not rotate collimator on guide tube stop with out loosening the thumbscrew then retighten.

PIPING OR HEADER GAMMA RAY PROCEDURE
Procedure No. 19

"DELETED"

MODEL 714 COLLIMATOR OPERATION
Procedure No. 20 (Rev. 1)

1.0 SCOPE:

This procedure describes the operation of the Model 714 Collimator. It is designed for use with AEA Technology Exposure Devices using a standard Tech/Ops. source stop.

2.0 RESPONSIBILITIES:

The Radiographer shall be responsible for adhering to this procedure without deviation.

3.0 PROCEDURE:

3.1 Loosen Clamping Bolts located on collimator

3.2 Insert standard source stop in opening and push it into the collimator until the source stop appears in side port.

3.3 Fasten collimator assembly to source guide tube by tightening clamping bolts.

3.4 Refer to Procedure 13 for operation of the exposure device.

OPERATING INSTRUCTIONS FOR T/O MODEL 715
SHIPPING CONTAINER
Procedure No. 21

"D E L E T E D"

OPERATION OF CALIBRATION UNIT MODEL #773
Procedure No. 22 (Rev. 1)

1.0 SCOPE:

The following procedure describes the operation of Calibration Unit Model #773.

2.0 RESPONSIBILITIES:

The radiographer is responsible for operating this device in strict accordance with this procedure. Procedures for the use of film badges or TLD, dosimeters, radiation survey instruments, alarm rate meters and the posting of radiation areas will be followed without deviation.

5.0 DESCRIPTION:

Calibration Unit Model #773 is designed for use with 165 mCi of Cesium137. The unit is equipped with three attenuators (Transmission of 0.25, 0.10 and 0.10) to allow a survey instrument with three ranges to be calibrated at 20% and 80% of each range without changing the position of the survey instrument. This unit can be used to calibrate survey instruments with ranges up to 2000 mR/hr.

5.0 OPERATION

The following procedure is designed for a survey instrument with three scales and a range of 0-1000 mR/hr. For instruments with different ranges, the procedure will be similar but the points will differ.

5.1 Turn on the survey meter and allow it to "warm up" for approximately 10 minutes.

5.2 Determine the activity of the source on the date of calibration from the decay chart provided with the source.

5.3 Determine the distance from the source at which the radiation intensity would be 800mR/hr.

OPERATION OF TECHNICAL OPERATIONS CALIBRATION UNIT MODEL #773
Procedure No. 22 (Cont'd)

5.0 OPERATION (Cont'd)

5.4 Using the tape measure attached to the Model #773, place the survey meter such that the axis of the detector is located at the proper distance from the source as determined above.

NOTE: The survey meter should be located so that the center of the detector is at the correct distance and centered on the centerline of the radiation beam. The axis of the detector should be perpendicular to the centerline of the radiation beam. Depending upon the physical size of the survey instrument, it may be necessary to mount it somewhat higher than the bench surface. When the proper geometry for your instrument has been established, use the same physical arrangement consistently in future calibration operations.

At short distances, using survey instruments with large detector volumes, the radiation intensity will not be uniform across the detector. Consideration should be given to this effect when determining the radiation intensities to be checked.

CAUTION

The meter should be placed so that you can read it from a distance without exposing yourself to the primary beam

5.5 Unlock the handle of the Model #773. Remove the shipping plate. Remove all the attenuators from the radiation beam.

5.6 Standing away from the radiation beam, expose the source by manually raising the source rod. Note and record the survey meter reading, return the source to the stored position. The actual intensity is 800 mR/hr. If the reading is within plus or minus 20% of the actual intensity, continue checking the instrument. If the instrument reading is not within plus or minus 20% of the actual intensity, the instrument must be adjusted and recalibrated.

5.7 Place the 0.25 attenuator in the beam. Repeat step 6; the actual intensity is 200 mR/hr.

5.8 Remove the 0.25 attenuator from the beam and place a 0.10 attenuator in the beam. Repeat step 6; the actual intensity is 80 mR/hr.

RADIATION SURVEY INSTRUMENT CALIBRATION
Procedure No. 22 (Cont'd)

5.0 OPERATION (Cont'd)

5.9 Place the 0.25 attenuator in the beam. Repeat step 6; the actual intensity is 20 mR/hr.

5.10 Remove the 0.25 attenuator from the beam and place a 0.10 attenuator in the beam. Repeat step 6; the actual intensity is 8 mR/hr.

5.11 Place the 0.25 attenuator in the beam. Repeat step 6; the actual intensity is 2 mR/hr.

5.12 Upon completion of the calibration, the source rod is to be dropped to the closed position, the locking bar inserted to prevent source movement and the lock secured. Survey the source shield and return to the storage area.

5.13 Survey meters which cannot be calibrated should be returned to the manufacturer for repair.

5.14 Fasten a label to the survey meter indication the date of calibration.

5.15 The results of the survey instrument calibration will be recorded on Form 1-RT-6 and retained in the files of Huntington Testing Inc.

PERSONNEL MONITORING - ALARMING RATE METER
Procedure No. 23 (Rev. 2)

1. SCOPE

Effective January 1, 1991 NRC requirement 10 CFR, Part 34.47 states that all radiographers and associates wear an alarming rate meter. This procedure describes the use of the NDS Model RA-500 Rate Alarm which will be used by Huntington Testing personnel.

2.0 RESPONSIBILITIES

It is the responsibility of all personnel engaged in radiography to assure themselves that their rate meters are calibrated in accordance with Section 2, Procedure 24, and to follow this procedure without deviation.

3.0 GENERAL

3.1 All personnel engaged in radiography shall wear an operable rate meter when performing radiographic operations.

3.2 Rate meter shall be an NDS Products Model RA-500 or equivalent.

4.0 RATE METER USAGE

4.1 Prior to commencing radiographic operations, each radiographer shall ensure the rate meter is in proper operating condition.

4.2 Slide selector switch to "ON"

4.3 Push the Audio/Battery check switch and hold for 15 seconds. The alarm will sound the battery indicator light will illuminate.

4.4 Should either function fail, replace the battery (9-volt) and repeat step 4.3.

4.5 If rate meter continues to operate improperly, do not engage in radiographic operations until a replacement is obtained.

4.6 Rate meters shall be tested per step 4.3 periodically during each shift.

RATE METER CALIBRATION
Procedure No. 24 (Rev. 1)

1.0 SCOPE

The following procedure outlines the rules to be followed and the technique to be employed during the calibration of the NDS Products Rate Meter Model RA-500.

2.0 RESPONSIBILITIES

2.1 It is the responsibility of the Radiation safety Officer and all qualified radiographers to assure themselves that all rate meters in use are within calibration prior to the start of each job.

2.2 No radiographer within the employ of Huntington Testing shall work without a calibrated rare meter being in his/her possession.

3.0 GENERAL

3.1 Rate meters shall be calibrated at intervals not exceeding 1 year or if there is any reason to suspect that the rate meter is defective.

3.2 Rate meter calibration shall be performed only by the RSO or by a qualified radiographer under the supervision of the RSO.

3.3 Rate meter calibration shall be accomplished using a Tech/Ops Model 773 Cesium 137 calibration device.

3.4 Rate meters shall be calibrated by their response to a known exposure. A rate meter shall be considered in satisfactory calibration if it exhibits an alarm of one solid tone when placed in a radiation field of 500 mR/hr (+ or – 20%).

4.0 PRODEDURE

4.1 Remove the Tech/Ops Model 773 from the storage vault, survey the source device to ensure that the source is in the stored position. (For operating instructions for Tech/Ops Model 773, see Section 2, Procedure 22).

4.2 Determine the distance the rate meter is to be placed from the calibration source to achieve a radiation field of 500 mR/hr.

4.3 Position the rate meter at the correct distance, centered on the centerline of the radiation beam and expose the source.

RATE METER CALIBRATION
Procedure No. 24 (Cont'd)

4.0 PRODEDURE (Cont'd)

4.4 If the rate meter does not alarm, calibration is to be adjusted by means of the potentiometer located adjacent to the battery. Repeat steps 4.3 and 4.4 until calibration is achieved.

4.5 When calibration is achieved a calibration tag shall be attached indicating the date of calibration, the due date and the technicians initials. This same information along with the rate meter serial number shall be recorded on Form 1-RT-11.

4.6 If the rate meter is unable to be calibrated, it will be returned to the Radiation Safety Officer for disposition.

OPERATION OF AEA TECHNOLOGY MODEL 880 DELTA EXPOSURE DEVICE
Procedure No. 25 (Rev. 2)

1.0 SCOPE:

This procedure describes the operation of Radiographic Exposure Device Model 880 DELTA/SIGMA manufactured by AEA Technology.

2.0 RESPONSIBILITIES:

The Radiographer is responsible for operating the Radiographic Exposure Device described herein in strict accordance with this procedure. Procedures for the use of film badges or TLD, dosimeters, radiation survey instruments and the posting of radiation areas will be followed without deviation.

3.0 DESCRIPTION:

AEA Technology Exposure Device Model 880 Delta is designed for use with Iridium 192. It has a capacity of 100 curies.

4.0 OPERATING INSTRUCTIONS:

4.1 Guide Tube Assembly. At the radiographic focal point, position and secure the snout of the master guide tube using the tripod stand and swivel clamps.

4.2 Remove the plastic dust caps and attach additional extender guide tubes, as necessary, to the master guide tube.

4.3 Determine the position of the exposure device allowing for maximum possible operating shielding. Assuming appropriate shielding is available, the operator will be approximately twenty-five feet from the exposure device during actual operation.

4.4 Lay out the guide tubes as straight as possible directing them toward the exposure device. Note that the bend radius of the guide tubes should not be less than twenty inches. Smaller bend radii may restrict the movement of the control cable.

NOTE: THE GUIDE TUBES SHOULD NOT BE SUBJECTED TO ANY UNDO STRESS OR ABUSE, WHICH COULD CAUSE RESTRICTION IN THE TUBES.

OPERATION OF AEA TECHNOLOGY, MODEL 880 DELTA EXPOSURE DEVICE
Procedure No. 25 (Cont'd)

4.0 OPERATING INSTRUCTIONS: (Cont'd)

4.5 Attach the source guide tube in accordance with the following sequence.

4.5.1 Simultaneously pull and rotate the spring-loaded outlet port cover a quarter of a turn in a clockwise direction.

4.5.2 Insert the bayonet fitting of the source guide tube into the exposed outlet port. Align the GREEN MARKINGS on the bayonet fitting and outlet port.

4.5.3 Rotate a quarter of a turn counter-clockwise.

4.5.4 Rotate the spring-loaded outlet port cover an additional 60 degrees in a clockwise direction until it stops.

CAUTION: NEVER OPERATE THE SYSTEM WITH MORE THAN THREE GUIDE TUBE SECTIONS (INCLUDING THE MASTER).

Control Unit: Determine the operating site of the control unit. For maximum safety, the operator should be located behind a protective field.

4.7 Lay out the control cable as straight as possible, directing it toward the exposure device. Note that the bend radius should not be less than three feet. Smaller bend radii may restrict the movement of the control cable.

4.8 Attach the control cable to the exposure device in accordance with the following sequence:

4.8.1 Unlock the exposure device with the key provided and turn the connector selector ring from the LOCK position to the CONNECT position. When the ring is in the CONNECT position, the storage cover will disengage from the exposure device.

4.8.2 Insert the protective cover into the lock housing during use of the device.

4.8.3 Slide the control cable collar back and open the jaws of the control cable connector. This exposes the male position of the swivel connector as shown.

4.8.4 Engage the male and female portions of the swivel connector by depressing the spring-loaded locking pin toward the exposure device with the thumbnail. Release the locking pin and test that the connection has been properly made.

4.8.5 Close the jaws of the control cable connector over the swivel-type connector.

OPERATION OF AEA TECHNOLOGY MODEL 880 DELTA EXPOSURE DEVICE
Procedure No. 25 (Cont'd)

4.0 OPERATING INSTRUCTIONS: (Cont'd)

4.8.6 Slide the control cable collar over the connector jaws.

4.8.7 Hold the control cable collar flush against the exposure device connector and rotate the selector ring from the CONNECT position to the LOCK position until actual operation is ready to start.

OPERATION OF AEA TECHNOLOGY MODEL 880 DELTA EXPOSURE DEVICE
Procedure No. 25 (Cont'd)

5.0 OPERATING PROCEDURE:

5.1 Establish the post "HIGH RADIATION AREA" and "RADIATION AREA" as specified in Procedure No. 3.

5.3 Thoroughly check all cable connections and bend radii and position of the snout of the master guide tube. (This represents the radiographic focal point of the source). To operate the system, perform the following:

WARNING: OPERATE THE SYSTEM ONLY IN AREAS MONITORED WITH APPROPRIATE RADIATION MEASURING EQUIPMENT.

5.4 Unlock the exposure device connector and rotate the selector ring to the OPERATE position.

5.4 Push the GREEN MARKING laterally from left to right (as seen from behind the exposure device) until the lock slide RED MARKING fully appears on the right side of the selector ring and you feel or hear the sleeve snap into the slide. The source is now free to move.

NOTE

IF CRANKING BECOMES DIFFICULT ANY TIME DURING THE NEXT STEP, REVERSE THE DIRECTION OF THE CRANKING TO RETURN THE SOURCE TO THE SECURED POSITION IN THE EXPOSURE DEVICE. FIRST MONITOR THE AREA WITH A SURVEY METER TO INSURE THAT THE SOURCE IS PROPERLY SECURED. THEN CHECK THE CONTROL AND GUIDE TUBES FOR EXCESSIVELY SMALL BEND RADII AND REPEAT THE STEP.

5.4 At the control unit, rapidly rotate the hand crank in the EXPOSE (counterclockwise) direction to move the source out of the exposure device and into the guide tubes toward the radiographic focal point. Continue to rotate the hand crank until the source reaches the snout which serves as a mechanical stop for the source.

5.5 Specimen exposure should be figured from the time that the source reaches the snout or stop.

5.6 To return the source to the exposure device, after the desired exposure time has elapsed, rapidly turn the hand crank in the RETRACT (clockwise) direction. Continue to turn the crank until the auto-lock is actuated and the GREEN MARKING on the slide bar is visible. Gently try to expose the source by cranking in the counter-clockwise position after the auto-lock has been actuated to insure the auto-lock has functioned properly. (Source properly secured).

OPERATION OF AEA TECHNOLOGY MODEL 880 DELTA EXPOSURE DEVICE
Procedure No. 25 (Cont'd)

5.0 OPERATING PROCEDURE: (Cont'd)

WARNING: IF THE EXPOSURE DEVICE AUTO-LOCK IS NOT IN THE GREEN POSITION, THE SOURCE HAS NOT BEEN FULLY RETRACTED.

CAUTION: AFTER AN EXPOSURE, THE EXPOSURE DEVICE AND FULL LENGTH OF THE GUIDE TUBE SHALL BE THOROUGHLY MONITORED WITH A SURVEY METER BEFORE CONTINUING.

5.7 At the exposure device, rotate the selector ring from the OPERATE position to the LOCK position to secure the auto-lock in the green position.

6.0 SPECIFIC INSTRUCTION FOR SECURING AEA TECHNOLOGY MODEL 880 DELTA EXPOSURE DEVICES WHEN NO ADDITIONAL EXPOSURES ARE REQUIRED:

6.1 Approach the exposure device with the survey meter. Survey the exposure device on all sides and the full length of the source guide tube to insure that source is in secured position. Radiation levels at contact with exposure device will vary between 10 mR/hr and 200 mR/hr depending on source strength. Record results on Radiographic Operations Report No. 1.

6.2 To disconnect the control unit from the exposure device, perform the following:

6.2.1 Unlock the exposure device using the supplied key.

6.2.2 Rotate the connector selector ring from the LOCK position to the CONNECT position. When the selector ring reaches the CONNECT position the cable connector will partially disengage from the exposure device.

6.2.3 Open the connector jaws and disconnect the swivel-type connector by depressing the spring-loaded locking pin towards the exposure device with the thumbnail and separating the male and female connections.

NOTE: IF ANY DIFFICULTY IS ENCOUNTERED, REPORT TO THE RSO FOR FURTHER INSTRUCTIONS.

6.2.4 Replace the storage cover in the exposure device connector and rotate the selector ring to the LOCK position. Remove the key and engage the lock to secure the exposure device.

6.2.5 Coil the control cable in the 664 control unit and store the unit in an area where the cable will not be subjected to undue stress or abuse.

OPERATION OF AEA TECHNOLOGY MODEL 880 DELTA EXPOSURE DEVICE
Procedure No. 25 (Cont'd)

6.0 SPECIFIC INSTRUCTION FOR SECURING AEA TECHNOLOGY MODEL 880 DELTA EXPOSURE DEVICE WHEN NO ADDITIONAL EXPOSURES ARE REQUIRED: (Cont'd)

6.3 Remove device to storage area and physically secure device to prevent tampering or removal by unauthorized personnel.

EMERGENCY SOURCE RETRIEVAL OPERATIONAL GUIDELINES
Procedure No. 26 (Rev. 1)

1.0 SCOPE:

The information contained in this document is intended to be used as an operational guide only. This is due to consideration that no two emergency retrievals are exactly the same and are rarely handled in the same fashion. Although these emergencies can be generically classified into a problem category, they must be handled on a case-by-case basis. Each emergency retrieval presents its own unique set of circumstances and must be handled accordingly.

1.0 RESPONSIBILITIES:

1.1 The use of these operational guidelines is limited to the Radiation Safety Officer/Designee. An in-depth knowledge of the equipment, problem assessment/planning, survey techniques, shielding techniques, problem repair/remedy, and dosimetry considerations is required beyond the information provided in the operation guidelines. Only those listed on license are permitted to perform retrieval operations.

1.2 All other individuals providing assistance in operations covered in these operational guidelines must be under the instruction/supervision of the R.S.O. or designee.

1.3 The use of sound radiation safety practices and common sense, in addition to properly assessing the emergency will be the first consideration to maintain exposure to radiation ALARA.

1.4 All personnel engaged in source retrieval operations must wear appropriate dosimetry to monitor whole/body and extremity exposure as applicable.

1.5 Radiography personnel suspected of possible exposure during discovery of the emergency shall be excluded from participation in the retrieval operations.

1.6 Unshielded radiation sources shall only be moved or manipulated by the use of remote handling tongs or tools in lengths sufficient to provide the operator protection.

1.7 If required, additional information, assistance will be obtained from the manufacturer AEA Technology. (1-800-815-1383)

EMERGENCY SOURCE RETRIEVAL OPERATIONAL GUIDELINES
Procedure No. 26 (Cont'd)

2.0 Operational/Action Guide – Source Hang-Up

2.1 Upon notification, the R.S.O./Designee must ensure the "Restricted Area" is secured at the site. The RSO/Designee should gather sufficient information to ensure appropriate equipment and response personnel are available for the emergency. Start a "chain of events" log to record all details of the response upon notification.

2.2 Upon arrival to the site, limit access to the "Restricted Area" to response personnel only.

2.3 Perform an assessment to verify the type of problem. If movement of the sources is possible, attempt to crank the source into collimator or to a greater distance away from the site of damage if possible.

2.4 Verify the location of the source by survey technique.

2.5 Develop a plan for retrieval based on the conditions.

2.6 Review plan for ALARA. Revise any portions of the plan where personnel exposure can be reduced.

2.7 Shield the source using a remote technique to allow repair. Add sufficient shielding to reduce personnel exposure. Survey the area that personnel will occupy during repair/remedy.

2.8 Examples of corrective repairs/remedies:

2.8.1 For small dent repair, gently hammer dented area of guide tube until round.

2.8.2 For more severe damage such as a flattened section, cut and remove the polyvinyl wrap from the damaged area to expose the metal conduit. Using caution, cut partially through the metal conduit. Insert a screwdriver into the cut to open up the flattened area. Repeat until damaged section is completely opened up.

2.9 Ensure all personnel are out of the "Restricted Area". Crank source into device using remote controls.

2.10 Perform surveys of the device, guide tube, lead shielding and collimator. Secure the source in device by locking. Record the device survey results.

2.11 Remove equipment from service for evaluation. Send equipment to the manufacturer for detailed evaluations. Save returned equipment for use in training sessions.

2.12 Make required notifications and submit required reports.

EMERGENCY SOURCE RETRIEVAL OPERATIONAL GUIDELINES
Procedure No. 26 (Cont'd)

3.0 Operational/Action Guide – Source Disconnect

3.1 Upon notification, the R.S.O./Designee must ensure the "Restricted Area" is secured at the site. The RSO/Designee should gather sufficient information to ensure appropriate equipment and response personnel are available for the emergency. Start a "chain of events" log to record all details of the response upon notification.

3.2 Upon arrival to the site, limit access to the "Restricted Area" to response personnel only.

3.3 Perform an assessment to verify the type of problem. Crank controls to project source into collimator or farthest distance possible. Confirm disconnect using survey technique while retracting crank.

3.4 Develop a plan for retrieval based on the conditions. Ensure necessary equipment is available and that a sufficient number of response personnel are available to perform the retrieval.

3.5 Each member of the team understands their assigned tasks and the entire plan. Determine the exposure for each individual and each independent operation.

3.6 Review plan for ALARA. Revise any portions of the plan where personnel exposure can be reduced.

3.7 The equipment and source involved in disconnect/misconnect retrievals must be removed from service for repair and evaluation. Equipment and sources should be sent to the applicable manufacturer for a comprehensive evaluation.

3.8 Examples of corrective repairs/remedies:

NOTE: The following guidelines are streamlined to point out the major steps to perform the operation. Considerations as detailed in the retrieval sequence flow chart are required prior to any corrective actions. Dosimeters are read after each task and recorded.

A. Shield/Cut/Push Method

Straighten and position guide tube on ground. Retract drive cable halfway into guide tube. Raise end of guide tube and shake to move source to end of drive cable. Shield source.

Position guide tube into U shape near side of shield

EMERGENCY SOURCE RETRIEVAL OPERATIONAL GUIDELINES
Procedure No. 26 (Cont'd)

3.0 Operational/Action Guide – Source Disconnect (con't)

Remove controls from device, set lock mechanism on "operate". Leave guide tube attached to the device

Cut off the source stop. Duct tape controls onto cut end.

Ensure all personnel are out of the "Restricted Area." Crank controls to PUSH the source assemble into device.

Survey device, guide tubes and shielding materials. Secure the source in device.

B. Direct Hot Stick Into Device-Outlet Port

This technique requires practice prior to the actual operation. Time of "open-air" handling is critical to control radiation exposure.

Locate source using survey technique and shield source.

Detach source guide tube from device

Remove controls and set lock mechanism to "operate." Position device near shield containing source with shipping plug.

Remove shielding remotely. Pick the guide tube up by the source stop into vertical position using remote handling tongs.

Shake until source drops out of guide tube. Have a second person time this action. If unable to perform this operation during the allocated time, you must stop and retreat. Repeat this process using a second response person.

After source drops to the ground, remotely pick the source up and introduce CONNECTOR FIRST into the outlet port. Using the remote tongs pick up the shipping plug and insert into the outlet port. Push the source into the fully shielded position.

Survey the device, guide tube, and shielding materials. Secure the source.

C. Hot Stick/Source Transfer Method

This method required the use of a second device containing a source assembly or dummy source assembly. If a source changer is available, use the source changer.

EMERGENCY SOURCE RETRIEVAL OPERATIONAL GUIDELINES
Procedure No. 26 (Cont'd)

3.0 Operational/Action Guide – Source Disconnect (con't)

Locate the source with survey technique and shield the source.

Retract drive cable carefully and detach guide tube from device. The source is contained in the shielded guide tube. Check drive cable connector for damage. Replace controls or drive cable if the connector or controls are worn or damaged. Attach a source guide tube extension in preparation for a source exchange.

Position the second device between the shielded source and the device prepared for the source exchange. Remove the shipping plug from the device and ensure the outlet port is facing towards the person who will perform the HOT STICK work.

Ensure all personnel are out of the "Restricted Area"

Remove shielding materials from the source using remote handling tongs. Elevate guide tube by the source stop to spill the source out onto the ground. Remotely pick up the source assembly and introduce it CAPSULE FIRST into the device containing the source.

Survey the device containing the two sources. Radiation levels should be low enough to allow manual connection of the connectors to perform a source exchange. Perform source exchange between the two devices.

Survey the two devices, and then secure both devices.

D. Direct Hot Stick Into Device

Locate the source using survey technique and shield the source.

Carefully retract the drive cable. Disconnect the source guide from the device and remove the controls from the device.

Remove back plate and locking assembly from the device. Install shipping plug into the device. Attach funnel to exposed "S" tube where the back plate was removed.

Position the device funnel up, on two blocks of wood, next to the shielded source.

Ensure all personnel are out of the "Restricted Area."

Using remote handling tongs, remove the shield. Remotely pick up the guide tube by the source stop and raise into vertical position to spill the source onto the ground. Remotely pick up the source assembly and introduce it CAPSULE FIRST into the funnel. Tap the source assembly remotely to fully push it home.

EMERGENCY SOURCE RETRIEVAL OPERATIONAL GUIDELINES
Procedure No. 26 (Cont'd)

3.0 Operational/Action Guide – Source Disconnect (con't)

Survey the device. Secure the source by placing the back-plate on the device and securing it with the fasteners. The locking mechanism should initially be in the operate mode. The source is secured after the back-plate is fastened to the device.

Survey the device upon completion of this operation.

E. Drive Cable/Modified Connector "Fishing" Method.

From controls, push the disconnected source into the collimator distal position within guide tube. Verify the disconnect problem by survey measurement. Retract drive cable as far as possible.

Verify source location using survey technique. Shield source using remote method. Position guide tube in straight line on ground. Disconnect guide tube from the device.

Remove entire drive cable from device and controls. Install modified connector-drive cable into the device and through the control housing (drive side only, crank removed). Re-attach source guide tube to device.

Push drive cable into guide tube by hand until it stops against source assembly connector. Push and rotate simultaneously to attempt a remote connection. Draw cable and observe for increase of radiation intensity. Repeat until an increase is observed. Do not fully withdraw the source from the shielding at this point.

Ensure all personnel are out of the "Restricted Area"

Grasp drive cable and walk quickly in a direction away from the device and source in the guide tube. Monitor movement of the source using a survey instrument.

Form 1-RT-6
5/1/04

CALIBRATION RECORDS

SURVEY METER MODEL #: ND-2000
MANUFACTURER: NDS Products

Calibrated with Calibrator Model #773
Calibrated with Source Type: Cs-137
Calibrated with Source Model #773-02

Survey Meter SN:

		Scale & Position						
		X-1		X-10		X-100		
Date of Calibration	Calibration performed by:	A	B	A	B	A	B	Remarks

Form 1-RT-10
5/1/04

CALIBRATION RECORDS

DOSIMETER MODEL #: 0-200 mr
MANUFACTURER: Arrow Tech
MODEL: 138

Calibrated with Calibrator Model #773
Calibrated with Source Type: Cs-137
Calibrated with Source Model #773-02

Dosimeter SN:

Date of Calibration	Calibration performed by:	Scale			24hr Leakage Rate	Remarks
		50 mr	100 mr	150 mr		

Form 1-RT-11
5/1/04

CALIBRATION RECORDS

RATE ALARM MODEL #: RA-500
MANUFACTURER: NDS Products
SET POINT: 500 mr/hr
Rate Alarm SN:

Calibrated with Calibrator Model #773
Calibrated with Source Type: Cs-137
Calibrated with Source Model #773-02
Calibration Reference Point: 400 mr/hr - 600 mr/hr

Date of Calibration	Calibration performed by:	Trip Point mr/hr	Remarks

Form 1-RT-12
314/05

RADIOACTIVE MATERIAL RECEIVING REPORT

I. RECIVEING DATE: _____ TIME RECEIVED: _____

II. LOCATION: (District or Project Location) _____

III. MATERIAL RECEIVED FROM: _____

IV. CARRIER: _____

V. RADIOACTIVE MATERIAL TYPE: ☐Iridium 192 ☐Cobalt ☐Other

SOURCE SERIAL NUMBER: _____ ACTIVITY: _____

REMARKS: _____

VI. CONTAINER TYPE: 1. ☐Source Changer - MODEL# _____ SERIAL# _____

2. ☐Exposure Device-MODEL# _____ SERIAL# _____

VII. PHYSICAL RADIATION SURVEY OF CONTAINER:

1. Radiation Level @ External Surface: _____ MR/HR

2. Radiation Level @ 3ft from External Surface: _____ MR/HR

3. RADIOACTIVE YELLOW _____ LABEL TRANSPORT INDEX _____

VII. IS THE SOURCE ACCOMPANIED BY:

1. A LEAK TEST: ☐YES ☐NO (Optional)

2. A DECAY CURVE: ☐YES ☐NO

IX. If Source is Received in a Source Changer, what Device is the Source to be installed in?

1. EXPOSURE DEVICE: MODEL# _____ SERIAL# _____

X. *NOTES:

1. The container shall be surveyed within three (3) hours after receipt during regular working hours, or within eighteen (18) hours if received after regular working hours.

2. Radiation levels should not exceed the following:
   a. 200 MR at the surface of the container.
   b. 10 MR at three (3) feet from the surface of the container
   c. IMMEDIATELY NOTIFY THE RADIATION SAFETY DIRECTOR IF THE RADIATION LEVEL EXCEEDS THE LEVEL SPECIFIED IN NOT 2a or 2b.

Signed: _____ DATE: _____

Radiation Safety Officer or Radiographer

Huntington
TESTING & TECHNOLOGY INC

RADIOGRAPHIC OPERATIONS REPORT No. 1

District/Branch _____

Part A: WARNING: Intentional Failure to Record Information Accurately on this Form may Result in a Fine and/or Disciplinary Action

Location of source: City _____ State _____ Date _____

Customer _____ Project _____

Part B: "Source of Radiation"
Ir _____ Co _____ X-ray _____
Model _____ Serial No _____
Activity _____ curies

"Projector"
Model No _____ Serial No _____
In Storage _____
Storage Dates _____ (1 wk Maximum)

"Survey Instrument"
Model No _____
Serial No _____
Cal Due _____
Back up S-N _____

Part C Transport to **Truck/Vehicle No** _____ **(Complete Applicable Column)**

1.) Placing Projector in vehicle
_____ mr/hr surface transport container
_____ Transport Index (0.1 - 10.0)
Label: Class I _____ II _____ III _____
_____ NRC Package Approval No. Attached
(Column 1 or 2) Vehicle Placarded _____ Yes _____ No

2.) Projector remaining in vehicle from previous transport
_____ Transport Index
Label: Class I _____ II _____ III

3) _____ Not transported (✓)

_____ mr/hr @ 1 ft. from vehicle surface _____ mr/hr @ Driver

Part D: Radiographic Operations:
Daily Equipment Inspection Check List

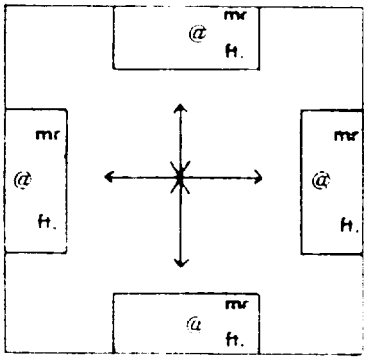
(✓) OK (NA) Not Applicable (•) See Remarks

_____ A Survey Projector for Excessive Radiation Levels
_____ B Projector inspected for damage to fittings, locks, and labels
_____ C Control Cable and Fittings checked for cuts, breaks, or looseness
_____ D Crank inspected for looseness
_____ E Control checked for freedom of cable movement
_____ F Guide tube inspected for cuts, crushing, and broken or loose fittings
_____ G Collimator (if used) checked for secure attachment
_____ H Pipe positioner (if used) checked for damage and secure attachment

Maintenance inspection performed or witnessed by Radiographer signed below (Part G)

Personnel Informed _____

Results of Physical Survey



_____ Signs _____ Rope
Constant Surveillance

Part E. Securing Radiographic Operations: Witnessed by Radiographer (Part G)

Record of Physical Survey made to determine source is in shielded position when securing exposure device (RSM Section 2 Proc. 18.3.1.3)

_____ mr/hr @ surface of exposure device or at 6" from device as required by RSM Section 2 Proc. 4

Survey Performed of Projector and Guide Tube after each exposure _____

Length of Exposures _____
Number of Exposures _____
Total Exposure Time _____

Part F Transport From/Return **Truck/Vehicle No** **(✓) If same as Part C** **(Complete the applicable column)**

Destination City _____ State _____ Location _____

1) Returning Projector to vehicle
_____ mr/hr surface transport container
_____ Transport Index (0.1 - 10.0)
Label: Class I _____ II _____ III _____
_____ NRC Package Approval No. Attached
(Column 1 or 2) VEHICLE PLACARDED _____ Yes _____ No

2. _____ Projector not removed from vehicle (✓)

3) _____ Not Transported (✓)

_____ mr/hr @ ft. from vehicle surface _____ mr/hr @ Driver

_____ mr/hr @ surface of Projector prior to return to vault

Part G: The below signed individual(s) herein verify that the above listed information (Part A through Part F) is accurate and has been completed in accordance with **HUNTINGTON TESTING** License Procedures and State and Federal Regulations.

In addition, the above named materials have been properly classified, described, packaged, marked, and labeled, and are in proper condition for transport according to the applicable regulations of the Department of Transportation.

Radiographer _____ Dosimeter: Start _____ End _____ Total _____

Radiographer _____ Dosimeter: Start _____ End _____ Total _____

INDEX--SECTION 3

TRAINING PROGRAM

ISOTOPE RADIOGRAPHY
Procedure 1 (Rev. 2)

1.0 PURPOSE:

The purpose of this program is to establish training requirements for industrial radiography personnel employed by Huntington Testing & Technology, Inc.

2.0 RESPONSIBILITY:

The responsibility for the administration of this program shall rest with the Radiation Safety Officer.

3.0 CLASSIFICATION OF PERSONNEL, QUALIFICATIONS AND DUTIES:

3.1 "Radiation Safety Officer" shall have administrative ability and experience. He shall be thoroughly familiar with all types of radiographic exposure devices and radiation detection instruments used by Huntington Testing, Inc., Huntington, WV. He shall be thoroughly familiar with applicable NRC safety requirements and reporting regulations applicable to industrial radiography. He will have satisfactorily completed formal training in establishing and maintaining a radiation safety program, in addition to the initial forty (40) hour safety course, covering the topics outlined in 10 CFR, Part 34

3.2 "Radiographer" shall have satisfactorily completed the initial training, on-the-job training and examination requirements for radiographers, as described in this Training Program Outline. As of June 27, 1999, all radiographers shall be certified by a certifying entity as prescribed in 10 CFR 34.43(a) (1). Only those individuals who have successfully completed a third parties' examination, and all other requirements are met, will be allowed to act as radiographers. A radiographer may operate or personally supervise the use of radiographic devices by a radiographer's assistant. He is responsible to the licensee for assuring compliance with the requirements of NRC regulations, Huntington Testing's Operating and Emergency procedures and the conditions of the license.

3.3 "Assistant Radiographer" shall work under the direct supervision of a qualified Radiographer and shall have satisfactorily completed the initial training in selected subjects and examination requirements for assistant radiographer as described in the Training Program Outline.

4.0 Before any individual will be permitted to act as a radiographer's assistant, he will be instructed in, and become familiar with:

a. Huntington Testing's Operating and Emergency Procedures

b. Radiographic Exposure Devices and related source handling and monitoring equipment as per initial training course outline.

c. Has received copies and instruction in the requirements described in NRC regulations contained in 10CFR Part 34.43 (c) (1).

INITIAL TRAINING PROGRAM
Procedure 2 (Rev. 2)

1.0 Initial Training for Radiographers Assistants shall be provided by Huntington Testing and Technology using AEA Technology's "Radiation Safety Training" course as a guide. A passing grade of at least 85% must be obtained prior to working as a Radiographer's Assistant.

2.0 The classroom segment of the course will consist of receiving copies and instruction in Regulatory Requirements and Huntington Testing and Technology's Operating and Emergency Manual.

3.0 This course shall also provide instruction in the use of all exposure devices, survey instruments, and monitoring equipment. This instruction will be provided during classroom training as well as the lab session of the course.

RADIOGRAPHIC EXPOSURE DEVICES AND RELATED
SOURCE HANDLING AND MONITORING EQUIPMENT
Procedure 3 (Rev. 1)

As a part of the Company's on-the-job training program, each radiographer's assistant will receive instruction in the Company's Operating and Emergency Procedures as well as practical instruction in the operation and use of all devices licensed by Huntington Testing & Technology, Inc.

This instruction will be given by the Radiation Safety Officer or a qualified radiographer and will include specific instruction regarding the design and function of these devices. Also, included in this phase of training will be observation of at least ten (10) radiographic set-ups.

When the individual has received sufficient instruction, as determined by the Radiation Safety Officer and has observed the necessary number of set-ups, he will be required to demonstrate his understanding of the instruction received by performing an operational competence test.

This test will be performed under the supervision of the Radiation Safety Officer and the test results recorded on Form 1-RT-9.

Should the individual fail this test, he will receive additional instruction from the Radiation Safety Officer.

TRAINING OUTLINE
Procedure 4 (Rev. 2)

1.0 ON-THE-JOB-TRAINING:

No one will be allowed to participate in on-the-job training until he has become qualified as a radiographer's assistant. During this phase of the training, the Assistant Radiographer may participate in radiographic operations under the direct supervision of a qualified radiographer. The Radiation Safety Officer will also frequently observe the Assistant's performance to accurately judge his competency. The duration of this phase of the training program will be approximately three months.

Successful completion of the above would permit an individual to act as a radiographer's assistant making him eligible for ASNT IRRSP Certification or equivalent.

AEA's 40 Hour Aspects of Radiation Safety shall be used as training for individuals with 3months (360 hours) minimum experience to meet the training requirements for ASNT's IRRSP. This training shall meet the requirements prescribed in 10 CFR Part 34.43 (g).

Individuals with a valid certificate shall only be allowed to act as a radiographer's after receiving copies and instruction in Huntington Testing's Operating & Emergency Procedures. Regardless of previous experience, all personnel shall be subject to the requirements of Section 1 of this Procedure. Radiographers possessing a valid certificate received while employed other than Huntington Testing, certification must be verified through the issuing agency before individual may act as a radiographer.

2.0 PERIODIC TRAINING:

Radiographic Personnel will receive up-dated instruction whenever changes occur in the radiography program. This includes revision to the Operating and Emergency Procedures; changes in equipment such as a new or different radiation survey instrument, radiographic sources and radiographic exposure devices; and amendments to applicable NRC regulations.

Radiographers shall demonstrate that they have an understanding of these instructions and are competent to use new equipment, instruments and procedures. (This will be accomplished by comprehensive written and/or oral examination or personal observation).

Refresher instructions on the fundamentals of radiation protection and associated subjects shall be given to Radiographers at intervals not to exceed 12 months.

TRAINING OUTLINE

3.0 TRAINING RECORD:

The Radiation Safety Officer shall maintain a complete record of all training and examination results for each individual engaged in Industrial Radiography for as long as they remain in the employment of Huntington Testing & Technology, Inc.

FORM 1-RT-9

RADIOGRAPHIC EXPOSURE DEVICES AND RELATED SOURCE HANDLING AND MONITORING EQUIPMENT

OPERATIONAL COMPETENCE TEST

NAME_____

		Yes	No
1.	Is Film Badge being worn?	___	___
2.	Is the survey meter calibrated and operable?	___	___
3.	Was radiographic device surveyed prior to removing it from storage vault?	___	___
4.	Is dosimeter being worn?	___	___
5.	Radiographic Operations Report #1 filled out?	___	___
6.	Equipment set up correctly?	___	___
7.	Was a theoretical "High Radiation Area" and " Radiation Area" established prior to making exposure?	___	___
8.	Were ropes and signs used at boundary of restricted area?	___	___
9.	When exposure was made, was the boundary of the restricted area surveyed? Radiographic Operations Report No. filled out?	___	___
10.	When source was returned to device, was device surveyed to insure return of source to storage position?	___	___
11.	Was device surveyed prior to securing it in storage vault?	___	___
12.	Radiographic Operations Report No. 1 completed?	___	___