Tri State Inspection & Consultants

115 ISLAND AVENUE • McKEES ROCKS, PA 15136

TELEPHONE (412) 771-0262

RADIATION SAFETY MANUAL

1986 EDITION

NAME:

CONTROL NUMBER:

106300

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POLICY STATEMENT

This manual summarizes the responsibility of all employees and to provide them with the necessary instructions to be followed in order to maintain an adequate Radiation Safety Program over all of our operations involving radiation.

The Radiation Safety Officer has my support and the authority for implementing the requirements contained in this manual.

Failure to comply with the procedures and regulations set forth in this manual will be just cause to apply appropriate disciplinary action.

TRI STATE INSPECTION & CONSULTANTS

Alexander Walker, Jr. 15 Oct. 86
President Date

TABLE OF CONTENTS

TABLE OF CONTENTS (CONTINUED)

TABLE OF CONTENTS (CONTINUED)

Alfred J. Mueller
Radiation Safety Officer

October 15, 1986
Date

1986 EDITION
LOG OF REVISIONS

PAGE	REVISION LEVEL
i	0
0.1.1	0
0.1.2	0
0.1.3	0
0.2.1	0
0.2.2	0
0.2.3	0
0.2.4	0
1.1	0
1.2	0
1.3	0
1.4	0
1.5	0
1.6	0
2.1	0
2.2	0
2.3	0
2.1.1	0
2.1.2	0

LOG OF REVISIONS (CONTINUED)

PAGE	REVISION LEVEL
3.1	0
3.2	0
3.3	0
3.4	0
3.5	0
3.6	0
3.7	0
3.8	0
4.1	0
4.2	0
4.1.1	0
4.2.1	0
4.3.1	0
4.3.2	0
5.1	0
5.2	0
5.1.1	0
5.1.2	0
5.1.3	0
5.1.4	0
5.1.5	0
5.2.1	0
5.2.2	0
5.3.1	0
5.3.2	0
5.4.1	0
5.4.2	0
5.5.1	0
5.5.2	0
5.6.1	0
5.6.2	0
5.6.3	0

LOG OF REVISIONS (CONTINUED)

PAGE	REVISION LEVEL
5.7.1	0
5.7.2	0
5.8.1	0
5.8.2	0
6.1	0
6.2	0
7.1	0
7.2	0
7.3	0
7.4	0
8.1	0
8.1.1	0
8.1.2	0
8.2.1	0
8.2.2	0
8.2.3	0
8.3.1	0
8.3.2	0
9.1	0
9.2	0
9.3	0
9.4	0
9.5	0
9.6	0
9.7	0
9.8	0
9.9	0
9.10	0
10.1	0
11.1	0
11.2	0

LOG OF REVISIONS (CONTINUED)

PAGE	REVISION LEVEL
12.1	0
12.2	0
12.3	0
13.1	0
13.2	0
14.1	0
14.2	0
14.3	0
14.4	0
15.1	0
15.2	0
15.3	0
15.4	0
15.5	0
15.6	0
15.7	0
15.8	0
15.9	0
15.10	0
15.11	0
15.12	0
15.13	0
16.1	0
16.2	0

The Appendices are not controlled pages within the Radiation Safety Manual.

SECTION 1 - RADIATION SAFETY ADMINISTRATION

1.0 SCOPE

1.1 This procedure describes the Administration of the Radiation Safety Program as established by TRI STATE INSPECTION AND CONSULTANTS (TSI&C) to comply with established Federal, State and Local Radiation Safety Requirements.

2.0 ORGANIZATION

2.1 Attachment No. 1 outlines the organizational structure with reference to Management, Radiographers and Radiographer's Assistants as contained in the Radiation Safety Program.

2.2 Radiation Safety Officer (RSO)

2.2.1 The Radiation Safety Officer is appointed by and reports to the President of TSI&C.

2.3 Assistant Radiation Safety Officer (ARSO)

2.3.1 The Assistant Radiation Safety Officer is appointed by the Radiation Safety Officer.

2.4 Radiation Safety Supervisor (RSS)

2.4.1 The Radiographer Foremen at a particular location serves as the Radiation Safety Supervisor.

3.0 QUALIFICATIONS

3.1 Radiation Safety Officer

3.1.1 The Radiation Safety Officer will be appointed by virtue of a resume submitted to the President of TSI&C. He shall be thoroughly familiar with all phases of radiographic operations and applicable Federal, State and Local regulations.

3.2 Assistant Radiation Safety Officer

3.2.1 The Assistant Radiation Safety Officer shall be thoroughly versed in all phases of Radiographic Operations, shall have had a minimum of two (2) years experience as a Radiographer in industrial radiography, and must demonstrate a thorough understanding of applicable Federal, State and Local regulations.

3.3 Radiation Safety Supervisor

3.3.1 The Radiation Safety Supervisor shall be trained and certified in Radiation Safety as required in TSI&C's Radiation Safety Manual.

4.0 RESPONSIBILITIES

4.1 Radiation Safety Officer (RSO)

4.1.1 The Radiation Safety Officer is responsible for the administration of the TSI&C Radiation Safety Program as required by Federal, State and Local regulations. His duties include but are not limited to the following:

4.1.2 Preparing, maintaining and controlling the Radiation Safety Manual (RSM).

4.1.3 Administering the Radiation Safety Training Program.

4.1.4 Serving as TSI&C's liaison officer with the Nuclear Regulatory Commission and/or Agreement States on license matters.

4.1.5 Maintaining control of procurement and of licensed material.

4.1.6 Developing and maintaining up-to-date Operating and Emergency Procedures.

4.1.7 Establishing and maintaining a Personnel Monitoring Program.

4.1.8 Establishing and maintaining an internal inspection system.

4.1.9 Establishing and conducting a survey instrument calibration program.

4.1.10 Controlling and instituting corrective action in emergency situations.

4.1.11 Investigating causes of incidents and determining necessary preventive action.

4.2 Assistant Radiation Safety Officer (ARSO)

4.2.1 The Assistant Radiation Safety Officer is directly responsible for Radiation Safety within his respective area. If an ARSO does not exist in the organization, the duties listed below shall be performed by the RSO. Their duties include but are not limited to the following:

4.2.2 Procuring and maintaining radiation survey instruments.

4.2.3 Establishing and maintaining radio-isotope storage facilities.

4.2.4 Maintaining exposure devices, radiography facilities and associated equipment.

4.2.5 Conducting and recording quarterly inventories (Form RR-11, Section 15, Page 15.13) and maintaining Source Utilization Reports (Radiographic Operations Report, Form RR-2) for his respective organization.

4.2.6 Maintaining all reports, records and correspondence relating to Radiation Safety and control for his organization.

4.2.7 Forwarding copies of reports and records to the Radiation Safety Officer.

4.2.8 Reporting to the Radiation Safety Officer as required.

4.2.9 Examining and determining competency of Radiographers and Radiographer's Assistants.

4.2.10 Establishing and maintaining a leak testing program.

4.3 Radiation Safety Supervisor(s)

4.3.1 The Radiation Safety Supervisor is responsible for administering TSI&C's Radiation Safety Program. He is responsible to assure that all radiographic operations are conducted in a safe manner and in accordance with the Radiation Safety Manual (RSM).

4.4 Radiographer

4.4.1 A Radiographer is an employee who performs radiography and/or personally supervises radiographic operations. He is directly responsible for all sources and equipment assigned to him. He is responsible for implementing the operating procedures of TSI&C's Radiation Safety Manual in compliance with applicable Federal, State and Local regulations.

4.5 Radiographer's Assistant

4.5.1 A Radiographer's Assistant is an employee who, under the direct supervision of a Radiographer, uses radiographic exposure devices and radiation monitoring devices. He is responsible for performing his assigned duties in accordance with the operation procedures of TSI&C's RSM in compliance with applicable Federal, State and Local regulations.

5.0 RADIATION SAFETY MANUAL

5.1 Structure

5.1.1 The Radiation Safety Manual (RSM) is comprised of operating procedures which define the Radiation Safety Administration Program and the Operating and Emergency Procedures for implementing and maintaining an adequate Radiation Safety Program within TSI&C.

5.1.2 The appendices included in the RSM contain:

5.1.2.1 USNRC TITLE 10 CFR Parts 19, 20, 21, 30, 34, 40 and 71.

5.1.2.2 USNRC License and conditions as applicable.

5.1.2.3 RECIPROCITY AND NOTIFICATION REQUIREMENTS AS APPLICABLE TO AGREEMENT STATES WHEREIN RADIOGRAPHIC OPERATIONS ARE CONDUCTED. (Other than USNRC or State License.)

5.1.2.4 USNRC Forms 3, 4, and 5 and APPLICABLE STATE FORMS.

5.1.2.5 Glossary of Terms.

5.2 Manual Control and Assignment

5.2.1 All manuals will be assigned a control number. The control number and name of the individual to whom the manual is assigned will be identified on the cover page. A master control log containing the manual control number and the name of the person to whom the manual is assigned will be maintained by the Radiation Safety Officer.

5.3 Radiation Safety Manual Revisions

5.3.1 When revisions are made, the affected Log of Revisions pages and the revised pages only shall be reissued.

5.3.2 Revisions to a page shall be indicated by a revision letter in the left hand margin adjacent to the revised paragraph.

5.3.3 Revised procedures shall be submitted, as required, to the Nuclear Regulatory Commission and/or Licensed Agreement State for approval prior to release to the manual holder.

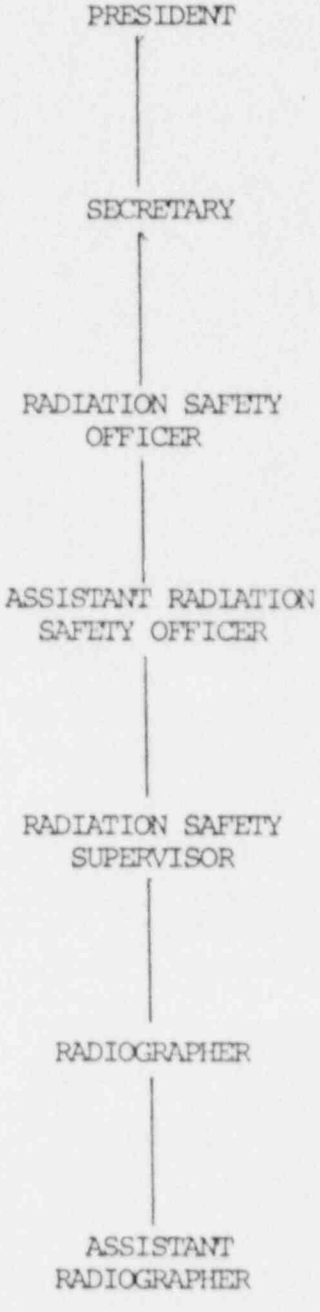
5.3.4 Appendices and/or Procedural Attachment Revisions will be issued without USNRC and/or Licensed Agreement State approvals.

5.3.5 Should Licensed Agreement State Regulations differ from USNRC Regulations, an Addendum will be issued to the affected operating procedure(s) to cover the specific requirement(s). Addendas will be revised, issued and controlled in the same manner as this manual.

5.3.6 A Manual Revision Transmittal and Receipt Form, as shown in Section 15, Page 15.2, shall accompany all manual revisions to manual holders. It will be the responsibility of the manual holder to incorporate the revision changes in his manual. The statement of receipt on the Transmittal and Receipt Form shall be completed and returned to the Radiation Safety Officer.

ATTACHMENT NO. 1

RADIATION SAFETY PROGRAM ORGANIZATION CHART



SECTION 2 - PERSONNEL MONITORING EQUIPMENT AND USAGE

1.0 SCOPE

1.1 This procedure shall govern the use of Personnel Monitoring Devices.

1.2 This procedure shall be used in conjunction with the TSI&C's procedure entitled Radiation Safety Records, Section 14 and Calibration Procedure for Dosimeters, Section 2.1.

2.0 EQUIPMENT

2.1 Dosimeter - direct reading from 0 to 200 MR.

2.2 Dosimeter Charger.

2.3 Film Badge.

2.4 Eberline Rad-Tad or equivalent.

3.0 USE

3.1 Dosimeters

3.1.1 Dosimeters are to be zeroed at the beginning of each work day by inserting the dosimeter into the socket on the Dosimeter Charger, and adjusting the knob until the indicator in the Dosimeter reads "0".

3.1.2 All Radiographers and Radiographer's Assistants shall wear a pocket dosimeter at all times during working hours. Dosimeters shall be worn on the clothing adjacent to the film badge in the chest area or on the T/O Pouch.

3.1.3 Dosimeters shall be read at frequent intervals during the work day so that you are aware of the exposure received during the course of radiographic activities.

3.1.4 Dosimeters shall be read at the end of each working day for which radiographic activities were performed, and the reading shall be recorded on TSI&C's Radiographic Operations Report, RR-2. (See Section 15, Page 15.3.) Dosimeters are delicate instruments, and should be treated as such. Jarring or dropping the instrument may cause a high reading. If your dosimeter does not operate properly, notify your supervisor and have it replaced.

3.1.5 In the event that a dosimeter becomes discharged beyond its capacity of 200 MR due to unknown circumstances in which the possibility exists that an excessive radiation exposure may have occurred, the individual shall contact the Radiation Safety Officer, Radiation Safety Supervisor or Assistant Radiation Safety Officer for instructions. In addition, he will not be permitted to engage in radiographic operations until the results of a film badge processing are acceptable.

3.1.6 Dosimeters shall be calibrated annually in accordance with TSI&C's procedure Section 2.1, Calibration Procedure for Dosimeters, to assure proper operation.

3.2 Film Badges

3.2.1 Film badges shall be assigned to and worn by only one individual.

3.2.2 Film badges will be forwarded to the radiographer by the Radiation Safety Officer or his designee so that the radiographer will have these in his possession at the beginning of the month.

3.2.3 Film badges shall be worn by all radiographic personnel during work hours and placed adjacent to the dosimeter on the clothing in the chest area. Care should be taken to prevent the film badge from becoming wet or mutilated.

3.2.4 In the event that:

3.2.4.1 An individual's dosimeter is discharged beyond its capacity or 200 MR due to unknown circumstances in which the possibility exists that an excessive radiation exposure may have occurred.

3.2.4.2 An individual's film badge becomes lost or mutilated.

3.2.4.3 An individual has reason to believe that his film badge may indicate a dosage that he may not have received,

3.2.4.4 The individual shall notify his Radiation Safety Officer, Radiation Safety Supervisor or Assistant Radiation Safety Officer so that he may disposition the situation. In addition, the applicable section(s) of an Incident Data Report (Form RR-3) (See Section 15, Page 15.4) shall be completed by the individual within 24 hours of the occurrence and the report forwarded to the Radiation Safety Officer. If the possibility exists that an excessive radiation exposure may have occurred, the individual shall not be permitted to engage in radiographic operations until the results of a film badge processing are satisfactory and he is issued another film badge.

3.2.5 Control film badges are not to be worn by a radiographer.

4.0 RECORDS

4.1 Dosimeter readings must be recorded on Radiographic Operations Form No. RR-2, for days on which radiographic activities were performed.

4.2 At the end of the work week Radiographic Operations Reports are to be returned to the Radiation Safety Supervisor for transmittal to the Radiation Safety Officer.

4.3 At the end of the month, the film badges are to be returned to the Radiation Safety Officer, who will send them to the film badge processor for reading, recording and reporting the dosage.

SECTION 2.1 - CALIBRATION PROCEDURE FOR DOSIMETERS

1.0 SCOPE

1.1 This procedure shall govern the calibration of dosimeters.

2.0 PROCEDURE

2.1 Charge the dosimeter to a value of zero.

2.2 Place the dosimeter in a low radiation area such as near the surface of the isotope camera, using shielding material or distance to obtain a known radiation intensity of approximately 20 MR/HR.

2.3 After 4 hours of exposure at this rate the dosimeter should be checked. The reading should be four times the original intensity or within plus or minus 30% of the true radiation exposure.

2.4 After another 4 hours of exposure at this same intensity, check the dosimeter. The reading should be eight times the original intensity or within plus or minus 30% of the true radiation exposure.

3.0 STICKER

3.1 If the dosimeter meets the above requirements it will have a sticker attached to it showing the date calibrated, serial number of the dosimeter and the date the next calibration is due.

3.2 If the dosimeter does not meet the requirements of plus or minus 30%, it shall be removed from service!

4.0 RESULTS

4.1 The results shall be recorded on the Dosimeter Calibration Record.

5.0 ALTERNATIVES

5.1 As an alternative, this calibration may be performed by an outside agency and a record of their calibration results shall be obtained and maintained. In this case, the results, as required in 4.0, need not be recorded by TSI&C.

5.2 As an alternative to the intensity and exposure time requirements of paragraphs 2.2, 2.3 and 2.4, a dosimeter calibrator of low radiation intensity may be used for set periods of time to activate the dosimeter. A record of the known calibrator activity, hours of exposure and results shall be recorded as in paragraph 4.0. Form RR-9 shall be used to record this data.

SECTION 3 - RADIATION SURVEYS AND POSTING

1.0 SCOPE

1.1 This procedure shall govern methods of performing Radiation Surveys and define Posting Requirements as outlined and established in USNRC Title 10 CFR Parts 20 and 34 and/or applicable established Licensed Agreement State Regulations.

1.2 This procedure shall be used in conjunction with TSI&C's procedure entitled:

SECTION 4 GENERAL PROCEDURE FOR USE OF RADIATION SURVEY INSTRUMENTS.

SECTION 4.1 OPERATING INSTRUCTION FOR USE OF VICTOREEN MODEL 592B and 492 SURVEY METER.

SECTION 4.2 OPERATING INSTRUCTIONS FOR USE OF EBERLINE 130G GEIGER COUNTER.

SECTION 4.3 OPERATING INSTRUCTIONS FOR USE OF GAMMA INDUSTRIES MODEL 250B AND 252B SURVEY METER.

SECTION 4.4 OPERATING INSTRUCTIONS FOR USE OF VICTOREEN MODEL 740B SURVEY METER.

2.0 POSTING OF NOTICES TO WORKERS

2.1 The Radiation Safety Supervisor shall post the following documents in the Mobile Laboratory, Plants and Sites to permit individuals, frequenting the area where radiographic operations take place, to observe them:

2.1.1 Form USNRC-3, NOTICE TO EMPLOYEES, Appendix D, or when performing under a specific state license, the applicable state form shall be posted instead of Form USNRC-3.

2.1.2 TSI&C Notice (Attachment Number 1).

2.1.3 Violation Notices, as described in 10 CFR 19.11, paragraph (a)(4) shall be posted immediately upon receipt from the Radiation Safety Officer.

3.0 ESTABLISHING RADIATION AREAS

3.1 The use of Radiation survey instruments allows the radiographer and/or radiographer's assistant to establish safety perimeters where applicable posting requirements can be accommodated and barricades can be established as required. (See Section 15, Page 15.3 and Attachment Number 3.)

4.0 POSTING OF RESTRICTED AREAS AND SECURING REQUIREMENTS FOR RADIOGRAPHIC OPERATIONS

4.1 Each exposure set-up must be posted to assure prevention of unauthorized access to a radiation area. The exposure at the perimeter of the posted area must be such that the total quantity of radiation in any one hour does not exceed 2 MR.

4.2 Signs used at the perimeters of the radiation area and high radiation area must comply with USNRC and/or applicable licensed Agreement State requirements and must be posted as follows:

4.2.1 Radiation Area

An area within which the radiation level exceeds 2 MR/HR. The signs posted conspicuously at the perimeters of this area must read "CAUTION - RADIATION AREA". (See Attachment Number 2, Figure 2.)

4.2.2 High Radiation Area

A Survey need not be made to determine the high Radiation Area since this would result in unnecessary exposure to the radiographer or radiographer's assistant. Instead, the signs should be posted at the perimeter of an area in which there is a calculated radiation level in excess of 100 MR/HR. (See Attachment Number 2, Figure 3.)

4.3 The radiographer and/or radiographer's assistant must be in continuous surveillance of a radiation area to prevent unauthorized entry.

5.0 REQUIRED RADIATION SURVEY

5.1 A physical radiation survey must be made to establish radiation areas for posting as required in Section 3 of this procedure and the results of this survey are to be recorded on Radiographic Operations Report, Form RR-2. (See Section 15, Page 15.3.)

5.2 After each radiographic exposure, a physical radiation survey must be made to determine that the source has returned to the safe position of the projector. (NOTE: This survey should be made at the same location relative to the projector for every survey and must include the area at the front of the projector near the port.)

5.3 At the conclusion of each radiographic operation and at the time of securing the source, a physical radiation survey must be made to determine that the source is in the safe position. This survey is to be made after the source has been disconnected and locked in the projector at the time of storage. Records of this survey must be recorded on Radiographic Operations Report, Form RR-2 (see Section 15, Page 15.3) and retained for review by the USNRC and/or applicable licensed agreement state.

5.4 After the projector has been placed in the area designated for storage, another survey is required to determine that the source is in the container. The surface of the box, building or mobile lab which must be posted "CAUTION - RADIOACTIVE MATERIAL" (see Attachment Number 2, Figure 1) must also be surveyed. The surface reading of the box, building or mobile lab must be such that if a person were continually present, he would not receive in excess of 2 MR in any given hour. THIS SURVEY MUST INDICATE 2 MR/HR READING OR LESS. This information from both of these surveys must be recorded on the Radiographic Operations Report, Form RR-2.

ATTACHMENT NUMBER 1

NOTICE

THE FOLLOWING DOCUMENTS ARE AVAILABLE FOR REVIEW AT THE JOBSITE, MOBILE LABORATORY OR IN TRI STATE INSPECTION & CONSULTANT'S PLANT OFFICE

1.0 USNRC RULES AND REGULATIONS

- 1.1 10CFR 19.
- 1.2 10CFR 20.
- 1.3 10CFR 21.
- 1.4 10CFR 30.
- 1.5 10CFR 34.
- 1.6 10CFR 40.
- 1.7 10CFR 71.
- 1.8 NRC-3.

2.0 APPLICABLE STATE REGULATIONS, AS REQUIRED.

3.0 TSI&C's RADIATION SAFETY MANUAL (RSM) WHICH INCLUDES:

- 3.1 OPERATION AND EMERGENCY PROCEDURES.
- 3.2 USNRC AND/OR APPLICABLE STATE LICENSE AND AMENDMENTS.

4.0 NOTICE OF VIOLATIONS PER 10CFR 19 (19.11, a, 4).

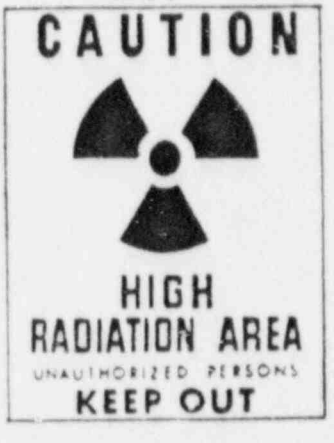
5.0 NRC-3, NOTICE TO EMPLOYEES.

ATTACHMENT NO. 2

FIGURE 1

FIGURE 2

FIGURE 3



ATTACHMENT NUMBER 3

Chart to be used for determining half-value layers for reducing radiation intensity.

	COBALT 60	IRIDIUM 192
Lead	1/2"	1/4"
Steel	1"	1/2"
Cement	3"	2"
Water	7"	4"

CHARTS FOR DETERMINING RADIATION LIMITS OF UNSHIELDED SOURCES

COBALT 60

Total Exposure Time in Any 1 hour	Distance from source to the perimeter of restricted area	Allowable MR/HR Reading On Meter
1 Curie (Unshielded)		
60 minutes	90 feet	2
30 minutes	65 feet	4
10 minutes	40 feet	12
5 minutes	30 feet	24
1 minute	15 feet	120
3 Curies (Unshielded)		
60 minutes	150 feet	2
30 minutes	110 feet	4
10 minutes	65 feet	12
5 minutes	45 feet	24
1 minute	20 feet	120
5 Curies (Unshielded)		
60 minutes	195 feet	2
30 minutes	140 feet	4
10 minutes	80 feet	12
5 minutes	60 feet	24
1 minute	25 feet	120
10 Curies (Unshielded)		
60 minutes	275 feet	2
30 minutes	195 feet	4
10 minutes	115 feet	12
5 minutes	80 feet	24
1 minute	35 feet	120

COBALT 60

Total Exposure Time in Any 1 hour	Distance from source to the perimeter of restricted area	Allowable MR/HR Reading On Meter
20 Curie (Unshielded)		
60 minutes	385 feet	2
30 minutes	275 feet	4
10 minutes	160 feet	12
5 minutes	115 feet	24
1 minute	50 feet	120
50 Curies (Unshielded)		
60 minutes	600 feet	2
30 minutes	425 feet	4
10 minutes	245 feet	12
5 minutes	175 feet	24
1 minute	80 feet	120
100 Curies (Unshielded)		
60 minutes	855 feet	2
30 minutes	605 feet	4
10 minutes	350 feet	12
5 minutes	250 feet	24
1 minute	110 feet	120

IRIDIUM 192

Total Exposure Time in Any 1 hour	Distance from source to the perimeter of restricted area	Allowable MR/HR Reading On Meter
10 Curies (Unshielded)		
60 minutes	175 feet	2
30 minutes	125 feet	4
10 minutes	75 feet	12
5 minutes	50 feet	24
1 minute	25 feet	120
20 Curies (Unshielded)		
60 minutes	245 feet	2
30 minutes	175 feet	4
10 minutes	100 feet	12
5 minutes	70 feet	24
1 minute	35 feet	120
50 Curies (Unshielded)		
60 minutes	390 feet	2
30 minutes	275 feet	4
10 minutes	160 feet	12
5 minutes	115 feet	24
1 minute	50 feet	120
100 Curies (Unshielded)		
60 minutes	545 feet	2
30 minutes	385 feet	4
10 minutes	225 feet	12
5 minutes	160 feet	24
1 minute	70 feet	120
150 Curies (Unshielded)		
60 minutes	665 feet	2
30 minutes	470 feet	4
10 minutes	275 feet	12
5 minutes	195 feet	24
1 minute	85 feet	120
200 Curies (Unshielded)		
60 minutes	770 feet	2
30 minutes	545 feet	4
10 minutes	315 feet	12
5 minutes	225 feet	24
1 minute	100 feet	120

SECTION 4 - GENERAL USE OF RADIATION SURVEY INSTRUMENTS

1.0 SCOPE

1.1 This procedure shall govern the use of Survey Instruments authorized by TSI&C.

1.2 This procedure shall be used in conjunction with the TSI&C's procedure entitled Radiation Surveys and Posting, Section 3.

2.0 EQUIPMENT

2.1 The survey instruments must be capable of measuring from 0 MR/HR through 1 R/HR.

3.0 CALIBRATION

3.1 No radiation survey instrument can be used without the evidence of quarterly calibration shown on a sticker placed on the side of the instrument indicating when the instrument was calibrated by either TSI&C, using a USNRC or state approved procedure, or by a designated representative who used a USNRC or state approved procedure, (see Section 5.4, 5.10, 5.11, as applicable).

3.2 Instruments with evidence of calibration and showing no indication of malfunction can be used for three (3) months after the date of calibration.

3.3 Calibration certification will be retained in TSI&C's Main Office and at the office where the survey instrument is being used.

4.0 USE

4.1 Survey instruments, since they are delicate, must be handled and used with utmost care to avoid damage.

4.2 Precautionary measures must be taken to avoid exposure of the instrument to excessive moisture and/or dirt.

4.3 Use of survey instruments in prolonged periods of excessive cold should be avoided since batteries may prove inefficient at colder temperatures.

4.4 Batteries should be replaced when their condition becomes questionable.

5.0 STORAGE

5.1 After use, survey instruments are to be turned to the "OFF" position and stored to preclude tampering. Additionally, the instruments are to be stored in a clean, dry environment.

SECTION 4.1 - OPERATING INSTRUCTIONS FOR USE OF SURVEY METERS

VICTOREEN MODEL 592B and 492

1.0 SCOPE

1.1 This procedure describes the operation of the Victoreen 592B and 492 survey meters.

1.2 This procedure shall be used in conjunction with the TSI&C's procedure entitled General Use of Radiation Survey Instruments, Section 4.

2.0 RANGE

2.1 The Victoreen 592B and 492 have three (3) scales covering the following ranges:

a) 1 x SCALE - 0 to 10 MR/HR
b) 10 x SCALE - 10 to 100 MR/HR
c) 100 x SCALE - 100 to 1000 MR/HR

3.0 OPERATION

3.1 Warm-Up

The instrument should be allowed to have a two (2) minute warm-up period with the selector switch set at the 1 x scale.

3.2 Zeroing (592B)

Turn the selector switch to the position marked ZERO. With the switch set at zero position, make an adjustment of the zeroing knob so that the meter needle (MR/HR INDICATOR) indicates zero (0).

3.3 Battery Check (492)

Turn selector switch to BAT. Position or press BAT. Check button. The dial indicator must reach the area in the scale labeled BAT.

3.4 Use

The meter should now be ready for use by turning the selector switch to the desired intensity range and reading the radiation intensity indicated by the meter.

3.5 After Use

Turn off the meter when it is not being used to preserve the batteries.

SECTION 4.2 - OPERATING INSTRUCTIONS FOR USE OF SURVEY METERS

EBERLINE MODEL E-130G GEIGER COUNTER

1.0 SCOPE

1.1 This procedure described the operation of the Eberline Model No E-130G Geiger Counter.

1.2 This procedure is to be used in conjunction with TSI&C's procedure entitled General Use of Radiation Survey Instruments, Section 4.

2.0 RANGE

2.1 The Eberline Model No. E-130G Geiger Counter has three (3) scales covering the following ranges:

a) 1 x SCALE - 0 to 10 MR/HR
b) 10 x SCALE - 10 to 100 MR/HR
c) 100 x SCALE - 100 to 1000 MR/ HR

3.0 OPERATION

3.1 Warm-up

The instrument should be allowed to have a two (2) minute warm-up period with the selector switch set at the 1 x scale.

3.2 Battery Check

After the warm-up period, turn the selector knob to the "BATTERY" position. If the meter needle does not fall within the area marked "BATTERY OK" on the right side of the meter face, the batteries are defective and the meter is considered inoperable until either the batteries are replaced or maintenance is performed.

3.3 Use

If the battery check is successful, the selector knob should be turned to the desired intensity range and the radiation level read from the meter indication.

3.4 After Use

The selector knob should be turned to the "OFF" position so that the batteries are preserved.

SECTION 4.3 - OPERATING INSTRUCTIONS FOR USE OF SURVEY METERS

GAMMA MODEL 250B and 252B SURVEY METERS

1.0 SCOPE

1.1 This procedure describes the operation of the Gamma Model 250B and 252B survey meters.

1.2 This procedure is to be used in conjunction with TSI&C's procedure entitled General Use of Radiation Survey Instruments, Section 4.

2.0 RANGE

2.1 The Gamma 250B and 252B has three (3) scales covering the following ranges:

a) 1 x SCALE - 0 to 10 MR/HR
b) 10 x SCALE - 10 to 100 MR/HR
c) 100 x SCALE - 100 to 1000 MR/HR

3.0 OPERATION

3.1 Battery Check

To determine if there is a sufficient charge in the batteries, turn the selector knob past the position of "Battery Check" to one of the scales X1, X10, or X100, after this is done, turn the selector knob back to battery check and check to see if the needle falls into the area marked on the scale as "Batter OK". If it falls into this area then the batteries have sufficient charge. If the needle does not fall into this area then the batteries should be replaced.

3.2 Use

If the battery check is successful, the selector knob should be turned to the desired intensity range and the radiation level read from the meter indication.

3.3 After Use

After use the selector knob should be turned to the "OFF" position so that the batteries are preserved.

3.4 Dosimeter Charger

The model 252B which has a dosimeter charger, must have the selector knob turned to one of the scales X1, X10, or X100 in order for the dosimeter charger to function. Refer to Section 2 for the proper procedure for charging (zeroing) dosimeters.

SECTION 5 - GENERAL USE OF RADIOGRAPHIC EXPOSURE DEVICES

1.0 SCOPE

1.1 This procedure provides instructions to radiographers and radiographer's assistants for the use of all radiographic exposure devices licensed by TSI&C.

1.2 This procedure shall be used in conjunction with the TSI&C's procedure entitled Radiation Surveys and Posting - Section 3 and the applicable procedure governing each specific radiographic exposure device.

2.0 EQUIPMENT

2.1 Only exposure devices authorized for use by TSI&C as approved and stipulated on the USNRC and/or applicable agreement state(s) radioactive material license(s) may be used.

2.2 At least one (1) calibrated and operable survey instrument must be present during radiographic activities for radiation monitoring.

3.0 QUALIFICATION OF PERSONNEL

3.1 Only personnel qualified as radiographers and radiographer's assistants shall be authorized to use radiographic exposure devices and sealed sources licensed by TSI&C.

4.0 GENERAL PROCEDURE

4.1 The radiographer and/or radiographer's assistant shall perform the following prior to engaging in radiographic operations.

4.1.1 Perform a physical surface survey of the device in the storage area and conduct the inspection as required in Procedure Section 7 and record the results on Radiography Operations Report described in Procedure Section 14.

4.1.2 Perform all the necessary radiographic setups.

4.1.3 Establish the restricted area as described in Procedure No. Section 3.

4.2 Assemble exposure device in accordance with specific operating procedure.

4.3 Prior to exposing the source, check the established restricted area to assure that no one has entered.

4.4 Expose source for radiographic exposure.

4.5 Conduct a physical radiation survey during the exposure to assure that the radiation level at the established restricted area is not in excess of 2 MR/HR as described in Procedure No. Section 3. The results of this survey shall be recorded on Radiographic Operations Report.

4.6 Maintain direct surveillance during each radiographic exposure to preclude entry into the restricted area by unauthorized personnel.

4.7 After the desired exposure time has elapsed, retract source to the stored position.

4.8 A physical radiation survey of the projector and guide tube (if applicable) shall be conducted after each radiographic exposure to assure that the source is returned to its properly shielded position.

4.9 After conducting the physical radiation survey, lock and secure the projector as stipulated in the applicable operating procedure.

4.10 At the completion of radiographic activities and when placing the device in a storage area, a final survey shall be made to determine again that the source is in its properly shielded position.

4.11 The results of the survey required in Paragraph 4.10 of the procedure shall be recorded on Radiographic Operations Report Form as described in Procedure Section 3.

SECTION 5.1 - EXPOSURE DEVICES OPERATING INSTRUCTIONS

TECHNICAL OPERATIONS MODELS 533, 660 and 920 PROJECTORS

1.0 SCOPE

1.1 This procedure shall govern the specific operation of Technical Operations Models 533, 660 or 920 Projectors.

1.2 This procedure shall be used in conjunction with the TSI&C's general procedure Section 5 entitled General Use of Radiographic Exposure Devices.

2.0 OPERATING INSTRUCTIONS

2.1 Refer to general procedure, Section 5, for instructions prior to assembly of projector for radiographic activities.

2.2 NOTE: Monitor all operations with a calibrated survey meter.

2.3 Locate projector at desired distance from specimen to be radiographed.

2.4 Remove shipping plug from the front of the projector.

2.5 Attach the guide tube to the projector position guide tube for making the radiographic exposure.

2.5.1 DO NOT SUBJECT GUIDE TUBE TO ANY SHARP BENDS WHICH WOULD RESTRICT MOVEMENT OF THE SOURCE IN GUIDE TUBE.

CAUTION

NEVER OPERATE THE SYSTEM WITH MORE THAN THREE (3) GUIDE TUBE SECTIONS (INCLUDING THE GUIDE TUBE WITH STOP). WHEN USING PIPE POSITIONER NO MORE THAN TWO (2) GUIDE TUBE SECTIONS SHALL BE USED.

2.6 Arrange the control assembly as follows:

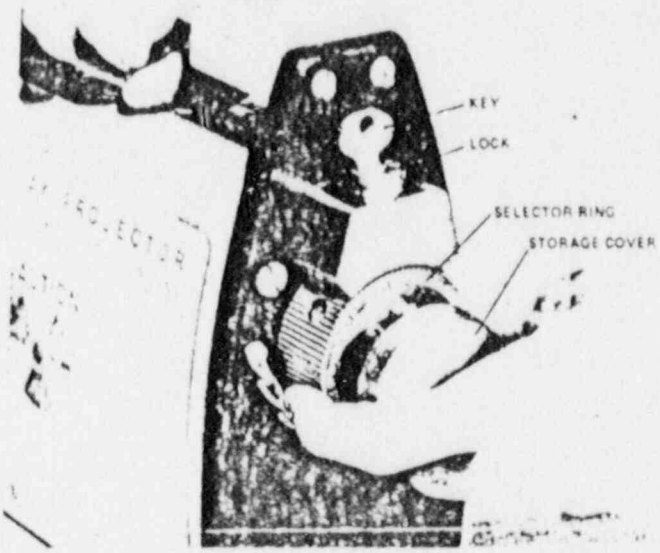
2.6.1 Determine the operating site of the control unit for maximum distance from the projector.

2.6.2 Lay out control unit as straight as possible directing the connector end to the rear of the projector.

TECHNICAL OPERATIONS MODELS 533, 660 and 920 PROJECTOR (CONT)

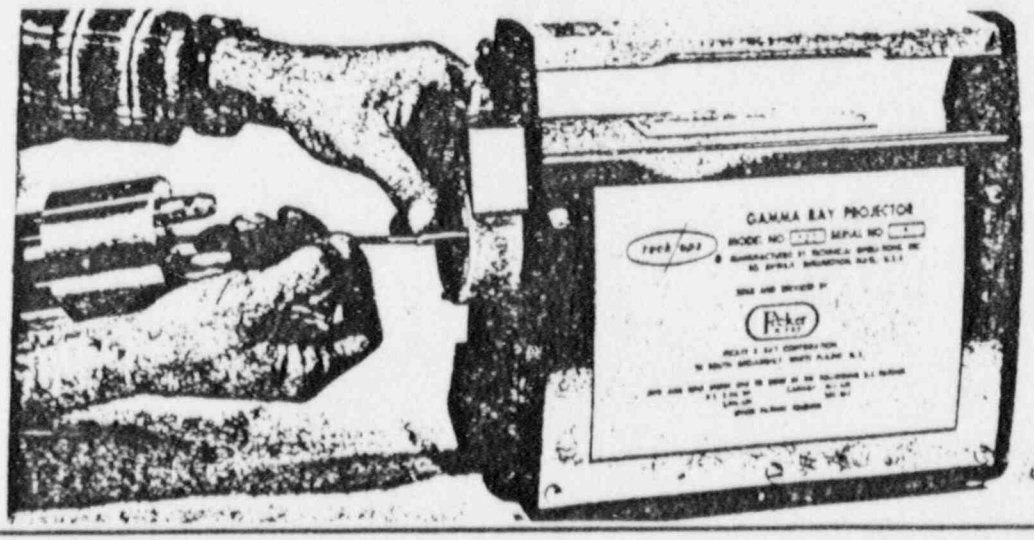
2.6.3 Do not subject control cable to any sharp bends which may restrict free movement of drive cable.

2.7 Unlock projector and rotate selector ring on control cable connector from the "LOCK" position to "CONNECT" position which will disengage the storage cover. Remove the storage cover holder.



2.8 Connection for Tech-Ops Model No 533

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

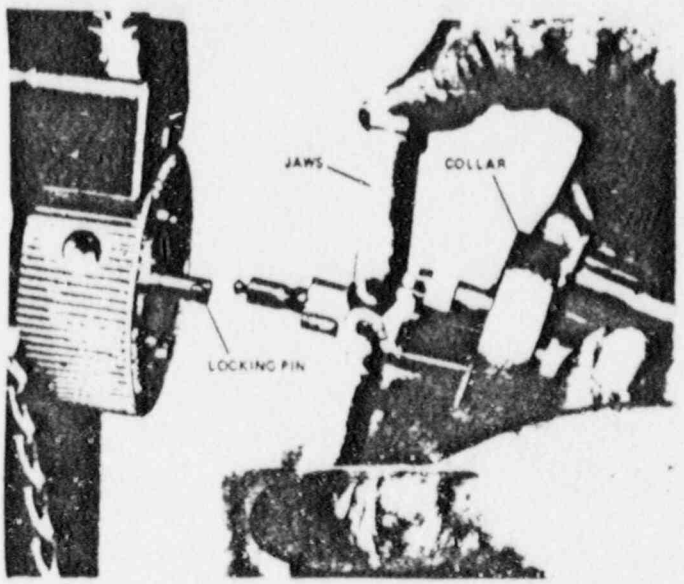


2.8.1 Insert control cable plug into projector control cable connector. Rotate selector ring from "CONNECT" position to "LOCK" position.

TECHNICAL OPERATIONS MODELS 533, 660 and 920 PROJECTOR (CONT)

2.9 Connection for Tech-Ops Model No. 660 and 920

Slide the control cable collar back and open the jaws of the control cable connector. This exposes the male portion of the swivel connector as shown.
Engage the male and female portions of the swivel connector as shown by depressing the spring-loaded locking pin toward the projector with the thumbnail. Release the locking pin and test that the connection has been properly made.
Close the jaws of the control cable connector over the swivel-type connector.



2.9.1 Rotate selector ring from "CONNECT" position to "LOCK" position.

2.10 Check the restricted area to assure that the area is clear of personnel.

2.11 Rotate the selector ring from "LOCK" position to the "OPERATE" position. Also on the Tech-Ops 920, lift the source position indicator to allow source to be released.

2.12 Rapidly, rotate the hand crank in the "EXPOSE" (counter-clockwise) direction to move the source out of the projector to the end of the guide tube stop.

2.13 Monitor operation with calibrated survey meter in accordance with general procedure RSP-5.

TECHNICAL OPERATIONS MODELS 533, 660 and 920 PROJECTOR (CONT)

2.14 After desired exposure time has elapsed, rapidly turn the hand crank in the "RETRACT" (Clockwise) direction. Continue to rotate until the source reaches the properly stored position.

2.15 After each exposure, monitor with calibrated survey meter as described in general procedure, Section 5.

2.16 At the completion of radiographic activities, disassemble projector as follows:

2.16.1 Remove the control cable plug by rotating the selector ring from the "OPERATE" position to the "CONNECT" position.

2.16.2 Disconnect the drive cable from projector in the same manner as described in Paragraph 2.8 or 2.9 for engaging.

2.16.3 Replace the storage cover in the control cable connector and rotate the selector ring from the "CONNECT" position to the "LOCK" position. Engage and lock to secure projector.

2.16.4 Remove guide tube from the source tube connector of the projector and install shipping plug.

2.17 Conduct final radiation survey and record as required in general procedures Section 5 and Section 3.

SECTION 5.2 - EXPOSURE DEVICES OPERATING INSTRUCTIONS

GAMMA PIPELINER #1

1.0 SCOPE

1.1 This procedure shall govern the specific operation of Gamma's Pipeliner #1 Exposure Device.

1.2 This procedure shall be used in conjunction with TSI&C's general procedure, Section 5, entitled General Use of Radiographic Exposure Devices.

2.0 OPERATING INSTRUCTIONS

2.1 Refer to general procedure, Section 5, for instructions prior to assembly of projector for radiographic activities.

2.2 NOTE: Monitor all operations with a calibrated survey meter.

2.3 Place jigs or fixtures to receive the pipeliner unit at the exposure area and place unit in position.

2.4 Check the restricted area to assure that the area is clear of personnel.

2.5 Unlock plunger lock.

2.6 Using remote control, turn flexible shaft clockwise 180° to expose the source. (Observe the higher readings of the survey meter.) Unit may be operated by hand, using the knurled knob as the on-off control. (See caution notes below.)

2.7 Monitor operation with calibrated survey meter in accordance with general procedure, Section 5.

2.8 After desired exposure time has elapsed, turn the remote control of knurled knob 180° counter-clockwise until position indicator and survey meter shows the source is in safe position, then lock the unit.

2.9 After each exposure monitor with calibrated survey meter as described in general procedure, Section 5.

2.10 At the completion of radiographic activities, lock unit and roll up control cable.

GAMMA PIPELINER #1 (CONT)

2.11 Conduct final radiation survey and record as required in general procedures Section 5 and Section 3.

CAUTION

NOTE 1 Operate the knob with the body turned away from the unit and the arm fully extended.

NOTE 2 Stand at the front of the unit, the knurled knob side, or the side with the indicator pin while turning the unit "on" and "off". This operation should take less than 3 seconds.

NOTE 3 Always move quickly to and from the unit.

SECTION 5.3 - EXPOSURE DEVICES OPERATING INSTRUCTIONS

GAMMA INDUSTRIES GAMMATRON 100A and 20A PROJECTOR

1.0 SCOPE

1.1 This procedure shall govern the specific operation of Gamma Industries Gammatron 100A and 20A projector.

1.2 This procedure shall be used in conjunction with TSI&C's general procedure, Section 5, entitled General Use of Radiographic Exposure Devices.

2.0 OPERATING INSTRUCTIONS

2.1 Refer to general procedure, Section 5, for instructions prior to assembly of projector for radiographic activities.

2.2 NOTE: Monitor all operations with a calibrated survey meter.

2.3 Locate projector at desired distance from specimen to be radiographed.

2.4 Remove safety plug from the front of the projector.

2.5 Attach the guide tube to the projector outlet nipple, test to insure proper connection.

2.5.1 DO NOT SUBJECT GUIDE TUBE TO ANY SHARP BENDS WHICH WOULD RESTRICT MOVEMENT OF THE SOURCE IN GUIDE TUBE.

2.6 Arrange the control assembly as follows:

2.6.1 Determine the operating site of the control unit for maximum distance from the projector.

2.6.2 Lay out control unit as straight as possible directing the connector end to the rear of the projector.

2.6.3 Do not subject control cable to any sharp bends which may restrict free movement of drive cable.

2.7 Inspect lockbox assembly for damage and misalignment.

2.8 Check the restricted area to assure that the area is clear of personnel.

GAMMA INDUSTRIES GAMMATRON 100A and 20A PROJECTOR (CONT)

2.9 Rotate key and unlock plunger. Unlock the unit by pulling back on the crank handle (counter-clockwise) which will permit the unit to be unlocked--only "A" models require that the handle be pulled back.

2.10 RAPIDLY rotate the hand crank in the "EXPOSE" (clockwise) direction to move the source out of the exposure device to the end of the guide tube stop.

2.11 Monitor operation with calibrated survey meter in accordance with General Procedure, Section 5.

2.12 After desired exposure time has elapsed, rapidly turn the hand crank in the "RETRACT" (Counter-clockwise) direction. Continue to rotate until the source reaches the properly stored position.

2.13 After each exposure, monitor with calibrated survey meter as described in general procedure, Section 5.

2.14 Turn crank back (counter-clockwise) and depress lock plunger--only "A" models require that the handle be pulled back.

2.15 At the completion of radiographic activities:

2.15.1 Roll up the control cable on the handle of the projector.

2.15.2 Remove guide tube from the outlet nipple by the use of the quick disconnect and and insert safety plug.

2.16 Conduct final radiation survey and record as required in general procedures Section 5 and Section 3.

SECTION 5.4 - EXPOSURE DEVICES OPERATING INSTRUCTIONS

GAMMA PIPELINER #201

1.0 SCOPE

1.1 This procedure shall govern the specific operation of Gamma's Pipeliner #201 Exposure Device.

1.2 This procedure shall be used in conjunction with TSI&C's general procedure, Section 5, entitled General Use of Radiographic Exposure Devices.

2.0 OPERATING INSTRUCTIONS

2.1 Refer to Section 5, for instructions prior to assembly of projector for radiographic activities.

2.2 NOTE: Monitor all operations with a calibrated survey meter.

2.3 Place jigs or fixtures to receive the pipeliner unit at the exposure area and place unit in position.

2.4 Check the restricted area to assure that the area is clear of personnel.

2.5 Remove the protective cap from the end of the handle revealing the control cable connector.

2.6 Crank the controls drive cable out to approximately twelve (12) inches and connect the controls drive cable connector to the control cable connector of the device.

2.7 Crank the control drive cable in so that the male connecting threads can be screwed into the control cable housing (handle).

2.8 Screw the swivel adaptor into the device handle.

2.9 Stretch the control cable away from the exposure area in as straight a line as possible.

2.10 Unlock the unit using the key supplied with it.

2.11 USING REMOTE CONTROL ONLY, turn the crank handle of the controls clockwise 180° to expose the source. (Observe the higher readings of the survey meter.) (See caution notes below.)

GAMMA PIPELINER #201 (Con't)

2.12 Monitor operation with calibrated survey meter in accordance with general procedure, Section 5.

2.13 After desired exposure time has elapsed, turn the remote control 180° counter-clockwise until position indicator and survey meter shows the source is in safe position, then lock the unit.

2.14 After each exposure monitor with calibrated survey meter as described in general procedure, Section 5.

2.15 At the completion of radiographic activities, lock unit, depress lock plunger, disconnect the swivel adapter and the drive cable, replace the protective cap and roll up control cable.

2.16 Conduct final radiation survey and record as required in general procedures Section 5 and Section 3.

CAUTION

NOTE 1 AFTER THE SOURCE HAS DECAYED TO 120 CURIES OR LESS, THE UNIT MAY BE OPERATED BY HAND, USING THE ON-OFF CONTROL.

NOTE 2 Operate the knob with the body turned away from the unit and the arm fully extended.

NOTE 3 WHEN OPERATING THE UNIT BY HAND, STAND AT THE FRONT OF THE UNIT OR THE KNURLED KNOB SIDE WHILE TURNING THE UNIT "ON" AND "OFF". This operation should take less than 3 seconds.

NOTE 4 Always move quickly to and from the unit.

SECTION 5.5 - EXPOSURE DEVICES OPERATING INSTRUCTIONS

J. L. SHEPPARD MODEL 28-5 OR 28-6A

1.0 SCOPE

1.1 This procedure shall govern the specific operating instruction for J. L. Sheppard Model 28-5 or 28-6A Exposure Device for calibration of survey meters.

1.2 This procedure shall be used in conjunction with TSI&C's general procedure, Section 5, entitled General Use of Radiographic Exposure Devices.

2.0 OPERATING INSTRUCTIONS

2.1 Refer to general procedure, Section 5, before assembling the exposure device for calibration activities.

2.2 Monitor all operations with a calibrated survey meter.

2.3 Zero the survey meter to be calibrated outside the RESTRICTED AREA.

2.4 Place the calibrator on a flat surface and lay out six (6) separate locations away from the calibrator exposure device using the DOSE/DISTANCE CALCULATOR or DECAY CHART and INVERSE SQUARE LAW.

2.5 These six locations should be in the proximity of:

3.0 MR/HR
8.0 MR/HR
30.0 MR/HR
80.0 MR/HR
300.0 MR/HR
800.0 MR/HR

2.5.1 Other intensity values may be used. The actual intensity values used shall be recorded on Form RR-10.

2.6 Place the uncalibrated survey meter in the 3.0 MR/HR location.

2.7 Unlock and remove the padlock on the calibrator.

J. L. SHEPPARD MODEL 28-5 OR 28-6A (Con't)

2.8 To expose the source, grasp the black operating knob (while standing behind calibrator, opposite beam port) and raise it until the spring loaded pin engages the depression on the operating shaft. Record the meter reading on the Calibration Record, Form RR-10, Section 15, Page 15.11.

2.9 Repeat step 2.8 for each of the six (6) locations.

2.10 A deviation of ±10% or less of the calculated or known value will be considered acceptable.

2.11 A meter reading within the acceptable limits will have a calibration sticker applied indicating the date of calibration, and date for recalibration (three months hence).

2.12 A deviation of more than 10%, but less than ±20%, is also acceptable provided the variations are recorded and attached directly to the meter.

2.13 Meter readings beyond the acceptable limits shall be repaired, or replaced and calibrated using the above procedure.

2.14 After the calibration activity has been completed, push the operating knob down until the pin on the shaft strikes the stop on calibrator top. Secure it with the padlock.

2.15 Survey unit to be sure source is stored properly.

2.16 Replace the calibrator to the storage area.

SECTION 5.6 - EXPOSURE DEVICES OPERATING INSTRUCTIONS

GAMMA INDUSTRIES CENTURY PROJECTOR

1.0 SCOPE

1.1 This procedure shall govern the specific operation of Gamma Industries Century exposure device.

1.2 This procedure shall be used in conjunction with TSI&C's general procedure Section 5 titled General Procedure For Use of Radiographic Exposure Devices.

2.0 OPERATING INSTRUCTION

2.1 Refer to General Procedure Section 5 for instructions prior to assembly of projector for radiographic activities.

2.2 NOTE: Monitor all operations with a calibrated survey meter.

2.3 Locate projector at desired distance from specimen to be radiographed.

2.4 Remove shipping plug from the front of the projector.

2.5 Attach the guide tube to the projector quick disconnect coupling.

2.5.1 DO NOT SUBJECT GUIDE TUBE TO ANY SHARP BENDS WHICH WOULD RESTRICT MOVEMENT OF THE SOURCE IN GUIDE TUBE.

2.6 Arrange the control assembly as follows:

2.6.1 Determine the operating site of the control unit for maximum distance from the projector.

2.6.2 Lay out control unit as straight as possible directing the connector end to the rear of the projector.

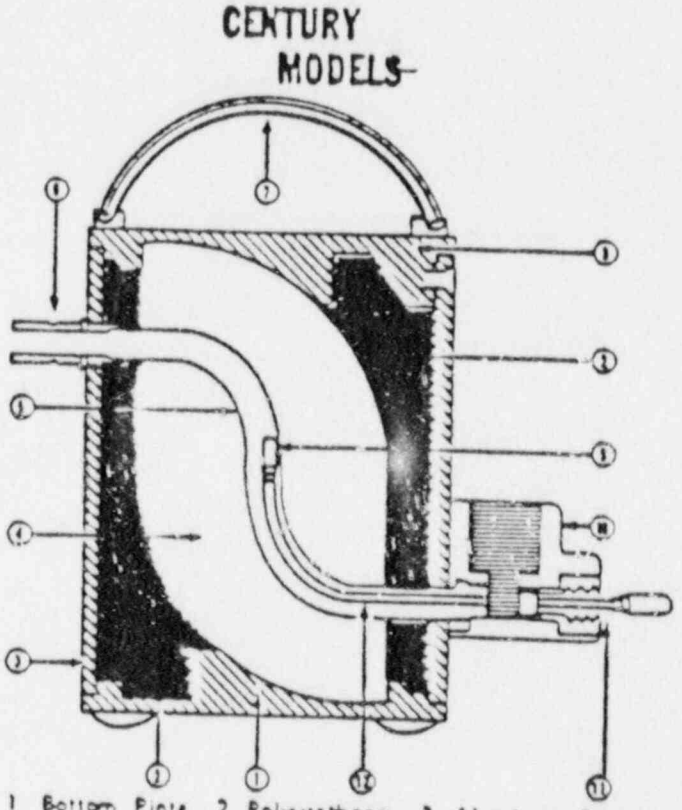
2.6.3 Do not subject control cable to any sharp bends which may restrict free movement of drive cable.

2.7 Remove the protector cap from the lock box thereby exposing the Saf-T-Key coupling.

2.8 Crank the control cable to a length of approximately 12 inches and connect control cable to the Saf-T-Key coupling.

GAMMA INDUSTRIES CENTURY PROJECTOR (Con't)

2.9 Crank control cable in so that the male connecting thread can be screwed into the lock box. Screw the control cable into the lock box.



1 Bottom Plate, 2 Polyurethane, 3 Aluminum Case, 4 Shield, 5 Zircaloy Tube, 6 Quick Disconnect Coupling, 7 Leather Handle, 8 Top Plate, 9 IR-192 Capsule, 10 Lock Box, 11 Set-T-Key Coupling, 12 Pigtail.

GAMMA INDUSTRIES CENTURY PROJECTOR (Con't)

2.10 Check restricted area to assure that the area is clear of personnel.

2.11 Unlock the key mechanism and move back to the crank handle.

2.12 Back crank the handle until the key retainer pops up then rotate the hand crank in the "exposed" direction to move the source out of the projector to the end of the guide tube stop.

2.13 Monitor operation with calibrated survey meter in accordance with General Procedure Section 5.

2.14 After desired exposure time has elapsed rapidly turn the hand crank in the "RETRACT" direction. Continue to rotate until the source reaches the properly stored position.

2.15 After each exposure monitor with calibrated survey meter as described in General Procedure Section 5.

2.16 At the completion of radiographic activities disassemble projector as follows:

2.16.1 Depress the plunger on the lock box to lock the radioactive capsule in the safe position.

2.16.2 Disconnect the drive cable from projector in the same manner as described in Paragraph 2.8 and 2.9 for engaging and replace the safety cap.

2.16.3 Remove guide tube from the projector quick disconnect coupling and install shipping plug.

2.17 Conduct final radiation survey and record as required in General Procedure Section 5 and Section Section 3.

SECTION 5.7 - EXPOSURE DEVICES OPERATING INSTRUCTIONS

TECHNICAL OPERATIONS MODEL NO. 616 PROJECTOR

1.0 SCOPE

1.1 This procedure shall govern the specific operation of TEchnical Operations Model 616 Projector.

1.2 This procedure shall be used in conjunction with the TSI&C's general procedure no. Section 5 entitles General Use of Radiographic Exposure Devices.

2.0 OPERATING INSTRUCTIONS

2.1 Refer to general procedure, SEction 5, for instructions prior to assembly of projector for radiographic activities.

2.2 NOTE: Monitor all operations with a calibrated survey meter.

2.3 Locate projector at desired distance from specimen to be radiographed and attach unit to stand.

2.4 After the projection is positioned, the flexible tube to the control should be plugged into the port on the actuator housing.

2.5 Lay out control cable as straight as possible from the unit to a place of maximum safety.

2.6 Caution all personnel immediately outside of the restricted area of the duration of the exposure and check the restricted area to assure that the area is clear of personnel.

2.7 Unlock the projector.

2.8 Set control valve to OFF.

2.9 Stroke the pump handle until the gage indicates a vacuum of 20 inches.

2.10 Initiate the exposure by putting the control valve in the ON position.

2.11 Monitor operation with calibrated survey meter in accordance with General Procedure, Section 5.

TECHNICAL OPERATIONS MODEL NO. 616 PROJECTOR (CONTINUED)

2.12 Terminate the exposure when desired by putting the control valve in the OFF position.

2.13 After each exposure, monitor with calibrated survey meter as described in General Procedure, Section 5.

2.14 Lock Projector.

2.15 Disconnect the control cable from the port on the actuator housing.

2.16 Conduct final radiation survey and record as required in General Procedures, Section 5 and Section 3.

SECTION 5.8 - EXPOSURE DEVICES OPERATING INSTRUCTIONS

TECHNICAL OPERATIONS NO. 773

1.0 SCOPE

1.1 This procedure shall govern the specific operating instruction for Technical Operations Model 773 Exposure Device for calibration of survey meters.

1.2 This procedure shall be used in conjunction with TSI&C's general procedure, Section 5, entitles General Use of Radiographic Exposure Devices.

2.0 OPERATING INSTRUCTIONS

2.1 Refer to general procedure, Section 5, before assembling the exposure device for calibration activities.

2.2 Monitor all operations with a calibrated survey meter.

2.3 Zero the survey meter to be calibrated outside the RESTRICTED AREA.

2.4 Place the T/O 773 on a flat surface and lay out six (6) separate locations away from the T/O 773 exposure device using the DOSE/DISTANCE CALCULATOR or DECAY CHART and INVERSE SQUARE LAW.

2.5 These six locations should be in the proximity of:

3.0 MR/HR
8.0 MR/HR
30.0 MR/HR
80.0 MR/HR
300.0 MR/HR
800.0 MR/HR

2.6 Place the uncalibrated survey meter in the 3.0 MR/HR location.

2.7 Unlock the handle of the Model 773. Remove the shipping plate and all the attenuators from the radiation beam.

TECHNICAL OPERATIONS MODEL NO. 773 (CONTINUED)

2.8 Standing away from the radiation beam, expose the source by manually raising the source rod. CAUTION: Do not enter the area of the radiation beam while the source is exposed. The radiation level at the source rod when the source is in the "operate" position is approximately 50 mr/hr. Movement of the source rod should be accomplished as expediously as practicable.

2.9 Place and remove the attenuators as needed for calibration, checking and recording two points on each range on the Calibration Record, Form RR-10, Section 15, Page 15.11.

2.10 A deviation of 10% or less of the meter range will be considered acceptable. For each scale the maximum deviation will be:

SCALE	DEVIATION
x 1	1 MR/HR
x 10	10 MR/HR
x 100	100 MR/HR

2.11 A meter reading within the acceptable limits will have a calibration sticker applied indicating the date of calibration, and date for recalibration (three months hence).

2.12 A deviation of more than 10%, but less than 20%, is also acceptable provided the variations are recorded and attached directly to the meter.

2.13 Meter readings beyond the acceptable limits shall be repaired, or replaced and calibrated using the above procedure.

2.14 After the calibration activity has been completed, replace attenuators, shipping plate and lock the projector.

2.15 Survey unit thoroughly to be sure source is stored properly.

2.16 Replace the T/O 773 to the storage area.

SECTION 6 - LOCKING AND SECURING RADIOGRAPHIC EQUIPMENT

1.0 SCOPE

1.1 This procedure shall govern the methods of locking and securing radiographic exposure devices, storage containers and sealed sources used by TSI&C.

1.2 This procedure conforms to the requirements of USNRC Title 10CFR Parts 34.22 and 34.23 and any applicable licensed agreement state regulations.

2.0 CONTROL

2.1 Each radiographic exposure device used by TSI&C shall be provided with a lock to prevent unauthorized or accidental removal or exposure of a sealed source and shall be kept locked at all times except when under the direct surveillance of a radiographer or radiographer's assistant.

2.2 Radiographic exposure devices and storage containers located in the plant or at field sites shall be stored in a designated storage area and sufficient means shall be used to limit access to this area to AUTHORIZED PERSONNEL.

3.0 SECURING STORAGE CONTAINERS

3.1 In a mobile laboratory, plant or at a construction site, storage containers housing radiographic exposure devices shall be sufficiently attached and/or secured so as to preclude unauthorized and/or accidental removal.

4.0 TEMPORARY FIELD CONSTRUCTION SITES

4.1 All Field construction site shall have either a company tool storage building, an office trailer or a trailer used to store radiographic devices.

4.2 Each exposure device is kept locked at all times when not in use and is stored in either a shipping barrel or a specially constructed steel box which is also padlocked.

4.3 The storage building or trailer used to store radiographic devices is also padlocked at the end of the work day.

4.4 After the projector has been placed in the area designated for storage, another survey is required at the surface of the storage building or mobile lab, which also must be posted "CAUTION: RADIOACTIVE MATERIAL". This survey must indicate 2 MR or less. Records of this survey must be recorded on Radiographic Operations Report - Form RR2.

SECTION 7 - INSPECTION/MAINTENANCE OF RADIOGRAPHIC EQUIPMENT

1.0 SCOPE

1.1 This procedure shall establish guidelines for inspection and maintaining radiographic exposure devices under TSI&C's Radioactive Material USNRC and/or Agreement State Licenses.

1.2 This procedure shall be used in conjunction with the TSI&C's procedures entitled Radiation Survey and Posting, Section 3 and General Use of Radiation Survey Instruments, Section 4.

2.0 GENERAL

2.1 If any portion of an inspection or maintenance check reveals defective equipment, this equipment must be repaired and/or replaced before its return to service.

3.0 PROJECTOR INSPECTION AND MAINTENANCE

3.1 The following items will be checked by the radiographer to whom the projector has been assigned prior to use during a work shift:

3.1.1 INSPECT CABLE FOR CUTS, BREAKS AND BROKEN FITTINGS.

3.1.2 INSPECT SOURCE TUBES FOR CUTS, CRUSHING AND BROKEN FITTINGS. SUPERFICIAL CUTS ON CABLE COVERING SHOULD BE TAPED.

3.1.3 SURVEY PROJECTOR FOR EXCESSIVE RADIATION LEVELS.

3.1.4 INSPECT SHIELD FOR DAMAGE TO FITTINGS, LOCK FASTENERS AND LABELS.

3.1.5 INSPECT CRANK FOR DAMAGE AND LOOSE HARDWARE.

3.1.6 CHECK OPERATION OF CABLE CONNECTION.

3.1.7 CHECK OPERATION OF CONTROL FOR FREEDOM OF SOURCE MOVEMENT.

3.2 The Radiation Safety Supervisor or a qualified radiographer designated by the Radiation Safety Supervisor, shall be responsible for inspection and maintaining the radiographic exposure devices at intervals not to exceed three (3) months, in accordance with the following:

3.2.1 Control Assembly

Remove the drive cable from the control assembly by cranking control in "EXPOSURE" direction. Examine cable for kinks, fraying, broken wires or rust. Minor bends in the cable may be straightened out 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. Heavy rust that has penetrated into the cable will cause unsatisfactory operation or complete failure. Replace cable.

Clean the cable by immersing the coil in solvent. A heavy accumulation of dirt laden lubricant may require more than one (1) washing.

Examine the connector. Use the Tech-Ops Model 550 Connector Gage to check for wear. Replace if connector fails at any gaged dimension. If connector is satisfactory, examine cable attachment to connector for straightness and evidence of looseness. A loose attachment or bend at this point mandates replacement.

Lubricate the cable with Texaco "UNITEMP" 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.

3.2.2 Control Crank

Inspect control cable housing for excessive wear. Check crank unit for excessive wear. Clean inside of housing and gear assembly by syringing a few ounces of solvent into housing and blowing out with low pressure air (not more then 20 psi). Check for excessive wear of the housing, crank unit or internal galling, which would indicate the need for replacement of the control crank unit.

Lubricate internal gear housing with "UNITEMP" grease.

3.2.3 Control Cable Housings

Examine carefully for internal damage by flexing the housings by hand. Internal damage to the reinforcing braid or flexible metallic tube will be evidenced by a crunch 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. Clean housings by syringing a few ounces of solvent into bore and blowing out with a low pressure air, (Not more than 20 psi.) Do not allow solvent to remain. Do not soak in solvent. Check end fittings for secure attachment.

3.2.4 Source Guide Tubes

Check for cuts, burns or crushed tubes. Check fittings for secure attachment. Examine and test screw threads for function. Clean bore of tube with water or solvent and drain out promptly. Do not soak in solvent.

3.2.5 Shield Assembly

Check exterior for loose or missing hardware. Replace or tighten as required. Examine source exit fitting. Examine the source function selector lock assembly in rear of projector for proper operation.

Examine the shield assembly for complete labels and warning symbol. Replace obliterated or illegible marking.

3.2.6 Final Inspection

Reassemble system, connect control cables and source guide tubes to shield. Operate machine several times to be sure of proper functioning. Check operation of the source position indicator system, if applicable.

Conduct a physical radiation survey to insure that radiation levels do not exceed the following:

3.2.6.1 AT ONE METER (39 inches) NOT MORE THAN 10 MR/Hr.

3.2.6.2 AT THE SURFACE NOT MORE THAN 200 MR/Hr. (EXCLUDING THE PIPELINER). (EQUIPMENT WHOSE SURFACE IS 4 INCHES OR GREATER FROM THE SOURCE).

3.2.6.3 FOR THE PIPELINER ONLY: AT SIX INCHES FROM THE SURFACE 50 MR/Hr. MAXIMUM, (EQUIPMENT WHOSE SURFACE IS LESS THAN 4 INCHES FROM THE SOURCE).

3.2.7 If the inspection reveals no discrepancies, an inspection and maintenance label (see Section 15, Page 15.5) shall be signed and dated by the person performing this inspection and securely attached to the projector. In addition, a record of this inspection shall be maintained by the TSI&C RSO.

3.2.7.1 A copy of the Completed inspection label shall be sent to the Radiation Safety Officer as record of inspection.

SECTION 8 - EXCHANGING SEALED SOURCES PROCEDURE

1.0 SCOPE

1.1 This procedure shall govern the exchange of sealed sources by TSI&C's radiographers.

1.2 This procedure shall be used in conjunction with the TSI&C's procedure entitled Radiation Surveys and Posting, Section 3 and the specific procedure governing the operation of the applicable source changer.

2.0 EQUIPMENT

2.1 Only source changers authorized for use by TSI&C as approved and shown on the USNRC and/or applicable Agreement State(s) License(s) may be used.

3.0 QUALIFICATION OF RADIOGRAPHERS TO PERFORM SOURCE CHANGES

3.1 Only qualified radiographers, who have been instructed in the operation of source changers and have demonstrated satisfactory performance of a source exchange to the cognizant Assistant Radiation Safety Officer and/or Radiation Safety Supervisor, as evidenced by documentation on TSI&C's Source Change Certification (See Section 15, Page 15.6), may conduct such source exchanges.

4.0 LEAK TEST

4.1 No sealed source will be put into a projector without evidence of a currently valid leak test. New sources show evidence of a leak test on the source decay curve. Sources that are more than six (6) months old will show evidence of the leak test on a Leak Test Record supplied by the organization who evaluates the Leak Test. Also complete Source Transfer Record, RR-7 (See Section 15, Page 15.7).

5.0 SURVEY METER

5.1 A calibrated and operable survey meter must be used during all source exchanges.

SECTION 8.1 - T/O MODEL NO. 650 SOURCE CHANGER INSTRUCTIONS

1.0 SCOPE

1.1 This procedure shall govern the operation of the Technical Operations (T/O) Model No. 650 Source Changer.

1.2 This procedure shall be used in conjunction with the TSI&C's procedure entitled General Procedure for Exchanging Sealed Sources Procedure, Section 8.

2.0 DESCRIPTION

2.1 The T/O Model No. 650 Source Changer has a capacity of containing two (2) sources, each one up to 100 curies of Iridium 192.

2.2 The T/O Model No. 650 is a DOT type "B" approved container for shipping.

3.0 INSTRUCTIONS FOR USE

3.1 POSITION THE PROJECTOR AND SOURCE CHANGER IN AN AREA WHERE THE SOURCE CAN BE EXPOSED.

3.2 PLACE THE PROJECTOR AND SOURCE CHANGER IN A RELATIONSHIP TO MINIMIZE ANY BENDS IN THE SOURCE GUIDE TUBE AND CONTROL CABLE. USE A SEVEN (7) FOOT SECTION OF GUIDE TUBE.

3.3 SET PROJECTOR AS FOR AN EXPOSURE AND OPEN SOURCE CHANGER. (TO REMOVE COVER, BREAK SEAL AND UNBOLT. TO REMOVE SOURCE, HOLD DOWN CAP, BREAK SEAL AND UNBOLT.)

Note: When cap is removed, the source connection is exposed and special care must be taken to prevent dislodging a source when handling the changer in this condition.

3.4 CONNECT SOURCE GUIDE TUBE FROM PROJECTOR TO THE FITTING ABOVE THE EMPTY CHAMBER, AVOIDING ANY SHARP BENDS.

3.5 CLOSE AND LATCH THE SOURCE GUIDES.

3.6 WHILE MONITORING THE RADIATION SURVEY METER, CRANK THE SOURCE INTO THE SOURCE CHANGER. INSURE THAT THE SOURCE COMPLETELY TRANSFERRED FROM THE PROJECTOR TO THE CHANGER.

3.7 MAKE A RADIATION SURVEY OF THE CHANGER TO ASSURE THAT THE SURFACE READING IS LESS THAN 200 MR/HR.

3.8 OPEN SOURCE GUIDES AND DISCONNECT CABLE FROM SOURCE ASSEMBLY. (DISCONNECTION IS ACCOMPLISHED IN THE SAME MANNER AS DISCONNECTING THE DRIVE CONTROL FROM THE PROJECTOR.)

3.9 DISCONNECT THE GUIDE TUBE FROM THE CHANGER.

3.10 CONNECT THE GUIDE TUBE TO THE CHAMBER CONTAINING THE NEW SOURCE.

3.11 CRANK THE DRIVE CABLE UNTIL THE CONNECTOR BUTTS THE SOURCE CONNECTOR.

3.12 CONNECT THE DRIVE CABLE TO THE NEW SOURCE. CHECK SOURCE CONNECTOR FOR PROPER FIT WITH DRIVE CABLE. WARNING: DO NOT MOVE SOURCE MORE THAN ½" FROM ITS STORED POSITION!

3.13 CLOSE AND LATCH THE SOURCE GUIDES.

3.14 WHILE MONITORING THE RADIATION SURVEY METER, CRANK SOURCE TO FULL RETRACTION WITHIN PROJECTOR.

3.15 MAKE A RADIATION SURVEY OF THE PROJECTOR TO ASSURE THAT THE SURFACE READING IS LESS THAN 200 MR/HR.

3.16 DISCONNECT THE SOURCE GUIDE TUBE FROM THE CHANGER.

3.17 AFFIX NEW SOURCE IDENTIFICATION (ID) TO PROJECTOR AND OLD SOURCE ID TO SOURCE CHANGER HOLD DOWN CAP.

3.18 BOLT HOLD DOWN CAP IN PLACE AND SEAL WITH MATERIAL PROVIDED.

3.19 INSERT LEAK TEST EVIDENCE AND OLD SOURCE DECAY CHART ALONG WITH A COPY OF THE SOURCE CHANGER INSTRUCTIONS IN THE CHANGER COVER, BOLT COVER IN PLACE AND SEAL WITH THE MATERIAL PROVIDED.

3.20 LABEL WITH APPROPRIATE "RADIOACTIVE YELLOW LABEL" AS REQUIRED IN SECTION 9 IN PREPARATION FOR SHIPMENT.

SECTION 8.2 - GAMMA INDUSTRIES MODEL NO. C-10 INSTRUCTIONS

1.0 SCOPE

1.1 This procedure shall govern the operation of the Gamma Industry Model No. C-10 Source Changer.

1.2 This procedure shall be used in conjunction with the TSI&C's procedure entitled Exchanging Sealed Sources Procedure, Section 8.

2.0 DESCRIPTION

2.1 The C-10 Source Changer has a capacity of containing up to 200 curies of Iridium 192.

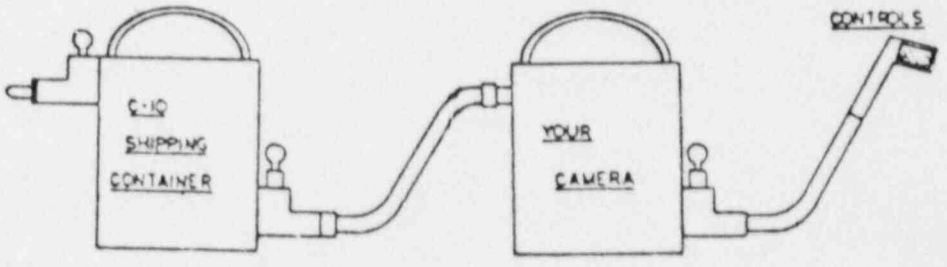
2.2 The C-10 is shipped in a container that is a DOT Type "B" approved container for shipping.

3.0 INSTRUCTIONS FOR USE

3.1 SURVEY THE C-10 SHIPPING CONTAINER WITH METER. THE RADIATION INTENSITY SHOULD NOT EXCEED 10 MR/HR AT 39 INCHES FROM ANY SURFACE OF THE C-10.

3.2 OPEN THE LOWER LOCK OF THE C-10 SHIPPING CONTAINER. REMOVE THE SAFETY PLUG.

3.3 CONNECT ONE END OF SHORT EXCHANGE TUBE (PROVIDED IN THE SHIPPING BARREL) TO THE LOWER LOCKBOX OF THE C-10 SHIPPING CONTAINER. ATTACH THE OTHER END OF THE SHORT EXCHANGE TUBE TO YOUR CAMERA.



3.4 CRANK YOUR OLD SOURCE INTO THE C-10 SHIPPING CONTAINER UNTIL IT REACHES A DEFINITE STOP.

3.5 SURVEY TO ASSURE THAT THE OLD SOURCE HAS REACHED A SAFE POSITION.

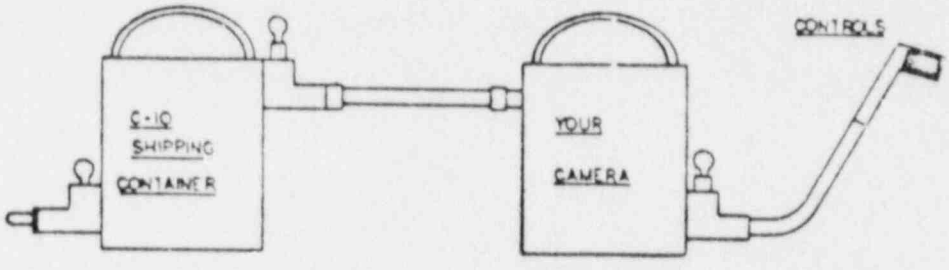
3.6 LOCK THE LOWER LOCK OF THE C-10 SHIPPING CONTAINER ONTO THE OLD PIGTAIL LOCKING BALL. YOU MUST BE AWARE THAT THE SOURCE COULD BE REMOVED FROM THE OPEN END OF THE LOCKBOX IF THE LOWER LOCK IS NOT LOCKED.

3.7 REMOVE THE SHORT EXCHANGE TUBE FROM THE C-10 SHIPPING CONTAINER. DISCONNECT THE CONTROL CABLE FROM THE OLD PIGTAIL. (ATTEMPT TO MOVE THE PIGTAIL INTO AND OUT OF THE C-10 SHIPPING CONTAINER TO ASSURE THE LOCK IS DEPRESSED UPON THE PIGTAIL LOCKING BALL. IF THE PIGTAIL CAN BE MOVED, THEN OPEN THE LOWER LOCK, CAREFULLY MOVE THE PIGTAIL, AND LOCK THE LOCK UPON THE PIGTAIL LOCKING BALL. THIS WILL ASSURE THAT THE OLD SOURCE WILL REMAIN PROPERLY LOCKED AND SHIELDED DURING THE RETURN SHIPMENT.

3.8 REMOVE THE SOURCE PROTECTOR CAP FROM THE UPPER LOCKBOX AND ATTACH THE SOURCE PROTECTOR CAP OVER THE OLD SOURCE PIGTAIL IN THE LOWER LOCKBOX.

3.9 ATTACH THE CONTROL CABLE TO THE NEW PIGTAIL WHICH IS IN THE UPPER LOCKBOX.

3.10 ATTACH SHORT EXCHANGE TUBE TO THE C-10 SHIPPING CONTAINER UPPER LOCKBOX.



3.11 UNLOCK THE UPPER LOCK FROM THE NEW SOURCE.

3.12 STANDING AS FAR AWAY AS POSSIBLE, CRANK THE NEW SOURCE FROM THE C-10 SHIPPING CONTAINER INTO YOUR CAMERA.

3.13 SURVEY.

3.14 LOCK YOUR CAMERA LOCK.

3.15 REMOVE THE SHORT EXCHANGE TUBE FROM YOUR CAMERA. REMOVE THE SHORT EXCHANGE TUBE FROM THE C-10 SHIPPING CONTAINER.

3.16 INSERT THE SAFETY PLUG INTO THE UPPER TUBE OF THE C-10 SHIPPING CONTAINER. LOCK THE UPPER LOCK OF THE C-10 SHIPPING CONTAINER.

3.17 SURVEY.

3.18 PLACE THE C-10 INTO THE BARREL IN THE SAME ORIENTATION WHICH IT WAS RECEIVED. PLACE THE SHORT EXCHANGE TUBE INTO THE BARREL. PLACE THE TOP ON THE BARREL AND SECURE WITH THE LOCKING RING.

3.19 INSERT A SAFETY SEAL INTO THE BARREL LOCKING RING.

3.20 SURVEY. (THE RADIATION INTENSITY SHOULD NOT EXCEED 200 MR/HR AT ANY BARREL SURFACE OR 10 MR/HR AT 39 INCHES FROM ANY BARREL SURFACE).

SECTION 8.3 - GAMMA INDUSTRIES MODEL NO. C-8 INSTRUCTIONS

1.0 SCOPE

1.1 This procedure shall govern the operation of the Gamma Industry Model No. C-8 Source Changer.

1.2 This procedure shall be used in conjunction with the TSI&C's procedure entitled General Procedure For Exchanging Sealed Sources Procedure, Section 8.

2.0 DESCRIPTION

2.1 The C-8 Source Changer has a capacity of containing up to 100 curies of Cobalt 60.

2.2 The C-8 is a DOT Type "B" approved container for shipping.

3.0 INSTRUCTIONS FOR USE

3.1 SURVEY THE C-8 CHANGER WITH METER. (SURFACE READING SHOULD NOT EXCEED 200 MR/HR AND 10 MR/HR AT 39 INCHES FROM THE SURFACE).

3.2 UNLOCK THE PLUNGER TYPE LOCK ON OLD SOURCE SIDE OF THE CHANGER AND REMOVE THE SAFETY PLUG.

3.3 CONNECT THE SHORT SOURCE EXCHANGE TUBE TO THE EMPTY LOCKBOX OF THE C-8. CONNECT THE OTHER END OF THE SOURCE EXCHANGE TUBE TO THE GAMMATRON OUTLET NIPPLE.

3.4 CONNECT THE CONTROL DRIVE CABLE TO THE OLD SOURCE IN YOUR GAMMATRON.

3.5 RELEASE THE LOCK TUMBLER FROM THE SOURCE ASSEMBLY.

3.6 CRANK THE OLD SOURCE FROM YOUR CAMERA INTO THE SOURCE CHANGER UNTIL IT STOPS, WHILE STANDING AT LONGEST POSSIBLE DISTANCE FROM THE GAMMATRON.

3.7 SURVEY THE C-8 CHANGER TO BE SURE THAT THE SOURCE HAS REACHED A SAFE POSITION.

3.8 DEPRESS THE LOCK PLUNGER. CHECK TO ASSURE THAT THE LOCK PLUNGER HAS ENGAGED THE LOCKING BALL AND THAT THE SOURCE CANNOT MOVE IN EITHER DIRECTION BY GENTLY CRANKING IN BOTH DIRECTIONS. DETACH THE SOURCE EXCHANGE TUBE AND PULL AWAY FROM THE SOURCE CHANGER SLOWLY, WHILE CRANKING FORWARD THE ADDITIONAL DRIVE CABLE FOR CLEARANCE. CONTINUE TO MONITOR WITH THE SURVEY METER TO BE CERTAIN THAT THE SOURCE IS LOCKED IN THE SAFE POSITION. THE OLD SOURCE CABLE AND SAF-T-KEY CONNECTORS SHOULD COME INTO VIEW AT THIS POINT.

3.9 RECHECK POSITION OF THE SOURCE LOCKING BALL TO ASCERTAIN THAT THE BALL IS DIRECTLY UNDER THE LOCK PLUNGER AND THAT THE SOURCE CANNOT MOVE IN EITHER DIRECTION. DISCONNECT THE CONTROL CABLE FROM THE SOURCE PIGTAIL.

3.10 AT THIS POINT, ATTACH THE SAFETY CAP INTO THE OLD SOURCE LOCKBOX TO PROTECT THE SOURCE ASSEMBLY AND FURTHER CONTAIN IT FROM REMOVAL IF THE LOCK TUMBLER WERE RELEASED.

3.11 MOVE THE GAMMATRON TO NEW SOURCE END OF THE C-8 CHANGER.

3.12 REMOVE THE SAFETY CAP FROM THE LOCKBOX MARKED NEW SOURCE.

3.13 CONNECT THE CONTROL DRIVE CABLE TO THE NEW SOURCE AND SCREW THE SOURCE EXCHANGE TUBE INTO THE LOCKBOX.

3.14 UNLOCK THE NEW SOURCE LOCK TUMBLER.

3.15 STAND AS FAR AWAY AS POSSIBLE AND DRAW THE NEW SOURCE INTO THE GAMMATRON UNTIL IT COMES TO THE SAFE POSITION.

3.16 SURVEY THE LOCKED NEW SOURCE IN THE GAMMATRON.

3.17 DISCONNECT THE CONTROL CABLE FROM THE SOURCE AND GAMMATRON.

3.18 REMOVE THE SOURCE EXCHANGE TUBE FROM THE GAMMATRON AND C-8 SOURCE CHANGER.

3.19 SCREW THE SAFETY PLUG INTO THE C-8 SOURCE CHANGER LOCKBOX MARKED NEW SOURCE AND LOCK.

3.20 SURVEY THE SOURCE CHANGER TO BE SURE THAT THE SURFACE RADIATION DOES NOT EXCEED 200 MR/HR, or 10 MR/HR AT 39 INCHES FROM THE SURFACE.

SECTION 9 - TRANSPORTATION OF RADIOACTIVE MATERIAL

1.0 SCOPE

1.1 This procedure describes the shipping paper, packaging, marking, labeling and placarding requirements for Transportation of Radioactive Material via TSI&C's vehicle and common carrier.

1.2 This procedure conforms to the requirements of USNRC Title 10 CFR Part 71 and the Department of Transportation, Title 49 Parts 171 to 177.

1.3 This procedure shall be used in conjunction with TSI&C's procedures entitled Radiation Surveys and Posting, Section 3 and General Use of Radiation Survey Instruments, Section 4.

2.0 PACKAGING

2.1 Projectors and source changers shall be packaged as described below:

PACKAGING REQUIREMENTS

Exposure Device (ED) or Source Changer (SC)	Maximum Activity And Source Type	Minimum Type of Over-Pack or Container
Gamma Ind. Pipeliner #1 (ED)	100 curies, IR-192	Barrel 821-1005-006
T/O 650 (SC)	200 curies, IR-192 (two 100 curie sources)	None required
T/O 533 (ED)	100 curies, IR-192	715 Shipping Barrel
Gamma Ind. C-10 (SC)	200 curies, IR-192	Shipping Barrel
Gamma Ind. C-8 (SC)	100 curies, CO-60	None required
T/O 660 (ED)	100 curies, IR-192	None required
Gammatron 20A (ED)	20 curies, CO-60	None required
T/O 616 (ED)	200 curies, IR-192	715 Shipping Barrel
T/O 773 (ED)	.16 curies, CS-137	None Required

Exposure Device (ED) or Source Changer (SC)	Maximum Activity And Source Type	Minimum Type of Over-Pack or Container
(Gamma Ind) Century (ED)	100 curies, IR-192	Shipping Barrel
Gamma Ind. Pipeliner #201 (ED)	200 curies, IR-192	Shipping Barrel
Gammatron #100A (ED)	100 curies, CO-60	None Required
J. L. Sheppard Calibrator 28-5	.12 curies, CS-137	None Required
J. L. Sheppard Calibrator 28-6A	1.2 curies, CS-137	None Required

2.2 When shipping a source changer or exposure device containing a source, assure that the source is in the properly stored position.

2.3 The exposure device or source changer shall be prepared for shipment as follows:

2.3.1 Exposure Device - Assure that the shipping plug is securely in place and sealed and the device is locked.

2.3.2 Source Changer - Assure that the source hold down and cover are properly bolted on and sealed.

3.0 MARKING

3.1 Each package of radioactive material prepared for transport shall contain the following information marked on the exterior surface of the package.

3.1.1 Proper Shipping Name

Source Changer or Package Containing Exposure Device	Proper Shipping Name/ Identification Number
A) Containing source	Radioactive Material Special Form N.O.S.; UN2974
B) Empty (except lead shielded devices)	Mfg'd. from natural or depleted uranium; UN2909

3.1.2 The name and address of TSI&C.

3.1.3 The USNRC Compliance Number or Type of Package. (See Section 15, Page 15.7.)

4.0 LABELING

4.1 Survey the package to determine the proper shipping label as described in the following:

Maximum Radiation Level at Surface & 39 Inches From Surface of Package	Required Label
A) Radiation level not exceeding 0.5 MR/HR at surface.	RADIOACTIVE WHITE I (see attachment #1, Figure A)
B) (1) Radiation level greater than 0.5 MR/HR at the surface and (2) not greater than 1.0 MR/HR at 39 inches.	*RADIOACTIVE YELLOW II (see attachment #1, Figure B)
C) (1) Radiation level greater than 50 MR/HR, but not exceeding 200 MR/HR at the surface and (2) greater than 1.0 MR/HR but not greater than 10 MR/HR at 39 inches.	*RADIOACTIVE YELLOW III (See attachment #1, Figure C)

*NOTE: The transport index is the highest radiation level in millirem per hour at 39 inches from any accessible external surface of the package. This number shall be expressed in the next highest tenth and written in the transport index box on the RADIOACTIVE YELLOW II and III LABELS, (e.g., 1.01 millirem, 1.1 millirem. Enter 1.1 in transport index).

4.2 Complete two (2) appropriate labels indicating the contents, Iridium 192, Cobalt 60 and the number of curies. For RADIOACTIVE II and III labels, record the transport index in the box (See Note above). The label shall be attached to opposite sides of the package, one being placed near the shipping label.

4.3 Empty exposure devices or source changers do not require labeling, if the following conditions exist:

4.3.1 THE RADIATION LEVEL AT THE SURFACE IS LESS THEN 0.5 MR/HR.

4.3.2 THERE IS NO MEASURABLE RADIATION LEVEL AT 39 INCHES FROM THE SURFACE.

4.3.3 IF THE ABOVE CONDITIONS EXISTS, THE PACKAGE LABEL SHALL BE BLANK OR AN EMPTY LABEL AND THE FOLLOWING STATEMENT SHALL BE ATTACHED TO THE PACKAGE:

"THIS PACKAGE CONFORMS TO THE CONDITIONS AND LIMITATIONS SPECIFIED IN 49CFR 173.424 FOR EXCEPTED RADIOACTIVE MATERIALS, ARTICLES MANUFACTURED FROM DEPLETED URANIUM; UN2909."

5.0 SHIPPING PAPERS

5.1 Shipments via commercial carrier:

5.1.1 A separate bill of lading or air bill shall be completed for EACH PACKAGE of radioactive material. The bill shall be marked in the Hazardous Material (HM) column.

5.1.2 The proper shipping name as described below shall be entered on the bill of lading or air bill for each package.

Package Containing Exposure Device or Source Changer (including an empty device)	Proper Shipping Name/ Identification Number
A) Containing Source	RADIOACTIVE MATERIAL, Special Form, N.O.S.; UN2974
B) Empty Device	RADIOACTIVE MATERIAL, Mfg'd. from natural or depleted uranium; UN2909

5.1.3 The bill of lading or air bill shall contain two (2) copies of Source Transfer Records described in Paragraph 6.

5.2 These requirements shall be followed even if the device is empty.

6.0 SHIPPING/SOURCE TRANSFER RECORD

6.1 As a minimum, four (4) copies of the Source Transfer Record shown in Section 15, Page 15.7 shall be completed for each package of radioactive material. Distribution shall be as follows:

6.1.1 Two (2) copies shall be attached to the bill of lading or air bill.

6.1.2 One (1) copy forwarded to the Radiation Safety Officer.

6.1.3 A copy is to be placed in the shipping container.

6.2 The Source Transfer Record shall be certified in accordance with 49CFR 172.204.

7.0 TRANSPORTING RADIOISOTOPES VIA TSI&C's AUTHORIZED VEHICLE

7.1 Three (3) copies of the Source Transfer Record shown in Section 15, Page 15.7 shall be completed for each package of radioactive material. One copy is to be placed in the container, one in driver's compartment near the driver and one to be forwarded to the Radiation Safety Officer.

7.2 On completion of temporary assignments, the Source Transfer Record, indicating the permanent transfer of the sealed source, shall be completed and distributed. When radiographers are moving from jobsite to jobsite on a daily/weekly basis, TSI&C will use Radioactive Material Transportation Record instead of the Source Transfer Record.

7.3 The radioactive device shall be either blocked, braced or strapped to prevent shifting within the vehicle during transport.

7.4 The requirements of Paragraphs 1.0, 2.0 3.0 and 4.0 shall apply with additional requirements as follows:

7.4.1 A calibrated, operable survey meter shall be located in the vehicle near the driver.

7.4.2 A radiation survey shall be conducted to insure that the radiation level at the external surface of the vehicle and at the driver's seat is 2 MR/HR or less.

7.4.3 Each vehicle, while transporting a radio-isotope requiring a RADIOACTIVE YELLOW III Label, (See Attachment No. 1, Figure C), shall display on the front, back and both sides of the vehicle, placards displaying the word "RADIOACTIVE"; (see Attachment 4).

7.4.3.1 These PLACARDS shall be removed or covered when the vehicle does not contain the article for which such marking is required (D.O.T. 49, Part 177.823, a).

7.4.4 Each vehicle requiring placards as specified in Paragraph 7.4.3 above, shall have posted in a conspicuous place as shown in Attachment No. 2 notifying authorities who to contact in the event of an accident.

8.0 SHIPMENT BY CARGO AIRCRAFT

8.1 In addition the the requirements of Paragraphs 1.0 through 6.0, the following requirements shall also apply for shipment of radioactive material via cargo aircraft.

8.1.1 The package shall have a "CARGO AIRCRAFT ONLY" label as shown on Attachment #3 affixed to the exterior surface.

ATTACHMENT NUMBER 1

FIGURE A

FIGURE B

FIGURE C

ATTACHMENT NUMBER 2

NOTICE

In case of an accident involving this vehicle

IMMEDIATELY NOTIFY

TRI STATE INSPECTION AND CONSULTANTS
115 Island Avenue
McKees Rocks, PA 15136
412/771-0262

NIGHTS
SUNDAYS CALL:
HOLIDAYS

Alfred J. Mueller
76 Crescent Boulevard Extension
Coraopolis, PA 15108
412/457-7565

Michael J. Stiger
Ridge Road Extension
Baden, PA 15009
412/869-1492

ATTACHMENT NUMBER 3

DANGER!

DO NOT LOAD ON PASSENGER AIRCRAFT

ATTACHMENT NUMBER 4

VEHICLE PLACARD

SECTION 10 - RECEIPT OF RADIOACTIVE MATERIAL PACKAGES

1.0 SCOPE

1.1 This procedure shall establish guidelines for receiving and opening packages containing radioactive materials.

1.2 This procedure conforms to the requirements of Title 10 CFR Part 20.205 and Title 49 CFR and applicable licensed agreement state regulations.

1.3 This procedure shall be used in conjunction with the TSI&C's procedure entitled General Use of Radiation Survey Instruments, Section 4.

2.0 GENERAL

2.1 Packages containing radioactive materials are to be received in accordance with USNRC Title 10 CFR Part 20.205, Paragraphs A and C and/or applicable agreement state regulations.

2.2 Only qualified radiographers and assistant radiographers may survey or open packages containing radioactive material.

2.3 If a radiation survey conducted in accordance with USNRC Title 10 CFR Part 20.205C or applicable agreement state regulations reveals a radiation level in excess of allowable limits, the package shall be segregated, roped off, barricaded or otherwise stored so as to preclude unnecessary exposure above 2 MR/HR, and the cognizant Radiation Safety Supervisor or Assistant Radiation Safety Officer shall be notified immediately.

3.0 RECEIPT OF PACKAGE CONTAINING RADIOACTIVE MATERIAL

3.1 Surveyed in accordance with USNRC Title 10 CFR Part 20.205C or applicable agreement state regulations.

3.2 Examined for proper labeling, classification, evidence of activity and leak test and the applicable sections of a TSI&C "Radioactive Material Receiving Report", Form RR-4 (see Section 15, Page 15.8) completed.

3.2.1 IF ANY OF THE ABOVE ITEMS ARE IN NONCOMPLIANCE, THE COGNIZANT RADIATION SAFETY OFFICER OR RADIATION SAFETY SUPERVISOR SHALL BE NOTIFIED.

SECTION 11 - CONDUCTING A LEAK TEST OF SEALED SOURCES

1.0 SCOPE

1.1 This procedure shall govern the method of performing Leak Test on radioisotopes used by TSI&C.

1.2 This procedure conforms to the requirements of USNRC Title 10 CFR Part 34.25 and applicable licensed agreement state regulations.

1.3 This procedure shall be used in conjunction with the TSI&C's procedure entitled Radiation Safety Records, Section 14.

2.0 GENERAL

2.1 Only those personnel authorized to perform leak tests by TSI&C as documented on TSI&C's Leak Tests Certification (see Section 15, Page 15.6) may perform such test.

2.2 One of the following leak test kits shall be used for wipe testing sealed sources possessed by TSI&C:

2.2.1 Applied Health Physics Mark V Leak Test Kit.

2.2.2 Gamma Industries Kowipe Leak Test Kit.

2.3 Each sealed source shall be tested for leakage at intervals not to exceed six (6) months while in use. Sources exempted from this test during storage, shall be tested for leakage prior to any use or transfer.

2.4 Applicable radiation safety precautions shall be maintained throughout the performance of this test.

3.0 PERFORMANCE OF TEST

3.1 The wipe test shall be performed in accordance with the supplier's instructions, a copy of which is included in each kit.

3.2 If indicated surface activity of the wipe test sample exceeds .005 microcuries, the cognizant Assistant Radiation Safety Officer or Radiation Safety Supervisor should be notified immediately.

4.0 RECORDS

4.1 Records of leak test results shall be kept in units of microcuries and maintained for inspection of the USNRC or applicable agreement state.

SECTION 12 - EMERGENCY PROCEDURE

1.0 SCOPE

1.1 The procedure as defined herein shall govern the steps to be taken by the radiographer and radiographer's assistant in the event of an emergency situation concerning radiation producing equipment. This procedure is designed to comply with Federal, State and Local requirements concerning emergency situations.

2.0 RESPONSIBILITIES

2.1 It is the radiographer's responsibility to notify TSI&C of any emergency situation wherein he feels that an emergency situation exists whether it be in the transportation, use and/or storage of source material.

2.2 The Administrative personnel at TSI&C to be notified via telephone "COLLECT" are:

2.2.1 McKees Rocks, PA Corporate Office:

Telephone Number (412) 771-0262

RADIATION SAFETY OFFICER
A. J. Mueller (412) 457-7565 (Residence)
or
ASSISTANT RADIATION SAFETY OFFICER
M. H. Stiger (412) 869-1492 (Residence)

3.0 EMERGENCY SITUATION

3.1 Emergency situations are defined but not limited to the following:

3.1.1 DOSIMETER GOES OFF 200 MR SCALE.

3.1.2 RADIOACTIVE SOURCE BECOMES STUCK IN SOURCE GUIDE TUBE.

3.1.3 SOURCE PROJECTOR IS DROPPED IN RIGGING TO WORK LOCATION.

3.1.4 RADIATION SURVEY INSTRUMENT DOES NOT FUNCTION PROPERLY (CHECK BACK-UP RADIATION SURVEY INSTRUMENT FIRST).

3.1.5 ACCIDENT IN TRANSPORTATION OF SOURCE MATERIAL VIA MOBILE LABORATORY OR COMPANY CAR.
NOTE: In the event of a radiographer becoming incapacitated during an accident, placards should be in an appropriate place in the vehicle to inform Local, State and/or Civil authorities who they should contact.
NEVER LEAVE THE SCENE OF THE ACCIDENT UNLESS YOU NEED MEDICAL ATTENTION until you are sure of the security of source material.

3.1.6 FIRE IN STORAGE BUILDING WHERE SOURCES ARE TEMPORARILY STORED AT CONSTRUCTION SITES. YOU AS A RADIOGRAPHER SHALL POST THE TELEPHONE NUMBER WHERE YOU CAN BE REACHED BY SITE MANAGEMENT PERSONNEL AND/OR THE LOCAL FIRE DEPARTMENT.

3.1.7 BROKE CONNECTOR OF SOURCE MATERIAL TO DRIVE CABLE PREVENTING RETRACTING OF SOURCE TO ITS SHIELDED POSITION.

3.1.8 LOST OR STOLEN SOURCE MATERIAL.

3.1.9 ANY SITUATION WHEREIN YOU AS A RADIOGRAPHER HAVE REASON TO BELIEVE THAT AN OVEREXPOSURE TO RADIATION HAS OCCURRED TO RADIATION WORKERS AND/OR NON-RADIATION WORKERS OR ANY PROPERTY DAMAGE OCCURRING OUT OF SOURCE MATERIAL.

4.0 EMERGENCY SITUATION ASSESSMENT

4.1 In the event of an emergency situation, the radiographer shall assess the sitation as follows:

4.1.1 RESTRICT AND POST THE RADIATION OR SUSPECTED RADIATION AREA TO A 2 MR/HR LEVEL. THIS CAN BE DONE EITHER WITH A RADIATION SURVEY INSTRUMENT OR BY CALCULATIONS.

4.1.2 "CALMLY" REVIEW AND ASSESS THE SITUATION. For example:

1) You have reason to believe that an individual has received an over-exposure (over 100 MR). Calculate the exposure based on time-distance and the source activity. If your calculation shows 1 R or more, the individual shall be scheduled for an immediate blood test.

2) Damage of source material projector controls due to accident. They can become damaged by cranes, etc.

3) Crushed source material guide tubes (something fell on them).

4.2 After assessment, "IMMEDIATELY" notify via telephone "COLLECT" the respective Radiation Safety Supervisor for direction and resolution of the situation.

5.0 REPORTING/NOTIFICATION

5.1 It shall be the responsibility of the Radiation Safety Officer (Company RSO) to file with the appropriate regulatory body reports as required for emergency situations.

5.2 In the event that the radiographer cannot locate the Radiation Safety Supervisor or the Radiation Safety Officer, he shall be required to notify the appropriate Federal and/or State Radiation Control Board by telephone. The telephone number of the USNRC Compliance Region can be found on USNRC Form 3 and/or the equivalent for respective agreement states which shall be posted in the laboratory or field location. Phone number for licensed agreement states will be recorded on the applicable State Notice To Employees Form.

5.3 After any emergency situation involving source material or equipment, you shall complete the Incident Data Report (Section 15, Page 15.4) to this procedure giving detailed information as required concerning the emergency situation.

SECTION 13 - RADIOGRAPHERS PERFORMANCE REVIEW

1.0 SCOPE

1.1 This procedure establishes the guidelines for reviewing an individual's performance to assure compliance with TSI&C's Operating and Emergency Procedures and applicable USNRC and/or state regulations.

2.0 RESPONSIBILITIES

2.1 Performance reviews shall be conducted by the Radiation Safety Officer and/or Assistant Radiation Safety Officer.

3.0 PERFORMANCE REVIEWS

3.1 Performance reviews shall be conducted on an announced and unannounced basis at the discretion of the auditor.

3.2 A quarterly review shall be conducted on each radiographer and/or assistant radiographer for compliance with the requirements contained in this manual.

3.2.1 If a radiographer or a radiographer's assistant has not participated in a radiographic operation for more than three months since the last review, that individual's performance must be observed and recorded the next time the individual participates in a radiographic operation.

3.3 The elements to be audited are listed in the Radiographer's Performance Review, Form RR-1 (See Section 15, Page 15.9).

3.4 The auditor shall observe an actual radiographic operation.

4.0 DISQUALIFICATION/UPGRADING

4.1 If an individual cannot demonstrate thorough understanding of the items listed in the Radiographer's Performance Review, (Section 15, Page 15.9) he shall:

4.1.1 Be disqualified from working with radioactive material until he:

a) COMPLETES ADDITIONAL TRAINING IN THE DEFICIENT AREAS.

b) DEPENDING UPON THE SEVERITY OF THE DEFICIENCY, BE DISCIPLINED.

5.0 RECORDS

5.1 A record of each radiographer's performance review shall be completed and retained by the Assistant Radiation Safety Officer and copies sent to the Radiation Safety Officer.

SECTION 14 - RADIATION SAFETY RECORDS

1.0 SCOPE

1.1 This procedure shall govern the maintenance of reports and records that each radiographer is required to generate as applicable and retain in compliance with the USNRC and/or state regulations.

1.2 The following reports and records are included in this procedure not only in text but, also in Section 15.

1.2.1 Radiograher's Performance Review (Section 15, Page 15.9).

1.2.2 Radiographic Operations Report, RR-2 (Section 15, Page 15.3).

1.2.3 Source Change and Leak Test Certification Record (Section 15, Page 15.6).

1.2.4 Incident Data Report (Section 15, Page 15.4).

1.2.5 Radioactive Material Receiving Report (Section 15, Page 15.8).

1.2.6 Source Transfer Record (Section 15, Page 15.7)

1.2.7 Radioactive Material Transportation Record (Section 15, Page 15.10).

1.2.8 Dosimeter Calibration Record (Section 15, Page 15.12).

1.2.9 Quarterly Inventory Record (Section 15, Page 15.13).

2.0 INTENT

2.1 It is the intent of this procedure to provide a ready reference to a radiographer showing the reports that he is responsible for completing. Since many of the reports are self-explanatory, no specific instruction are given for detailed completion. If the report is to be completed after the performance of an operation for which there is a TSI&C procedure, that procedure will be referenced in the applicable part of this procedure and any special instructions for the use of that report will be found in the referenced procedure.

3.0 REPORTS

3.1 Radiographic Operations Report (See TSI&C procedure entitled Personnel Monitoring Equipment and Usage, Section 2). A Radiographic Operations Report (See Section 15, Page 15.3) must be completed by personnel daily when they are performing radiography activities. At the end of the work week, these reports must be forwarded to the respective Assistant Radiation Safety Officer for transmittal to the Radiation Safety Officer.

3.2 TSI&C Radiographic Operations Report

The TSI&C Radiographic Operations Report (See Section 15, Page 15.3) is to be completed as applicable for each time a source is transported or used. This report consists of:

3.2.1 SOURCE UTILIZATION RECORD AS REQUIRED BY USNRC TITLE 10 CFR PART 34.27 AND APPLICABLE LICENSED STATE REGULATIONS.

3.2.2 A MAINTENANCE AND INSPECTION OF THE RADIOGRAPHIC EXPOSURE DEVICE AS REQUIRED BY USNRC TITLE 10 CFR PART 34.28 AND APPLICABLE LICENSED STATE REGULATIONS.

3.2.3 A RADIATION SURVEY OF RADIOGRAPHIC OPERATIONS SHOWING SOURCE LOCATIONS AND RADIATION LEVELS AT BOUNDARIES OF RESTRICTED AREAS.

3.2.4 A SURVEY (ENTIRE CIRCUMFERENCE) RECORD OF THE DEVICE WHEN IT IS PLACED IN A STORAGE AREA AS REQUIRED BY USNRC TITLE 10 CFR PART 34.43, PARAGRAPH C AND APPLICABLE LICENSED STATE REGULATIONS.

3.2.5 A VEHICLE SURVEY RECORD TO ASSURE COMPLIANCE WITH DEPARTMENT OF TRANSPORTATION REGULATIONS CONTAINED IN TITLE 49 CFR PARTS 171 THROUGH 177 AND APPLICABLE USNRC AND/OR STATE REGULATIONS.

The TSI&C Radiographic Operations Report is to be completed in duplicate, one (1) copy of which is sent to the respective Assistant Radiation Safety Officer at the end of the work week and one (1) copy of which is sent to and maintained by the Radiation Safety Supervisor.

3.3 Source Change and Leak Test Certification Record

A Source Change and Leak Test Certification Record (See Section 15, Page 15.6) shall be completed, as applicable, in accordance with instructions contained in TSI&C's procedure entitled Conducting a Leak Test, Section 11 or Exchanging Sealed Sources Procedure, Section 8.

3.4 Incident Data Report, Form No. RR-3)

An Incident Data Report (See Section 15, Page 15.4) shall be completed in the circumstance that:

3.4.1 A DOSIMETER IS DISCHARGED BEYOND ITS CAPACITY AND IMMEDIATE PROCESSING OF A FILM BADGE IS REQUIRED.

3.4.2 A FILM BADGE BECOMES WET, LOST OR MUTILATED.

3.4.3 A FILM BADGE MAY INDICATE AN EXCESSIVE EXPOSURE WHICH THE USER DID NOT RECEIVE.

3.4.4 A problem or incident has occurred which must be reported.

3.4.5 The completed report shall be sent to the Radiation Safety Officer as soon as possible.

3.5 Radioactive Material Receiving Report

A Radioactive Material Receiving Report (See Section 15, Page 15.8) shall be completed in accordance with TSI&C's Procedure entitled Receipt of Radioactive Material Packages. These reports are to be completed in duplicate, one (1) copy to be sent to the RSO and one (1) to be retained by the Radiation Safety Supervisor.

3.6 Source Transfer Record

A Source Transfer Record (See Section 15, Page 15.7) shall be completed in accordance with TSI&C's procedure entitled, Transportation of Radioactive Materials, Section 12. In addition, when a source is being transported over the road from job to job, the Radioactive Material Transportation Record (see Section 15, Page 15.10) shall be completed by the radiographer.

3.7 Quarterly Inventory Record

The Quarterly Inventory Record (see Section 15, Page 15.13) shall be completed in accordance with TSI&C's procedure entitled Radiation Safety Administration, Section 1.

3.8 Dosimeter Calibration Record

The Dosimeter Calibration Record (see Section 15, Page 15.12) shall be complete in accordance with TSI&C's procedure entitled Calibration Procedure for Dosimeters, Section 2.1.

3.9 Survey Instruments Calibration Record

The Survey Meter Calibration Record (see Section 15, Page 15.11) shall be completed in accordance with the requirements of the applicable operating instruction for calibrators, Section 5.4, 5.10 and 5.11.

INDEX OF FORMS

MANUAL REVISION TRANSMITTAL AND RECEIPT FORM

TRI STATE INSPECTION & CONSULTANTS

INTER-DEPARTMENT DISTRIBUTION BY RECEIVING DEPARTMENT	McKEES ROCKS PA (ORIGINAL BRANCH)	Q.A. (ORIGINAL DEPT.)	QA (TOPIC NO. PAGE)
	RADIATION SAFETY OPERATIONS MANUAL (TOPIC)		
	(DATE)	---- (REVIEW DATE)	------ (CANCEL DATE)

DISTRIBUTION:

TO _____ Document Control No. _____

_____ Date _____

INSTRUCTIONS: The below listed document is transmitted herewith for your custody, control and use. Please complete the lower portion and return this transmittal to the TRI STATE INSPECTION & CONSULTANTS office in PA.

C/O A. J. KUELLER
TRI STATE INSPECTION & CONSULTANTS
115 ISLAND AVENUE
McKEES ROCKS, PA 15136

DOCUMENT DESCRIPTION: _____ _____

_____ _____

_____

_____ _____

_____

REMARKS:

_____

_____

_____

RECEIPT ACKNOWLEDGEMENT (to be completed by document holder):

My controlled copy has been updated to include the above document and all superseded pages have been destroyed or marked VOID.

SIGNATURE _____ DATE _____

RADIOGRAPHIC OPERATIONS REPORT (RR-2)

Page _____ of _____ Form RR-2
Date _____ Rev 0
NRC License No _____
Expires on _____

RADIOGRAPHIC OPERATIONS REPORT

"WARNING" - INTENTIONAL FAILURE TO RECORD INFORMATION ACCURATELY ON THIS FORM CAN RESULT IN TERMINATION

LOCATION: CITY _____ STATE _____ CONTRACT No _____

TYPE OF RADIATION:

X-RAY _____ MODEL No _____ SERIAL No _____ KV _____ MA _____

GAMMA-RAY CONTAINER _____ MODEL No _____ SERIAL No _____

ISOTOPE SOURCE _____ MODEL No _____ SERIAL No _____ CURIES _____

LEAK TEST DUE DATE _____

SURVEY INSTRUMENT USED

MAKE _____ MODEL _____ SERIAL No _____ RECALIBRATION DUE DATE _____

RECORD OF PHYSICAL SURFACE SURVEY _____ MR/HR IN STORAGE AREA

RADIOGRAPHIC EQUIPMENT INSPECTED
PER THE FOLLOWINGCHECK LIST
INDICATE OK or NOT APPLICABLE (N/A) or REPAIR (R)
If (R) is indicated Contact the Radiation Safety Supervisor before proceeding with work.

__A. SURVEY PROJECTOR FOR EXCESSIVE RADIATION LEVELS.
__B. PROJECTOR INSPECTED FOR DAMAGE TO FITTINGS, LOCK, FASTENERS & LABELS.
__C. CONTROL CABLE INSPECTED FOR CUTS, BREAKS, BROKEN OR LOOSE FITTINGS.
__D. CRANK INSPECTED FOR LOOSENESS.
__E. GUIDE TUBE INSPECTED FOR CUTS, CRUSHING AND BROKEN OR LOOSE FITTINGS.
__F. COLLIMATOR, IF USED, CHECKED FOR SECURE ATTACHMENT.
__G. OPERATION OF CONTROL CHECKED TO ASSURE FREEDOM OF SOURCE MOVEMENT.
H. SOURCE RETURNED TO _____

Comments: _____

_____

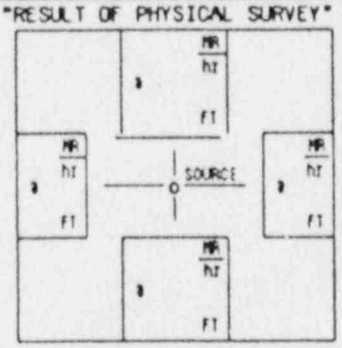
Inspection completed by _____ Date _____

RECORD OF PHYSICAL SURFACE SURVEY TO DETERMINE SOURCE IS IN SHIELDED POSITION AFTER PLACEMENT IN STORAGE AREA

_____ MR/HR

SURVEY OF STORAGE AREA _____ MR/HR

"RESULT OF PHYSICAL SURVEY"



WARNING SIGNS AND ROPES PLACED
AS REQUIRED YES ☐
CONSTANT SURVEILLANCE YES ☐
COMMENTS _____

_____

THE CONTAINER SURVEY AFTER EACH EXPOSURE WAS _____ MR/HR

_____
Radiographer

LENGHT OF EXPOSURE _____
NUMBER OF EXPOSURES _____

RADIOGRAPHER _____ BADGE No _____ DATE _____ DOSIMETER S/N _____ MR ____

RADIOGRAPHER'S ASST. _____ BADGE No _____ DATE _____ DOSIMETER S/N _____ MR ____

REVIEWED BY _____ DATE _____
RADIATION SAFETY SUPERVISOR

COPY - RADIATION SAFETY OFFICER COPY - RADIATION SAFETY SUPERVISOR/ASSISTANT RADIATION SAFETY OFFICER

INCIDENT DATA REPORT (RR-3)

Page 1 of 2
FORM RR3

"INCIDENT DATA REPORT"

THIS REPORT IS TO BE COMPLETED WITHIN 24 HOURS IN THE EVENT THAT:

A. Your Dosimeter is discharged beyond 200 MR due to unknown circumstances in which the possibility of an excessive exposure to radiation exists.

B. Your Film Badge becomes wet mutilated or lost.

C. You have reason to believe that your Film Badge may indicate an excessive exposure that you may not have received.

SECTION 1 - (Complete All Items)

1. NAME:_____SIGNATURE:_____

2. WORK LOCATION_____
Plant Site City State

3. DID YOU STOP RADIOGRAPHIC OPERATIONS IMMEDIATELY: YES___NO___

4. DID YOU NOTIFY YOUR RADIATION SAFETY SUPERVISOR_____

ASSISTANT RADIATION SAFETY OFFICER_____

RADIATION SAFETY OFFICER_____

5. WHEN? DATE:_____TIME:_____

6. WHICH OF THE ITEMS OCCURRED? A._____(COMPLETE SECTION 2)

B._____(COMPLETE SECTION 3) C._____(COMPLETE SECTION 4)

SECTION 2 - (To be Completed in the Event that "A" Above Occurred)

1. WHEN WERE YOU AWARE THAT YOUR DOSIMETER WENT OFF SCALE? DATE:_____
TIME:_____

2. IF POSSIBLE OVER-EXPOSURE OCCURRED, AT WHAT DISTANCE WERE YOU FROM THE SOURCE?_____FOR WHAT LENGTH OF TIME?_____

3. PROJECTOR DEVICE EMPLOYED - MAKE AND MODEL_____S/N_____

4. SOURCE TYPE: IR-192___CO-60___SOURCE S/N_____ACTIVITY_____
CURIES

5. SURVEY METER: MODEL_____SERIAL NUMBER_____

6. EXPLAIN IN DETAIL EXACTLY EVERYTHING THAT OCCURRED. (Use Reverse Side)

Page 2 of 2
FORM RR3

SECTION 3 - (To be Completed in the Event That "B" Above Occurred)

1. EXPLAIN IN DETAIL HOW YOUR FILM BADGE BECAME WET, MUTILATED OR LOST. (Use Reverse Side)

SECTION 4 - (To Be Completed in The Event That "C" Above Occurred)

1. WHERE WAS YOUR FILM BADGE LOCATED WHEN YOU BELIEVE IT WAS EXPOSED TO RADIATION?_____

2. HOW MUCH RADIATION DO YOU BELIEVE YOUR FILM BADGE RECEIVED?
20 to 100 MR_____100 to 300 MR_____
300 to 600 MR_____Above 600 MR_____
Unknown_____

3. WHY WERE YOU NOT WEARING YOUR FILM BADGE?_____

4. EXPLAIN EXACTLY EVERYTHING THAT OCCURRED. (Use Reverse Side of Sheet)

5. ON THE REVERSE SIDE INCLUDE ANY OTHER INFORMATION WHICH YOU FEEL IS PERTINENT.

MAINTENANCE INSPECTION STICKER

TRI STATE INSPECTION
115 Island Avenue
McKEES ROCKS, PA 15136
(412) 771-0262

MAINTENANCE INSPECTION

Camera No._____ Date_____

Inspection due date _____

Inspection performed by_____

_____

SOURCE CHANGE AND LEAK TEST CERTIFICATION

SOURCE CHANGE CERTIFICATION

This is to certify that:

MR _____ POSITION _____

WAS GIVEN A DEMONSTRATION OF SOURCE CHANGES USING THE FOLLOWING AUTHORIZED SOURCE CHANGERS:

- ☐ T/O 650 Capacity _____ Curies of Iridium 192
- ☐ Gamma Ind. C-10 _____ Curies of Iridium 192
- ☐ Gamma Ind. C-8 _____ Curies of Cobalt 60

THE ABOVE MENTIONED EMPLOYEE HAS DEMONSTRATED COMPETENCE IN CHANGING OF THESE SOURCES USING THE APPLICABLE TS1&C PROCEDURE(S) SECTION-8, SECTION-8.1, SECTION-8.2, AND SECTION-8.3. THE CHANGE WAS SUPERVISED BY THE ASSISTANT RADIATION SAFETY OFFICER OR RADIATION SAFETY SUPERVISOR.

DATE: _____

_____

Assistant Radiation Safety Officer Radiation Safety Supervisor

---

LEAK TESTS CERTIFICATION

This is to certify that:

MR _____ POSITION _____

HAS BEEN GIVEN A DEMONSTRATION TO PERFORM A LEAK TEST USING _____ LEAK TEST KIT. THIS IS TO BE PERFORMED UNDER THE PROVISIONS OF THE TS1&C LICENSE AND LEAK TEST PROCEDURE SECTION-11. THE ABOVE TEST HAS BEEN SUPERVISED BY THE ASSISTANT RADIATION SAFETY OFFICER OR RADIATION SAFETY SUPERVISOR.

DATE: _____

_____

Assistant Radiation Safety Officer Radiation Safety Supervisor

SOURCE TRANSFER RECORD (RR-7)

SOURCE TRANSFER RECORD

DATE _____
NRC License _____
Amendment _____ FORM RR-7
Expires on _____ REV 0

OLD SOURCE: ☐ Iridium 192 ☐ Cobalt 60

Mfr _____ Source Model No _____
Source Serial No _____ Curies _____
Container Model No _____
Container Serial No _____
Last Leak Test date _____

TRANSFERRED TO:

Container Model No _____ Serial No _____
MR/HR at surface of container _____
MR/HR at 1 m (39") from container _____
Survey Meter used: Make _____
Model No _____ Serial No _____
Last Calibrated ___ within 3 mo Yes ☐ No ☐

SENT TO: _____

RADIOACTIVE MATERIAL, SPECIAL FORM, N.O.S.

NATURE AND QUANTITY OF CONTENT				PACKAGE		
RADIONUCLIDE		FORM	ACTIVITY	CATEGORY	TRANSPORT INDEX	TYPE
NAME OF PRINCIPAL RADIOACTIVE CONTENT	INDENT NUMBER	EITHER CHEMICAL FORM PLUS GAS/ LIQUID SOLID OR SPECIAL FORM	NUMBER OF CURIES OR MILLICURIES	I-WHITE II-YELLOW III-YELLOW LABEL	FOR YELLOW LABEL CATEGORY	TYPE A OR TYPE B
	UN2974	SPECIAL FORM			MR/HR AT 39 IN.	TYPE B

Does shipping container have proper radioactive material label ? Yes ☐ No ☐
Has container been sealed with device, not readily breakable, which indicates that the container has not been opened ? Yes ☐ No ☐
Sealed exchanger cap plugs & attached D.O.T. labels ? Yes ☐ No ☐

NEW SOURCE: ☐ Iridium 192 ☐ Cobalt 60

Mfr _____ Source Model No _____
Source Serial No _____ Curies _____
Exchanger Serial No _____
Leak Test date _____
MR/HR at surface of Exchanger when received _____

TRANSFERRED TO:

Container Model No _____ Serial No _____
MR/HR _____
at surface of exposure device after exchange _____
Exchanged old source label for new source label Yes ☐ No ☐

This is to certify that the above named materials are properly classified, described, packaged, marked and labeled, and are in proper condition for transportation according to the applicable regulations of the Department of Transportation.

I hereby certify that the contents of this consignment are fully and accurately described above by proper shipping name, and are classified, packed, marked and labeled and in proper condition for carriage by air according to applicable national governmental regulations.

This shipment is within the limitations prescribed for cargo aircraft only

SIGNATURE _____ DATE _____
Radiographer or Supervisor

COPIES TO: 1 - COPY CARRIER
1 - COPY IN SHIPPING CONTAINER
1 - COPY - FILE AT JOB SITE/PLANT
1 - COPY - SHIPPER
1 - COPY - RSO

RADIOACTIVE MATERIAL RECEIVING REPORT (RR-4)

Form RR-4

RADIOACTIVE MATERIAL RECEIVING REPORT

REV. 0

I. RECEIVING DATE: _____ TIME RECEIVED: _____

II. LOCATION: (Plant or Project Location) _____

III. MATERIAL RECEIVED FROM: _____

IV. CARRIER: _____

V. RADIOACTIVE MATERIAL TYPE: _____

_____ Iridium 192 _____ Cobalt 60 Other _____

SOURCE SERIAL NO. _____ ACTIVITY _____

REMARKS: _____

VI. CONTAINER TYPE:

1. SOURCE CHANGER _____ MODEL NO. _____ SERIAL NO. _____
2. EXPOSURE DEVICE _____ MODEL NO. _____ SERIAL NO. _____

VII. PHYSICAL RADIATION SURVEY OF CONTAINER: *

1. Radiation Level @ External Surface: _____ MR/HR
2. Radiation Level @ 39 inches From External Surface _____ MR/HR
3. RADIOACTIVE YELLOW _____ LABEL
   TRANSPORT INDEX _____

VIII. IS SOURCE ACCOMPANIED BY:

1. Decay Curve: _____ Yes _____ No (Optional)
2. Evidence of Leak Test: ___ Yes _____ No

IX. If Source is Received in Source Changer, what Device is Source to be inst ed in ?

1. EXPOSURE DEVICE: MODEL NO.: _____ SERIAL NO. _____

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 39 inches from the surface of the container.
   c. IMMEDIATELY NOTIFY THE RADIATION SAFETY SUPERVISOR IF THE RADIATION LEVEL EXCEEDS THE LEVELS SPECIFIED IN NOTE 2a OR 2b.

Signed _____ Date _____

Radiation Safety Supervisor or Radiographer

WHITE COPY - Radiation Safety Officer YELLOW COPY - File

RADIOGRAPHER'S PERFORMANCE REVIEW (RR-1)

RADIOGRAPHER'S PERFORMANCE REVIEW

Form RR 1

UNANNONCED ( ) , ANNONCED ( )

Rev 0

LOCATION _____ DATE _____

RADIOGRAPHER _____ FILM BADGE No _____

ASSIST. RADIOGRAPHER _____ FILM BADGE No _____

X-RAY ( ) SURVEY METER No _____ CALIB. DUE _____

IRIDIUM 192 ( ) PROJECTOR No _____ SOURCE No _____

COBALT 60 ( ) PROJECTOR No _____ SOURCE No _____

	1	2	3
1. Placement of fixture or collimator			
2. Layout of restricted area			
3. Placement of "Caution-Radiation Area" signs			
4. Placement of "Caution-High Radiation Area" signs			
5. Layout of control cable in an orderly manner			
6. Layout of source tube (Avoiding kinks)			
7. Securing projector when not in use			
8. Notification of personnel beyond restricted area			
9. Manipulation of cranking mechanism			
10. Method of survey of restricted area			
11. Continuous surveillance at source exposure			
12. Survey of projector after exposure			
13. Orderly storing of cables and equipment			
14. Survey of storage area (Prior-completion) work			
15. Inspection of projector for valid leak test			
16. Dosimeter used as required			
17. Operating and emergency procedures available			
18. Preparation of radiation survey record			
19. Preparation of maintenance inspection record			
20. Radiation survey meter in proper working order and calibrated			

ADDED TRAINING AND REMARKS _____

NAME: _____

ASST. RADIATION SAFETY OFFICER RADIOGRAPHERS ACKNOWLEDGMENT

1-Acceptable 2-Needs Corrective Action 3-Not Applicable

RADIOACTIVE MATERIAL TRANSPORTATION RECORD (RR-8)

RADIOACTIVE MATERIAL TRANSPORTATION RECORD

Form RR-8
REV. 0

CONTAINER INFORMATION

NRC License No: _____

Proper Shipping Name : Radioactive Material, Special Form, N.O.S., (UN2974)
Type of Container : Type B
Physical Description : Special Form
Transport Group : Special Form

Weight : _____
Nuclide : Iridium 192 ☐ Co 60 ☐
Curies : _____
Label : Radioactive _____

SHIPPER'S (TSI & C'S) CERTIFICATION

This is to certify that the above named materials are properly classified, described, packaged, marked and labeled, and are in proper condition for transportation according to the applicable regulations of the Department of Transportation.

Container or Radioactive device has been secured to prevent shifting or movement during transportation.

YES ☐ NO ☐

RADIOGRAPHER: _____ DATE: _____

MATERIAL ORIGIN	MATERIAL DESTINATION	ACT.	CONTAINER SURVEY		VEHICLE SURVEY		TRANSPORT INDEX	DATE
		Curies	MR/HR Surface	MR/HR 39inches	MR/HR CAB	MR/HR Exterior		

SURVEY METER CALIBRATION RECORD (RR-10)

Form RR-10
REV. 0

SURVEY METER CALIBRATION RECORD

CALIBRATION STANDARD CS 137 SOURCE SERIAL NUMBER _____ MODEL _____ SERIAL NUMBER _____	METER MANUFACTURER _____ MODEL _____ SERIAL NUMBER _____
CALIBRATOR OUTPUT X-1 _____ _____ _____ X-10 _____ _____ _____ X-100 _____ _____ _____	METER READING _____ _____ _____ _____ _____ _____ _____ _____ _____

REMARKS _____

_____

_____

_____

_____

BY _____ DATE _____

DOSIMETER CALIBRATION RECORD (RR-9)

DOSIMETER RESPONSE CHECK RECORD

Form RR-9

KNOWN RADIATION INTENSITY _____ MR/HR

Rev 0

Dosimeter Serial No	Date	___ Hr Resp	___ Hr Resp	Results	By	Next Check Due Date

QUARTERLY INVENTORY RECORD (RR-11)

TRI STATE INSPECTION AND CONSULTANTS

Form RR-11
Rev 0

LOCATION _____ DATE _____

NRC License No _____ ☐ 1st Quarter - March 31

Amendment _____ ☐ 2nd Quarter - June 30

Expires on _____ ☐ 3rd Quarter - September 30

State License/Registration _____ ☐ 4th Quarter - December 31

_____ BY _____

QUARTERLY INVENTORY RECORD
EXPOSURE DEVICES AND SOURCES

EXPOSURE DEVICE/SN	SOURCE MODEL	SOURCE S. N.	SOURCE ORIGINAL CURIES	SOURCE DATE	PRESENT CURIES	DATE	LEAK TEST DUE DATE
			IRIDIUM 192				
			COBALT 60				
			CESIUM 137				

SECTION 16 - REPORTING OF DEFECT, MALFUNCTIONS AND NONCOMPLIANCES

1.0 SCOPE

1.1 This procedure is provided to assure that all information necessary for the reporting of defects, malfunction, or nonconformances in equipment or materials is reported to Management, the Companies involved, and to the regulatory agency overseeing the items involved.

1.2 This procedure conforms to the requirements of the 10CFR21.

1.3 This procedure shall be used in conjunction with all TSI&C Procedures within the Radiation Safety Manual.

2.0 REPORTING OF DEFECTS, MALFUNCTIONS, OR NONCOMPLIANCES

2.1 During operations being performed under the controls established by TSI&C Radiation Safety Manual ANY defect, malfunction or noncompliance discovered in equipment or materials shall be reported in writing to the Radiation Safety Officer by the Radiographer in charge at the time of discovery.

2.2 The written report shall include but not be limited to the following:

a. Date and Time defect, malfunction, or noncompliance first became evident.

b. Names and Positions of ALL individuals involved.

c. Description of defect, malfunction, or noncompliance in detail;

1. If equipment is defective or malfunctioning, list:

a. Manufacturer
b. Part description i.e., part name and identification or catalog number.

d. If a radiation hazard took place complete all necessary forms including an INCIDENT DATA REPORT Form RR-3 (See page 15.4) and notify the RSO listed in Section 12.

2.3 After the written report and all required forms have been completed by the Radiographer in charge, the information shall be transmitted to the Radiation Safety Officer.

3.0 Reporting to appropriate agencies is the responsibility of the Radiation Safety Officer and shall be done in accordance with the procedures outlined in 10CFR21.

APPENDIX A

RULES & REGULATIONS

10 CFR 19
10 CFR 20
10 CFR 21
10 CFR 30
10 CFR 34
10 CFR 40
10 CFR 71

APPENDIX B

TSI&C'S NRC LICENSE