

Bran-Shon, Inc.

P.O. BOX 451
DEERFIELD, OH 44411

BRAN - SHON, INC.

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RADIATION SAFETY MANUAL

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RADIATION SAFETY MANUAL

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RADIATION SAFETY MANUAL

PART I

Bran-Shon, Inc.

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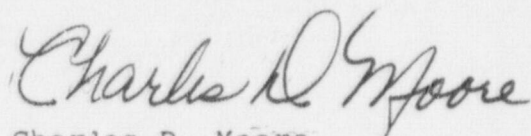
"POLICY STATEMENT"

The procedures established herein are designed to provide the framework for a uniform and adequate Radiation Safety Program for Field Radiographic Operations performed by Bran-Shon, Inc.

The Radiation Safety Director has the complete support of Corporate Management and the authority in implementing the requirements contained in this manual.

Failure to comply with the procedures and regulations set forth herein by any employee will be just cause for termination.

Bran-Shon, Inc.



Charles D. Moore
President

Bran-Shon, Inc.

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RADIATION SAFETY MANUAL

PART II

Bran-Shon, Inc.

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PROCEDURE
IDENTIFICATION

DEFINITIONS

DEFINITIONS

The following are definitions of terms, as used in this manual.

- 1.0 ACTIVATION is the process by which stable atoms are bombarded with neutrons and are made unstable, or radioactive.
- 2.0 An AGREEMENT STATE is a state which has entered into an agreement with the NRC by which the State assumes responsibility for regulation of certain uses of radioactive material, including Industrial Radiography.
- 3.0 An ALPHA PARTICLE is a positively charged particle emitted by certain radioactive materials. It is made up of two (2) neutrons and two (2) protons, hence it is identical to the nucleus of a helium atom.
- 4.0 An ATOM is a particle of matter indivisible by chemical means. It is the fundamental building block of chemical elements.
- 5.0 The ATOMIC NUMBER denotes the number of protons in the nucleus of an atom, the number of positive charges in the nucleus, and the number of orbiting electrons.
- 6.0 The ATOMIC WEIGHT denotes the number of protons and neutrons in the nucleus of an atom.
- 7.0 AUTHORIZED PERSONNEL means personnel qualified as Radiographers and Assistant Radiographers in accordance with Bran-Shon's procedures.
- 8.0 A BETA PARTICLE (Beta Ray) is an elementary particle emitted from a nucleus during radioactive decay. It has a single electrical charge and a mass equal to 1/1840 that of a proton. Beta particles are easily stopped by a thin sheet of metal. A negatively charged beta particle is physically identical to the electron. If the beta particle is positively charged, it

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is called a positron. Beta radiation may cause skin burns, and beta emitters are harmful if inhaled or ingested.

- 9.0 BY-PRODUCT MATERIAL means any radioactive material (except special nuclear material) yielded in or made radioactive by exposure to the radiation incident to the process of producing or utilizing special nuclear material.
- 10.0 CALIBRATION means to check the accuracy of radiation measuring instruments against a known standard and correct as required.
- 11.0 CESIUM-137 is a radioisotope of the element Cesium.
- 12.0 COBALT-60 is a radioisotope of the element Cobalt.
- 13.0 A COLLIMATOR is a device used to reduce radiation levels and/or to produce a directional radiation beam.
- 14.0 COMPTON SCATTERING is a process in which a photon transfers a portion of its energy to an orbital electron in matter and a lower energy photon is scattered at an angle to the original photon path.
- 15.0 CONTAMINATION is the presence of unwanted radioactive matter, or the "soiling" of objects or materials with "radioactive dirt".
- 16.0 CURIE is a unit of activity for measuring the quantity of radioactive material. One (1) curie yields 3.7×10^{10} (37 billion) disintegrations per second.
- 17.0 DOSE means the amount of ionizing radiation energy absorbed per unit mass of irradiated material at a specific location, such as a part of the human body. Measured in rems and rads.
- 18.0 DOSE RATE means the radiation dose delivered per unit time and measured, for instance, in rems per hour. (See also DOSE)
- 19.0 A DOSIMETER is a device that measures radiation dose. It contains an ionization chamber.
- 20.0 A DOSIMETER CHARGER is a device used to charge a dosimeter.

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- 21.0 ELECTROMAGNETIC RADIATION consists of electric and magnetic waves that travel at the "speed of light". Examples: Light, Radio waves, Gamma rays, X-rays. All can be transmitted through a vacuum.
- 22.0 An ELECTRON is an elementary particle with a unit negative electrical charge and a mass 1/1840 that of the proton. Electrons surround the atom's positively charged nucleus and determine the atom's chemical properties.
- 23.0 An ELEMENT is one of the 104 known chemical substances that cannot be divided into simpler substances by chemical means. Examples: Hydrogen, Lead, Uranium.
- 24.0 A FILM BADGE is a package of photographic film worn like a badge by workers in the nuclear industry to measure exposure to ionizing radiation. The absorbed dose can be calculated by the degree of film darkening caused by the irradiation.
- 25.0 GAMMA RAYS are high-energy short-wavelength electromagnetic radiation emitted during the decay of an unstable nucleus. Energies of gamma rays are usually between 0.010 and 10 Mev. X-rays also occur in this energy range, but are not of nuclear origin. Gamma radiation usually accompanies alpha and beta emissions and always accompanies fission. Gamma rays are very penetrating and are best attenuated by dense materials like lead and depleted uranium.
- 26.0 GENETIC EFFECTS OF RADIATION means the effects that produce changes in those cells of organisms which give rise to egg or sperm cells and therefore could affect offspring of the exposed individuals.
- 27.0 HALF-LIFE is the time required for one half of the radioactive atoms in a sample to disintegrate.

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- 28.0 A HALF-VALUE LAYER is that thickness of material required to absorb one-half of the impinging radiation. It is an approximate value.
- 29.0 HIGH RADIATION AREA means any area in which there exists radiation at such levels that a major portion of the body could receive in any one hour a dose in excess of 100 MREM.
- 30.0 An ION is an atom or molecule that has lost or gained one or more electrons. By such "ionization" it becomes an electrically charged particle.
- 31.0 IONIZATION is the process of adding electrons to, or knocking electrons from, atoms or molecules, thereby creating ions. High temperatures, electrical discharges, and nuclear radiation can cause ionization.
- 32.0 IONIZING RADIATION is any radiation that directly or indirectly displaces electrons from the orbital shell of atoms. Examples: Alpha, Beta, Gamma Radiation.
- 33.0 IRIDIUM-192 is a radioisotope of the element Iridium.
- 34.0 ISOTOPES are atoms with the same atomic number (same chemical element) but different atomic weights. An equivalent statement is that the nuclei have the same number of protons but different numbers of neutrons.
- 35.0 "MILLI" is a prefix that divides a basic unit by one thousand.
- 36.0 MONITORING is the act of surveying or measuring with instruments, pocket dosimeters, film badges, or thermoluminescent dosimeters (TDL's) the amount of radiation an individual has been exposed to.
- 37.0 A NEUTRON is an uncharged elementary particle with a mass nearly equal to that of the proton. The isolated neutron is

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- unstable and decays with a half-life of about 13 minutes into an electron, proton, and neutrino.
- 38.0 NRC means the United States Nuclear Regulatory Commission.
- 39.0 A NUCLEUS is the small, positively charged core of an atom. It is only about 1/10,000 the diameter of the atom but contains nearly all the mass. Except for ordinary hydrogen, all nuclei contain both protons and neutrons.
- 40.0 PERMANENT RADIOGRAPHIC INSTALLATION means a shielded installation designed and/or intended for radiography in which the requirements for a temporary radiation area are not required.
- 41.0 PHYSICAL SURVEY is the act of measuring radiation intensities at various locations in an area where radiation exists.
- 42.0 A PROTON is an elementary particle with a single positive electrical charge and a mass approximately 1840 times that of the electron. The atomic number of an atom is equal to the number of protons in its nucleus.
- 43.0 RADIATION means any or all of the following: Alpha Rays, Beta Rays, Gamma Rays, and X-Rays.
- 44.0 RADIATION AREA means any area where radiation exists at such levels that a major portion of the body could receive in any one hour a dose in excess of 2 MREM.
- 45.0 A RADIATION SURVEY is the process of using an instrument (survey meter) to measure the presence of ionizing radiation.
- 46.0 RADIOACTIVE DECAY is the spontaneous disintegration of an unstable nucleus to a more stable state during which radiation is emitted.
- 47.0 RADIOGRAPHIC EXPOSURE DEVICE means any device that is NRC or Agreement State approved and is designed to contain a sealed

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source which may be moved or otherwise changed from a shielded to unshielded position for making a radiographic exposure.

(Also called a "camera" or "projector".)

- 48.0 RADIOGRAPHIC PERSONNEL means all monitored personnel directly connected with radiographic operations.
- 49.0 RADIOGRAPHY is the nondestructive method of inspecting parts or materials using penetrating radiation and a film, or other recording medium.
- 50.0 A RADIOISOTOPE is an unstable isotope of an element that decays or disintegrates spontaneously, emitting radiation. More than 1300 natural and artificial radioisotopes have been identified.
- 51.0 REM is a measure of the dose of radiation to body tissue in terms of its estimated biological effect relative to a dose of one (1) Roentgen of X-Rays. A dose of one (1) Roentgen of X or Gamma Rays is considered to be equivalent to a dose of one (1) REM. (One [1] millirem [mrem] = 0.001 REM.)
- 52.0 A RESTRICTED RADIOGRAPHIC AREA is an area under the control of GFS personnel for the purpose of protecting unmonitored persons from radiation exposure during radiographic operations.
- 53.0 ROENTGEN (R) is the unit of measurement of X-Rays and Gamma Rays absorbed in air. It is a measure for the absorption of X-Rays and Gamma Radiation in the same sense that feet or inches are a measure of length.
- 54.0 SEALED SOURCE means a radioactive material that is encased in a capsule designed to prevent leakage or escape of the radioactive material.

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- 55.0 SHIPPING/STORAGE CONTAINERS means any device that is NRC or Agreement State approved and is used to store a sealed source or to contain a sealed source during transport.
- 56.0 SOMATIC EFFECTS OF RADIATION means the effects that are realized by the exposed individuals. Somatic effects can be prompt (such as burns due to an acute exposure) or delayed (such as possible increased risk of cancer).
- 57.0 A SURVEY METER is a portable instrument which measures dose rate of exposure or radiation intensity.
- 58.0 TEMPORARY RADIATION AREA means a restricted radiation area in which ropes, or other temporary barriers, and/or constant visual surveillance are used to control access to the area.
- 59.0 THERMOLUMINESCENT DOSIMETERS (TLD's) are small devices worn like a badge, that contain phosphor in a solid crystal structure (such as lithium flouride) that is sensitive to exposure to radiation. The radiation dose can be determined by the amount of visible light given off by the crystals when they are heated in a special processing device.
- 60.0 UNRESTRICTED AREA means any area into which entry is not controlled by Bran-Shon personnel for the purposes of radiation protection.
- 61.0 An X-RAY is penetrating electromagnetic radiation emitted when the inner orbital electrons of an atom are excited and release energy. Thus, the radiation is not nuclear in origin and is generated in practice by bombarding a metallic target with high-speed electrons.

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RADIATION SAFETY MANUAL

PART III

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PROCEDURE
IDENTIFICATION

MANUAL STRUCTURE, CONTROL, AND ASSIGNMENT

1.0 RADIATION SAFETY MANUAL (RSM)

1.1 STRUCTURE

- A. Radiation Safety Administration
- B. Operating and Emergency Procedures
- C. USNRC
- D. USNRC, State License(s) And Conditions As Applicable.

2.0 MANUAL CONTROL AND ASSIGNMENT

- 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 name of the individual which the manual is assigned to, will be maintained by the Radiation Safety Director's Department.
- 2.2 When revisions are made to a procedure, the entire procedure shall be revised.
- 2.3 Revisions to procedures shall be indicated by a horizontal line above a triangle ($\bar{\Delta}$) containing the Revision Number in the right hand margin adjacent to the revised paragraph. ($\bar{\Delta}$)
- 2.4 Revised procedures shall be submitted as required to the USNRC and/or licensed Agreement State for approval to release to the manual holder.
- 2.5 Appendice and/or Provision Attachment Revisions will be issued without USNRC and/or licensed Agreement State approvals.
- 2.6 Should licensed Agreement State regulations differ from USNRC regulations, an Addendum will be issued to the affected procedure(s) to cover the specific requirement(s).

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MANUAL STRUCTURE, CONTROL, AND ASSIGNMENT

2.0 MANUAL CONTROL AND ASSIGNMENT (cont.) 2.6

Addenda will be revised, issued and controlled in the same manner as procedures in 2.2, 2.3., and 2.4.

- 2.7 A Manual Revision Transmitted and Receipt Form as shown in Attachment #1, shall accompany all manual revisions. It will be the responsibility of the manual holder to incorporate the revision changes in his/her manual. The Statement of Receipt on Attachment #1 shall be completed and returned to the Radiation Safety Director's Department.

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ATTACHMENT #1

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PROCEDURE
IDENTIFICATION

MANUAL STRUCTURE, CONTROL, AND ASSIGNMENT

B R A N - S H O N , I N C .

MANUAL REVISION TRANSMITTAL AND RECEIPT FORM

MANUAL NUMBER _____ DATE _____

MANUAL HOLDER _____

MANUAL CHANGES

A. REMOVE AND DISPOSE OF THE FOLLOWING: _____

B. INSERT THE FOLLOWING REVISIONS: _____

RECEIPT OF REVISIONS STATEMENT

THE REVISIONS LISTED IN ITEM "B" HAVE BEEN INSERTED IN MANUAL NUMBER _____ ASSIGNED TO ME, AND THE SUPERSEDED REVISIONS LISTED IN ITEM "A" HAVE BEEN REMOVED AND DESTROYED.

SIGNED BY _____

DATE _____

SIGN AND RETURN TO THE RADIATION SAFETY DIRECTOR

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RADIATION SAFETY MANUAL

PART IV

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PROCEDURE
IDENTIFICATION

RADIATION SAFETY ADMINISTRATION

1.0 ORGANIZATION

1.1 The attached chart (Attachment #1) outlines the structure of Bran-Shon's Radiation Safety Program with reference to management, radiographers, and assistant radiographers.

2.0 RESPONSIBILITIES

2.1 The NDE Operations Manager is responsible for the over all implementation of the Radiation Safety Program as detailed in this manual. He is also responsible for assuring that equipment deviations and noncompliances are evaluated and that defects and noncompliances that could cause substantial radiation safety hazard are reported to the USNRC as required by 10CFR Part 21, or as required by state regulations.

2.2 The Radiation Safety Director (RSD) is responsible for the administration of the Radiation Safety Program and for assuring that the activities of radiographic personnel are in accordance with applicable procedures and regulations. He shall also:

- 2.2.1 Act as Bran-Shon's liaison officer with the USNRC and State Agencies on all license matters.
- 2.2.2 Develop and maintain current operating and emergency procedures.
- 2.2.3 Establish, conduct and/or supervise the Training Program for Radiographic Personnel. (RSTP)
- 2.2.4 Examine or have Assistant R.S.D's examine and determine the qualifications and competency of Radiographic Personnel.
- 2.2.5 Evaluate instances of excessive personnel radiation exposure, equipment deviations, or procedure,

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RADIATION SAFETY ADMINISTRATION

2.0 RESPONSIBILITIES (cont.) 2.2.5

license or regulation noncompliances to determine if such instances are required to be reported to the Regulatory Agency, and to make such reports, if required, as designated by the NDE Operation Manager.

2.2.6 Assume control and initiate corrective action in emergency situations.

2.2.7 Investigate the cause of incidents and determine any necessary preventive action.

2.2.8 Maintain control over the following:

A. Procurement and Disposal of Licensed Radioactive Material.

B. Personnel Monitoring Program

C. Radiation Survey Instrument Calibration Program

D. Radioactive Material Quarterly Inventory

E. Source Leak Testing Program

F. Internal Auditing System

2.3 The Assistant Radiation Director(s) are responsible for radiation duties which include the following:

2.3.1 Procuring and maintaining radiation survey instruments

2.3.2 Establishing and maintaining radioisotopes storage facilities

2.3.3 Maintaining exposure devices and associated equipment

2.3.4 Conducting quarterly inventories

2.3.5 Maintaining all reports, records and correspondence relating to radiation safety.

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PROCEDURE
IDENTIFICATION

RADIATION SAFETY ADMINISTRATION

2.0 RESPONSIBILITIES (cont.) 2.3.6

- 2.3.6 Forwarding copies of reports and records to the Radiation Safety Director
- 2.3.7 Reporting to the Radiation Safety Director as required.
- 2.3.8 Performing Radiographer's Performance Audits
- 2.3.9 Other duties assigned by the Radiation Safety Director
- 2.4 The radiographer is responsible for the safe use and handling of by-product materials and X-Ray machines while performing a radiographic assignment. He will also:
 - 2.4.1 Ascertain that all regulations and procedures pertaining to Radiation Safety are strictly adhered to prior to, during, and after a radiographic exposure. Any deviation from written procedure is just cause for termination of employment.
 - 2.4.2 Personally supervise (watch) all assistant radiographers under his charge while that assistant is using radiographic exposure devices or conducting surveys after an exposure.
 - 2.4.3 Notify the Assistant RSD or the Radiation Safety Director concerning instances of radiographic equipment deviations or items of procedure, license, or regulation noncompliance, noted at his location.
- 2.5 The Assistant Radiographer is responsible for the proper use of radiographic exposure devices and survey instruments while performing a radiographic assignment while under the personal supervision of a radiographer.

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PROCEDURE
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RADIATION SAFETY ADMINISTRATION

3.0 RECORDS

- 3.1 The following Radiation Records shall be retained indefinitely:
 - 3.1.1 Film and/or TLD Badge Reports
 - 3.1.2 Personnel Radiation History Records
 - 3.1.3 Other records, such as Survey Records of an incident used to document personnel exposure in absence of Film and/or Badge Reports.
- 3.2 Personnel Training and Examination Records shall be retained a minimum of three (3) years.
- 3.3 Other radiation records shall be maintained for two (2) years.

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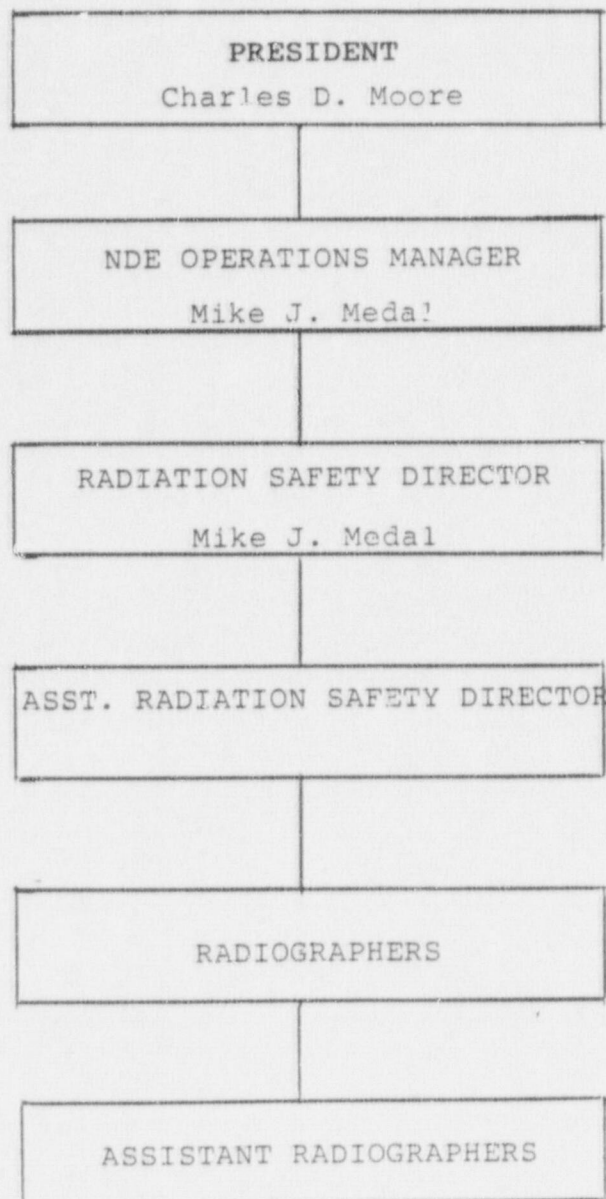
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ORGANIZATION CHART



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RADIATION SAFETY MANUAL

PART V

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PROCEDURE IDENTIFICATION

USE OF PERSONNEL MONITORING DEVICES

1.0 SCOPE

This procedure describes the method of charging and using Pocket Dosimeters and the use and control of Thermoluminescent Dosimeters (TLD's).

2.0 RESPONSIBILITIES

It is the responsibility of all Radiographic Personnel to follow this procedure without deviation.

3.0 DOSIMETER CHARGING

3.1 Insert dosimeter into charging socket.

3.2 Turn knob clockwise to the "on" position, when applicable.

3.3 Depress dosimeter in socket firmly.

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

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

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

4.0 DOSIMETER USAGE

4.1 Radiographic Personnel shall wear dosimeters, with a range of 0 to 200 mrem, at all times while performing radiographic assignments.

4.2 Pocket dosimeters are required to be tested for accuracy at intervals not to exceed one (1) year. The next test due date will be indicated on a sticker on the dosimeter.

4.3 The dosimeter shall be worn adjacent to the TLD badge on the front trunk area of the body.

4.4 Dosimeters will be recharged to near zero daily or as required at the start of each shift.

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USE OF PERSONNEL MONITORING DEVICES

4.0 DOSIMETER USAGE (cont.)

- 4.5 Dosimeters shall be read at frequent intervals during the work day so there is an awareness of the amount of exposure received during the course of radiographic activities.
- 4.6 At the end of the work day, dosimeters will be read and the amount indicated on the scale recorded in the appropriate column of the weekly time sheet.
- 4.7 In the event that a dosimeter becomes discharged beyond its capacity of 200mr due to unknown circumstances in which the possibility exists that an excessive radiation exposure may have occurred, the individual shall contact the Radiation Safety Director immediately for instructions. In addition, he/she will not be permitted to engage in radiographic operations until the results are evaluated by the processing laboratory are acceptable.
- 4.8 At the end of each week, the time sheet (showing the dosimeter readings) will be forwarded to the office for retention. One copy will be retained by the Radiographer and one copy by the applicable branch office as required. (See RS-GP-1 Dosimeter Report - Attachment #1)

5.0 TLD USE AND CONTROL

- 5.1 All Radiographic Personnel will wear a TLD badge in addition to a pocket dosimeter at all times while performing radiographic assignments.
- 5.2 Each TLD badge will be assigned to only one person and will have that person's name or identification, and the period the TLD is to be worn, indicated on it.

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USE OF PERSONNEL MONITORING DEVICES

5.0 TLD USE AND CONTROL (cont.)

- 5.3 TLD periods will be "monthly".
- 5.4 A TLD badge will be forwarded to the Radiographers and Assistant Radiographers by the Radiation Safety Director's Department, so that these will be in the possession of Radiographic Personnel at the beginning of each month.
- 5.5 TLD badges shall be stored in a radiation free area under lock and key when they are not being worn.
- 5.6 At the end of the month, TLD badges shall be returned to the Radiation Safety Director's Department for transmittal to the processing laboratory.

6.0 TLD REPORTS

- 6.1 TLD reports will be sent by the processing laboratory to the Radiation Safety Director.
- 6.2 If the monthly TLD report indicates that any individual has received radiation in excess of 800 MREM, the Radiation Safety Director will investigate the cause and take corrective action in an effort to reduce future exposure.
- 6.3 A written explanation describing the cause and corrective action taken will be attached to the original TLD report in 6.2 above.
- 6.4 Copies of the TLD reports will be forwarded to the branch offices.

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USE OF PERSONNEL MONITORING DEVICES

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(216)654-4905/(216)482-9922

NOTICE

THIS INFORMATION
MUST BE COMPLETE

PLEASE BEAR DOWN AND PRINT LEGIBLE

WEEKLY TIME AND DOSIMETER RECORD

JOB LOCATION	PAYROLL WEEK ENDING
EMPLOYEE NAME (FIRST) (NO NICKNAME)	(MIDDLE INITIAL) (LAST)
EMPLOYEE ADDRESS FOR RECEIVING PAYCHECK (IF DIFFERENT FROM BELOW)	
EMPLOYEE ADDRESS FOR RECEIVING FILM BADGE AND OTHER MAIL	DOSIMETER NO

TIME REPORT					EXPENSE REPORT					DAILY REPORT						
DATE DAY	JOB NUMBER	HOURS WORKED		HOL HRS	EXPLANATION OF HOURS NOT CHARGED CUSTOMER	PER DIEM	PERSONAL AUTO		CASH RECEIPTS MUST BE ATTACHED			NO. OF MILES SPEC. TO	MILES TRUCK DRIVEN	IF TRUCK SERVICED SHOW SPEEDOMETER READING	VEHICLE NO	DOSIMETER READING
		TOTAL	CUSTOMER HOURS				VAC HRS	MILE DRIVEN	AMOUNT	TRUCK REPAIR	GAS OIL SERVICE FOR TRUCK					
MON																
TUES																
WED																
THUR																
FRI																
SAT																
SUN																
		TOTAL													TOTAL	

EMPLOYEE SIGNATURE

HOURS APPROVED BY

LICENSE NO. _____ VED BY _____

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PROCEDURE IDENTIFICATION

USE OF RADIATION SURVEY INSTRUMENTS

1.0 SCOPE

This procedure describes the proper operation of radiation survey instruments.

2.0 RESPONSIBILITIES

The Radiographer is responsible for following this procedure without deviation.

3.0 SURVEY INSTRUMENTS

3.1 Survey instruments will have a range of at least 2 MR/HR through 1000 MR/HR.

3.2 Survey instruments are required to be calibrated at intervals not to exceed three (3) months. The next calibration due-date will be indicated on a sticker on the side of the meter. The Radiographer has the responsibility to assure he is using a survey meter that is in the calibration cycle.

4.0 OPERATION

4.1 Turn the selector switch to one of the operating settings and let the meter have a two minute warm-up period.

4.2 The Radiographer should assure complete understanding of meter switch positions and scale limitations for each position prior to initial use.

4.3 After the warm-up period turn the selector switch to the "Battery Test" position. The needle should fall within the "Battery OK" area on the meter face. If it does not, the batteries shall be replaced and the warm-up period and battery test repeated.

4.4 If the batteries test OK, the meter is ready for use by turning the selector switch to the desired intensity range and reading the radiation intensity indicated by the meter.

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PROCEDURE
IDENTIFICATION

USE OF RADIATION SURVEY INSTRUMENTS

4.0 OPERATION (cont.)

- 4.5 Prior to initial use, survey meters should be checked against a known radiation source, when available (sealed projector), for proper response to a radiation field.
- 4.6 Survey Instruments, since they are delicate, must be handled and used with utmost care to avoid damage.
- 4.7 Precautionary measures must be taken to avoid exposure of the instrument to excessive moisture and/or dirt.
- 4.8 Use of Survey Instruments in prolonged periods of excessive cold should be avoided since batteries may prove inefficient at colder temperatures.
- 4.9 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.

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PROCEDURE IDENTIFICATION

POSTING OF TEMPORARY RADIATION AREAS AND RADIATION SURVEYS

1.0 SCOPE

This procedure describes the proper method of establishing a temporary radiation area and other occasions for conducting physical radiation surveys.

2.0 RESPONSIBILITIES

The Radiographer is responsible for following this procedure without deviation.

3.0 POSTING OF TEMPORARY AREAS

3.1 A calibrated and operable radiation survey instrument will be maintained at each radiographic exposure site.

3.2 All exposure areas ("Restricted Radiographic Areas") shall have "CAUTION-RADIATION AREA" signs and ropes (or some other type barrier) erected at the 2 MR/HR, or less perimeter.

3.3 "CAUTION-HIGH RADIATION AREA" signs will be placed inside the 2 MR/HR perimeter at approximately the 100 MR/HR perimeter.

NOTE: It will not be necessary to take a physical radiation survey to locate the "HIGH RADIATION AREA" signs exactly at the 100 MR/HR perimeter. However, it is necessary to take a physical survey to establish the restricted radiographic area at the 2 MR/HR perimeter.

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

3.5 A physical radiation survey will be made during the exposure to insure that the radiation level outside of the

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PROCEDURE
IDENTIFICATION

POSTING OF TEMPORARY RADIATION AREAS AND RADIATION SURVEYS

3.0 POSTING OF TEMPORARY AREAS (cont.) 3.5

Restricted Radiographic Area does not exceed 2 MR/HR
(Except when time factors are used).

- 3.6 To prevent unauthorized entry, the Radiographer will position himself so the entire radiation area is constantly under his direct visual surveillance.
- 3.7 The Radiographer or Assistant Radiographer shall maintain direct surveillance until such time as the source is safely retrieved, returned to its shielded-locked position and the device secured to protect against unauthorized entry.
- 3.7.1 The Assistant Radiographer shall not operate radiographic equipment or perform surveys within the restricted area boundary unless the Radiographer is in attendance and supervising operations.
- 3.7.2 When a shift change occurs with the source in the exposed position, it shall be noted in the remarks section of The Radiographic Operation Report and initialed by the relieving Radiographer.
- 3.7.3 In the event of an emergency, surveillance shall be maintained in accordance with Procedure 5, paragraph 3.
- 3.8 Signs and ropes will be removed as soon as the source of radiation is returned to storage. (CAUTION: must be employed so as not to leave signs and ropes in evidence when not in use.)
- 3.9 In certain situations, the use of occupancy or time factors might allow a relaxing of the restrictions for "radiation" areas as described in paragraph 3.2 above. When time factors are used, a notation shall be made in the remarks

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PROCEDURE
IDENTIFICATION

POSTING OF TEMPORARY RADIATION AREAS AND RADIATION SURVEYS

3.0 POSTING OF TEMPORARY AREAS (cont.) 3.9

section of the Radiographic Operations Report.

- 3.10 Ropes, or other type barriers, will not be required when exposures are made in open field locations where the erecting of ropes is impractical. However, all other provisions of this procedure must be complied with.

4.0 REQUIRED RADIATION SURVEYS

- 4.1 A physical radiation survey shall be made after each radiographic exposure to verify that the source has been returned to the stored position. The entire circumference of the camera, the guide tubes, and collimator (if used) shall be surveyed.
- 4.2 The exposure device shall be secured and surveyed prior to being moved from one location to another.
- 4.3 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.
- 4.4 After the projector has been put into storage, another survey shall be made to verify that the radiation area on the outside surface of the storage area is not more than 2 MR/HR.
- 4.5 Surveys regarding transportation of sources are covered in RS-GP-12.

5.0 RECORDS

- 5.1 The Radiographic Operations Report is to be completed on a

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POSTING OF TEMPORARY RADIATION AREAS
AND RADIATION SURVEYS

5.0 RECORDS (cont.) 5.1

daily basis when a source is used, and will be used to record the following information:

5.1.1 Source utilized:

- A. Source type
- B. Source serial number
- C. Curie strength

5.1.2 Radiographic exposure device used:

- A. Device model number
- B. Device serial number
- C. Results of daily equipment inspection

5.1.3 Survey meter used:

- A. Device model number
- B. Device serial number
- C. Calibration due date

5.1.4 Results of survey:

- A. Distance from source to area boundaries
- B. Radiation levels at area boundaries
- C. Results of final survey from paragraph 4.3

5.2 One copy of The Radiographic Operations Report will be forwarded to the Radiation Safety Director's Department, one copy to the applicable branch office, and one copy will be retained by the Radiographer.

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PROCEDURE IDENTIFICATION

SECURITY OF RADIOACTIVE MATERIALS

1.0 SCOPE

This procedure describes the means of insuring that radioactive materials are secured so that unauthorized personnel do not have access to these materials.

2.0 RESPONSIBILITIES

The Radiographer and the Radiation Safety Director are responsible for full compliance with this procedure.

3.0 PROCEDURE

- 3.1 Radiographic devices and storage vaults will be kept locked at all times when not in use.
- 3.2 Source storage areas will be properly posted using an approved radiation sign bearing the words "CAUTION-RADIO-ACTIVE MATERIAL".
- 3.3 Keys for radiographic devices and storage vaults will be kept in such a manner that only authorized personnel have access to them.
- 3.4 The maximum allowable radiation level at any and all outside surfaces of a storage vault in an unrestricted area shall be 2 MR/HR.

NOTE: An "EMPTY" tag should be wired to any exposure device or source changer that does not contain a sealed source while that container is at a shop or field location.

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PROCEDURE IDENTIFICATION

EMERGENCY PROCEDURES

1.0 SCOPE

This procedure describes the emergency measures to be followed during incidents affecting the security of radioactive sources or involving a radiation hazard.

2.0 RESPONSIBILITIES

It is the responsibility of all Radiographic Personnel to follow this procedure without deviation.

3.0 GENERAL

Radiographers, in general, will be restricted to performing the following during a Radiation Safety Emergency:

- 3.1 Secure the source, if possible, and return it to the storage area.
- 3.2 Survey the area and set up a restricted area, as described in Procedure 3, if the source is not in the shielded position.
- 3.3 Maintain constant visual surveillance over the restricted area to prevent other personnel or members of the public from receiving unnecessary radiation exposure.
 - 3.3.1 At field construction sites it may be necessary for the Radiographer to post temporary guards to permit emergency notification for assistance and/or assist in controlling the restricted area perimeter.
 - 3.3.1.1 Guards should be selected as follows:
 - A. Record names and names of immediate supervisors.
 - B. Should be employed by Bran-Shon, Inc. site customer or Bran-Shon, Inc.
 - C. Should be aware of hazard as well as capable and reliable at preventing unauthorized personnel entry.

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PROCEDURE IDENTIFICATION	EMERGENCY PROCEDURES	
3.0	<u>GENERAL (cont.)</u> 3.4 Notify the Radiation Safety Director concerning the Radiation Safety Emergency. <u>NOTE:</u> Maintaining the integrity of the restricted area is foremost and takes precedence over notification requirements. RADIOGRAPHERS ARE STRICTLY PROHIBITED FROM MAKING ANY INDEPENDENT SOURCE RETRIEVAL ATTEMPT.	
	<u>SPECIFIC EMERGENCY PROCEDURES</u> 4.1 DAMAGE TO RADIOGRAPHIC EXPOSURE DEVICES, SOURCE GUIDE TUBES, OR CONTROL CABLES: 4.1.1 Return the source to the device, if possible, survey the device, and secure the source. 4.1.2 If the source cannot be returned, set up a restricted area as outlined in Procedure 3. 4.1.3 Notify the Radiation Safety Director and follow any instructions that are given. 4.1.4 Damaged equipment shall not be used again until repairs are made and the equipment is inspected by the Radiation Safety Director's Department. 4.2 FIRE OR ACCIDENT IN OR NEAR RADIOGRAPHIC EXPOSURE AREA: 4.2.1 Return the source to the device, if possible, survey the device, and secure the source. 4.2.2 Return the device to the source storage area. 4.2.3 In the event the radiographic exposure device cannot be removed from the danger area, set up a restricted area as outlined in Procedure 3.	
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EMERGENCY PROCEDURES

4.0 SPECIFIC EMERGENCY PROCEDURES (cont.)

4.2.4 Notify the Radiation Safety Director and notify the Fire Department or security personnel, whichever is applicable.

4.3 LOSS OR THEFT OF SOURCE:

4.3.1 If a source is lost or stolen, the Radiation Safety Director will be notified immediately.

4.3.2 The last known location of the source will try to be determined.

4.3.3 If the source is located, the area will be surveyed and, if the source is in the unshielded position, a restricted area will be set up in accordance with Procedure 3. Contact the Radiation Safety Director for further instructions.

4.3.4 If the source cannot be located, the Radiation Safety Director will notify the applicable regulatory authority.

4.3.5 If, for some reason, management personnel cannot be reached, the Radiographer will notify the applicable regulatory authority directly.

4.4 ACCIDENT INVOLVING BRAN-SHON, INC.'S VEHICLE TRANSPORTING RADIOACTIVE MATERIAL:

4.4.1 If a vehicle transporting radioactive material is involved in an accident and the source container is damaged, the area will be surveyed and, if the source is in the unshielded position, a restricted area will be set up in accordance with Procedure 3.

4.4.2 If the radiation survey instrument is inoperable, the area will be roped off as best as possible at

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EMERGENCY PROCEDURES

4.0 SPECIFIC EMERGENCY PROCEDURES (cont.) 4.4

the distances shown in Table 1 of this procedure.

4.4.3 The local civil authorities will be notified concerning the radiation hazard. The Radiation Safety Director will be notified as soon as possible after the accident.

4.4.4 In case of a minor accident where it can be determined that the source has not been dislodged from the container, it will not be necessary to establish a restricted area.

4.4.5 If no radiation hazard exists and the radiation survey instrument is operable, the vehicle may continue on its trip.

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

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 civil authorities who they should contact.
THE RADIOGRAPHER SHOULD NEVER LEAVE THE SCENE OF THE ACCIDENT, UNLESS THERE IS NEED FOR MEDICAL ATTENTION-UNTIL THE SOURCE IS SECURED.

5.0 NOTIFICATION AND REPORTS

5.1 A list of the office and home phone numbers of the Radiation Safety Director, Assistant Radiation Safety Officers, and other management personnel will be maintained by all Radiographic Personnel.

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IDENTIFICATION

EMERGENCY PROCEDURES

5.0 NOTIFICATION AND REPORTS (cont.)

- 5.2 A written report will describe in detail any incident involving the loss, theft, or an accident pertaining to radioactive material.
- 5.3 The Radiation Safety Director will determine the necessity for notifying the applicable regulatory authority in all cases except for the loss or theft of a source when management personnel cannot be reached.
- 5.4 The President and NDE Operations Manager will be advised directly of all reportable occurrences of this section.

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EMERGENCY PROCEDURES

TABLE I

DISTANCES TO ROPE OFF UNSHIELDED SOURCES

COBALT 60

<u>STRENGTH IN</u> <u>CURIES</u>	<u>DISTANCE TO</u> <u>2 MR/HR (FEET)</u>	<u>STRENGTH IN</u> <u>CURIES</u>	<u>DISTANCE TO</u> <u>2 MR/HR (FEET)</u>
100.....	851	200	768
90.....	808	180.....	728
80.....	762	160.....	687
70.....	712	140.....	642
60.....	660	120.....	594
50.....	602	100.....	543
45.....	571	90.....	515
40.....	539	80.....	485
35.....	504	70.....	454
30.....	467	60.....	421
25.....	426	50.....	384
20.....	381	40.....	344
15.....	330	30.....	298
10.....	270	20.....	243
5.....	190	10.....	172

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PROCEDURE IDENTIFICATION

OPERATION AND USE OF RADIOGRAPHIC EXPOSURE DEVICES AND X-RAY MACHINES

1.0 Operating Instructions for Radiographic Exposure Devices Licensed by Bran-Shon, Inc.

2.0 This procedure shall be used in conjunction with the procedures for the use of TLD badges, dosimeters, radiation survey instruments, the posting of radiation areas, and daily inspections will be followed without deviation.

3.0 OPERATION OF TECHNICAL OPERATIONS RADIOGRAPHIC EXPOSURE DEVICES

3.1 DESCRIPTION OF EXPOSURE DEVICES

3.1.1 Model 650 exposure device is shielded with 30 pounds of depleted uranium, having a total weight of 44 pounds. It has a capacity of 100 curies of Iridium 192.

3.1.2 Model 900 exposure device is shielded with 28 pounds of depleted uranium, having a total weight of 44 pounds. It has a capacity of 100 curies of Iridium 192.

3.1.3 Model 680 exposure device is shielded with 285 pounds of depleted uranium, having a total weight of 405 pounds. It has a capacity of 100 curies of Cobalt 60.

3.2 REMOTE CONTROL UNITS

3.2.1 The devices above are operated with either a pistol grip handle control (T/O Model 693) or a reel type unit (T/O 664). The remote control unit is a polyvinyl covered flexible composite cable, the standard length being 25 feet.

3.3 SOURCE TUBES

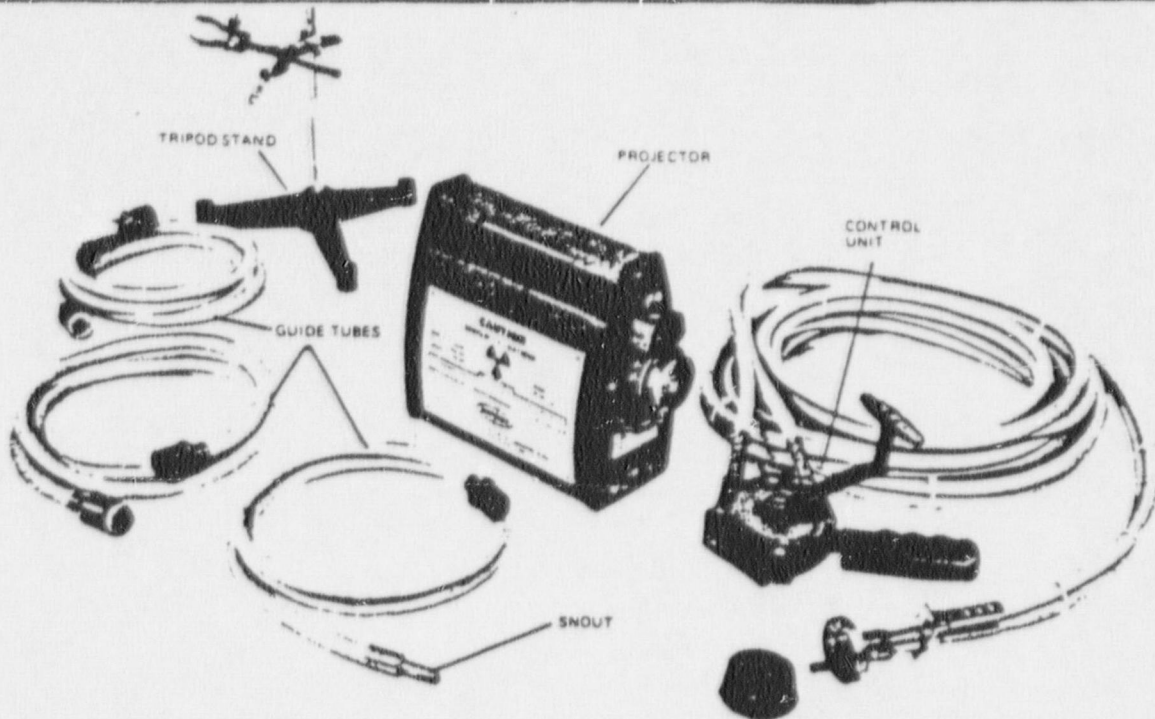
3.3.1 Source tubes are polyvinyl protected flexible metallic hose sections. One section is attached to the source exposure device. The extension sections are coupled to extend the range of the source from the device.

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PROCEDURE IDENTIFICATION

OPERATION AND USE OF RADIOGRAPHIC EXPOSURE DEVICES AND X-RAY MACHINES



3.0 OPERATION OF TECHNICAL OPERATIONS RADIOGRAPHIC EXPOSURE DEVICES

3.4 STANDARD OPERATING PROCEDURE

NOTE: A calibrated survey instrument is required for radiographic operations.

3.4.1 ASSEMBLY OF SOURCE TUBE

Remove the plastic dust caps and assemble the source tubes and master guide tube (with snout). Tighten fittings finger-tight. Do not use pliers or other tools.

3.4.2 POSITIONING THE SOURCE TUBE

Place the source tube snout in the desired location for making the radiographic exposure. (This represents the radiographic focal point). Keep the source tube as straight as possible (avoid small radius bends) and

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OPERATION AND USE OF RADIOGRAPHIC EXPOSURE DEVICES AND X-RAY MACHINES

3.0 OPERATION OF TECHNICAL OPERATIONS RADIOGRAPHIC EXPOSURE DEVICES (cont.) 3.4.2

extend it to its full length as far away from the exposure location as possible.

3.4.3 CONNECTING THE SOURCE TUBE TO THE EXPOSURE DEVICE

Place the exposure device at the open end of the source tube and remove the dust cap. Remove the shipping/storage plug from the device and attach the source tube assembly connector to the exposure device exit fitting. Tighten fitting finger-tight only!

CAUTION

NEVER OPERATE THE SYSTEM WITH MORE THAN THREE (3) GUIDE TUBE SECTIONS (INCLUDING THE MASTER STOP).

WHEN USING PIPE POSITIONER, NO MORE THAN TWO (2) GUIDE TUBE SECTIONS SHALL BE USED.

3.4.4 CONNECTING REMOTE CONTROLS

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

3.4.4.1 Unlock the projector with the key provided and turn the connector selector ring from the LOCK position to the CONNECT position. When the ring is in the CONNECT position, the storage cover will disengage from the projector as shown.



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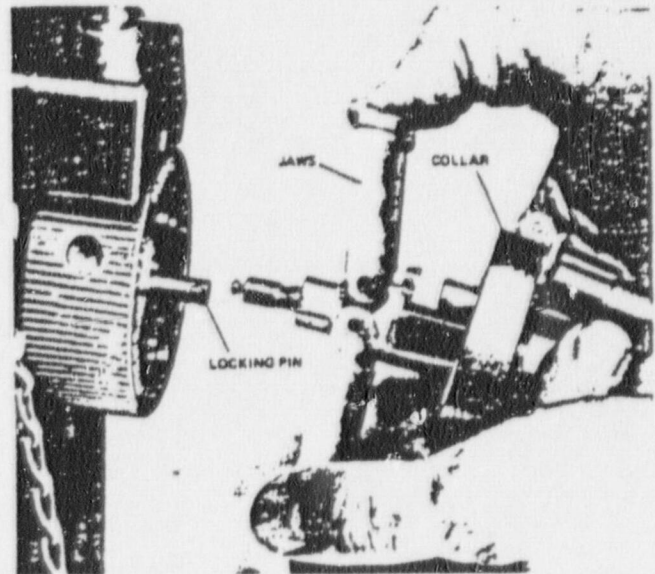
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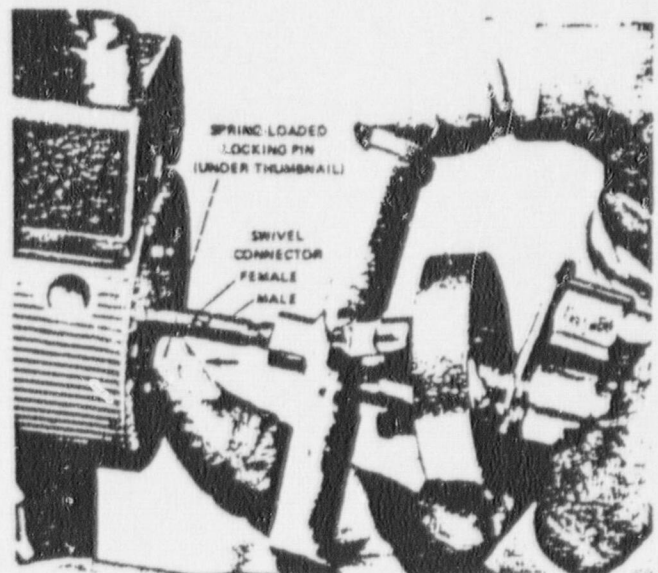
OPERATION AND USE OF RADIOGRAPHIC EXPOSURE DEVICES AND X-RAY MACHINES

3.0 OPERATION OF TECHNICAL OPERATIONS RADIOGRAPHIC EXPOSURE DEVICES

3.4.4.2 Slide the control cable back and open the jaws of the control cable connector. This exposes the male portion of the swivel connector as shown.



3.4.4.3 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.



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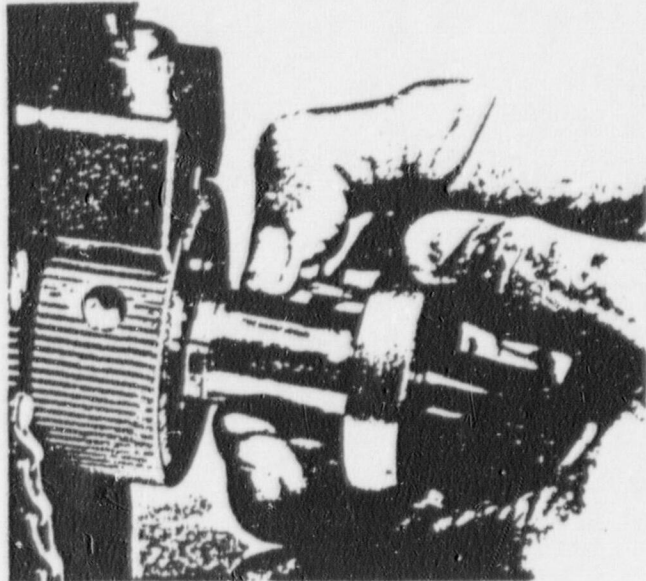
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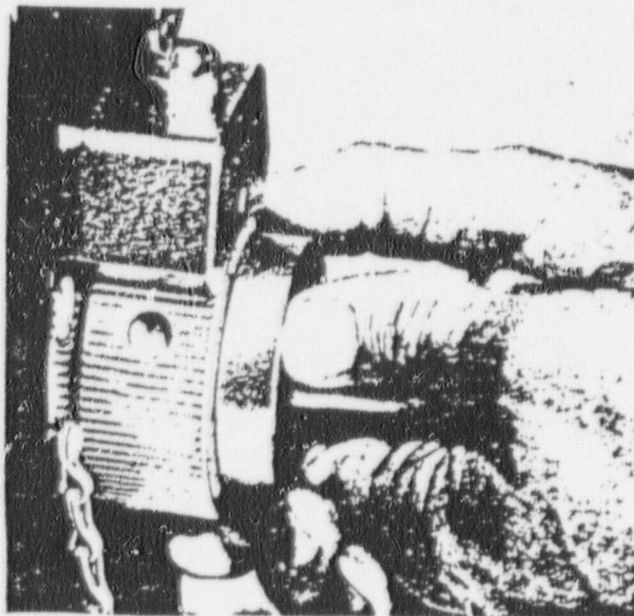
OPERATION AND USE OF RADIOGRAPHIC EXPOSURE
DEVICES AND X-RAY MACHINES

3.0 OPERATION OF TECHNICAL OPERATIONS RADIOGRAPHIC EXPOSURE DEVICES

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



3.4.4.5 Slide the control cable collar over the connector jaws.



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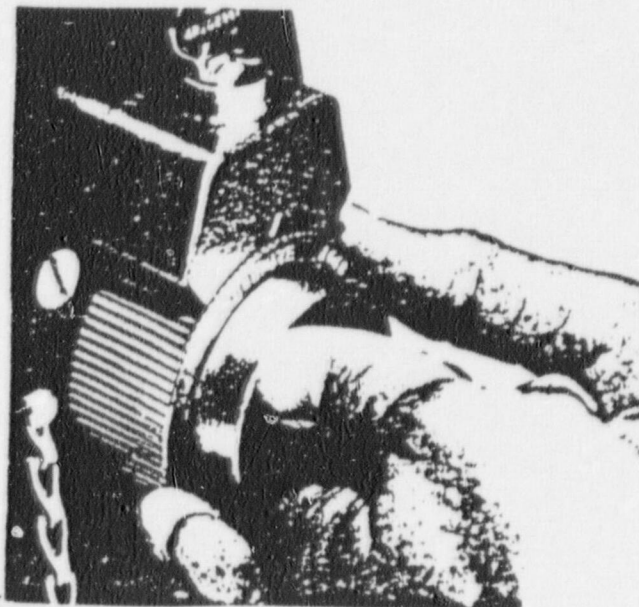
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OPERATION AND USE OF RADIOGRAPHIC EXPOSURE DEVICES AND X-RAY MACHINES

3.0 OPERATION AND USE OF RADIOGRAPHIC EXPOSURE DEVICES

3.4.4.6 Hold the control cable collar flush against the projector connector and rotate the selector ring from the CONNECT position to the LOCK position. Keep the projector in the LOCK position until actual operation is ready to start.



3.5 POSITIONING THE HAND CRANK

Unroll the control cable and position the crank as far as possible from the exposure position and behind some natural shielding (such as a column or some equipment) if possible. The control cable must not be subjected to any undue stress or abuse which could cause restriction of the drive cable.

3.6 OPERATION

Thoroughly check all cable connections and bend radii, and the position of the snout of the master guide tube. To operate the system, perform the following:

3.6.1 Restrict and monitor the area in accordance with Procedure 3.

3.6.2 Unlock the projector connector and rotate the selector ring to the operate position. The source is now free to move.

NOTE:

If cranking becomes difficult at any time during the next step reverse the direction of the cranking to return the source to

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PROCEDURE IDENTIFICATION

OPERATION AND USE OF RADIOGRAPHIC EXPOSURE DEVICES AND X RAY MACHINES

3.0 OPERATION AND USE OF RADIOGRAPHIC EXPOSURE DEVICES (cont.) 3.6.2

the stored position in the projector. First monitor the area with a survey meter to insure that the source is properly stored. Then check the control and guide tubes for excessively small bend radii and repeat the step.

3.6.3 At the control unit, rapidly rotate the hand crank in the EXPOSE (counter-clockwise) direction to move the source out of the projector and into the guide tubes toward the radiographic focal point. Continue to rotate the hand crank until the source reaches the snout, which serves as a mechanical stop for the source. The start of the exposure time should be figured from the time that the source reaches the snout or stop.

NOTE: During the radiographic exposure, the Radiographer will move away from the control crank if the radiation level exceeds 2 MR/HR. He will keep the radiation area under constant surveillance during this entire period. The radiation survey instrument will be observed at all times to follow the source from its unshielded position to the radiographic exposure location and upon retracting the source.

3.6.4 To return the source to the projector after the pre-determined exposure time has elapsed, rapidly turn the hand crank in the RETRACT (clockwise) direction. Continue to turn the crank until it will no longer turn and the source is properly stored.

3.6.5 Slowly approach the exposure device while checking with a survey meter for excessive radiation levels. Survey the entire shield surface and the guide tubes to be certain the source was returned to the shield. Rotate

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OPERATION AND USE OF RADIOGRAPHIC EXPOSURE
DEVICES AND X-RAY MACHINES

3.0 OPERATION AND USE OF RADIOGRAPHIC EXPOSURE DEVICES (cont) 3.6.5
the selector ring to the "LOCK" position.

NOTE: If it is determined that the source is not properly stored, the emergency procedure (Procedure 5) will be invoked immediately.

DO NOT FORCE THE CRANK AT ANY TIME DURING OPERATION

3.6.6 After the last exposure, disassemble the equipment in the reverse order of paragraphs 4.1 to 4.5.

3.6.7 At the completion of radiographic activities and prior to storing the projector, a final survey shall be made to verify that the source is properly shielded. This survey shall be recorded on The Radiographic Operations Report.

4.0 OPERATION OF SOURCE PRODUCTION & EQUIPMENT CO. RADIOGRAPHIC EXPOSURE DEVICE

4.1 DESCRIPTION OF EXPOSURE DEVICES

4.1.1 Model 2-T Exposure Device is shielded with 35 pounds of depleted uranium, Having a total weight of 40 pounds. It has a capacity of 200 curies of Iridium 192.

4.1.2 Model I Exposure Device is shielded with 350 pounds of depleted uranium, having a total weight of 475 pounds. It has a capacity of 100 curies of Cobalt 60.

4.2 REMOTE CONTROL UNITS

4.2.1 The devices above are operated with a 25 foot mechanical control assembly. The assembly is extremely light weight and the flexible source guide tube may be up to 23 feet long.

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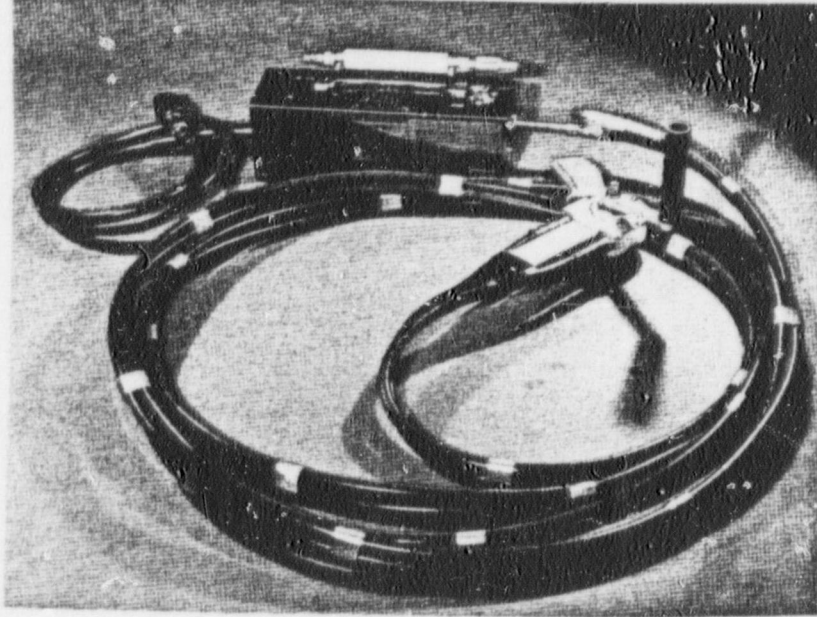
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DEVICES AND X-RAY MACHINES

4.0 OPERATION OF SOURCE PRODUCTION & EQUIPMENT CO. RADIOGRAPHIC EXPOSURE DEVICE (cont.)



4.3 STANDARD OPERATING PROCEDURES

- 4.3.1 Before handling the SPEC 2-T make sure you have an operable calibrated survey meter and monitor every operation.
- 4.3.2 Remove the safety cap from the back of the unit (end nearest lock) exposing the pigtail connector.
- 4.3.3 Turn crank on the control assembly in a clockwise direction to expose approximately eight inches of drive cable.
- 4.3.4 Connect the drive cable to the source pigtail.
- 4.3.5 Crank the control assembly in a counter clockwise direction so that the swivel connector can be threaded into the back of the unit. Screw the male connecting thread all the way into the back of the unit.

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OPERATION AND USE OF RADIOGRAPHIC EXPOSURE
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4.0 OPERATION OF SOURCE PRODUCTION & EQUIPMENT CO. RADIOGRAPHIC EXPOSURE DEVICE (cont.)

4.3 STANDARD OPERATING PROCEDURES

- 4.3.6 Remove safety plug from the outlet on the front of the unit by retracting the quick disconnect coupling.
- 4.3.7 Connect the source tube by snapping the quick disconnect coupling over the outlet nipple.
- 4.3.8 Check to see that the end piece is securely in place on the end of the source tube. Place the end of the source tube in the desired position while avoiding small radius bends and kinks.
- 4.3.9 Fully extend the controls from the unit avoiding as many turns and kinds as possible.
- 4.3.10 Unlock the unit using key provided.
- 4.3.11 To expose the source, turn crank handle clockwise. As source nears the end of the source tube, diminish turning speed to prevent the source from hitting the end piece with undue force. Count the number of crank turns so you will know when you are approaching the end of the tube.
- 4.3.12 Survey to determine if radiation levels are appropriate.
- 4.3.13 To retract the source after the exposure, turn the crank handle counter clockwise.
- 4.3.14 Survey to ascertain that the source is in the stored or safe position.
- 4.3.15 Lock the device by depressing the lock plunger. Jiggle the connector to be certain that the pigtail is firmly locked in position.

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4.0 OPERATION OF SOURCE PRODUCTION & EQUIPMENT CO. RADIOGRAPHIC EXPOSURE DEVICE (cont.)

- 4.3.16 Unscrew the swivel connector and crank out approximately 8 inches of the drive cable.
- 4.3.17 Disconnect the drive cable from the source pigtail.
- 4.3.18 Replace safety cap over the source pigtail.
- 4.3.19 Disconnect the source tube and replace the safety plug.

5.0 OPERATION OF GAMMA INDUSTRIES RADIOGRAPHIC EXPOSURE DEVICES

5.1 DESCRIPTION OF EXPOSURE DEVICES

- 5.1.1 Model Century S and SA is shielded with 26 pounds of depleted uranium, having a total weight of 42 pounds. It has a capacity of 100 curies of Iridium 192.
- 5.1.2 Model Gammatron 100A is shielded 360 pounds of depleted uranium, having a total weight of 515 pounds. It has a capacity of 100 curies of Cobalt 60.

5.2 SOURCE CONTROL ASSEMBLIES

- 5.2.1 The devices above are operated with either a pistol grip handle assembly or a spool type unit. The source control conduit assemblies come in three styles; black standard, S.S. braided, yellow vinyl. The standard length is 25 feet.

5.2.2 SOURCE GUIDE TUBES

- A. Flexible metal tube 3/8" I.D.--Convoluteds brass tube, flexible throughout, wire braid, with the alternate brass and bronze wire.
- B. Light weight vinyl source guide tubes 3/8" I.D.--convoluted stainless steel tube, flexible throughout. Yellow polyvinylchlorine.

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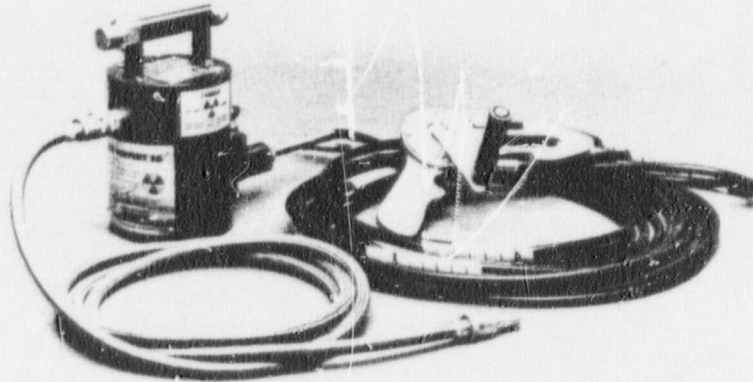
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5.0 OPERATION OF GAMMA INDUSTRIES RADIOGRAPHIC EXPOSURE DEVICES (cont.)

- 5.2.2 C. Flexible metal source guide tubes $\frac{1}{2}$ " I.D. -- convoluted brass tube, flexible throughout. Wire braid with alternate brass and bronze wire. (Standard equipment for G/I-Gammatron 100A.



5.3 STANDARD OPERATION (G/I CENTURY S AND SA)

- 5.3.1 Have an operating survey meter and always use it.
5.3.2 Remove the lock box safety cap from the lock box assembly thereby exposing the pigtail connector.
5.3.3 Crank the control cable to a length of approximately six inches.
5.3.4 Connect control cable to pigtail.
5.3.5 Crank control cable in so that male connecting thread can be screwed into lock box.
5.3.6 Screw connecting thread into lock box.

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5.0 OPERATION OF GAMMA INDUSTRIES RADIOGRAPHIC EXPOSURE DEVICES (cont.)

- 5.3.7 Remove safety plug from protruding nipple located approximately one inch from top of unit.
- 5.3.8 Connect source tube.
- 5.3.9 Place free end of source tube in desired position trying to keep it in a straight line without kinks.
- 5.3.10 Stretch control cable away from exposure device in as straight a line as possible.
- 5.3.11 Unlock the unit by turning the handle back (counter-clockwise) which will permit the key to be turned. This is required only on the SA model.
- 5.3.12 Crank source out as smoothly as possible. When you feel that source is approaching end of source tube, slow the turning speed so that pigtail does not strike the end of the source tube with undue force.
- 5.3.13 Survey to see that radiation levels are within limits.
- 5.3.14 At the end of the exposure, retract source into unit.
- 5.3.15 Now for the most important step of all:
Survey carefully to be sure that source has returned to safe position.
- 5.3.16 turn crank back (counter-clockwise) and depress lock plunger. The SA models only require that the handle be pulled back.
- 5.3.17 Disconnect cable.
- 5.3.18 Screw safety cap into place.
- 5.3.19 Disconnect source tube.
- 5.3.20 Insert safety plug.

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5.0 OPERATION OF GAMMA INDUSTRIES RADIOGRAPHIC EXPOSURE DEVICES (cont.)

5.4 STANDARD OPERATION (G/I GAMMATRON 100A)

- 5.4.1 Have an operating survey meter and always use it.
- 5.4.2 Place exposure device in the desired location and lay out the control cable and guide tube as straight as possible. Too many or too tight bends may restrict movement of the drive cable.
- 5.4.3 Remove dust cap from the lock box, exposing the pig-tail connector.
- 5.4.4 Turn control crank forward (clockwise) and expose about eight inches of drive cable.
- 5.4.5 Connect control cable to source pigtail, matching keyway to key on the male and female Saf-T-Key connector.
- 5.4.6 Crank the control cable back in (counter-clockwise) so that the male thread on the swivel connector can be screwed into the lock box. Attach control cable swivel connector to the lock box.
- 5.4.7 Remove safety plug from the outlet nipple on the front of the shield.
- 5.4.8 Connect source guide tube by pulling back the sleeve on the quick disconnect and slide the fitting over the outlet nipple. Slide the sleeve toward the shield and turn it to lock in place.
- 5.4.9 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 against spring pressure.

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5.0 OPERATION OF GAMMA INDUSTRIES RADIOGRAPHIC EXPOSURE DEVICES (cont.)

- 5.4.10 Crank source out smoothly, slowing the speed of cranking near the end of travel so as not to cause the source to strike the end piece with undue force.
- 5.4.11 Survey to determine that radiation levels are within prescribed limits.
- 5.4.12 At the end of the exposure, retract the source by cranking counter-clockwise.
- 5.4.13 SURVEY CAREFULLY TO INSURE THAT THE SOURCE HAS RETURNED TO THE SAFE POSITION. If the survey meter indicates that the source is not in the safe position, INSTITUTE EMERGENCY PROCEDURES AT ONCE.
- 5.4.14 Turn crank back (counter-clockwise) and depress lock plunger--only "A" models require that the handle be pulled back against spring pressure to allow the lock plunger to be depressed.
- 5.4.15 Disconnect control cable and screw dust cap in place.
- 5.4.16 Disconnect source guide tube and attach safety plug.
- 5.4.17 Return unit to storage area.

6.0 OPERATION OF X-RAY MACHINES

6.1 This procedure describes the operation of X-ray generating equipment used in Bran-Shon, Inc.'s radiography operations.

6.2 RESPONSIBILITIES

The Radiographer is responsible for operating the equipment described herein strict accordance with this procedure. Procedures for the use of TLD badges, dosimeters radiation survey instruments, the posting of radiation areas, and daily inspection will be followed without deviation.

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6.0 OPERATION OF X-RAY MACHINES (cont.)

6.3 PRECAUTIONS

- 6.3.1 X-ray generating devices are electrical equipment and as such the operator should always be aware of the potential shock hazard.
- 6.3.2 In the event of any emergency involving X-ray generating devices, the operator should follow the emergency instructions in Procedure 5.

6.4 GENERAL OPERATING INSTRUCTIONS

NOTE: A calibrated survey instrument is required for all radiographic operations.

- 6.4.1 Position X-ray equipment in general location for X-ray operation and inspect for damage.
- 6.4.2 Inspect all electrical connections for soundness, proper connection, and power supply voltage.
- 6.4.3 Perform all the necessary radiographic setups.
- 6.4.4 Establish the restricted area as described in Procedure 3.
- 6.4.5 Assemble X-ray generation device in accordance with manufacturers operating procedure.
- 6.4.6 Prior to energizing the device, check the established restricted area to assure no one has entered.
- 6.4.7 Energize the X-ray device in accordance with the manufacturers operating procedure for the desired exposure.
- 6.4.8 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 3.

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DEVICES AND X-RAY MACHINES

6.0 OPERATION OF X-RAY MACHINES (cont.)

- 6.4.9 Maintain direct surveillance during each radiographic exposure to preclude entry into the restricted area by unauthorized personnel.
- 6.4.10 After the desired exposure time has elapsed check to assure the X-ray device has deenergized and survey to verify X-ray tube is no longer producing X-rays.
- 6.4.11 For continued operation return to Step 4.6.
- 6.4.12 After the conclusion of X-ray operations disassemble X-ray generating device in accordance with the manufacturers operating procedure.
- 6.4.13 Complete applicable sections of Radiographic Operations Report, Form No. 1001. (See RS-GP-15 Records)

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PROCEDURE IDENTIFICATION

USE OF COLLIMATORS AND SOURCE POSITIONING DEVICES

1.0 SCOPE

- 1.1 This procedure describes the proper use of collimators and source positioning devices.
- 1.2 It shall be the responsibility of the Radiographer to follow this procedure without deviation.

2.0 USE OF COLLIMATORS

- 2.1 Radiation collimators shall be used whenever possible to limit the amount of primary radiation and reduce scatter radiation.

3.0 SLIDE ON COLLIMATORS

- 3.1 Slide-on-collimators-Slip over the guide tube stop and secure to the metal tip.
 - 3.1.1 CAUTION-Care should be used to avoid excessive torque to avoid crimping guide tube metal stop.

4.0 SCREW ON COLLIMATORS

- 4.1 Screw-on-collimators-Threaded connectors male to female ends on guide tube without stop. (extensions)
- 4.2 An inspection of each collimator must be performed prior to its use to insure that:
 - A. The collimator is free of dirt or any other obstruction
 - B. Connecting threads are not damaged and properly mate to extension
 - C. Collimator components are secure and not damaged
 - D. The collimator is securely attached to the guide tube or projector
- 4.3 The collimator should be securely screwed into a guide tube without stop (extension) or projector source outlet fitting.

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USE OF COLLIMATORS AND SOURCE POSITIONING DEVICES

4.0 SCREW ON COLLIMATORS (cont.)

4.4 Collimators shall be secured firmly in place for the duration of each exposure to preclude movement.

NOTE: Screw-on collimators should NEVER be used with more than two (2) sections of guide tube (14 Feet).

5.0 DESCRIPTION

5.1 SLIDE-ON-COLLIMATORS

5.1.1 SPEC-T1-Mini collimator has 8 HVL, depleted uranium ports, weighs 1.5 lbs., and is secured with a thumb screw.

5.1.2 TECH/OPS MODEL 799-Tungsten collimator with a 60° conical angle side port, weighs less than 2 lbs., and is secured with a thumb screw.

5.1.3 TECH/OPS MODELS 906 & 907-Lead collimator for use with the 900 Series, Gamma Ray Projectors. It weighs on 3 lbs. and is secured with two (2) clamping bolts.

5.1.4 TECH/OPS MODELS 911 & 912-Tungsten collimators for use with the 900 Series Gamma Ray projectors. The Model 911 weighs 2 lbs. and Model 912 weighs 5.5 lbs. Both models are secured by thumb screws.

5.2 SCREW-ON COLLIMATORS

5.2.1 TECH/OPS-

- A. 799 - Tungsten, 1.75 lbs, 60° Side Port
- B. 846 - Tungsten, 4.25 lbs., 360° Panoramic
- C. 827 - Tungsten 4.25 lbs., 60° Side Port
- D. 828 - Tungsten 9.5 lbs., 60° Beam Angle
- E. 822 - Uranium 238, 2 lbs., 30° x 60° Beam

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PROCEDURE IDENTIFICATION

USE OF JOLIMATORS AND OSURCE POSITIONING DEVICES

5.0 DESCRIPTION (cont.) 5.2.1

- F. 903 - Lead, 12 lbs., 360° Panoramic
900 Projector Series
- G. 904 - Lead, 13 lbs., 30° x 60° Side Port
900 Projector Series
- H. 782 - Lead, 15 lbs., 60° x 30° Side Port
IR192 or CO60
- I. 783 - Lead, 15 lbs., 30° x 60° Front Port
IR192 or CO60
- J. 784 - Lead 15 lbs., 20° x 360° Panoramic IR192
- K. 527 - Lead 32 lbs., 60° Beam or 360° Panoramic
- L. 719 - Lead & Uranium 238, 24 lbs., 60° Beam
or 360° Panoramic, IR192 or CO60.
(See figure 1)

6.0 USE OF SOURCE POSITIONERS

- 6.1 Source Pipe Positioners (See Figure 2) are devices that allow positioning of a radiographic source on the I.D. of piping through radiographic access openings that will not allow the use of guide tubes furnished with projectors.
- 6.2 Source Pipe Positioners should never be used with more than two (2) sections of tuide tube (fourteen [14] feet total).
- 6.3 The following items must be inspected whenever a Source Pipe Positioner is used:
 - 6.3.1 THE COPPER TUBE (PART F ON DRAWING), MUST BE CHECKED FOR DAMAGE OR KINKS.
 - 6.3.2 THE END CAP (PART E) MUST BE CHECKED FOR LOOSENESS AND SIGNS OF DAMAGE.
 - 6.3.3 THREADS ON ALL COMPONENTS MUST BE INSPECTED FOR DAMAGE OR GALLING.

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USE OF COLLIMATORS AND SOURCE POSITIONING DEVICES

6.0 USE OF SOURCE POSITIONERS (cont.)

- 6.4 Insert Positioner in desired location and screw part marked "H" in the gamma-ray opening in pipe until light.
- 6.5 Hand tighten part "D" on Assembly Movable to compress part "B" copper tube "F". This will prevent movement of the copper tube.
- 6.6 Hand tighten part "D" on Assembly Static to compress part "B" so as to lock assemblies on copper tube "F".
- 6.7 Attach source guide tube to part marked "J".

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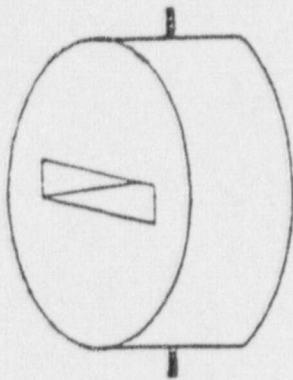
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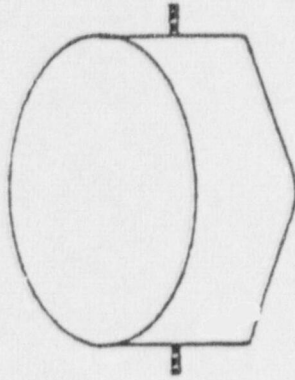
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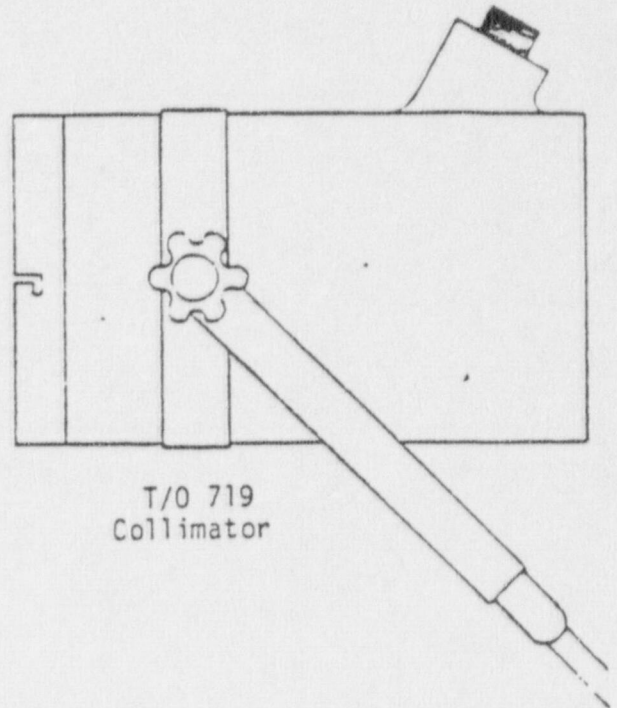
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FIGURE 1
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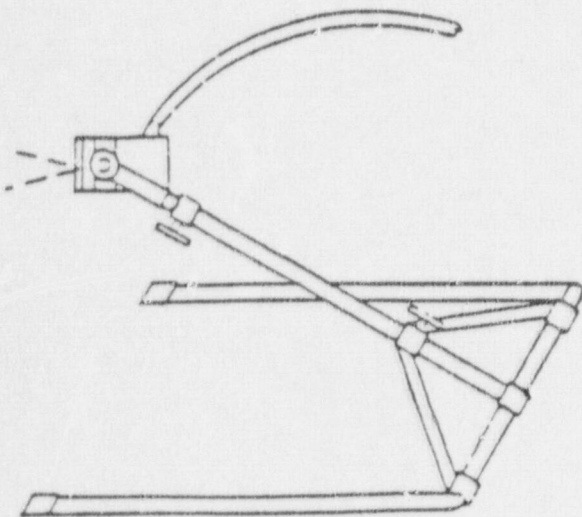
Directional
Insert



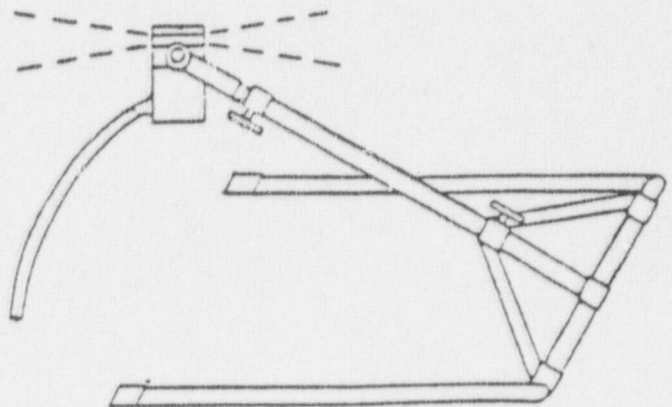
Panoramic
Insert



T/O 719
Collimator



Typical Directional
Exposure
 $30^{\circ} \times 60^{\circ}$



Typical Panoramic
Exposure
 $20^{\circ} \times 360^{\circ}$

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FIGURE 2
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Steel or Copper Tubing (hard)
1/2" O.D. X 0.35 Wall

Silver Solder
Plug in End

Brass
end Plug

(E)

(H)

(J)

(A) Knurl O.D.

(B)

(C)

(D)

(F)

(G)

(I)

Assembly
Moveable

Assembly
Static

BRAN-SHON, INC.
RADIOGRAPHIC SOURCE PIPE POSITIONER

BRAN-SHON, INC.
RADIOGRAPHIC SOURCE PIPE POSITIONER

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PROCEDURE IDENTIFICATION

INSPECTION AND MAINTENANCE OF RADIOGRAPHIC EXPOSURE DEVICES

1.0 SCOPE

This procedure delineates the method to be employed in the inspection and maintenance of radiographic exposure devices and accessories. The procedure is broken into two parts; a daily (when equipment is in use) inspection, and a periodic inspection.

2.0 RESPONSIBILITIES

- 2.1 It is the responsibility of the Radiation Safety Director to assure that all phases of the inspection and maintenance program are carried out in accordance with this procedure.
- 2.2 Radiographers will be responsible for performing the daily inspections and reporting any equipment malfunction or damage to the Radiation Safety Director. No attempt will be made to use any exposure equipment that is not working properly.
- 2.3 Only those Radiographers specifically designated by the Radiation Safety Director shall be authorized to perform shield assembly maintenance which requires projector disassembly.

3.0 DAILY INSPECTION PROCEDURE

To insure safety and avoid malfunctions that could impair the productivity of this equipment, daily (when in use) inspections will be made and the results recorded on the Radiographic Operations Report. (Form #1001)

3.1 Equipment will be inspected for completeness, as follows:

3.1.1 Shield (Radiographic Projector)

- A. Key for Lock
- B. Labels
- C. Source Identification Tag
- D. Shipping Plug

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3.0 DAILY INSPECTION PROCEDURE (cont.) 3.1.1

E. Connector Cap

3.1.2 Accessories

A. Control Cables

B. Source Guide Tubes

C. Collimator (where applicable)

D. Special Fixtures (where applicable)

3.2 Equipment will be inspected for serviceability, as follows:

3.2.1 Shield (Radiographic Projector)

A. Check functioning of lock

B. Check source exit fitting for dirt or possible damage

C. Check source connectors for dirt, looseness, binding, or possible damage

D. Check general hardware for looseness or missing items

E. Survey for excessive radiation levels

3.2.2 Accessories

A. Check source drive cable connector

B. Check for dirt at connector

C. Check for kinks, fraying, or flattening of guide tubes

D. Check source drive cable housing fittings

E. Check source drive cable housing for kinks, fraying, or flattening

F. Check crank for loose or missing hardware, damaged parts, and free turning

G. Check source guide tube fittings for possible damage

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PROCEDURE IDENTIFICATION

INSPECTION AND MAINTENANCE OF RADIOGRAPHIC EXPOSURE DEVICES

4.0 PERIODIC INSPECTIONS AND MAINTENANCE FREQUENCY

Periodic inspection and maintenance will be performed on all equipment in use at intervals not to exceed three (3) months and following exposure of equipment to unusually severe stress (e.g. dropping or submersion in water).

5.0 PERIODIC MAINTENANCE PROCEDURE

5.1 REMOVING DRIVE CABLE

5.1.1 The sealed source shall remain in the exposure device during periodic inspection unless shield assembly maintenance is needed, in which case the source shall be transferred to a source changer.

5.1.2 Eject the drive cable from the control cable housing by cranking the control in the "EXPOSE" direction and coil the cable.

5.2 INSPECTION OF DRIVE CABLE

5.2.1 Examine the cable for kinks, fraying, broken wire, or rust. Minor bends in the cable may be straightened by hand: **DO NOT USE PLIERS !!!** A cable with frayed or broken wires must be replaced. Light rust may be removed by hand wire brushing. Do not use a powered brush or abrasives. Heavy rust that has penetrated into the cable will cause unsatisfactory operation or complete failure: **Replace Cable**

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

5.2.3 Inspect the connector to check for wear. Tech/Ops connectors shall be checked with the Model 550 Go-No Go gauge. If the connector is worn, it is to be

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5.0 PERIODIC MAINTENANCE PROCEDURE (cont.) 5.2.3

taken out of service and replaced. Examine cable attachment to connector for straightness and evidence of looseness. A loose attachment or bend at this point must be repaired. Do not attempt to fabricate a replacement connector or to fasten it to the cable. The connector is a special heat treated steel made to exacting tolerances and under strict metallurgical control. The attachment is swagged with special tools and proof tested. Order a replacement. Lubricate the cable with "Unitemp" grease; 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.

5.3 CONTROL CABLE HOUSING

5.3.1 Remove the control cable housings by undoing the fitting nuts at each end.

5.3.2 Examine carefully for internal damage by flexing the housing by hand. Internal damage to the reinforcing braid or flexible metallic tube will be evidenced by a crunchy feeling when the cable housing is flexed. Cut, flattened, or burnt cable housings should be replaced. Superficial cuts or burns may be sealed or reinforced with tape. Replace any missing cable ties. Check fittings for secure attachment.

5.3.3 Clean housings by spraying a few ounces of solvent into bore and blow out with low pressure air. (Not more than 20 PSI) Do not allow solvent to remain. Do not soak in solvent.

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5.0 PERIODIC MAINTENANCE PROCEDURE (cont.)

5.4 CONTROL CRANK

- 5.4.1 Disassemble the crank unit. Wash parts in solvent. Check inside of housing for evidence of galling and wear. A deeply scored (more than .020 deep) line where the cable contacts the inner wall of the housing indicates the need for replacement.
- 5.4.2 Check clearance between the hubs of the wheel and the bushings. More than .005 clearance indicates replacement.
- 5.4.3 Examine teeth of wheel for damage. A bent tooth may be filed off. Two or more bent teeth adjacent will require replacement of the wheel.
- 5.4.4 Lubricate bushings with "Unitemp" grease and reassemble.

5.5 SOURCE GUIDE TUBES

- 5.5.1 Check for cuts, burns, kinks, dents, or crushed tubes
- 5.5.2 Check fittings for secure attachment. Examine and test the fittings for proper functioning.
- 5.5.3 Clean bore of tube with solvent and drain out promptly. Do not soak in solvent.
- 5.5.4 Check for free passage of source by holding tube vertical and dripping a dummy source assembly through the tube. The dummy assembly should fall through freely.

5.6 SHIELD ASSEMBLY

- 5.6.1 Check exterior for loose or missing hardware. Replace or tighten as required. Examine source exit fitting. Nut should rotate freely without excessive

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RADIOGRAPHIC EXPOSURE DEVICES

5.0 PERIODIC MAINTENANCE PROCEDURE (cont.) 5.6.1

shake. Look into exit port and check concentricity of source tube with nut. Misalignment, if found, indicates a damaged housing or shifting of the shield within the housing. (Do not attempt to disassemble or repair. Return to manufacturer for repair.) Pour an ounce or so solvent through the source tube from the cable connection end and drain.

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

5.6.3 If the inspection reveals a problem that would require shield disassembly, the Radiation Safety Director shall be notified.

5.7 SOURCE PIGTAIL CONNECTOR

5.7.1 Examine connector of the sealed source. Assembly should be clean and free from grit and dirt.

5.7.2 Check cable to connector junction for fraying or looseness.

5.7.3 Test engagement of connector with mating part of source drive cable.

5.8 REASSEMBLY

5.8.1 Reconnect the control cable housings to the control crank and the shield connector.

5.8.2 Feed the drive cable back into the control cable housing.

5.9 FINAL INSPECTION

5.9.1 Install the source guide tubes.

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5.0 PERIODIC MAINTENANCE PROCEDURE (cont.)

- 5.9.2 Operate the equipment several times by taking a simulated exposure in accordance with the applicable procedure.
- 5.9.3 If the equipment does not operate smoothly, it will be taken out of service and the manufacturer will be contacted for additional inspection and maintenance service.

5.10 INSPECTION RECORDS

- 5.10.1 Complete the Quarterly Maintenance Checklist Form (See Attachment #1)
- 5.10.2 Complete the Maintenance Sticker (See Attachment #2) and forward copy to the Radiation Safety Director's Department and retain copy to be inserted in the Source Record Book.
- 5.10.3 Affix the Maintenance Sticker to the exposure device.
- 5.10.4 Return the exposure device to storage position.

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Bran-Shon, Inc.

ATTACHMENT #1

P.O. BOX 451
DEERFIELD, OH 44411

PROCEDURE
IDENTIFICATION

INSPECTION AND MAINTENANCE OF
RADIOGRAPHIC EXPOSURE DEVICES

QUARTERLY MAINTENANCE CHECKLIST

CAMERA MODEL NO. _____ DATE _____
CAMERA SERIAL NO. _____

ANY PARTS FOUND DEFECTIVE SHALL BE REPLACED
RETURN (WORN OR DEFECTIVE) PARTS TO RSD

ACCEPTABLE

WORN OR DEFECTIVE

_____ LOCK BOX PROTECTOR CAP	_____
_____ PIGTAIL CONNECTOR	_____
_____ LOCK OPERATION	_____
_____ SOURCE SAFETY PLUG	_____
_____ SOURCE OUTLET NIPPLE	_____
_____ SOURCE TUBE DISCONNECT	_____
_____ SOURCE TUBE	_____
_____ SOURCE TUBE END OR COLLIMATOR	_____
_____ SOURCE IDENTIFICATION TAG	_____
_____ "CAUTION-RADIOACTIVE MATERIAL" LABEL	_____
_____ DRIVE CABLE CONNECTOR	_____
_____ DRIVE CABLE	_____
_____ DRIVE CABLE CONDUIT OR HOUSING	_____
_____ CONTROL ASSEMBLY	_____

REMARKS: _____

QUARTERLY MAINTENANCE PERFORMED BY: _____

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ATTACHMENT #2

P.O. BOX 451
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PROCEDURE
IDENTIFICATION

INSPECTION AND MAINTENANCE
RADIOGRAPHIC EXPOSURE DEVICES

MAINTENANCE INSPECTION STICKER

BRAN-SHON, INC.
1028 Lower Elkton Road
Columbiana, OH 44408
(216) 482-9922

MAINTENANCE INSPECTION

In accordance with Bran-Shon, Inc.'s
Radiation Safety Manual RS-GP-8

EXPOSURE DEVICE: _____

DATE: _____

INSPECTION DUE DATE: _____

INSPECTION PERFORMED BY: _____

X

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P.O. BOX 451
DEERFIELD, OH 44411

PROCEDURE
IDENTIFICATION

REPLACEMENT OF SEALED SOURCES

1.0 SCOPE

1.1 This procedure describes the proper methods to be used in exchanging sealed sources, using source changers listed in Paragraph

2.0 RESPONSIBILITY

2.1 It shall be the responsibility of the Assistant Radiation Director or the Radiation Safety Director or a designated Radiographer to perform source changing operations.

3.0 DESCRIPTION

3.1 Source changers are portable shielded shipping and storage containers designed to permit Field exchange of old for new sources without exposure of the operator to unsafe radiation levels.

4.0 STANDARD SOURCE REPLACEMENT PROCEDURES

- 4.1 An inspection of all source changing equipment will be made before all source changing operations. The source changer model number and serial number will be noted in the remarks column on the Radiographic Operations Report.
- 4.2 The exposure device and accessories will be inspected in accordance with the "Daily Inspection Procedure" in RS-GP-8.
- 4.3 The source changer will be inspected as follows:
- 4.3.1 Check for complete and proper labeling
 - 4.3.2 Check for proper security seals
 - 4.3.3 Check for obvious damage to the overpack or to the shield and source changer cover
 - 4.3.4 Check for excessive radiation levels
 - 4.3.5 Check for proper operation of the hold down caps and rods, plug, or lock assembly

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PROCEDURE
IDENTIFICATION

REPLACEMENT OF SEALED SOURCES

4.0 STANDARD SOURCE REPLACEMENT PROCEDURE (cont.) 4.3

4.3.6 Check fitting threads for dirt or damage

4.3.7 Check for proper operation and locking of the source guides

4.4 Cut the security seals and unlock and/or unbolt the shipping container or source changer cover.

4.5 Assemble the radiographic exposure device in accordance with the proper operation procedure.

4.6 Position the source changer at the outlet end of the exposure device.

4.7 Restrict and monitor the area in accordance with RS-GP-3.

4.8 Proceed as instructed in Paragraph 5.0, 6.0, and 7.0.

5.0 SOURCE CHANGING PROCEDURE -TECH/OPS MODEL 650

5.1 The shielding consists of a lead or depleted uranium filled steel shell. Imbedded in the shield is a "u" shaped source tube with both ends emerging from the shell. Midway in the "u" is a stop dividing it into two (2) compartments, one (1) for the new source, and one (1) for the depleted source. The closure mechanism consists of two (2) single or one (1) dual cap and hold down rod assembly which fasten down over the "u" tube ports to hold the source and connector firmly in safe position.

5.1.1 The Model 650 use 35 lbs. of depleted uranium 238 for shielding and has a capacity of 200 curies of Iridium 192 or 75 millicuries of Cobalt 60. The shipping weight is 66 lbs.

5.2 Connect the source guide tube as follows:

5.2.1 Break the security seal and unbolt the hold down cap.

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PROCEDURE IDENTIFICATION

REPLACEMENT OF SEALED SOURCES

5.0 SOURCE CHANGING PROCEDURE-TECH/OPS MODEL 650 (cont.) 5.2

- 5.2.2 Remove the hold-down cap. Take care as not to dislodge the new source.
- 5.2.3 Screw the source guide tube onto the exposed fitting over the empty channel.
- 5.2.4 Close and latch the source guides over the empty channel.
- 5.3 Following the applicable exposure device operation procedure, crank the source into the source changer.
- 5.4 Survey the source changer. The radiation level at the surface should be approximately 2 MR/HR per curie (including both the old and the new source), and in no case greater than 200 MR/HR.
- 5.5 Open the source guides to expose the source connector.
- 5.6 Disengage the male and female portions of the connector by depressing the spring-loaded locking pin and sliding the connector out through the keyway.
- 5.7 Disconnect the source guide tube from the source changer.
- 5.8 Connect the source guide tube to the fitting over the new source (after removing the caps and hold down rods).
- 5.9 Open the source guides to expose the source connector.
- 5.10 Engage the male and female portions of the connector by depressing the spring-loaded locking pin and sliding the connector into the keyed sleeve. Release the pin and make sure a proper connection has been made.
- 5.11 Close the source guides.
- 5.12 Crank the new source into the exposure device and secure it in accordance with the appropriate exposure device operation procedure.

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PROCEDURE
IDENTIFICATION

REPLACEMENT OF SEALED SOURCES

5.0 SOURCE CHANGING PROCEDURE-TECH/OPS MODEL 650 (cont.)

- 5.13 Survey both the source change and the exposure device. The radiation level at the surface of either container should be approximately 2 MR/HR per curie present in the container, and in no case greater than 200 MR/HR.
- 5.14 Disconnect the source guide tube from the source changer.
- 5.15 Reinstall the hold-down plug or rods and caps and attach security seals.
- 5.16 Exchange the source I.D. plates.
- 5.17 Reinstall the source changer cover and lock and/or attach the security seals.
- 5.18 Prepare the source changer for shipping in accordance with the procedure RS-GP-13.
- 5.19 Disassemble the exposure device in accordance with the appropriate exposure device operation procedure.

6.0 SOURCE CHANGING PROCEDURE-G/I C-10

6.1 G/I MODEL C-10

The shielding for this container consists of a depleted uranium filled steel shell. Imbedded in its shield is an "s" shaped stainless steel source tube with both ends emerging from its shell. There is no stop in the middle of the "s" tube. The closure mechanism consists of a plunger lock assembly at each end of the "s" tube that secure the source pigtails.

- 6.1.1 The Model C-10 use 30 lbs of depleted uranium and has a capacity of 200 curies of Iridium 192. The shipping weight, including the C-10 overpack barrel, is 70 lbs.

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PROCEDURE
IDENTIFICATION

REPLACEMENT OF SEALED SOURCES

6.0 SOURCE CHANGING PROCEDURE-G/I C-10 (cont.)

- 6.2 Open the lower lock of the source changer and remove the safety plug.
- 6.3 Connect the short guide tube supplied with the source changer to the exposure device and the source changer lower lock box.
- 6.4 Following the applicable exposure device procedure, crank the source into the source changer.
- 6.5 Survey the source changer. The radiation level at the surface should be approximately 2 MR/HR per curie (including both the old and the new source), and in no case greater than 200 MR/HR.
- 6.6 Lock the lower lock of the source changer onto the pigtail locking bolt.

CAUTION: The source could be removed from the lock box if the lock is not fully engaged.

- 6.7 Remove the exchange tube from the lower lock box.
- 6.8 Disconnect the control cable from the source pigtail.
- 6.9 Carefully attempt to move the pigtail into and out of the lock box to assure that the lock is depressed upon the pigtail locking ball. If the pigtail can be moved, open the lower lock and carefully move the pigtail and depress the lock upon the locking ball.

CAUTION: Do not move the pigtail more than $\frac{1}{2}$ "-this would move the source from its shielded position.

- 6.10 Remove the source protector cap from the upper lock box (labeled "new source") and attach it over the old source in the lower lock box.
- 6.11 Attach the control cable to the pigtail of the new source.

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PROCEDURE
IDENTIFICATION

REPLACEMENT OF SEALED SOURCES

6.0 SOURCE CHANGING PROCEDURE-G/I C-10

- 6.12 Attach the short exchange guide tube to the source changer upper lock box.
- 6.13 Unlock the upper lock from the new source.
- 6.14 Crank the new source into the exposure device and secure it in accordance with the appropriate exposure device operation procedure.
- 6.15 Survey the source changer and the exposure device. The radiation level at the surface of either container should be approximately 2 MR/HR per curie present in the container, and, in no case greater than 200 MR/HR.
- 6.16 Disconnect the exchange tube from the source changer.
- 6.17 Insert the safety plug into the upper lock box and lock it.
- 6.18 Exchange the source I.D. plates.
- 6.19 Secure the source changer, return it to the shipping container, and prepare it for shipping in accordance with applicable Procedure of Sub-Section I-III.
- 6.20 Disassemble the exposure device in accordance with the applicable exposure device operation procedure.

7.0 SOURCE CHANGING PROCEDURE-SPEC-C-1

7.1 RECEIVING PACKAGE

- 7.1.1 Survey exterior of shipping package. If radiation intensity exceeds 200 MR/HR, notify Radiation Safety Director. Otherwise, proceed as follows.
- 7.1.2 Inspect tamper seal on package (drum) closure ring. If not intact, notify Radiation Safety Director. Otherwise, proceed as follows.
- 7.1.3 Remove tamper seal, open drum, remove decay chart envelope, and remove C-1 source exchanger from drum.

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PROCEDURE
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REPLACEMENT OF SEALED SOURCES

7.0 SOURCE CHANGING PROCEDURE-SPEC-C-1

7.2 SOURCE EXCHANGE PREPARATION

IMPORTANT: Use only a properly functioning and calibrated survey meter at all times.

7.2.1 Place C-1 and exposure device on flat stable surface approximately two (2) feet apart. Position outlet end of exposure device toward rear of C-1.

7.2.2 Rotate C-1 carrying handle to fall against rear wall (toward exposure device).

7.2.3 Unlock C-1 padlock using key provided in decay chart envelope. Open top door.

7.2.4 Gently lay C-1 on its back. (The C-1 will be slightly inclined due to resting upon carrying handle). Open front door.

7.2.5 Remove changer tube and connect to exposure device and EMPTY side of C-1. Pull both connections to insure secure installation.

7.2.6 Open EMPTY side of C-1 by pulling up spring-loaded plunger knob and rotating slightly. The knob must be rotated in either direction to keep plunger in the retracted (open) position.

NOTE: 1. The spring-loaded plunger secures a source in the C-1 by pushing a rod against the pigtail cable (directly behind the source capsule) once the source has been fully installed within the shield. If the plunger is not retracted, the source is able to enter the C-1, but WILL NOT be in the shielded area and WILL NOT be able to be secured in place.

2. The empty side plunger of C-1 must be retracted before proceeding.

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REPLACEMENT OF SEALED SOURCES

7.0 SOURCE CHANGING PROCEDURE-SPEC-C-1

7.3 EXCHANGING SOURCE FROM EXPOSURE DEVICE TO C-1

- 7.3.1 Attach control assembly according to normal operating procedures.
- 7.3.2 With survey meter in hand, extend control assembly to its fullest extent, unlock exposure device and crank source into C-1.
- 7.3.3 While applying slight forward pressure on crank arm, approach C-1 with survey meter. Carefully survey exchange tube, C-1, and exposure device. If high radiation intensity is detected, return source to exposure device and notify Radiation Safety Director. If radiation intensity is safe, proceed as follows.
- 7.3.4 Rotate plunger knob until plunger snaps into its original engaged (closed) position.
- 7.3.5 Extend control assembly, and very gently attempt to crank source out of C-1. Resistance will indicate that the source is properly secure. Verify by surveying.
- 7.3.6 While applying forward pressure on crank arm, carefully disconnect end of exchanger tube attached to C-1.
CAUTION: Once disconnected, **DO NOT** pull exchanger tube away from C-1. **REMEMBER**, the source is still attached to the drive cable.
- 7.3.7 Gently crank FORWARD until approximately two (2) feet of drive cable has been exposed.
- 7.3.8 Carefully disconnect drive cable from source according to normal operating procedures.
- 7.3.9 Verify that the source has been properly secured in the shielded position by surveying.

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PROCEDURE
IDENTIFICATION

REPLACEMENT OF SEALED SOURCES

7.0 SOURCE CHANGING PROCEDURE-SPEC-C-1

7.4 EXCHANGING SOURCE FROM C-1 TO EXPOSURE DEVICE

CAUTION: The C-1 lock plunger must remain in its original, fully engaged (closed) position until instructed otherwise.

- 7.4.1 Connect control assembly to EMPTY exposure device according to normal operating procedures.
- 7.4.2 Connect exchanger tube to exposure device and loaded side of C-1 to establish proper distance between the two units. Disconnect exchanger tube from C-1 and crank forward until approximately two (2) feet of drive cable is exposed.
- 7.4.3 Connect drive cable to source according to normal operating procedures.
- 7.4.4 Gradually crank drive cable backward until all slack is removed. Connect the exchanger tube to C-1 and gently pull both exchanger tube ends to insure secure connections.
- 7.4.5 Open lock plunger by pulling up and rotating slightly. (Refer to 7.3.6 above)
- 7.4.6 With survey meter in hand, extend the control assembly completely and crank source into exposure device.
- 7.4.7 Approach exposure device with survey meter in hand, survey exchanger tube, exposure device and C-1. If high radiation intensity is detected, crank source back into C-1 following steps 7.3.2 through 7.3.5 above and notify the Radiation Safety Director.

NOTE:

If unable to shield source in either unit, immediately follow emergency procedures.

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PROCEDURE
IDENTIFICATION

REPLACEMENT OF SEALED SOURCES

7.0 SOURCE CHANGING PROCEDURE-SPEC-C-1 (cont.) 7.4.7

If survey indicates safe radiation intensity, lock exposure device, and proceed as follows.

7.4.8 Disconnect exchanger tube, insert inside of C-1, close and lock C-1, and prepare for shipping. Instructions follow.

7.5 PREPARING PACKAGE FOR SHIPPING

7.5.1 Place C-1 in shipping drum, insert packing material as needed to prevent excessive movement of C-1 inside drum, install lid, closure ring and tamper seal.

7.5.2 Survey exterior of drum. Radiation intensity must not exceed 200 MR/HR at surface or 10 MR/HR at one (1) meter. Prepare shipping documents according to applicable regulations.

NOTE:

If transported EMPTY the labeling and documents must be completed accordingly.

7.5.3 The CONSIGNOR or CARRIER of this package is required to comply with any requirement of the Government of any country through or into which the package is to be transported. Contact Source Production & Equipment Company, Inc., if assistance is required.

Bran-Shon, Inc.

P.O. BOX 451
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PROCEDURE IDENTIFICATION

RADIATION SURVEY INSTRUMENT CALIBRATION

1.0 SCOPE

This procedure describes the method to be used in guaranteeing that operable and calibrated radiation survey instruments are maintained at temporary sites.

2.0 RESPONSIBILITIES

- 2.1 The Radiation Safety Director's Department shall be responsible for the repair and recalibration of survey instruments as performed by Bran-Shon, Inc., or a qualified laboratory.
- 2.2 It is the responsibility of the Radiation Safety Director to assure that calibrated operable survey instruments are available at all sites where radiographic operations are to be conducted.
- 2.3 It is the responsibility of site Radiographers to assure that only calibrated operable survey instruments are used in radiography operations and that all out-of-calibration meters and those requiring maintenance or repair are promptly returned to the main office.

3.0 PROCEDURE

- 3.1 The Radiation Safety Director shall procure meters from the Radiation Safety Director's Department such that instrument calibration dates are staggered to assure that sufficient calibrated survey instruments are available for each job site.
- 3.2 The site Radiographer shall check all survey meters before leaving for a job site and any meters received at that location for:
 - 3.2.1 Proper calibration dates
 - 3.2.2 Damage
 - 3.2.3 Proper operational response to radiation

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PROCEDURE IDENTIFICATION

RADIATION SURVEY INSTRUMENT CALIBRATION

4.0 RECORDS

- 4.1 A calibration sticker will be affixed to the side of each survey instrument indicating the next calibration due date.
- 4.2 A record of calibration and service will be kept for all survey instruments by the Radiation Safety Director's Department.
- 4.3 Copies of survey instrument calibration reports shall be retained for meters used by each Branch at that location as required.

5.0 APPROVED SURVEY INSTRUMENT CALIBRATING LABORATORIES

- | | |
|-------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------|
| 5.1 Applied Health Physics, Inc.
2986 Industrial Blvd.
P.O. Box 197
Bethel Park, PA 15102
Phone (412)563-2242 | 5.4 Eberline Instrument Corp.
P.O. Box 2108
Santa Fe, NM 87501
Phone (505)471-3232 |
| 5.2 Southeastern Atomic
Laboratories
3520 Northwest 7th Ave.
Gainesville, FL
Phone (904)373-5924 | 5.5 Ridge, Inc.
4432 Bibb Blvd.
Tucker, GA 30084
Phone (404)939-1554 |
| 5.3 Technical Operations, Inc.
Radiation Products Division
40 North Ave.
Burlington, MA 01803
Phone (617)272-2000 | 5.6 Gamma Industries, Inc.
2255 Ted Dunham Ave
Baton Rouge, LA 70821
Phone (504)383-7791 |

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PROCEDURE IDENTIFICATION

TESTING FOR SEALED SOURCES

1.0 SCOPE

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

2.0 RESPONSIBILITIES

It is the responsibility of the Radiation Safety Director, or designated site Radiographer to perform this test and to insure that each sealed source is tested at intervals not to exceed six (6) months.

3.0 GENERAL REQUIREMENTS

3.1 Each sealed source shall be tested for leakage at intervals not to exceed six (6) months, unless the source is in storage. However, any stored source that was exempted from leak testing shall be tested when taken out of storage and prior to any use or transfer.

3.2 Only "Leak Test Kits" from the following list shall be used for wipe testing sealed sources:

- A. Health Physics Leak Test Kit No. HP-C2
- B. Technical Operations Model 518 Leak Test Kit
- C. Gamma Industries, Inc. Kowipe Leak Test Kit

4.0 PROCEDURE

4.1 Remove plug from storage container or from source tube port of exposure device.

4.2 Follow the specific manufacturer's instructions supplied with the leak test kits for preparing the solutions and/or swabs.

4.3 Wet the swab with solution. Shake off excess solution and insert the swab into the hole of the container. Wipe the interior of the hole thoroughly by rotating swab holder.

4.4 Withdraw swab and place in the plastic envelope.

Bran-Shon, Inc.

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PROCEDURE IDENTIFICATION

TESTING FOR SEALED SOURCES

4.0 PROCEDURE (cont.)

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

NOTE: Move the swab not the survey instrument.

4.6 If there is no indication on the meter, or if the indication is no more than 2 MR/HR above background, put the plastic envelope with the swab in the provided mailing box.

4.7 Mail the box to the Radiation Safety Director's Department.

4.8 If the swab should show more than 2 MR/HR, **DO NOT MAIL!** Contact the Radiation Safety Director or Assistant Radiation Safety Director for specific directions.

5.0 RECORDS

5.1 Fill out the record form supplied with the leak test kit (see RS-GP-15 Records for sample forms). Forward one copy (with the kit) to the Radiation Safety Director's Department, and retain one copy in the source record book.

5.2 The leak test certificate will be sent by the kit supplier to the Radiation Safety Director, who in turn will forward a copy to the site Radiographer for inclusion in the source record book.

Bran-Shon, Inc.

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PROCEDURE IDENTIFICATION

SHIPPING, RECEIVING AND TRANSPORTING RADIOACTIVE MATERIAL

1.0 SCOPE

This procedure describes the shipping, receiving, and transportation procedures of Bran-Shon, Inc. The transportation of radioactive materials is governed by the rules and regulations of the U.S. Nuclear Regulatory Commission, 10 CFR, PART 71, and the U.S. Department of Transportation, 49 CFR, PARTS 170 through 189 and PART 397.

2.0 RESPONSIBILITIES

- 2.1 It is the responsibility of the Radiographer to assure that the procedures are followed without deviation.
- 2.2 It is the responsibility of the Radiation Safety Director to establish, prior to transfer of radioactive materials to or between shops or field sites, that qualified personnel are at the shop or field site and that the radioactive material licenses are current where the shipment is to be received.
- 2.3 It is the responsibility of the supplier of by-product materials to ship radioisotopes to Bran-Shon, Inc. or field sites in approved containers and in accordance with all applicable rules and regulations.
- 2.4 It is the responsibility of common or contract carriers including air-carriers, to assume the responsibility for adherence to Federal and State rules and regulations governing the transportation of radioactive materials whenever radioactive materials are in their possession under a shipping contract with Bran-Shon, Inc.
- 2.5 It is the responsibility of Bran-Shon's employee assigned to transport radioactive materials in any vehicle under the control of Bran-Shon, Inc. to comply with these procedures without deviation.

Bran-Shon, Inc.

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PROCEDURE
IDENTIFICATION

SHIPPING, RECEIVING AND TRANSPORTING
RADIOACTIVE MATERIAL

3.0 DEFINITIONS OF TERMS

- 3.1 RECEIVING - means the acceptance of a radioactive material shipment from a carrier (trucking company or cargo airline). A receipt can take place at either the carrier's terminal or at Bran-Shon, Inc.'s Shop or field location.
- 3.2 SHIPPING - means the presentation of a radioactive material shipment to a carrier (trucking company or cargo airline).
- 3.3 TRANSPORTING - means the transferring of radioactive material between Bran-Shon, Inc. or to or from a carrier's terminal using only Bran-Shon, Inc.'s vehicle.
- 3.4 BRAN-SHON, INC. VEHICLE - means any motor vehicle owned or leased by Bran-Shon, Inc., or any private motor vehicle (such as an automobile) operated by Bran-shon, Inc. employee while that employee is engaged in activities related to his job.

4.0 USE OF SHIPPING AND RECEIVING PROCEDURES

- 4.1 For routine operations, sources shall be shipped, received, and transported in accordance with the applicable procedure, as indicated by the procedure title. Each step of the applicable procedure shall be completed.
- 4.2 For special situations (such as shipments of multiple sources) additional and/or alternate instructions will be provided by the Radiation Safety Director's Office.

5.0 RECEIVING SOURCES FROM A CARRIER

- 5.1 If a radioactive material package is delivered by the carrier, it must be accepted at the time it is delivered.
- 5.2 If a radioactive material package is to be held at the carrier's terminal for pickup, arrangements must be made to receive notification from the carrier of the arrival of the

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PROCEDURE
IDENTIFICATION

SHIPPING, RECEIVING AND TRANSPORTING
RADIOACTIVE MATERIAL

5.0 RECEIVING SOURCES FROM A CARRIER (cont.) 5.2

package at the time of arrival. The package must be picked up expeditiously upon receipt of the notification.

5.3 The package will be inspected for damage or evidence of unauthorized opening.

5.4 The package shall be physically surveyed at the surface and at three (3) feet from the surface with a calibrated survey instrument within three (3) hours after a receipt (or within 18 hours if receipt is made after normal working hours).

5.5 If the rading at the surface is in excess of 200 MR/HR, the emergency procedure (RS-Gp-5) will be invoked immediately and the Radiation Safety Director will be notified.

5.6 If the radiation levels are within the limits given in Paragraph 5.5, the source may be placed in storage or transferred to an exposure device.

5.7 The following information will be recorded on the "Radioactive Material Receiving Report":

A. Name of shipper

B. Date received

C. Shipping container model number

D. Shipping container serial number

E. Source type

F. Source serial number

G. Source strength

H. MR/HR at container surface and at 3 feet from the surface

I. Initials of person receiving source

5.8 Retain a copy of the Receiving Report (Form #1003) at the applicable Branch/Field location and forward the original to the Radiation Safety Director.

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PROCEDURE
IDENTIFICATION

SHIPPING, RECEIVING AND TRANSPORTING
RADIOACTIVE MATERIAL

6.0 SHIPPING SOURCES VIA CARRIER

6.1 Secure the source in the proper source changer or the exposure device, whichever is being shipped, and verify that there are no significant defects in the container.

6.2 Attach the lead-wire security seals.

6.3 Certain devices will be shipped in an overpack, as required by Table 1 of this procedure.

A. The container will be placed in the overpack and blocked in the center to prevent shifting during transit.

B. The overpack will be securely closed to prevent loss or shifting of the contents. Any crate or box shall be strong enough to survive under conditions normally incident to transportation, such as being dropped or roughly handled.

C. Each package will have some type of sealing device, which is not readily breakable and which, while intact, will be evidence that the package has not been illicitly opened.

D. The following should appear on the outside surface of the box or crate (NOTE: Lettering must be at at least $\frac{1}{2}$ " high):

1. "RADIOACTIVE MATERIAL--SPECIAL FORM, N.O.S.--UN 2974"
2. "INSIDE PACKAGE COMPLIES WITH PRESCRIBED SPECIFICATIONS"
3. (Applicable specification number from Table 1)
4. (Gross weight of package) 1b

6.4 Determine the proper shipping labels to be applied to the package based on radiation levels according to the following criteria (both readings will apply): (See Attachment 1 & 2)

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RADIOACTIVE MATERIAL

6.0 SHIPPING SOURCES VIA CARRIER (cont.) 6.4

LABEL DESIGNATION	MR/HR AT ANY AND	MR/HR AT 3 FEET
	ALL SURFACE POINTS	FROM SURFACE
RADIOACTIVE WHITE -I	0.5 OR LESS	0
RADIOACTIVE YELLOW -II	50 OR LESS	1.0 OR LESS
RADIOACTIVE YELLOW -III	200 OR LESS	10 OR LESS

The radiation levels will be determined by using a calibrated survey instrument. (See Figures 1, 2, & 3 of Attachments 1 & 2 for label identification).

CAUTION--Over-labeling is considered as undesirable as under-labeling.

- 6.5 Properly complete two (2) shipping labels indicating the contents (Iridium 192, Cobalt 60, etc.), the number of curies, and the Transport Index. (The Transport Index is the dimensionless number (rounded up to the first decimal place) expressing the maximum radiation level in MR/HR at 3 feet from the package surface (used on Yellow--II or III labels only).
- 6.6 Apply the two (2) properly completed labels to two (2) opposite sides of the package, one being placed near the address label. Be certain to remove any traces of old labels.
- 6.7 The following information will be indicated on the shipping papers (bill of lading):
- 6.7.1 "RADIOACTIVE MATERIAL--SPECIAL FORM N.O.S - UN 2974"
 - 6.7.2 Type of source (Iridium 192, Cobalt 60, etc.)
 - 6.7.3 Curie strength of source
 - 6.7.4 Label type (from Paragraph 6.4) required
 - 6.7.5 Transport Index (from Paragraph 6.5).
 - 6.7.6 Source serial number
 - 6.7.7 Container model number and serial number

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6.0 SHIPPING SOURCES VIA CARRIER (cont.) 6.7

- 6.7.8 Container specification number (from Table 1)
- 6.7.9 Date of shipment
- 6.7.10 Name and address of shipper (Bran-Shon, Inc. and local address)
- 6.7.11 Name and address of consignee
- 6.7.12 The following statement--"All shipping procedure requirements have been satisfied."
- 6.7.13 The following statement--"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."
- 6.7.14 Signature and title of person making the shipment.
- 6.8 If shipping a source by air (ONLY cargo aircraft are permitted to carry these materials), the following shall also apply:
 - A. Add "CARGO-ONLY AIRCRAFT" to item (A) of paragraph 6.7.
 - B. Complete two (2) copies of the "air certification" form indicating: "This shipment is within the limitations prescribed for Cargo-Only Aircraft."
 - C. Apply one (1) "Cargo-Only Aircraft" label (see Figure 4 of Attachment #2)
- 6.9 A copy of the shipping papers will be retained in the source records book and a copy will be forwarded to the Radiation Safety Director.
- 6.10 When shipping a source to another Bran-Shon, Inc's location, the following will also be observed:

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TABLE 1

CONTAINER MODEL NO.	CURIE CAPACITY	REQUIRED OVERPACK	SPECIFICATION
T/O 660	100 ci IR192	Wooden Crate or Metal Box	USA/9033/B(u) Type-B
T/O 900	100 ci IR192	Wooden Crate or Metal Box	USA/9141/B(u) Type-B
T/O 680	100 ci CO60	Wooden Crate or Metal Box	USA/9035/B(u) Type-B
T/O 650	100 ci IR192	None	USA/9033/B(u) Type-B
T/O 850	200 ci IR192	None	USA/9147/B(u) Type-B
T/O 771	100 ci CO60	None	USA/9107/B(u) Type-B
G/I Century S	100 ci IR192	#6717 Shipping Barrel	USA/9135/B(u) Type-B
G/I Century SA	100 ci IR192	#6717 Shipping Barrel	USA/9135/B(u) Type-B
G/I Gammatron 100A	100 ci CO60	None	USA/9127/B(u) Type-B
G/I C-10	100 ci IR192	#6717 Shipping Barrel	USA/9133/B(u) Type-B
G/I C-8	100 ci CO60	G/I Shipping Barrel	USA/9128/B(u) Type-B
SPEC-2T	100 ci IR192	SPEC Shipping Barrel	USA/9056/B(u) Type-B
SPEC-CO60 Model I	100 ci CO60		DOT-20WC
SPEC-C1	100 ci IR192	SPEC Shipping Barrel	USA/9036/B(u) Type-B

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6.0 SHIPPING SOURCES VIA CARRIER (cont.) 6.10

A. The responsible person at the destination will be notified by phone of the source transfer when applicable.

B. The source record book will be forwarded with the source.

6.11 See Procedure 7.0, Transporting Sources, if the source is to delivered to the carrier's terminal.

7.0 TRANSPORTING SOURCES VIA BRAN-SHON, INC.'S VEHICLE

7.1 Prepare the package for shipment in accordance with Paragraphs 6.1 through 6.6 of Section 6.0 (if shipping or transporting) or pick up the package at the carrier's terminal (if receiving--see Section 5.0).

7.2 The container or crate will be loaded onto Bran-Shon, Inc.'s transporting vehicle and properly secured so that it will not shift in transit. It will be locked in some manner to prevent unauthorized removal.

NOTE: If an automobile is used, the package will be secured in the vehicle's trunk.

7.3 A radiation survey of the vehicle will be taken to ascertain that the radiation level in the driver/passenger compartment and at 18 inches from any and all outside vehicle surfaces is no more than 2 MR/HR. (Lead or other shielding material shall be added, if necessary, to reduce radiation levels to meet these requirements.)

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

7.5 If the package bears Radioactive Yellow--III labels, four (4) "RADIOACTIVE" placards shall be affixed to the vehicle; one on the front, one on each side, and one on the rear.

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7.0 TRANSPORTING SOURCES VIA BRAN-SHON, INC.'S VEHICLE (cont.) 7.5

7.5.1 When transporting Radioactive Yellow Class III material, the following additional conditions shall be met:

1. At least 3 standard emergency flares or reflectors shall be placed on the vehicle.
2. A fire extinguisher having a rating of at least 10 B.C. shall be placed on the vehicle where readily accessible if needed.
3. The driver shall inspect for proper working condition before transport the following items.
 - A. service and emergency brakes
 - B. rear-vision mirror
 - C. horn
 - D. steering machanism
 - E. lighting devices and reflectors
 - F. windshield wipers
 - G. tires

7.6 Routes shall be chosen which avoid heavily populated areas, tunnels, narrow streets, etc., and which, to the extent possible, minimize time in transit. Interstate highway routes are preferred.

CAUTION: Certain roads, generally State thruways or turnpikes prohibit the passage of vehicles carrying radioactive materials or require special permits. Entrances to these roadways are posted. Unless advised by the Radiation Safety Director that proper permits have been obtained, no attempt will be made by Bran-Shon, Inc.'s controlled vehicles to use prohibited roads.

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7.0 TRANSPORTING SOURCES VIA BRAN-SHON, INC.'S VEHICLE

- 7.7 A qualified and certified Radiographer or Assistant Radiographer will accompany the vehicle driver or drive the vehicle himself.
- 7.8 The Radiographer or Assistant Radiographer will wear his dosimeter and TLD badge, and bring with him his copy of Bran-Shon, Inc.'s Radiation Safety Manual.
- 7.9 A shipping document is required to be visibly displayed within the immediate reach of the driver of the vehicle at all times when radioactive materials are on that vehicle, as follows:
- A. If receiving a source at a carrier's terminal, the shipping documents from the shipper shall be used.
 - B. If delivering a source to a carrier's terminal, the shipping documents from Section 6.0, Paragraph 6.7, shall be used.
 - C. If transferring a source, the appropriate entries shall be made on The Radiographic Operation Report in the source book, and it shall be used.

8.0 RECEIVING EMPTY DEPLETED URANIUM CONTAINER FROM A CARRIER

- 8.1 If a radioactive material package is delivered by the carrier, it must be accepted at the time it is delivered.
- 8.2 If a radioactive material package is to be held at the carrier's terminal for pick up, arrangements must be made to receive notification from the carrier of the arrival of the package at the time of arrival. The package must be picked up expeditiously upon receipt of the notification (See Section 10.0).
- 8.3 The package will be inspected for damage or evidence of unauthorized opening.

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8.0 RECEIVING EMPTY DEPLETED URANIAUM CONTAINER FROM A CARRIER

8.4 The applicable spaces on the Receiving Report will be completed and a copy forwarded to the Radiation Safety Director.

9.0 SHIPPING EMPTY DEPLETED URANIUM CONTAINERS VIA CARRIER

9.1 The empty container will be secured and sealed, as if a source was being shipped.

9.2 A tag shall be wired or taped to the device indicating the following:

A. Name of consignor (Bran-Shon, Inc.'s address and phone number)

B. The following statement - "EMPTY DEVICE-THIS PACKAGE CONFORMS TO THE CONDITIONS AND LIMITATIONS SPECIFIED IN 49 CFR 173.424 FOR EXCEPTED RADIOACTIVE MATERIAL. ARTICLES MANUFACTURED FROM DEPLETED URANIUM, UN 2909.

9.3 The container will be placed in a wooden crate or metal box (minimum outside dimensions-2" larger than container dimensions) and blocked in the center of the box or crate to prevent shifting during transit. (The radiation level at the box surface must not exceed 0.5 MR/HR.)

9.4 The crate or box will be securely closed to prevent a loss or shifting of the contents. It shall be strong enough to survive under conditions normally incident to transportation, such as being dropped or roughly handled.

9.5 Each package will have some type of sealing device, which is not readily breakable and which, while intact, will be evidence that the package has not been illicitly opened.

9.6 No special markings or labels are required on the outside of the crate or box. Be certain to remove or completely obliterate any traces of old markings or old shipping labels.

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9.0 SHIPPING EMPTY DEPLETED URANIUM CONTAINERS VIA CARRIER

- 9.7 No special shipping paper entries are required. The device shall be identified as "inspection equipment".
- 9.8 No special requirements are necessary for air shipments. Empty devices can be transported on both cargo and passenger carrying aircraft.
- 9.9 When shipping an empty container to another Bran-Shon, Inc. location, the responsible person at the destination will be notified by phone concerning the transfer.
- 9.10 See Section 10.0 if the container is to be delivered to the carrier's terminal.

10.0 TRANSPORTING EMPTY DEPLETED URANIUM CONTAINERS VIA BRAN-SHON, INC.'S VEHICLE

- 10.1 Prepare the container for shipment in accordance with Paragraphs 9.1 through 9.5 of Section 9.0 (if shipping or transporting) or pick up the package at the carrier's terminal (if receiving--see Section 8.0).
- 10.2 The box or crate will be loaded onto Bran-Shon, Inc.'s transporting vehicle and properly secured so that it will not shift in transit. It will be locked in some manner to prevent unauthorized removal.

NOTE: If an automobile is used, the package will be secured in the vehicle's trunk.

- 10.3 There are no special requirements for displaying shipping papers.

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FIGURE I

"RADIOACTIVE WHITE - I" LABEL

FIGURE II

"RADIOACTIVE YELLOW - II" LABEL



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PROCEDURE
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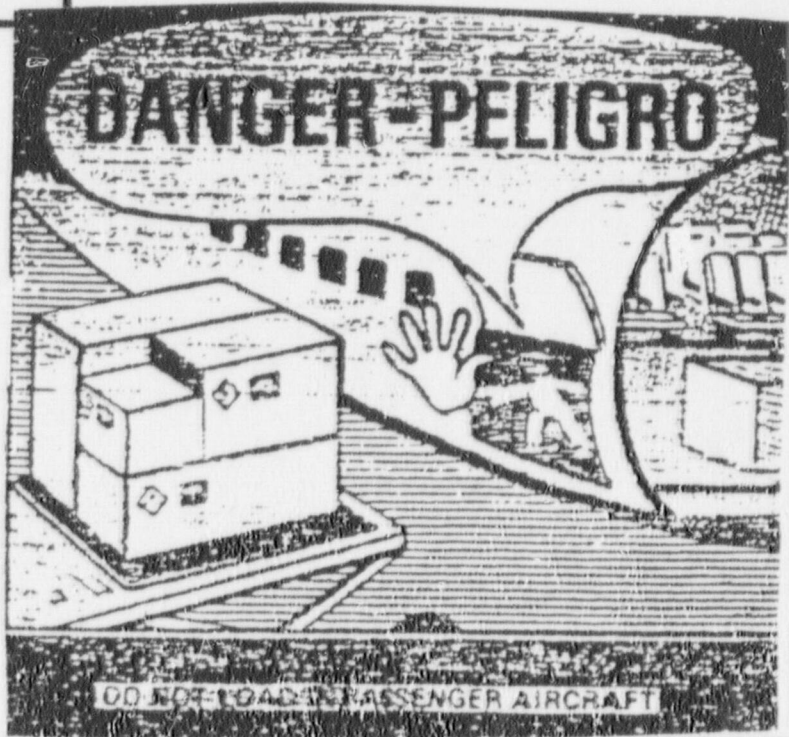


FIGURE III

"RADIOACTIVE YELLOW - III" LABEL

FIGURE IV

"CARGO-ONLY AIRCRAFT" LABEL



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PROCEDURE IDENTIFICATION

RADIOACTIVE MATERIAL INVENTORY

1.0 SCOPE

The following procedure describes the method of taking a quarterly inventory of radiation sources.

2.0 RESPONSIBILITIES

It shall be the responsibility of the Radiation Safety Director and site Radiographer to take quarterly inventories at their respective locations.

3.0 TIME OF INVENTORY

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

3.2 Inventories will be made during the first week of January, the first week of April, the first week of July, and the first week of October.

4.0 INVENTORY PROCEDURE

4.1 A physical source inventory will be taken of all sources received and in the possession of Bran-Shon, Inc.

4.2 Source storage containers or exposure devices will be removed from their place of storage.

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

5.0 RECORDS

5.1 The Inventory Record (Form #1002) will be used in recording the following quarterly inventory information.

A. Location

B. Date of Inventory (fill in date and year by appropriate month)

C. Source type

D. Source serial number

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RADIOACTIVE MATERIAL INVENTORY

5.0 RECORDS

- E. Source strength at day of inventory
- F. Manufacturer and model number of exposure device or container
- G. Serial number of exposure device or container
- H. MR/HR at container surface
- I. Initials of person taking inventory

5.2 The completed Inventory Record (Form #1002) will be forwarded to the Radiation Safety Director. (See RS-GP-15 RECORDS)

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PROCEDURE IDENTIFICATION

INTERNAL AUDITING SYSTEM

1.0 SCOPE

1.1 This procedure establishes the guidelines for auditing Radiographers and Assistant Radiographers to assure compliance with Bran-Shon, Inc.'s Operating and Emergency Procedures and applicable USNRC and/or state rules and regulations.

2.0 RESPONSIBILITIES

2.1 Audits shall be conducted at intervals not to exceed three (3) months by Bran-Shon, Inc.'s Radiation Safety Director and/or his Assistant(s) Radiation Safety Director(s).

3.0 AUDITS

3.1 Audits shall be conducted on an announced and unannounced basis at the discretion of the Auditor.

3.2 Audits shall be at intervals not to exceed three (3) months on each Radiographer and/or Assistant Radiographer for compliance with the procedures contained in this manual.

3.3 The items to be audited are listed in the Radiographers Quarterly Audit, Form #1005 (See Attachment #1).

4.0 REVOKING RADIOGRAPHERS CERTIFICATION

4.1 When the Radiographer cannot demonstrate thorough understanding of the items listed in the Radiographers Quarterly Audit, (Form #1005 See Attachment # 1) he shall:

4.1.1 Be terminated from working with Radioactive Material until he:

A. Completes additional training in the areas of deficiency.

B. Depending upon the severity of the non-compliance, be terminated from employment with Bran-Shon, Inc.

5.0 UPGRADING

5.1 In compliance with USNRC Rules and Regulations, and Bran-Shon,

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INTERNAL AUDITING SYSTEM

5.0 UPGRADING (cont.) 5.1

Inc.'s NRC License condition as contained in Bran-Shon, Inc.'s Radiation Safety Training Program, Section 6.0, all Radiographers shall complete an annual review and receive a refresher course. (See Form #1006 Attachment #2)

6.0 RECORDS

6.1 All records of Radiographers and Assistant Radiographer shall be retained by Bran-Shon, Inc.'s Radiation Safety Director's

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B R A N - S H O N , I N C .

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RADIOGRAPHER'S PERFORMANCE AUDIT

CUSTOMER _____ DATE _____

LOCATION _____

USNRC REGION: I II III IV V STATE _____

RSO OR JOB RADIOGRAPHER _____ ASST. RAD. _____

PROJECTOR SN# _____ RADIOACTIVE CONTENT _____

SURVEY COMMENTS

1. DOSIMETERS CHARGED DAILY AND READINGS RECORDED. SN# _____ SN# _____
COMMENT _____
2. RADIATION SURVEY METER(S) IN PROPER WORKING ORDER; INCLUDING CALIBRATION DATE.
COMMENT _____ SN# _____ CAL. DATE _____
3. FILM BADGES PROPERLY WORN AND STORED
COMMENT _____
4. COPY OF RADIOGRAPHIC OPERATIONS MANUAL (RSM-1) AVAILABLE AND COPY OF USNRC OR APPLICABLE STATE LICENSE
COMMENT _____
5. COPY OF THE APPLICABLE USNRC OR STATE RULES AND REGULATIONS AVIALABLE
COMMENT _____
6. COPIES OF USNRC FORM #3 OR APPLICABLE STATE FORM PROPERLY POSTED
COMMENT _____
7. PROJECTORS POSTED TO INDICATE CONTENTS
COMMENT _____
8. RADIOISOTOPE STORAGE BUILDING OR MOBILE LAB PROPERLY POSTED TO INDICATE RADIOACTIVE MATERIAL
COMMENT _____
9. RECORDS OF SOURCE STORAGE, EQUIPMENT MAINTENANCE AND UTILIZATION
COMMENTS _____

10.0 RECORDS OF VEHICLE SURVEY (WHEN APPLICABLE)

COMMENT _____

11.0 RADIATION AREA POSTING

COMMENTS _____

=====

REMARKS

SIGNATURES:

BSI-RED

RADIOGRAPHER

ASST. RADIOGRAPHER

Bran-Shon, Inc.

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RADIOGRAPHER'S PERIODIC REFRESHER TRAINING

As required by CFR Part 34.11 Sub-paragraph (b)(2) and in Bran-Shon, Inc.'s License condition as contained in Bran-Shon, Inc. RSTP Section 6.0 and RSM-RS-GP-14 Paragraph 5.0.

I. RADIOGRAPHERS NAME _____ SOCIAL SECURITY NO. _____

II. Date of Original Radiographers Certification by Bran-Shon, Inc. _____

III. SUBJECT(S) REVIEWED _____ TYPE REVIEW: ORAL ☐ WRITTEN ☐ DEMO ☐

1. Review and critique of internal radiographers experience
2. Discussing of available radiographers experience
3. Review and discuss personnel doses and reduction
4. New procedures and regulations
5. Review critical operating and emergency procedures
6. Review at least one fundamental radiation topic
7. Review Radiographer's Performance Review

IV. Time allotted to Subjects 1. _____ 2. _____ 3. _____
4. _____ 5. _____ 6. _____ 7. _____

V. Radiation Safety Directors review and comments.

Comments _____

VI. STATEMENT OF UNDERSTANDING

I _____ do herewith express understanding and the subjects contained in III. Items 1 thru 7.

VII. CERTIFICATION

I certify that the foregoing review was conducted by me. An interview was entertained with the Radiographer to further his understanding of BSI Radiation Safety Program.

Signed _____ Date _____ Next Review Required _____
Radiation Safety Director

Bran-Shon, Inc.

P.O. BOX 451
DEERFIELD, OH 44411

RECORD FORMS

FORM

#1001	RADIOGRAPHIC OPERATIONS REPORT, SOURCE UTILIZATION, INSPECTION
#1002	QUARTERLY INVENTORY RECORD
#1003	RADIOACTIVE MATERIAL RECEIVING REPORT

SAMPLE FORMS

1.	WEEKLY TIME SHEET/DOSIMETER LOG
2.	LEAK TEST FORM--TECH/OPS MODED 518
3.	LEAK TEST FORM--HEALTH PHYSICS NO. HP-C2
4.	LEAK TEST FORM--GAMMA INDUSTRIES KOWIPE
5.	SHIPPING/CERTIFICATION FOR RADIOACTIVE MATERIAL
6.	D.O.T. SHIPPING CERTIFICATE
7.	RADIOACTIVE SOURCE EXCHANGE QUALIFICATION
8.	LEAK TEST RECORD
9.	LEAK TEST QUALIFICATIONS
10.	VEHICLE ACCIDENT NOTICE
11.	RADIATION SAFETY INCIDENT DATA REPORT

RADIOGRAPHIC OPERATIONS REPORT

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

LOCATION of Source Use: City _____ State _____ Date _____ District/Branch _____

CUSTOMER _____ PROJECT _____ Job No. _____

Part B: "Source of Radiation"

Ir _____ Co _____ X-Ray _____
Model _____ S/N _____
Activity _____ curies

"Projector"

Model No. _____ S/N _____
In Storage _____
Storage Dates: _____
(1 wk maximum)

"Survey Instrument"

Model No. _____ S/N _____
Cal Due: _____
Backup Meter S/N: _____

Part C: Transport To (Location from Part A):

1) Placing Projector in vehicle:
_____ mr/hr surface Storage container
_____ Transport Index (0.1-10.0)
Label class: I _____ II _____ III _____

Truck/Vehicle No. _____
2) Vehicle Placarded _____ Yes _____ No _____
_____ mr/hr @ 18" from vehicle
_____ mr/hr @ driver

(Complete applicable column(s) 1&2, or 2&3, or 4)

3) Projector remaining in _____ (X)
vehicle from previous
transport
_____ Transport Index
Label Class: I _____ II _____ III _____

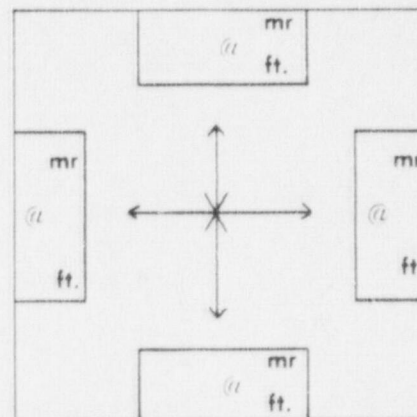
Material prepared for transport in accordance with written procedures by the Radiographer signed below (Part H).

Part D: Radiographic Operations:**Daily Equipment Inspection Check List**

(X) OK (NA) Not Applicable (*) See Remarks

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

Maint. inspection performed or witnessed by the Radiographer signed below (Part H)

RESULTS OF PHYSICAL SURVEY

Personnel Informed: _____

_____ Signs _____ Rope _____ Exposure Room
_____ Constant Surveillance

Part E: Securing Radiographic Operations:

Record of physical survey made to determine source is in shielded position when securing exposure device: _____ mr/hr @ surface or at 6" from device as required.
Survey performed or witnessed by Radiographer signed below (Part H).

Length of Exposure: _____

Number of Exposure: _____

Total Exposure Time: _____ hr _____ min.

Part F: Transport From/Return: Destination: City _____ State _____ Location _____

Truck/Vehicle No. _____ (X) if same as Part C (Complete the applicable column(s) 1&2, or 3, or 4)

- 1) Placing Projector in vehicle: _____ mr/hr surface Storage container
- _____ Transport Index (0.1 - 10.0)
- Label Class: I _____ II _____ III _____
- 2) Vehicle Placarded _____ Yes _____ No _____
- _____ mr/hr @ 18" from vehicle
- _____ mr/hr @ driver
- 3) Projector not used or removed from vehicle _____ (X)
- 4) Not transported: _____ (X)

Material prepared for transport in accordance with written procedures by the Radiographer signed below (Part H).

Part G: Storage Survey: _____ mr/hr when the projector is placed in storage, as performed in accordance with 10 CFR 34.43 (d). Survey Performed or witnessed by Radiographer signed below (Part H).

(Survey when the projector is placed in the storage vault, or other approved storage location.)

(When the projector is stored in the vehicle this survey shall be the same as Part F Column 1 line 1)

Part H: The Below signed individual(s) herein verify that the above listed information (Part A thru Part G) is accurate and has been completed in accordance with Bran-Shon, Inc. License procedures, State, and Federal Regulations. In addition, the above named materials have been properly classified, described, packaged, marked, and labeled, and are in proper condition for transport according to the applicable regulations of the Department of Transportation.

RADIOGRAPHER: _____ RADIOGRAPHER'S ASSISTANT: _____
Remarks: _____

RADIATION RECORD FORM

BYPRODUCT RADIOACTIVE MATERIAL QUARTERLY INVENTORY

The individual signing below herein certifies that this Radioactive Material Inventory Report has been completed in accordance with Bran-Shon, Inc. Procedure No. 13 and USNRC 10 CFR 34 Part 34.26 for the _____ calendar quarter of 19 _____.

Date of Inventory _____ Individual Performing Inventory _____
Location of below listed material _____

[illegible]

Inventory Performed by _____

P.O. BOX 451
DEERFIELD, OH 44411

"RADIOACTIVE MATERIAL RECEIVING REPORT"

RECEIVING DATE: _____ TIME RECEIVED: _____

LOCATION: _____

MATERIAL RECEIVED FROM: _____

CARRIER: _____

RADIOACTIVE MATERIAL TYPE: (IR192) _____ (CO60) _____ (OTHER) _____

SOURCE SERIAL # _____ ACTIVITY _____

REMARKS: _____

CONTAINER TYPE: SOURCE CHANGER _____ MODEL# _____ SERIAL# _____

EXPOSURE DEVICE _____ MODEL# _____ SERIAL# _____

PHYSICAL RADIATION SURVEY OF CONTAINER:

RADIATION LEVEL@EXTERNAL SURFACE _____ MR/HR

RADIATION LEVEL@THREE(3) FEET FROM EXTERNAL SURFACE _____ MR/HR

RADIOACTIVE YELLOW _____ LABEL _____ TRANSPORT INDEX _____

IS SOURCE ACCOMPANIED BY: DECAY CURVE _____
EVIDENCE OF LEAK TEST _____

IF SOURCE IS RECEIVED IN SOURCE CHANGER, WHAT DEVICE IS SOURCE TO BE
INSTALLED IN?

EXPOSURE DEVICE: MODEL# _____ SERIAL# _____

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

****** Radiation levels should not exceed the following:

200MR at the surface of the container

10 MR at three (3) feet from the surface of the container

****** IMMEDIATELY NOTIFY THE RADIATION SAFETY DIRECTOR IF THE
RADIATION LEVELS EXCEEDS THE LEVELS SPECIFIED ABOVE.

Signature _____ DATE _____

WEEKLY TIME AND DOSIMETER RECORD

BRAN - SHON , INC .

P.O. BOX 451

DEERFIELD, OH 44411

(216)654-4905/(216)482-9922

NOTICE

THIS INFORMATION
MUST BE COMPLETE

PLEASE BEAR DOWN AND PRINT LEGIBLE

JOB LOCATION	PATROLL - WEEK ENDING
EMPLOYEE NAME (FIRST) (NO NICK-NAME)	(MIDDLE INITIAL) (LAST)
EMPLOYEE ADDRESS FOR RECEIVING PATCH (IF DIFFERENT FROM BELOW)	
EMPLOYEE ADDRESS FOR RECEIVING FILM BADGE AND OTHER MAIL	
DOSIMETER NO	

TIME REPORT				EXPENSE REPORT				DAILY REPORT					
DATE AND DAY	JOB NUMBER	HOURS WORKED		EXPLANATION OF HOURS NOT CHARGED CUSTOMER	PER DIEM	PERSONAL AUTO		CASH RECEIPTS MUST BE ATTACHED		MILES TRUCK DRIVEN	IF TRUCK SERVICED SHOW SPECIFIC READING	VEHICLE NO	DOSIMETER READING
		TOTAL	CUSTOMER HOURS			VAC HRS	MILES DRIVEN	AMOUNT	TRUCK REPAIR				
MON													
TUE													
WED													
THUR													
FRI													
SAT													
SUN													
												TOTAL	

EMPLOYEE SIGNATURE

HOURS APPROVED BY

FILED BY

"EXAMPLE"



40 NORTH AVENUE
BURLINGTON, MA. 01803
(617) 272-2000

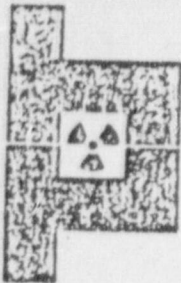


Co. Name BRAN-SHON, INC. P.O. No. MM-27-58
Street 1028 Lower Elkton Rd. NRC or INSERT NRC LICENSE #
City, State Columbiana, Ohio State License No. _____
Projector
Model No. T/o 660 Serial No. 3292
Source
Model No. A-424-1 Serial No. 66-3292 Curies 27
IR-1/2 X CO-60 _____ CS-137 _____ Other _____
Wipe
Performed By INSERT SIGNATURE Date 10-20-87

The United States Nuclear Regulatory Commission requires that radiographic sources be tested for evidence of leaking at the time of manufacture and thereafter at not more than six-month intervals.
The amount of removable contamination must not exceed 0.005 microcuries. If the test shows more than 0.005 microcurie of removable contamination, the source and equipment must be immediately taken out of service and be repaired or be disposed of. Please note that this source must be tested again on or before _____

FOR TECH-OPS USE ONLY

ORIGINAL



CERTIFICATE OF RADIOACTIVITY LEAK TEST

RS-GP-15

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HEALTH PHYSICS ASSOCIATES LTD. CONSULTANTS IN RADIATION SAFETY

"EXAMPLE"

2356 SKOKIE VALLEY ROAD / HIGHLAND PARK, ILL. 60035 / PHONE: (312) 433-3330

Name BRAN-SHON, INC. Test Due, on/or Before 5-16-88
Address 1028 Lower Elkton Rd. License No. INSERT NRC LICENSE
City Columbiana State Ohio Zip Expiration Date 10-20-92
Equipment Manufacturer T/O 660 Model No. 8955 Serial No. 66-3292
Isotope IRIDIUM 192 Curiage 47 Date 5/12/86 Source Serial No. 34-8955
Individual performing test INSERT NAME Date 10-20-87
This test was performed in accordance with H.P. Associates instructions included in this kit, No. 286

INSERT SIGNATURE
(Signature of Individual Performing Test)

(To be filled out by Health Physics Associates)

DATE SAMPLE RECEIVED DATE SAMPLE PROCESSED

TEST DATA

Sample	CPM (Net)	DPM	Microcuries
1			
2			
3			
Standard			

CPM — Counts Per Minute
DetectedDPM — Disintegrations Per
MinuteM — Less than 0.0001
Microcuries

CONCLUSION:

Results of this test indicate the presence of less than 0.005 microcuries of removable contamination and meet presently accepted standards of radiation safety. In accordance with prevailing regulations, this source should again be leak tested on or before

Approved for Health Physics Associates



Gamma Industries Inc.

2255 Ted Dunham Avenue
Baton Rouge, Louisiana 70802
(504) 387-1707 — Telex 586473

KOWIPE LEAK TEST KIT

*EXAMPLE:

COMPANY: BRAN-SHON, INC.

ADDRESS: Columbiana, Ohio

SOURCE
MANUFACTURER: GAMMA INDUSTRIES

DATE OF TEST: 10-20-87

ISOTOPE: IRIDIUM 192

SOURCE STRENGTH (ci): 27 CURIES

SOURCE
SERIAL NO. 66.3292

REMARKS: N/A

GAMMA INDUSTRIES LEAK TEST KIT SERVICE

NOTICE: Control of sealed Radioisotope sources by The U.S. Nuclear Regulatory Commission and The Agreement States require leak tests at defined intervals — six months for Beta-Gamma Sources, or three months for Alpha Sources, or as required by specific licenses. Licensee's performing their own leak tests must be licensed to do this and procedures for performing the tests must be approved by the NRC or Agreement State. Licensees may choose to have required leak tests performed by some other entity which has been approved by the NRC or Agreement State.

Gamma Industries has been approved to perform leak tests on radioisotope sealed sources. This is accomplished using the KOWIPE Leak Test Kit.

BKGD	TOTAL CPM	EFF %	DPM	MICROCURIE CONTAMINATION

INSTRUCTIONS FOR USING THE KOWIPE LEAK TEST KIT

1. Completely identify the source being leak tested by providing information on KOWIPE Leak Test Kit.
 2. DO NOT attempt to test the sealed source capsule because of the possible excessive personnel radiation exposure. The test shall be performed by swabbing an area most accessible to the source.
 3. Using a survey meter, ascertain that the source is in a safe, shielded position.
 4. Instructions:
 - a) Dissolve the contents of attached packet in a small volume of water.
 - b) Remove swab in packet on left. Dip cotton tip in the solution and proceed with the wipe test by swabbing areas nearest and most accessible to the source.
- a) Replace the swab in the same container from which it was removed.
 - b) Remove the second swab and perform the wipe test with the swab dry.
 - c) Return the swab to the container.
 - d) It is important that the swabs be placed in the proper container.
 - e) Be sure the requested information is compiled to properly identify the source.
 - f) Return the KOWIPE Leak Test Kit to Gamma Industries for analysis.

Bran-Shon, Inc.

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P.O. BOX 451
DEERFIELD, OH 44411

"SHIPPING/CERTIFICATION DOCUMENT FOR RADIOACTIVE MATERIAL"

SHIPPED TO: _____ CARRIER: _____

WEIGHT: _____

PROPER SHIPPING NAME



RADIOACTIVE MATERIAL
SPECIAL FORM N.O.S. "UN-2974"



RADIOACTIVE MATERIAL
L.S.A., N.O.S.

"EXPOSURE DEVICE AND MATERIAL IDENTIFICATION"

EXPOSURE DEVICE	SERIAL NO.	SOURCE NO.	NRC CERT. OF COMP.	TYPE OF PACKAGE
T/O 660			USA/9033/B(U)	TYPE B
T/O 900			USA/9147/B(U)	TYPE B
T/O 680			USA/9035/B(U)	TYPE B
G/I CENTURY S (NEW)			USA/9135/B(U)	TYPE B
G/I CENTURY SA (NEW)			USA/9135/B(U)	TYPE B
G/I GAMMATRON 100			USA/9127/B(U)	TYPE B
G/I CENTURY S (OLD)			USA/6717/B()	TYPE B OVERPACK
G/I CENTURY SA (OLD)			USA/9135/B()	TYPE B OVERPACK
SPEC-2T			USA/9056/B(U)	TYPE B
SPEC-C060-MODEL I				DOT-20WC
SOURCE CHANGERS	SERIAL NO.	SOURCE NO.	NRC. CERT. OF COMP.	TYPE OF PACKAGE
T/O 650			USA/9033/B(U)	TYPE B
T/O 850			USA/9147/B(U)	TYPE B
T/O 771			USA/9107/B(U)	TYPE B
G/I C-10			USA/9133/B(U)	TYPE B
G/I C-8			USA/9128/B(U)	TYPE B
SPEC C-1			USA/9036/B(U)	TYPE B

NATURE AND QUANTITY OF CONTENTS

LABELING

RADIONUCLIDE	FORM	ACTIVITY IN CURIES
IRIDIUM 192	SPECIAL FORM	
COBALT 60	SPECIAL FORM	
CESIUM 137	SPECIAL FORM	
DEPLETED U238	NORMAL FORM	
LB. AT .15 MCI/LB.		

SHIPPING LABEL	TRANSPORT INDEX
RADIOACTIVE WHITE I	
RADIOACTIVE YELLOW II	
RADIOACTIVE YELLOW III	

SHIPPERS CERTIFICATION

This is to certify that the above named materials are properly classified, described, packaged, and labeled; and are in proper condition for transportation according to the applicable of the DEPARTMENT OF TRANSPORTATION (D.O.T.)

TRANSPORTATION BY AIR

This shipment is within the limitations prescribed for cargo - only aircraft.

SIGNATURE

DATE

Bran-Shon, Inc.

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P.O. BOX 451
DEERFIELD, OH 44111

"DEPARTMENT OF TRANSPORTATION(D.O.T.) SHIPPING CERTIFICATE"

NRC PACKAGE APPROVAL # _____

TRUCK/VEHICLE # _____ DRIVER _____

RADIATION SURVEYS:

SURFACE OF TRANSPORT CONTAINER _____ MR/HR

THREE (3) FEET AWAY FROM CONTAINER _____ MR/HR

TRANSPORT INDEX: (0.1 to 10.0) _____ MR/HR

RADIOACTIVE YELLOW LABEL: CLASS I _____ CLASS II _____ CLASS III _____

() MOBILE LAB () PRIVATE VEHICLE () COMPANY CAR

MR/HR LEVEL -AT DRIVER _____ MR/HR LEVEL AT PASSENGER _____

TYPE OF RADIOACTIVE MATERIAL:

() IR192 () CO60 () OTHER

EXPOSURE DEVICE: MODEL# _____ SERIAL# _____

SOURCE MODEL# _____ ACTIVITY _____ CURIES _____

****NOTE**** THE RADIOACTIVE MATERIAL AND VEHICLE COVERED IN THIS CERTIFICATE-
IS CONSIDERED "SOLE USE" FOR BRAN-SHON, INC.

****** IT IS THE RESPONSIBILITY OF THE RADIOGRAPHER TO COMPLETE THIS
FORM FOR EACH SHIPMENT OF RADIOACTIVE MATERIAL USED IN "SOLE
USE" VEHICLES FOR BRAN-SHON, INC.

RADIOGRAPHER: _____ DATE: _____

Bran-Shon, Inc.

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P.O. BOX 451
DEERFIELD, OH 44411

"RADIOACTIVE SOURCE EXCHANGE QUALIFICATION"

THIS IS TO CERTIFY THAT:

NAME: _____

NDE QUALIFICATION/CERTIFICATION: _____

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

- () TECH/OPS 770,771 - capacity of 250 curies of cobalt 60
- () TECH/OPS 650 - capacity of 100 curies of iridium 192
- () TECH/OPS 850 - capacity of 200 curies of iridium 192
- () G/I C-8 - capacity of 200 curies of cobalt 60
- () G/I C-10 - capacity of 100 curies of iridium 192
- () SPEC-C1 - capacity of 200 curies of iridium 192

THE ABOVE RADIOGRAPHER HAS DEMONSTRATED COMPETENCE IN CHANGING OF THE
SOURCE(S) USING THE MANUFACTURERS SOURCE CHANGE PROCEDURES.

THIS CHANGE WAS DEMONSTRATED AND SUPERVISED BY BRAN-SHON'S RADIATION
SAFETY DIRECTOR AND/OR THE MANUFACTURERS QUALIFIED REPRESENTATIVE.

WITNESSED BY: _____ DATE: _____
RADIATION SAFETY DIRECTOR

APPROVED BY: _____ DATE: _____

Bran-Shon, Inc.

P.O. BOX 451

DEERFIELD, OH 44411

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"LEAK TEST RECORD"

SOURCE MODEL# _____ SERIAL# _____

ACTIVITY _____ CURIES _____

DATE RECEIVED: _____

RECEIVED FROM: _____

DATE OF MANUFACTURERS LEAK TEST: _____

LEAK TEST DUE DATE: _____

() HP-C2 LEAK TEST KIT, HEALTH PHYSICS ASSOCIATES

() T/O 518 LEAK TEST KIT, TECHNICAL OPERATIONS

() KOWIPE LEAK TEST KIT, GAMMA INDUSTRIES

RESULTS OF LEAK TEST: _____

REMARKS: _____

LEAK TEST PERFORMED BY: _____ DATE: _____

Bran-Shon, Inc.

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P.O. BOX 451
DEERFIELD, OH 44411

"RADIOACTIVE LEAK TEST PROCEDURE QUALIFICATIONS"

THIS IS TO CERTIFY THAT:

NAME: _____

NDE QUALIFICATION/CERTIFICATION: _____

_____ WAS GIVEN A DEMONSTRATION TO PERFORM

A LEAK TEST USING:

- () HP - C2 LEAK TEST KIT, HEALTH PHYSICS ASSOCIATES
- () TECH/OPS 518 LEAK TEST KIT, TECHNICAL OPERATIONS
- () KOWIPE LEAK TEST KIT, GAMMA INDUSTRIES

THIS TEST IS TO BE PERFORMED USING THE INSTRUCTIONS SUPPLIED BY THE MANUFACTURER WITH THE LEAK TEST KIT AND SHALL COMPLY THE PROVISIONS OF BRAN-SHON, INC.'s USNRC LICENSE CONDITIONS.

THE ABOVE TEST HAS BEEN DEMONSTRATED TO THE SATISFACTION OF THE RADIATION SAFETY DIRECTOR OF BRAN-SHON, INC.

WITNESSED BY: _____ DATE: _____
RADIATION SAFETY DIRECTOR

APPROVED BY: _____ DATE: _____

Bran-Shon, Inc.

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P.O. BOX 451
DEERFIELD, OH 44411

NOTICE

In case of an accident involving this vehicle
IMMEDIATELY NOTIFY:

BRAN-SHON, INC.
1028 Lower Elkton Rd.
Columbiana, Ohio
(216) 482-9922

OR

BRAN-SHON, INC.
P.O. BOX 451
Deerfield, OHIO 44411
(216) 654-4905

NIGHTS
SUNDAYS
HOLIDAYS

CALL

..... MIKE J. MEDAL-RADIATION SAFETY DIRECTOR

(216) 482-9922 - SHOP

(216) 877-9403 - HOME

CHUCK MOORE-PRESIDENT

(216) 482-9922 - SHOP

(216) 654-2910 - HOME

Bran-Shon, Inc.

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P.O. BOX 451
DEERFIELD, OH 44111

"RADIATION SAFETY INCIDENT DATA REPORT"

**THIS REPORT IS TO BE COMPLETED WITHIN 24 HOURS AND IMMEDIATELY
FORWARDED TO THE RADIATION SAFETY DIRECTOR IN THE EVENT THAT:

- 1.) Any emergency situation defined in Bran-Shon's Radiation Safety Manual Section 5, Emergency Procedure, that may have occurred.
- 2.) Your film badge/TLD becomes wet, mutilated, or lost.
- 3.) You have reason to believe that your film badge/TLD may indicate an excessive exposure that you may not have received.

SECTION-1: (complete all items)

NAME: _____ SIGNATURE: _____

WORK LOCATION: _____

DID YOU STOP RADIOGRAPHIC OPERATIONS IMMEDIATELY? yes _____ no _____

DID YOU NOTIFY YOUR RADIATION SAFETY DIRECTOR? yes _____ no _____

WHEN? DATE: _____ TIME: _____

EQUIPMENT: EXPOSURE DEVICE: MODEL# _____ SERIAL# _____

SOURCE SERIAL# _____ ACTIVITY _____ CURIES _____

SURVEY INSTRUMENT: MODEL# _____ SERIAL# _____ CAL. DATE: _____

SECTION-2 (to be completed in the event that #2 above occurred)

EXPLAIN IN DETAIL HOW YOUR FILM BADGE/TLD BECAME WET, MUTILATED, OR LOST.
(USE REVERSE SIDE OF REPORT)

SECTION-3 (to be completed in the event that #3 above occurred)

WHERE WAS YOUR FILM BADGE/TLD LOCATED WHEN YOU BELIEVED IT WAS EXPOSED TO RADIATION: _____

HOW MUCH RADIATION DO YOU BELIEVE YOUR FILM BADGE/TLD RECEIVED?
20-100MR _____ 100-300MR _____ 300-600MR _____ ABOVE 600MR _____

WHY WERE YOU NOT WEARING YOUR FILM BADGE/TLD? _____

EXPLAIN EXACTLY EVERYTHING THAT OCCURED. (use reversed of report)

ON THE REVERSE SIDE OF REPORT INCLUDE ALL OTHER INFORMATION WHICH YOU
FEEL IS PERTINENT.

Bran-Shon, Inc.

P.O. BOX 451
DEERFIELD, OH 44411

A P P E N D I C E I

U S N R C TITLE 10CFR PARTS 19,20,21,34

INSERT 10CFR PARTS 19,20,21,34

Bran-Shon, Inc.

P.O. BOX 451

DEERFIELD, OH 44411

A P P E N D I C E I I

U S N R C L I C E N S E & C O N D I T I O N S

INSERT BRAN-SHON, INC.'S USNRC RADIOACTIVE MATERIAL LICENSE HERE

Bran-Shon, Inc.

P.O. BOX 451
DEERFIELD, OH 44411

APPENDICE III

AGREEMENT STATES, AND LICENSES

RADIATION CONTROL PROGRAM DIRECTORS
AGREEMENT STATES

ALABAMA 205-832-5990

Mr. Aubrey Codwin, Director
Division of Radiological Health
Environmental Health Administration
Room 314, State Office Building
Montgomery, Alabama 36130

ARIZONA 602-255-4845

Mr. Charles F. Tedford, Director
Arizona Radiation Regulatory Agency
925 South 52nd Street, Suite 2
Tempe, Arizona 85281

ARKANSAS 501-661-2301

Mr. E. Frank Wilson, Director
Radiation Control and Emergency
Management Programs
Arkansas Department of Health
4815 West Markham Street
Little Rock, Arkansas 72201

CALIFORNIA 916-322-2073

Mr. Joseph O. Ward, Chief
Radiologic Health Section
State Department of Health Services
714 P Street
Sacramento, California 95814

COLORADO 303-320-8333 Ext. 6246

Mr. Albert J. Hazle, Director
Radiation and Hazardous Waste Control
Division
Department of Health
4210 East 11th Avenue
Denver, Colorado 80220

FLORIDA 904-487-1004

Mr. Uray Clark, Administrator
Radiological Health Program
Department of Health and Rehabilitation
Service
1317 Winewood Blvd
Tallahassee, Florida 32301

GEORGIA 404-894-5795

Dr. Naresh K. Chawla, Director
Radiological Health Unit
Department of Human Resources
47 Trinity Avenue
Atlanta, Georgia 30334

IDAHO 208-334-4107

Mr. Robert Funderburg, Program Manager
Radiation Control Section
Idaho Department of Health and Welfare
450 West State, 5th Floor
Statehouse
Boise, Idaho 83720

IOWA 515-281-4928

Mr. John A. Eure, Director
Environmental Health Section
Iowa Department of Health
Lucas State Office Building
Des Moines, Iowa 50319

KANSAS 313-862-9360 Ext. 284

Mr. Gerald W. Allen, Director
Bureau of Radiation Control
Department of Health and Environment
Building 740, Forbes Field
Topeka, Kansas 66620

KENTUCKY 502-564-3700

Donald R. Hughes, Supervisor
Radiation Control
Commonwealth of Kentucky
Department for Health Services
275 East Main Street
Frankfort, Kentucky 40621

LOUISIANA 504-925-4518

Dr. William H. Spell, Administrator
Nuclear Energy Division
State Department of Natural Resources
P.O. Box 14690
Baton Rouge, Louisiana 70898

*mark mass
vicki jeffs*

MARYLAND 301-383-2744

Mr. Robert E. Corcoran, Chief
Division of Radiation Control
Department of Health and Mental Hygiene
201 West Preston Street
Baltimore, Maryland 21201

MISSISSIPPI 601-354-6657

Mr. Eddie S. Fuente, Director
Division of Radiological Health
State Board of Health
P.O. Box 1700
Jackson, Mississippi 39205

NEBRASKA 402-471-2168

Mr. H. Ellis Simmons, Director
Division of Radiological Health
Department of Health
301 Centennial Mall, South
P.O. Box 95007
Lincoln, Nebraska 68509

NEVADA 702-885-4750

Mr. John D. Vaden, Supervisor
Radiological Health
Consumer Health Protection Services
505 East Kinkead Street, Room 103
Carson City, Nevada 89710

NEW HAMPSHIRE 603-271-4588

Ms. Diane Tefft
Office of Radiation Control
Division of Public Health
Health and Welfare Building
Hazen Drive
Concord, New Hampshire 03301

NEW MEXICO 505-984-0020 Ext. 279

Mr. Alphonso A. Topp, Jr., Chief
Radiation Protection Bureau
Health and Environment Department
P.O. Box 968
Santa Fe, New Mexico 87504

NEW YORK 518-473-3613

Mr. Howard L. Boldman, Director
Bureau of Radiation Control
State Department of Health
Tower Building
Albany, New York 12237

NORTH CAROLINA 919-733-4283

Mr. Dayne H. Brown, Chief
Radiation Protection Section
Department of Human Resources
Box 12200
Raleigh, North Carolina 27605

NORTH DAKOTA 701-224-2348

Mr. Dane K. Mount, Director
Division of Environmental Engineering
North Dakota Department of Health
1200 Missouri Avenue
Bismarck, North Dakota 58501

OREGON 503-229-5797

Dr. Marshall Parrott, Manager
Radiation Control Service
State Health Division
P.O. Box 231
Portland, Oregon 97207

RHODE ISLAND 401-277-2438

Mr. James E. Hickey, Chief
Division of Occupational Health and
Radiation Control
Department of Health
Cannon Building, Davis Street
Providence, Rhode Island 02908

SOUTH CAROLINA 803-758-7806

Mr. Heyward Shealy, Chief
Bureau of Radiological Health
Department of Health and Environmental Control
2600 Bull Street
Columbia, South Carolina 29201

TENNESSEE 615-741-7812

Mr. J. A. Bill Graham
Radiological Physicist
Division of Radiological Health
Department of Public Health
150 Ninth Avenue, North
Terra Building
Nashville, Tennessee 37219

TEXAS 512-835-7000

Dr. Robert Bernstein, Commissioner
Bureau of Radiological Control
Texas Department of Health
1100 West 49th Street
Austin, Texas 78756

UTAH 801-533-6734

Mr. Larry Anderson, Director
Bureau of Radiation Control
State Department of Health
150 West North Temple
Box 2500
Salt Lake City, Utah 84110

WASHINGTON 206-753-3468

Mr. Terry Strong, Head
Radiation Control Section
Department of Social and Health Services
Aindustrial Park
Olympia, Washington 98504

RADIATION CONTROL PROGRAM DIRECTORS
NON-AGREEMENT STATES

ALASKA 907-465-2600

Dr. Richard A. Neve, Commissioner
Department of Environmental Conservation
Pouch O
Uuneau, Alaska 99811

CONNECTICUT 203-566-2110 *5668* *McCarthy*

Mr. Stanley J. Pac, Commissioner
Department of Environmental Protection
State Office Building
165 Capitol Avenue
Hartford, Connecticut 06106

DELAWARE

Mr. E. Lee Stein, Director
Office of Radiation Safety
Department of Health and Social Services
Jesse S. Cooper Memorial Building
Capitol Square
Dover, Delaware 19901

DISTRICT OF COLUMBIA 202-724-4113

Dr. Herbert T. Wood
Acting Deputy Bureau Chief
BCHS OESOA
Environmental Health Administration
Department of Environmental Services
415 12th Street NW, Room 314
Washington, DC 20004

HAWAII

Mr. Sadamoto Iwashita, Chief
Occupational and Radiological Health
Branch
Department of Health
P.O. Box 3378
Honolulu, Hawaii 96801

ILLINOIS

Mr. Philip Brunner, Chief
Division of Radiological Health
Department of Public Health
535 West Jefferson Street
Springfield, Illinois 62761

INDIANA

Mr. Hal Stocks, Director
Division of Radiological Health
State Board of Health
1330 West Michigan Street
Indianapolis, Indiana 46206

IOWA

Dr. C. L. Campbell, Acting Director
Radiation Management Division
State Department of Health
State Office Building
Des Moines, Iowa 50319

MAINE

Mr. Donald C. Hoxie, Director
Health Engineering
Department of Health and Welfare
State House
Augusta, Maine 04330

MASSACHUSETTS 617-727-6214

Mr. Robert M. Hallisey, Director
Radiation Control Program
Department of Public Health
600 Washington Street, Room 770.
Boston, Massachusetts 02111

MICHIGAN 1-517-335-8000

1-517-335-8000
1111111111
~~Mr. D. E. Van Farowe~~, Chief
Radiation Division
Department of Public Health
3500 North Logan Street
Lansing, Michigan 48914
1-517-335-8000

RADIATION CONTROL PROGRAM DIRECTORS
NON-AGREEMENT STATES

MINNESOTA

Ms. Alice Dolezal, Acting Chief
Section of Radiation Control
Department of Health
717 Delaware Street, S.E.
Minneapolis, Minnesota 55440

PENNSYLVANIA

Mr. Thomas M. Gerusky, Director
Bureau of Radiological Health
Department of Environmental Resources
Post Office Box 2063
Harrisburg, Pennsylvania 17105

MISSOURI

Mr. Kenneth V. Miller, Acting Director
Bureau of Radiological and
Occupational Health
Department of Public Health and Welfare
2511 Industrial Drive
Jefferson City, Missouri 65101

PUERTO RICO

Mr. David Saldana, Acting Director
Radiological Health Program
Department of Health
1306 Ponce de Leon Avenue
Stop 16
Santurce, Puerto Rico 00908

MONTANA 404-449-3671

Mr. Larry Lloyd, Chief
Radiological Health Program
Department of Health and Environmental
Sciences
Cogswell Building, Room A113
Helena, Montana 59620

SOUTH DAKOTA

Dr. Robert H. Hayes
Secretary of Health
State Department of Health
State Capitol
Pierre, South Dakota 57501

NEW JERSEY 609-292-8392

Mr. Frank Cosolito, Acting Chief
Bureau of Radiation Protection
380 Scotch Road
Trenton, New Jersey 08628

VERMONT

Mr. Harry B. Ashe, Director
Division of Occupational Health
Radiological Health Program
Department of Health
Post Office Box 607
Barre, Vermont 95641

OHIO

Mr. James C. Wynd, Engineer-in-Charge
Radiological Health Unit
Department of Health
Post Office Box 118
Columbus, Ohio 43216

VIRGINIA

Mr. Bryne P. Schofield, Director
Bureau of Industrial Hygiene and
Radiological Health Supervisor
Department of Health
109 Governor Street
Richmond, Virginia 23219

OKLAHOMA

Mr. J.D. McHard, Director
Occupational & Radiological Health
Division
State Department of Health
North East 10th and Stonewall Streets
Oklahoma City, Oklahoma 73105

WEST VIRGINIA

Mr. Harvey J. Roberts, Director
Bureau of Industrial Hygiene
Radiological Health Program
State Department of Health
1800 East Washington Street
Charleston, West Virginia 25305

WISCONSIN

Dr. William L. Lea, Chief
Radiation Protection Section
Department of Health and Social Services
Post Office Box 309
Madison, Wisconsin 53701

WYOMING 307-777-7956

Dr. Lawrence J. Cohen, Administrator
Department of Health and Social Services
Division of Health and Medical Services
State Office Building
Cheyenne, Wyoming 82001

INSERT STATE LICENSES AND REGISTRATION CERTIFICATES