



NONDESTRUCTIVE TESTING SERVICES

NDE Procedure T78-45

Rev. 5

TRUTOM (U.S.) LTD

OPERATING AND EMERGENCY PROCEDURES

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OPERATING AND EMERGENCY PROCEDURES

I. PURPOSE

The purpose of these instructions is to establish safe and uniform operating and emergency instructions for all personnel handling and using Iridium 192 and Cobalt 60 sources. The duties and responsibilities of radiographic personnel are detailed herein. These personnel shall become familiar with and abide by these instructions.

Additionally, all radiographers and assistants shall become familiar with 10 CFR Parts 19, 20, 21, and 34. (New York State "Industrial Code Rule 38 for performing work in New York State) All radiographers who are employed by Trutom (U.S.) Limited shall be trained, qualified, and certified to perform work at all Trutom (U.S.) Limited offices. The proper completion of all forms referenced in this procedure are the responsibility of the radiographer, and shall be turned in to the office manager at the end of each shift.

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OPERATING AND EMERGENCY PROCEDURES

II. RESPONSIBILITIES

1. Radiographer. Any individual who performs, or who, in attendance at the site where sources of radiation are being used, personally supervises, industrial radiographic operations and who is responsible to Trutom for assuring compliance with Trutom Operating and Emergency Procedure and Nuclear Regulatory Commission License and all its conditions. (New York State License and Code Rule 38)
2. Radiographer's Assistant. Any individual who, under the personal supervision of a radiographer, uses sources of radiation, related handling tools or survey instruments in industrial radiography.
3. Radiation Safety Officer. An individual designated by Trutom, who is qualified by training and experience in radiological health to evaluate the radiation hazards of the use and storage of radioactive materials at installations or mobile field sites, and to establish and administer a radiation protection program.



III. COMMITMENT TO ALARA

The management at Trutom (U.S.) Limited is committed to the ALARA program. Time, distance and shielding are all associates with this program, ALARA--
As Low As Reasonably Achievable. Jobs that involve a large amount of exposure are studied by the RSO and management. The total exposure anticipated to all persons on the job and the means of reducing exposure are discussed to determine the best method of completing the job.

The ALARA Program maintains one should assess the exposure to be expended over the entire job. The total exposure or, collective exposure, would be said to be ALARA if shielding, training, pre-planning, and having the proper tools were all considered.

The ALARA Program may use any or all the means mentioned to reduce the total or, collective exposure, to the minimum achievable.



IV. FILM BADGES

Purpose

Film Badges shall be used to maintain a permanent record of whole-body exposure from Gamma, Beta and X-Rays.

Rules

1. Trained personnel shall wear Film Badges at all times when handling radioactive materials.
2. Film Badges shall be worn only by the person to whom it is assigned.
3. Film Badges will be supplied by R.S. Landaver or other qualified services.
4. Film Badges shall be changed every two weeks except in emergencies or specific situations.
5. Film Badges will be changed by the Radiation Safety Officer or his assistant and sent to Landaver for evaluation.
6. The results of the Film Badge are sent to the Radiation Safety Officer who will review them and investigate any high or unusual results. If abnormal conditions occur the individual and his supervisor shall be informed.
7. Any accumulative dose as recorded on the Film Badge reports that exceeds three (3) REM in any (13) thirteen consecutive weeks or (5) REM in any 52 consecutive weeks shall be reported to the appropriate regulatory agency.
8. The results of Film Badge monitoring will be maintained on file and cannot be discarded after any period of time, except by permission of the Nuclear Regulatory Commission (Department of Labor State of New York).
9. The Radiation Safety Officer shall post a copy of the Film Badge report for each employee to review.
10. Film Bages shall be stored in a designated area along with a "control" Film Badge.
At field sites, Film Badges shall be stored away from sources of radiation, heat, moisture, micro-waves, color television, etc.



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Procedure for Use

Prior to handling radioactive material, personnel shall:

1. Remove assigned Film Badge from the storage area.
2. Immediately place Film Badge on the trunk of the body.
3. Return Film Badge to storage area when the assignment is completed.

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V. DOSIMETERS

Equipment

Dosimeter Corp Model 862 or equivalent. All dosimeters shall be capable of measuring X-Ray and Gamma radiation in a range of 0-200 milliroentgens with an accuracy of plus or minus 20%. Dosimeters shall be calibrated at a minimum of once a year in accordance to procedure. Check the reading on the dosimeter by holding the barrel toward a light source and look through the lens. The verticale fiber indicated the number of milliroentgens on the scale of 0-200.

Rules

1. Dosimeters shall be worn by all personnel when handling radioactive material.
2. During production hours or when radiographers and assistants are working with Gamma and/or X-Rays, they are to take readings at frequent intervals during the work shift. Readings are to be taken before the first exposure and after the first exposure, after which readings should be taken between 15 minutes and half-hour intervals.
3. If dosimeter is off-scale and radiation exposure is possible cause, see Emergency Section XV.
4. Dosimeters are delicate instruments. If you drop your dosimeter, read it immediately to be sure it did not go off-scale. If you receive an electric shock, read it immediately to be sure it did not go off-scale. High-humidity may also affect your dosimeter and cause abnormal readings. If at any time the dosimeter becomes suspect of being faulty, notify the Radiation Dafety Office who will take the appropriate steps.

Storage

Dosimeters shall be stored with Film Badges.



V. DOSIMETERS

Procedure

Before using a dosimeter, it shall be charged as follows:

1. Remove dosimeter from storage area.
2. Check to be sure calibration interval has not expired.
3. Remove protective cover from charging end of dosimeter.
4. Remove protective cover from dosimeter charger.
5. Place female charging end of dosimeter on male fitting of dosimeter charger and press down firmly.
6. Look in dosimeter while performing step 4, and locate hair line indicator.
7. Adjust hair line indicator to zero or as close as possible by turning adjustment dial up or down scale.
8. Remove dosimeter from charger and verify reading.
9. Log starting reading on Utilization Log, Appendix A, and immediately place dosimeter on the trunk of your body.



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V . DOSIMETER CALIBRATION

Purpose

All dosimeters shall be calibrated in accordance with T85-103 any time they are suspected of malfunction, and at a minimum of once a year. Dosimeters may also be sent out for calibration to a certified vendor whose license shall be kept on file.

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VI. SURVEY METERS

Purpose

Calibrated Survey Meters shall be used to constantly monitor radiation levels in any given area, when approaching or handling radioactive materials. Victoreen Model 492 or equivalent shall be used.

Rules

Survey Meters shall be calibrated in accordance to T85-102 at intervals not to exceed three months. The radiographer and assistant shall each have a Survey Meter. When using the Meter to conduct a survey, the selector switch shall be set on the range which provides a reading in the upper 80% of the Meter scale, or on the lowest range possible.

Survey Meters shall be checked prior to every use by the following procedure.

Procedure

1. Check for adequate power supply by turning selector switch on Meter to "battery" position.
2. The indicator on the dial must reach within the battery check band shown on the dial. If the indicator does not read within the battery check band, the batteries must be replaced before use.
3. Check "calibration sticker" on the Meter to assure that Meter is within the calibration date.



VII. DAILY MAINTENANCE PROCEDURE

Purpose

Daily inspections shall be performed on all radiographic equipment in accordance to the following rules and procedures.

Rules

All radiographic equipment shall be cleaned and/or repaired in accordance with the manufacturer's maintenance instructions.

Any major repairs that have to do with the source shield shall be made by the Technical Operations, Inc. company (Tech-Ops).

Inspections of radiographic devices shall be made before each use and at three month intervals. Inspection and maintenance should also be performed at source changes, and at any time that the radiographer notices any change in the operating characteristics of the device.

Procedure

1. Obtain assigned Film Badge from Film Badge and Dosimeter storage area, in accordance with Section IV.
2. Obtain a Dosimeter from the Film Badge and Dosimeter storage and zero it, in accordance with Section V.
3. Obtain a Survey Meter and check its operation, in accordance with Section VI.
4. Obtain a "Daily Inspection & Maintenance Form, Appendix H. (New York State Only)
5. Inspect equipment using the Maintenance Form as a guide, along with the Operator's Manual provided by the manufacturer.



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VII. DAILY MAINTENANCE PROCEDURE

Procedure

- 6) Record all findings on Daily Maintenance Form, Appendix H.
(New York State Only).
- 7) Any damage to any radiographic equipment which may impair its operation shall be reported immediately to the Radiation Safety Officer and rectified before the device is put back into operation.
- 8) Any deficiency found in equipment shall be immediately reported to Radiation Safety Officer. Equipment shall be taken out of use.
- 9) Application portion of Utilization Log shall be filled out.

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VIII. QUARTERLY INSPECTION AND MAINTENANCE

PURPOSE:

Quarterly inspections shall be performed on all radiographic equipment in accordance with the following rules and procedures.

RULES:

All equipment shall be cleaned and/or repaired in accordance with the manufacturer's maintenance instructions.

Any major repairs that have to do with the source shield shall be made by Technical Operations, Inc. Company (Tech-Ops).

Inspections of radiographic devices shall be made before each use and at three-month intervals. Inspection and maintenance should also be performed at source changes, and at any time that the radiographer notices any change in the operating characteristics of the device.

The applicable section of the "Equipment Utilization Log" shall be filled out each time these inspections occur.

Quarterly Inspection And Maintenance Report Forms, Appendix I, shall be completed and sent to the Radiation Safety Officer.

PROCEDURE:

- 1) Obtain assigned Film Badge from Film Badge and Dosimeter storage area, in accordance with Section IV.
- 2) Obtain a Dosimeter from the Film Badge and Dosimeter storage area and zero it, in accordance with Section V.



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VIII. - QUARTERLY INSPECTION AND MAINTENANCE

Procedure, Continued

- 3) Obtain a Survey Meter and check its operation, in accordance with Section VI.
- 4) Obtain a Quarterly Inspection and Maintenance Form, Appendix I.
- 5) Inspect equipment using the Maintenance Form as a guide, along with a Tech-Ops' Operators Manual.
- 6) Record all findings on Quarterly Inspection and Maintenance Form, Appendix I.
- 7) Any damage to any radiographic equipment which may impair its operation shall be reported immediately to the Radiation Safety Officer and rectified before the device is put back into operation.

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IX. ASSEMBLY, OPERATION & DISASSEMBLY OF REMOTE CONTROL
RADIOGRAPHIC DEVICES

Purpose

This procedure shall provide step-by-step instructions for the proper assembly and disassembly of remote control radiographic devices. Tech-Ops Models 660, 680, 920, and 500.

Rules

Only qualified radiographers or radiographer's assistants, under the direct supervision of the radiographer shall assemble, operate or disassemble radiographic devices. Never operate the system with more than three guide tube sections (including the master).

Procedure

1. Obtain Film Badge in accordance with Section IV.
2. Obtain Dosimeter in accordance with Section V.
3. Obtain Survey Meter in accordance with Section VI.
4. Survey camera storage area.
5. Survey camera storage container.
6. Survey camera in storage container.
7. Remove camera and survey all around camera to ensure source is secured in shielded position.
8. Sign out camera on Camera Sign-Out Sheet, Appendix B.
9. Perform daily maintenance in accordance with Section VII.
10. Fill out Utilization Log, Appendix A.
11. Secure restricted area in accordance with field radiography Section XIII, or permanent facility radiography Section XI, whichever is applicable.

XX. ASSEMBLY, OPERATION & DISASSEMBLY OF REMOTE CONTROL RADIOGRAPHIC DEVICES 7. 2

Procedure

- 12) Personnel assembling camera shall position themselves to the rear or side of the camera in order to minimize exposure.
- 13) Survey Meter should be placed near the front of the camera and monitored constantly.
- 14) Place source tube and film in position.
- 15) Position and straighten control cable placing hand crank in a position which will afford the Radiographer the best possible protection.
- 16) Bring exposure device with Survey Meter into position.
- 17) Unlock storage cover on back of device with key and rotate selector to the connect position. (Tech-Ops Model 500 drive cable assembly is already connected.)
- 18) Remove storage cover from control cable connector.
- 19) Connect drive cable to the connector.
- 20) Manually pull both parts of the connector to be sure the connection has been made properly.
- 21) Place selector in lock position.
- 22) Remove safety plug from the front of the exposure device, and thread in source guide tube. Once the safety plug has been removed, the person making the connection will not allow himself to be distracted until the source guide tube is threaded into place.
- 23) Place selector lever in the operable position.
- 24) Camera is now ready to operate by turning crank in direction marked expose.
- 25) After exposure is complete, crank source back into the shield. When this is not possible, refer to Section XI^v.
- 26) Make radiation survey of the area and radiograph device including source guide tubes and/or collimator to be sure that the source is in the safe, stored position.



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IX. ASSEMBLY, OPERATION & DISASSEMBLY OF REMOTE CONTROL RADIOGRAPHIC DEVICES

Procedure

- 27) Place selector ring in lock position.
- 28) Lock camera and pocket the key.
- 29) Record survey results and the location of restricted area boundaries on the Equipment Utilization Log, Appendix A. Whenever there is a subsequent change in these boundaries due to a new set-up, this information shall be added to the Equipment Utilization Log, Appendix A.
- 30) Survey the device to assure the source is in the safe, stored position.
- 31) Place selector in locked position.
- 32) Disconnect source guide tube. Replace safety plug and dust caps.
- 33) Turn selector ring to connect position.
- 34) Turn control crank in expose direction to expose source connector cable.
- 35) Disconnect source from control cable.
- 36) Replace storage cover.
- 37) Turn selector to lock position.
- 38) Push down lock and remove key.
- 39) Replace end protector on end of control cable.
- 40) Take final survey reading on exposure device. Log this value on the Equipment Utilization Log, Appendix A. Place device in storage area.
- 41) Log date, time of return, and radiographer's initials on the Camera Sign-Out Sheet, Appendix B, when the source is put back into storage.
- 42) Lock storage box, lock storage area and post as applicable.
- 43) Log Dosimeter reading on Daily Dosimeter Log, Appendix C.
- 44) Return Film Badge and Dosimeter in accordance with Section IV and V.

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X. AUDIBLE DOSIMETER CHECK PROCEDURE

Purpose:

The following rules and procedure will be followed by Trutom personnel when checking the Audible Dosimeter.

RULES

Only Tech-Ops Prima IIA or equivalent shall be used. The proper functioning of the Audible Dosimeter Alarm shall be checked at the beginning of every shift in which the exposure room is used, by the following procedure.

PROCEDURE

1. Obtain Film Badge in accordance with Section IV.
2. Obtain Dosimeter in accordance with Section V.1
3. Obtain Survey Meter in accordance with Section VI.
4. Survey the outside of source storage area.
5. Find an area reading 2 mR per Hr.
6. Place the Audible Dosimeter in the 2 mR/Hr. area, and turn it on low range.
7. Check for proper functioning, which will be indicated by a consistent "chirping" sound at slow intervals.
8. Log date and time of check on Audible Dosimeter Check Log, Appendix F.

XI. PERMANENT FACILITY RADIOGRAPHY

Purpose

When performing Radiography at Trutom's permanent facilities the following rules and procedures shall be followed

Rules

1. All doors controlling access to the exposure room area shall be kept locked when Trutom personnel are not in attendance.
2. Non-radiographic personnel shall not be allowed access to areas where radiation levels are in excess of 2 mR / hr.
3. Appropriate radiation area signs shall be maintained around the area.
4. All keys shall be kept locked in the Trutom office at the end of all shifts. Only Radiographers shall have access to them.
5. The exposure devices and their storage containers shall be kept locked at all times when not in use.
6. While exposures are in progress, the Radiographer must be in attendance.
7. The large collimator shall be used whenever possible.
8. The exposure shall be directed towards the floor whenever possible.
9. The exposure shall be taken within the designated work area within the exposure room.
10. The Gama alarm shall be kept on at all times.
11. The Gama alarm shall be checked for operation at least once a day, by turning it off then on. All red lights and the horn should come on for an instant.

Procedure

1. Obtain FilmBadge in accordance with Section IV.
2. Obtain Dosimeter in accordance with Section V.



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XI. PERMANENT FACILITY RADIOGRAPHY

Procedure

3. Obtain Survey Meter in accordance with Section VI.
4. Survey camera storage area.
5. Survey camera storage container.
6. Survey camera in storage container.
7. Remove camera and survey all around to ensure source is secured in shielded position.
8. Complete daily maintenance check in accordance with Section VII.
9. Fill out Utilization Log, Appendix A.
10. Check Audible Alarm in accordance with Section X. (New York only)
11. Set up camera in accordance with Section IX.
12. Turn on flashing red lights on top of exposure room walls and lock exposure room door during each exposure. (New York only) In CT and VT make sure red lights connected to Gama Alarm are activated.
13. Survey outside of exposure room to ensure no area is over 2 mR/hr.
14. If there is an area over 2 mR / hr, it shall be roped off and posted as a restricted area.
15. After source is retracted, survey outside of exposure room.
16. A constant survey shall be made while approaching the source from the rear.
17. Lock the camera and survey all around to ensure source is secure in shielded position.
18. Exposure room and camera survey shall be performed after each exposure.
19. Break down camera in accordance with Section IX.

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XI. PERMANENT FACILITY RADIOGRAPHY

Procedure

20. Survey camera all around and record results on Utilization Log, Appendix A. At no time should the radiation level at the surface of the camera be in excess of 200 mR/hr.
21. Place camera in storage container and secure container.
22. Turn off flashing lights and Audible Alarm, (New York) and lock exposure room door.
23. Log Dosimeter readings on Daily Dosimeter Log, Appendix C, and Utilization Log, Appendix A.
24. Turn in Film Badge and Dosimeter in accordance with Section IV and V.
25. Turn in key to exposure room to office to be secured.

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CRUTON NONDESTRUCTIVE TESTING SERVICES

TRANSPORTING RADIOACTIVE MATERIAL

Purpose

Whenever radioactive material is to be transported, the following procedure shall be followed.

Rules

Ensure that the vehicle used is in good condition and carries the normal compliment of safety equipment, including radiation area signs, a length of rope, spare tire, fire extinguisher, set of vehicle tools, and a set of flares. The glove compartment shall contain the registration certificate and an operating flashlight.

A Source Vehicle Card Packet shall be kept attached to the camera while transporting each source. Vehicle Card Packet shall be kept current and contain the following information:

- 1) A Source Vehicle Card, Appendix G, which specifies DOT shipping name of radionuclide, description of physical/chemical form, category of label, package certificate ID, camera number, and source number.
- 2) Current Leak Test Certificate with Decay Chart.
- 3) Extra "Radioactive II" Stickers.
- 4) Two blank copies of Source Location Change Form. When camera is to be left at another office with another radiographer, the Source Location Change Form is to be filled out and filed in the source file of the transporting office.

Procedure

- 1) Obtain Film Badge in accordance with Section IV



XII. TRANSPORTING RADIOACTIVE MATERIAL

Procedure

2. Obtain Dosimeter in accordance with Section V.
3. Obtain Survey Meter in accordance with Section VI.
4. Survey camera storage area.
5. Survey camera storage container.
6. Survey camera in storage container.
7. Remove camera from storage container.
8. Survey camera on all sides to ensure the source is secured in the proper shielded position.
9. Sign camera out on Camera Sign-Out Sheet, Appendix B.
10. Fill out Utilization Log, Appendix A, and complete daily inspection of camera and all related equipment in accordance with Section VII.
11. Place the camera in the camera storage compartment in the vehicle and secure it against movement. Lock camera storage compartment.
12. Survey outside of vehicle and drivers compartment to ensure radiation levels are below 2mR/hr record results of survey on the utilization log.
13. If the vehicle is transporting a package bearing a "Radioactive Yellow III" Label, the vehicle must be placarded on all four sides with "Radioactive" placards.
14. Ensure that the vehicle has Truton emergency phone list posted on the dashboard, Appendix J and mobile unit check list, Appendix K.
15. If the vehicle becomes disabled on the road, do not leave the vehicle unguarded when going for help.
16. Should any kind of accident occur, refer to Emergency Section XIX.



XIII. OPERATING PROCEDURE FOR REMOTE CONTROL RADIOGRAPHIC DEVICES AT FIELD SITES

Purpose

This procedure shall outline use of radiographic exposure devices in the field.

Rules

Only qualified Radiographers shall operate radiographic equipment. All applicable state and federal regulations shall be adhered to. Radiation area signs shall be posted around all areas where radiation levels are 2mR to 100 mR . High radiation area signs shall be posted where radiation levels are 100 mR-hr or higher.

Procedure

1. Obtain Film Badge in accordance with Section IV.
2. Obtain Dosimeter in accordance with Section V.
3. Obtain Survey Meter in accordance with Section VI.
4. Survey source storage area.
5. Survey source storage container.
6. Survey camera inside storage container.
7. Survey camera outside storage container to ensure source is secured in proper shielded position.
8. Sign camera out on Camera Sign-Out Sheet.
9. Perform daily inspection and maintenance in accordance to Section VII.
10. Fill out Camera Utilization Log.
11. Secure camera in vehicle in accordance with Section XII.
12. Make sure all related safety equipment is in vehicle, i.e. tongs, tunnel, vehicle card packet.
13. After arriving at site, notify site supervisor, and all personnel in area that you will be performing radiography.

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RADIOGRAPHIC DEVICES AT FIELD SITES
- XIII . . OPERATING PROCEDURE FOR REMOTE CONTROL
- Procedure, Continued
- 14) Calculate 2mr boundaries using inverse square law and rope and post them. Calculate 100 mR boundaries using inverse square law and rope and post area.
 - 15) Survey camera before removing from vehicle to ensure source is secured in shielded position.
 - 16) Place source and equipment inside restricted area.
 - 17) Hook up camera in accordance with Section IX.
 - 18) Make sure all personnel are outside restricted area.
 - 19) Make exposure and survey boundaries to ensure no area outside boundaries is above 2 mR per hour.
 - 20) Maintain constant surveillance of restricted area and survey boundaries any time source location changes.
 - 21) At end of job, break down and secure camera in accordance to Section IX.
 - 22) Take down barriers and signs and inform personnel that you are finished.
 - 23) Survey camera to ensure source is secured in shielded position and record survey on Utilization Log.
 - 24) Record Dosimeter readings on Utilization Log.
 - 25) Secure camera in vehicle in accordance to Section XII.
 - 26) Upon arriving at Trutom office, survey camera before removing from vehicle.
 - 27) Remove camera from vehicle and place in camera storage container and secure.
 - 28) Sign camera in on camera sign out sheet, Appendix B.
 - 29) Record Dosimeter readings on Daily Dosimeter Log, Appendix C.
 - 30) Turn in Film Badge and Dosimeter in accordance with Section IV.



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XIV. LEAK TEST

PURPOSE

A Leak Test shall be performed to ensure the integrity of the sealed source.

RULES

A Leak Test shall be performed using a TECH-OPS Model 518 Leak Test. The Leak Test shall be performed at intervals not to exceed six months. They shall be performed by or under the direct supervision of the Radiation Safety Officer, following the procedure outlined herein.

PROCEDURE

- 1) Personnel shall obtain their assigned Film Badge from the Film Badge storage area, in accordance with Section IV.
- 2) Personnel shall obtain their Dosimeter from the storage area and zero it in accordance with Section V.
- 3) Personnel shall obtain and check Survey Meter, in accordance with Section VI.
- 4) Survey outside area of Source storage area.
- 5) Enter Source storage area and survey outside of Source storage container.
- 6) Open Source storage container and survey Camera inside the storage container.
- 7) Remove Camera from storage container and survey all around Camera to determine that Source is in stored position.

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11 Tipping Dr.
Branford, CT 06405
203-481-4660

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790 Watervliet-Shaker Rd.
Latham, New York 12110
518-783-1070

VERMONT
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Griswold Ind. Pk.
WATERVILLE, VT 05671



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XIV. LEAK TEST,

- 8) Check Camera to make sure selector ring is in locked position and that lock is depressed.
- 9) Remove test swab and swab holder from TECH-OPS Model 518 Leak Test Kit and insert swab in holder.
- 10) Moisten the test swab with EDTA Solution supplied with the Kit, and shake of excess solution.
- 11) While standing behind the Camera with the Survey Meter positioned in front of the Camera, remove the shipping plug.
- 12) Wipe the inside of the "S" Tube and the female connector assembly with the test swab.
- 13) Place the test swab and holder into the plastic envelope supplied with the Test Kit, making sure the swab touches nothing except the inside of the envelope as it may be contaminated.
- 14) Immediately replace the shipping plug and survey the entire camera.
- 15) With the Survey Meter set on its most sensitive range and in an area of low or no background radiation, move the wipe test swab toward the meter and observe the radiation level indication.
- 16) If the radiation level increases less than 0.2 mR/hr above background, place the plastic envelope with swab and holder inside the mailing box supplied in the Kit along with completed identification form supplied with the Kit and mail to TECH-OPS.
- 17) If the Meter indicates a reading higher than 0.2mR /hr; do not mail the wipe test patch and do not use the exposure device. Contact TECH-OPS for further instruction.

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XIV. LEAK TEST, *Leak* ;

- 18) Replace locked camera back in storage container, survey camera, and log survey in Utilization Log, Appendix A.
- 19) Secure storage container and storage area.
- 20) Record final reading in Daily Dosimeter Log, Appendix C, and log in Utilization Log, Appendix A.
- 21) Place Dosimeter and Film Badge back in Film Badge storage area.



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XV. RECEIVING RADIOACTIVE MATERIAL

PURPOSE:

The following rules and procedures shall be implemented whenever radioactive material is received.

RULES:

A package of radioactive material must be accepted from the carrier at the time it is delivered. If a package of radioactive material is to be held at the carrier's terminal, it must be picked up expeditiously upon receipt of notification from the carrier of its arrival. Only qualified Radiographer's shall receive radioactive material.

PROCEDURE:

- 1) Personnel shall obtain their assigned Film Badges from the Film Badge and Dosimeter storage area, in accordance with Section IV.
- 2) Personnel shall obtain their Dosimeter from the Film Badge and Dosimeter storage area and zero it, in accordance with Section V.
- 3) Personnel shall obtain a Survey Meter and check its operation, in accordance with Section VI.
- 4) Obtain a copy of Trutom's Receiving Report, Appendix D.
- 5) Visually inspect and survey package while approaching it.
- 6) Survey the exterior surfaces of the package to ensure that the radiation levels do not exceed 200 milliroentgens per hour.
- 7) Survey three feet from the exterior surfaces of the package to ensure that radiation levels do not exceed 10 milliroentgens per hour.
- 8) Record the results of these surveys on the Receiving Report. If any of the above limits are exceeded, notify the Radiation Safety Officer. Any visual damage to the package shall be recorded on the Receiving Report.



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XV. RECEIVING RADIOACTIVE MATERIAL,

Procedure, Continued

- 9) Record on the Receiving Report the Source model number, serial number, isotope, activity, shipping container model number and serial number.
- 10) Move to designated storage area and survey again.
- 11) Forward a copy of the Receiving Report to the Radiation Safety Officer.
- 12) Record Dosimeter reading on Daily Dosimeter Log, Appendix C.
- 13) Return Film Badge and Dosimeter to appropriate storage area.

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XVI. SOURCE CHANGE Tech-Ops Model 650 Changer

PURPOSE

When a Source is received from the manufacturer, the following rules and procedures shall be followed.

RULES

Only qualified Radiographers shall perform Source changes, and only after the Source has been properly received, in accordance with Section XV... All precautions used when making radiographic exposures must be followed.

PROCEDURE

- 1) Personnel shall obtain their assigned Film Badge from the Film Badge and Dosimeter storage area, in accordance with Section IV.
- 2) Personnel shall obtain their Dosimeter from the Film Badge and Dosimeter storage area, and zero it, in accordance with Section V.
- 3) Personnel shall obtain a Survey Meter and check its operation, in accordance with Section VI.
- 4) Upon receipt of the Source Changer, survey the Source Changer to ensure that the Source is in the proper storage position.
- 5) Locate the Source Changer and projector in a restricted area. Locate the devices so as to avoid sharp bends in the guide tube or control housing.
- 6) Set the projector as for an exposure, as per Section IX.
- 7) Remove the cover from the Source Changer by breaking the seal wire and removing the bolts.



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XVII. SOURCE CHANGE

Procedure, Continued

- 8) Remove the source holdown cap by breaking the seal wire and unbolting.
CAUTION: When the source holdown cap is removed, the Source connector is exposed. Care must be taken to ensure the Source is not dislodged when handling the changer.
- 9) Connect one end of a guide tube extension to the projector to the Source Changer.
- 10) Close and latch the source guides.
- 11) At the projector controls, crank the Source from the projector to the Source Changer.
- 12) Approach the projector with the Survey Meter. Survey the projector on all sides, survey the guide tube and survey the Source Changer on all sides to ensure the Source has been properly transferred. The maximum radiation level at the Source Changer should be less than 200 milliroentgens per hour at contact.
- 13) Open the source guides. Disconnect the drive cable from the source assembly by moving the lock pin down and sliding the drive cable connector out through the keyway.
- 14) Disconnect the guide tube from the Source Changer. Connect the guide tube to the fitting above the chamber containing the new Source.
- 15) Couple the drive cable to the Source by depressing the lock pin, sliding the drive cable connector into the keyway, and releasing the lock pin.
Test for engagement.
- 16) Close and latch the source guides.

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XVI. SOURCE CHANGE,

Procedure, Continued

- 17) At the projector controls, crank the Source from the Source Changer to its storage position in the projector.
- 18) Approach the projector with a Survey Meter. Survey the projector on all sides, survey the guide tube, and survey the Source Changer on all sides to ensure the Source has been properly transferred.
- 19) Lock the projector.
- 20) Disconnect the source guide tube from the Source Changer.
- 21) Affix the identification plate of the new Source to the projector and attach the identification plate of the old Source to the source holddown cap.
- 22) Bolt the source holddown cap in place and seal wire.
- 23) Bolt the Source Changer cover in place and seal wire.
- 24) Survey all exterior surfaces of the Source Changer to ensure that the radiation level does not exceed 200 milliroentgens per hour at contact.
- 25) Measure the radiation level three meters from all exterior surfaces of the Source Changer and ensure that the radiation level is less than 10 milliroentgens per hour. The maximum radiation level measured three meters from any exterior surface is the Transport Index. Example: With a maximum radiation level of 2.2 milliroentgens per hour, the Transport Index is 2.2.
- 26) Complete the "RADIOACTIVE III" or "RADIOACTIVE II" shipping labels, as applicable. For contents list the radioisotope contained. Indicate the activity as the number of Curies. Record the transport index as determined above.

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XV: SOURCE CHANGE, :

Procedure, Continued

- 27) Apply the RADIOACTIVE II or III shipping labels, as applicable, properly completed to two, opposite sides of the container.
- 28) Return the container to Tech-Ops, in accordance with ~~Section VIII~~ ~~Section VII~~.
- 29) Break down Camera in accordance with ~~Section IX~~.
- 30) Place Camera back in storage box, survey Camera, and record on Utilization Log, Appendix A.
- 31) Log Dosimeter reading on Daily Dosimeter Log, Appendix C.

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XVII. SOURCE CHANGE Tech-Ops Model 680 Changer

Purpose

When a Source is received from the manufacturer, the following rules and procedures shall be followed.

Rules

Only qualified Radiographers shall perform Source changes, and only after the Source has been properly received, in accordance with Section XV. All precautions used when making radiographic exposures must be followed.

Procedure

1. Personnel shall obtain their assigned Film Badge from the Film Badge and Dosimeter storage area, in accordance with Section IV.
2. Personnel shall obtain their Dosimeter from the Film Badge and Dosimeter storage area, and zero it, in accordance with Section V.
3. Personnel shall obtain a Survey Meter and check its operation, in accordance with Section VI.
4. Upon receipt of the Source Changer, survey the Source Changer to ensure that the Source is in the proper storage position.
5. Locate the Source Changer and exposure device in a restricted area. Position the Source Changer in an upright position and near the exposure device so that one section of source guide tube will connect them with no sharp turns or bends. The bend radius of the guide tube should never be less than twenty inches. Shorter bend radii can restrict source movement in the source guide tube. The Source Changer must remain in an upright position during source changing operations. Do not position Source Changer on its side.



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XVII. SOURCE CHANGE Tech-Ops Model 680 Changer

6. Remove any foreign matter from the guide tube connector and attach the source guide tube to the exposure device. Remove the Source Changer cover plate by breaking the seal wire and removing the bolts. Attach the other end of the tube to the empty chamber of the Source Changer. Assure that the lock assembly of the chamber containing the source is in the locked position. Unlock the key operated lock over the empty chamber and slide the lock bar to the OPEN position.

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XVII. SOURCE CHANGE Tech-Ops Model 680 Changer

7. Attach the control unit to the exposure device following the exposure device operating instructions and lift the indicator knob up until the indicator slide locks in place. The source is now free to move.
8. Crank the source rapidly from the exposure device to the source changer. During this process, the survey meter reading should increase (to approximately 1000mR/hr for a 100 curie iridium 192 source) as the source is first exposed, fall slightly as the source is being cranked out then drop to background when the source is in the source changer.
9. Approach the exposure device, source changer and source guide tube with the survey meter. Survey the exposure device on all sides, survey the guide tube and survey the source changer on all sides to ensure that the source is fully within the source changer. The maximum radiation levels should not exceed 200mR/hr on the surface of the source changer nor 10mR/hr at three meter from the surface.
10. Slide the lock bar to the locked position and engage the key operated lock.

WARNING

Do not remove the guide tube for the source changer fitting until the lock slide is in the lock position and the key operated lock is engaged.

11. Disconnect the source guide tube from the source changer lock assemble. Disconnect the drive cable from the source holder assembly by moving the lock pin down and sliding the drive cable connector out through the keyway.
12. Couple the drive cable to the new source holder assembly and connect the source guide tube to the fitting on the source changer. Unlock the key operated lock on the chamber containing the source to be transferred and slide the lock bar to the OPEN position.



XVII. SOURCE CHANGE Tech-Ops Model 680 Changer

13. Return to the controls and crank the new source or drive cable into the exposure device. If a new source is being transferred, the survey meter should increase as the source leaves the source changer and approaches the exposure device, then drop to background level when the source is shielded in the exposure device. If a source is not being transferred the survey meter should indicate only background radiation levels.
14. Approach the exposure device with a survey meter. Survey the exposure device on all sides, survey the guide tube and survey the source changer on all sides to ensure that the process has been properly completed. Radiation levels should read no more than 200 mR/hr at the surface of the exposure device if it has been loaded to maximum capacity. Rotate the selector ring to the lock position.
15. Assure that the source is in the source changer by assuring the slide mechanism is in the lock position and the lock plunger is depressed.
16. Disconnect the control unit and source guide tube from the exposure device as described in the exposure device operating instructions and disconnect the source guide tube from the source changer.
17. Remove the source identification plate from the exposure device and attach it with seal wire to the source changer. Attach the identification plate for the new source to the exposure device.
18. Remove the keys from the lock plungers and bolt the two cover plates to the source changer. Secure the bolts with seal wire using a security seal.



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XVII. SOURCE CHANGE Tech-Ops Model 680 Changer

19. Survey all exterior surfaces of the source changer to ensure that radiation levels do not exceed 200 milliroentgens per hour at contact. Measure the radiation level three meter from all exterior surfaces of the source changer and ensure that the radiation level is less than 10 milliroentgens per hour. the maximum radiation level measured three meter from any exterior surface is the Transport Index. (Example: With a maximum radiation level of 2.2 milliroentgens per hour, the Transport Index is 2.2)/
20. Select the proper shipping labels according to the radiation levels at the surface and at three meters from the surface of container as described in the following table. Complete two labels listing the radioisotope contained (Iridium-192), the activity (the number of curies) and the Transport Index as determined above.

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XVIII. SHIPPING RADIOACTIVE MATERIAL

PURPOSE:

The following rules and procedures shall be implemented whenever radioactive material is shipped.

RULES:

Only qualified Radiographers shall ship radioactive material. Radioactive sources shall be placed in the shipping container in accordance with Section XVI, or XVII.

PROCEDURE:

- 1) Obtain a blank copy of Shipping Report, Appendix E.
- 2) Obtain Film Badge in accordance with Section IV.
- 3) Obtain Dosimeter in accordance with Section V.
- 4) Obtain Survey Meter in accordance with Section VI.
- 5) Survey source storage area.
- 6) Survey source storage container.
- 7) Open source storage container and survey source changer.
- 8) Remove source changer and survey all around to ensure that the source is secured in the proper shielded storage position.
- 9) Attach a security seal with an identification mark to the package closure.
- 10) If the shipping container is to be packaged inside a crate or other outer packaging, the outer packaging must be strong enough to withstand the normal conditions of transport. Place the shipping container in the outer package with sufficient blocking to prevent

shifting during transportation.

- 11) Survey the package at the surface and at three meter from the surface to determine the proper radioactive shipping labels to be applied to package. Use the criteria listed on Shipping Report.
- 12) Properly complete two shipping labels indicating the contents (Iridium 192,) the number of curies and the Transport Index (maximum radiation level measured at three meters from the surface of the package (used on Yellow II and Yellow III labels only).
- 13) Ensure that any old shipping labels have been removed from the package. Apply the two properly completed radioactive shipping labels to two opposite sides of the package.
- 14) Mark the outside of the package with the proper shipping name (Radioactive Material, Special Form, N.O.S.), if not already marked.
- 15) If a shipping container is packaged inside a crate or other packaging, mark the outside package "Inside Container in Accordance with _____". (Fill in the blank space with the appropriate DOT Specification Number of Type B Certificate Number) and the words "TYPE B" or "TYPE A", if applicable.
- 16) Ensure material has a valid leak test certificate issued within the last six months.
- 17) Properly complete the Shipping Report, indicating:
 - a. Proper shipping name (i.e. Radioactive Material, Special Form, N.O.S.).

- b. Name of Radionuclide (i.e. Iridium 192.)
- c. Physical or chemical form (or special form).
- d. Activity of source (expressed in curies or millicuries)
- e. Category of Label applied (i.e. Radioactive Yellow III).
- f. Transport Index
- g. USNRC Identification Number or DOT Specification Number
(i.e. USNRC: USA/9032/B or DOT-7A).
- h. For export shipments, IAEA Identification Number
(i.e. IAEA: USA/9032/B).
- i. Shipper's Certification:

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



XIX. EMERGENCIES

Purpose

The following rules shall be followed whenever an emergency arises.

Rules

Whenever an emergency occurs, one of the following people will be contacted immediately:

President
Vice-President
Radiation Safety Officer
Tech-Ops

The following scenarios are examples of some common emergencies, and the action to be taken.

Vehicle Accident

1. Survey camera storage area to determine if source is still in the shielded position.
2. If a radiation area exists, restrict the area with ropes and signs.
3. Notify the Radiation Safety Officer and applicable authorities, i.e. local police, state police, etc.
4. Do not leave the source of restricted area unguarded.
5. Collect information pertinent to the accident such as names of witnesses, names of people involved, names of police, license numbers, and circumstances of the accident.
6. If a source should escape from its container, the vehicle operator should make no attempt to restore the source by himself, but he should wait for instructions from the Radiation Safety Officer or other company officer.
7. The Radiation Safety Officer shall proceed to the site and assist in the restricting of the area.
8. If a situation exists involving such radiation source which may have caused or may threaten to cause any individual to receive a dose that exceeds the limits permitted by Industrial



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XIX. EMERGENCIES

Code Rule 38, the Radiation Safety Officer shall notify the Industrial Commissioner of the State of New York by telephone.

9. The Radiation Safety shall determine and institute corrective and preventative measures as are necessary to reduce the hazard.

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DOSIMETER OFF-SCALE

The following sequence of events should be performed by Truton employees when the individual's dosimeter goes off scale.

1. The individual shall cease radiographic operations, lock and survey the source.
2. Immediately notify the Radiation Safety Officer.
3. If in the judgement of the Radiation Safety Officer, the off-scale condition was not caused by an over-exposure to radiation the Radiation Safety Officer shall issue an new dosimeter and film badge to the individual.
4. The individual may resume working and the Radiation Safety Officer shall send his film badge in for immediate processing.
5. If the Radiation Safety Officer has any doubt as to the reason for the dosimeter off-scale condition, or believes the condition was caused by radiation exposure, he shall ensure that the individual does not work with or around radioactive material.
6. The individual's film badge will be sent out for immediate processing.
7. A reenactment of the series of events will be conducted to try and determine the extent of the over-exposure.
8. The Radiation Safety Officer shall determine if a blood test is necessary.
9. The Radiation Safety Officer shall determine and institute corrective and preventative measures as are necessary.

FIRE

The following is a synopsis of the events that should be executed by Trutom radiographers, if a fire should occur in his area or if emergency personnel should need access into his radiation-restricted area.

The radiographer shall:

- 1) Stop all operations immediately.
- 2) Lock, secure and remove all exposure devices, radiation signs, barrier ropes, and other radiation equipment to a safe area.
- 3) If unable to comply with the above, he shall then lock and secure and post all exposure devices or radioactive material storage containers.
- 4) The radiographer should proceed to the perimeter of the radiation-restricted area, and assist emergency personnel as necessary to ensure no delay in fire or rescue operations as caused by radiation signs, barrier ropes, or tape.
- 5) Notify Radiation Safety Officer as soon as possible.
- 6) The Radiation Safety Officer shall determine and institute corrective and preventive measures as are necessary.



OVER-EXPOSURE

The following sequence of events should be performed by Trutom personnel whenever an over-exposure to a radiographer or any individual is suspected.

1. Notify the Radiation Safety Officer immediately.
2. The radiographer shall submit to the Radiation Safety Officer a written synopsis of the incident to include names and estimated time exposed.
3. If the individual was wearing a Film Badge, the Radiation Safety shall send it out for processing immediately.
4. If the individual was not wearing a Film Badge, the Radiation Safety Officer shall arrange for the individual to obtain a blood test to help determine the extent of exposure.
5. The Radiation Safety Officer shall recreate the incident to determine estimated exposure to the individual.
6. If the dose is determined to have been greater than the limits permitted by the Industrial Code Rule 39, the Radiation Safety Officer shall immediately notify the Industrial Commissioner of the State of New York.
7. The Radiation Safety Officer shall determine and institute corrective and preventive measures as are necessary.
8. If suspected over-exposure involved a radiographer or assistant that individual shall not be permitted in a radiation area until the amount of exposure is determined.



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LOST SOURCE

In the case of a lost source, the Radiographer shall:

- 1) Survey the immediate area to determine if the source is in the immediate area. If it is found in the immediate area, the Radiographer shall clear all personnel from the radiation restricted area and utilize any other means available to reduce unnecessary exposure to personnel.
- 2) Notify the Radiation Safety Officer immediately by telephone or messenger. Do not, under any circumstances, leave the incident site or attempt to retrieve the source.
- 3) If the source is not found, the Radiation Safety Officer is to be notified immediately.
- 4) The Radiation Safety Officer shall proceed to the site and help evacuate all areas in which the source may be located.
- 5) The Radiation Safety Officer shall organize a methodical search of all areas in which the source may be lost, utilizing all radiation detection equipment available to him and whatever radiation safety trained individuals are available.
- 6) The Radiation Safety Officer shall notify the office of the Industrial Commissioner of the State of New York immediately, by telephone.
- 7) The Radiation Safety Officer shall make a full written report of the incident to the Industrial Commissioner of the State of New York.

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LOST SOURCE, PAGE 2

- 8) The Radiation Safety Officer shall determine the cause of the incident and initiate corrective measures, as applicable.

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RADIATION INCIDENT

The following is a synopsis of the duties of Trutom personnel that are involved in any type of operation, which could be considered to be a "radiation incident", ie, a damaged radioactive source or a source that cannot be returned to its stored/safe position. The radiographer shall:

1. Clear all personnel from the radiation-restricted area, and use any other means available to reduce unnecessary exposure to personnel.
2. Notify the Radiation Safety Officer by telephone or messenger. Do not leave the restricted area unguarded or attempt to retrieve the source.
3. Obtain the names of any individuals who may have received an excessive exposure.
4. The Radiation Safety Officer shall proceed to the site immediately and arrange for source retrieval by Tech-Ops.
5. The Radiation Safety Officer shall attempt to determine if any personnel have received an over-exposure, and shall take necessary action for medical processing of known and suspected over-exposure.
6. If exposures were in excess of the limits permitted by the New York Code Rule 38, the Industrial Commissioner shall be notified immediately by telephone.
7. The Radiation Safety shall determine and institute preventative and corrective actions as necessary.

APPENDIX A



U.S. LIMITED

TESTING SERVICES

EQUIPMENT UTILIZATION LOG

WARNING - INTENTIONAL FAILURE TO RECORD INFORMATION ACCURATELY ON THIS FORM CAN RESULT IN A FINE AND/OR DISCIPLINARY ACTION.

DATE _____ CITY _____ STATE _____

PROJECT _____ CUSTOMER _____

SOURCE OF RADIATION
 IR-192 ☐ CO-60 ☐ X-RAY ☐
 S/N _____ S/N _____ S/N _____

ACTIVITY OF SOURCE _____ CURIE _____

SURVEY INSTRUMENT MODEL NO. _____

EXPOSURE DEVICE MODEL NO. _____ S/N _____ VOID DATE _____

RADIOGRAPHIC EQUIPMENT INSPECTED IN ACCORDANCE WITH TRUTOM PROCEDURE T78-45 LATEST REV. APPENDIX H DAILY CHECK LIST.

INSPECTION COMPLETED BY _____

RECORD OF PHYSICAL SURVEY MADE TO DETERMINE SOURCE IS IN SHIELDED POSITION PRIOR TO SECURING EXPOSURE DEVICE.

IR-192 _____ MR/HR @ 5' FROM SURFACE

CO-60 _____ MR/HR @ SURFACE OF EXPOSURE DEVICE

TOTAL EXPOSURE TIME FOR THIS DAY _____ HRS. _____ MINS.

PERSONNEL INFORMED _____

RADIOGRAPHER _____

RADIOGRAPHER'S ASSISTANT _____

SERIAL NO. OF DOSIMETER _____

AND _____

TOTAL MR RECORDED START _____

FINISH _____

MR _____

AND START _____

FINISH _____

MR _____

FILM BADGE AND SERIAL NO. _____

AND _____

REMARKS _____

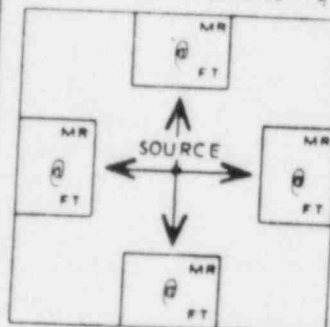
SURVEY OF TRANSPORTING VEHICLE

MR/HR @ DRIVER _____

MR/HR @ OUTSIDE SURFACE _____

MR/HR @ 1 FT. FROM SURFACE _____

RESULT OF PHYSICAL SURVEY



BARRICADE EQUIPMENT

- ☐ SIGNS
- ☐ ROPE
- ☐ CONSTANT SURVEILLANCE
- ☐ _____

APPENDIX B

CAMERA SIGN OUT SHEET

NDE Procedure T78-45

TYPE:

S/N:

[illegible]

DAILY EXPOSURE LOG

30 HINOM

YEAR

LOCATION

ACTUAL EXPOSURE PER DAYS OF MONTH

[illegible]

RECEIVING INSPECTION REPORT

CONTENTS:

☐ In 192☐ In 192☐ Co 60☐ Cs 137☐ Depleted
Uranium
(Empty shielded
container)☐ Lead
(Empty shielded
container)

FORM:

☐ Radioactive
Material
Special Form
N.O.S.☐ Radioactive
Material
Special Form
N.O.S.☐ Radioactive
Material
Special Form
N.O.S.☐ Radioactive
Material
Special Form
N.O.S.☐ Radioactive
material, LSA
NOS, Solid Metal☐ N/A

US NRC ID #:

☐ 9033☐ 9032☐ N/A☐ N/A☐ Exempt☐ N/ADOT Spec #
for Export☐ USA/9033/B
IAEA☐ USA/9032/B
IAEA☐ DOT 55☐ DOT 7A☐ Exempt☐ N/A

Shipments:

☐ USA/9033/B☐ USA/9032B☐ Mark
Cont.
Empt

ISOTOPE MODEL:

☐ 424-9☐ 424-9☐ 453-1☐ 77302☐ 660

DEVICE MODEL:

☐ 660☐ 650☐ 500☐ 773☐ 650

ISOTOPE S/N:

CAMERA S/N:

Activity in Ci:

mr/hr @ surface:

Mr/hr @ 3feet:

Type of Sticker:

<input type="checkbox"/> Radioactive - White I5		3 FEET
<input type="checkbox"/> Radioactive - Yellow II	50		
<input type="checkbox"/> Radioactive - Yellow III (Vehicle must be placarded)	200		
<input type="checkbox"/> N/A				

MR/HR

SURFACE

3 FEET

None

1

10

Transport Index:

(mr/hr @ 3 feet)

Company Transporting Package:

FINAL SHIPPING INSPECTION REPORT

CONTENTS:

☐ Ir 192☐ Ir 192☐ Co 60☐ Cs 137☐ Depleted
Uranium
(Empty shielded
container)☐ Lead
(Empty
shielded
container)

FORM:

☐ Radioactive
Material
Special Form
N.O.S.☐ Radioactive
Material
Special Form
N.O.S.☐ Radioactive
Material
Special Form
N.O.S.☐ Radioactive
Material
Special Form
N.O.S.☐ Radioactive
material, USA
NOS, Solid Metal☐ N/A

US NRC ID #:

☐ 9033☐ 9032☐ N/A☐ N/A☐ Exempt☐ N/ADOT Spec #
for Export☐ USA/9033/B
IAEA☐ USA/9032/B
IAEA☐ DOT 55☐ DOT 7A☐ Exempt☐ N/A

Shipments:

☐ USA/9033/B☐ USA/9032B☐ Mark
Container
Empty

ISOTOPE MODEL :

☐ 424-9☐ 424-9☐ 453-1☐ 77302☐ 660

DEVICE MODEL:

☐ 660☐ 650☐ 500☐ 773☐ 650

ISOTOPE S/N:

CAMERA S/N:

Activity in Ci:

mr/hr @ surface:

Mr/hr @ 3 feet:

Type of Sticker:

☐ Radioactive - White I☐ Radioactive - Yellow II☐ Radioactive - Yellow III (Vehicle must be placarded)....☐ N/A

SURFACE

MR/HR

3 FEET

.5

None

50

1

200

10

Transport Index:

(mr/hr @ 3 feet)

Company Transporting Package:

AUDIBLE DOSIMETER CHECK LOG

CANADA
6077 Upper Lachine Rd.
Montreal, Quebec,
Canada H4T 2C1

CONNECTICUT
11 Tipping Dr.
Branford, CT 06405

NEW YORK
790 Watervliet-Shaker Rd.
Latham, New York 12110

VERMONT
Avenue C
Griswold Ind. Pk

SOURCE VEHICLE CARD

DOT Shipping Name: RADIOACTIVE MATERIAL SPECIAL
FORM - N.O.S.

Name of Radionuclide: Iridium 192

Description of physical/chemical form: SPECIAL FORM

Category of Label: RADIOACTIVE - Yellow II

Package Cert. ID 9033 for Technical Operations
660 Camera

CAMERA# _____

SOURCE # _____

DAILY INSPECTION AND MAINTENANCE OF EQUIPMENT

All equipment shall be cleaned and/or repaired in accordance with the manufacturer's maintenance instructions. Any major repairs that have to do with the source shield shall be made by the Technical Operations, Inc. company (Tech-Ops).

Inspection of radiographic devices shall be made before each use and at three-month intervals. Inspection and maintenance should also be performed at source changes and at any time that the radiographer notices any change in the operating characteristics of the device. The applicable section of the "Equipment Utilization Log" shall be filled out each time these inspections occur, along with this form.

The following items shall be checked and a record kept of any necessary repairs. These records shall be forwarded to the RSO.

	<u>Satisfactory</u>	<u>Unsatisfactory</u>
1) Changes in the operating characteristics of the device.		
2) Proper operation of the source position indicator mechanism.		
(a) Light Indicators		
(b) Odometer Indicators		
3) Proper operation of the crank mechanism.		
4) Proper operation of the locking mechanism.		
5) Source and drive-cable wear or damage.		
6) Damaged or worn source and drive-cable tube.		
7) Connector wear or damage.		
8) Rust, dirt or sludge buildup in the source guide tubes.		
9) Shifting of the shield inside the projector housing.		
10) Proper connection of all mating components.		
11) Cable drive gearbox damage and wear.		
12) Proper positioning of source inside the shield.		
13) Proper labeling.		
14) Miscellaneous (Screws, safety caps, legs).		
15) Storage facility in order; locks properly functioning and box secure.		

Any damage to any radiographic device which may impair its operation shall be reported immediately and rectified before the device is put back into operation. All damage of this nature will be reported immediately to the Radiation Safety Officer, who shall take the proper steps to see that the condition is rectified.

REMARKS

Technician's Signature

QUARTERLY INSPECTION AND MAINTENANCE REPORT

TRUTOM (US) LTD

MACHINE SERIAL NUMBER _____ CRANK SERIAL NUMBER _____

SERIAL NUMBER OF SOURCE _____

INSPECTION	COMMENTS & MAINTENANCE DETAILS
------------	--------------------------------

Changes in Operating Characteristics of Device	
--	--

Proper Operation of the Crank Mechanism	
---	--

Proper Operation of Source Position Indicator	
---	--

Source & Drive-Cable Wear or Damage	
-------------------------------------	--

Proper Operation of the Locking Mechanism	
---	--

Damaged or Worn Source and Drive Cable Tubes	
--	--

Connector Wear or Damage	
--------------------------	--

Rust, Dirt or Sludge Buildup in the Source Guide Tubes	
--	--

Shifting of Shield in Projector Housing	
---	--

Proper Connection of all Mating Components	
--	--

Cable Drive Gearbox Damage or Wear	
------------------------------------	--

Proper Positioning of Source inside Shield Unit	
---	--

Proper Labelling	
------------------	--

Miscellaneous (Loose Screws, Safety Caps, Legs, etc.)	
---	--

INSPECTED BY: _____ DATE: _____

APPROVED BY: (RSO) _____ TIME: _____

ANY DAMAGE TO EQUIPMENT SHALL BE REPORTED IMMEDIATELY TO THE R.S.O.

APPENDIX K
CHECKLIST FOR MOBILE
UNIT

1. Operating and emergency procedure.
2. All applicable license (NRC and New York) and amendments.
3. Notice to employees.
4. Assistant radiographer or radiographer certification card.
5. Copies of 10 CFR Part 19, 20, 21, and 34 and Code Rule 38.
6. Source vehicle card packet.
7. Calibrated survey meter.
8. Personnel identification.
9. Emergency equipment, tongs, tunnel, ropes, and signs.
10. Personnel monitoring equipment, film badge, and dosimeter.

TRUTOM EMERGENCY PHONE LIST

APPENDIX J

President-	Business	Home
Radiation Safety Officer-	Business	Home
Vice-President-	Business	Home
Tech-Ops Hotline		
New York State Dept. Labor		
NRC Region I		

EMERGENCY EQUIPMENT: The perimeter ropes and signs in this vehicle may be used to rope off the 2 MR/Hr boundary in case of vehicular emergency.



NONDESTRUCTIVE TESTING SERVICES

NDE Procedure T78-45
ADMIN

TRUTOM U.S. LTD.

EMERGENCY & OPERATING PROCEDURES

ADMINISTRATION SECTION

CANADA
6077 Upper Lachine Rd.
Montreal, Quebec,
Canada H4A 2C4
514-481-5674

CONNECTICUT
11 Tipping Dr.
Branford, CT 06405
203-481-4660

NEW YORK
790 Watervliet-Shaker Rd.
Latham, New York 12110
518-783-1272

VERMONT
Avenue C
Griswold Ind. Pk.
Williston, VT 05495
802-864-6939



NONDESTRUCTIVE TESTING SERVICES

NDE Procedure T78-45
ADMIN

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CANADA
6077 Upper Lachine Rd.
Montreal, Quebec,
Canada H4A 2C4
514-481-5674

CONNECTICUT
11 Tipping Dr.
Branford, CT 06405
203-481-4660

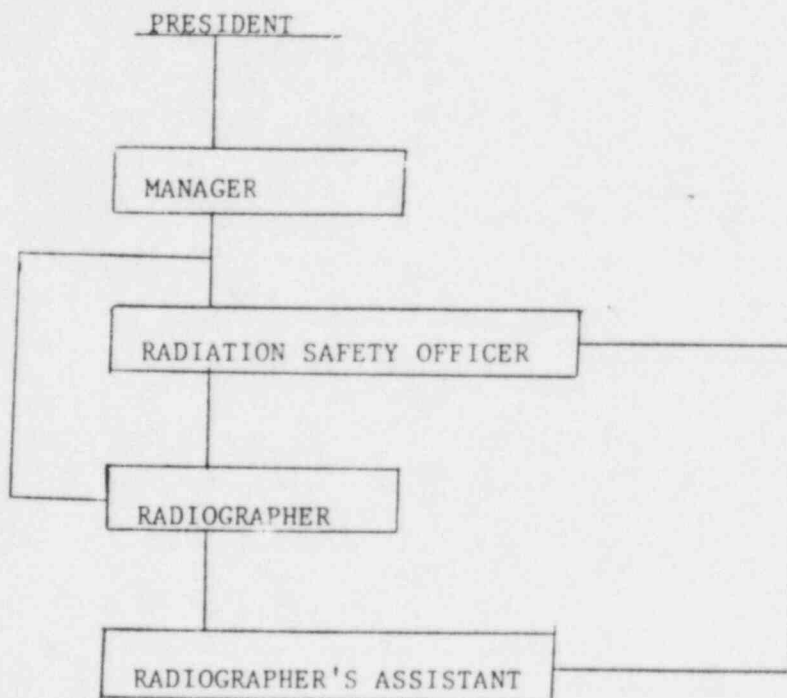
NEW YORK
790 Watervliet-Shaker Rd.
Latham, New York 12110
518-783-1272

VERMONT
Avenue C
Griswold Ind. Pk.
Williston, VT 05495
802-864-6939

TRUTOM (U.S) LIMITED

ORGANIZATION CHART

RADIOGRAPHY DEPARTMENT



I. ORGANIZATION OF TRUTOM (U.S.) LIMITED

1. Classification of Personnel

Personnel employed at Trutom (U.S.) Limited shall be classified in the following categories:

- a) Radiographer's Assistant Trainee
- b) Radiographer's Assistant
- c) Radiographer
- d) Radiation Safety Officer
- e) Manager

Minimum qualifications for these positions are as defined in T87-46 and as described below.

2. Requirements for Management Personnel

- A. The Manager shall be a radiographer with a minimum of ten years experience as an industrial radiographer.
- B. The Radiation Safety Officer (RSO) shall be a radiographer. In addition, he shall have a positive attitude towards safety, display good common sense, and have a good reputation based on past experience. He shall have as a minimum of four years experience as an industrial radiographer using IR192, C060 and X-Ray

3. Responsibilities of Personnel

- A. President. The ultimate responsibility for Trutom's operation shall rest with H. Paul Thomas, the Company's President. Therefore, he shall act as the company's liason officer with the NRC on all license matters.
- B. Manager. The Manager shall be directly responsible to the President. Control of the technical aspects of the operation shall be his responsibility. He shall provide safety and technical training to the radiographic personnel. He shall be the supervisor of the RSO and the other radiographers. He shall play an active role in assuring that employees under his supervision are complying with NRC regulations and Trutom's "Operating & Emergency Procedures". He shall participate in the internal audit system as specified in the "Inspection System for the Control of Radioisotopes", Section B of the NRC license application.

continued.

1. Organization of Trutom (U.S.) Limited, Continued

C. Radiation Safety Officer (RSO). Directly responsible to the Manager. Duties of the RSO are as follows:

1. Receiving and disposal of source material
 - a. Review "Receiving Inspection Report" and verify that source has a valid leak test certificate.
 - b. He shall maintain these documents appropriately.
 - c. When source is shipped, he shall review and maintain on file a copy of the Bill of Lading and the "Final Shipping Inspection Report".
2. He shall maintain up-to-date "Operating & Emergency Procedure" instructions. Changes in pertinent state and/or federal regulations, deficiency noted in current set and acquisition of new equipment, or some factor requiring changes be made shall be his responsibility.
3. The personnel monitoring program shall be managed by the RSO. It shall be his responsibility to ensure that film badges are being turned in and analyzed at the proper intervals. He shall review the reports from the Radiation Dosimetry Service to ensure that employee doses are not in excess of or likely to exceed state and/or federal regulations.

If an employee's pocket dosimeter goes over scale and radiation is a possible cause, the RSO shall issue that employee a new badge immediately and shall have the badge in question analyzed as expeditiously as possible. The RSO shall periodically review the "Daily Exposure Log" to be sure that it is being kept up-to-date by all applicable employees. It is his responsibility to ensure that enough operable pocket dosimeters are readily available.
4. It shall be the RSO's responsibility to ensure that an adequate supply of operable calibrated survey meters are available. He shall remove from possible use all meters which are due for calibration. He shall review and maintain as records all calibration reports.
5. The training shall be administered by the RSO and/or Manager. It shall be the RSO's responsibility to ensure that all radiographic personnel receive at least the minimum training as described in Section I of this part.
6. Devising, administering and grading examinations to determine the competency of personnel shall be done by the RSO and/or the Manager. All exams and RSO employee evaluations shall be maintained by the RSO.

continued. . .

I. Organization of Trutom (U.S.) Limited, Continued

7. The Radiation Safety Officer shall ensure that no source will be used which has not had an acceptable leak test performed within the previous six month period. All leak test certificates shall be kept on file by him until at least six months after the next required leak test has been performed or until the source has been returned to the manufacturer.
8. The Radiation Safety Officer and/or the Manager shall perform the periodic inspections per the procedures and intervals specified in the "Inspection System for the Control of Radioisotopes." The Radiation Safety Officer shall maintain records of these checks.
9. The "Equipment Utilization Logs" shall be maintained by the Radiation Safety Officer. These logs shall be filed by him by date.

The "Quarterly Inventory Records" shall be developed and maintained by the Radiation Safety Officer. These records shall be kept for two years. The inventory records shall list all sources maintained by the type, model number, serial number, manufacturer, quantity of radioactivity, and where sources are kept. These records shall be updated quarterly and when new sources are acquired.

10. As soon as the Radiation Safety Officer is notified of an emergency he shall assume direct supervision over the proceedings. He shall notify the President of all such instances. The President and/or the Radiation Safety Officer shall notify the NRC of these situations as specified in 10CFR, 20.402, 20.403, and 20.405.
11. Any incidents such as emergency situations, equipment damage due to abuse or to lack of maintenance, report of or discoveries of unsafe operations, etc., shall be thoroughly investigated by the Radiation Safety Officer. He shall determine the cause and effect preventative action. He shall make a full report of his investigation to the President.
12. Maintenance of the storage facility is the daily responsibility of the radiographer. However, the Radiation Safety Officer shall periodically review these facilities to ensure that all pertinent safeguards are being properly utilized.
13. The Radiation Safety Officer shall ensure that daily maintenance and inspection of exposure devices, radiographic facilities, and associated equipment is being carried out by the Radiographers. Accurate records shall be kept on the "Inspection and Maintenance Reports". These forms shall be reviewed by the Radiation Safety prior to his filing them as permanent records. He shall pay special attention to the maintenance performed and deviations noted.

I. ORGANIZATION OF TRUTOM (U.S.) LIMITED ,Continued

14. The Radiation Safety Officer shall ensure that quarterly maintenance is carried out on schedule and in accordance with the Section VII of the "Operating and Emergency Procedures."
15. The Radiation Safety Officer shall serve as the licensee's liaison officer with the NRC and Department of Labor, New York.
16. The Radiation Safety Officer shall establish and maintain the licensee's record keeping system.
17. The Radiation Safety Officer shall review and ensure maintenance of records kept by others.
18. The Radiation Safety Officer shall act in an advisory capacity to the licensee's management.
19. The Radiation Safety Officer shall authorize qualified persons to act in his stand when absent.
20. The Radiation shall maintain on file copies of licenses of vendors performing licensable activities.

D. Radiographers. These individuals are directly responsible to the Manager and, secondly, to the Radiation Safety Officer. They are responsible for following "Operating & Emergency Procedures" when performing any radiographic operation or transportation of radioisotopes.

E. Radiographer's Assistants. These individuals shall be responsible first to the Manager, secondly, to the Radiation Safety Officer, and thirdly, to the radiographer.

II. INSPECTION SYSTEM FOR THE CONTROL OF RADIOISOTOPES

Scope

This procedure shall provide a system by which management can assure that radiographers and radiographer's assistants are complying with NRC regulations and the Company's "Operating & Emergency Procedures".

A. Responsibility

- A. Radiation Safety Officer. The RSO shall be responsible to ensure that radiographers and radiographer's assistants are in compliance with "Operating & Emergency Procedures".
- B. Manager. The Manager shall be responsible to audit the RSO to ensure that he is correctly and conscientiously performing his duties.

B. Qualification of Personnel

Both the RSO and the Manager shall have as a minimum the qualifications specified in the "Organization of Trutom (U.S.) Limited".

C. Audit of Personnel

- A. Frequency.
 - 1. Any time that management receives information or suspects that personnel are not complying with NRC regulations.
 - 2. The inspections shall be performed at least quarterly on each radiographer and each radiographer's assistant.
- B. The RSO and/or the Manager shall perform these inspections.
- C. The inspections shall be unannounced.
- D. The knowledge of the radiographer and/or radiographer's assistant shall be verified by the use of the checklist, Appendix H.
- E. If an individual does not understand the safety measures, he shall not be permitted to operate source projectors. He shall prove, by subsequent examinations and demonstrations, that he has the required knowledge to safely operate exposure devices.
- F. All non-compliance shall be discussed as part of the periodic training program.

continued. . .

D. Audit of Internal Systems

- A. On at least a weekly basis, the RSO shall review the "Inspection and Maintenance Reports" and the "Equipment Utilization Log" reports as submitted by the radiographic personnel.
- B. The RSO shall perform all the duties as specified in the "Organization of Trutom (U.S.) Limited" section.
- C. The Manager shall periodically audit the RSO. At least yearly he shall perform an audit checking the following items:
 - 1. Calibration system.
 - 2. Records kept by RSO.
 - 3. Receiving and disposal of source material file.
 - 4. Inspection and maintenance of equipment logs.
 - 5. Quarterly Inventories.
 - 6. Exposure logs.
 - 7. Personal monitoring system.
 - 8. Updates to "Operating & Emergency Procedures".
 - 9. Other items, as applicable.

INSPECTION SYSTEM FOR THE CONTROL OF RADIOISOTOPESRADIATION SAFETY AUDIT CHECKLIST

Name of Individual:

Classification:

1. Is a copy of Trutom Operations and Emergency Procedure in the individual's possession
yes ☐ no ☐
2. What does the individual do to ensure that himself and other personnel are not overexposed
signs ☐ ropes ☐ meter ☐ lights ☐
3. Has there been any occasion where the individual has performed work with damaged or malfunctioning equipment
yes ☐ no ☐ how many times ☐
4. Does the individual know where the safety tongs are kept
yes ☐ no ☐
5. Does the individual have the following equipment in the vehicle when transporting a radioactive isotope to a job site
meter ☐ signs ☐ tongs ☐
emergency container ☐ tunnel ☐
6. Is the individual performing the necessary equipment check for damage before use
yes ☐ no ☐
7. Does the radiographer know the allowable radiation levels for himself and non-radiation workers
yes ☐ no ☐

RADIATION SAFETY AUDIT CHECKLIST

8. Is the individual using a film badge
yes ☐ no ☐
9. Does the individual return the exposure device to the storage container after its use
yes ☐ no ☐
10. Does the individual approach the exposure device after the termination of an exposure with a survey meter turned on
yes ☐ no ☐
11. Is a copy of NY Code Rule 58 in the possession of the individual, if he/she is a NY radiographer
yes ☐ no ☐
12. If this inspection takes place outside of NY, is the individual aware of the significance of Code Rule 58 in regard to working in NY
yes ☐ no ☐
13. Does the individual use the proper procedure for turning on the survey meter
yes ☐ no ☐
14. Does the individual monitor the survey meter readings with each exposure to be aware of abnormal survey meter operation
yes ☐ no ☐
15. Does the individual check of audible doseimeter when in Latham Lab
yes ☐ no ☐
16. Does the individual at any time rely solely on the audible doseimeter
yes ☐ no ☐

17. Did the individual zero the dosimeter at the beginning of the day
yes ☐ no ☐
18. Is the individual aware of what the most recent dosimeter reading was
yes ☐ no ☐
19. Did the individual log the initial dosimeter reading on the radiation report
yes ☐ no ☐
20. Has the individual logged in the daily dosimeter exposures as required
yes ☐ no ☐
21. Is the individual's film badge out of date
yes ☐ no ☐
22. Does the individual leave his/her film badge and dosimeter at the Trucom office permanent storage point with control badge and control dosimeter
yes ☐ no ☐
23. Does the individual check the dosimeter reading as frequently as required
yes ☐ no ☐
24. Does the camera the individual is using have its proper paperwork
up to date ☐ leak test ☐ source/vehicle card ☐
source location change form ☐ extra type 11 sticker ☐
camera utilization checklist ☐ radiation report ☐ daily inspection checklist ☐
25. Is the individual aware of his/her responsibility to keep one copy of the "Equipment Utilization Log" in permanent personal possession and file, and to submit without delay the original copy for permanent Trucom file in Latham, NY
yes ☐ no ☐

26. Does the individual allow him/herself to be distracted while connecting or disconnecting the camera
yes ☐ no ☐
27. Is the individual posting "High Radiation Area" and "Radiation Area" signs * (High Radiation signs not applicable to NY)
yes ☐ no ☐
28. Does the individual know how to calculate what the radiation area boundary will be by the inverse square law
yes ☐ no ☐
29. Does the individual utilize time distance and shielding to minimize personal exposure to the best possible advantage with each operation
yes ☐ no ☐
30. Does the individual know what to do in an emergency, i.e., the source won't return to the camera
yes ☐ no ☐
31. Does the individual know what constitutes an emergency
yes ☐ no ☐
32. Did the individual sign out on the "Camera Signout Sheet"
yes ☐ no ☐
33. Has the radio-rapher notified the proper job site personnel
yes ☐ no ☐
34. Actual radiation dose rates at the boundaries are _____
35. Are survey sketches accurate, and do they provide enough detail
yes ☐ no ☐
36. Is final survey performed properly
yes ☐ no ☐

31. Other notes, observations, & recommendations _____

TRAINING AND QUALIFICATION OF RADIOGRAPHIC PERSONNEL

TRUTOM (U.S) LTD.