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August 21, 2006

USNRC  
Region I  
Nuclear Materials Safety Branch  
475 Allendale Road  
King of Prussia, PA 19406

Attention: Ms. Kathy Modes

Subject: License Amendment  
Reference: License No. 06-30317-01 03034177

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MS-16

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REGION 1

2006 AUG 22 AM 10:22

Dear Ms. Modes,

This amendment request is to allow integrated Technologies, inc. qualified radiation safety personnel to retrieve sources that can not be retracted to the fully shielded position, by normal procedures.

As the corporate Radiation Safety Officer for integrated Technologies inc. (*iTi*) I have successfully completed a course of instruction and practical training in source recovery administered by Mr. Robert Kelly, of QSA Global. The course duration was 24 hours and it was completed in November, 2003. I also have a current ASNT-IRRSP radiographer qualification card.

Mr. Paul Neidig of *iTi* is a designated Assistant Radiation Safety Officer and has also completed a Radiation Safety training seminar for Administration of Isotope Radiography Safety Programs. He also completed the course of instruction and practical training in source recovery, administered by Mr. Kelly. He has a current ASNT-IRRSP radiographer qualification card.

Mr. Paul Mundahl is the Assistant Radiation Safety Officer at our Manchester, PA location. In addition to his radiographer safety training he has attended a Radiation Safety training seminar for Administration of Isotope Radiography Safety Programs, and the course of instruction and practical training in source recovery, administered by Mr. Robert. Mr. Mundahl has a current ASNT-IRRSP radiographer qualification card.

As additional personnel receive training in source recovery they will be added to a list of personnel authorized to retrieve sources. A minimum of 5 years experience as an industrial radiographer shall be a prerequisite for a candidate to attend the source recovery class.

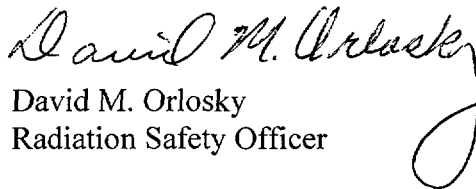
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NMSS/RGNI MATERIALS-C02

In 2001 along with a revision of our radiation safety manual, a general source recovery procedure was submitted as Attachment J (copy enclosed). In addition to this general source recovery procedure is a copy of the Emergency Procedures Source Retrieval Operational Guidelines developed by QSA Global. These guidelines will be used as a supplement to *iTi*'s general source recovery procedure.

A source retrieval tool kit has been assembled and is available in the event there is a need for a source retrieval. The tool kit contains the items recommended by Mr. Kelly. Should a retrieval be deemed necessary every precaution will be taken to minimize exposure to the general public and the retrieval team.

If you have any questions you can call me at (860) 447-2474.

Very truly yours,



David M. Orlosky  
Radiation Safety Officer

cc: Frederick Klorczyk  
President  
Paul Neidig  
Waterford, CT ARSO  
Paul Mundahl  
Manchester, PA ARSO

**ATTACHMENT J**

**General Source Recovery**

## 1. INTRODUCTION

This source recovery procedure is to be utilized by the *iTi* Radiation Safety Officer and the Assistant Radiation Safety Officer(s) who have had specific training in the techniques described herein. Depending on the circumstances of the emergency situation, the Radiation Safety Officer may elect to contact an outside consultant to perform the source retrieval. In this case, the consultant may utilize this procedure or his own approved techniques. During source retrieval operations, all personnel involved shall have a film badge, 0-200 mR and 0-1 R pocket ion chambers and an operable survey meter.

- 1.1 When a source retrieval is necessary, notification shall be made to the NRC or affected Agreement State within 4 hours of the discovery that an emergency situation exists. (Per Part 30 section 30.50) The NRC Operations Center phone number is (301) 816-5100. The Agreement State notification phone numbers are listed on the reciprocity request form. A followup notification by telephone will be made within 24 hours of the retrieval giving the detailed information as listed in section 30.50 of Part 30.
- 1.2 Follow up reporting will be per Part 30 above and Part 34, section 34.101 which requires a written report within 30 days of the occurrence.

## 2. SOURCE RECOVERY PROCEDURE

- 2.1 An emergency situation exists whenever a source can not be retracted to the fully shielded position by normal procedures. Should this occur, the first step must be to establish a new restricted area boundary. This may require increasing the original boundary significantly if the source is not in the collimator. A new radiation restricted area shall be established by posting additional signs, roping off the area, and if needed posting additional personnel in order to maintain control. The posted area shall not exceed 2 millirem in any one hour. If additional assistance is needed from on-site personnel to help maintain the restricted area boundaries they shall be instructed as necessary on how to maintain the boundary. They shall be advised that they are not to cross the boundary at anytime and they shall maintain their post until the radiographer in charge dismisses them.
  - 2.1.1 Evaluate the situation to determine the location of the source and if possible try to crank the source back into the exposure device. If this cannot be achieved try to advance the source into the collimator so that the radiation area is the same as for the exposure.
  - 2.1.2 If the source is jammed and can not be put back into the collimator, quickly determine the location of the source in the tube by the following method:
    - a. Quickly place a lead tunnel over the source tube at the camera exit port.

- b. Pull the camera away from the tunnel such that the tube is dragged through the tunnel. Use the crank cable to pull the camera.
  - c. Watch the survey meter carefully to note when the radiation level drops. The source is then enclosed within the 1½" thick lead tunnel.
- 2.2 Once either (a) or (b) above has been done, determine the unshielded restricted area and establish a new restricted area as described in 2.1 above and proceed with this step immediately.
- 2.3 The retrieval operation shall proceed as follows:
  - 2.3.1 Determine the nature of the problem. This step is of the utmost importance.
  - 2.3.2 The most common problems and solutions are as follows:
    - a. **Source tube is kinked** - Quickly locate the kink and tap the tube lightly with a hammer to try to round it out. Retract the source.
    - b. **Source becomes disconnected** - The source may be disconnected because the pigtail connector on the cable has separated. If this happens, the source should be driven to the collimator.
      - 1. Prepare a clean work area around the camera and have tongs ready. (Tongs should be 4' to 8' long for source retrieval).
      - 2. Unscrew the source tube from the front of the camera.
      - 3. Pull the cable back through the camera until it is free from the camera. **Do not change the camera setting from "Operate"**. This will leave a clear tube through the camera so the source can be put back in without obstruction.
      - 4. Shake the source out of the tube with the tongs.
      - 5. Pick up the source with the tongs and put it back into the camera. Insert the pigtail and use the plunger to secure the source in the camera.
    - c. **Obstruction in source tube** - In this case, the source is connected and will retract up to the obstruction, but will not pass it and no visible kink is present.
      - 1. Determine the area of obstruction with the lead tunnel technique.

2. Place lead sheets over the obstructed area. One inch total, or equivalent, shielding should be used.
  3. Unscrew the source tip and collimator.
  4. Place the end of the open tube under the lead tunnel.
  5. Crank the source into the tunnel. Be careful not to crank too fast. Watch the survey meter carefully to determine when the source is inside of the tunnel.
  6. Quickly disconnect the source and retract the cable.
  7. Unscrew the obstructed tube.
  8. Move the camera exit port up to the source with about 2' of cable sticking out of the camera exit port.
  9. Reconnect the source and retract carefully.
- d. **Source is jammed in the tube and will not go forward or backward**  
- This is quite unlikely because if it can be cranked into a jammed position, it should be possible to crank it out of that position. However, if this should occur:
1. Determine the location of the jam with the lead tunnel technique. Keep the tunnel over the source.
  2. Unscrew the hose and cut the cable.
  3. Use tongs to put the entire tube into a safety container and secure.
- e. **Drive cable becomes damaged while shot is out** - Cut the drive cable close to the camera. Pull the cable by hand to retract the source.
- 2.4 During all source retrieval operations, be sure to take all reasonable steps to keep the exposure to a minimum. All persons in a crew should plan to spend approximately equal amounts of time in the high radiation area, but at no time should all be in that area at the same time. Do not panic and do not rush the operation. Plan each step carefully. Hasty operations performed incorrectly could worsen the problem. **Never touch the source with your hands. Always use tongs.**

## **Emergency Procedures**

### **Source Retrieval Operational Guidelines**

**Purpose:** The following information provides guidelines for use in the retrieval of isotope radiography sources involved in accidents.

**Scope:**

1. The information contained in this document is intended to be used as an operational guide only. This is due to consideration that no two emergency retrievals are exactly the same and are rarely handled in the same fashion. Although these emergencies can be generically classified into a problem category, they must be handled on a case-by-case basis. Each emergency retrieval presents its own unique set of circumstances and must be handled accordingly.
2. The use of these operational guidelines is limited to the Radiation Safety Officer/Designee. An in-depth knowledge of the equipment, problem assessment/planning, survey techniques, shielding techniques, problem repair/remedy, and dosimetry considerations is required beyond the information provided in the operational guidelines.
3. All other individuals providing assistance in operations covered in these operational guidelines must be under the instruction/supervision of the R.S.O. or designee.
4. The use of sound radiation safety practices and common sense, in addition to properly assessing the emergency will be the first consideration to maintain exposure to radiation ALARA.
5. All personnel engaged in source retrieval operations must wear appropriate dosimetry to monitor whole/body and extremity exposure as applicable.
6. Unshielded radiation sources shall only be moved or manipulated by the use of remote handling tongs or tools in lengths sufficient to provide the operator protection.
7. Radiography personnel suspected of possible exposure during discovery of the emergency, shall be excluded from participation in the retrieval operations.
8. If required, additional information, assistance or a second opinion can be obtained from the manufacturer by calling the 24-hour response telephone number: SENTINEL / AEA Technology 1-800-815-1383. Inform the operator that you have a "radiological emergency."

## **Emergency Procedures Source Retrieval Operational Guidelines**

### **PROBLEM TYPE: SOURCE HANG-UP**

#### **Operational Guide:**

1. Upon notification, the RSO/Designee must ensure the "Restricted Area" is secured at the site. The RSO/Designee should gather sufficient information to ensure appropriate equipment and response personnel are available for the emergency. Start a "chain of events" log to record all details of the response upon notification.
2. At the site, interview the radiography personnel. Limit access to the "Restricted Area" to response personnel only.
3. Determine the exposure expected to result from the assessment.
4. Perform the assessment to verify the type of problem. If movement of the source is possible, attempt to crank the source into collimator or to a greater distance away from the site of damage if possible. Read dosimeter and record.
5. Verify the location of the source by survey technique. Read dosimeter and record.
6. Develop a plan for retrieval based on the conditions. Ensure there is a sufficient number of response personnel available to handle the tasks and that the necessary equipment to perform the retrieval is available. Sketches, Polaroids, and diagrams are helpful in the planning phase. Ensure each member of the team understands their assigned tasks and the entire plan.

Determine the exposure for each individual and each independent operation.

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

7. Straighten and position the source guide tube on the ground using remote handling tools.

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



## Emergency Procedures Source Retrieval Operational Guidelines

### PROBLEM TYPE: SOURCE HANG-UP

8. Examples of corrective repairs/remedies:

- a. *For small dent repair*, gently hammer dented area of guide tube until round.
- b. *For more severe damage* such as a flattened section, cut and remove the polyvinyl wrap from the damaged area to expose the metal conduit.

Using caution, cut partially through the metal conduit. (You may be able to see an impression of the drive cable in the flattened area. Be extremely careful to avoid cutting into the drive cable during the partial cut). Insert a screwdriver into the cut to open up the flattened area. Repeat until damaged section is completely opened up.

Note: Right angle tools might be needed for this operation if the damage site is in close proximity to the shielded source.

In both examples, keep extremities out of primary beam emanating from the shielding materials. Use tools long enough to keep extremities outside of the beam. Wear ring TLDs or dosimeter on wrist.

Read dosimeter and record.

9. Ensure all personnel are out of the "Restricted Area." Crank source into device using remote controls.
10. Perform surveys of the device, guide tube, lead shielding and collimator. Secure the source in device by locking. Record the device survey results. Read dosimeter and record.
11. Remove equipment from service for evaluation. Send equipment to the manufacturer for detailed evaluations. Save returned equipment for use in training sessions.
12. Reference "Retrieval Sequence" flow chart for sequential steps. (Attachment A)

## **Emergency Procedures Source Retrieval Operational Guidelines**

### **PROBLEM TYPE: SOURCE DISCONNECT**

#### **Operational guide:**

1. Upon notification, the RSO/designee must ensure the "Restricted Area" is secured at the site. The RSO/designee should gather sufficient information to ensure appropriate equipment and response personnel are available for the emergency. Start a "chain of events" log to record all details of the response upon notification.
2. At the site, interview the radiography personnel. Limit access to the "Restricted Area" to response personnel only.
3. Determine the exposure to result from the assessment.
4. Perform the assessment to verify the type of problem. Crank controls to project source into collimator or farthest distance possible. Confirm disconnect using survey technique while retracting crank. Read dosimeter and record.
5. Develop plan of retrieval based on the conditions. Ensure necessary equipment is available and that sufficient number of response personnel are available to perform the retrieval. Sketches, Polaroids, and diagrams are helpful in the planning phase. Ensure each member of the team understands their assigned tasks and the entire plan. Determine the exposure for each individual and each independent operation. Review plan for ALARA. Revise any portions of the plan where personnel exposure can be reduced.
6. The equipment and source involved in disconnect/misconnect retrievals must be removed from service for repair and evaluation. Equipment and sources should be sent to the applicable manufacturer for a comprehensive evaluation.
7. EXAMPLES of corrective repair/remedies:

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

## **Emergency Procedures Source Retrieval Operational Guidelines**

### **A. SHIELD/CUT/PUSH METHOD:**

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

Check dosimeter and record.

Position guide tube into U shape near side of shield.

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

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

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

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

### **B. DIRECT HOT STICK INTO DEVICE-OUTLET PORT**

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

Locate source using survey technique and shield source.

Detach source guide tube from device.

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

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

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

## **Emergency Procedures**

### **Source Retrieval Operational Guidelines**

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

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

#### **C. HOT STICK/SOURCE TRANSFER METHOD**

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

Locate source with survey technique and shield the source.

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

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

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

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

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

Survey the two devices, then secure both devices.

#### **D. DIRECT HOT STICK INTO DEVICE**

Locate the source using survey technique and shield the source.

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

## **Emergency Procedures Source Retrieval Operational Guidelines**

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

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

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

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

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

Survey the device upon completion of this operation.

### **E. DRIVE CABLE/MODIFIED CONNECTOR "FISHING" METHOD**

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

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

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

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

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

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

# Retrieval Sequence

The sequential steps to follow in a retrieval.

