

RTS TECHNOLOGY, INC.

A Company of the Sauerwein Group



17 April 1987

RTS TECHNOLOGY, INC.
35 Flagship Drive
North Andover, MA 01845
Tel.: 617-683-5211
Fax.: 617-683-9465

Mr. Thomas K. Thompson
Nuclear Material Safety Section B
Division of Radiation Safety and Safeguards
US Nuclear Regulatory Commission
Region 1
631 Park Avenue
King of Prussia, PA 19406

P7

Dear Mr. Thompson,

This letter is in response to our telephone conversation of 16 April 1987 regarding our application dated 3 March 1987 for a materials license. We wish to provide clarifications and answers to the questions raised in your letter.

1. We wish to confirm that all sealed sources possessed under our license would be stored in containers designed for the purpose. In general, these storage containers would also be transport containers authorized for shipment by the US Department of Transportation or the USNRC. In some cases, there may be as many as eight to ten sources stored in a single container with an aggregate activity of up to 1000 curies of iridium-192. Such containers would be similar to those identified as USA/0316/B(U) or USA/9165/B(U). More routinely, storage would be limited to one or two sources per container with an aggregate activity of up to 200 curies.

In no case would sources be stored outside of such shielded containers. Sources would not be stored in an exposing position within the applications laboratory. Neither would sources be stored within a hot cell or shielded box. Section 1 of our Operating and Emergency Procedures Manual has been revised to clarify this.

2. We wish to confirm that sources used for calibration of radiation measuring instruments would have the determination of their activity traceable to the National Bureau of Standards. Sections of our Operating and Emergency Procedure Manual have been revised to indicate this.
3. We wish to confirm that our applications laboratory will be equipped with both visible and audible indicators to warn of the presence of radiation. The visible signal will be actuated by radiation when a source is exposed within the room. The audible signal shall be actuated when an attempt is made to enter the room while the source is exposed.

22 APR 1987

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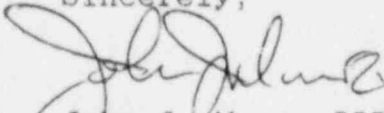
RTS TECHNOLOGY, INC.
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Section 4 of our Administrative Manual has been revised to indicate this.

4. We wish to confirm that a drift test of pocket ionization chamber dosimeters will be conducted as part of the calibration procedure. Section 14 of our Operating and Emergency Procedures Manual has been revised to reflect this.
5. We wish to confirm that we will limit our possession of sealed sources of radioactive material to those for which a Certificate of Registration has been issued either by the US Nuclear Regulatory Commission or by an Agreement State.

We trust that this provides the clarification which you requested. If we can provide any additional information about these items, please contact us.

Sincerely,



John J. Munro III
President

Administrative Manual Contents

1. Introduction	Rev. 0	23 Feb 87
2. Organization and Radiation Safety Officer	Rev. 0	23 Feb 87
3. Training and Qualification	Rev. 0	23 Feb 87
4. Facility Description	Rev. 1	17 Apr 87
5. Instrumentation	Rev. 0	23 Feb 87
6. Internal Inspection	Rev. 0	23 Feb 87

The facility is located at 35 Flagship Drive, North Andover, MA. The Application Laboratory is situated as shown in Figure 4.1.

The Application Laboratory is designed with sufficient shielding that the radiation intensity at a distance of 18 inches from the outside surface of the walls will not exceed 2 mrem/hr when a source of 100 curies of iridium-192, 40 curies of cesium-137, 2 curies of cobalt-60, 200 curies of ytterbium-169 or 200 curies of thulium-170 is exposed within the room. When sources of greater activities than these are exposed, additional localized shielding and/or restrictions on time of exposure will be used to assure that no individual who is continuously present in the area could receive an exposure in excess of 2 mrem in any one hour.

Unescorted access to the laboratory is limited to the Radiation Safety Officer, Assistant Radiation Safety Officer, Radiological Technicians and individuals to whom the President of RTS Technology, Inc. gives special permission. Visitors with legitimate business with RTS Technology, Inc. are allowed access to the laboratory only with the approval of either the Radiation Safety Officer or the President of RTS Technology, Inc., and only when escorted by an individual who is authorized unescorted access to the laboratory. Individuals under age eighteen and pregnant women will not be allowed to enter the laboratory.

The Applications Laboratory is equipped with both visible and audible indicators to warn of the presence of radiation. The visible signal is actuated by radiation when the source is exposed within the room. The audible signal is activated when an attempt is made to enter the room while a source is exposed.

The applications laboratory is equipped with a door interlock system which prevents entry into the room when radiation levels, as monitored with an area monitor, exceed 5mR/hr. If the door to the Applications Laboratory were to be opened while the area monitor is in the energized condition, an alarm will sound.

Smoking is prohibited in the Applications Laboratory. Food and beverages are not permitted in the laboratory.

Operating and Emergency Procedure Manual Contents

1. Introduction and General Requirements	Rev. 1	17 Apr 87
2. Use of Personnel Monitoring Equipment	Rev. 0	23 Feb 87
3. Receipt of Radioactive Material	Rev. 0	23 Feb 87
4. Shipment of Radioactive Material	Rev. 0	23 Feb 87
5. Shipment of Empty Uranium Shielded Containers and Uranium Shielded Collimators	Rev. 0	23 Feb 87
6. Carriage of Radioactive Material	Rev. 0	23 Feb 87
7. Operation of Radiographic Exposure Devices in the Applications Laboratory	Rev. 0	23 Feb 87
8. Controlling Access to Restricted Areas	Rev. 0	23 Feb 87
9. Operation of Radiographic Exposure Devices at Field Locations	Rev. 0	23 Feb 87
10. Periodic Inspection and Maintenance	Rev. 0	23 Feb 87
11. Source Changing	Rev. 0	23 Feb 87
12. Leak Test Wipe of Sealed Source and Radioassay	Rev. 0	23 Feb 87
13. Calibration of Radiation Survey Instruments	Rev. 1	17 Apr 87
14. Calibration of Pocket Dosimeters	Rev. 1	17 Apr 87
15. Calibration of Contamination Monitors	Rev. 1	17 Apr 87
16. Calibration of Scaler Counting Equipment	Rev. 1	17 Apr 87
17. Handling of Unencapsulated Depleted Uranium Shields	Rev. 0	23 Feb 87
18. Radioactive Waste Disposal	Rev. 0	23 Feb 87
19. Emergency Procedures	Rev. 0	23 Feb 87

Operating and Emergency Procedure Manual
Introduction and General Requirements

Section 1
Revision 1
17 Apr 87

1. This manual establishes company policies and requirements for the use of radioactive materials and other sources of ionizing radiation.
2. It is the responsibility of each employee to take every reasonable precaution to minimize the radiation exposure of himself, other employees and the general public. The basis for company policies and requirements are the regulations of the U.S. Nuclear Regulatory Commission, the U.S. Department of Transportation, the Massachusetts Department of Public Health and the Massachusetts Department of Labor and Industries.
3. Any question of interpretation of any regulation or company requirement shall be referred to the Radiation Safety Officer.
4. All employees, consultants and other individuals working on company premises shall adhere to the regulations of the above listed regulatory agencies, the requirements of this Administrative Manual and the requirements of the Operating & Emergency Procedures Manual. In addition to adherence to these regulations and requirements, all individuals shall conduct themselves in such a manner as to assure other employees and the general public that the company is continually extending itself to assure radiation safety for all concerned.
5. Any employee who knows or believes that an unusual, abnormal or unsafe event has occurred during the performance of any operation, which could lead to unnecessary radiation exposure shall immediately notify the Radiation Safety Officer.
6. Any employee who know or believes that a violation of any rules or regulations of the U.S. Nuclear Regulatory Commission, U.S. Department of Transportation, Massachusetts Department of Public Health, Massachusetts Department of Labor and Industries or any other governmental agency or a violation of any RTS Technology, Inc. license has occurred shall notify the Radiation Safety Officer.
7. Any employee who knows or believes that a product has been delivered to a customer which contains a defect which could cause a substantial radiological safety hazard shall notify the Radiation Safety Office.
8. Upon receipt of any of the above notifications, the Radiation Safety Officer shall promptly evaluate the situation to determine if a substantial radiological safety hazard exists and make the appropriate notifications as required by federal and state regulations.

9. Any employee may examine the regulations of the U.S. Nuclear Regulatory Commission, the USNRC licenses, documents incorporated into the license by reference and the RTS Technology Inc., Administrative and Operating and Emergency Procedures Manuals by contacting the Radiation Safety Officer.
10. Any area accessible to personnel in which there exists radiation at such levels that a major portion of the body could receive a dose in excess of two millirem in any one hour or 100 millirem in seven consecutive days shall be designated as a Restricted Area. Access to this area shall be controlled and the boundary of this area shall be posted with "Danger - Radiation Area" signs.
11. Any area accessible to personnel in which there exists radiation at such levels that a major portion of the body could receive a dose in excess of 100 millirem in any one hour shall be designated as a High Radiation Area. Access to this area shall be controlled and the boundary of this area shall be posted with "Danger - High Radiation Area".
12. When not under the direct surveillance of a radiological technician, all radioactive material must be stored in containers such that the radiation intensity on the outside surface of the outer container does not exceed 200 mrem/hr and the radiation intensity at one meter from the outside surface of the container does not exceed 10 mrem/hr. Under no circumstances shall sealed sources be stored outside their designated storage containers. Within the facility, containers of radioactive material must be stored within the Applications Laboratory or within a locked storage location such that the radiation intensity at a distance of 18 inches from the outside surface of the storage location does not exceed 0.6 mrem/hr.
13. Any area or room which contains radioactive material shall be posted with "Danger - Radioactive Material" signs. Each container which contains radioactive material shall be labeled "Danger - Radioactive Material". In addition to this label, the contents of each container shall be displayed indicating the radionuclide, activity and the date of measurement.

NOTICE TO EMPLOYEES

In accordance with the requirements of the U.S. Nuclear Regulatory Commission in 10CFR21.6, Section 206 of the Energy Reorganization Act of 1974 is posted for your information:

- (a) Any individual director, or responsible officer of a firm constructing, owning, operating, or supplying the components of any facility or activity which is licensed or otherwise regulated pursuant to the Atomic Energy Act of 1954, as amended, or pursuant to this Act, who obtains information reasonably indicating that such facility or activity or basic components supplied to such facility or activity --
 - (1) Fails to comply with the Atomic Energy Act of 1954 as amended, or any applicable rule, regulation, or order, or license of the Commission relating to substantial safety hazards, or
 - (2) Contains a defect which could create a substantial safety hazard, as defined by regulations which the Commission shall promulgate, shall immediately notify the Commission of such failure to comply or of such defect unless such person has actual knowledge that the Commission has been adequately informed of such defect or failure to comply.
- (b) Any person who knowingly and consciously fails to provide the notice required by subsection (a) of this section shall be subject to a civil penalty in an amount equal to the amount provided by Section 284 of the Atomic Energy Act of 1954 as amended.
- (c) The requirements of this section shall be prominently posted on the premises of any facility licensed or otherwise regulated pursuant to the Atomic Energy Act of 1954 as amended.
- (d) The Commission is authorized to conduct such reasonable inspections and other enforcement activities as needed to insure compliance with the provisions of this sections.

Operating and Emergency Procedure Manual
Calibration of Radiation Survey Instruments

Section 13
Revision 1
17 Apr 87

1. This operation shall only be performed by individuals authorized by the Radiation Safety Officer. Each individual performing this operation shall wear a direct reading pocket dosimeter and either a film badge or a TLD on the trunk of his body. Additionally, each individual shall have a calibrated and operable radiation survey meter.
2. This operation shall only be performed within a restricted area. The boundary of this area shall be posted with "DANGER - RADIATION AREA" signs.
3. Survey meters shall be calibrated at intervals not to exceed three months and after each servicing. The activity of sources used to calibrate radiation survey meters shall be traceable to the National Bureau of Standards. Calibrate the instrument by checking the instrument's response to a known radiation intensity at 20% and 80% of the full scale reading on each of the instruments ranges.
4. Turn on the survey meters to be calibrated and allow them to warm up.
5. Using a calibrated and operable survey meter, remove the calibration device from storage. Survey the calibration device on all sides to assure that the radiation intensity does not exceed 200 mrem/hr. If the intensity exceeds this limit, notify the Radiation Safety Officer. Place the calibration device in the calibration position within the restricted area.
6. Determine the intensities to be used for checking the instrument response (i.e. 20% and 80% of the full scale reading on each of the instrument's ranges. Record these on the data sheet.
7. Determine the activity of the calibration source on the day of calibration. Determine the distances from the source at which the radiation intensity would be equal to the intensities determined in Step 6 using the relationship:

Using a cesium-137 calibration source:

$$d = \sqrt{3200 \cdot A/I}$$

Using a cobalt-60 calibration source

$$d = \sqrt{13000 \cdot A/I}$$

where d = Distance to the desired intensity in centimeters

A = Activity of the calibration source in millicuries

I = Desired intensity in mrem/hr

8. Using a tape measure, place the survey instrument such that the axis of the detector is located at the distance from the source at which the radiation intensity is 80% of the maximum range of the instrument to be calibrated.

NOTE: The survey meter should be located such that the center of the detector is at the correct distance and is centered on the center line of the radiation beam. The axis of the detector should be perpendicular to the center line of the radiation beam. Depending upon the physical size of the survey instrument, it may be necessary to mount the instrument somewhat higher than the bench surface. When proper geometry for the instrument has been established, this geometry shall be used consistently in future calibrations.

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

9. Unlock the calibration device. Standing away from the beam, manually expose the source by raising the source rod. Note and record the indicated radiation intensity on the data sheet. Return the source to the shielded position. If the source rod fails to return to the fully shielded position, notify the Radiation Safety Officer.
10. Repeat Steps 8 and 9 for each of the intensities to be checked.
11. Calculate the variation between the indicated intensity and the true intensity. If the variation is within 20%, the instrument is within proper calibration. If the variation is greater than 20%, adjust the instrument response to attempt to bring the variation within 20% and repeat Steps 8 through 11.
12. Upon completion of the calibration, lock the calibration device. Survey the device on all sides to assure that the radiation level does not exceed 200 mrem/hr . Place the device in storage.
13. If the instrument is within proper calibration, prepare a calibration certificate and attach a calibration label to the instrument. If after adjustment, the variation is greater than 20%, do not provide a calibration certificate. Label the instrument that repair is necessary.

Survey Meter Manufacturer	Model	Serial Number

Calibration Source Model	Serial Number	Radionuclide	Activity

Date of Calibration:

[illegible]

Operating and Emergency Procedure Manual

Calibration of Pocket Dosimeters

Section 14

Revision 1

17 Apr 87

1. This operation shall only be performed by individuals authorized by the Radiation Safety Officer. Each individual performing this operation shall wear a direct reading pocket dosimeter and either a film badge or a TLD on the trunk of his body. Additionally, each individual shall have a calibrated and operable radiation survey meter.
2. This operation shall only be performed within a restricted area. The boundary of this area shall be posted with "DANGER - RADIATION AREA" signs.
3. Pocket dosimeters shall be calibrated at intervals not to exceed one year. The activity of sources used to calibrate pocket dosimeters shall be traceable to the National Bureau of Standards. Calibrate the dosimeter by checking its response to a known radiation exposure at 20% and 80% of the full scale reading of the dosimeter.
4. Using a calibrated and operable survey meter, remove the calibration device from storage. Survey the calibration device on all sides to assure that the radiation intensity does not exceed 200 mrem/hr. If the intensity exceeds this limit, notify the Radiation Safety Officer. Place the calibration device in the calibration position within the restricted area.
5. Determine the exposures to be used for checking the dosimeter response (i.e. 20% and 80% of the dosimeter's full scale reading). Record these on the data sheet.
6. Determine the activity of the calibration source on the day of calibration. Determine the distance from the source at which the radiation intensity would be 800 mrem/hr using the relationship:

Using a cesium-137 calibration source:

$$d = \sqrt{4 \cdot A}$$

Using a cobalt-60 calibration source

$$d = \sqrt{16.25 \cdot A}$$

where d = Distance to an intensity of 800 mrem/hr
in centimeters

A = Activity of the calibration source in
millicuries

7. Initially charge the dosimeter. Using a tape measure, place the dosimeter such that the axis of the detector is located at the distance from the source at which the radiation intensity is 800 mrem/hr.

NOTE: The dosimeter should be located such that the center of the detector is at the correct distance and is centered on the center line of the radiation beam. The axis of the detector should be perpendicular to the center line of the radiation beam.

8. Determine the time (in minutes) required to obtain the desired exposure by dividing the desired exposure (in mrem) by 13.33. Record this result on the data sheet.
9. Unlock the calibration device. Standing away from the beam, manually expose the source by raising the source rod. Keep the source rod raised for the period of time calculated in step 8. At the conclusion of this time, return the source to the shielded position. If the source rod fails to return to the fully shielded position, notify the Radiation Safety Officer.
10. Repeat Steps 8 and 9 for each of the exposures to be checked.
11. Calculate the variation between the indicated exposure and the true exposure. If the variation is within 30%, the dosimeter is within proper calibration. If the variation is greater than 30%, do not use the dosimeter.
12. Upon completion of the calibration, lock the calibration device. Survey the device on all sides to assure that the radiation level does not exceed 200 mrem/hr. Place the device in storage.
13. Recharge the dosimeter and note the initial reading. Place the dosimeter in a low background area for at least 24 hours. Assure that the leakage rate does not exceed 2% of the full scale reading in a 24 hour period. Record the leakage rate on the data sheet.
14. If the dosimeter is within proper calibration and the leakage rate is satisfactory, prepare a calibration certificate and attach a calibration label to the instrument. If the variation is greater than 30%, do not provide a calibration certificate. Label the instrument that it should not be used.

Dosimeter Calibration Data Sheet

Dosimeter Manufacturer Model Serial Number

Calibration Source Model Serial Number Radionuclide Activity

Date of Calibration:

Distance to 800 $\mu\text{rem/hr}$:

Exposures to be Checked ($\mu\text{rem/hr}$)	Time of Exposure (min)	Exposure Indicated (μrem)	Variation (%)
-----	-----	-----	-----
-----	-----	-----	-----

Leakage Rate: $\mu\text{R/24 hr}$

Operating and Emergency Procedure Manual

Calibration of Contamination Monitors

Section 15

Revision 1

17 Apr 87

1. This operation shall only be performed by individuals authorized by the Radiation Safety Officer. Each individual performing this operation shall wear a direct reading pocket dosimeter and either a film badge or a TLD on the trunk of his body.
2. This procedure shall only be used for calibrating thin window geiger counter rate meters. Contamination monitors are to be calibrated at intervals not to exceed three months and after each instrument servicing.
3. Contamination monitors shall be calibrated by measuring the response to a known source of radiation and calculating the efficiency. The activity of sources used to calibrate contamination monitors shall be traceable to the National Bureau of Standards.
4. Allow the contamination monitor to warm up for five minutes.
5. Remove the reference source from storage. Place the reference source such that its active surface is approximately one centimeter away from the screen cover of the geiger tube.
6. Count the reference source long enough for the meter reading to stabilize and determine the count rate in counts per minute. Remove the reference source and wait long enough for the meter reading to again stabilize. Determine the background count rate in counts per minute. Subtract the background count rate from the observed count rate to determine the net count rate due to the reference source. Return the reference source to storage.
7. Divide the reference source activity in microcuries by the net count rate in counts per minute to determine the calibration factor in microcuries per count per minute.
8. Divide the net count rate in counts per minute by the activity of the reference source in disintegrations per minute to determine the efficiency of the monitor.
9. Record the efficiency and calibration factor on the Contamination Monitor Calibration Record.
10. Attach a tag to the contamination monitor indicating the calibration factor, the efficiency, the date of calibration and the technician's initials.

Contamination Monitor Calibration Record

Contamination Monitor Manufacturer: Model: Serial:

Probe Manufacturer: Model: Serial:

Calibration Source Model: Serial: Radionuclide: Activity:

Date of Calibration	Count Rate at one cm	Calibration Factor	Efficiency -----	Initials -----
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Operating and Emergency Procedure Manual
Calibration of Scaler Counting Equipment

Section 16
Revision 1
17 Apr 87

1. This operation shall only be performed by individuals authorized by the Radiation Safety Officer. Each individual performing this operation shall wear a direct reading pocket dosimeter and either a film badge or a TLD on the trunk of his body.
2. This procedure shall only be used for calibrating well counters connected to scaler counting equipment. Scaler counting systems are to be calibrated at intervals not to exceed three months and after each instrument servicing.
3. Scaler counting systems shall be calibrated by measuring the response to a known source of radiation and calculating the efficiency. The activity of sources used to calibrate scaler counting systems shall be traceable to the National Bureau of Standards.
4. Turn on the counting system and allow it to warm up for five minutes.

Remove the reference sources from storage.

5. Assure that there is not a sample in the well detector and make a ten minute background count. Preset the one minute background count result, or record the one minute background count rate on the log sheet adjacent to the counting system.
6. Make five one minute counts for each of the standard calibration sources.
7. Determine the efficiency for each of these radionuclides by dividing the average count rate from each source by its activity in microcuries and then by dividing the result by 2,220,000.
8. Determine the calibration factor for each of these radionuclides by dividing the activity of each reference source by its average count rate.
9. Record the efficiency and calibration factor for each radionuclide on the Scaler Counting System Calibration Record.
10. Attach a card to the scaler counting system indicating the efficiency and calibration factor for each radionuclide, the date of calibration and the technician's name.

Scaler Counting System

Calibration Record

Count Rate

Source:

-----	-----	-----	-----
-----	-----	-----	-----
-----	-----	-----	-----
-----	-----	-----	-----
-----	-----	-----	-----

Average Count Rate

-----	-----	-----	-----
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Efficiency

-----	-----	-----	-----	-----
-------	-------	-------	-------	-------

Calibration Factor Ci/cpm

-----	-----	-----	-----	-----
-------	-------	-------	-------	-------

Date of Calibration:
Technician:

FCML CONTROL NO. _____

DATE: 3/23/87

SOURCE AND DEVICE EVALUATION TECHNICAL ASSISTANCE REQUEST

TO: Steven Baggett, Material Licensing Branch, FC/NMSS MS 396-SS

FROM: J. Kimberley

REGION: I II III IV V (Circle One)

FTS PHONE NO. 28743

DATE: 3/23/87

LICENSE CONTROL NO.(S) 106904

LICENSE NO.(S) new

LETTER/APPLICATION DATE 3/3/87

LICENSEE: RJA Lech.

REQUEST ACTION (CHECK APPROPRIATE BOX)

- / / SOURCE AND/OR DEVICE REVIEW
/ / CUSTOM/IMPORTED
/ / AMENDMENT OF REGISTRATION SHEET NO. (Reference "c" on ltr.)
/ / OTHER: _____

FOR FCML USE ONLY

MODELS: _____

DATE RECEIVED: _____ REVIEWER: _____

TYPE OF ACTION (INDICATE NO. OF EACH ON THE LINES)

/ / SOURCE REVIEW _____ / / DEVICE REVIEW _____

/ / FORMAL _____ / / AMENDMENT _____ / / CUSTOM _____

TOTAL REVIEWER HOURS SPENT ON EVALUATION _____ DATE COMPLETED: _____

NOTES: _____ DEFICIENCY LETTER _____ DATE SENT: _____
_____ DEFICIENCY PHONE CALL _____ DATE MADE: _____
_____ RESPONSE TO DEFICIENCY: _____
_____ TYPING DRAFT _____ IN _____ OUT _____ FINAL _____ IN _____ OUT _____

FOR LFMS USE ONLY

FEEs THAT HAVE BEEN PAID FOR: (INDICATE NO. OF EACH ACTION ON THE LINES)

/ / SOURCE REVIEW _____ / / DEVICE REVIEW _____
/ / FORMAL _____ / / AMENDMENT _____ / / CUSTOM _____

NOTES: _____ DATE TO LFMS: _____
_____ DATE RETURNED: _____
_____ SIGNED _____
_____ DATE: _____

"EVALUATION" ON FILE10

"OFFICIAL RECORD COPY"

ML10