



INDUSTRIAL PROCESS CONTROL EQUIPMENT

390 Holbrook Drive • Wheeling, IL 60090 • (312) 520-1100 • TELEX: 281-085 • CABLE: KAYRAY • FAX: (312) 520-1101

April 1, 1987

Bruce Mallett, Ph.D., Chief  
Radioisotopes Licensing Section  
U.S. Nuclear Regulatory Commission  
Region III  
799 Roosevelt Road  
Glen Ellyn, IL 60137

Re: Pending Renewal Application for  
NRC License #12-11184-01 (Control #79165)

Dear Dr. Mallett:

Our original application for renewal of the above referenced license now contains some outdated information. Significant revisions have been made in our Radiation Safety Program. These revisions reflect the changes in building layout at our new address and changes in personnel, titles, and organization.

Accordingly, we have rewritten portions of the supplemental information required for Items 7 and 9 of NRC Form 313 submitted on June 15, 1985.

Please discard the original first page of Item 7 and replace it with the revised page enclosed. Two changes have been made on this page: First, Paul C. Colclough, Stockroom, Source Loading, and Shipping Supervisor, is no longer employed by Kay-Ray, and has been replaced by Richard E. Lopez. Second, James C. Lundin, Source Loader, is also no longer employed by Kay-Ray. Instead of one, we now have three trained source loaders, but have not listed them. Refer to the first note. The original attachment to this page is still relevant.

Please discard the original first page of Item 9 and the three attached sketches. The description of source handling procedures has been altered and expanded upon somewhat to reflect changes in the floor plan, the names given to various areas, and to clarify the procedures. It was decided that, since the facility floor plans are a part of the Radiation Safety Program write-up and since they are now much larger

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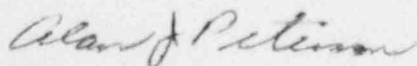
Bruce Mallett, Ph.D., Chief  
U.S. Nuclear Regulatory Commission  
Re: Pending Renewal Application for  
NRC License #12-11184-01 (Control #79165)  
April 1, 1987

drawings, that there is no need to duplicate them for Item 9. The list of "Radiation Measurement Equipment Used at Kay-Ray", attached to the original Item 9, remains unchanged.

Finally, please discard the original Radiation Safety Program manual, the last attachment to our application, and replace it with the enclosed revised copy. For the most part, the changes to this manual reflect minor changes in the organizational structure and position titles at Kay-Ray, and changes in building layout. For example, the old "Vice President, Research and Engineering" is now "Director of Engineering"; the old "Vice President, Manufacturing" is now "Vice President, Operations"; and the old "Production Manager" is now the "Materials Manager". A new position of "Production Control Manager" has been added. Chapter III, Facilities, has been changed significantly because Kay-Ray is now located in one larger building rather than two smaller buildings. The remaining portion of the manual has been changed only in minor ways to provide additional information and to clarify certain points. The changes are too numerous to detail, but no significant changes in source handling procedures or company policy have been made.

Please call if you have any questions, or if we may assist you in any way.

Sincerely,



Alan J. Peterson  
Radiation Safety Officer

AJP/sh

cc: John Crump, President, Kay-Ray, Inc.  
John Benway, Director of Engineering, Kay-Ray, Inc,  
Stan A. Huber, President, Stan A. Huber Consultants, Inc.

Ref: NRC 313, Item 7

Individual(s) Responsible For Radiation Safety Program and Their Training and Experience

Alan J. Peterson: Radiation Safety Officer

Attended the Installation and Nuclear Radiation Safety course presented by Kay-Ray, Incorporated in June, 1977.

Was a participant in the Continuing Engineering Study on Radiation Safety presented by Northwestern University Technological Institute in November, 1983.

Has been Kay-Ray's Radiation Safety Officer since January, 1977.

Richard E. Lopez: Source Loading, Stockroom, and Shipping Supervisor

Attended the Installation and Nuclear Radiation Safety course presented by Kay-Ray, Incorporated in August, 1981.

Has been a source loader since March, 1977, and a source loading supervisor since January, 1979.

Is the Assistant Radiation Safety Officer.

Donald R. Freeman: National Manager of Field Engineering Services (F.E.S.)

Received his original training in radiation safety and field installation techniques from Kay-Ray's former president, Jack Crump.

Has been a Kay-Ray employee for nineteen years, twelve of which were spent as a field service technician and assistant manager of F.E.S.

Was instrumental in developing the Installation and Nuclear Radiation Safety course.

Note: At the present time there are three individuals, other than Mr. Lopez, who are trained source loaders. Also, there are presently seven field service engineers who are trained to repair loaded source housings. Since the number of individuals, their training, and experience may change from time to time, we feel that it would not be appropriate to list them in this application.

Note: Two (2) copies of the above referenced Kay-Ray "Installation and Nuclear Radiation Safety Course" manual were hand delivered to NRC Region III Licensing with cover letter dated May 22, 1985 (copy attached). This course consists of four (4) full days of training.

Ref: NRC 313, Item 9

Facilities and Equipment

Drawings of our facility are included in the Radiation Safety Program manual, attached to NRC 313, Item 10, Radiation Safety Program. The basic description of radiation source handling at our facility is as follows:

1. Packages containing source capsules are received at the SHIPPING/RECEIVING DOCK or at the RECEIVING DOOR, surveyed, and moved directly to the SOURCE LOADING CAGE where they are opened. The capsules are then counted, logged, and moved to the SOURCE STORAGE ROOM, where they are placed in the PIT or TUNNEL until needed.
2. Source capsules are installed (loaded) into source housings by source loaders working behind the SOURCE LOADING SHIELD. The loaded source housings are then surveyed at the SURVEYING AREA, labeled at SOURCE HOUSING LABELING AREA, and forwarded to the LOADED SOURCE HOUSING STORAGE area to await crating for shipment.
3. The loaded housings are then either crated and shipped to customers, or stored, or used by Engineering or Production for test purposes in designated areas.

The list of "Radiation Measurement Equipment Used at Kay-Ray" is attached (Item 9, continued). This list is updated when instruments are replaced, or when additions or deletions are made.

Descriptions of Source Handling, Storage, and Shielding are given in Section III, "Facilities", of the attached Radiation Safety Program.

KAY-RAY, INC.

RADIATION SAFETY PROGRAM

REVISION RECORD

Revision 0: Initial Release June 1, 1985

Revision 1: Revised in its Entirety March, 1987

KAY-RAY, INC.

RADIATION SAFETY PROGRAM

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KAY-RAY, INC.

RADIATION SAFETY PROGRAM

POLICY STATEMENT

It shall be the policy of Kay-Ray, Incorporated, that our primary consideration will be to minimize the radiation exposure to employees and to the public to the greatest extent possible. Our guide will be the ALARA principle which says that all reasonable steps shall be taken to reduce radiation exposure to individuals to the lowest reasonably achievable levels.

The position of Radiation Safety Officer was created to establish and enforce rules for the safe handling of radioactive material. The Radiation Safety Officer shall have the full support of Kay-Ray Management in the performance of his duties.

Kay-Ray shall endeavor to comply in full with all applicable government regulations regarding the storage, handling, and shipment of radioactive material.

KAY-RAY, INC.  
RADIATION SAFETY PROGRAM

I. ORGANIZATION

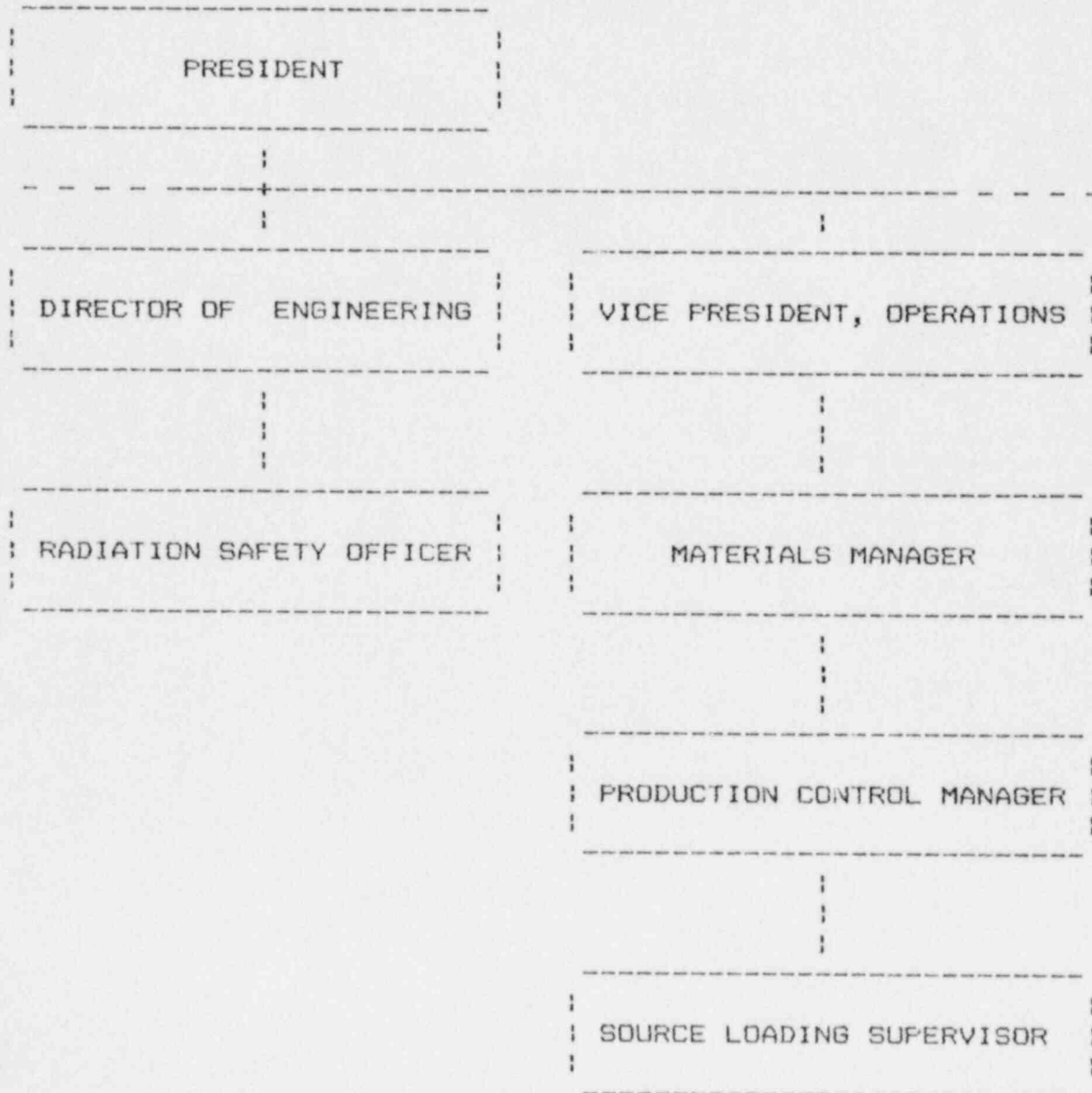
- A. The Radiation Safety Officer (RSO) reports to the Director of Engineering.
- B. The Director of Engineering reports to the President of Kay-Ray.
- C. The Source Loading Supervisor reports to the Production Control Manager.
- D. The Production Control Manager Reports to the Materials Manager.
- E. The Materials Manager reports to the Vice President, Operations.
- F. The Vice President, Operations, reports to the President of Kay-Ray.
- G. Refer to the partial organizational chart on the following page.



KAY-RAY, INC.

RADIATION SAFETY PROGRAM

PARTIAL ORGANIZATIONAL CHART



KAY-RAY, INC.

RADIATION SAFETY PROGRAM

II. AUTHORITY AND RESPONSIBILITIES OF THE RSO

- A. The RSO has the authority to alter, modify, suspend, or terminate any use of radioactive material whenever he feels there is a potential hazard, or if he feels there is work being performed that may lead to a violation of any rule or regulation promulgated by the Illinois Department of Nuclear Safety (IDNS) or the U.S. Nuclear Regulatory Commission (NRC).
- B. The RSO is responsible for the day-to-day operation of the radiation safety program. He makes recommendations on radiation safety policy and operations to corporate management. He is also responsible for the review and maintenance of all records and documents necessary for the proper operation of the radiation safety program.
- C. The Source Loading Supervisor serves as Assistant RSO. When the RSO is not present, the Assistant RSO will exercise the authority and responsibilities of the RSO.

KAY-RAY, INC.

RADIATION SAFETY PROGRAM

III. FACILITIES

A. Kay-Ray, Inc., is located at 390 Holbrook Drive, Wheeling, Illinois 60090.

B. The building encompasses approximately 33,000 square feet of floor space.

1. These departments are located on the ground floor:

a. Manufacturing

(1) Production

(2) Receiving/Shipping

(3) Stores

(4) Source Loading

b. Field Engineering Services (FES)

c. Quality Control (QC)

d. Radiation Safety

e. Engineering/Research & Development

2. Second Floor

a. Administration

b. Accounting

c. Sales/Marketing

d. Purchasing

e. Human Resources

3. Basement

a. Engineering/R & D

b. Lunch Room

c. Meeting Room

d. Computer Room

KAY-RAY, INC.

RADIATION SAFETY PROGRAM

III. FACILITIES (Continued)

C. Source Handling/Storage Facilities

1. Source Storage Room (17 ft. x 20 ft. x 12 ft. high):  
The top of this room is covered with wire mesh. It is used for the storage of loose\* source capsules and source housings that have been returned from customers and are awaiting disposition. This room must be entered through the source loading cage described in 4., below, and its door is kept locked at all times. It contains:
  - a. The pit described in 2., below.
  - b. Heavy-duty, custom-made steel shelving for "active" source storage.
  - c. A 1/4-ton, electrically operated hoist on an over-head I-beam.
2. Source Storage Pit (6 ft. x 10 ft. x 7 ft. deep): This "pit" is actually the head of the tunnel described below and is contained within the source storage room described above. The pit is used for the storage of the bulk of Kay-Ray's loose capsules.
3. Tunnel (5-1/2 ft. x 5-1/2 ft. x about 50 ft. long): This tunnel used to connect the building Kay-Ray now occupies with the building directly to the east. The tunnel has been bricked up at about the mid-point to prevent access to Kay-Ray by employees of the other building. A small portion of this tunnel near the pit is used for loose capsule storage.
4. Source Loading Cage (20 ft. x 22 ft. x 7 ft. high): This is a wire mesh enclosure with a sliding entry gate which is kept locked at all times. This room is used for "loading" - the process of installing source capsules in housings - and the storage of a variety of tools and parts. It contains:
  - a. A custom-made steel and lead source loading shield with a lead-glass viewing window.
  - b. Assorted source loading tools (forceps, remote manipulators, crimping rods, shielding plugs, etc.).

\*A "loose" capsule is one contained in a storage container; one that has not yet been installed in a source housing.

KAY-RAY, INC.

RADIATION SAFETY PROGRAM

III. FACILITIES (Continued)

- C. 4. c. Roller-type conveyor.
- d. Radiation monitoring and surveying instrumentation.
- 5. Loaded source housing inspection station.
- 6. Survey instrumentation.
  - a. An assortment of beta/gamma survey meters with ranges from 0.5 mR/hr, full scale, to 2 R/hr, full scale.
  - b. Two neutron REM meters with scales from 5 mREM/hr, full scale, to 5 REM/hr, full scale.
  - c. Standard G-M tube probes, energy compensated G-M probes, a gamma scintillation probe with 1" x 1" sodium iodide crystal, and a "pancake" probe.
- 7. Leak testing instrumentation.
  - a. Gamma scintillation probe with 2" x 2" sodium iodide crystal.
  - b. Custom-made, steel-jacketed, lead-filled sample holder.
  - c. Pulse counter/scaler.
  - d. "Pancake" type alpha/beta/gamma detector with tungsten shield.
  - e. Drawer type sample holder.
  - f. Cesium-137, cobalt-60, and americium-241 beta standards traceable to the NBS.
- 8. A floor plan of the facility is shown on the following pages.

KAY-RAY, INC.

RADIATION SAFETY PROGRAM

IV. EMPLOYEE TRAINING

- A. Each new employee receives a two-page memo entitled "Radiation At Kay-Ray" with an accompanying signature sheet.
- B. Each new employee who works in the production area:
  - 1. Must pass a psychological test evaluated by a professional testing service.
  - 2. Is given the memo in A., above.
  - 3. Is shown a one-hour video tape on radiation safety.
- C. Each new Field Engineering Services (FES) employee:
  - 1. Must pass the test.
  - 2. Is given the memo.
  - 3. Is shown the video tape.
  - 4. Attends a four-day seminar on installation and nuclear radiation safety presented by FES.
- D. Each new employee who is to be trained as a source handler or "loader":
  - 1. Must pass the test.
  - 2. Is given the memo.
  - 3. Is shown the video tape.
  - 4. Attends the seminar.
  - 5. Is shown a 30-minute video tape on source handling procedures.
  - 6. Is given intensive personal training in source handling and documentation procedures.
    - a. A training session may be one to two hours long.
    - b. As many sessions as needed are given until the employee demonstrates to the RSO's satisfaction that he is proficient in all phases of source handling.



KAY-RAY, INC.

RADIATION SAFETY PROGRAM

IV. EMPLOYEE TRAINING (Continued)

E. Retraining

1. Each production employee, field service engineer, and source loader attends a one-hour refresher training class each year.
2. Source loaders are recertified semi-annually.

KAY-RAY, INC.

RADIATION SAFETY PROGRAM

V. RADIATION MONITORING

A. Dosimeter Types. The following types of personnel monitoring devices are used at Kay-Ray.

1. Whole-body badges consisting of a holder; a film sensitive to beta, gamma, and x- radiation; and a chip sensitive to neutrons.
2. Whole-body badges consisting of a holder and a film sensitive to beta, gamma, x-, and neutron radiation.
3. Thermoluminescent dosimeter (TLD) rings.
4. TLD chips in small, clear plastic packets on elastic bands.
5. Quartz fiber, direct-reading, pocket dosimeters.
6. Electronic monitors with audible signal (beeper).

B. Dosimeter Distribution

1. Each employee who works in the production area, and each field service engineer, is issued a whole-body film badge described in A. 1., above.
2. Each source loader is issued:
  - a. A film badge described in A. 1., above.
  - b. A film badge described in A. 2., above.
  - c. A TLD ring.
  - d. A TLD chip to be worn at eye level.
  - e. A pocket dosimeter.
3. Any employee who requests a dosimeter is issued the type(s) desired.
4. Visitors to the production area, depending on the nature of their activities and the length of their stay, may be issued a badge or a pocket dosimeter.

C. Dosimeter Use

1. Each employee to whom a film badge has been issued is required to wear the badge at all times while at work.

KAY-RAY, INC.

RADIATION SAFETY PROGRAM

V. RADIATION MONITORING (Continued)

C. 2. Each source loader, in addition to wearing both film badges, is required to wear his TLD ring, eye-level TLD chip, pocket dosimeter, and electronic beeper while working with unshielded sources.

D. Area Monitoring. The following areas are monitored at all times with a film badge:

1. The source loading cage.
2. The outside wall of the source storage room.
3. The wall in the tunnel that separates Kay-Ray from the building to the east.
4. The north wall of the marketing/sales offices.
5. Other areas may be monitored from time to time as the RSO deems necessary.

E. Film Badge Change Frequency

1. The film badges described in A. 1. are changed once each month.
2. The film badges described in A. 2., the TLD rings, and the TLD chips are changed once each week.
3. Pocket dosimeters are read and recorded at least once for each day that they are used. Pocket dosimeters are zeroed when the reading exceeds 50% of full scale, and are calibrated annually.

F. Daily Distribution and Collection of Dosimeters

1. Dosimeters are distributed at the beginning of each working day and collected at quitting time.
2. When not in use, dosimeters are kept locked in a cabinet located in a low background radiation area.
3. Certain employees, such as field service engineers, because of the nature of their work, are not required to pick up and return their dosimeters each day.

KAY-RAY, INC.

RADIATION SAFETY PROGRAM

V. RADIATION MONITORING (Continued)

G. Dosimetry Reports

1. A dosimetry service is used for all film badges and TLD's
2. Reports are issued monthly for the monthly change dosimeters, and weekly for the weekly change dosimeters.
3. The reports contain all the information required by NRC regulations.
4. Each employee is given a copy of the appropriate dosimetry report to study. An employee may have a copy of the report to keep, if desired.
5. Each employee is given a copy of his yearly radiation exposure summary to keep. The original is kept in the employee's personnel file.
6. All dosimetry reports are kept on file in the radiation safety files indefinitely.

KAY-RAY, INC.

RADIATION SAFETY PROGRAM

VI. OPERATING PROCEDURES

Detailed operating procedures are contained in the Radiation Safety Procedures manual. Existing procedures are updated and new procedures are added from time to time. The following topics are covered:

- A. Authority and Responsibilities of the RSO
- B. Pocket Dosimeter Procedures
- C. Source Loading Procedures
- D. Emergency Procedures
  - 1. For an accident involving injuries and contamination
  - 2. For an accident involving contamination
  - 3. Emergency phone number list
  - 4. Personnel decontamination chart
  - 5. Area and material decontamination chart
- E. Receiving and Shipping Radioactive Materials
  - 1. Receiving radioactive materials
  - 2. Handling returned source housings
  - 3. Reporting on improperly shipped housings
  - 4. Receiving and stocking new source capsules
  - 5. Source capsule log procedures
  - 6. Source capsule identification procedures
  - 7. Source loading log procedures
- F. Source Capsule Inventory Procedures
  - 1. Daily inventory update
  - 2. Source capsule tag count
  - 3. Source capsule physical inventory

KAY-RAY, INC.

RADIATION SAFETY PROGRAM

VI. OPERATING PROCEDURES (Continued)

G. Leak Testing

1. Leak test analyzing procedure
2. Leak test certification

H. Instrument Calibration



KAY-RAY, INC.

RADIATION SAFETY PROGRAM

VII. EMERGENCY PROCEDURES

A. Types of Emergency Situations

Since Kay-Ray possesses only special form sealed sources, the types of emergency situations that are likely to arise are limited. Nevertheless, specific emergency procedures have been prepared for the following:

1. An accident involving injuries and contamination
2. An accident involving contamination only
3. A suspected loss or theft of radioactive material

B. Step-by-Step Procedures

Detailed emergency procedures are contained in the Radiation Safety Procedures manual. The following points are expanded upon in the detailed procedures:

1. In the event of an accident involving serious personal injury as well as radiological hazards, life-saving first aid is to be the primary consideration. Medical help is called if needed.
2. Persons in the immediate vicinity of the accident are alerted and the area is cleared and secured.
3. Any persons who are suspected of being contaminated are to retreat to an area where they are out of direct exposure to radiation, but are not to wander too far to avoid spreading the contamination.
4. The RSO is notified. In his absence, the Assistant RSO is notified.
5. The situation is assessed and a plan for dealing with the emergency is formulated. Outside professional services are notified if needed.
6. Contaminated clothing is removed and placed in plastic bags along with other contaminated articles.
7. Persons are decontaminated. Detailed decontamination procedures are contained in the Radiation Safety Procedures manual.
8. Areas and articles are decontaminated.

KAY-RAY, INC.

RADIATION SAFETY PROGRAM

VII. EMERGENCY PROCEDURES (Continued)

- B. 9. Radiation dosages are assessed.
- 10. If required, the NRC is notified.

KAY-RAY, INC.

RADIATION SAFETY PROGRAM

VIII. POSTING OF NOTICES AND SIGNS

A. Radiation Safety Bulletin Boards

1. Locations

Kay-Ray has three bulletin boards devoted to radiation safety/product safety. Their locations are:

- a. In the main assembly/test area, on the wall between the production department offices and the engineering department offices, next to the film badge storage cabinet.
- b. On the west wall of the lunch room.
- c. On the west wall of the source loading cage.

2. Information Displayed

- a. NRC Form 3, "Notice to Employees".
- b. IDNS Form KLA.001.01, "Notice to Employees".
- c. 10 CFR 19, "Notices and Instructions to Workers".
- d. 10 CFR 20, "Standards for Protection Against Radiation".
- e. Kay-Ray Radiation Safety Bulletin No. 16, "Where to Examine Documents".
- f. In addition to the above, notices of general interest are displayed from time to time as the RSD may decide.

B. Posting of Signs

1. The following signs are posted in each area where radioactive materials are in use or in storage:
  - a. "CAUTION - RADIOACTIVE MATERIALS"
  - b. "CAUTION - RADIATION AREA"
2. The following signs are posted at the entrance to the source loading cage:

KAY-RAY, INC.

RADIATION SAFETY PROGRAM

VIII. POSTING OF NOTICES AND SIGNS (Continued)

- B. 2. a. The signs in B. 1., above.
- b. "RESTRICTED AREA - AUTHORIZED PERSONNEL ONLY"
- c. "NO EATING, DRINKING, OR SMOKING IN THIS AREA"
- 3. At the entrance to the source capsule storage room, the sign "CAUTION - HIGH RADIATION AREA - PERSONNEL MONITORING REQUIRED" is posted.
- 4. Each source housing and container in which a source capsule is located is identified by a tag on which the radionuclide and activity is given. On source housings, the tag is later replaced by a permanent metal label.
- 5. Other areas or devices may be posted with warning signs as the RSO deems necessary.

KAY-RAY, INC.

RADIATION SAFETY PROGRAM

IX. PLANT RADIATION SURVEYS

A. Survey Frequency

1. All areas of Kay-Ray are surveyed at least once each week by the RSO or the Assistant RSO.
2. Surveys of specific areas may be performed as often as deemed necessary by the RSO.

B. Instruments Used

1. Beta/gamma survey meter with G-M tube probe
2. Neutron REM meter

C. Areas Surveyed

1. Offices, storage areas, and conference rooms, as well as production areas are included in the survey.
2. Areas where employees are working, and areas frequented by employees are given special attention.
3. Outside walls by the source storage room, the source loading cage, and the conveyor are also included in the survey.
4. A visual inspection is also performed during the surveys.
5. Notes are made of any conditions that require corrective action, such as:
  - a. Excessively high radiation readings
  - b. Improper use or storage of sources
  - c. Improper use or lack of warning signs

D. Records

1. A form is used to record all measurements and comments.
2. Copies of the surveys are distributed to:
  - a. The Vice President, Operations
  - b. The Director of Engineering

KAY-RAY, INC.  
RADIATION SAFETY PROGRAM

IX. PLANT RADIATION SURVEYING (Continued)

D. 2. c. The Production Foreman

d. The Source Loading Supervisor

e. The manager of any department where corrective action is required.

3. The survey form original is kept in the Radiation Safety files.

E. Corrective Action

1. Immediate action is taken to correct problems noted during the survey.

2. If required, additional surveys are performed to determine if corrective action has been effective.



KAY-RAY, INC.

RADIATION SAFETY PROGRAM

X. RECEIVING AND SHIPPING RADIOACTIVE MATERIAL

A. Receiving

1. All packages of radioactive material that arrive at Kay-Ray are surveyed on the surface and at one meter from the surface with a geiger counter.
2. All packages are checked to determine if:
  - a. The package and its contents are in good condition.
  - b. The correct labels and the correct number of labels have been applied.
  - c. The freight bill accompanying the package is correct.
3. If high radiation levels are found, or if serious errors in transport indexing, labeling, or documentation are found, a Returned Source Housing Report (RSHR) is written.
4. If radiation levels in excess of 200 mR/hr on the surface or 10 mR/hr at one meter from the surface are found, the NRC and the shipper are notified.
5. If the package or its contents are found to be damaged, a RSHR is written. The NRC and/or the shipper may be notified depending on the severity of the damage.
6. All returned source housings are leak tested unless a leak test was performed just prior to shipment.

B. Shipping

Before any package containing radioactive materials is shipped from Kay-Ray, the quality control department checks to be sure that:

1. The item is securely fastened to its pallet.
2. The correct labels have been attached to the item, and the labels have been correctly stamped.
3. The correct labels have been applied to the overpack.
4. The package has been properly surveyed and transport indexed, and the transport index label has been properly completed.

KAY-RAY, INC.

RADIATION SAFETY PROGRAM

X. RECEIVING AND SHIPPING RADIOACTIVE MATERIAL (Continued)

- B. 5. A copy of the user's specific license has been received if required.

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RADIATION SAFETY PROGRAM

XII. WASTE DISPOSAL

- A. Radioactive waste disposal at Kay-Ray is simplified by the fact that only four different radionuclides are used, and these are all in special form sealed capsules.
- B. Kay-Ray does not "generate" waste in the sense that the material is an unwanted byproduct of a process; our waste is source capsules that are no longer wanted because:
  - 1. They have decayed below the point where the activity is great enough to be of any use in our gauges.
  - 2. They are of an obsolete style that we no longer stock, and for which we no longer manufacture holders.
  - 3. They have been returned to us in damaged housings and their removal would be difficult and/or dangerous.
- C. Kay-Ray employs the services of a licensed waste disposal service or "broker".
- D. Kay-Ray is registered with the Illinois Department of Nuclear Safety as a waste generator, and has a site use permit at Richland, Washington.
- E. Records of disposals, including radionuclides, activities, volumes, weights, and dates, are maintained indefinitely.
- F. No disposal methods, other than burial at a licensed facility, are used by Kay-Ray.

KAY-RAY, INC.

RADIATION SAFETY PROGRAM

XIII. LEAK TESTING

A. Leak tests are performed:

1. When source capsules arrive from the capsule manufacturer. The capsules and the inner surfaces of each container are wiped at this time.
2. When a source housing is returned from a customer. If a leak test was not performed just prior to shipment, the housing is wiped on its arrival at Kay-Ray.
3. When a damaged source housing is returned from a customer. Regardless of when the last leak test was performed, a damaged source housing is leak tested immediately on its arrival at Kay-Ray.
4. When a capsule is installed in a source housing and six months or longer have elapsed since its last leak test.
5. Just prior to shipping a source housing if the capsule it contains has not been leak tested within six months of the shipping date.
6. On source housings used by Kay-Ray for test or demonstration purposes every six months.
7. On source housings by Kay-Ray service engineers at customer job sites when requested to do so by the customer.
8. On instruments, tools, surfaces, etc., as deemed necessary or desirable by the RSO.

B. Leak Test Method

1. The areas most likely to become contaminated (weld joints, openings, cavities, source holders, capsules, etc.) are wiped with a moistened, 6" long cotton-tipped swab.
2. Each swab is placed in a separate, identified plastic bag.

C. Analyzing Procedure

Leak test swabs are analyzed by one of two methods:

KAY-RAY, INC.

RADIATION SAFETY PROGRAM

XIII. LEAK TESTING (Continued)

- C. 1. The bag containing the swab is placed in a polyethylene bottle which is placed in a lead-shielded chamber at the bottom of which is a gamma scintillation probe containing a 2" x 2" sodium iodide crystal. The scintillations, amplified by a photomultiplier tube, are counted on a pulse counter-scaler.
2. The swab is removed from its plastic bag and placed in a sample tray beneath a tungsten-shielded G-M "pancake" probe. The pulses are amplified and counted on a pulse counter-scaler.
3. The number of gamma ray photons in a pre-determined energy range (for method 1) or beta particles (for method 2) are counted for a fixed period of time. The number of counts obtained for the swab is compared to the number of counts obtained from a standard of known activity under identical conditions.

D. Leak Test Results

1. If the swab is shown to have removed less than five nanocuries of contamination, a leak test certificate is issued.
2. If the swab is shown to have removed five nanocuries or more of contamination, the NRC is notified. If the swab is from a customer, the customer is also notified.

KAY-RAY, INC.

RADIATION SAFETY PROGRAM

XIV. INSTRUMENT CALIBRATION

- A. All radiation survey instruments used by Radiation Safety, Quality Control, Source Loading, and Field Engineering Services (FES) will be calibrated semiannually.
- B. All radiation survey instruments used by Kay-Ray will be calibrated by a licensed calibration service.
- C. Calibration Certificates and Stickers
  - 1. A certificate will be issued for each survey meter calibrated for Kay-Ray.
  - 2. Calibration certificates for meters used by Radiation Safety, Quality Control, and Source Loading will be maintained by the RSO.
  - 3. Calibration certificates for meters used by FES will be maintained by the FES Manager.
  - 4. A sticker, bearing the calibration date, next due date, and initials of the individual performing the calibration, will be affixed to each meter calibrated.
- D. The RSO will be responsible for assuring that all survey meters used by Radiation Safety, Quality Control, Source Loading, and FES are calibrated by a licensed individual, and at the prescribed interval.