RADIUM 226 BROMIDE AND KRYPTON 85 COLD CATHODE TUBES (HANDLING, PACKAGING AND SHIPPING PROCEDURES)

CONTENTS

EXHIBITS

TABLES

1. GENERAL

1.01 This section details procedures for removing, packaging and shipping Radium 226 Bromide and/or Krypton 85 tubes from a Southwestern Bell Telephone (SWBT) Company central office to a Material Reprocessing and Consolidation (MARC) Center.

1.02 When this section is reissued, the reason(s) for reissue will be specified in this paragraph.

2. PURPOSE

2.01 As used by SWBT Company, cold cathode tubes do not represent a health hazard. However, great care should be taken whenever handling these tubes. Guidelines detailed in this practice provide for the safe handling of cold cathode tubes companywide.

2.02 The Department of Transportation (DOT) regulates materials that can pose an unreasonable risk to public safety and property during transport over public roadways. Radium 226 Bromide and Krypton 85 contained in tubes described in this practice are of normal form, alpha emitting radionuclides in nondispersible solid, and gaseous forms, respectively. Therefore, tubes containing these elements are classified as hazardous radioactive materials and must be shipped according to U.S. DOT regulations.

3. DEFINITIONS

3.01 A definition is provided for unfamiliar terms used throughout this practice to assist the reader in understanding the text.

3.02 **Activity:** The sum of radioactive materials contained in a package, an instrument, or device. Activity is expressed in terms of curies (Ci) millicuries (mCi), microcuries (μCi), or picocuries (pCi).

3.03 **Alpha Radiation:** A fast moving particle having a double positive charge (two protons and two neutrons), having high ionization characteristics but low penetrating capabilities, and capable of being stopped by a sheet of paper. It does not constitute a dose hazard generally, but may be extremely injurious should the particle gain admittance to the body through ingestion or inhalation of alpha emitting material.

3.04 **Gamma Radiation:** An electromagnetic wave with short wave lengths and high frequency which causes ionization mainly by secondary means. It interacts with matter to produce charged particles which ionize. It can destroy tissue and inflict serious burns quite rapidly. Gamma is capable of deep penetration and requires several inches of lead to stop it.

3.05 **Geiger Counter:** An instrument consisting of a Geiger tube and associated electronic equipment, used to detect, measure, and record nuclear emissions, cosmic rays, and artificially produced subatomic particles.

3.06 **Geiger Tube:** A gas-filled tube containing coaxial cylindrical electrodes between which a potential difference slightly below the breakdown voltage is maintained, so that production of a pair of ions in the gas by passage of a charged particle or by ionizing radiation causes a breakdown throughout the tube.

3.07 **Package:** The packaging together with its radioactive contents as presented for transport.

3.08 **Nonfixed Radiation Contamination:** Radioactive contamination that can be readily removed from a surface by wiping with an absorbent material.

3.09 **Radiation Level:** The radiation dose-equivalent rate expressed in millirem per hour (mRem/h).

3.10 **Survey Meter:** An instrument capable of detecting and measuring nuclear emissions, cosmic rays, and artificially produced subatomic particles.

NOTE: THE SURVEY METER MAY READ EITHER IN UNITS OF mRem/h OR mR/h. THESE ARE INTERCHANGEABLE UNITS FOR GAMMA RADIATION AND BOTH ARE ACCEPTABLE. THE RADIATION LEVEL IS THE HIGHEST OBSERVED READING ON THE SURVEY METER.

3.11 **Transport Index (T.I.):** The dimensionless number (rounded up to the first decimal place) placed on the label of the package being shipped to designate the degree of control to be exercised by the carrier during transport.

4. ROLES AND RESPONSIBILITIES

4.01 The safe and proper handling of Radium 226 Bromide and Krypton 85 tubes is extremely dependent on the cooperation of interdepartmental personnel's roles and responsibilities. Those roles and responsibilities are as follows:

a. Network Central Office Engineering:

(1) Alerts removal crews (outside vendors or SWBT Company installation crews) of the possible presence of equipment containing cold cathode tubes. This is achieved through written instructions provided by the engineer in job specifications or telephone company equipment orders (TEO).

(2) Makes known to removal crews procedures for coordinating the identifying, removing, and packaging of tubes from equipment.

(3) Coordinates with Procurement's Logistics Services District to schedule training for removal crews on identifying, removing and packaging cold cathode tubes.

b. Procurement (Logistics Services District):

(1) Provides training to removal crews for the safe and proper handling of cold cathode tubes containing Radium 226 Bromide and Krypton 85.

(2) Procures packaging for cold cathode tubes which meets DOT standards.

(3) Maintains documentation of testing required in 49 CFR, 173.415.

(4) Arranges and coordinates transporting of cold cathode tubes from a central office to a MARC Center for consolidation.

(5) Coordinates the final disposal of cold cathode tubes with a licensed and qualified disposal vendor.

(6) Contacts the designated disposal vendor and arranges for pickup and disposal.

(7) Provides notification of removal and movement of cold cathode tubes to State Environmental Coordinators utilizing Form SW 3145, Logistics Services Notification of Hazardous Material Activity (Exhibit 1).

(8) Assures that materials forwarded to licensed radioactive waste disposal sites are handled and transported in accordance with the DOT regulations and the applicable state authority.

Exhibit 2, Logistics Services Removal Staff, lists the telephone numbers of the Manager-Hazardous Material Removals, and each Manager-Removal Operations including geographic regions of responsibility.

c. State Environmental Coordinators:

(1) Keeps abreast of all activity, (i.e., removing, transporting, storing, disposing) associated with handling Radium 226 Bromide and Krypton 85 tubes in the state.

Exhibit 3, State Environmental Coordinators, provides the address and telephone number of each State Environmental Coordinator.

5. IDENTIFICATION/CHARACTERISTICS OF COLD CATHODE TUBES

5.01 Krypton 85 and Radium 226 Bromide tubes can generally be identified by the dark-purplish color of the glass envelope and tube codes. However, the 423C tube has a clear glass envelope.

Table A, Cold Cathode Tube Conversion Chart, lists tubes commonly present in SWBT Company central office equipment by code number.

5.02 Radium 226 Bromide and Krypton 85 tubes can have the same tube codes. However, tube types can be determined by the manufactured date which appears on each tube. For example, the code 5913 printed on a 313C tube would indicate the tube contained Radium Bromide. The first two digits of the code designate the year the tube was manufactured and the last two digits represent the quarter. Quarters are represented by 13 denoting the first quarter, 26, the second and 39 and 52 denoting the third and fourth quarters, respectively. Therefore, this particular tube would have been manufactured during the first quarter (13) of 1959 (59). According to Table A, 313C tubes were converted from Radium 226 Bromide to Krypton 85 during the second quarter (26) of 1960 (60).

5.03 Radium 226 Bromide tubes contain varying amounts of nondispersible, solid radium. Some may be marked with a magenta (reddish-purple) color, three-bladed radioactive symbol.

5.04 Krypton 85 tubes are filled with uncompressed radioactive gas. These tubes are not labeled with a radioactive symbol.

5.05 Mixtures of Radium 226 Bromide and Krypton 85 tubes can be found in SWBT Company central office equipment. The mix depends upon the maintenance and tube replacement history of the office.

5.06 Certain central office equipment can contain concentrations of up to several hundred tubes. Examples of central office equipment which are more likely to contain large concentrations of tubes are as follows:

- o No. 5 Crossbar 100 Line Translator Frame
- o No. 5 Crossbar 2000 Line Translator Frame
- o No. 5 Crossbar Billing Indexer Frame
- o No. 5 Crossbar Foreign Area Translator Frame
- o No. 5 Crossbar Message Register Frame
- o No. 5 Crossbar Tandem Foreign Area Translator Frame
- o Step-by-Step Central Offices

6. EQUIPMENT TO BE SCRAPPED

6.01 The removal engineer shall contact the Manager-Removal Operations to request and coordinate a time schedule. The time-frame scheduled will allow for training the removal crew on identifying, removing and containerizing radioactive cold cathode tubes.

6.02 The quantity of containers needed for packing tubes will be determined by the Manager prior to training the removal crew. SW 747-200-900, Central Office Scrap Removal - Logistics Services, provides

guidelines for determining the number of compartmented containers to be provided for a central office equipment removal.

7. REUSE EQUIPMENT

7.01 Radioactive cold cathode tubes must be removed from central office equipment scheduled for removal and reuse prior to dismantling any other apparatus.

8. HANDLING PRECAUTIONS

8.01 Tubes shall not be carried on a handler's person or handled when not necessary to do so.

NOTE: THE SLIGHT AMOUNT OF RADIATION PRODUCED BY THE COLD CATHODE TUBES DURING NORMAL HANDLING ON THE JOB WILL NOT CAUSE OVEREXPOSURE.

8.02 No eating, drinking or smoking shall be permitted in areas where radioactive cold cathode tubes are being handled.

8.03 Employees shall wash their hands thoroughly with water and mild soap after handling radioactive cold cathode tubes.

9. REMOVING COLD CATHODE TUBES

Daily Work Operations

9.01 An empty compartmented container shall be available at all times in locations where radioactive cold cathode tubes are present in central office equipment. Containers can be obtained by contacting the Manager-Removal Operations responsible for a specific geographic region.

9.02 Replacement of cold cathode tubes during daily work routines shall be handled as directed in paragraphs 9.05 through 9.08.

9.03 The Manager-Removal Operations shall be notified by the Network manager responsible for a particular SWBT Company central office when containers become filled, and guidelines addressed in paragraph 9.09 must be followed.

Complete Equipment Removals

9.04 All cold cathode tubes must be located and removed from central office equipment prior to dismantling equipment from its installed position.

9.05 Removing wired-in tubes will require the coordination of two people to avoid dropping or breaking tubes. One person must support the tube on the equipment side of the frame while the second person removes the mounting screws and wiring on the wired side of the frame.

9.06 Plug-in tubes shall be removed by grasping the base of the tube and gently "wiggling" the prongs of the tube from the plug.

CAUTION: A TUBE EXTRACTOR SHALL BE UTILIZED TO REMOVE DAMAGED TUBES FROM EQUIPMENT. TUBE EXTRACTORS CAN BE ORDERED FROM THE STOCK CATALOG USING THE FOLLOWING INFORMATION: "TOOL, 553A EXTRACTOR SWITCH LAMP TOOL; ITEM 100 753904."

9.07 Removed tubes shall be placed in compartmented-type containers referred to in paragraph 6.02.

9.08 Packaged tubes shall be protected from accidental damage by placing the containers in an area, e.g., store room, away from the immediate work area(s).

9.09 The Manager-Removal Operations will inspect the contents of all compartmented containers prior to labeling and marking containers as directed in sections 11 through 13.

10. HANDLING BROKEN COLD CATHODE TUBES

10.01 A clean-up kit containing the following items shall be maintained at all central office locations to be utilized in the event of cold cathode tube breakage:

- o Disposable rubber protective gloves
- o Rigid pieces of paper or cardboard
- o Sealable-type plastic bags, e.g., Ziploc storage bags
- o Paper towels

10.02 The Network manager responsible for a particular central office shall check the tube clean-up kit periodically to ensure items listed in paragraph 10.01 are replaced as necessary.

Personal Safety

10.03 Radium 226 Bromide is hazardous only if it gets inside the body through inhalation, ingestion or cuts in the skin.

10.04 Krypton 85 is a noble gas which means it will not react chemically and will not remain in the body if breathed in. Therefore, it is not a health hazard even if a tube is broken.

10.05 If a tube should become broken, all persons should immediately evacuate the area within 25 feet for three to five minutes to prevent inhalation of emitted dust or vapor before attempting to pick up broken parts.

CAUTION: BROKEN GLASS SHOULD NOT BE WALKED ON.

10.06 After returning to the area, cordon off the area to prevent personnel from tracking through radioactive dust and broken glass, and spreading the contamination to other areas.

10.07 Employees should never pick up broken parts of cold cathode tubes bare-handed. Disposable protective rubber gloves should **always** be worn.

10.08 Employees who cut themselves in the process of handling broken tubes should immediately wash the cut with water and mild soap, and rinse thoroughly. **Repeat this procedure three times.** In all cases, the injury should be promptly reported to the job supervisor. All incidents of broken cold cathode tubes shall also be reported to the appropriate Manager-Removal Operations.

Tube Clean Up

10.09 Each broken tube should be picked up separately using rigid pieces of paper or cardboard and placed into a sealable-type plastic bag.

CAUTION: DO NOT USE VACUUM CLEANERS OR BROOMS TO PICK UP BROKEN PARTS OF COLD CATHODE TUBES.

10.10 Each sealable-type bag shall be put into a separate cell of the compartmented-type container. The pieces of paper or cardboard shall also be folded and put into the bag with the broken tube.

10.11 The contaminated floor area shall be wiped with damp paper towels and the used towels placed in the sealable-type bag. When decontaminating the area is complete, place the used protective gloves in a sealable-type bag and seal all containers for disposal.

10.12 After cleanup has been completed, the Manager-Removal Operations may require an alpha contamination level measurement with a survey meter capable of detecting alpha particles.

NOTE: SURVEY METERS WITH A METAL-WALLED GEIGER TUBE WILL NOT DETECT ALPHA PARTICLES AND ARE UNSUITABLE FOR THIS PURPOSE. IF A SURVEY METER CAPABLE OF MEASURING ALPHA PARTICLES IS NOT LOCALLY AVAILABLE, THE MANAGER WILL ARRANGE TO HAVE A METER MADE AVAILABLE.

Alternatively, wipes of the area may be taken and sent to an authorized laboratory for analysis.

10.13 Containers with broken tubes and cleanup material will be marked as determined in section 11.

11. SHIPPING DESCRIPTIONS AND APPLICABLE DOT REQUIREMENTS

11.01 "Activity," "radiation level," and "external contamination" of individual tubes, and packages of tubes prepared for shipment determine applicable DOT marking, labeling, packaging, and shipping paper and certification requirements.

11.02 Radioactive cold cathode tubes shall be classified and shipped using one of the proper shipping names and identification numbers described in parts A, B, or C of this section.

A. Radioactive Material, Instruments and Articles, UN2911

11.03 The shipping description "Radioactive material, instruments and articles, UN2911" can only be used when shipping unbroken tubes, the radiation level of each tube contained in the package has been measured, and all the following restrictions apply:

(a) The activity of each tube in segregated or mixed shipments does not exceed:

Krypton	- 1.0 Ci (1,000,000 µCi)
Radium	- .0005 Ci (500 µCi)
Krypton and Radium	- .0005 Ci (500 µCi)

(b) The total activity per package does not exceed:

Krypton	- 10.0 Ci (10,000,000 µCi)
Radium Bromide	- .05 Ci (50,000 µCi)
Krypton and Radium	- .05 Ci (50,000 µCi)

(c) The radiation level at 10 centimeters (four (4) inches) from any point on the external surface of any unpacked tube does not exceed 10 mRem/h.

(d) The radiation level at any point on the external surface of the package bearing the tubes does not exceed 0.5 mRem/h; or, for exclusive use domestic shipments, 2 mRem/h.

(e) The nonfixed (removable) radioactive surface contamination on the external surface of the package does not exceed one picocurie per square centimeter (1 pCi/cm^2) or 2.2 disintegrations per minute per square centimeter (2.2 dpm/cm^2).

NOTE: THE LEVEL OF NONFIXED RADIOACTIVE CONTAMINATION CAN BE DETERMINED BY WIPING AN AREA OF 300 SQUARE CENTIMETERS OF THE SURFACE AFFECTED WITH AN ABSORBENT MATERIAL, USING MODERATE PRESSURE, AND MEASURING THE ACTIVITY OF THE WIPING MATERIAL. TWO OR THREE MEASUREMENTS SHALL BE TAKEN IN THE MOST APPROPRIATE LOCATIONS, I.E., BOTTOM, SIDES AND/OR TOP OF PACKAGE, TO YIELD REPRESENTATIVE ASSESSMENT OF THE NONFIXED CONTAMINATION LEVELS. THE AMOUNT OF RADIOACTIVITY MEASURED ON ANY SINGLE WIPING MATERIAL WHEN AVERAGED OVER THE SURFACE WIPED SHALL NOT EXCEED THE LIMITS SHOWN IN ITEM E ABOVE AT ANY TIME DURING TRANSPORT.

(f) The shipment must be certified for transportation by having a notice enclosed in or on the package, included with the packing list, or otherwise forwarded with the package. The notice must include the consignor's name and the statement as follows:

Southwestern Bell Telephone Company

This package conforms to the conditions and limitations specified in 49 CFR 173.422 for excepted radioactive material, instruments and articles, UN2911.

Marking

11.04 Radioactive tubes classified as "Radioactive Material, Instruments and Articles, UN2911" do not require DOT marking.

Labeling

11.05 Packages of tubes classified and shipped as "Radioactive Material, Instruments and Articles, UN2911" do not require DOT labeling.

Packaging

11.06 Standard, fiberboard, compartmented (egg-carton type) containers that will not leak during conditions normally incident to transportation shall be utilized to package shipments of tubes transported under the "Radioactive Material, Instruments and Articles."

Shipping Papers And Certification

11.07 Packages of tubes classified as "Radioactive Material, Instruments and Articles" do not require DOT shipping paper and certification requirements except as addressed in paragraph 11.03 (f). However, Form FA SW 6152A, Straight Bill of Lading, shall be prepared for radioactive tubes transported under this shipping description. Exhibit 4, Straight Bill of Lading, illustrates Form FA SW6152A and provides instructions for preparing the form when shipping radioactive tubes.

B. Radioactive Material, Limited Quantity, N.O.S., UN2910

11.08 When all of the restrictions listed below can be met, the shipping description "Radioactive material, limited quantity, N.O.S., UN2910" shall be entered on Form FA SW6152A:

(a) The total activity per package of segregated does not exceed:

Krypton	- 1.0 Ci	(1,000,000 µCi)
Radium Bromide	- .00005 Ci	(50 µCi)
Krypton and Radium	- .00005 Ci	(50 µCi)

(b) The tubes are packed in strong, tight packages that will not leak any of the radioactive materials during conditions normally incident to transportation.

(c) The radiation level at any point on the external surface of the package does not exceed 0.5 mRem/h.

NOTE: A CONTAINER EXCEEDING THE SURFACE RADIATION LEVEL OF 0.5 mRem/h SHALL BE PLACED INSIDE AN APPROPRIAT ELY-SIZED LARGER CONTAINER AND SURROUNDED COMPLETELY BY A SUFFICIENT AMOUNT OF PACKING MATERIAL (E.G., CRUMPLED NEWSPAPER, STYROFOAM) UNTIL THE SURFACE RADIATION LEVEL IS REDUCED BELOW OR NOT EXCEEDING 0.5 mRem/h.

(d) The nonfixed radioactive surface contamination on the external surface of the package does not exceed one picocurie per square centimeter (1 pCi/cm^2) or 2.2 disintegrations per minute per square centimeter (2.2 dpm/cm^2).

(e) The outside of the inner packaging, or if there is no inner packaging, the outside of the packaging must be marked "**RADIOACTIVE.**"

(f) The shipment must be certified for transportation by having a notice enclosed in or on the package, included with the packing list, or otherwise forwarded with the package. The notice must include the consignor's name and the statement as follows:

Southwestern Bell Telephone Company

This package conforms to the conditions and limitations specified in 49 CFR 173.421 for excepted radioactive material, limited quantity, N.O.S., UN2910.

Broken Tubes

11.09 Broken tubes and cleanup materials meeting the restrictions of paragraph 11.08 (a) through (f) must be sealed within an airtight container and marked with the word "RADIOACTIVE." Without exception, the inner container shall be packaged within an outer box and surrounded by packing material as directed in the "Note" of paragraph 11.08 (c).

11.10 An attempt should be made to identify the type of tubes broken utilizing Table A. The code numbers and the microcuries of Radium 226 or Krypton 85 should be recorded for each tube broken.

NOTE: THIS INFORMATION MUST BE ENCLOSED WITH SHIPMENTS OF BROKEN TUBES AND CLEANUP MATERIALS FOR USE BY THE MANAGER-REMOVAL OPERATIONS.

11.11 Information in Table B, Limited Quantity, N.O.S., UN2910, and information associated with paragraph 11.08 may be used to determine the minimum spacing necessary between the inner and outer packages. Use the top or bottom section of Table B as appropriate for packages containing Radium 226 or Krypton 85.

11.12 In cases where tubes containing Radium 226 and Krypton 85 are packaged together, the minimum spacing may be determined by converting the Krypton 85 activity to an equivalent Radium 226 activity as follows:

(1) Divide the total Krypton 85 activity (microcuries) by 200.

(2) Add the result to the total Radium 226 activity.

(3) Compare this new total activity to the upper section of Table B.

Marking

11.13 Each package of radioactive tubes classified as "Radioactive Material, Limited Quantity, N.O.S., UN2910" must be marked "RADIOACTIVE" on the outside of the inner packaging, or if there is no inner packaging, on the outside of the packaging itself.

Labeling

11.14 Packages of tubes classified and shipped as "Radioactive Material, Limited Quantity, N.O.S., UN2910" do not require DOT labeling.

Packaging

11.15 Tubes transported under the shipping description "Radioactive Material, Limited Quantity, N.O.S., UN2910" shall be packaged in standard, fiberboard, compartmented (egg-carton type) containers. Containers should not leak during conditions normally incident to transportation.

Shipping Papers And Certification

11.16 Shipments of tubes classified as "Radioactive Material, Limited Quantity, N.O.S., UN2910," do not require DOT shipping paper and certification requirements except as addressed in paragraph 11.08 (f). However, Form SW6152A shall be prepared for radioactive tubes transported under this shipping description. (Refer to Exhibit 4.)

C. Radioactive Material, N.O.S., UN2982

11.17 Shipments of tubes not meeting the restrictions in parts A or B of this section must be shipped as "Radioactive material, N.O.S., UN2982."

Marking

11.18 Each package of tubes classified under the "Radioactive Material, N.O.S., UN2982" shipping description must be marked as follows:

- o Radioactive Material, N.O.S., UN2982;
- o in an unobstructed area with numerals as least 1/2 inch high, the words: "USA DOT 7A Type A";
- o the name and address or symbol of the packaging manufacturer; and
- o the gross weight of the package if in excess of 110 pounds.

11.19 DOT regulations require that specification markings be in English and printed on or affixed to the surface of the containers.

11.20 Markings must be displayed on a background of sharply contrasting color, cannot be obscured by other markings that could detract from them, and must be placed near the radioactive labels that are affixed to the package.

11.21 The name and address of the company location shipping the package and the address of the company location receiving the package must be marked on each package for identification purposes.

Labeling

11.22 Radioactive tubes transported under the "Radioactive Material, N.O.S., UN2982" shipping description require DOT labeling.

11.23 The Manager-Removal Operations will determine the proper radioactive label by taking two radiation level measurements. Radiation level measurements must be made by personnel trained in the use of alpha and gamma survey meters, and in the requirements of the DOT for shipping radioactive materials.

11.24 The radiation level in units of millirem per hour (mRem/h) shall be taken with the detector in contact with the surface of each package.

NOTE: THE HIGHEST SURFACE RADIATION LEVEL MEASURED IN CONJUNCTION WITH THE TRANSPORT INDEX (T.I.) RADIATION LEVEL MEASURED SHALL BE USED IN DETERMINING THE LABEL TO BE USED.

11.25 The T.I. is the second measurement of the radiation level in mRem/h and shall be taken with the detector at one meter (39 inches) from the surface of each package.

NOTE: THE HIGHEST T.I. RADIATION LEVEL MEASURED IN CONJUNCTION WITH THE HIGHEST SURFACE RADIATION LEVEL MEASURED SHALL BE USED IN DETERMINING THE APPROPRIATE RADIATION LABEL.

11.26 The highest of the two radiation level measurements, surface and T.I., taken determine the radioactive label to be used. For example, a package with a T.I. of zero and a maximum surface reading of 0.7 mRem/h requires a Radioactive Yellow-II label. Use Figure 1, Radiation Label Selection, in selecting the correct label according to the radiation levels measured.

SURFACE (mRem/h)	T.I. (m/Rem/h)	LABEL TO USE
RL < 0.5 mRem/h	N/A	Radioactive White-I
0.5 mRem/h < RL < 50	T.I. < 1.0	Radioactive Yellow-II
50 mRem/h < RL	1.0 < T.I.	Radioactive Yellow-III

Figure 1

RADIATION LABEL SELECTION

11.27 Two radioactive labels must be affixed to opposite sides of each package, excluding the bottom, and the appropriate information printed in spaces worded as follows:

- "Contents"

  o 85_{Kr} Krypton (uncompressed)
  or
  o 226_{Ra} Radium

(For combined shipments of Radium and Krypton tubes, print both names in the "Contents" space.)

- "Activity"

- "T.I."

Packaging

11.28 Tubes transported under the shipping description "Radioactive Material, N.O.S." must be packaged in U.S. DOT Specification 7A, Type A general packaging meeting the design, test and authorization requirements specified in the DOT regulations.

NOTE: THE TOTAL ACTIVITY PER PACKAGE OF SEGREGATED OR MIXED TUBES MUST NOT EXCEED THE FOLLOWING LIMITS IN ORDER TO QUALIFY FOR TYPE A PACKAGING:

Krypton	**-**	**1,000 Ci (1,000,000,000 µCi)**
Radium Bromide	**-**	**0.05 Ci (50,000 µCi)**
Krypton and Radium	**-**	**0.05 Ci (50,000 µCi)**

Shipping Papers And Certification

11.29 Packages of tubes classified as "Radioactive materials, N.O.S." are subject to DOT shipping paper and certification requirements.

11.30 Form FA SW 6152A, Straight Bill of Lading, is the only shipping paper authorized for use with intracompany shipments involving radioactive tubes.

11.31 The preprinted shipper's certification on the bill of lading ensures that SWBT has certified that the tubes are offered for transportation according to U.S. DOT regulations, when applicable.

12. PLACARDING

12.01 The Manager-Removal Operations will provide "Radioactive" placards to vehicles transporting packages bearing a Radioactive Yellow-III label, unless alternative arrangements have been made with the transporter.

12.02 Placards must be placed on each side and each end of the vehicle transporting packages labeled with Radioactive Yellow-III labels.

13. SHIPPING TO/RECEIVING AT THE MARC CENTER

13.01 Cold cathode tubes and related materials will be shipped to and received at a MARC Center for storage until sufficient quantities are accumulated for final disposal.

13.02 MARC Centers will handle and store cold cathode tubes as directed in SW 745-010-902, Hazardous Materials/ Waste MARC Centers.

13.03 Final disposal will be coordinated by the Manager-Hazardous Materials Removals and an authorized disposal vendor as outlined in SW 745-010-902.

13.04 Cold cathode tubes and associated materials will be shipped to approved disposal sites that are licensed by the respective state authority in which the site is located, and under the auspices of the U.S. Nuclear Regulatory Commission.

14. EMPTY RADIOACTIVE MATERIALS PACKAGING

14.01 Compartmented containers emptied of cold cathode tubes can be reshipped for reuse, providing the following

restrictions are met:

(a) The radiation level at any point on the external surface of the packaging does not exceed 0.5 mRem/h.

(b) The nonfixed (removable) radioactive surface contamination on the external surface of the packaging does not exceed one (1) picocurie per square centimeter (1 pCi/cm^2) or 2.2 disintegrations per minute per square centimeter (2.2 dpm/cm^2).

(c) The packaging is in unimpaired condition and is securely closed so that there will be no leakage of radioactive material under conditions normally incident to transportation.

(d) Internal contamination does not exceed 100 picocuries per square centimeter (100 pCi/cm^2) or 220 disintegrations per minute per square centimeter (220 dpm/cm^2).

(e) All DOT labels previously applied are removed, obliterated or covered and the "Empty" label, as illustrated in Figure 2, is affixed to the packaging.

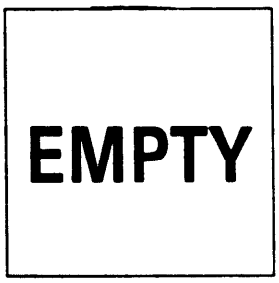


Figure 2

EMPTY Label

14.02 Meeting all the conditions listed in paragraph 14.01, (a) through (e), the empty package must be certified for transportation by having a notice enclosed in or on the package, included with the packing list, or otherwise forwarded with the package. The notice must include the consignor's name and the statement as follows:

Southwestern Bell Telephone Company

This package conforms to the conditions and limitations specified in 49 CFR 173.427 for excepted radioactive material, empty packages, UN2908.

EXHIBIT 1

LOGISTICS SERVICES NOTIFICATION OF HAZARDOUS MATERIAL ACTIVITY FORM SW 3145

Southwestern Bell Telephone

SW-3145 (5-90)

LOGISTICS SERVICES
HAZARDOUS MATERIAL ACTIVITY NOTIFICATION

TO: STATE ENVIRONMENTAL COORDINATOR

This is to advise you of upcoming hazardous material activity which I will be coordinating in your state. This activity will take the form of one of the following:

_____ Central Office Battery Removal

_____ Central Office Asbestos Abatement

_____ Central Office Equipment Tearout (PCBs, Mercury Relays, Cold Cathode Tubes, etc.)

Location and approximate date(s):

Additional information:

Name of contractor/vendor:
MRO on site during activity shown above _____yes _____no
Safety/emergency procedures (Check all appropriate):

_____ C.O.E scrap removals (SW 747-200-900)
_____ Asbestos procedures (SW 010-100-904)
_____ C.O. wet-cell battery removals (SW 747-200-902) (SW 010-160-900)
_____ Mercury relays, switches and tubes (SW 010-160-902)
_____ PCBs (SW 010-160-012SW)
_____ Radium 226 Bromide and Krypton 85 tubes (BR 010-160-015)
_____ Transportation policies (JP 122)
_____ Disposition policies (JP 123)

If you need further information, please call me.

☐ Manager-Removal Operations
500 North Broadway, Room 1000
St. Louis, MO 63102
(314) 235-2218

☐ Manager-Removal Operations
10400 North Amity
Kansas City, MO 64153
(816) 891-7277

☐ Manager-Removal Operations
Three Bell Plaza, Room 1924
Dallas, TX 75202
(214) 464-7192

☐ Manager-Removal Operations
2032 Mansard
Houston, TX 77054
(713) 796-0949

☐ Manager-Removal Operations
105 Auditorium Circle, Room 1121
San Antonio, TX 78205
(512) 222-5225

☐ Manager-Hazardous Material Removals
500 North Broadway, Room 1000
St. Louis, MO 63102
(314) 235-2222

_____ _____
Signature Date

State Environmental Coordinator Copy
Duplicate Copy - Administrative Retention Only

EXHIBIT 2

LOGISTICS SERVICES' REMOVAL STAFF

Manager-Hazardous Material Removals
500 North Broadway, Room 1000
St. Louis, MO 63102
(314) 235-2222

ARKANSAS/MISSOURI (314/417/OUTSTATE 816)

Manager-Removal Operations
500 North Broadway, Room 1000
St. Louis, MO 63102
(314) 235-2218

KANSAS/MISSOURI (METROPOLITAN 816)/OKLAHOMA

Manager-Removal Operations
10400 North Amity
Kansas City, MO 64153
(816) 891-7277

TEXAS

Dallas

Manager-Removal Operations
Three Bell Plaza, Room 1903
Dallas, TX 75202
(214) 464-6693

Houston

Manager-Removal Operations
2032 Mansard
Houston, TX 77054
(713) 796-0949

San Antonio

Manager-Removal Operations
105 Auditorium Circle, Room 1121
San Antonio, TX 78205
(512-222-5225)

EXHIBIT 3

STATE ENVIRONMENTAL COORDINATORS

ARKANSAS

1200 West 3rd
Room 354
Little Rock, AR 72203-1611
(501) 373-3913

KANSAS

823 Quincy
Room 202
Topeka, KS 66612
(913) 276-6103

MISSOURI

100 North Tucker
Room 1050
St. Louis, MO 63101
(314) 247-4068

OKLAHOMA

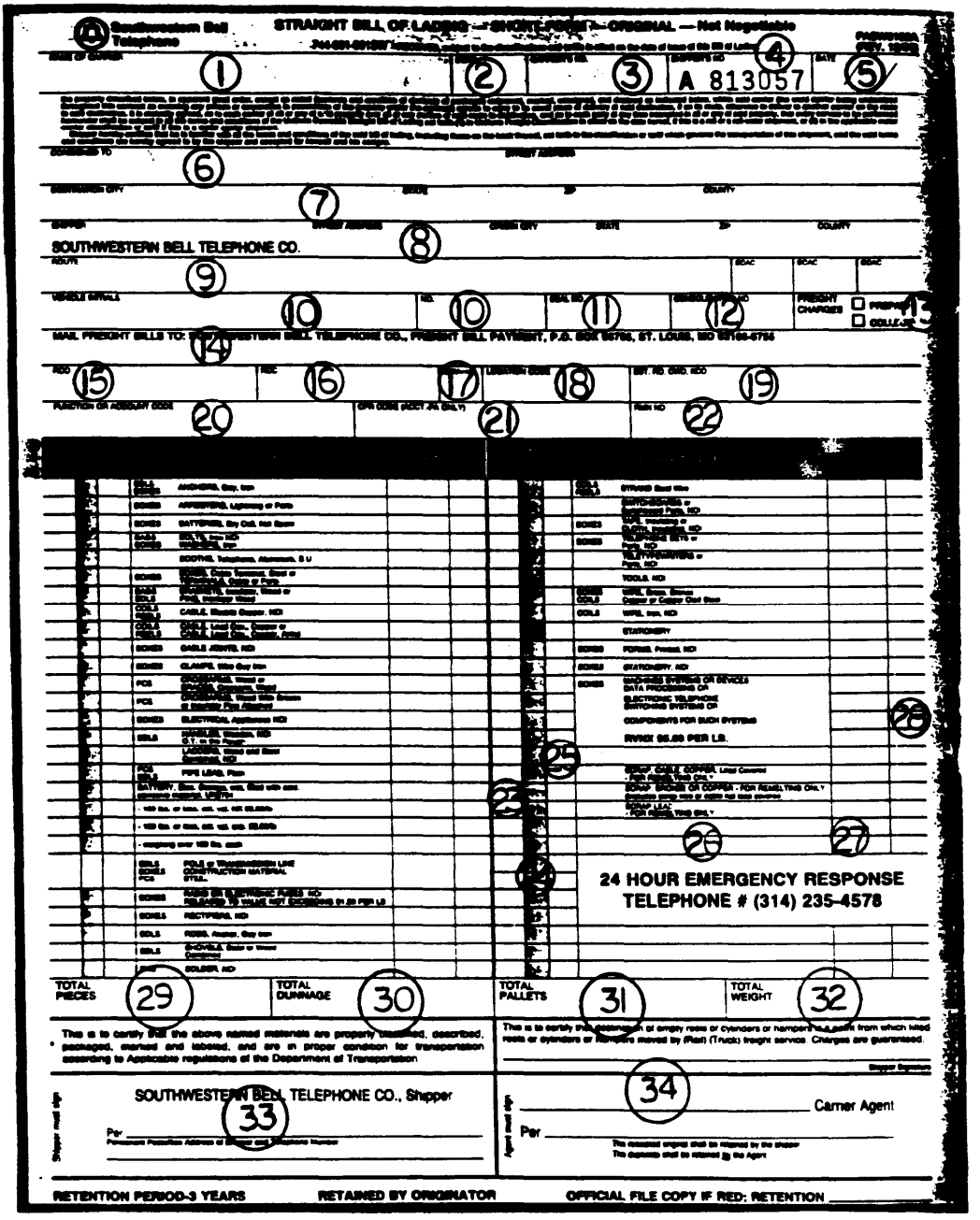
800 North Harvey
Room 399
Oklahoma City, OK 73102
(405) 278-5180

TEXAS

6500 West Loop South
Zone 1.2
Bellaire, TX 77401
(713) 567-8976

EXHIBIT 4

STRAIGHT BILL OF LADING
FORM FA SW 6152A
(Page 1 of 7 pages)



Southwestern Bell Telephone — STRAIGHT BILL OF LADING — SHORT FORM — ORIGINAL — Not Negotiable

A 813057

SOUTHWESTERN BELL TELEPHONE CO.

MAIL FREIGHT BILLS TO: SOUTHWESTERN BELL TELEPHONE CO., FREIGHT BILL PAYMENT, P.O. BOX 66768, ST. LOUIS, MO 63166-6768

24 HOUR EMERGENCY RESPONSE
TELEPHONE # (314) 235-4578

TOTAL PIECES 29 | TOTAL DUNNAGE 30 | TOTAL PALLETS 31 | TOTAL WEIGHT 32

SOUTHWESTERN BELL TELEPHONE CO., Shipper 33

Per

34 Carrier Agent

Per

RETENTION PERIOD-3 YEARS | RETAINED BY ORIGINATOR | OFFICIAL FILE COPY IF REQ: RETENTION

PROPRIETARY

Not for use or disclosure outside Southwestern Bell Telephone Company except under written agreement.

EXHIBIT 4

STRAIGHT BILL OF LADING
FORM FA SW 6152A
(Page 2 of 7 pages)

COLUMN OR SPACE		PREPARATION
1.	Name of Carrier:	Show name of truck line to be used for the shipment.
2.	SCAC:	Leave blank
3.	Carrier No.:	To be filled in by carrier's agent.
4.	Shipper's No.:	This field will be preprinted.
5.	Date:	The date to be shown is that on which the shipment is receipted for by the carrier's driver/agent.
6.	Consigned To:	Show company name and complete street address to which the shipment is being consigned. P.O. Box numbers should not be used.
7.	Destination City:	Show the destination city, state and zip code of the consignee shipped to.
8.	Shipper:	The shipper's name (Southwestern Bell) will be preprinted. Enter the street address, city, and zip code from which the shipment is originating.
9.	Route:	When two or more motor carriers are involved, this space should not be filled in unless a specific route is requested. Otherwise, this space is normally used only for rail shipments.

EXHIBIT 4

STRAIGHT BILL OF LADING
FORM FA SW 6152A
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COLUMN OR SPACE	PREPARATION
10. Vehicle Initials and No.:	Complete when the shipment involves a full truckload on motor shipments or full carload on rail shipments.
11. Seal No.:	Record the serial number of the seal applied when seals are used for shipment security.
12. Consolidation No.:	Populate this field when the shipment is part of a consolidation.
13. Freight Charges:	Shipper must designate if shipment is to be prepaid or collect. When SWBT vehicles are used for the movement of cold cathode tubes, leave this field blank.
14. Mail Freight Bills To:	Unless this field is populated with an authorized preprinted mailing address, all freight bills shall be mailed to: Southwestern Bell Telephone Company Freight Bill Payment P.O. Box 66755 St. Louis, MO 63166-6755
15. RCO (Responsibility Code Originating):	Enter the responsibility code of the organization originating the shipment.

EXHIBIT 4

STRAIGHT BILL OF LADING
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COLUMN OR SPACE	PREPARATION
16. RCC (Responsibility Code Charged):	Enter the responsibility code of the organization bearing the freight charges, if different than the RCO.
17. ENV (Environment):	Enter the environmental code of the organization originating the shipment.
18. Location Code:	Enter the location code of the organization bearing the freight charges.
19. Estimate, RO, CWO, KCO:	Enter the estimate number, routine order number, custom work order, or keep cost order number when applicable.
20. Function or Account Code:	Enter the field account code (C, X, M, R) as appropriate. If the shipment is to be charged to an account code other than a field account code, enter the function code in this space. Special job function codes shall be preceded by an "F."
21. CPR Code (Acct. FA Only):	Leave blank.
22. RMN No.:	Enter the Returned Material Notice number associated with the particular job in this field.
23. No. Pkgs.:	Enter the number of packages being shipped.

EXHIBIT 4

STRAIGHT BILL OF LADING
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COLUMN OR SPACE	PREPARATION
24. * HM:	Place an "X" in this column to the left of description of article.
25. Kind of Pkg.:	Indicate the type of packaging with abbreviations such as "BX" for box or "DR" for drums.
26. Description of Article:	Enter one of the following for the description and classification: a) Radioactive material, instruments and articles, UN2911 b) Radioactive material, limited quantity, n.o.s., UN2910 After the proper shipping description, item a) or b) above, enter "(Electron tubes containing 226 Radium and/or 85 Krypton)," as appropriate. c) Radioactive material, n.o.s., UN2982; 85 Krypton; uncompressed gas; plastic, glass and metal; and/or 226 Radium; solid; plastic, glass and metal;" For "Radioactive material, n.o.s., UN2982," these additional items must immediately follow the above description. 1) The activity contained in each package in units of μCi, mCi or Ci.

EXHIBIT 4

STRAIGHT BILL OF LADING
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COLUMN OR SPACE	PREPARATION
26. Description of Article:	2) The type of DOT radioactive label applied to the package such as "Radioactive White-I." 3) The transport index (T.I.) for each package in the shipment bearing "Radioactive Yellow-II" or "Radioactive Yellow-III" labels. 4) The type of package indicated by the words "TYPE A PACKAGE."
27. Weight:	Enter the total weight of the package(s).
28. Class or Rate:	Leave blank.
29. Total Pieces:	Show the total quantity of packages for all articles described for shipment.
30. Total Dunnage:	Show the total weight of dunnage if used. Dunnage does not include packaging.
31. Total Pallets:	If pallets, platforms or skids are used in transporting the shipment, their total number should be shown separately in this field.
32. Total Weight:	Enter the total weight for accumulations of all articles shipped.

EXHIBIT 4

STRAIGHT BILL OF LADING
FORM FA SW 6152A
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COLUMN OR SPACE	PREPARATION
33. Shipper:	The employee or agent authorizing the shipment on behalf of Southwestern Bell Telephone Company shall sign their full, legible signature, origin address and telephone number in this field. Bills of lading shall **not** be presigned.
34. Carrier Agent:	The driver or agent representing the carrier shall sign in this field.

TABLE A

COLD CATHODE TUBE
CONVERSION CHART

	RADIUM BROMIDE TUBES			KRYPTON TUBES		
TUBE CODE	RADIUM 226 CONTENTS MICROCURIES	RADIUM 226 CONTENTS MILLICURIES	DATE CONVERTED TO KR-85	KRYTPON 85 CONTENT MICROCURIES	KRYTPON 85 CONTENT MILLICURIES	CODE M.D. REPLACED BY
313A	0.10	0.0001	-	-	-	313C
313B	0.01	0.0001	-	-	-	313CA
313C	0.01	0.00001	6026	0.50	0.0005	-
313AA	0.10	0.0001	-	-	-	313CA
313CA	0.01	0.00001	6026	0.50	0.0005	-
313CB	0.01	0.00001	6026	0.50	0.0005	-
313CC	0.01	0.00001	6026	0.50	0.0005	-
313CD	0.01	0.00001	6026	0.50	0.0005	-
333A	0.01	0.00001	-	-	-	426A
346A	0.10	0.0001	-	-	-	346B
*346B	1.00	0.001	-	-	-	346C
346C	-	-	5952	4.50	0.0045	-
353A	0.01	0.00001	6026	0.50	0.0005	-
358A	-	-	6026	0.05	0.00005	-
359A	0.01	0.00001	6013	1.20	0.0012	-
372A	0.01	0.00001	-	-	-	426A
376A	0.10	0.0001	-	-	-	376B
*376B	1.00	0.001	-	-	-	376C
376C	-	-	5952	4.00	0.004	-
395A	0.01	0.00001	6039	1.60	0.0016	-
411A	0.01	0.00001	-	-	-	425A
*413A	1.00	0.001	-	-	-	413B
413B	-	-	5952	4.40	0.0044	-
423A	0.01	0.00001	-	-	-	423C
*423B	0.50	0.0005	-	-	-	423C
423C	-	-	6052	4.50	0.0045	-
425A	0.01	0.00001	6026	2.10	0.0021	-
426A	0.01	0.00001	6013	2.00	0.002	-
427A	0.10	0.0001	6039	4.00	0.004	-
*430A	0.50	0.0005	-	-	-	430B
430B	-	-	5952	4.50	0.0045	430C
430C	-	-	7226	15.00	0.015	-
432A	0.01	0.00001	-	-	-	432B
432B	0.01	0.00001	6052	4.50	0.0045	-
439A	0.01	0.00001	6139	3.00	0.003	-
443A	0.01	0.00001	6013	2.00	0.002	-
446A	0.10	0.0001	6026	0.10	0.0001	-
447A	0.01	0.00001	6026	0.10	0.0001	-
451A	0.01	0.00001	6026	2.10	0.0021	-
453A	0.01	0.00001	6026	0.30	0.0003	-
*5589	1.00	0.001	-	-	-	None
6140	0.01	0.00001	6052	4.50	0.0045	-
6141	0.10	0.0001	6039	4.00	0.004	-
6167	0.01	0.00001	6139	3.00	0.003	-
6388	0.01	0.00001	6013	2.00	0.002	-

*RaBr tubes may be marked with 3 bladed magenta radiation symbol. No Krg5 tubes are marked with this symbol.

TABLE B

Limited Quantity, N.O.S., UN2910

Total activity within inner package Microcuries		Minimum spacing between inner & outer packaging Inches
0 but less than 1		1.6
1 but less than 2		2.3
2 but less than 3		2.8
3 but less than 4		3.2
4 but less than 5		3.6
5 but less than 6		3.9
6 but less than 7	Radium 226 Bromide	4.2
7 but less than 8		4.5
8 but less than 9		4.8
9 but less than 10		5.1
10 but less than 20		7.2
20 but less than 30		8.8
30 but less than 40		10.1
40 but less than 50		11.3
0 but less than 10		0.4
10 but less than 20		0.5
20 but less than 30		0.6
30 but less than 40		0.7
40 but less than 50		0.8
50 but less than 100		1.1
100 but less than 200		1.6
200 but less than 300	Krypton 85 Gas	2.0
300 but less than 400		2.3
400 but less than 500		2.5
500 but less than 1000		3.6
1000 but less than 2000		5.1
2000 but less than 3000		6.2
3000 but less than 4000		7.2
4000 but less than 5000		8.0

Example: 4.1 microcuries of Radium 226 require a minimum separation distance of 3.6 inches between the inner and outer packages.

Example: 190 microcuries of Krypton 85 requires a minimum separation distance of 1.6 inches between the inner and outer packages.