

3/16/94

WREI TRAINING PROGRAM

RADIATION AND RADIOACTIVE SOURCE TRAINING MATERIALS

MARCH, 1994

Developed By: K. L. Tronsberg 3/17/94
K. L. Tronsberg
WREI Training Coordinator

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3/16/94

WREI TRAINING PROGRAM
MARCH, 1994

RADIATION TRAINING

I. INTRODUCTION

- What Is Radiation?
- What Is a Radioactive Source?
- When Is a Radioactive Radiation Source Useful?
- Where are WREI's Radiation Sources?
- Why do We Use Radioactive Sources?

II. PLANT OPERATIONS and MAINTENANCE

- What Precautions Do You need to Take Around Sources?
- What Procedures are in Place to Protect You?
- When should You be Handling the Sources?
- Where are You going to encounter Environmental Problems or Concerns?
- Why should You monitor and enforce procedures for Radiation Sources?

III. REGULATORY REQUIREMENTS

- Code of Federal Regulations (CFR) Requirements - 10 CFR, Part 19
- NRC Requirements

I. INTRODUCTION

A. WHAT IS RADIATION?

1. Radiation is the propagation of waves or particles emitted by a nuclear reaction.
2. Radioactivity includes the radiation of particles called alpha particles, nucleons, electrons and gamma rays.
3. A Nuclear Reaction is a process in which the **ENERGY, COMPOSITION,** or **STRUCTURE** of a nucleus of an atom is modified.
4. Radiation from nuclear sources which is mishandled or which is accidentally left exposed to humans and other life can cause radiation sickness. It is important to understand the type of source, the level of exposure and the precautions which are taken when working around sources to protect worker's health and safety.

B. WHAT IS A RADIOACTIVE SOURCE?

1. A WREI radioactive source is a lead/steel container holding a small quantity of radioactive material; in our case, Cesium-137 (CS-137).
2. WREI radioactive sources emit gamma rays from the nuclear reaction of CS-137.
3. WREI's radioactive sources are manufactured by KAY-RAY.
4. A radioactive source is always posted with caution signs that look like the one attached. (Also, I have one to show you.)
A radioactive source or container of a source will be marked:

" CAUTION - RADIOACTIVE MATERIAL "

C. WHEN IS A RADIOACTIVE RADIATION SOURCE USEFUL?

1. We use radioactive sources to give us information about the levels of ash and water in the ram extractor units. These level indicators provide alarms to the Control Room when

high levels in the extractors exist.

2. High or low levels in the extractors cause problems in the combustion system;
 - High Levels indicate potential loss of extractor seal and jamming
 - Low Levels indicate potential leakage of air into the unit
3. The radioactive radiation sources are useful for level measurement in the ram extractors because of the environment within the extractor. Instruments have a difficult time remaining intact inside the ram extractor due to the rugged conditions inside.

D. WHERE ARE WREI'S RADIOACTIVE RADIATION SOURCES LOCATED?

1. The radiation sources are located on the front of the ram extractor inlet chute. The accompanying diagram indicates the location of the KAY-RAY sources in the WREI ram extractor units.
2. The KAY-RAY sources are not located in an area easily accessible to you on the unit, therefore, they are not readily visible to you. The extractors are marked with the " CAUTION - RADIATION " signs.

E. WHY DO WE USE RADIOACTIVE SOURCES?

1. Radiation sources were selected for level measurement devices because they are "non-contact" devices. They are mounted outside the medium they are measuring. Also, they can be used in a "hostile environment" where other devices would be continually damaged or broken from their holders.
2. WREI uses radioactive radiation sources because of their successful history of providing accurate level data.
3. WESTINGHOUSE has successfully used these type of instruments in our other facilities.

II. PLANT OPERATIONS AND MAINTENANCE

A. WHAT PRECAUTIONS DO YOU NEED TO TAKE AROUND RADIOACTIVE RADIATION SOURCES?

1. BACKGROUND

Long experience in the nuclear gauging industry with hundreds of gauges, where a radioactive radiation source is contained in a source holder, indicates that the radiation dose received by operations and maintenance personnel is below the minimum dose required for monitoring.

2. POSTINGS AND NOTICES

To stay healthy, you need to stay informed. Read the Notice to Employees concerning the use of radiation sources here on site hanging in the Lunch room and the Control Room. Become familiar with the Radiation Caution signs. They are hung to alert you.

3. TRAINING AND HEALTH PROTECTION

You need to pay attention to training with regard to radiation and working around sources. Following maintenance procedures, lockout/tagout rules and confined space entry requirements will protect you in almost every situation with regard to our sources.

4. USE, STORAGE AND TRANSFER INFORMATION

Pay attention to your supervisors' updates about the location, removal, storage or transfer of any radiation sources we may have or may obtain in the future.

- WREI has eliminated from the site all Ronan radiation sources.
- WREI is in the process of finding an alternate device for use in place of the KAY-RAYS.

B. WHAT PROCEDURES ARE IN PLACE TO PROTECT YOU?

1. PRECAUTIONS AND PROCEDURES TO MINIMIZE EXPOSURE

Think ahead; before you work in the ram extractor, verify that the shutter on the radiation source has been closed. This is your first and best line of protection when working around our sources. You can verify this by checking for the lockout/tagout tag.

2. PURPOSE AND FUNCTION OF PROTECTIVE DEVICES

You are not required to wear or utilize any special protective clothing or devices when working in the ram extractor. You are protected from radiation exposure from our sources by the sources' shutters being locked closed.

3. LICENSE REQUIREMENTS FOR EXPOSURE

The Nuclear Regulatory Commission issues licenses to authorized licensees for possession and use of radioactive sources like ours. Under the Conditions section of our license you are protected from accidental exposure or mishandling by the following:

- Sources can only be used on WREI's site under the supervision of our Plant Manager, who is the Radiation Safety Officer. Users or Handlers of the Sources must have completed an approved training program done by KAY-RAY.
- Radiation sources or cells can not be opened or have the material removed from their holders by plant personnel.
- Each source will be tested for leakage as specified by the NRC license.
- Each source will be tested for shutter operation every six months.
- Installation, radiation survey, relocation or removal from service of our sources can only be done by individuals licensed by the NRC. KAY-RAY would be our first choice.*
- Radiological survey work will be done on the sources if they have been moved, dismantled or worked on. Records will be maintained of the data received.*
- Every six months a physical inventory of the sources will be made. Records will be maintained.
- WREI can obtain no additional radioactive material other than the quantity included in the original sources without prior agreement with the NRC.

* Sources may only be worked on by the Vendor from whom you have purchased the units or under his direct supervision.

C. WHEN SHOULD YOU BE INVOLVED WITH THE SOURCES?

1. After the shutter on the source is closed and you are sure that the device has been verified to be locked out, you will be authorized by the Shift Supervisor that it is "ok" to enter the ram extractor to do work or any inspections.
2. When your efforts are complete, follow the lockout/tagout procedure and inform the Shift Supervisor you are done. The source will be put back in operation when all tags are clear.
3. REPORTING RESPONSIBILITIES
When you are working in the area with a source you are required to report any violation of the procedures described above to the Shift Supervisor, or when in dispute with him/her, your supervisor. Also, if you notice any missing signs or sources when you are working in the area, you are required to report their disappearance.

D. WHERE ARE YOU GOING TO ENCOUNTER ANY ENVIRONMENTAL PROBLEMS OR CONCERNS?

1. The sources we have on site are a very small danger to the environment and to ourselves when handled and maintained correctly. Tampering with, or releasing the radiation sources from their holders can do damage to you or the environment. We need to be responsible operators of our sources.
2. RESPONSE TO RADIATION WARNINGS GIVEN ON SITE
You are expected to protect yourself from unexpected exposure to a malfunctioning source by following all instructions given to you by the Shift Supervisor when working in the ash extractor.
3. PERSONAL CONCERNS FOR HEALTH AND SAFETY
Because we are not required to maintain exposure reports on any personnel there are no individual site health records for you to review. If you wish to discuss any potential health or safety risks to your person when working around the sources, talk to the site's Health and Safety Officer or your supervisor.

E. WHY SHOULD YOU MONITOR AND ENFORCE PROCEDURES FOR RADIATION SOURCES?

1. Enforcing the procedures protects you from any health or safety risks.
2. It's the Law under Federal Regulations.

III. REGULATORY REQUIREMENTS

A. CFR REQUIREMENTS

1. Information on the Federal requirements to protect and inform you about radiation sources used on site come from CFR 10, Part 19.
2. Copies of the CFR are available to you in the Document Library.

B. NRC REQUIREMENTS

1. Information on the NRC requirements to protect and inform you about the use and handling of radiation sources is outlined in our site permit.
2. Copies of our permit are available for review from the site's Environmental Engineer.
3. The NRC-mandated "Notice to Employees" is posted in the Lunch Room and the Control Room and a copy is attached to this handout package.

References

1. 10 CFR, Parts 19 and 20, January 1, 1990.
2. NRC Materials License, WREI, November 30, 1990.
3. Incident Report, Licensed Radioactive Material Unaccounted For at The Delaware County Resource Recovery Facility, Scientific Ecology Group, Inc., February 24, 1991.
4. Radiation Training, Rev. 3, Bay County Energy Systems, undated.

RADIOACTIVE MATERIAL

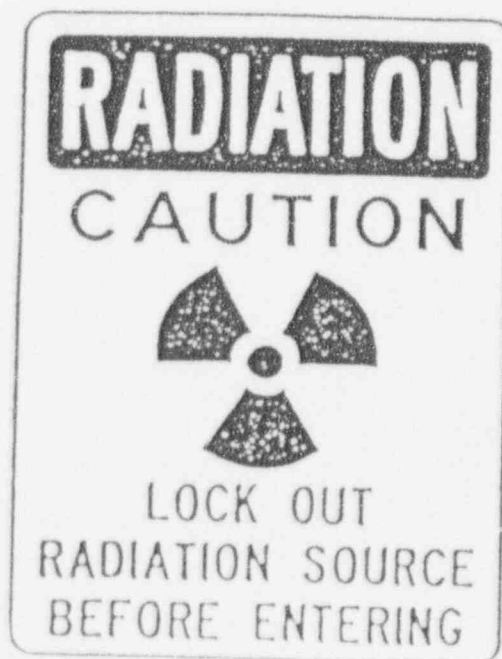
One piece of equipment in the plant utilizes radioactive material for metering purposes: The Ash Extractors. The radiation sources are housed in lockable containment enclosures which are remote from any personnel traffic areas. The ash extractor source is on the front of the extractor inlet chute. The areas are posted with caution signs: "Caution - Radioactive Material".

The "Notice to Employees" required by the U.S. Nuclear regulatory commission is attached.

CAUTION

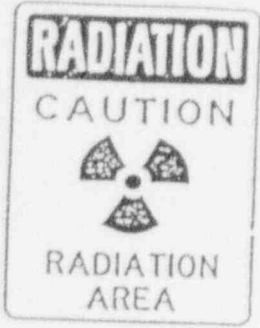


RADIATION AREA

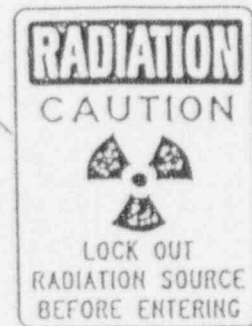
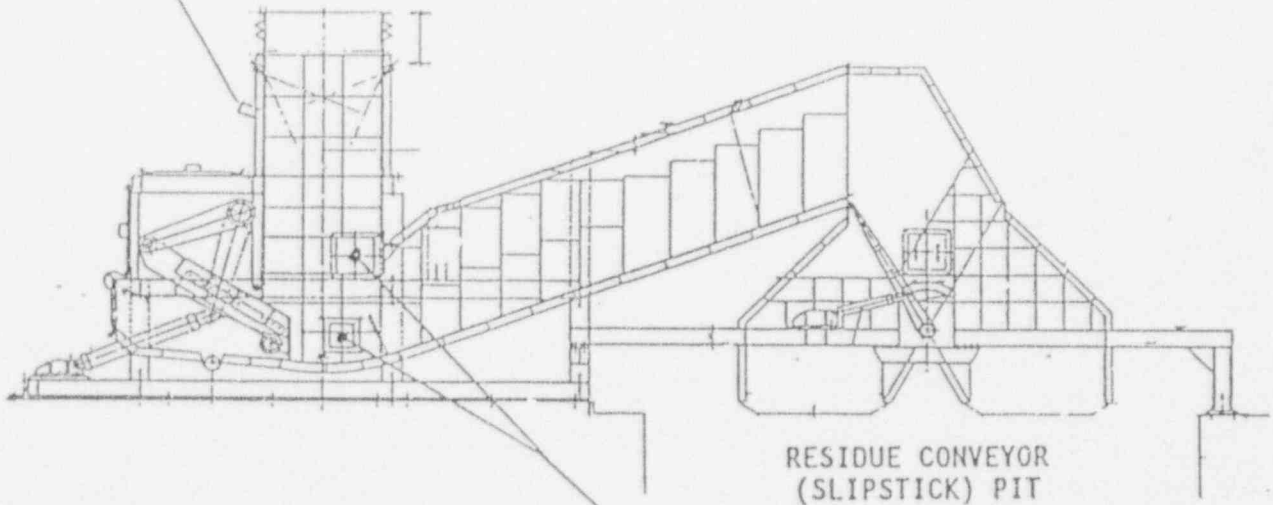


Waste Resource Energy, Inc.

10 Highland Avenue-Chester, PA 19013-610/497-8100-Fax 610/497-8125

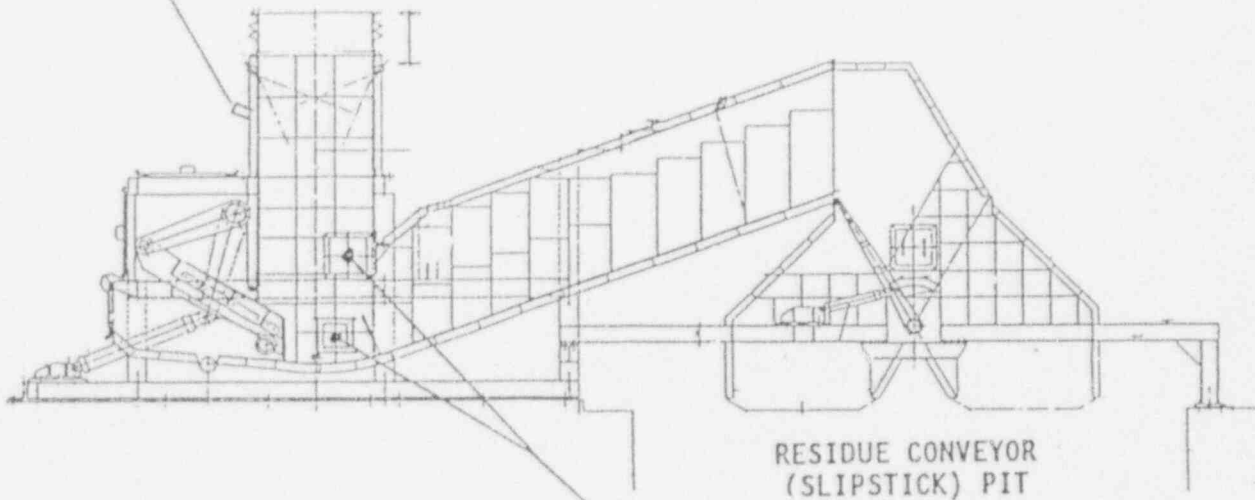


TLT - BABCOCK
ASH EXTRACTOR

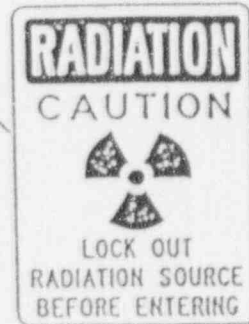




TLT - BABCOCK
ASH EXTRACTOR



RESIDUE CONVEYOR
(SLIPSTICK) PIT



RADIOACTIVE MATERIAL

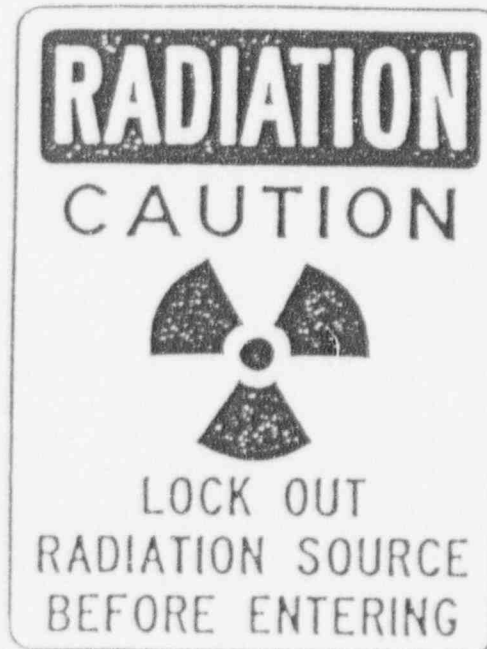
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The "Notice to Employees" required by the U.S. Nuclear regulatory commission is attached.

CAUTION



RADIATION AREA



Waste Resource Energy, Inc.
10 Highland Avenue-Chester, PA 19013-610/497-8100-Fax 610/497-8125

CONTRACTOR SITE ORIENTATION

CUMMINS Diesel
Employer (Company Name)

HAZARDOUS MATERIAL COMMUNICATION

I have been informed of the location of oils, hazardous materials and radioactive devices (attached map) and of the associated hazards of these materials.

Material Safety Data sheets (MSDS) are at the following locations:

1. Maintenance Cage
2. Administration Area
3. Control Room
4. Chemistry Lab
5. Hazard Material Locker Turbine Deck

CONTRACTOR SAFETY ORIENTATION

My signature acknowledges that I have received instruction and orientation in Contractor Safety Procedures for the Delaware County Resource Recovery Facility site including Site Hazardous Material Communication. I have been provided an opportunity to have questions answered to ensure my understanding of the information presented.

I have received a personal hand out for my use in understanding the material presented.

AL SITHINGER
(Print Name)

SS# - -

Alexis Sithinger 5/26/94
Signature Date

Kay-Ray/Sensall

Kay-Ray/Sensall, Inc.
 1400 Business Center Drive
 Mount Prospect, IL 60056-6063 USA
 Tel: (708) 803-5100
 Fax: (708) 803-5466

May 31, 1994

REF: IR# 11672
 S/O

Mr. Nazre Adum
 Westinghouse Electric
 Waste Research Enery Inc.
 10 Highland Avenue
 Chester, PA 91013

Dear Mr. Adum:

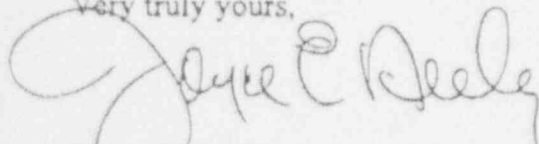
Please be advised that the following radioactive source housings have been received at our facility as of May 19, 1994, ownership on this date has been transferred from your company to Kay Ray/Sensall Inc.

MANUFACTURER	MODEL NO.	SERIAL NO.	ISOTOPE	ACTIVITY
AMERSHAM	7062B	27051	CS-137	30 MCI
AMERSHAM	7062B	27052	CS-137	30 MCI
AMERSHAM	7062B	27053	CS-137	30 MCI
AMERSHAM	7062B	27054	CS-137	30 MCI
AMERSHAM	7062B	27055	CS-137	30 MCI
AMERSHAM	7062B	27056	CS-137	30 MCI

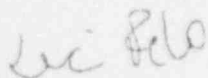
NRC regulation parts 20.301 & 20.302 pertaining to disposal and part 20.401 pertaining with record keeping, requires that a permanent record of the disposal be kept on file. This would include the final leak test certificate.

If you have any further questions, please contact us.

Very truly yours,



Joyce E. Neely
 Repair & License Administrator





Waste Resource Energy, Inc.

10 Highland Avenue • Chester, PA 19013 • 215/497-8100 • Fax 215/497-8125

May 31, 1994

U.S. NUCLEAR REGULATORY COMMISSION
Region I
475 Allendale Road
King of Prussia, PA 19406

Attn: Mr. Keith Brown, NRC Inspector

SUBJECT: U.S. NUCLEAR REGULATORY COMMISSION
MATERIALS LICENSE No. 37-28556-01
DOCKET No. 030-3180

Dear Mr. Brown:

Per our telephone conversation, this letter is to request the NRC to terminate the Materials License No. 37-28556-01. As discussed, the licensed materials-- five 100 mCi and six 30 mCi sources, have been transferred to RONAN and KAY-RAY/Sensall.

Confirmations of the receipt and possession of the licensed material from Ronan and Kay-Ray/Sensall are attached.

If you have any questions, please do not hesitate to call me at (215) 497-8100.

Sincerely,

Nazre G. Adum, P.E.
Environmental Engineer

cc: M. Clawson, WREI
W. Bickerstaff, W EA
M. Johnson, W RES
W. Wall, W EA ✓

MATERIALS LICENSE

Amendment No. 01

Pursuant to the Atomic Energy Act of 1954, as amended, the Energy Reorganization Act of 1974 (Public Law 93-438), and Title 10, Code of Federal Regulations, Chapter I, Parts 30, 31, 32, 33, 34, 35, 39, 40 and 70, and in reliance on statements and representations heretofore made by the licensee, a license is hereby issued authorizing the licensee to receive, acquire, possess, and transfer byproduct, source, and special nuclear material designated below, to use such material for the purpose(s) and at the place(s) designated below, to deliver or transfer such material to persons authorized to receive it in accordance with the regulations of the applicable Part(s). This license shall be deemed to contain the conditions specified in Section 183 of the Atomic Energy Act of 1954, as amended, and is subject to all applicable rules, regulations and orders of the Nuclear Regulatory Commission now or hereafter in effect and to any conditions specified below.

Licensee

1. Westinghouse Electric Corporation
Resource Energy Systems Division

2. 2400 Ardmore Boulevard
Forest Hills, Pennsylvania 15221

In accordance with letter dated
November 30, 1990,
3. License number 37-28556-01

4. Expiration date October 31, 1995

5. Docket or Reference No 030-31830

6. Byproduct, source, and/or special nuclear material

7. Chemical and/or physical form

8. Maximum amount that licensee may possess at any one time under this license

A. Cesium 137

A. Sealed sources

A. See Item 9.A. and not to exceed 1500 millicuries total

Authorized use

A. For possession and use in Kay Ray, Accuray, Ohmart, LFE, Berthold Systems, Inc., Data Measurement Corp., Flow Measurement Systems, Ronan Engineering or Texas Nuclear devices which have been evaluated and approved for licensing purposes and authorized for distribution under a license issued by the Nuclear Regulatory Commission or an Agreement State.

CONDITIONS

10. Licensed material may be used only at the licensee's facilities at Delaware County Resource Recovery Facility, Front and Thurlow Streets, Chester, Pennsylvania.
11. A. Licensed material shall be used by, or under the supervision and in the physical presence of Dave A. Boward, or individuals who have successfully completed the manufacturer's training program for gauge users and who have been designated by the Radiation Safety Officer. The licensee shall maintain records of individuals designated as users for 3 years following the last use of licensed material by the individual.
B. The Radiation Safety Officer for this license is Dave A. Boward.
12. Sealed sources or detector cells containing licensed material shall not be opened or sources removed from source holders or detector cells by the licensee.

Handwritten signature/initials: 9/103080264

MATERIALS LICENSE
SUPPLEMENTARY SHEET

License number

37-28556-01

Docket or Reference number

030-31830

Amendment No. 01

(Continued)

CONDITIONS

13. A. Sealed sources and detector cells shall be tested for leakage and/or contamination at intervals not to exceed 6 months or at such other intervals as are specified by the certificate of registration referred to in 10 CFR 32.210, not to exceed 3 years.
- B. Notwithstanding Paragraph A of this Condition, sealed sources designed to emit alpha particles shall be tested for leakage and/or contamination at intervals not to exceed 3 months.
- C. In the absence of a certificate from a transferor indicating that a test has been made within six months prior to the transfer, a sealed source or detector cell received from another person shall not be put into use until tested.
- D. Each sealed source fabricated by the licensee shall be inspected and tested for construction defects, leakage, and contamination prior to any use or transfer as a sealed source.
- E. Sealed sources and detector cells need not be leak tested if:
- (i) they contain only hydrogen 3; or
 - (ii) they contain only krypton 85; or
 - (iii) the half-life of the isotope is 30 days or less; or
 - (iv) they contain not more than 100 microcuries of beta and/or gamma emitting material or not more than 10 microcuries of alpha emitting material; or
 - (v) they are not designed to emit alpha particles, are in storage, and are not being used. However, when they are removed from storage for use or transfer to another person, and have not been tested within the required leak test interval, they shall be tested before use or transfer. No sealed source or detector cell shall be stored for a period of more than 10 years without being tested for leakage and/or contamination.
- F. The test shall be capable of detecting the presence of 0.005 microcurie of radioactive material on the test sample. Records of leak test results shall be kept in units of microcuries and shall be maintained for inspection by the Commission. If the test reveals the presence of 0.005 microcurie or more of removable contamination, a report shall be filed with the U.S. Nuclear Regulatory Commission and the source shall be removed from service and decontaminated, repaired, or disposed of in accordance with Commission regulations. The report shall be filed within 5 days of the date the leak test result is known with the U.S. Nuclear Regulatory Commission, Region I, ATTN: Chief, Nuclear Materials Safety Branch, 475 Allendale Road, King of Prussia, Pennsylvania 19406. The report shall specify the source involved, the test results, and corrective action taken.

MATERIALS LICENSE
SUPPLEMENTARY SHEET

License number

37-28556-01

Docket or Reference number

030-31830

Amendment No. 01

(13. Continued)

CONDITIONS

6. The licensee is authorized to collect leak test samples for analysis by Kay Ray or Ronan Engineering. Alternatively, tests for leakage and/or contamination may be performed by persons specifically licensed by the Commission or an Agreement State to perform such services.
14. Each gauge shall be tested for the proper operation of the on-off mechanism and indicator, if any, at no longer than six-month intervals or at such longer intervals as specified by the manufacturer, not to exceed 3 years.
15. Installation, initial radiation surveys, relocation, removal from service, or any similar activity with devices containing licensed material shall be performed only by persons specifically licensed by the Commission or an Agreement State to perform such services. The licensee may initially mount the device in accordance with written instructions provided by the manufacturer; however, the device may not be used until surveyed by a person specifically licensed by the Commission or an Agreement State to install gauges. The licensee may repair the electronic equipment not associated with the source or its shielding.
16. Prior to initial use and after installation, relocation, dismantling, alignment, or any other activity involving the source or removal of the shielding, the licensee shall assure that a radiological survey is performed to determine radiation levels around, above and below the gauge with the shutter open. This survey shall be performed only by persons authorized to perform such services by the Commission or an Agreement State. A record of the results of this survey shall be maintained.
17. The licensee shall conduct a physical inventory every 5 months to account for all sources and/or devices received and possessed under the license. Records of inventories shall be maintained for 5 years from the date of each inventory.
18. The licensee shall not acquire licensed material in a sealed source or in a device that contains a sealed source unless the source or device has been registered with the Nuclear Regulatory Commission under 10 CFR 30.32(g) or with an Agreement State.

MATERIALS LICENSE
SUPPLEMENTARY SHEET

License number	37-28556-01
Docket or Reference number	030-31830
Amendment No. 01	

(Continued)

CONDITIONS

19. Except as specifically provided otherwise in this license, the licensee shall conduct its program in accordance with the statements, representations, and procedures contained in the documents, including any enclosures, listed below. The Nuclear Regulatory Commission's regulations shall govern unless the statements, representations and procedures in the licensee's application and correspondence are more restrictive than the regulations.
- A. Application dated July 10, 1990
 - B. Letter dated September 25, 1990 from J. W. Dorrycott
 - C. Letter dated September 25, 1990 from W. H. Bushnell

date JAN 16 1991

For the U.S. Nuclear Regulatory Commission
 Original Signed By:
 By Marlene J. Taylor
 Nuclear Materials Safety Branch
 Region I
 King of Prussia, Pennsylvania 19406

RADIATION SOURCE LOG

DATE: 5/30/94

TIME: 12:35

NUMBER ONE (1) INCLINE CONVEYER SCALE SOURCE

PRESENT: YES NO

NUMBER TWO (2) INCLINE CONVEYER SCALE SOURCE

PRESENT: YES NO

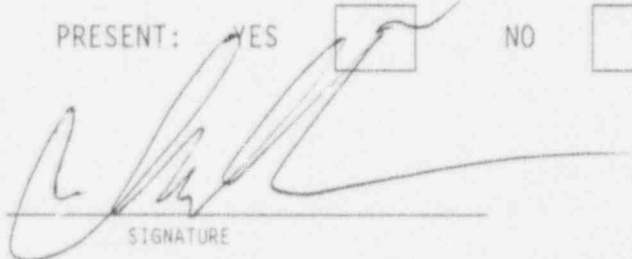
NUMBER ONE (1) FEED CHUTE LEVEL SOURCE

PRESENT: YES NO

NUMBER TWO (2) FEED CHUTE LEVEL SOURCE

PRESENT: YES NO

SHIFT SUPERVISOR:


SIGNATURE