



UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D. C. 20555

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MEMORANDUM FOR: File

FROM: Eugene A. Trager
Office for Analysis and Evaluation
of Operational Data

SUBJECT: REVIEW OF REPORTS OF LEAKING RADIOACTIVE SOURCES

This memo documents the results of our review of reports of leaking radioactive sources. The reports, which are summarized in Enclosure 1, included all those received by AEOD since mid-1980. Most of the reports are of statistical interest only. Some of the reports indicate problems that may be the result of shortcomings in the source and device review process.

The first generic problem involves the January 9, 1981 and May 15, 1981 reports of leaking Po-210 static eliminator bars at a Clairol facility. The second problem involves the December 21, 1980 report by Thomas Jefferson University Medical Center. A review of that report indicated that the control system for importing byproduct material may not be adequate (see the March 16, 1981 AEOD memo to file on this subject). The January 21, 1981 report by the Sequoyah Nuclear Plant concerns foreign-produced byproduct sources that have been found to leak.

These potential problems will be included in an evaluation by the nonreactor group of the adequacy of the source and device review process. In the case of the Clairol leakers, the question is whether limitations on the use of devices had been properly fed back to users. The second and third cases involve foreign manufacture of sources.

The two reports concerning leakage from sources produced in Agreement States have been forwarded to OSP.

Eugene A. Trager, J.

Eugene A. Trager
Office for Analysis and Evaluation
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cc: K. Black
S. Pettijohn

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1990 Leaking Source Reports

Reported By	Report Date	Source Manufacturer	Source Description	µCi Removable Contamination	Cause/Comments
BM (for Polaroid Cambridge, MA General Lic.)	5/5/81	3M (22-00057-G6 & 22-00057-32G)	3M Model 204 Static Eliminator (w/ Po-210 micro- spheres)	0.029	Damaged in use. Protective screen torn away and image scratched. (Statistical value only)
Ford Res. & Eng. Dearborn, MI (21-04114-12)	6/3/80	Kelvex Corp. Foster City, CA (Agreement State Lic.)	Model XANK 3 mCi Curium-244 Alpha Source	0.0137	Cause unknown. Contamination contained within device. Report referred to OSP. (Statistical value only)
Victoreen Cleveland, OH (34-00486-04)	9/22/80	ICN Irvine, CA (Agreement State Lic.)	ICN Model 312 0.5 mCi Sr-90	0.004 to 0.05	Leak tested on arrival at Victoreen. 11 of 54 showed leakage. (Report referred to OSP)
Reliance Testing Lab., Inc. Timonium, MD (Agreement State Lic.)	11/14/80	Tech. Oper., Inc. Burlington, MA	Ir-192 source for gamma ray projec- tor Model 660	0.0052	Reliance test results were not confirmed by Tech. Ops. nor state of Maryland. (false report)
Thomas Jefferson Univ. Medical Center Phila., PA (37-00148-06)	12/12/80	(Unknown)	Brown Boveri Corp. 10 mCi Sr-90 Calibration Check Source	(Unknown)	Cause unknown. Numerous problems noted. See Mar. 16, 1981 AEOD memo to file on this subj. (Attached)

1981 Leaking Source Reports

Reported By	Report Date	Source Manufacturer	Source Description	μ Ci Removable Contamination	Cause/Comments
3M (for Clairol, Stamford, CT General Lic.)	1/9/81	3M (20-00057-32G)	Model 210, Po-210 Static Eliminator Bars (6 total)	0.018 to 0.520	Caused by solvent (water) attack at high temperature (95°C).
Sequoyah Nuclear Plant	1/21/81 (phone con.)	Ion Track Instru- ments, Inc. Burlington, MA (20-15525-02E)	10 μ Ci Ni-63 foil	0.451	Source is contained within explosive detection devices imported from England. Devices are distributed as exempt from licensing. Other instances of leakage of these sources were found by RI and RII inspectors.
LFE (for Alumax Foil St. Louis, MO General Lic.)	2/9/81	LFE (20-01382-16G)	LFE Model S2A2 100 mCi Sr-90	(Not reported)	Contamination contained within gauging device. (Statistical value only)
AMP (37-01220-03)	4/22/81	Twin City Testing Corp. (22-01376-03)	Model TL-204 S/N C2172 50 μ Ci Tl-204 source	0.043	Cause unknown. (Statistical value only)
Phillip Morris (45-00385-06)	2/25/81	Amersham (12-12836-04G)	Model #SIF-10 4mCi Sr-90	0.00644	Cause unknown. Device distributed by Molins Machine under terms of AEC lic. #GL104 at time of purchase 3/8/66. (Statistical value only)
Univ. of Montana (25-01706-03)	2/25/81	(Described in Part 6.K of lic.)	10 mCi Ni-63 foil	0.071	Wipe test of gas chromatograph carrier gas exit port. (Statistical value only)
Kay-Ray (12-11184-01)	4/4/81	General Radio- isotope Products	Model 850033 S/N K-1105 200 mCi Cs-137	0.020	Cause unknown. Capsule for Kay-Ray Model 7050 was rec'd 6/11/75. (Statistical value only)

1981 Leaking Source Reports

Reported By	Report Date	Source Manufacturer	Source Description	μ Ci Removable Contamination	Cause/Comments
Clairol Stamford, CT (General Lic.)	5/15/81	3M (22-00057-32G)	Model 210, Po-210 Static Eliminator Bars (5)	0.01 to 1 or 2	Resulted from attach by industrial cleaning solvent (95% trichloroethane).
Clairol Saddle Brook, NJ (General Lic.)	5/19/81	3M (22-00057-32G)	Model 210, Po-210 Static Eliminator Bar	0.07	Physical damage (gouge) to active face of source.



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MAR 16 1981

MEMORANDUM FOR: Kathleen Black
Office for Analysis and Evaluation
of Operational Data

FROM: Eugene A. Trager
Office for Analysis and Evaluation
of Operational Data

SUBJECT: INTERIM REPORT ON BROWN BOVERI BETATRON
CALIBRATION CHECK SOURCE

Background

In a letter dated February 12, 1980, the Brown Boveri Corporation (BBC) informed Dr. N. Suntharalingam of the Thomas Jefferson University Medical Center (TJUMC) of a potential source leakage problem. BBC stated "One of our U.S. customers reported to us that after a control the calibrating source (A105) of the Asklepitron-45 showed a leakage," and recommended that leakage from the source be checked "according to the state and federal time requirements." The BBC Asklepitron-45 is a 45 MeV Betatron which includes a 10 mCi Sr-90 calibration check source. As the leakage test recommended by BBC involved dismantling the ionization chamber device, TJUMC requested that BBC perform the test. A BBC service engineer later discovered corrosion on the source holder and recommended disposal of the entire ionization chamber assembly as radwaste. A replacement assembly was installed on August 8, 1980, and the outer surface of the chamber was leak tested as per (standard) condition 13D of the TJUMC license.

TJUMC forwarded the above information in a December 12, 1980 letter to Region 1 and requested a clarification of the leak test required for the ionization chamber. In a letter to IE headquarters on January 29, 1980 (Enclosure 1), Region I forwarded the response to TJUMC along with related correspondence.

Discussion

A check by AEOD personnel with the FCML Branch of NMSS on February 10, 1981, indicated the following:

1. TJUMC license #37-00148-6 was of the Medical Institutional Broad License variety and authorized 100 mCi of Sr-90 encapsulated sources and 10 mCi of Sr-90 in "any" form. The 10 mCi Sr-10 ionization chamber check source was not explicitly authorized.
2. A discussion with a cognizant engineer in the Material Certification and Procedures Branch and a check of the source catalogue indicated that the design of the BBC Betatron check source had not been reviewed and approved by the NRC.

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Although the Asklepitron 45 is manufactured by BBC Brown, Boveri, and Company, Ltd., of Baden, Switzerland, a local BBC office in North Brunswick, NJ, had originally contacted TJUMC about the leaking source. On February 20, 1981, Mr. Philippe Senn of the New Brunswick BBC office was contacted by E. Trager of AEOD concerning this matter. Mr. Senn agreed to provide: (1) a list of all U.S. owners of the Asklepitron 45; (2) the name of the U.S. customer who had contacted BBC about the leaking source; and (3) the name of the source manufacturer. In a letter dated February 25, 1981 (Enclosure 2) information was provided on the two former but not on the latter item.

On March 4, 1981, AEOD personnel examined the FCML docket file folders for the licensees BBC stated were owners of the Asklepitron 45 betatron, i.e., Tufts - New England Medical Center (20-03857-06), Thomas Jefferson University Medical Center (37-00148-06), Miami Valley Hospital (34-00341-06), and Pondville State Hospital (20-04597-1). Although these are all Medical Institutional Licenses only the first two are Broad licenses. Review of these files indicated: (1) only Pondville recognized the need for and obtained an amendment explicitly authorizing the 10 mCi Sr-90 calibration check source; (2) information provided by Pondville on the "custom" source would not be adequate for determining source acceptability currently and (3) Miami Valley did not report the leaking source as required.

Preliminary Conclusions

Information gathered on this matter at this point in time indicates:

1. Miami Valley did/does not have authorization for the BBC source. In addition, when the source leakage was noted at Miami Valley, this was not reported to the NRC.
2. The Medical Institutional Broad Licenses authorized possession and use of a source which was not approved by the NRC.
3. The system for the control of importing byproduct material would not have prevented this. 10 CFR 110.11 enables Broad medical licensees to import byproduct material in "any" form.
4. The standard license condition for leak testing sources may not have been sufficiently clear in this case.

The following related questions arise:

1. Should licenses be revised to clarify that sources authorized for possession are only those which have been approved by the NRC?
2. What were the results for licensees in Agreement States? Have occurrences of this nature been reported by the States to OSP? Are the reporting requirements uniform for the States?

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3. Is the control system for importing byproduct material adequate?
4. Are there other types of non-licensed radiation-generating equipment which contain components such as calibration check sources which should be, but which are not, currently licensed?

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Enclosures:
As Stated