



OFFICE OF THE  
GENERAL COUNSEL

UNITED STATES  
NUCLEAR REGULATORY COMMISSION  
WASHINGTON, D.C. 20555-0001

DOCKETED  
USNRC

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July 25, 1995

OFFICE OF SECRETARY  
DOCKETING & SERVICE  
BRANCH

Marshall E. Miller  
Presiding Officer  
512 Magnolia  
Frederick, MD 21701

Dr. Harry Foreman  
Special Assistant  
1564 Burton Avenue  
St. Paul, MN 55108

In the Matter of  
ADVANCED MEDICAL SYSTEMS, INC.  
Material License No. 34-19089-01  
Docket No. 30-16055-ML-REN

Dear Administrative Judges:

Pursuant to 10 C.F.R. § 2.1231(c), attached please find the following documents to be included in the hearing file for this proceeding.

22. Letter to Advanced Medical Systems, Attn: Mr. Robert Meschter, Radiation Safety Officer, from Kevin G. Null, Nuclear Materials Licensing Section, U.S. Nuclear Regulatory Commission, re: Amendment No. 33 to NRC Material License No. 34-19089-01, May 23, 1995.
23. Letter to Advanced Medical Systems, Attn: Mr. Robert Meschter, Radiation Safety Officer, from Kevin G. Null, Nuclear Materials Licensing Section, U.S. Nuclear Regulatory Commission, re: Amendment No. 34 to NRC Material License No. 34-19089-01, June 9, 1995.
24. Letter to John Madera, Chief - Nuclear Materials Licensing Section, U.S. Nuclear Regulatory Commission, Region III from David Cesar, Treasurer, Advanced Medical Systems, re: response to letter dated April 17, 1995 requesting additional information for renewal of license, June 16, 1995.
25. Letter to Advanced Medical Systems, Attn: Mr. Robert Meschter, Radiation Safety Officer, from Kevin G. Null, Nuclear Materials Licensing Section, U.S. Nuclear Regulatory Commission, re: Amendment No. 35 to NRC Material License No. 34-19089-01, June 20, 1995.
26. Letter to Advanced Medical Systems, Attn: Mr. Robert Meschter, Radiation Safety Officer, from Kevin G. Null, Nuclear Materials Licensing Section, U.S. Nuclear Regulatory Commission, re: Amendment No. 36 to

SECY-030

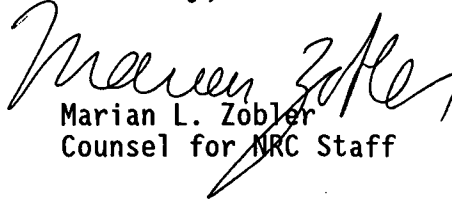
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NRC Material License No. 34-19089-01, June 21, 1995.

- 27 Letter to Advanced Medical Systems, Inc., Attn: David Cesar, Treasurer from John R. Madera, Chief, Nuclear Materials Licensing Section, U.S. Nuclear Regulatory Commission, re: standby trust agreement, June 29, 1995. Please note that Enclosure 1, Letter dated 3/13/95, was previously submitted to the Hearing File by letter dated April 12, 1995 and is, therefore, not enclosed here.

Sincerely,

  
Marian L. Zabler  
Counsel for NRC Staff

Enclosures: As stated

cc w/encl.: Service List



UNITED STATES  
NUCLEAR REGULATORY COMMISSION

REGION III  
801 WARRENVILLE ROAD  
LISLE, ILLINOIS 60532-4351

MAY 23 1995

Advanced Medical Systems  
ATTN: Mr. Robert Meschter  
Radiation Safety Officer  
1020 London Road  
Cleveland, OH 44110

Dear Mr. Meschter:

Enclosed is Amendment No. 33 to your NRC Material License No. 34-19089-01 in accordance with your request.

Please review the enclosed document carefully and be sure that you understand all conditions. If there are any errors or questions, please notify the U.S. Nuclear Regulatory Commission, Region III office so that we can provide appropriate corrections and answers.

With this amendment, authorization is granted for AMS to utilize Lockheed Analytical Services for confirmatory analyses of treated water samples. Note that License Condition No. 20 has been amended to add Subitem I. which ties down your letters dated May 3 and May 17, 1995.

Please be advised that your license expires at the end of the day, in the month, and year stated in the license. Unless your license has been terminated, you must conduct your program involving byproduct materials in accordance with the conditions of your NRC license, representations made in your license application, and NRC regulations. In particular, note that you must:

1. Operate in accordance with NRC regulations 10 CFR Part 19, "Notices, Instructions and Reports to Workers; Inspections," 10 CFR Part 20, "Standards for Protection Against Radiation," and other applicable regulations.
2. Notify NRC, in writing, within 30 days:
  - a. When Radiation Safety Officer permanently discontinues performance of duties under the license or has a name change; or
  - b. When the licensee's mailing address changes (no fee is required if the location of byproduct material remains the same).

3. In accordance with 10 CFR 30.36(b) and/or license condition, notify NRC, promptly, in writing, and request termination of the license when you decide to terminate all activities involving materials authorized under the license.
4. Request and obtain a license amendment before you:
  - a. Change Radiation Safety Officers;
  - b. Order byproduct material in excess of the amount, or radionuclide, or form different than authorized on the license;
  - c. Add or change the areas of use or address or addresses of use identified in the license application or on the license; or
  - d. Change ownership of your organization.
5. Submit a complete renewal application with proper fee or termination request at least 30 days before the expiration date of your license. You will receive a reminder notice approximately 90 days before the expiration date. Possession of byproduct material after your license expires is a violation of NRC regulations. A license will not normally be renewed, except on a case-by-case basis, in instances where licensed material has never been possessed or used.

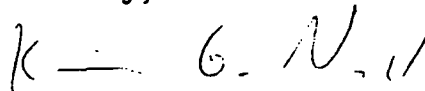
In addition, please note that NRC Form 313 requires the applicant, by his/her signature, to verify that the applicant understands that all statements contained in the application are true and correct to the best of the applicant's knowledge. The signatory for the application should be the licensee or certifying official rather than a consultant.

You will be periodically inspected by NRC. Failure to conduct your program in accordance with NRC regulations, license conditions, and representations made in your license application and supplemental correspondence with NRC will result in enforcement action against you. This could include issuance of a notice of violation, or imposition of a civil penalty, or an order suspending, modifying or revoking your license as specified in the General Policy and Procedures for NRC Enforcement Actions, 10 CFR Part 2, Appendix C. Since serious consequences to employees and the public can result from failure to comply with NRC requirements, prompt and vigorous enforcement action will be



taken when dealing with licensees who do not achieve the necessary meticulous attention to detail and the high standard of compliance which NRC expects of its licensees.

Sincerely,

A handwritten signature in dark ink, appearing to read "K - G. Null". The signature is written in a cursive, somewhat stylized manner.

Kevin G. Null  
Nuclear Materials Licensing Section

License No.: 34-19089-01  
Docket No.: 030-16055

Enclosure: Amendment No. 33

## MATERIALS LICENSE

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, 36, 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.

398546

## Licensee

1. Advanced Medical Systems, Inc.

2. 1020 London Road  
Cleveland, OH 44110

In accordance with letter dated  
May 3, 1995,  
3. License Number 34-19089-01 is amended in  
its entirety to read as follows:

4. Expiration Date December 31, 1994

5. Docket or  
Reference No. 030-16055/040-08764/030-17154Byproduct, Source, and/or  
Special Nuclear Material

A. Cobalt-60

B. Cobalt-60

7. Chemical and/or Physical  
Form

A. Solid Metal

B. Sealed sources  
(teletherapy/  
radiography sealed  
sources which have  
been evaluated and  
approved for  
commercial  
distribution by the  
NRC or an Agreement  
State)

C. Sealed sources  
(teletherapy/  
radiography sealed  
sources which have  
been evaluated and  
approved for  
commercial  
distribution by the  
NRC or an Agreement  
State)

D. Depleted Uranium

E. Cobalt-60

D. Nickel Plated

E. Sealed Sources

8. Maximum Amount that Licensee  
May Possess at Any One Time  
Under This License

A. 150,000 curies

B. 135,000 curies  
(no single source  
to exceed 13,700  
curies)

C. 40,000 curies (no  
single source to  
exceed 2,200  
curies)

D. 4,040 kilograms

E. 15,000 curies

COPY

**MATERIALS LICENSE  
SUPPLEMENTARY SHEET**

License number

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Docket or Reference number

030-16055/040-08764/030-17154

Amendment No. 33

- |   |                                  |  |
|---|----------------------------------|--|
| 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 |
|---|----------------------------------|--|

F. Cobalt-60

F. Sealed Sources  
(any sealed source approved by the NRC or an Agreement State)

F. 15 millicuries

9. Authorized Use:

- A. For storage only incident to waste disposal or transfer to an authorized recipient. This license does not authorize the manufacture of sealed sources.
- B. For installation, maintenance of, dismantling and servicing of Picker Corporation and Advanced Medical Systems, Inc. teletherapy units and Picker Model 6145 radiography units possessed by licensees authorized to possess the radioactive material pursuant to a specific license issued by the Commission or an Agreement State. For installation and removal of sealed sources into Picker Corporation, Advanced Medical Systems, Inc. and Keleket Barnes teletherapy units of licensees authorized to possess the radioactive material pursuant to a specific license issued by the Commission or an Agreement State. For training Hospital or Clinic personnel for in-house service operations on teletherapy equipment, on unit model per course, in accordance with letter dated August 15, 1988 and September 29, 1988.
- C. For installation, maintenance, dismantling and servicing of Picker Corporation and Advanced Medical Systems radiography and teletherapy units of licensees authorized to possess the radioactive material pursuant to a specific license issued by the Commission or an Agreement State.
- D. Shielding material in Picker Corporation and Advanced Medical System, Inc., radiography and teletherapy devices.
- E. For storage only, those non-NRC approved sources in the possession of the licensee prior to the issuance of this amendment.
- F. For use in devices (including Tech OP Model 571 Calibrator described in application dated November 12, 1984) approved by the Nuclear Regulatory Commission or an Agreement State to calibrate radiation survey instruments.

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Amendment No. 33

CONDITIONS

10. Licensed material in Items 6.A., 6.E. and 6.F. shall be used only at the licensee's facility at 1020 London Road, Cleveland, Ohio. Licensed material in Items 6.B. and 6.C. shall be used only at 1020 London Road, Cleveland, Ohio and at facilities of customers who possess a specific license from the NRC authorizing possession of the licensed material. Licensed material in Item 6.D. shall be used only at the licensee's facilities at 1020 London Road, Cleveland, Ohio or 121 North Eagle Street, Geneva, Ohio, and at facilities of customers who possess a specific license from the NRC authorizing possession of the licensed material.

11. A. The Radiation Protection Officer for service operations described in Subitems 9.B. and 9.C. and routine health physics activities is Robert Meschter.

The licensee shall not perform service operations described in Subitems 9.B. and 9.C. until Robert Meschter has completed the required training.

- B. Licensed material shall be used by, or under the supervision of and in the physical presence of users listed in the table below. The users are only authorized to perform the indicated services on the teletherapy or radiography units specified in the table below:

AMS/PICKER TELETHERAPY/RADIOGRAPHY UNITS MODELS

	CS 600	C 1000	C 2000	C 3000	C 5000	C 10,000	C4	C8	C9	C12	Cyclops
USER											
Curtis Perry				3	1.2	1.2	1.2	1.2	1.2		1.2
Haddock	5	5	5	5	5	5	5	5	5	5	5

AMS/PICKER TELETHERAPY/RADIOGRAPHY UNITS MODELS

	V 1000	V 2000	V 3000	V 10,000	C V4	C V9					
USER											
Curtis Perry		1.2	1.2	1.2	1.2	1.2					
Haddock	5	5	5	5	5	5					

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Amendment No. 33

## 11. (Continued)

1. Authorizes the servicing of AMS/Picker units, excluding source exchange.
2. Authorizes sealed source exchange.
3. Authorizes removal of unit and head from customer sites only.
4. Authorizes the training of AMS personnel in the manufacture of AMS/Picker sealed sources.
5. Authorizes the handling of sealed sources only.

12. A. (1) Each sealed source acquired from another person and containing licensed material, other than hydrogen-3, with a half-life greater than 30 days and in any form other than gas shall be tested for contamination and/or leakage before use. In the absence of a certificate from a transfer or indicating that a test has been made within 6 months before the transfer, a sealed source received from another person shall not be put into use until tested.
- (2) Notwithstanding the periodic leak test required by this condition, any licensed sealed source is exempt from such leak tests when the source contains 100 microcuries or less of beta and/or gamma emitting materials or 10 microcuries or less of alpha emitting material.
- (3) Except for alpha sources, the periodic leak test required by this condition does not apply to sealed sources that are stored and not being used. The sources excepted from this test shall be tested for leakage before any use or transfer to another person unless they have been leak tested within 6 months before the date of use or transfer.
- B. Each sealed source fabricated by the licensee shall be inspected and tested for construction defects, leakage, and contamination prior to use or transfer as a sealed source. If the inspection or test reveals any construction defects or 0.005 microcurie or greater of contamination, the source shall not be used or transferred as a sealed source until it has been repaired, decontaminated and retested.
- C. Each sealed source containing licensed material, other than hydrogen-3, with a half-life greater than 30 days and in any form other than gas shall be tested for leakage and/or contamination at intervals not to exceed 6 months except that each source designated for the purpose of emitting alpha particles shall be tested at intervals not to exceed 3 months.
- D. The test shall be capable of detecting the presence of 0.005 microcurie of radioactive material on the test sample. The test sample shall be taken from the sealed source or from the surfaces of the device in what the sealed source is permanently or semi-permanently mounted or stored on which one might expect contamination to accumulate. Records of leak test results shall be kept in units of microcuries and maintained for inspection by the Commission. Records may be disposed of following Commission inspection.

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Amendment No. 33

12. (Continued)

- E. If the test required by Subsection A. or C. of this condition reveals the presence of 0.005 microcurie or more of removable contamination, the licensee shall immediately withdraw the sealed source from use and shall cause it to be decontaminated and repaired or to be disposed of in accordance with Commission regulations. A report shall be filed within 5 days of the date the leak test result is known with the U.S. Nuclear Regulatory Commission, Region III, 801 Warrenville Road, Lisle, Illinois 60532-4351, ATTN: Chief, Nuclear Materials Safety Branch, describing the equipment involved, the test results, and the corrective action.

The licensee may transport licensed material in accordance with the provisions of 10 CFR Part 71, "Packaging and Transportation of Radioactive Material."

14. Inventory Requirements:

- A. An inventory system will be established that accounts for the receipt, movement, transfer and disposal of all radioactive material possessed under this license. Records of inventories will be maintained for 10 years from the date of each inventory.
- B. A complete examination of records will be completed every six months to confirm the location of all radioactive material and ensure that possession is within the limits specified in this license.
- C. A physical inventory of all radioactive material possessed under this license will be conducted on or before June 1, 1993. Thereafter, a physical inventory of all radioactive material possessed under this license will be completed within 60 months of the previous physical inventory.
15. The licensee's field service audits (as described in the ATC Medical Group Management Plan, revised April 1, 1989, and submitted with letter dated April 17, 1989) shall be performed unannounced by the Radiation Protection Officer (i.e., Radiation Safety Officer).
16. The licensee shall follow the recommend survey frequencies outlined in Regulatory Guide 8.21, Revision 1, October 1979, in work areas where radioactive materials are handled or used.
17. The licensee shall maintain records of information important to safe and effective decommissioning at 1020 London Road, Cleveland, Ohio per the provisions of 10 CFR 30.35(g) until this license is terminated by the Commission.

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Amendment No. 33

18. The licensee shall maintain and execute the response measure of their Emergency Plan dated October 25, 1991 and revised January 1992, May 27, 1992 and April 26, 1993. The licensee shall make no change in the emergency plan submitted pursuant to 10 CFR [30.32(i), 40.31(j), 70.22(i)] that would decrease the effectiveness of the plan without prior Commission approval. The licensee may make changes to its Emergency Plan without prior Commission approval if the changes do not decrease the effectiveness of the plan. The licensee shall maintain records of changes that are made to the plan without prior approval for a period of three years from the date of the changes and shall furnish the Chief, Medical, Academic, and Commercial Use Safety Branch, Division of Industrial and Medical Nuclear Safety, NMSS, U.S. Nuclear Regulatory Commission, Washington, DC 20555, and the appropriate NRC Regional Office specified in Appendix D of 10 CFR 20, a report, within six months after the change is made, containing a description of each change.
19. The licensee is authorized to begin the following activities no sooner than March 17, 1995, and must complete them within 90 days after March 17, 1995 in accordance with letters dated January 27, February 2, 10, and 14, and March 1, 3, 8, and 10, 1995, wherein the licensee proposed and clarified its plans and schedules for: (1) dealing with the accumulation of ground water in and around its facility basement; (2) immobilizing and/or remediating contamination that has collected in below ground sewer piping and manholes; and (3) processing future ground water that builds up around the facility. These plans and schedules address the following actions the licensee will take.
- A. Process water that is currently stored outside its facility in above-ground tanks.
- i. Tanked water will be processed in-situ using a submersible water treatment system that includes filtration and ion-exchange demineralization as described in letters dated March 1, 3, 8, and 10, 1995.
  - ii. Water will be treated until it contains no detectable non-soluble cobalt-60 and less than 200 pCi/l of soluble cobalt-60 as determined by a contract analytical laboratory. The treated water will subsequently be pumped to 25,000 gallon storage containers located in the facility warehouse, as described in letters dated March 3, 8 and 10, 1995.
- B. Simultaneously pump and process water currently residing in the sewer manhole and lateral, building sump pit and basement.
- i. Pumping will be sequenced as described in letter dated March 1, 1995, to ensure a positive hydrostatic pressure is maintained from outside to inside the facility's basement.
  - ii. Water in the sewer manhole, lateral, building sump pit, and basement will be pumped to a radiologically controlled area of the facility and processed using a skid mounted, multi-stage filtration and ion-exchange system as described in letters dated March 1, 3, 8 and 10, 1995. Spill procedures and radiological controls will be implemented as described in letter dated February 14, 1995, and Attachment 2 to letter dated March 1, 1995.

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Amendment No. 33

19. (Continued)

- iii. Water removed from the sewer manhole, lateral, building sump pit, and basement will be treated to contain no detectable non-soluble cobalt-60 and less than 200 pCi/l soluble cobalt-60 as determined by a contract analytical laboratory. The treated water will subsequently be pumped to 25,000 gallon storage containers located in the facility warehouse, as described in letters dated March 3, 8, and 10, 1995.
- C. Water sampling and analytical protocols will be as described in letter dated February 2, 1995, as clarified in letters dated February 14, and March 3, 1995. Solubility of cobalt-60 in samples containing detectable activity will be demonstrated in accordance with the reference in Supplement 2 to letter dated March 3, 1995. All solid radwaste generated from the water processing activities, including filter and demineralizer resin wastes, will be collected and stored at the London Road facility pending its ultimate disposal as radioactive waste.
- D. Excavate areas around the facility to allow: (i) access to the radioactively contaminated four-inch waste discharge line; and (ii) the radiological evaluation of the facility's underdrain system and surrounding soils.
- i. Excavate the soil in the vicinity of the building's four-inch waste discharge line and underdrains and disconnect these drains as described in letter dated March 1, 1995. Evaluate the radiological contamination status of the underdrain system and remediate or replace the system. Reconnect the underdrain system to the building sump pit and pump, test and process the underdrain system waters as described in letter dated March 1, 1995. The testing and processing of water pumped from the underdrain system will continue until sampling of the water consistently reveals no detectable non-soluble cobalt-60 and less than 200 pCi/l soluble cobalt-60.
- ii. Evaluate the radiological status of the soil in the vicinity of the underdrain system and building sump pit as described in the letter dated March 1, 1995.
- E. Immobilize the radioactive contamination present in the sewer manhole, lateral and four-inch discharge line.
- i. Completely grout-in the radioactively contaminated four-inch sewer discharge line and the manhole and lateral up to the sewer interceptor as described in "Issue 4" of letter dated January 27 and letter dated March 1, 1995. The grouting will render the existing sewer discharge piping system inoperable and immobilize (fix) the radioactive contamination that resides in the system.
- ii. Develop and implement a sub-surface radiological monitoring program to assess contamination migration as described in letter dated February 10, 1995. The program must be submitted in writing and approved by the NRC.

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License number

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030-16055/040-08764/030-17154

Amendment No. 33

- F. Remediate the London Road interceptor in the vicinity of the abandoned lateral, as described in letter dated January 27, 1995. The remediation activities will be coordinated with the Northeast Ohio Regional Sewer District.
20. 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 November 12, 1984;
- B. Letters dated November 12, 1984 (excluding Item 4), February 12, 1985, June 7, 1985 (excluding letter Item 4), September 6, 1985 (excluding change to Page 29 of ISP-1 manual);
- C. Letters dated May 29, 1986 (Response to Enclosure A, Significant Licensing Deficiencies of NRC letter dated March 7, 1986);
- D. Letter dated July 23, 1986 (Response to Enclosure B, Additional Licensing Issues for Renewal Applications of NRC letter dated March 7, 1986) excluding approval of the licensee's in-house training program;
- E. Letters dated August 22, 1986, October 28, 1986, November 13, 1986, November 14, 1986 and December 4, 1986 (with Revised ISP-1 Manual, Appendices A and B attached), May 7, 1987, August 3, 1987, December 31, 1987, January 15, 1988 (Item V only), August 15, 1988 (with attached course manual), September 29, 1988 (with attachments) and November 21, 1988; and
- F. Letters dated March 29, 1989 (except Section 3.4 "Hot Cell Entry and Action Levels"), April 7, 1989, August 25, 1989 (except Item B(4)), July 23, 1990 (except Sections 3.0 and 5.0 of ISP-14 procedure), March 1, 1991 (with attachments), March 27, 1991 (with attachments), May 9, 1991, May 14, 1991, February 27, 1992, February 28, 1992, March 2, 1992, and March 5, 1992.
- G. Letters dated April 16, 1992 (with enclosures), June 15, 1992 (with attachments), August 10, 1992, September 18, 1992, December 29, 1992 (with enclosures), January 20, 1993, March 30, 1993, March 31, 1994 (with enclosure), April 11, 1994, and September 21, 1994.

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Amendment No. 33

20. (Continued)

- H. Letters with attachments dated January 27, 1995, February 2, 10, and 14, 1995, and March 1, 3, 8, and 10, 1995.

Notwithstanding any reference to the specific activities in the above listed letters, the following activities are not addressed by this license.

- i. The evaporation of treated water or its discharge to the sanitary sewer system.
- ii. Installation of a composite sampler and flow gage.
- iii. Conventional disposal of excavated soils exhibiting cobalt-60 concentrations greater than 8 pCi/g.
- iv. Re-connection of the foundation underdrain system to the proposed new manhole and lateral.

- I. Letters dated May 3, 1995, and May 17, 1995.

FOR THE U.S. NUCLEAR REGULATORY COMMISSION

Date 5/18/95

By K. G. N. H.  
Materials Licensing Section, Region IV

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UNITED STATES  
NUCLEAR REGULATORY COMMISSION

REGION III  
801 WARRENVILLE ROAD  
LISLE, ILLINOIS 60532-4351

June 9, 1995

Advanced Medical Systems, Inc.  
ATTN: Mr. Robert Meschter  
Radiation Safety Officer  
1020 London Road  
Cleveland, OH 44110

Dear Mr. Meschter:

Enclosed is Amendment No. 34 to your NRC Material License No. 34-19089-01 in accordance with your request.

Please review the enclosed document carefully and be sure that you understand all conditions. If there are any errors or questions, please notify the U.S. Nuclear Regulatory Commission, Region III office so that we can provide appropriate corrections and answers.

License Condition Number 19.A.ii. and B.iii. has been amended to increase the release criterion for treated water into the storage bladders from 200 to 1000 pCi/l of water.

As requested in Item 1 of your June 6, 1995 letter, we have amended License Condition Number 19.A.ii. to authorize you to continue to pump water to the collapsible storage containers before you receive results on solubility tests conducted by the contract laboratory.

Finally, please be aware that because you are authorized to continue to pump treated water to the collapsible storage containers prior to receiving laboratory results on cobalt-60 concentrations, you risk the need to do further treatment of water that has been pumped to the containers.

Please be advised that your license expires at the end of the day, in the month, and year stated in the license. Unless your license has been terminated, you must conduct your program involving byproduct materials in accordance with the conditions of your NRC license, representations made in your license application, and NRC regulations. In particular, note that you must:

1. Operate in accordance with NRC regulations 10 CFR Part 19, "Notices, Instructions and Reports to Workers; Inspections," 10 CFR Part 20, "Standards for Protection Against Radiation," and other applicable regulations.

June 9, 1995

2. Notify NRC, in writing, within 30 days:
  - a. When Radiation Safety Officer permanently discontinues performance of duties under the license or has a name change; or
  - b. When the licensee's mailing address changes (no fee is required if the location of byproduct material remains the same).
3. In accordance with 10 CFR 30.36(b) and/or license condition, notify NRC, promptly, in writing, and request termination of the license when you decide to terminate all activities involving materials authorized under the license.
4. Request and obtain a license amendment before you:
  - a. Change Radiation Safety Officers;
  - b. Order byproduct material in excess of the amount, or radionuclide, or form different than authorized on the license;
  - c. Add or change the areas of use or address or addresses of use identified in the license application or on the license; or
  - d. Change ownership of your organization.
5. Submit a complete renewal application with proper fee or termination request at least 30 days before the expiration date of your license. You will receive a reminder notice approximately 90 days before the expiration date. Possession of byproduct material after your license expires is a violation of NRC regulations. A license will not normally be renewed, except on a case-by-case basis, in instances where licensed material has never been possessed or used.

In addition, please note that NRC Form 313 requires the applicant, by his/her signature, to verify that the applicant understands that all statements contained in the application are true and correct to the best of the applicant's knowledge. The signatory for the application should be the licensee or certifying official rather than a consultant.

You will be periodically inspected by NRC. Failure to conduct your program in accordance with NRC regulations, license conditions, and representations made in your license application and supplemental correspondence with NRC will result in enforcement action against you. This could include issuance of a notice of violation, or imposition of a civil penalty, or an order suspending, modifying or revoking your license as specified in the General Policy and Procedures for NRC Enforcement Actions, 10 CFR Part 2, Appendix C. Since serious consequences to employees and the public can result from failure to

June 9, 1995

comply with NRC requirements, prompt and vigorous enforcement action will be taken when dealing with licensees who do not achieve the necessary meticulous attention to detail and the high standard of compliance which NRC expects of its licensees.

Sincerely,



Kevin G. Null  
Nuclear Materials Licensing Section

License No.: 34-19089-01  
Docket Nos.: 030-16055/040-09864/  
030-17154

Enclosure: Amendment No. 34

## MATERIALS LICENSE

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, 36, 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.

<b>Licensee</b>  1. Advanced Medical Systems, Inc.  2. 1020 London Road Cleveland, OH 44110	<b>In accordance with letter dated June 6, 1995,</b> 3. License Number 34-19089-01 is amended in its entirety to read as follows:  4. Expiration Date December 31, 1994  5. Docket or Reference No. 030-16055/040-08764/030-17154
--	--

**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. Cobalt-60

B. Cobalt-60

C. Cesium-137

D. Depleted Uranium

E. Cobalt-60

A. Solid Metal

B. Sealed sources  
(teletherapy/  
radiography sealed  
sources which have  
been evaluated and  
approved for  
commercial  
distribution by the  
NRC or an Agreement  
State)C. Sealed sources  
(teletherapy/  
radiography sealed  
sources which have  
been evaluated and  
approved for  
commercial  
distribution by the  
NRC or an Agreement  
State)

D. Nickel Plated

E. Sealed Sources

A. 150,000 curies

B. 135,000 curies  
(no single source  
to exceed 13,700  
curies)C. 40,000 curies (no  
single source to  
exceed 2,200  
curies)

D. 4,040 kilograms

E. 15,000 curies

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- |   |   |  |
|---|---|--|
| 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 |
| F. Cobalt-60  | F. Sealed Sources (any sealed source approved by the NRC or an Agreement State) | F. 15 millicuries  |

9. Authorized Use:

- A. For storage only incident to waste disposal or transfer to an authorized recipient. This license does not authorize the manufacture of sealed sources.
- B. For installation, maintenance of, dismantling and servicing of Picker Corporation and Advanced Medical Systems, Inc. teletherapy units and Picker Model 6145 radiography units possessed by licensees authorized to possess the radioactive material pursuant to a specific license issued by the Commission or an Agreement State. For installation and removal of sealed sources into Picker Corporation, Advanced Medical Systems, Inc. and Keleket Barnes teletherapy units of licensees authorized to possess the radioactive material pursuant to a specific license issued by the Commission or an Agreement State. For training Hospital or Clinic personnel for in-house service operations on teletherapy equipment, on unit model per course, in accordance with letter dated August 15, 1988 and September 29, 1988.
- C. For installation, maintenance, dismantling and servicing of Picker Corporation and Advanced Medical Systems radiography and teletherapy units of licensees authorized to possess the radioactive material pursuant to a specific license issued by the Commission or an Agreement State.
- D. Shielding material in Picker Corporation and Advanced Medical System, Inc., radiography and teletherapy devices.
- E. For storage only, those non-NRC approved sources in the possession of the licensee prior to the issuance of this amendment.
- F. For use in devices (including Tech OP Model 571 Calibrator described in application dated November 12, 1984) approved by the Nuclear Regulatory Commission or an Agreement State to calibrate radiation survey instruments.

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CONDITIONS

10. Licensed material in Items 6.A., 6.E. and 6.F. shall be used only at the licensee's facility at 1020 London Road, Cleveland, Ohio. Licensed material in Items 6.B. and 6.C. shall be used only at 1020 London Road, Cleveland, Ohio and at facilities of customers who possess a specific license from the NRC authorizing possession of the licensed material. Licensed material in Item 6.D. shall be used only at the licensee's facilities at 1020 London Road, Cleveland, Ohio or 121 North Eagle Street, Geneva, Ohio, and at facilities of customers who possess a specific license from the NRC authorizing possession of the licensed material.

11. A. The Radiation Protection Officer for service operations described in Subitems 9.B. and 9.C. and routine health physics activities is Robert Meschter.

The licensee shall not perform service operations described in Subitems 9.B. and 9.C. until Robert Meschter has completed the required training.

- B. Licensed material shall be used by, or under the supervision of and in the physical presence of users listed in the table below. The users are only authorized to perform the indicated services on the teletherapy or radiography units specified in the table below:

AMS/PICKER TELETHERAPY/RADIOGRAPHY UNITS MODELS

	CS 600	C 1000	C 2000	C 3000	C 5000	C 10,000	C4	C8	C9	C12	Cyclops
USER											
Curtis Perry				3	1,2	1,2	1,2	1,2	1,2		1,2
Haddock	5	5	5	5	5	5	5	5	5	5	5

AMS/PICKER TELETHERAPY/RADIOGRAPHY UNITS MODELS

	V 1000	V 2000	V 3000	V 10,000	C V4	C V9					
USER											
Curtis Perry		1,2	1,2	1,2	1,2	1,2					
Haddock	5	5	5	5	5	5					



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## 11. (Continued)

1. Authorizes the servicing of AMS/Picker units, excluding source exchange.
  2. Authorizes sealed source exchange.
  3. Authorizes removal of unit and head from customer sites only.
  4. Authorizes the training of AMS personnel in the manufacture of AMS/Picker sealed sources.
  5. Authorizes the handling of sealed sources only.
12. A. (1) Each sealed source acquired from another person and containing licensed material, other than hydrogen-3, with a half-life greater than 30 days and in any form other than gas shall be tested for contamination and/or leakage before use. In the absence of a certificate from a transfer or indicating that a test has been made within 6 months before the transfer, a sealed source received from another person shall not be put into use until tested.
- (2) Notwithstanding the periodic leak test required by this condition, any licensed sealed source is exempt from such leak tests when the source contains 100 microcuries or less of beta and/or gamma emitting materials or 10 microcuries or less of alpha emitting material.
- (3) Except for alpha sources, the periodic leak test required by this condition does not apply to sealed sources that are stored and not being used. The sources excepted from this test shall be tested for leakage before any use or transfer to another person unless they have been leak tested within 6 months before the date of use or transfer.
- B. Each sealed source fabricated by the licensee shall be inspected and tested for construction defects, leakage, and contamination prior to use or transfer as a sealed source. If the inspection or test reveals any construction defects or 0.005 microcurie or greater of contamination, the source shall not be used or transferred as a sealed source until it has been repaired, decontaminated and retested.
- C. Each sealed source containing licensed material, other than hydrogen-3, with a half-life greater than 30 days and in any form other than gas shall be tested for leakage and/or contamination at intervals not to exceed 6 months except that each source designated for the purpose of emitting alpha particles shall be tested at intervals not to exceed 3 months.
- D. The test shall be capable of detecting the presence of 0.005 microcurie of radioactive material on the test sample. The test sample shall be taken from the sealed source or from the surfaces of the device in what the sealed source is permanently or semi-permanently mounted or stored on which one might expect contamination to accumulate. Records of leak test results shall be kept in units of microcuries and maintained for inspection by the Commission. Records may be disposed of following Commission inspection.

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12. (Continued)

- E. If the test required by Subsection A. or C. of this condition reveals the presence of 0.005 microcurie or more of removable contamination, the licensee shall immediately withdraw the sealed source from use and shall cause it to be decontaminated and repaired or to be disposed of in accordance with Commission regulations. A report shall be filed within 5 days of the date the leak test result is known with the U.S. Nuclear Regulatory Commission, Region III, 801 Warrenville Road, Lisle, Illinois 60532-4351, ATTN: Chief, Nuclear Materials Safety Branch, describing the equipment involved, the test results, and the corrective action.

The licensee may transport licensed material in accordance with the provisions of 10 CFR Part 71, "Packaging and Transportation of Radioactive Material."

14. Inventory Requirements:

- A. An inventory system will be established that accounts for the receipt, movement, transfer and disposal of all radioactive material possessed under this license. Records of inventories will be maintained for 10 years from the date of each inventory.
- B. A complete examination of records will be completed every six months to confirm the location of all radioactive material and ensure that possession is within the limits specified in this license.
- C. A physical inventory of all radioactive material possessed under this license will be conducted on or before June 1, 1993. Thereafter, a physical inventory of all radioactive material possessed under this license will be completed within 60 months of the previous physical inventory.

15. The licensee's field service audits (as described in the ATC Medical Group Management Plan, revised April 1, 1989, and submitted with letter dated April 17, 1989) shall be performed unannounced by the Radiation Protection Officer (i.e., Radiation Safety Officer).
16. The licensee shall follow the recommended survey frequencies outlined in Regulatory Guide 8.21, Revision 1, October 1979, in work areas where radioactive materials are handled or used.
17. The licensee shall maintain records of information important to safe and effective decommissioning at 1020 London Road, Cleveland, Ohio per the provisions of 10 CFR 30.35(g) until this license is terminated by the Commission.

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18. The licensee shall maintain and execute the response measure of their Emergency Plan dated October 25, 1991 and revised January 1992, May 27, 1992 and April 26, 1993. The licensee shall make no change in the emergency plan submitted pursuant to 10 CFR [30.32(i), 40.31(j), 70.22(i)] that would decrease the effectiveness of the plan without prior Commission approval. The licensee may make changes to its Emergency Plan without prior Commission approval if the changes do not decrease the effectiveness of the plan. The licensee shall maintain records of changes that are made to the plan without prior approval for a period of three years from the date of the changes and shall furnish the Chief, Medical, Academic, and Commercial Use Safety Branch, Division of Industrial and Medical Nuclear Safety, NMSS, U.S. Nuclear Regulatory Commission, Washington, DC 20555, and the appropriate NRC Regional Office specified in Appendix D of 10 CFR 20, a report, within six months after the change is made, containing a description of each change.
19. The licensee is authorized to begin the following activities no sooner than March 17, 1995, and must complete them within 90 days after March 17, 1995 in accordance with letters dated January 27, February 2, 10, and 14, and March 1, 3, 8, and 10, 1995, wherein the licensee proposed and clarified its plans and schedules for: (1) dealing with the accumulation of ground water in and around its facility basement; (2) immobilizing and/or remediating contamination that has collected in below ground sewer piping and manholes; and (3) processing future ground water that builds up around the facility. These plans and schedules address the following actions the licensee will take.
- A. Process water that is currently stored outside its facility in above-ground tanks.
- Tanked water will be processed in-situ using a submersible water treatment system that includes filtration and ion-exchange demineralization as described in letters dated March 1, 3, 8, and 10, 1995.
  - Water will be treated until it contains no detectable non-soluble cobalt-60 and less than 1000 pCi/l of soluble cobalt-60 as determined by a contract analytical laboratory. The licensee may continue to pump treated water to the collapsible storage containers prior to receiving results of solubility tests from the contract laboratory. The treated water will subsequently be pumped to 25,000 gallon storage containers located in the facility warehouse, as described in letters dated March 3, 8 and 10, 1995.
- B. Simultaneously pump and process water currently residing in the sewer manhole and lateral, building sump pit and basement.
- Pumping will be sequenced as described in letter dated March 1, 1995, to ensure a positive hydrostatic pressure is maintained from outside to inside the facility's basement.

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19. (Continued)

- ii. Water in the sewer manhole, lateral, building sump pit, and basement will be pumped to a radiologically controlled area of the facility and processed using a skid mounted, multi-stage filtration and ion-exchange system as described in letters dated March 1, 3, 8 and 10, 1995. Spill procedures and radiological controls will be implemented as described in letter dated February 14, 1995, and Attachment 2 to letter dated March 1, 1995.
- iii. Water removed from the sewer manhole, lateral, building sump pit, and basement will be treated to contain no detectable non-soluble cobalt-60 and less than 1000 pCi/l soluble cobalt-60 as determined by a contract analytical laboratory. The licensee may continue to pump treated water to the collapsible storage containers prior to receiving results of solubility tests from the contract laboratory. The treated water will subsequently be pumped to 25,000 gallon storage containers located in the facility warehouse, as described in letters dated March 3, 8, and 10, 1995.
- C. Water sampling and analytical protocols will be as described in letter dated February 2, 1995, as clarified in letters dated February 14, and March 3, 1995. Solubility of cobalt-60 in samples containing detectable activity will be demonstrated in accordance with the reference in Supplement 2 to letter dated March 3, 1995. All solid radwaste generated from the water processing activities, including filter and demineralizer resin wastes, will be collected and stored at the London Road facility pending its ultimate disposal as radioactive waste.
- D. Excavate areas around the facility to allow: (i) access to the radioactively contaminated four-inch waste discharge line; and (ii) the radiological evaluation of the facility's underdrain system and surrounding soils.
  - i. Excavate the soil in the vicinity of the building's four-inch waste discharge line and underdrains and disconnect these drains as described in letter dated March 1, 1995. Evaluate the radiological contamination status of the underdrain system and remediate or replace the system. Reconnect the underdrain system to the building sump pit and pump, test and process the underdrain system waters as described in letter dated March 1, 1995. The testing and processing of water pumped from the underdrain system will continue until sampling of the water consistently reveals no detectable non-soluble cobalt-60 and less than 200 pCi/l soluble cobalt-60.
  - ii. Evaluate the radiological status of the soil in the vicinity of the underdrain system and building sump pit as described in the letter dated March 1, 1995.

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- E. Immobilize the radioactive contamination present in the sewer manhole, lateral and four-inch discharge line.
- i. Completely grout-in the radioactively contaminated four-inch sewer discharge line and the manhole and lateral up to the sewer interceptor as described in "Issue 4" of letter dated January 27 and letter dated March 1, 1995. The grouting will render the existing sewer discharge piping system inoperable and immobilize (fix) the radioactive contamination that resides in the system.
- ii. Develop and implement a sub-surface radiological monitoring program to assess contamination migration as described in letter dated February 10, 1995. The program must be submitted in writing and approved by the NRC.
- F. Remediate the London Road interceptor in the vicinity of the abandoned lateral, as described in letter dated January 27, 1995. The remediation activities will be coordinated with the Northeast Ohio Regional Sewer District.
20. 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 November 12, 1984;
- B. Letters dated November 12, 1984 (excluding Item 4), February 12, 1985, June 7, 1985 (excluding letter Item 4), September 6, 1985 (excluding change to Page 29 of ISP-1 manual);
- C. Letters dated May 29, 1986 (Response to Enclosure A, Significant Licensing Deficiencies of NRC letter dated March 7, 1986);
- D. Letter dated July 23, 1986 (Response to Enclosure B, Additional Licensing Issues for Renewal Applications of NRC letter dated March 7, 1986) excluding approval of the licensee's in-house training program;
- E. Letters dated August 22, 1986, October 28, 1986, November 13, 1986, November 14, 1986 and December 4, 1986 (with Revised ISP-1 Manual, Appendices A and B attached), May 7, 1987, August 3, 1987, December 31, 1987, January 15, 1988 (Item V only), August 15, 1988 (with attached course manual), September 29, 1988 (with attachments) and November 21, 1988; and
- F. Letters dated March 29, 1989 (except Section 3.4 "Hot Cell Entry and Action Levels"), April 7, 1989, August 25, 1989 (except Item B(4)), July 23, 1990 (except Sections 3.0 and 5.0 of ISP-14 procedure), March 1, 1991 (with attachments), March 27, 1991 (with attachments), May 9, 1991, May 14, 1991, February 27, 1992, February 28, 1992, March 2, 1992, and March 5, 1992.

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- G. Letters dated April 16, 1992 (with enclosures), June 15, 1992 (with attachments), August 10, 1992, September 18, 1992, December 29, 1992 (with enclosures), January 20, 1993, March 30, 1993, March 31, 1994 (with enclosure), April 11, 1994, and September 21, 1994.
- H. Letters with attachments dated January 27, 1995, February 2, 10, and 14, 1995, and March 1, 3, 8, and 10, 1995.

Notwithstanding any reference to the specific activities in the above listed letters, the following activities are not addressed by this license.

- i. The evaporation of treated water or its discharge to the sanitary sewer system.
  - ii. Installation of a composite sampler and flow gage.
  - iii. Conventional disposal of excavated soils exhibiting cobalt-60 concentrations greater than 8 pCi/g.
  - iv. Re-connection of the foundation underdrain system to the proposed new manhole and lateral.
- I. Letters dated May 3, 1995, May 17, 1995 and June 6, 1995 (excluding Item 3).

FOR THE U.S. NUCLEAR REGULATORY COMMISSION

Date

6/9/95

By

*L.R. Mad...*  
Materials Licensing Section, Region III

# Advanced Medical Systems, Inc.

121 North Eagle Street • Geneva, Ohio 44041  
(216) 466-4671 FAX (216) 466-0186

June 16, 1995

Mr. John Madera  
Chief-Nuclear Materials Licensing Section  
U.S. Nuclear Regulatory Commission  
Region III  
801 Warrenville Road  
Lisle, IL 60532-4351

RE: License No. 34-19089-01  
Control No. 97891

Dear John:

In response to your letter dated April 17, 1995 in which you request additional information for renewal of License No. 34-19089-01, the following are our responses:

- I.A. The Radiation Safety Officer, by having a mandatory position on the Management Team, is a critical part of Senior Management. As such, he has direct access to not only other senior managers, but also to the President and/or Treasurer of the Company.
- I.B. Both the Safety and Isotope Committees take minutes of their meetings. These minutes are put in writing and contain any findings, concerns or issues, etc. that the committees feel affect the company. Copies of these minutes are distributed to Senior Management including the President and Treasurer of Advanced Medical Systems. The President of Advanced Medical Systems is kept apprised of the ongoing operations through the minutes not only of the Safety and Isotope Committees, but also the Management Team. The President and Treasurer may, from time to time, elect to talk directly to the committee or its individual members on those issues which he feels requires his direct involvement. All members of the Safety and Isotope Committees and Management Team are made aware that they have direct access to the President and/or Treasurer of the company.

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REGION III

June 16, 1995

- I.C. The duties of the Safety Committee involve those issues which relate to the unit and service performed on that unit. The Safety Committee does not involve any issues which affect the Isotope Committee except those safety issues which involve the source operation within the unit. The Isotope Committee duties and responsibilities involve every issue that pertains to radioactive materials including radiation safety and possession of nuclear materials. The Isotope Committee has the primary responsibility for complying with our NRC Materials License.
- I.D. Advanced Medical Systems confirms that records of Safety and Isotope Committee meetings will be maintained. The minutes will include at a minimum the date of the meeting, list of attendees, all topics discussed, any problems identified and corrective actions taken or planned. In addition, minutes of the previous meeting will be reviewed to insure action is being taken on those items that warrant it.
- I.E. Your understanding is correct that the AMS Engineering Manager will make the determination whether a licensed AMS staff person will respond to a request for teletherapy unit service or if the service will be subcontracted. The primary criteria for determining whether AMS will service the call with in-house personnel or subcontract the service is whether AMS has people available. Currently, AMS does not have any employees available to perform licensed service work on teletherapy units. Accordingly, all service work, both domestic and international, is being subcontracted to a licensed third party. When AMS has licensed personnel, the primary criteria will be availability to perform the requested service; the second criteria would be cost. Advanced Medical Systems' internal operations take precedent over the dispatching of licensed staff personnel. Advanced Medical Systems' current Engineering Manager is Ed Svigel. His primary responsibility relates to the production of the teletherapy unit. Mr. Svigel has in-depth knowledge of the unit's construction, operation and characteristics. He has held his position since his date of hire. Mr. Svigel's qualifications are listed in Table 1 of the AMS Training Manual (Notebook 3 of 3). Mr. Svigel is qualified to make technical judgments relating to the ability of AMS personnel to service the unit. The Radiation Safety Officer is also involved in any service work which involved AMS personnel as it is his responsibility they have received the appropriate radiation safety training.



- II. Your understanding is correct that service performed by AMS staff personnel is limited to Class I or II service engineers. Furthermore, it is correct that AMS currently does not have on staff a licensed Class I or Class II service engineer. We are very well aware of the fact that we cannot provide service until qualified personnel have been trained and their qualifications submitted to the NRC and our license amended.

II.A.1

The scope of a field service audit as it relates to radiological safety includes the proper use of dosimetry, the possession and use of survey equipment, and adherence to procedures. The fact that the RSO is qualified and approved by the NRC and named on the license to be the facility RSO as it relates to radiation safety is ample qualification to conduct field service audits as it relates to radiation safety. The RSO is knowledgeable with regard to the source exchange process and equipment used for the source exchange.

II.A.2

Over the last several years, Advanced Medical Systems has preferred to subcontract field service work. Though AMS does not currently have licensed personnel to perform service, in the future the company may have licensed service personnel and the amount of service work being performed by its employees may be limited. Advanced Medical Systems should have the option that the field service audit be conducted during a simulated service call. This option is necessary as a situation may arise in which a licensed staff person may not have an opportunity to perform an actual service call on an annual basis.

II.A.3

This is to confirm that service records will be maintained for NRC inspection. The records will contain at a minimum the service engineer who performed the work, any AMS supporting personnel who accompanied him, the equipment serviced, the date and type of service performed, the problem identified, and the corrective action performed on the unit. This commitment of maintaining records for NRC inspection also pertains to records of all field service audits.

- II.B AMS will take under advisement your recommendation to establish a program for auditing the activities of the RSO and his staff. The Isotope Committee currently oversees the RSO's performance.

## III.A

The following is the basis for the application request for possession of 40 curies of Cobalt-60 in the form of waste:

<u>ITEM</u>	<u>FORM</u>	<u>MATERIAL DESCRIPTION</u>	<u>ESTIMATED ACTIVITY (Ci)</u>
Packaged Waste	Solid	Materials contained in high-level waste storage, LSA boxes and drums in the basement of the facility.	29
Surface Contamination	Solid	Uncharacterized surface activity in the restricted areas of the facility.	11

Since this licensing action requested in the application addresses possession/storage/use rather than decommissioning, the total quantity of residual radioactive materials at the facility has not been fully characterized. However, the AMS conceptual decommissioning plan indicates that up to 11 Ci of solid waste may be generated during decommissioning and decontamination activities.

AMS concurs that the radioactivity that currently exists in the WHUT Room should be included in the possession limit. Therefore, the application will be modified to include the quantity of Cobalt-60 that currently exists in the WHUT Room, based upon an analysis of the data provided in the SEG "Waste Holdup Tank Room Survey", May, 1995:

<u>ITEM</u>	<u>FORM</u>	<u>MATERIAL DESCRIPTION</u>	<u>ESTIMATED ACTIVITY (Ci)</u>
Packaged Waste	Solid	Materials contained in high-level waste storage, LSA boxes and drums in the basement of the facility.	29
Packaged Waste	Solid	Solid waste generated during the water treatment project.	80
Unpackaged Waste	Solid/Sludge	Materials contained in the WHUT Room.	40
Surface Contamination	Solid	Uncharacterized surface activity in the restricted area of the facility.	11
TOTAL			160

III.B

The possession limits requested in Item 5, Section I.I of our application does include the suspected inventory in the Hot Cell front storage plug. Accordingly, we do not have to amend our licensed possession units at this time nor our Decommissioning Funding Plan cost estimate.

III.C

The 60-month cycle for a physical inventory is currently justified as 1) the inventory is a three to four month evolution, 2) few sources are being sold from the current inventory, and 3) there is little if any turnover or movement of sources currently anticipated. Additionally, if any sources are moved for any reason, the location is reflected on a current inventory listing which includes the source location and other pertinent data. This inventory listing is maintained on a PC spreadsheet for ease of data entry and revision and is revised at the time of source movement.

III.D

Section I.2 of the application discusses purposes for which the licensed material will be used. Advanced Medical Systems had agreements with third parties to accept transfer of the majority of our Cobalt-60 sealed source inventory. This program has been delayed due to various events at our facility. We have not had any recent contact with these third parties and will not have any contact until we are in a position to begin source transfers. We estimated that it would take approximately twelve (12) months to complete these source transfers from the date of the first shipment. Due to ongoing events at the facility, preparing milestone dates, is not appropriate at this time. The primary purpose of the materials license for Advanced Medical Systems at this time is to possess Cobalt-60. For the purpose of license renewal, the disposition of this material as storage incident to disposal or transfer to a licensed third party is sufficient.

III.E "Devices" means fixed radiation monitor with built-in "check sources" of less than 10 microcuries Cs-137 each and a pocket dosimeter calibrator with less than 10 microcuries of Cs-137. The 665 curies is listed in the license renewal to cover the possible existence of a Cs-137 teletherapy source that may be in the front cell plug which is stuck and pending removal. This unknown regarding this teletherapy source is due to a possible discrepancy in a prior physical inventory.

- IV. The training status of Mr. Reed is irrelevant to this license renewal application and should have no bearing on the issue. Isotope Technicians do not appear on the license by name or by duties as do Isotope Handlers. Accordingly, Mr. Reed's Isotope qualifications will not be submitted to the NRC. When and if Mr. Reed completes the qualifications for Isotope Handler, the documentation will be submitted as required. Mr. Reed's Isotope Technician training records are maintained at the facility and are available for review.
- V.A. Instructions to Ancillary Personnel, ISP-28, is intended to provide basic radiation safety knowledge to part time or temporary personnel. It could be viewed as the AMS equivalent to nuclear power plant General Employee Training (GET) and Radiological Controls Training (RCT). The intent of this training is not to produce highly qualified health physics technicians, isotope technicians, or isotope handlers. Also, ancillary personnel are further trained and limited in their activities by the RWP process. Since the nature of the ancillary personnel training is so fundamental, it is felt that any experienced or qualified permanent AMS isotope technician, or isotope handler can be designated when appropriate or as needed to provide this training. The use of a "designee" is common practice throughout the nuclear industry and is used to allow for uninterrupted activities during the absence of a responsible individual, in this case the RSO.
- Item 2.5 does not state that "ancillary personnel may be tested on their comprehension". It states that they may be asked general questions relating to the training to determine their overall comprehension. The purpose of this item is to provide for a mechanism to weed out individuals who are felt to be intellectually incapable of working in a radiological environment. Should this rare condition present itself, it would be documented on the training form under "comments". Due to the nature, purpose, and level of training discussed above, it is not necessary to make a "formal production" of this concern.
- V.B. The typo in "routing" will be changed to "routine". Corrected ISP-31 is enclosed (Attachment A).

Item 4.2 is clear as written as to who conducts the training and their qualifications.

A copy of the test with answers is included for Isotope Technician (Attachment B).

Dosimetry training is covered in ISPs which are covered in the Basic Radiation Safety Training.

- V.C A copy of the test with answers for Isotope Handler is included (Attachment C).

An Isotope Handler must first be an Isotope Technician. Emergency Plan Training is covered in ISP-31 (See Attachment A).

An Isotope Handler must first be an Isotope Technician. Dosimetry training is covered in ISPs which are covered in Basic Radiation Safety Training.

Section 4.3 of ISP-32, Isotope Handler Training Program, specifies who trains an Isotope Handler. The current licensed handler is already on the AMS license. Steve Haddock's qualifications were submitted when originally licensed and were submitted with the license renewal. A third submittal should not be necessary.

- V.D The company will update the basic Radiation Training Manual to reflect current operating conditions. This update will be completed by January 1, 1996. The company has retained a third party to assist in the update.
- VI.A The hot cell will be used to load sources into shipping casks when appropriate, inspect sources when appropriate, or any activity related to source handling that can only be accomplished by using the hot cell.
- VI.B&C
- See USNRC Inspection Report No. 030-16055/93002(DRSS) (Attachment D) prepared by W. Slawinski, NRC Inspector, et al April, May 1993. The facility ventilation system has been reviewed in extreme detail and documented in the referenced report. The only change made to the system since this report is a reduction of the set point that shuts the system down to prevent a release to the environment. The current set point is 500 cpm over a current background of 500 cpm. This set point is orders of magnitude lower than previous acceptable set points.
- The only credible potential point of airborne release from the facility is through the described and NRC inspected system.
- VI.D The source garden is the storage location for sources that are not in the cell nor in a head or source exchange container. Procedures include ISP-18, Source Installation and Exchange Procedures Using Catalog 3320/3320AR Loading and Exchange Containers at Authorized Third Party Facilities; IS-27, Source Transfer Out of Hot Cell and Source Calibration; and ISP-29, Radiation Work Permits. Additionally, sources are moved only by the licensed Isotope Handler. The NRC currently has the pertinent details on this individual.

- VI.E. The "mounted" gamma alarms are response checked monthly in accordance with ISP-6, Monthly Check List. This response check involves the use of a "beam" calibrated check source. The source is decay corrected and the required distance to place the source to achieve the desired dose rate alarm point is calculated using industry standard calculations (performed on a computer). The calculations are printed out and attached to the checklist. Since these gamma monitors are used for indication of a possible situation only and are not used in any way to calculate official whole body exposure, a "calibration" methodology beyond this scope is not necessary.
- VII. The need to revise and modify procedures as required without license amendment is essential to maintaining proper and adequate control of the facility and programs in a timely and efficient manner. This flexibility allows for immediate inclusion of revised regulations into the procedures, deleting obsolete methods and incorrect techniques, upgrading or enhancing procedures to effect improved performance, allow for editorial changes to improve user comprehension, and add new procedures in a timely manner as appropriate.

Currently, hundreds of other licensees revise and change procedures to meet the changing scope of regulations, work environment, and technology without being required to submit a license amendment. AMS will generate a procedure to prepare, revise, delete, review and approve procedures and will include the Isotope Committee in the review and approval cycle for procedure changes.

VII.A.1

The Victoreen Model 550 is used in the hot cell for relative dose rate indicating purposes only. AMS is aware that the unit is out of calibration, hence the use of the term "or equivalent" on page 31, item C.2. Because of this knowledge, the unit would never be used for official dose rate survey purposes. Only calibrated dose rate meters such as a Teletector or Eberline PIC-6 ion chamber are used to set dose rates and calculate stay times. Past cell entries and surveys with a Teletector have shown close agreement with the Victoreen Model 550 measured dose rates; therefore, AMS is confident in the use of the Victoreen Model 550 as an "information only" device. Should the Victoreen cable, probe, electronics fail at some point in the future, the unit will be replaced or an alternative and appropriate method for accomplishing cell dose rates will be established at that time.

Electric wiring in the cell will be replaced when needed. Should the lighting fail, temporary lighting may and will be substituted as appropriate until permanent repairs are made. In keeping with the ALARA concept of exposure control, it is not considered appropriate to receive exposure to verify that "all is well" with the wiring.

VII.A.2.a

Self reading pocket dosimeters are calibrated in accordance with ISP-23, Calibration of Portable Radiation Detection Instruments, section 3.2. This procedure was submitted with the license renewal application.

VII.A.2.b

Adding the statement "per 10CFR20.1502(a)(3)" is not necessary as radiation areas and high radiation areas at AMS are included in the category of "restricted" areas. Our dosimetry requirements are more restrictive than 10CFR20.

VII.A.2.c

Clarification of the obvious need not be addressed in this section. ISP-28, Instructions to Ancillary Personnel covers workers responsibilities as well as AMS responsibilities for monitoring and reporting worker exposure to workers.

VII.A.2.d

AMS dosimetry service is currently (and has been since Sept., 1985) provided by Landauer, Inc., 2 Science Rd, Glenwood, IL 60425-1586. A copy of their accreditation is included with this response (Attachment E).

VII.A.2.e

Units will be incorporated into the formula. Whole Body Count criteria will be included. Reference to Regulatory Guide 8.9 will be included. See Attachment F, revised Page 28.

VII.A.2.f

In order to maintain the flexibility to effect safe operations of the facility, it is necessary to provide for the exceptional occurrence that the hot cell may need to be entered in the absence of the RSO. This section clearly defines the requirements that need to be met should a cell entry in the RSO's absence be needed. It is not anticipated that this situation will ever come to pass; however, this contingency needs to be available if ever needed.

Mr. John Madera

June 16, 1995

Reference to ISP-11 has been corrected. See Attachment G, revised Page 31.

VII.A.2.g

Item D.1.f. on page 32 "Check source inventory" means inventory the Check sources. These are small sealed sources used for instrument checks etc. AMS employees understand what this item means.

VII.A.2.h

It is assumed that your reference to "section III.D of this letter" really means section III.C which discusses inventory. Section III.D discusses inventory reduction issues separate from the inventory cycle. Page 33 of ISP-1 currently reflects our response to item III.C.

VII.A.2.i

ISP-2, Area Survey Procedure, will be changed to include a hot cell survey requirement. See Attachment H, revised ISP-2.

VII.A.3.a

Personnel frisking is addressed on page 42 under the section "Personnel Monitoring" item F. Frisking is required upon exit of a contaminated area - defined elsewhere as greater than 1000 dpm/100 cm . (your comment is missing the value of 100 and is assumed to be a typo)

The use of protective clothing is specified and addressed in the RWP process. Specification and use of dosimetry is addressed in Personnel Exposure Monitoring, Page 26, and in the RWP process.

We do not wear protective clothing in "potentially" contaminated areas. This facility, as any other including nuclear power plants, has clean or uncontaminated areas and contaminated areas. All areas of this or any like facility have the potential to become a contaminated area although the probability is very slight. If an area becomes contaminated, protective clothing is used in that area until it is decontaminated and released as clean. This is industry standard practice.

VII.A.3.b

The "as soon as possible" notification of the RSO will be included. See Attachment I.



VII.A.4

It should be noted that ISP-1 is a general overview of the AMS facility and operations and is not intended to be an all encompassing to the last absolute detail description of the facility. AMS feels that the current description regarding storage, postings and security is adequate as written. To further detail security items and measures could lead to a compromise of the building security should this detail become available to unauthorized individuals. USNRC inspection personnel such as W. Slawinski, M. Weber, et al, are intimately familiar with the details regarding this issue and have conducted past inspections with no discrepancies noted.

VII.A.5

The reference to research and development has been deleted (Attachment J).

VII.A.6

Given the sensitivity of a count rate meter with G-M pancake probe and considering the typical background for frisking (200 cpm nominal, possibly up to 300 cpm) and factoring in normal meter fluctuation of 100 cpm, the specified limit of 100 cpm above background equates to saying that the contamination limit is "none detected above background". In other words, 100 cpm above background represents the lower limit of detection for the instrument and evaluation situation. Since we are dealing with an imprecise measurement to begin with, certain latitudes of judgment must be allowed. It is also an industry standard practice to state personnel contamination limits in the manner specified in this section when using the described instrument.

To make a blanket all encompassing statement that decontamination will be performed until levels reach background is not considered to be appropriate or desirable. Decontamination efforts beyond three cleanings may result in the degradation of the skin and result in aggravating the contamination situation or lead to an internal deposition through abraded skin. Severe cases of contamination may require medical attention prior to subsequent decontamination attempts and would be dealt with on a case by case basis. Therefore, AMS will subscribe to industry standard and acceptable practices such as those outlined in "The Health Physics and Radiological Health Handbook" revised edition 1992, Bernard Shleien, or other credible source of guidance (also see Reg. Guides 8.21, 8.23, 8.24, 8.30).

## VII.B

## Response to "General Comments":

The procedures submitted with the license renewal were revised versions of the "old" I.S. Procedures (ISPs). The primary focus of the revisions was to bring the procedures into compliance with the "new" 10CFR20, eliminate obsolete and incorrect practices, and improve the workability and "user friendliness" aspects of the procedures. Every attempt was made to use the word "shall" to denote those items that reflect regulatory compliance requirements. In those areas that did not require regulatory compliance, the word "should" was used to allow for flexibility of interpretation based on the working situation at hand. Not all phases of operation at this facility (or others) are absolute thereby requiring inflexible and rigid procedures. It should be noted that the regulations cited in 10CFR20 allow for flexibility in procedural approach and decision making (see 10CFR20.1204). AMS procedures are dynamic (not static) in nature and are subject to change as appropriate; therefore, changing "shalls & shoulds" will be made when appropriate in the best judgment of the RSO, Isotope Committee, and when required by regulations. If our submitted procedures have failed to specify a "shall" regarding regulatory compliance, it is due to an unintentional oversight and will be corrected in subsequent reviews or upon specific identification in the NRC inspection process. AMS does not have to defend or justify the use of the word "should" in those areas not specifically related to regulatory compliance. Additionally, the new procedure mentioned in the response to Item VII will address the use of the words "shall, should, and may" in accordance with the definitions in NQA-1, 1989.

All incorrect references to mr/hr will be changed to mrem/hr.

Action levels ("trigger") are specified in ISP-2 Part 3.3 and are listed on the bottoms of forms ISP-2A,B,C. RSO notification is required in section 3.3.3 of ISP-2.

## VII.B.1

A statement regarding the reference to 20.1301(a)(2) for 2 mrem in any one hour has been included.

3.3.4,c has been changed to say "...at least weekly, or more frequently as appropriate, or as directed by the RSO."

Survey forms for controlled and restricted area surveys have been changed to include surveys outside the south end of the building.

The incorrect location listed for the clean equipment room has been corrected.

Changes to the survey forms regarding the WHUT room and ISA roof have been made.

See Attachment H, ISP-2 for revisions.

VII.B.2

The MDC formula AMS uses, as stated in the procedure, is presented in NUREG 1156, "Accuracy and Detection Limits for Bioassay Measurements in Radiation Protection: Statistical Considerations" (1986) and NUREG/CR-4007, "Lower Limit of Detection: Definition and Elaboration of a Proposed Position for Radiological Effluent and Environmental Measurements" (1984) and is consistent with that contained in Regulatory Guide 8.25 "Air Sampling in the Work Place" (1992). However, it is important to note that this equation is used to demonstrate a system capability. Therefore, the count rates and count times are obtained from measurements made with "background" filters and smears, and the radical contains the standard error of background counting conditions. If the MDA for a sample smear or filter is desired, the equation from Reg. Guide 8.25, section 6.3 would be used. In this case, the radical contains the standard error from the sample smear or filter.

VII.B.3

Given: The air sampling/monitoring system is set to isolate and shut down the ventilation system when a count rate of 500 cpm above a current background of 500 cpm is achieved. The system configuration is such that the ventilation cannot restart automatically. Restart of the system requires that the trip logic be manually reset by human action. Should the system shut down as the result of a spurious or random spike in ambient radiation levels in the vicinity of the stack detector, then the strip chart would record this spike and return to a normal recorded level on the paper. Should the system shut down due an increased count rate on the sampler filter paper as the result of cobalt deposition on the filter paper, the strip chart would record an increase and that level would stay increased on the chart. The system cannot be reset without remedial action. AMS personnel are and have been instructed that any reading above background is considered abnormal and that follow up actions are required per the instructions in the ISP. Therefore, it is not necessary to specify a "trigger" level on the check list.

## VII.B.4

The Isotope Shop Air Samples deleted from the check list referred to two fixed station sample heads in line with calibrated rotometers. The fixed locations for these sample points were at the exhaust louvers of the shop ventilation system located near the floor and against the walls of the shop area. It was erroneously assumed in the past that these samples could be used to adequately evaluate airborne radioactivity in the shop area and could be used to monitor worker intake of airborne radioactivity. Upon evaluation of this situation by the current RSO, it was decided that this past practice and methodology was inappropriate for the past and, in light of the current regulatory requirements, inappropriate for the present. Therefore, AMS now requires that all entries into contaminated areas include the use of breathing zone air samplers by individuals. This requirement is specified on the RWP and falls under the category of "as directed by the RSO" in ISP-9. All air samples for individuals are recorded per ISP-9 and dose is assigned based on the sample results. This issue and methodology was reviewed and discussed with, and accepted by W. Slawinski, USNRC, during the last quarter of 1994.

## VII.B.5

The air pump for the system is not calibrated. The rotometer for the system is sent to our calibration vendor (GTS, Pittsburgh, PA) for calibration semi-annually. AMS possesses two rotometers, one in service and one out for calibration.

There are, as stated in 2.1, two conditions when this check is done. Condition one is monthly - "It is to be performed monthly". Condition two is when there is an abnormal increase on the monitor. The two conditions are connected by the word "or" meaning that either condition will cause a system check. To connect the two conditions with the word "and" is illogical. If the two conditions are connected by the word "and", then both conditions would have to occur simultaneously to cause a system check. Please read 2.1 again for the obvious and specific intent.

The limit specified in 3.9 is the limit from 10CFR20 for Cobalt-60 and is a true and correct statement as written. AMS has added an action guide statement to notify the RSO if 10% of this value is approached (Attachment K).

## VII.B.6

AMS has changed the set point to 10% of the current value (Attachment L).

VII.B.7

The AMS policy for requiring breathing zone air samples (BZAS) is more conservative and restrictive than current regulation and regulatory guidance. There is a potential at this facility to exceed 10% of the limits; therefore, all work in contaminated areas requires the use of BZAS (see response to VII.B.4).

Currently, AMS feels that section 3.1 of this procedure is sufficient and appropriate guidance for calibrating the samplers. Who better than the manufacturer is qualified in this area?

VII.B.8

AMS stands by the position outlined in the response to VII.A.2.f. Not making this change to ISP-11 was an oversight.

Item 2.6 has been changed to reflect training with respect to ISP-11 and the RWP requirements for the entry. Dosimetry requirements are specified in the RWP written for the cell entry. RWPs are written by the RSO. AMS has added a guidance statement pertaining to dosimetry in the procedure (Attachment M).

It is common knowledge at this facility that "isotopes" as mentioned in 3.1.1 refers to sealed sources or source material used to make sealed sources. AMS has clarified this statement.

Given the current and future state of operations at this facility, a maximum contamination level cannot be specified. As soon as conditions permit, the next project for the cell is removal of the stuck front cell plug. Part of the plug removal project will employ strippable coatings to 1) fix contamination during the removal process and 2) facilitate decontamination after the project. After these evolutions, the cell should not re-contaminate to the degree in the past as future cell activities will not be of the nature that will cause an increase in contamination. The statement in the procedure is a hold over from the past. Removal of the statement cannot be justified as "decontamination to the degree practicable" is always a consideration when considering the task at hand. For example, if the task at hand is to enter the cell for 15 seconds to remove an article from the table, then decontamination may not be considered warranted or justified.

See response to VII.A.1 regarding cell surveys.

The intent of "as determined by the RSO" is to allow the flexibility to set the alarming dosimeter at a lower alarm point if desired. The limit specified in the procedure is considered a maximum alarm set point with the federal exposure limits being the absolute limit. It should be noted that AMS uses and administrative control limit of 4500 mrem/y.

Is "clarify what is meant by the term at the door opening" a serious question? "At the door opening" means the space the door occupies when the door is shut. When the door is open, the "door opening" is the point where the door was before it was opened. Beyond the "door opening" is the interior of the cell.

The use of 20 rem/h is a hold over from previous procedures and past operating experience. It is believed that this limit was picked as a dose rate greater than this may indicate the presence of a source pellet or other condition of equal concern. It cannot be justified to set this limit higher or lower at this time. It is anticipated that this limit may be reduced in the future as cell conditions improve.

Periodic monitoring is accomplished by 1) reading the SRPD, 2) reading the display of the alarming dosimeter, 3) quickly estimating dose based on dose rate vs. stay time, or combinations of these steps, all of which are industry normal practices.

Air sampling was addressed in the response to VII.B.4. Again, breathing zone air samples are required for any work in a contaminated area.

#### VII.B.9

The statement the "current staff has not performed this activity" is not a complete and true statement. The RSO has changed HEPA filters and pre-filters (portable units and building ventilation systems) at nuclear power plants and research laboratory (plutonium oxide filters on laboratory glove boxes), the current licensed Isotope Handler has changed the AMS HEPA filters and pre-filters, and the current technician has changed HEPA filters and pre-filters (portable type) at a nuclear power plant. The procedure is sufficiently written for use by experienced personnel. An inexperienced person would never be assigned this task without the assistance of an experienced person. Keep in mind that procedures (ours and other facilities) are not intended for the "man off the street" to read and follow with no training or input from the facility staff.

The current installed system was installed and finally placed in service in 1992. Since that time the filters have only been changed once and that was due to high DP across the filters. Previously no change criteria was established. The procedure has been changed to give the criteria (dose rate or DP) for changing the filters (Attachment N). It is anticipated that at minimum, the pre-filter will be change prior to the project to remove the stuck front cell plug.

Due to the nature of a filter change, the use of a portable HEPA is second nature to experienced personnel and would be used. Additionally, respirators would be worn for this activity. Dosimetry requirements will be addressed in the RWP and will be appropriate based on the dose rates encountered.

The "special" box is special only in that it is sized to contain the filter adequately.

All tools and equipment removed from a contaminated area are frisked (checked for contamination), this includes respirators (ISP-30 addresses smears inside respirators). Also, personnel frisk their face upon exit from contaminated areas. Respirators are not disposed of after use, they are cleaned as appropriate and inspected and reused.

VII.B.10

3.2.1 of this procedure does not specify an order to do the surveys. It merely states "Record the following on form..." A trained individual knows to approach the package with the survey meter on. If there is a "dose rate problem" with the package it would be obvious during the initial stages of the survey.

VII.B.11

Each air sample result is reviewed by the RSO as it is generated. While not detailed in a procedure, each individual has a log sheet showing the current status of internal exposure monitoring. Also, this information is kept on a PC that will "flag" the log at 200 DAC-HRS of exposure for that individual. Since this item is subject to continuous scrutiny, it is felt that including a review statement is not necessary.

3.2.3 (a) will be clarified (Attachment O).

VII.B.12

AMS interprets the use of the word "governed" to mean "has the responsibility for" or other equivalent interpretation (see Webster's Dictionary).

3.4.3 has been changed to read "source handling or related activities" (Attachment P).

The assignment of an individual as a "designee" is predicated on sound judgment by the RSO in relation to the knowledge level of the individual and the confidence level the RSO has in that individual with regard to the task at hand.

VII.B.13

Our depleted uranium parts and subassemblies fall under the category of "excepted" (49CFR173.424) and are exempt from the requirements of sub-part G per paragraph 172.600(d) as no shipping papers are required (Attachment Q).

VII.B.14

Alarming dosimeters and SRPDs with greater than 200 mr range are sent to a commercial vendor for calibration once every six months. The 6-month frequency has been added to the procedure (Attachment R).

VII.B.15

10CFR19.13 gives the reporting requirements as annually, para. (b); for formally engaged workers para. (c); when reporting is required per 20.2202, 2203, 2204 or 2206, para (d); and for terminating employees. AMS specifies that individuals be informed of their film badge results any time they ask for the information. They need not wait until the end of the year to receive a Form 5 or terminate to obtain this information. Also, this statement regarding film badge reports is in reference to the vendor supplied results of the film badges processed. Refer to the Purpose statement at the beginning of the procedure.

VII.B.16

Reference to compactor operations has been deleted from this procedure (Attachment S).



VII.B.17

The regulations require that the Bill of Lading contain an emergency phone number. An emergency phone number requirement has been included in this section.

Item 3.6.3 has been clarified (See Attachment T).

VII.B.18

The AMS position on the use of a "designee" is covered in the responses to V.A, VII.A.2.f and VII.B.12.

The "radiation safety job coverage" determination is made based on the experience and sound judgment of the RWP preparer. This determination is also based on the nature of the job and the experience level of the workers involved. Absolute and rigid criteria is neither warranted nor desired. Flexibility to meet changing demands must be maintained to ensure overall safe operations.

VII.B.19

The intent of the regulations pertaining to the use of respiratory protection state that if respirators are used then they will be used in accordance with the regulations. AMS intends to use respirators; therefore, AMS will have a respiratory protection program in accordance with the regulations. No where in the regulations does it require that a licensee establish and use protection factors for the respirators. AMS will not establish and use protection factors; hence the reason for breathing zone air samples and the assignment of dose based on the air sampling results regardless of whether a respirator was worn or not. The probability that a worker could receive an internal exposure in excess of 20.1502 exists at AMS; therefore, monitoring and assessment of the dose is required. Again, the reason for breathing zone air samples. The use of respiratory protection device, when appropriate, is industry common sense and a "good practice" to minimize internal exposure even though no credit is taken for the degree of protection. ISP-9 satisfies the requirements of 20.1703 (a)(3)(i). ISP-1, page 28 satisfies the requirements of 20.1703 (a)(3)(ii); additionally, ISP-1 page 28 is being revised per our response to Item VII.A.2.e.

AMS does not measure for oxygen deficient atmospheres as AMS has no confined spaces to be entered. This statement is included as a general warning and can be found in the literature supplied by the manufacturer as well as most respiratory protection programs even when not applicable to that specific program.

The "R" in ALARA stands for reasonable which includes economic and other factors to be considered. Respirator filters are not inexpensive. A 2mrem/h filter on a respirator being worn in a hot cell with a general area dose rate of 12 rem (not mrem)/h with contamination levels possibly in excess of 100 mrem/h smearable would not be considered unacceptable nor unreasonable. It is common practice at nuclear power plants and other facilities to set aside respirators and filters as well as cotton coveralls, gloves etc. with fixed radioactive contamination on the item (typically up to 5 mrem/h) for use in high radiation and high contamination areas. The radiological concerns for the item being worn in these cases are negligible in comparison to the area the item is worn in; therefore, AMS reserves the right to follow ALARA practices as other licensees do. Also, there is no requirement that new or non-contaminated filters be used each time a respirator is worn.

VII.B.20

The statement about isotope technicians being able to calibrate survey instruments and meters have been deleted (Attachment A, ISP-31). These personnel will be trained to ISP-23.

VII.B.21

"Calibrate sources" means to verify and document the source strength with a condenser R-Chamber or equivalent.

VII.B.22

Steps 3.1 and 3.2 will be reversed (Attachment U).

VIII.A

AMS never intended to compact waste at our facility. This reference was to state AMS may ship waste to a third party for compaction.

VIII.B.1

AMS is not aware of any additional permits required.

VIII.B.2

Waste is stored in the facility basement below grade. Waste in this area is from prior cell operations (plug removal attempt) with some items in concrete/lead shielded 55 gallon drums. Waste is stored in a designated "high level" waste storage area consisting of 3' thick walls and ceiling with slab on grade floor. This room also has a labyrinth entrance and is used to store waste greater than 50 mrem/h. Low level DAW (protective clothing etc.) is stored in LSA boxes in the Isotope Shop Warehouse. All areas are weather secure. Vulnerability to hazards is considered low with the hazard probabilities the same now as it was for previous licenses.

VIII.B.3

See response to VIII.B.2. Additional shielding will be addressed on a case-by-case basis when appropriate. Monitoring is currently performed under existing procedures and routine surveys.

- IX.A Page 3 under the heading "General" in the AMS Service Procedures Manual has been updated to reflect that shutter service will be performed only by NRC-licensed individuals (Attachment V).
- IX.B The instrument referenced in Section C of Page 8 is a device that gives an audible response (beep or chirp) at a rate relative to the dose rate it is present in. It does not have display of dose received nor does it have a means to preset any dose rate. It is used by the Service Technician as a quick and handy method to determine when the cobalt source is in the teletherapy head or in the source exchange container or in transit between the two units; i.e., slow chirp rate when the source is in either container and fast chirp rate when the source passes from one container to the other.
- IX.C Items B.2 and 3 provide for a field assessment of a leaking source. The specified count rate is used as decision point as to which direction to proceed in the procedure. If greater than 2000 cpm, go to the emergency procedure. If less than 2000 cpm, proceed with normal service operations. The procedure is adequate as written.
- X. Advanced Medical Systems is aware that the Decommissioning Funding Plan and Emergency Plan issues are a part of our license renewal. The items discussed and deficiency letters have been addressed and, pending further questions, have been resolved.

Mr. John Madera

June 16, 1995

If you have any further questions, please do not hesitate to contact me.

Sincerely,

A handwritten signature in cursive script, appearing to read "D. Cesar".

DAVID CESAR  
Treasurer

DC/mz  
Enclosures

### LISTING OF ATTACHMENTS

<u>ATTACHMENT</u>	<u>DESCRIPTION</u>	<u>QUESTION</u>
A	Revised ISP-31	V.B., V.C., VII.B.20
B	Isotope Technical Exam with Answers	V.B.
C	Isotope Handler Exam with Answers	V.C.
D	USNRC Report 030-16055/93002 (DRSS)	VI.B and C
E	Landauer Accrediation	VII.A.2.d
F	Revised Page 28 of ISP-1	VII.A.2.e
G	Revised Page 31 of ISP-1	VII.A.2.f
H	Revised ISP-2	VII.A.2.i, VII.B.1
I	Revised Page 37 of ISP-1	VII.A.3.b
J	Revised Page 40 of ISP-1	VII.A.5
K	Revised ISP-7	VII.B.5
L	Revised ISP-8	VII.B.6
M	Revised ISP-11	VII.B.8
N	Revised ISP-12	VII.B.9
O	Revised ISP-14	VII.B.11
P	Revised ISP-15	VII.B.12
Q	Revised ISP-21	VII.B.13
R	Revised ISP-23	VII.B.14
S	Revised ISP-25	VII.B.16
T	Revised ISP-26	VII.B.17
U	Revised ISP-33	VII.B.22
V	Revised Page 3 - <u>General</u> Section of AMS's Service Procedure Manual	IX.A

# ADVANCED MEDICAL SYSTEMS OPERATING PROCEDURE

## ISOTOPE TECHNICIAN TRAINING PROGRAM

ISP-31 Rev. 05/95

Page 1 of 5

- 1.0 PURPOSE: To develop a staff of training individuals capable of assisting the RSO and Isotope Handler by performing routine radiation safety-related checks and measurements.
- 2.0 SCOPE: This program is applicable to all individuals who will work independently in restricted areas at the London Road Isotope Facility for the performance of specified tasks.
- 3.0 OBJECTIVE: Upon completion of training, the candidate will be able to perform the following tasks:
- A. Safety assurance checks specified in ISP-4 and Form 4A.
  - B. Receipt of radioisotope shipping containers.
  - C. Release of packaged radioactive materials for transportation.
- 4.0 REQUIREMENTS:
- 4.1 The training program shall consist of (1) approximately 3 days of classroom instruction on basic radiation theory and safety practices; (2) approximately 2 days of training on the procedures, methods and precautions required to perform given tasks; and (3) approximately 1 month of on-the-job training.

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Prepared by: Robert Meschter

Approved by:

Date:

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- 4.2 A trained health physicist and other qualified instructors, under the direction of the RSO, shall provide the classroom instructions. The job-specific training and the on-the-job training shall be coordinated by the RSO and supervised by the RSO or an approved Isotope Handler.
- 4.3 For the classroom instruction, a written examination(s) shall be administered to determine comprehension of the material presented. The examination(s) shall be prepared, administered and scored by the instructor. The minimum passing grade shall be 80%.
- 4.4 An oral (supported by quiz) walk-through, job performance exam will be administered after completion of the on-the-job training. The examination shall be prepared and administered by the RSO. The minimum passing grade shall be 80%.
- 4.5 A certificate shall be awarded to each candidate who successfully completes the training.
- 4.6 Candidates who do not successfully complete the primary training shall be given additional training and retested.
- 4.7 Refresher training shall be provided on an annual basis and whenever there is a change in duties, procedures or regulations.
- 4.8 Documentation of all training shall be maintained by the RSO.
- 4.9 Prior to assuming duties as an Isotope Technician, the candidate's qualifications must be reviewed and approved by the Isotope Committee.

## 5.0 PROGRAM OF INSTRUCTION

- 5.1 Basic Radiation Therapy and Safety Practices Course  
(24 Hours)
- 5.2 Job Specific Training
  - 5.2.1 Radiation Surveys (1.5 Hours)  
Knowledge of unrestricted and restricted areas;

Proper selection and operation of portable survey instrumentation;

Notification procedures; proper documentation and posting of areas.

5.2.2 Contamination Surveys (2.5 Hours)

Proper technique for sample collection;

Proper selection of counting equipment;

Smear counting and analysis procedures;

Isolation and proper tagging;

Procedures for performing personnel body contamination checks;

Notification procedures

5.2.3 Instrumentation (2 Hours)

Knowledge in procedures for operation and calibration of survey meters, counting equipment, air monitors;

Inspecting and tagging out inoperative instruments.

5.2.4 Air Monitoring (2 Hours)

Knowledge of operation and proper functioning of the permanent air monitoring system;

Location of sampling lines, use and operation of portable air samplers, inspection of air monitor chart and alarms;

Notification procedures.

5.2.5 Radiation Work Permit Coverage (1.5 Hours)

Obtain adequate information about the job;

Identifying, monitoring, mitigating and controlling direct radiation hazards;

Proper methods for locating and controlling contamination hazards;



Demonstrating proficiency in the use of anti-contamination clothing and respiratory equipment.

5.2.6 Waste Management (1 Hour)

Solid waste generation, handling, packaging for disposal;

Liquid waste management;

Designated waste handling and storage areas;

Notification procedures.

5.2.7 Radioactive Material Receipt/Shipping Procedures (1.5 Hours)

Survey and contamination requirements;

Documentation requirements - inventory control;

Handling and storage procedures, storage areas;

Notification procedures.

5.2.8 Emergency Action Plan (4 Hours)

Familiarization with facility alarm system and response activities of civil agencies;

Knowledge of Emergency Pre-Plan;

Maintenance and testing of emergency generator, fire pump;

Location of potential chemical and radiation hazards.

5.3 On-the-Job Training

5.3.1 Performance of each task as outlined in 3.0 a minimum of two times under supervision.

5.4 Copies of written quizzes, exams and evaluation forms are attached.

5.5 Documentation forms for job specific and on-the-job training are attached.

- 5.6 A certificate of training issued to Isotope Technician candidates who successfully complete the training program is attached.

## ISOTOPE TECHNICIAN JOB PERFORMANCE EVALUATION

85 Points

Candidate: \_\_\_\_\_

Date: \_\_\_\_\_

RSO: \_\_\_\_\_

	<u>SATISFACTORY</u>	<u>UNSATISFACTORY</u>
1. Daily Checks	_____	_____
2. Use of Survey Instruments	_____	_____
3. Use of Well Counter	_____	_____
4. Analysis of Wipes	_____	_____
5. Knowledge of Hazards	_____	_____
6. Generator Test	_____	_____
7. Air Monitor Calibration	_____	_____
8. Analysis of Air Samples	_____	_____
9. Gamma Alarm Settings	_____	_____
10. Air Monitor Calibration	_____	_____
11. Receiving Radioactive Material	_____	_____
12. Shipping Radioactive Material	_____	_____
13. Survey and Wipes	_____	_____
14. Calibration of Instruments	_____	_____
15. Application of RWP	_____	_____
16. Emergency Plans	_____	_____
17. Use of Anti-C Clothing	_____	_____
18. Personal Contamination	_____	_____
19. Methods for Reducing Exposure	_____	_____
20. Surface Contamination Limits	_____	_____
21. Decontamination Methods	_____	_____

Comments:

**ISOTOPE TECHNICIAN EXAM**

The test consists of 15 questions minimum passing percentage is 70%.

Name: ANSWER KEY

Date: \_\_\_\_\_

1. List the high radiation areas in the London Road Facility.

**HIGH LEVEL WASTE STORAGE, HOT CELL, DECON ROOM, HOT SIDE BASEMENT, HEPA ROOM**

2. Normal controlled area surveys are performed using which instrument?

**VICTOREEN 491, MICRO-R METER OR EBERLINE ASP-1**

3. Calculate the well counter efficiency using the following data:

Background 165 CPM    Std. Counts 17500 CPM  
Std. Activity .042 uCi

$$\frac{(17500 - 165)}{(.042)(2.22 \times 10^6)} = \frac{17335}{93240} = .186$$

4. How do you convert CPM to DPM when analyzing a wipe?

**DIVID CPM BY THE COUNTER EFFICIENCY OR MULTIPLY THE CPM BY COUNTER EFFICIENCY FACTOR.**

5. Personnel frisking is performed using which scale on the Ludlum Model 177 Ratemeter?

**X 1 SCALE (LOWEST)**

6. At how many points on each scale should a survey instrument be calibrated?

**AT LEAST TWO SEPARATED BY 50% OF SCALE.**

7. Under what conditions should a survey instrument be recalibrated?

**WHEN OUT OF CALIBRATION  
AFTER MAJOR REPAIR  
AFTER DROP OR DAMAGE**

8. Describe the stack air monitoring system.

**AIR SAMPLE DRAWN THROUGH PROBE IN STACK TO FILTER HOUSING.  
DETECTOR NEAR FILTER IS CONNECTED TO RATEMETER IN CELL  
CONTROL AREA. CHART RECORDER RECORDS ACTIVITY ON A CON-  
TINUOUS BASIS.**

9. Who can authorize a radiation work permit?

**RSO OR DESIGNEE**

10. When is a radiation work permit necessary?

**WHEN ENTERING A RESTRICTED AREA**

11. At what radiation level does an area become a radiation area?

**5 MREM/H @ 30CM FROM SOURCE**

12. For controlled areas, what is the maximum radiation level allowable?

**0.5 MREM/H**

13. Describe your actions if you should find a contaminated article in an controlled or unrestricted area.

**(1) SURVEY SURROUNDING AREA TO INSURE CONTAMINATION HAS NOT  
SPREAD. (2) POST IT OR BAG IT AND MARK WITH RADIOACTIVE  
MATERIAL STICKER. (3) NOTIFY RSO.**

14. Describe your actions if you should find a Gamma Alarm flashing red.

**(1) LEAVE AREA  
(2) LOCATE A SURVEY INSTRUMENT AND DETERMINE ACTUAL RADIA-  
TION LEVELS BEFORE ENTERING.  
(3) NOTIFY RSO.**

15. The radiation level increases or decreases as you approach a radiation source?  
By what amount?

**INCREASE - INVERSELY PROPORTIONAL TO SQUARE OF THE DISTANCE  
FOR A POINT SOURCE.**

INSTRUCTOR: \_\_\_\_\_

GRADE: \_\_\_\_\_

**ISOTOPE HANDLER EXAM**

This test consists of 50 questions minimum passing percentage is 70%.

Name: ANSWER KEY

Date: \_\_\_\_\_

1. Isotopes are atoms which have the same number of neutrons, but different numbers of protons. True or False? FALSE
2. Tritium is a radioisotope. True or False? TRUE
3. All radioactive isotopes, or radioisotopes, emit beta radiation. True or False? FALSE
4. The number of disintegrations per second is a measure of the radioactivity of the source. True or False? TRUE
5. The curie is a unit of radioactivity. True or False? TRUE
6. Specific activity is the number of curies per gram of material. True or False? TRUE
7. The half life of Cobalt 60 is 5.6 years. True or False? FALSE
8. Alpha particles, beta particles and gamma radiation are all emitted from the nucleus of the atom. True or False? TRUE
9. An Angstrom is a unit of radioactivity. True or False? FALSE
10. The material in a teletherapy head becomes radioactive once a source is installed. True or False? FALSE
11. An electron volt is a measure of kinetic energy acquired by a neutron. True or False? FALSE
12. Ions are electrically charged particles. True or False? TRUE
13. The roentgen is the unit of radiation quantity. True or False? TRUE

14. For gamma and X-rays, the rem and rad are the same. True or False? TRUE
15. For Cobalt 60 the half-value layer of lead is 1.49 inches.  
True or False? FALSE
16. A dose of 0.2 rem is equal to 200 mrem/hour for 1 hour of exposure to gamma or X-radiation. True or False ? FALSE
17. A lead apron will provide adequate shielding from gamma radiation.  
True or False? FALSE
18. The dose rates from a 1500 RHM source and a 2000 RHM source are the same when shielded by three inches of lead. True or False? FALSE
19. A service engineer working in an area where the dose rate is 3 Roentgens/minute receives a dose of about 333 mrem in 10 seconds. True or False? FALSE
20. The nominal rating for an AMS source is 1.1 RHM per curie.  
True or False? TRUE
21. A green light on the hot cell operator area Gammalarm means that the radiation level at the instrument is not greater than 4 mrem/hr.  
True or False? FALSE
22. The film badge protects its wearer from harmful effects of radiation.  
True or False? FALSE
23. AMS survey meters are calibrated to  $\pm 20$  percent. True or False? FALSE
24. The Victoreen 491 is a G-M type meter. True or False? TRUE
25. A Radiation Work Permit is required for routine surveys and smears.  
True or False? TRUE
26. One of the effects of radiation in humans is the destruction of blood-producing tissue in bone marrow. True or False? TRUE
27. The NRC regulations are found in Title 10 of the Code of Federal Regulations.  
True or False? TRUE
28. Possession and use of Cobalt-60 requires an NRC or Agreement State license. True or False? TRUE



29. The allowable dose to the hands may exceed 50 rems per calendar year.  
True or False? FALSE
30. The maximum radiation level allowable in a unrestricted area is 2 R/hour.  
True or False? FALSE
31. Film badges and pocket dosimeters are required to be worn by radiation workers. True or False? TRUE
32. More than half of the 50 states in the U.S. are agreement states.  
True or False? TRUE
33. Agreement states have their own regulations for the protection of workers and the possession and use of radioactive materials. True or False? TRUE
34. It is important that all personnel frisk clothing and other items before they are brought out of the Isotope shop area. True or False? FALSE
35. An internal exposure of 10 DAC-hours will result in a committed effective dose equivalent of:  
(a) 2.5 mrem  
(b) 25 mrem  
(c) 250 mrem  
(d) none of the above
36. The PIC 6A survey meter can measure radiation levels up to:  
(a) 1 R/hour  
(b) 100 R/hour  
(c) 1000 R/hour  
(d) none of the above
37. The following instrument is not required when performing a source transfer:  
(a) pocket dosimeter  
(b) Victoreen 570R Ratemeter  
(c) survey meter  
(d) none of the above
38. The Victoreen 500 Electrometer used to survey the hot cell reads out in:  
(a) R/hour  
(b) R/min  
(c) mR/min  
(d) none of the above

39. The following information is not required to be on the Yellow Radioactive III label:
- (a) Transport Index
  - ☒ (b) Destination
  - (c) Activity
  - (d) none of the above
40. Survey instruments and pocket dosimeter are calibrated at the following intervals:
- (a) 12 months
  - (b) 3 months
  - ☒ (c) 6 months
  - (d) none of the above
41. The HVL of concrete for Cobalt 60 is approximately 2.5 inches. If the dose rate on the source side of a 10-inch concrete wall is 100 R/minute, the dose rate on the opposite side of the wall is:
- (a) 50 R/minute
  - (b) 12.5 R/minute
  - ☒ (c) 6.25 R/minute
  - (d) none of the above
42. You find the dose rate from a source to be 2 R/hour at 1 foot. What would the dose rate at 8 feet?
- (a) 500 mR/hour
  - ☒ (b) 31.25 mR/hour
  - (c) 62.5 mR/hour
  - (d) none of the above
43. A cobalt source gives a dose rate of 800 mR/hour at 10 feet. At what distance from the source is the dose rate 50 mR/hour?
- ☒ (a) 40 feet
  - (b) 30 feet
  - (c) 20 feet
  - (d) none of the above
44. An AMS 6000 RHM Cobalt 60 source contains approximately \_\_\_\_\_ curies of Cobalt 60.
- (a) 6450
  - (b) 4450
  - ☒ (c) 5450
  - (d) none of the above

45. Smoking, eating or drinking is not permitted in contaminated areas of the isotope facility because:
- (a) damage could occur to company equipment
  - (b) it is possible to ingest radioactive material
  - (c) it is possible to contaminate the radioactive material
46. The maximum permissible whole body dose per calendar year, as provided for in 10CFR20.1201, is:
- (a) 3 rems
  - (b) 5 rems
  - (c) 12.5 rems
  - (d) none of the above
47. One millicurie equals:
- (a)  $3.7 \times 10^{10}$  dps
  - (b)  $3.7 \times 10^7$  dps
  - (c)  $3.7 \times 10^4$  dps
  - (d) none of the above
48. A survey meter reads 4.5 mR/hour with the rate switch at X3.0. The dose rate is, therefore;
- (a) 135 mR/hour
  - (b) 1.35 mR/hour
  - (c) 13.5 mR/hour
  - (d) none of the above
49. The highest allowable source shipping package surface reading is
- (a) 10 mR/hour
  - (b) 200 mR/hour
  - (c) 1000 mR/hour
  - (d) none of the above
50. The AMS materials license allows the possession of \_\_\_\_\_ curies of Cobalt 60 in the form of sealed sources:
- (a) 60,000
  - (b) 135,000
  - (c) 150,000
  - (d) none of the above

INSTRUCTOR: \_\_\_\_\_

GRADE: \_\_\_\_\_

U.S. NUCLEAR REGULATORY COMMISSION

REGION III

Report No. 030-16055/93002(DRSS)

License No. 34-19089-01

Priority I

Category B

Docket No. 030-16055

Licensee: Advanced Medical Systems, Inc. (AMS)  
1020 London Road  
Cleveland, OH 44110

Site Inspections Conducted: April 19, 1993 and May 24-28, 1993

Inspectors: <u>Wayne Slawinski</u> Wayne Slawinski Senior Radiation Specialist	<u>7-29-93</u> Date
<u>Donald Sreniawski</u> Donald Sreniawski Senior Radiation Specialist	<u>7-29-93</u> Date
<u>Raymont G. Gliniski</u> Raymont Gliniski Radiation Specialist	<u>7-29-93</u> Date
<u>Wayne Slawinski for</u> Kevin Null Radiation Specialist	<u>7-29-93</u> Date
<u>Wayne Slawinski for</u> Robert Hays Radiation Specialist	<u>7-29-93</u> Date

Accompanying Personnel: Cynthia Jones, Leader  
Programmatic Safety Section

Reviewed By: <u>Roy Caniano</u> Roy Caniano, Chief Nuclear Materials Safety Branch	<u>7-29-93</u> Date
<u>John Grobe</u> John Grobe, Chief Fuel Cycle and Decommissioning Branch	<u>7-29-93</u> Date

## Inspection Summary:

Inspections on April 19, 1993 and May 24-28, 1993  
(Report No. 030-16055/93002(DRSS))

Areas Inspected: Special, announced, limited scope safety inspections to evaluate the licensee's: (1) physical inventory and pre-inventory hot cell decontamination projects; and (2) effluent management and control program. The inspection included a review of: organization, management control and staffing; radiological controls implemented during the hot cell decontamination and physical inventory projects, including external and internal exposure controls and monitoring; physical inventory progress and problems; effluent release pathways and control mechanisms; sanitary sewer and airborne effluent discharges, monitoring and analysis, including previous unresolved items associated with the stack monitoring system; and portions of the licensee's facility survey program. The inspection team analyzed several samples collected from various restricted and unrestricted areas on the licensee's property, both within and outside the licensee's facility, and conducted extensive surveys of the licensee's facility and property.

Results: One violation of regulatory requirements and several other concerns were identified. In addition, unresolved items associated with the adequacy of your sanitary sewer liquid radwaste release procedure and the application of facility water usage data to determine liquid effluent release concentrations are being evaluated further by the staff. The inspection found the radiological controls implemented during the hot cell decontamination and physical inventory projects to be generally good with one exception. This exception is described in Section 5(b). The concerns identified during the inspections are listed below.

- Reliability of the removable compression plug in the basement floor drain (Section 6(a)).
- Potential for floods or other uncontrolled entries of water into the facility and ability to obtain a representative sample of these liquid radwastes (Section 6(a)).
- Area survey program weaknesses (Sections 7 and 8(b)).
- Identification and control of potentially contaminated floor mop wash water (Section 8(a)).

## DETAILS

### 1. Persons Contacted

Steven Haddock, Isotope Technician  
Norman Kelbley, Former Radiation Safety Officer  
\*Mark Loeser, Radiation Safety Officer  
Steven McDermott, Former Radiation Safety Officer  
\*Sherry Stein, Director, Regulatory Affairs  
Edward Svigel, Engineering Manager

The inspectors also contacted and were assisted in surveying the sanitary sewer system by representatives from the Northeast Ohio Regional Sewer District and City of Cleveland. Additionally, an Ohio Department of Health representative assisted the inspectors in conducting site area surveys.

A public exit meeting was held on May 28, 1993 and attended by state and local government officials, media representatives and local residents.

\*Denotes those present at the site (licensee) exit meeting on May 27, 1993.

### 2. Purpose and Scope of Inspection

These limited scope special safety inspections were conducted to review primarily two areas of the licensee's program. The licensee's physical inventory and pre-inventory hot cell decontamination projects; and its radioactive effluent management and control program, including a historical review of effluent discharges to the environment.

The effluent management and control program was reviewed to gather information to assist the NRC staff in evaluating a 10 CFR 2.206 petition from the Northeast Ohio Regional Sewer District. The petition requests that the NRC require AMS to: (1) assume all costs resulting from the offsite release of cobalt-60 that has been deposited at the Sewer District's Southerly Treatment Center and (2) decontaminate the sewer connecting AMS' London Road facility with the public sewer at London Road and continue downstream to the extent sampling indicates is necessary.

The inspection team analyzed several samples collected from the licensee's site, including soil and sanitary sewer sludge/sediment samples, and performed surveys both inside the licensee's facility and outside the facility within the site boundary. Surveys outside the facility's site boundary and in the sewer system were conducted in response to Cleveland City Council concerns about the radiological environment in the neighborhood surrounding the licensee's London Road facility.

### 3. Organization, Management Controls and Staffing

The licensee's organization and management control system remains essentially as previously described (Inspection Reports No. 030-1055/90001(DRSS) and No. 030-16055/92001(DRSS)).

As reported in Inspection Report No. 030-16055/92001(DRSS), the licensee experienced significant turnover in radiation safety officer and health physics personnel in the last several years. The licensee employed five different RSOs between 1987 and 1992. The sole isotope handler (i.e. source fabricator) also terminated employment a couple years ago and a replacement has not been obtained. As a result of significant turnover of radiation safety management and health physics personnel, the licensee has lacked continuity and oversight of certain licensed operations and has been slow in implementing necessary improvements to its program. The current radiation safety officer (RSO) was hired by the licensee and subsequently approved by the NRC in Amendment No. 23, dated March 13, 1992. At the same time, an isotope technician was also hired and authorized to conduct sealed source handling operations. One of the licensee's two authorized teletherapy service engineers terminated employment in 1993. The licensee has no immediate plans to fill the vacated engineer position. The London Road facility is normally staffed only by the RSO and isotope technician. Other licensee staff frequent the London Road facility as deemed necessary. The remainder of the licensee's staff maintain offices at its Geneva, Ohio facility.

The licensee's current health physics staff has limited hot cell operational and sealed source manufacturing experience. Consequently, license authorization is currently limited to the conduct of teletherapy service operations and routine health physics activities at the London Road facility.

For the last several months, the licensee has focused its time toward completing its initial physical inventory and transferring sealed sources to authorized recipients in an effort to reduce its overall inventory of licensed material. These activities are further described in Section 5.

### 4. Hot Cell Decontamination

#### a. Overview

For approximately one month beginning in late January 1993, the licensee performed a general decontamination of its hot cell. The decontamination was necessary to improve the cell's radiological condition, and thereby enable physical inventory activities to be conducted safely. (An historical perspective of the physical inventory issue is provided in Section 5). To accomplish the physical inventory, sealed sources must be transferred into the hot cell for examination and identification purposes.

Consequently, prior to inventory initiation, solid radwastes had to be removed from the cell and the cell's contamination levels reduced.

The inspectors discussed the decontamination project with the licensee and reviewed relevant health physics records. Inspector findings are presented below.

b. Staffing

The decontamination was performed by four members of the licensee's staff. The RSO planned the job and provided health physics supervision, the isotope technician was responsible for manipulator operations and two service engineers from the licensee's Geneva, Ohio office fulfilled various health physics and decontamination tasks. All involved personnel possessed previous health physics experience and received job specific instructions from the RSO both initially and as the job progressed.

c. Radiological Controls

The decontamination job was performed remotely using the hot cell's manipulators. This reduced the degree of radiological controls required to accomplish the task safely. The principal health physics concerns were contamination control and external dose from waste and other materials removed from the cell.

To control contamination, the licensee fabricated a plastic containment around the cell's transfer chute. Routine contamination smear surveys of the containment structure and surrounding isotope shop floor areas were made each time materials were removed from the cell. Protective clothing (PCs) consisting of gloves, booties and coveralls were worn by those working near the containment structure in the isotope shop. Radiation Work Permits (RWPs) were developed and described the necessary radiological controls. Contamination control effectiveness was evaluated through continuous air sampling of the work environment in the isotope shop. The air samples were taken in a manner to represent the worker's breathing zone. Highly contaminated paper and other solid wastes which littered the cell were removed and loose cobalt-60 pellets were collected, placed in bulk capsules and stored in one of the cell's storage plugs. A magnetic sweep tool was used to collect the loose pellets. Decontamination foam and paper towels were used to reduce smearable contamination levels on the cell's tabletop.

The inspectors reviewed the licensee's air sample analysis and maximum permissible concentration (MPC) assignment methods and results; no problems were noted. No individual involved in the decontamination project was exposed to significant airborne concentrations, nor approached the 40 - hour control level of 10



CFR 20.103(b)(2). The licensee reported that the containment structure maintained its integrity and controlled contamination as intended.

External exposure control methods included assessment of external radiological conditions in the work area and use of shielding. All individuals involved in the project were provided whole body and wrist film and thermoluminescent dosimeter (TLD) ring badges supplied and analyzed by R. S. Landauer Jr., and Company, and licensee supplied high and low range self-reading dosimeters. The TLD extremity monitors were worn by those involved in cell waste removal. Dosimeters were read and dose recorded at least daily. Whole body film badges were exchanged weekly and extremity badges monthly. Whole body and extremity monitoring results were reviewed by the inspectors for the first quarter of 1993, for all individuals involved in the project. Maximum quarterly whole body and extremity exposures were 1035 mrem and 5870 mrem, respectively. These exposures are 35% and 31% of 10 CFR 20.101 whole body and extremity quarterly limits.

During the decontamination project, the licensee increased the frequency of its hot cell stack air sample analysis from monthly to weekly. The frequency was increased at the NRC's request to better evaluate short term increases in airborne effluent concentrations that normally occur during hot cell activities. Licensee records show that the maximum weekly concentration of cobalt-60 effluent released to the environment during the decontamination project was  $7 \text{ E-12 uCi/ml}$ . This concentration is less than 3% of the 10 CFR 20.106 limit.

Approximately two cubic feet of radioactive waste was generated during the decontamination project. This waste is currently stored onsite pending disposal.

No violations of regulatory requirements were identified.

## 5. Physical Inventory Project

### a. Historical Overview/Progress and Problems

License Condition 14 of Amendment No. 8, which became effective in June 1986, required that the licensee conduct a physical inventory every 6 months to account for all sources and/or devices received and possessed under its license. An NRC inspection conducted in January 1990 disclosed that physical inventories had not been conducted for several years, and likely not conducted since inception of the requirement in 1986. In July 1990, the NRC issued a violation to the licensee for failure to conduct physical inventories.

The licensee accepted inventory records from the previous owner of the facility, equipment and sources, Picker Corporation. The licensee stated that they did not verify that the licensed material listed on its predecessor's inventory record was actually present and accounted for. Rather than an inventory to physically account for all material possessed at a given time, the licensee conducted a semi-annual records review to account for material receipt/transfer. Additionally, the licensee's inventory records documented uncertainties in the location of several sources.

The licensee initiated a physical inventory shortly after the January 1990 inspection, but suspended further inventory efforts in September 1990, due to the resignation of its RSO. A replacement RSO was not hired and authorized on the NRC license until May 1991. Between May 1991 and early 1992, the newly appointed RSO was involved with training, hot cell ventilation system replacement, and the preparation of a Decommissioning Funding Plan cost estimate which is required by 10 CFR 30.35. Consequently, little time was devoted to the completion of the required physical inventory. A new ventilation system was installed for the hot cell, to replace an existing temporary system that was installed during an NRC ordered facility decontamination. ("Order Modifying License, Effective Immediately, and Demand For Information", dated July 23, 1987). However, the newly installed ventilation system subsequently leaked and its design, fire protection safety features and operability testing were found to be deficient by the NRC staff (Inspection Report No. 030-16055/91002(DRSS)).

In early 1992, the RSO left the employ of the licensee. On March 13, 1992, AMS amended its NRC license to add another new RSO. Again, the physical inventory was postponed due to the training requirements for the new RSO and completion of the hot cell ventilation system redesign and replacement project. To avoid previous similar problems, the ventilation system was redesigned with contractor assistance and evaluated and approved by the NRC prior to its construction.

Condition 14 of the AMS license was amended on May 8, 1992, to outline a schedule of activities required to be accomplished in order to complete the inventory in a timely manner. License Condition 14 required a properly designed, constructed, installed and tested ventilation system to be completed by August 31, 1992. The physical inventory was required by License Condition to be completed on or before March 31, 1993.

An appropriate hot cell ventilation system was installed, tested and declared operable by the licensee to satisfy the August 31, 1992 deadline. Shortly thereafter, the radiological conditions in the hot cell were found to be unacceptable to allow the inventory to recommence safely, as described in Inspection Report

No. 030-16055/92002 (DRSS). Consequently, the decontamination of the hot cell described in Section 4 was undertaken by the licensee.

The physical inventory was started in March 1993. By early April 1993, the licensee had completed about 75% of the inventory, including an inventory of its principal sealed source storage area, the source garden. At this time, only the two hot cell storage plugs (wells) remained to be inventoried. However, the licensee discovered that one of the two hot cell storage plugs was stuck, its lifting bracket severed and could not be repaired without personnel entry into the cell. As a result, the licensee was unable to gain access to the radioactive material stored in the front storage well, despite several varied attempts to remove the storage plug remotely. Although the cell was previously decontaminated to allow the inventory to resume, the cell was not sufficiently clean to permit safe personnel entry. On April 19, 1993, License Condition 14 was again amended, extending the required inventory completion date from March 31 to June 1, 1993.

In April and May 1993, the licensee completed the inventory of the licensed material in the rear hot cell storage plug and transferred several cesium-137 and cobalt-60 sources to authorized recipients. However, the licensee's attempts to open the cell's stuck front plug continued to be unsuccessful. In a letter dated May 17, 1993, the licensee outlined three actions that must be completed prior to personnel entry into the cell to remove the front plug. First, the cobalt-60 sources in the source garden must be removed or rearranged to allow space for the sources from the cell's rear plug. Second, the sources in the rear plug must be placed in the garden. Third, the decontamination room and hot cell must be decontaminated to allow safe personnel entry. Techniques must also be devised and evaluated to determine the best methods for removal of the front plug. The letter further stated that the hot cell and decontamination room cleanup would not be completed until at least July 31, 1993.

As of June 1, 1993, the physical inventory of licensed material in the hot cell's front plug has not been initiated. The licensee does not anticipate inventory completion until late August or September 1993. Consequently, the licensee is in violation of License Condition 14., which requires that a physical inventory of all radioactive material possessed under the license be completed by June 1, 1993.

b. Radiological Controls

To conduct the physical inventory, sealed sources stored in the licensee's source garden, need to be individually transferred into the hot cell for identification. The "transfer monster", a large shielded cask, is used to make the transfer of sources from garden to hot cell. In addition, sealed sources and bulk (unsealed)

material stored in source capsules within the hot cell's two storage plugs must be removed from their storage wells and inventoried.

Prior to the inventory project, the licensee was generally aware of both the external and internal exposure control problems which could be encountered. This included monitoring and controlling external dose to the lower extremities while using the transfer monster and monitoring for contamination upon source removal from the hot cell after identification is complete. However, as discussed later in this section, the licensee did not fully recognize all the potential contamination problems associated with externally contaminated or potentially leaking sealed sources transferred from its source garden, and was also somewhat hampered because it did not possess more sophisticated air monitoring equipment. The inspectors review of the radiological controls used by the licensee during the inventory project are discussed below.

(1) External Exposure Control and Monitoring

Prior to inventory initiation, the two licensee personnel involved in the inventory work discussed the inventory methods, familiarized themselves with transfer monster operations and conducted dry runs of the transfer process. Basic time, distance and shielding principles were utilized during the inventory process to reduce external exposure. RWPs were developed to prescribe the necessary radiological controls.

With the exception of wrist badges, the personnel monitoring equipment described in Section 4(c) was provided to the two workers involved. Additionally, a TLD and self-reading dosimeter (SRD) was worn on the ankle of one worker to assess lower extremity dose that occurred when sources are raised from the source garden into the transfer monster and later returned to the garden. About 70 mrem per week was received by the lower extremities during the source garden inventory in March 1993. The whole body and upper extremity doses incurred by licensee staff in the first quarter of 1993 are provided in Section 4(c). Although the licensee did not differentiate between dose that was accrued during the hot cell decontamination versus physical inventory projects, based on SRD data, the majority of dose accumulated during the first calendar quarter of 1993 did not result from physical inventory activities.

The external exposure control methods, practices and personnel dosimetry programs utilized by the licensee during the inventory project appear adequate.

(2) Contamination and Internal Exposure Control and Monitoring

All sources stored in the source garden were known to be sealed sources; consequently, the licensee did not anticipate significant contamination control problems in transferring them to the hot cell. However, since the physical condition of some of the older sources in the storage garden was unknown, the potential existed for a leaking and/or externally contaminated source. To evaluate this potential problem, the licensee continuously collected air samples from two fixed locations in the isotope shop. (The isotope shop is the area where the transfer process from source garden to hot cell took place.) Also, worker breathing zone samples were collected during insertion and removal of sources into the hot cell. However, since the licensee did not possess a portable continuous air monitoring system providing real time air concentration data, work environment airborne concentrations were not known until samples were analyzed subsequent to the work activity. The hot cell's transfer chute was contamination smear surveyed each time a source was removed from the cell, as an immediate indication of a potential contamination problem. Transfer chute surveys were not conducted, however, after insertion of sources into the cell. The licensee would perform personnel surveys (frisks) if contamination was suspected during the course of the day and upon egress from the radiologically controlled area (RCA). Full PCs minus head protection were worn by involved personnel.

Despite the contamination control measures described above, both workers discovered contamination on their heads and necks upon egress from the RCA at the end of work activities on Friday March 12, 1993. Frisks with a portable survey instrument identified about 300,000 disintegrations per minute (dpm) on the head of one worker and about 6500 dpm on a nasal smear. Contamination on the face and neck of the other worker was significantly less. Multiple sources were transferred from the source garden to hot cell and inventoried on that afternoon between personnel surveys; therefore, the licensee was unable to pinpoint the cause of the contamination event at the time.

Both workers were immediately decontaminated and arrangements were made for whole body count bioassays to take place the next work day at the University of Pittsburgh. Based on the magnitude and duration of the skin contamination, the maximum cobalt-60 beta skin dose to the head of one worker was determined by the NRC to be about 100 mrad. The gamma (deep) dose to the worker's head from the contamination was less than the skin dose. Whole body counts at the University of Pittsburgh on Monday, March 15,

1993, revealed a maximum intake of about 3 nanocuries of cobalt-60. No isotopes other than natural occurring potassium-40 were identified by the whole body counts. This maximum cobalt-60 intake equates to an airborne concentration less than 10% of the 40-hour control level of 10 CFR 20.103(b)(2).

The licensee learned after the event, that depleted uranium was used as shielding/encapsulation for certain competitor cobalt-60 sealed sources that it possessed, and that the depleted uranium readily oxidized over time. The oxidized depleted uranium was reported to appear as a black sooty material, which was observed in the hot cell by the licensee when a competitor's sealed source was inventoried on March 11 and another was inventoried late in the day on March 12, 1993. According to the licensee, the March 12, 1993 contamination event was likely caused by the source inventoried late in the day on March 12, which was externally contaminated with depleted uranium. However, based on the whole body count results, only cobalt-60 was involved in the contamination event and not depleted uranium. Also, the magnitude of the contamination identified on the workers was greater than what would be expected from oxidation of depleted uranium on the external surfaces of a source. Therefore, the NRC concludes that the source of the contamination problem remains unknown. The problem was more likely caused by a sealed source that was externally contaminated with cobalt-60 from its long term storage in the source garden, or became contaminated with cobalt when introduced into the hot cell. Although not confirmed through the performance of a leak test, source leakage may also have caused or contributed to the contamination event. The suspect competitor source was returned to the source garden after it was inventoried on March 12, 1993, where it continues to reside. The suspect source does not pose any further radiological hazard, provided it remains stored in the source garden.

To minimize the probability of similar contamination problems, the licensee expanded its contamination surveys and on March 16, 1993, began conducting hot cell transfer chute contamination smear surveys after each source transfer both into and out of the hot cell. The licensee also began wearing PCs with hoods. These additional control measures appeared to be effective since no additional contamination control problems reportedly occurred during completion of the source garden inventory.

One violation of regulatory requirements was identified.

6. Effluent Release Pathways, Mechanisms and Discharges

The inspectors evaluated the licensee's radioactive effluent management program, including an evaluation of release pathways, mechanisms and procedures, and a review of effluent discharge records. The licensee's operations generate two types of radioactive effluent: liquid effluent (radwaste) released to the sanitary sewer system and airborne particulate effluent released to the environment through the hot cell ventilation system stack.

Results of inspector review of these two effluent release pathways is provided below.

a. Liquid Effluent

- The London Road facility and its equipment was purchased by AMS from Picker Corporation in 1979. No significant changes were made to the facility's design by AMS upon its purchase, including those portions of the facility used for collecting and processing liquid radwastes.

AMS obtained an NRC license to possess radioactive material and began facility operations in November 1979. From 1979 through mid to late 1988, liquid radioactive waste was collected in two stainless steel holdup (settling) tanks located in the waste holdup tank room (WHUT) in the basement of the facility directly beneath the hot cell. The tanks have a total capacity of 600 gallons. A 500-gallon tank received waste water from the decontamination showers and sinks in the isotope shop locker room change area, an isotope shop sink and a washing machine used to launder protective clothing. A 100-gallon tank received waste water from the hot cell sink and floor drains, the decontamination room sink and floor drain and the isotope shop floor trench. Although not shown on facility plumbing blueprints, the current RSO believes that the hot cell sink drain connects to the floor drain discharge line. Documents which describe the AMS facility indicate that the tanks were interconnected so that the 100-gallon tank drained into the 500-gallon tank, if overfilled.

Based on the licensee's ISP-1 Procedure Manual, the WHUT room has no floor drains and the room is diked (curbed) to contain a capacity of approximately 2400-gallons of liquid. The floor drain and dike information was confirmed in a February 8, 1988 WHUT room decontamination plan, compiled by a licensee health physics contractor, Nuclear Support Services, Inc. (NSS). ISP-1 also states that all drains to the WHUT room tanks have screen filters, preventing solids of 1 mm or larger from passing into the tanks.

One of the licensee's previous RSOs stated that when the WHUT room was in use, waste water was pumped from the two WHUT room tanks into a 55-gallon steel batch tank (drum) located just outside the WHUT room in the back basement. The contents of the batch tank

were mixed and a small sample drawn and analyzed for compliance with regulatory limits, prior to discharge of the tank's contents through the back basement floor drain and into the sanitary sewer system.

Licensee sewer discharge logs indicate that on April 16, 1986, use of the 55-gallon batch tank was discontinued and replaced by a new 200-gallon plastic tank. The 200-gallon tank was and continues to be positioned in the front basement just outside the WHUT room. Although a previous RSO recalled that the 55-gallon batch tank was still positioned in the back basement in early 1988, it does not appear that it was used for batch releases to the sanitary sewer system since April 1986. The same RSO indicated that the 55-gallon tank was physically removed from its radwaste processing position sometime later in 1988.

In October 1988, as part of a major decontamination project at the facility, the NRC approved interim entombment of the WHUT room in lieu of decontamination at that time. The entombment was approved until December 31, 1994, to coincide with the next renewal of the AMS license. In mid-1988, the licensee began isolation of the WHUT room and completed its entombment in early 1989. The isolation and entombment was conducted pursuant to the aforementioned NSS Plan. A February 13, 1989 facility decontamination status report to the NRC stated that the WHUT room entombment had been completed. According to the February 8, 1988 NSS plan, all pipes, conduits and ductwork leading into the WHUT room were severed on the outside of the room and interior pieces were pushed into the room. Room penetrations were then sealed with concrete and silicon sealants. The access door to the WHUT room was sealed with brick and concrete blocks mortared together on the outside of the room and sprayed with epoxy sealants. Based on January 1988 NSS survey data and taking into account radioactive decay, the WHUT room and its tanks currently contain about 200-300 curies of cobalt-60 in the form of sediment. The tanks also likely contain liquids. There is no indication that the WHUT room floor was treated with sealant to provide a watertight seal or whether water remained in the room at that time or exists in the room today.

One of the licensee's previous RSOs indicated that during the WHUT room isolation process in 1988, discharge lines from the isotope shop sink and locker room change area showers, sinks and washing machine were re-routed into the 200-gallon plastic tank, rather than the 500-gallon WHUT room tank. The time frame recalled by the previous RSO appears fairly accurate since a licensee letter to the NRC dated February 8, 1988, states that discharges from the locker room change area were re-routed from the WHUT room. Also, during WHUT room isolation, discharge lines from the isotope shop floor trench and decontamination room sink and floor drain were disconnected and removed, eliminating further discharges into the 100 gallon WHUT room tank from these sources. The decontamination



room sink has been physically removed. However, the current RSO indicated that both the hot cell sink and floor drains remain unplugged and should the hot cell sink be used, the water could drain into the WHUT room. The cell plug and drain configurations could not be physically verified by the inspectors during the inspection.

Sometime during or shortly before WHUT room isolation, the licensee discontinued its use of water in the hot cell, decontamination room, and isotope shop and reverted to use of decontamination foam and paper toweling as its decontamination agent. The washing machine was physically removed after the licensee switched from cloth to plastic disposable PCs several years ago. Although the water supply to the hot cell sink is currently double valved closed and the licensee has no immediate plans for use of water in the cell, the potential exists for future liquid discharges into the WHUT room. To address this potential problem, the licensee agreed to maintain the water supply line valves closed and tag the valves to alert others to maintain them isolated. Other than use of the hot cell sink, the only other potential source of liquid radwaste that could result from facility operations is from the isotope shop sink or locker room change area showers or sinks, and those liquids drain to the 200-gallon tank in the front basement.

Since radioactive waste discharge lines were severed, removed and/or re-routed during WHUT room isolation, the 200-gallon plastic tank served as both a holdup tank, replacing the WHUT room tanks, and sanitary sewer batch release tank. Liquid radwastes from both the 55-gallon batch tank and later the 200-gallon batch/holdup tank were released to floor drains in the facility basement; the 55-gallon tank to the back basement floor drain and the 200-gallon tank to the front basement drain. Both drains are linked to a common line which discharges into the sanitary sewer system through the manhole on AMS property in front of the building.

The discharge pipe from the 200-gallon plastic tank is epoxied into the floor drain in the front basement, sealing the drain from other inputs. To prevent potentially contaminated water from inadvertently discharging to the sanitary sewer system through the back basement floor drain, the licensee installed a removable compression type plug in the floor drain. The primary function of the plug is to contain flood waters in the basement from flowing to the sewer system until sampled and analyzed by the licensee. Similarly, the license requires in Procedure Manual ISP-1 that the basement floor drain be temporarily plugged when the basement floor is washed (decontaminated), and the wash water vacuumed up and placed into the WHUT room holdup tanks. An August 1986 licensee contractor health physics survey report (Rad Services, Inc.) states that the basement floor drain was plugged at the time of their visit. As described later in this Section, a city sewer

backup in 1989 flooded the facility basement and the floor drain plug held the flood waters from back flowing into the city sewer system; however, the NRC is concerned that the existing removable compression plug could be inadvertently removed or may loosen and fail to function as intended. Consequently, the licensee should investigate options to replace the existing plug with one that ensures more reliability.

The licensee's London Road facility was constructed with two liquid effluent discharge lines which transfer effluent into the municipal sanitary sewer system. A four inch diameter discharge line used to convey radioactive liquid effluent from the front and back basement floor drains, and a fifteen inch line designed for discharge of clean (non-radioactive) liquids from all other sinks, toilets and drains in the facility. The two discharge lines meet at a common manhole just outside the entrance to the licensee's facility. Also joining that manhole is a connection from the building foundation drains and storm water drains. From there, the lines connect into the sewer below London Road. The details of the underground drain system were verified through review of the facility's original plumbing blue prints. To further verify liquid effluent discharge routes, during the inspection, a dye was placed into the facility's loading dock catch basin and visually verified that it drained to the London Road sewer and not one of the side street interceptors.

Based on licensee statements and discharge log records, no liquid radwaste has been generated or released to the sanitary sewer system since May 1989. Also, the licensee has stated that it does not plan to produce liquid radwaste in the future since water is no longer used in source manufacturing operations or in facility decontamination activities. Furthermore, the revised 10 CFR 20 prohibits discharges of licensed material to the sanitary sewer system that is not readily soluble (or dispersible biological material) in water. Due to the form of the cobalt-60 used, liquid radwastes generated by the licensee would not meet the new 10 CFR 20 criteria. Consequently, effective January 1, 1994, the licensee would no longer be authorized to release liquid radwastes containing cobalt-60 to the sanitary sewer system.

When the licensee purchased the London Road facility from Picker Corporation and obtained an NRC license in 1979, the Picker facility operating procedures were subsumed and incorporated into the AMS license. One of these procedures is ISP-12, "Release Of Liquid Waste Into Sanitary Sewerage System", governing release of liquid radwaste to the municipal sewer system. Another procedure, ISP-1, the facility procedure manual, requires that waste be pumped off the top of the WHUT room holding tanks, passed through a cloth filter to remove solids, and placed in the 55 gallon batch tank. ISP-1 has not been revised, however, to address the 200

gallon batch tank; in use since 1986. The inspectors were unable to verify if liquids pumped from the WHUT room tanks to the batch tank were filtered in any way.

ISP-12 currently requires the licensee to use actual facility water usage data from water bills, updated on a quarterly basis, to determine daily and monthly sewer discharge limits and demonstrate compliance with 10 CFR 20.303. Prior to each release to the sewer system, ISP-12 specifies that the batch tank's contents be mixed for five minutes, using a motor driven agitator (propeller) positioned near the bottom of the batch tank. After mixing, a sample is drawn using a water column sampling probe and discharged into a beaker. A 5 ml subsample is then required to be withdrawn from the beaker and analyzed using a well counter system. A 5 ml liquid cobalt-60 reference standard is used to determine well counter efficiency. An earlier (1983) version of ISP-12 required that the batch tank sample be drawn through the tank's sample valve. A schematic diagram of the batch tank in ISP-1 continues to show a sample drain valve near the bottom of the tank. Whether a water column sample probe or the sample drain valve was used for batch tank sampling was not resolved during the inspection. ISP-12 further indicates that if the product of the sample concentration and volume of liquid in the batch tank, divided by the facility's average daily water use is less than applicable 10 CFR 20.303 concentration limits, the tank's contents could be released to the sanitary sewer system. The licensee's discharge logs show that the licensee would also verify that the total cumulative activity discharged for the calendar year was less than the one curie limit of 10 CFR 20.303, prior to the discharge.

Inspector review of ISP-12 revealed several issues which are considered unresolved at this time. The filtering, mixing and sampling practices need to be further examined. The mixing practices and sampling techniques could introduce significant uncertainties into the quantities of licensed material reportedly released to the sewer system. While the current ISP-12 procedure appears adequate, until reviewed further, technical aspects associated with actual batch tank mixing/sampling are unknown.

During the inspection, the NRC and licensee split a sample of contaminated water for independent analysis and comparison. The NRC analyzed its sample using the gamma spectroscopy system in the mobile laboratory (described in Section 9) and the licensee used its well counter. NRC/licensee analysis results were comparable, differing by less than 5%. Based on the split sample analysis, the licensee has the capability to accurately determine the concentration of cobalt-60 in a liquid sample.

Inspector review of the licensee's sanitary sewer discharge log book disclosed that the licensee typically determined its facility's average daily water usage based on annual water bill

use records, not quarterly data as required by the current (1987) version of ISP-12. It is unclear if and when quarterly water usage data was applied to sanitary sewer discharges. The 1983 revision to ISP-12 required that average facility water usage be computed based on annual water bills. Until reviewed further, this matter also remains unresolved. Had quarterly water usage data been used to determine average daily use rates for the facility, the concentrations reported by the licensee as released to the sewer may have been underestimated during certain low water use periods. This was particularly true in the second quarter of 1983, where the licensee listed its water usage to be only 1000 cubic feet (i.e. 84 gallons per day average). However, this small volume of water reported to have been used is unlikely to be accurate, considering the size of the licensee's staff at the time, and appears to be an error in the licensee's water usage record. The licensee's facility used about 25,000 - 50,000 cubic feet of water in a typical calendar quarter in the 1980's. The NRC does not have specific requirements regarding the method for determining average daily and monthly water usage.

The inspectors reviewed batch tank analysis methods, resultant data and sewer disposal logs maintained by the licensee. Logs were available and reviewed for the period May 1980 to May 1989. Quarterly facility water usage information listed by the licensee for the period June 1981 to date was also reviewed and verified with water billing records, when available. The licensee's records showed that 121 batch tank releases were made to the sanitary sewer system, totaling 225 millicuries (mCi) of cobalt-60, from May 1980 through 1989. Specifically, ten batch tank releases were made to the sanitary sewer system in 1980, 5 in 1981, 4 in 1982, 37 in 1983, 8 each in 1984 and 1985, 20 in 1986, 12 in 1987, 16 in 1988 and one in 1989.

Additionally, records showed that the licensee released 3.2 mCi of cobalt-60 in a volume of about 5300 gallons of liquid to the sewer in May 1989, when a sewer backup flooded the basement of the licensee's facility. There is likely considerable uncertainty regarding the total quantity of licensed material released from the 1989 sewer backup, due to the problems in accurately calculating the volume involved and ensuring a representative sample was obtained for the analysis process. This issue will also be pursued further by the NRC. Records showed the May 1989 release to be the last discharge of liquid radwaste to the sanitary sewer system. Based on the licensee's records, the cumulative quantities of liquid effluent released to the sanitary sewer system in calendar years 1980-1989, satisfied 10 CFR 20.303 annual limits. However, based on the uncertainties and unresolved issues discussed above, the accuracy of the release data is uncertain and continues to be reviewed by the NRC. Annual release data obtained from licensee logs is graphically depicted in Figure I (attached).

Due to the potential for producing a large volume of liquid radwaste should a flood or other uncontrolled release of water into the facility basement occur, and the problem associated with obtaining a representative sample of liquids containing metallic cobalt-60, the NRC plans to split sample and independently analyze all future radwaste effluent to the sanitary sewer system prior to its release.

b. Airborne Particulate Effluent

The licensee's ventilation system maintains restricted area air flow negative with respect to surrounding unrestricted areas. Normal air flow with the ventilation system operable is from unrestricted areas, into the isotope shop, decontamination room and hot cell, up through the cell's high efficiency particulate air (HEPA) filtration system and subsequently released through the stack located atop the roof of the London Road facility. The hot cell ventilation system was redesigned by the licensee and a consultant, and a new improved system was installed and tested within the past year.

Stack effluent is monitored and sampled continuously by a system consisting of an MD-1, 1.4 mg/cm<sup>2</sup> end window geiger mueller (G.M.) probe linked to a Ludlum Model 177 ratemeter and strip chart recorder. Particulate samples are continuously collected on a filter paper which is changed and analyzed by the licensee at least monthly. The current stack monitoring and sampling system was designed, installed and its operating parameters analyzed in 1986 by one of the licensee's previous RSOs, with assistance from a consultant health physics group. System design parameters, specifications and current operating data were re-evaluated during this inspection, including the unresolved items previously identified in Inspection Reports No. 030-16055/90001(DRSS) and No. 030-16055/91002(DRSS). The inspectors determined the stack sampling system to be isokinetic, in that the velocity of air entering the sampling probe is equivalent to the actual stack flow (about 900 linear feet/minute). The inspectors also determined that sampling system line losses were not significant, based on ANSI N13.1-1969 criteria. Dioctyl phthalate (DOP) tests of the hot cell's HEPA filtration system in September 1992 showed filtration efficiency to be 99.99% for 0.3 micron particles. The stack alarm setpoint, however, was discovered to be set somewhat higher than desirable, as described below.

The stack monitoring system is currently set to alarm at 4000 counts per minute (cpm). Upon alarm, the ventilation system automatically shuts down and the licensee is contacted by its security vendor, which continuously monitors facility alarms. The alarm setpoint was derived by the licensee based on a previous determination of the stack monitor's probe efficiency (4% for cobalt-60). This alarm setpoint translates to a 24-hour effluent concentration equivalent to 10 CFR 20.106 limits. However, since

the monitoring system's G.M. probe efficiency is currently about 2.7% and not 4%, the licensee's stack alarm setpoint should be reduced to about 3000 cpm to better coincide with regulatory limits. This was discussed with the RSO during the inspection and the licensee agreed to lower the alarm threshold.

Based on evaluations performed by the inspectors and recent consultant tests of the ventilation system, the previously unresolved items (Inspection Reports No. 030-16055-90001(DRSS) and No. 030-16055-91002(DRSS)) associated with the licensee's stack monitoring and sampling system are closed.

As discussed above, the facility's HEPA filtered ventilation system effectively filters (traps) airborne particulates with a diameter in excess of 0.3 micron. The isokinetic sampling system installed in the hot cell exhaust stack continuously monitors the effectiveness of the filtration system by collecting particulate samples on fibrous media (i.e. filter paper). The filter paper is changed and analyzed by the licensee at least monthly. The analysis is conducted pursuant to Procedure ISP-8, "Air Monitor System Check" and ISP-4, "Well Counting Procedure". Calibration of the stack air monitor's G.M. probe is conducted quarterly pursuant to Procedure ISP-9, "Air Monitor Calibration". The latest in-situ calibration of the stack air monitor probe revealed the monitoring system's efficiency to be 2.7% for cobalt-60.

The inspectors reviewed the stack sampling system procedures and analysis methods and independently calculated several effluent release concentrations using the licensee's raw data. No significant problems were noted. However, the inspectors discovered that the licensee's computer program used to calculate effluent concentrations contained a conservatism factor of 4.8. This was unknown to the licensee. This overestimates the effluent release concentrations reported by the licensee by the value of this factor.

Licensee stack monitoring analysis records indicate that the average annual concentration of effluent released to the environment in calendar years 1980 - 1992 was less than applicable 10 CFR 20.106 limits. As reported in Inspection Report No. 030 - 16055/90001(DRSS), short term effluent concentrations would occasionally exceed 20.106 limits; however, when averaged over the calendar year (as permitted in the regulations), discharges were at or less than 18% of applicable limits. Average annual effluent release data obtained from licensee records is graphically depicted in Figure II (attached).

No violations of regulatory requirements were identified; however, a concern associated with a floor drain plug and two unresolved items were noted.

7. Area Surveys (Licensee)

The licensee routinely conducts direct reading and contamination (smear) surveys on monthly and semi-monthly frequency in restricted and unrestricted areas inside its London Road facility. Outside surveys are conducted by the licensee around the perimeter of its building on a quarterly basis. However, the NRC is concerned that building perimeter surveys are not necessarily conducted in a timely manner to identify changes in radiological conditions resulting from internal movement of sources and equipment. This concern is discussed further in Section 8(b).

The inspectors selectively reviewed records of the licensee's monthly and semi-monthly surveys conducted in 1993, and discussed the survey and documentation methods with the RSO. No significant problems were noted; however, the licensee's survey records do not routinely include localized areas of elevated radiation (hot spots), identified during the surveys. The licensee's survey records typically list only general area radiation levels. To address this concern, the licensee agreed to improve its survey documentation and record all hot spots identified during a survey, keyed to a schematic or map of the area. The licensee also committed to expand its surveys to include direct radiation measurements of floor drains, overhead pipe runs and wall penetrations.

No violations of regulatory requirements were identified. However, weaknesses in the licensee's area survey program were noted.

8. NRC Independent Surveys and Samples

The NRC inspection team conducted independent surveys throughout various restricted and unrestricted areas both inside and outside the licensee's facility, but within the site area boundary. Several types of samples were also collected and analyzed by the team. The survey and analysis equipment used by the NRC team is listed in section 9. Survey and sample analysis findings are described in the subsections below.

a. Inside Facility

NRC surveys included direct reading and contamination smear surveys throughout the facility, focusing in the basement and in other areas where liquid radwastes are generated, conveyed or stored. Surveys did not include the WHUT room which is sealed and inaccessible at this time. Water and/or sediment samples were also collected from floor drains and sink traps. Surveys consisted of measurements of discharge pipes used to transport radioactive liquids within the facility, floor drains, the holdup/batch tank in the front basement, and discharge pipes leading to the sanitary sewer system. No unusual or unexpected results were identified by the surveys or samples collected in restricted areas of the facility. However, small concentrations

of cobalt-60 were identified in a sink drain trap located in an unrestricted area of the facility. This finding is further described in the paragraph below.

The inspection team randomly surveyed sinks, drains and associated piping located in various unrestricted areas of the facility and not designated for radioactive discharges. No radioactivity above area background was identified, with one exception. A sediment sample collected from the trap of a mop sink located in an unrestricted area exhibited a cobalt-60 concentration of  $1 \text{ E-5 uCi/ml}$ . This concentration is about 35% of the 10 CFR 20.106 unrestricted area effluent release limit and 1% of the 20.303 sanitary sewer discharge limit. According to the RSO, this sink is used to discharge waste water from hallway and bathroom floor mopping and is not designated for discharge of radioactive liquids. The origin of the sink trap contamination is unknown but likely accumulated and concentrated in the trap sediment generated over several years of mop water discharges. Although the mop sink sample did not exhibit a cobalt-60 concentration in excess of unrestricted area effluent release or sanitary sewer discharge limits, the NRC is concerned that the licensee was unaware of its existence and origin.

b. Outside Facility

External radiation level measurements were taken in the parking lot on AMS property and at the perimeter fence-line, using instrumentation capable of measuring radiation levels at or below natural background. Levels measured in these areas varied between 5-15 micro Roentgen/hour and were indistinguishable from background levels measured in the surrounding neighborhood. Levels measured along the brush line near the southern edge of the AMS building ranged from 20-28 micro Roentgen/hour. The 10 CFR 20.105 regulatory limits for radiation levels in unrestricted areas are 2 milli Roentgen in any one hour and 100 milli Roentgen in any 7 consecutive days. The chain link fence surrounding the AMS property was examined and found to be intact. The fence is about eight feet high and topped with multiple strands of barbed-wire.

Surveys at waist level on the exterior surfaces of the AMS building revealed levels ranging from 5 micro Roentgen/hour up to 1200 micro Roentgen/hour. Levels were indistinguishable from background on the north, east and west walls, except for two isolated areas along the west wall which measured 40-80 micro Roentgen/hour. Surveys along the south wall revealed elevated levels ranging from 160-1200 micro Roentgen/hour along nearly the entire area, but within 10 CFR 20.105 regulatory limits. These elevated levels were attributed to cobalt-60 sources housed in teletherapy heads and source exchange containers located within the back warehouse portion of the building. According to the licensee, several of the heads and containers were moved from



other areas of the facility a few days earlier. The licensee was unaware of the elevated levels created along the south wall from these movements. During the inspection, several of the teletherapy heads and containers were relocated to other areas within the warehouse, reducing radiation levels along the south wall to less than 200 micro Roentgen/hour. To alleviate similar problems, the licensee committed to conduct surveys along the perimeter of its building, whenever source or equipment movement inside the facility could adversely affect radiological conditions outside.

In addition to the surveys described above, the inspection team collected a gravel sample from the roof of the AMS building near the stack, and five soil samples from within the site boundary. The soil samples were analyzed in the NRC mobile laboratory (Section 9) and exhibited cobalt-60 concentrations less than 0.5 picocuries/gram (pCi/g). The roof gravel sample showed a cobalt-60 concentration of 3.3 pCi/g. These results are equivalent to those measured by Oak Ridge Associated University during their surveys of the AMS facility in 1985 and 1988. These soil concentrations are within the NRC's unrestricted use release criteria.

External radiation level measurements, sediment samples and water samples were taken in the onsite combination sanitary and storm sewer manhole and two onsite catch basins. The manhole is located between the main entrance to AMS and London Road.

Radiation levels were measured at 70 micro Roentgen/hour at the top of the manhole increasing to 800 micro Roentgen/hour at about 3 feet from the bottom of the manhole. The highest contact radiation levels were from the outlet line going to the street, 11 mR/hour (11,000 micro Roentgen/hour), and the entry line from AMS into the manhole, 6 mR/hour (6000 micro Roentgen/hour).

Sediment samples from the manhole, as listed in the Table below, ranged from 790 to 73,500 pCi/g cobalt-60. Liquid samples from the manhole ranged from 5.9 to 16.4 pCi/g cobalt-60.

The radiation and contamination levels in the manhole are consistent with levels reported in the late 1980's when corrected for decay (cobalt-60 half-life = 5.27 yrs). Access into the manhole is controlled by the licensee with a padlocked grate and restricted area posting.

Sediment samples from two catch basins that collect storm water runoff on the AMS property showed no detectable activity in one and 2.5 pCi/g cobalt-60 in the other. The absence of any significant levels of cobalt-60 in the catch basins indicate that airborne releases by way of the ventilation system did not contaminate rain water runoff.

### Sample Analysis Results from Onsite Manhole and Catch Basins

The uncertainties reported are two standard deviations.

Sample Location	Sample Type	Results (pCi/g) Co-60
Floor drain line from AMS as it enters manhole - Sample #1	Sediment #1	73,500 $\pm$ 920
	Water decanted from Sediment #1	16.4 $\pm$ 0.56
Floor drain line from AMS as it enters manhole - Sample #2	Sediment #2	53,500 $\pm$ 640
	Water decanted from Sediment #2	10.2 $\pm$ 0.6
Floor drain line from AMS about 1 meter up the manhole discharge pipe	Sediment	787 $\pm$ 6.1
Floor drain line from AMS as it enters manhole	Water	5.9 $\pm$ 0.36
Outlet line from manhole to street	Sediment	1380 $\pm$ 22
Catch basin near loading dock	Sediment	2.5 $\pm$ 0.23
Catch basin at north edge of lot near Mandalay Ave	Sediment	none detected

No violations of regulatory requirements were identified. However, a concern regarding the presence of contamination in a sink drain was noted.

#### 9. NRC Survey and Analysis Equipment

The NRC Region III Mobile Laboratory was deployed to a secure site near the AMS facility, and its equipment was used for analysis of samples and smears collected by the inspection team. The survey instrumentation and analysis equipment utilized by the inspection team is listed below:

Ludlum Micro R Meters  
Model 19, NRC No. 11021 and No. 14808  
Last calibrated May 8, 1993 and May 13, 1993

Bicron Micro Analyst  
NRC No. 028330  
Last calibrated May 8, 1993

Eberline Ion Chamber  
Model PIC-6B, NRC No. 034628  
Last calibrated May 8, 1993

Eberline G.M.  
Model E-520, NRC No. 009571  
Last calibrated January 13, 1993

Canberra Model 802-3 Sodium Iodide 2x2-inch probe w/portable  
multi-channel analyzer Gamma Spectroscopy System

Ortec Gamma Spectroscopy System  
w/ Intrinsic Germanium Detector

10. Exit Meetings

a. Licensee

Members of the inspection team met with the licensee representatives denoted in Section I at the conclusion of the site inspection on May 27, 1993, and summarized the scope and preliminary findings of the inspection. Inspection findings were further discussed with the licensee in a telecon with Messrs Caniano, Madera and Slawinski of the Region III staff on July 29, 1993. The following violations, unresolved items and concerns identified during the inspections were discussed with the licensee:

Violation

- Failure to complete a physical inventory as required by license condition (Section 5(a)).

Concerns

- Failure to conduct building perimeter surveys to identify changing radiological conditions (Sections 7 and 8(b)).
- Reliability of removable drain plug in back basement (Section 6(a)).

- Potential for unmonitored release resulting from a flood or other uncontrolled entry of water into the facility and ability to obtain a representative sample of these liquid radwastes. (Section 6(a))
- Failure to document localized areas of elevated radiation in area survey records and routinely survey overhead piping, floor drains and wall penetrations (Section 7).
- Failure to identify and control the buildup of contaminated water/sediment in a sink drain resulting from floor moppings (Section 8(a)).

#### Unresolved Items

- Adequacy of Procedure ISP-12 with respect to batch tank mixing and sampling. (Section 6(a))
- Application of facility water usage (dilution) data to sanitary sewer discharges. (Section 6(a)).

In addition to the above, the licensee agreed to maintain the water supply line valves for the hot cell sink closed and tag the valves to ensure their continued isolation.

#### b. Public

An NRC Region III management representative, members of the inspection team and NRC's regional public and government affairs staff conducted a public exit meeting at the Holy Redeemer Roman Catholic Church on May 28, 1993. The purpose of the meeting was to: (1) discuss the preliminary findings of the onsite inspection, as described in Inspection Report No. 030-16055/93002(DRSS); (2) describe the results of surveys conducted by the inspection team in neighborhood areas surrounding the AMS facility, as described in Inspection Report No. 99990003/93010(DRSS); and (3) respond to questions from elected officials and the public.

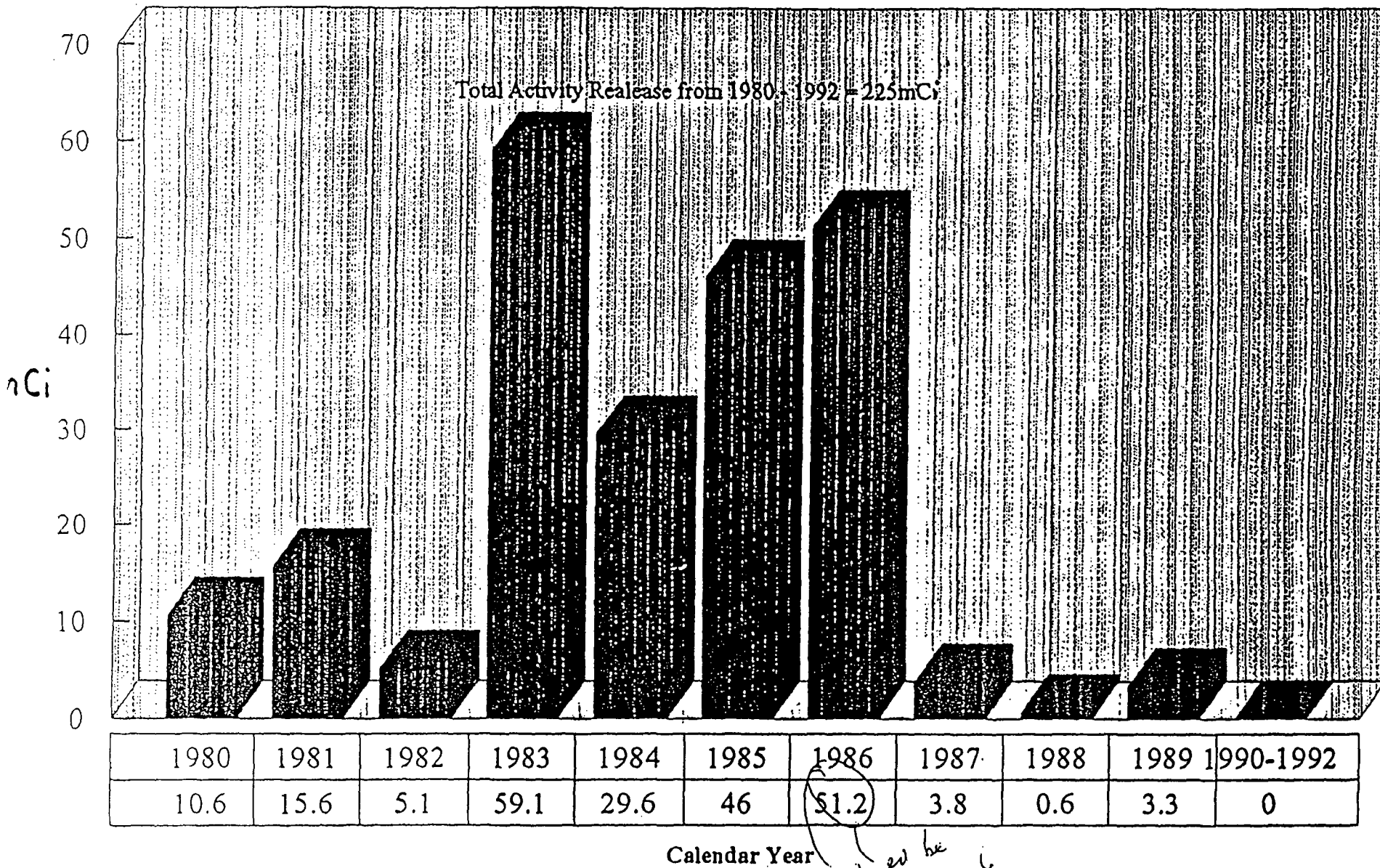
The public meeting was attended by state and local government officials, licensee representatives, several media representatives and approximately 25 members of the public that reside in the vicinity of the AMS facility.

#### Attachments:

Figure I-Sanitary Sewer Effluent Discharge Data  
Figure II-Airborne Effluent Discharge Data

# ADVANCED MEDICAL SYSTEMS

## Cumulative Sanitary Sewer Release Activity vs. Year

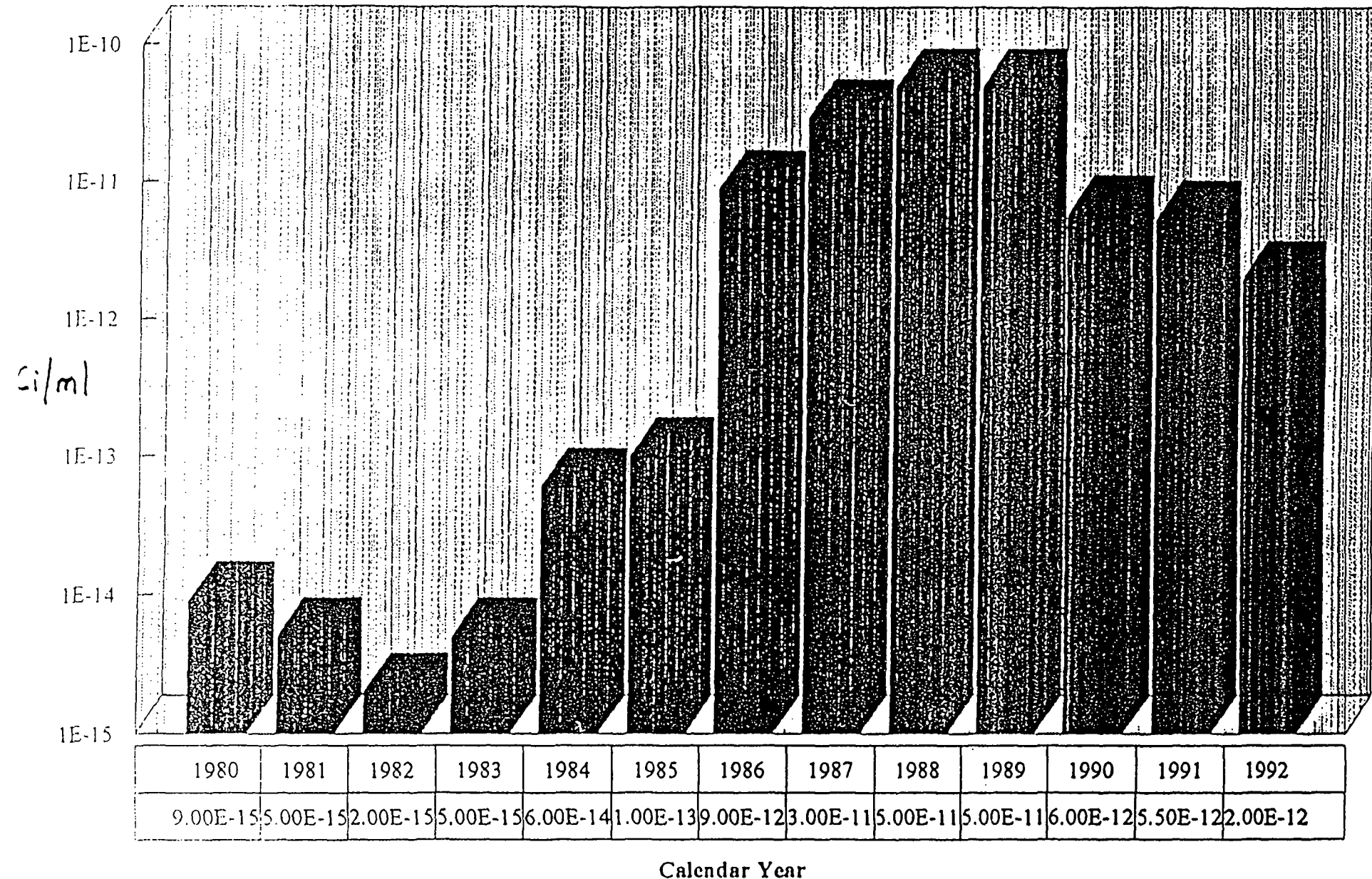


Calendar Year

should be  
35.6 mCi

# ADVANCED MEDICAL SYSTEMS

## Average Annual Stack Discharges vs. Year



United States Department of Commerce  
National Institute of Standards and Technology



ISO/IEC GUIDE 25:1990  
ISO/IEC GUIDE 58:1993  
ISO 9002:1994

Certificate of Accreditation



ATTACHMENT E

LANDAUER, INC.  
GLENWOOD, IL

*Is recognized under the National Voluntary Laboratory Accreditation Program for satisfactory compliance with criteria established in Title 15, Part 285 Code of Federal Regulations. These criteria encompass the requirements of ISO/IEC Guide 25 and the relevant requirements of ISO 9002 (ANSI/ASQC Q92-1987) as suppliers of calibration or test results. Accreditation is awarded for specific services, listed on the Scope of Accreditation for:*

IONIZING RADIATION DOSIMETRY

January 1, 1996

Effective until

  
For the National Institute of Standards and Technology

NVLAP LAB CODE: 0518

- C. The RSO shall periodically review individual exposure records and conditions under which the exposure was received.

## II. Extremity Exposure

- A. Extremity exposure shall be controlled within 90% of the limits of 10CFR20.1201.
- B. Personnel are responsible for tracking their exposure and maintaining their exposure within the administrative limits.
- C. The RSO shall periodically review individual exposure records and conditions under which the exposure was received.

## III. Internal Exposure

- A. Internal exposure is most likely to occur from work in areas of potential airborne contamination. This type of exposure shall be monitored by calculating DAC-hrs and intake for each individual working in any such area as follows:

concentration of air sample

$1.0 \times 10^{-8}$  uci/ml

x time in area = DAC-hrs

Time in area x  $2 \times 10^4$  ml/h x concentration of sample = Intake

- B. The administrative limit for Internal Exposure is 200 DAC-hrs/year. The sum of the External and Internal exposure should not exceed the administrative TEDE. In the event that these limits are exceeded, the RSO shall review all circumstances involved to determine any necessary actions.
- C. Individuals are responsible for maintaining their exposure within these limits.
- D. Internal exposure shall also be monitored by periodic Whole Body Counts performed by a commercial service. The WBC should be performed at least annually and in accordance with Regulatory Guide 8.9, "Acceptable Concepts, Models, Equations, and Assumptions for a Bioassay Program".

## IV. Exposure Control for Minors, Declared Pregnant Women and Members of the General Public



B. Action Levels for Restricted Areas

1. Surface contamination - 40,000 dpm/100cm<sup>2</sup> (except Hot Cell). Contamination levels exceeding this amount should be decontaminated. A survey of the decontamination results shall be documented and forwarded to the RSO for review and filing.
2. Radiation levels - Areas shall be posted in accordance with the levels stated above (i.e. Radiation Area, High Radiation Area or Very High Radiation Area). Where practical, sources of radiation shall be moved or shielded to maintain personnel exposure ALARA.
3. Airborne levels - Posting is required for areas that could exceed the levels defined in the definition of an Airborne Area. Portable air samples are required for entry into these areas. Respiratory protection may be required for entry into these areas.

C. Hot Cell Entry and Action Levels

1. The Hot Cell is the only accessible potential Very High Radiation Area within the Isotope Facility. Each entry requires a job specific Radiation Work Permit (RWP) and specific permission of the RSO. It is preferred that the RSO be on-site for all Cell entries. If the RSO is not available, the Senior Isotope Handler may supervise the Cell entry with prior specific authorization of the RSO.
2. The Hot Cell is surveyed remotely with a Victoreen Model 500 Ratemeter (or equivalent). Monitoring is performed continuously during all phases of source production and remote decontamination operations. Although Hot Cell operations have been very limited since January 1988, recent experience indicates that levels of 1,000mrem/minute or less should be maintainable during operations (source material in storage plugs).
3. Hot Cell entries shall be performed in accordance with ISP-11.

# ADVANCED MEDICAL SYSTEMS OPERATING PROCEDURE

## AREA SURVEY PROCEDURE

ISP-2 Rev. 05/95

Page 1 of 7

1.0 PURPOSE: To standardize the method used for performing radiation and contamination surveys.

2.0 PRECAUTIONS AND LIMITATIONS:

2.1 Observe all posted requirements for Restricted Areas.

2.2 Ensure survey instruments are in calibration and good working order prior to use.

2.3 Care must be used when handling smear samples to prevent spreading contamination or cross-contaminating samples.

2.4 The following information should be recorded for each survey performed:

ALL SURVEYS

Date  
Time  
Performed by  
Reason for survey  
Area surveyed  
Instrument(s) used  
(Serial #, Calibration due date)

CONTAMINATION SURVEYS

Background cpm  
Counter Efficiency  
Counting time

2.5 All surveys are Legal Records, therefore, it is of the utmost importance that all information is neatly and accurately recorded.

2.6 Do not hesitate to add additional information onto survey forms (i.e. oil on floor, lights burnt out, etc.).

---

Prepared by: Robert Meschter

Approved by:

Date:

---

### 3.0 INSTRUCTIONS:

#### 3.1 Radiation Surveys.

- 3.1.1 For general area dose rates, walk slowly around the area being surveyed while holding the probe at waist level. Record the highest dose rate in the appropriate units (normally mrem/hr).
- 3.1.2 For contact readings, hold the probe within one (1) inch of the surface and record the dose rate, noting that it is a contact reading.
- 3.1.3 All readings less than 0.1 millirem per hour should be recorded as  $<0.1\text{mrem/hr}$ .
- 3.1.4 For Hot Spot surveys, walk slowly around the area to be surveyed, determine the area of highest radiation, obtain a contact reading and record the location and dose rate.

#### 3.2 Contamination Surveys.

- 3.2.1 Using moderate pressure, wipe a dry smear over a  $100\text{ cm}^2$  area ( $100\text{ cm}^2 = 4" \times 4"$  area or a 16" long S-shape of that area).
- 3.2.2 Record the smear locations using one of the following methods:
  - a. List: Accurately record the location on a list of smear locations for the survey being performed.
  - b. Map: Use a number to indicate the smear location on a map of the area being surveyed. Smears should be noted on maps in the following manner:
    - Circle - horizontal surfaces
    - Square - vertical surfaces

#### 3.3 Action Levels.

##### 3.3.1 Loose Surface Contamination:

- a. Restricted Areas -  $40,000\text{ dpm}/100\text{ cm}^2$ .
- b. Controlled Areas -  $1,000\text{ dpm}/100\text{ cm}^2$ .
- c. Unrestricted Areas -  $1,000\text{ dpm}/100\text{ cm}^2$ .

3.3.2 Radiation Levels:

- a. Controlled Areas - 0.5mrem/hr general area.
- b. Unrestricted Areas - Not to exceed one hundred (100) mrem exposure to the general public in one (1) year, and not to exceed 2mrem in any one hour.

3.3.3 Actions required if limits are exceeded.

- a. Restrict access to the area.
- b. Notify the RSO.
- c. Determine the cause of the excess radiation or contamination levels.
- d. Decontaminate and resurvey.
- e. Shield or remove the source of radiation and resurvey.
- f. If the above actions cannot be accomplished before the end of the day, the area should be posted and secured according to the degree of the hazard.

NOTE:

In the event that levels cannot be immediately reduced, all actions taken should be recorded and forwarded to the RSO for review. The RSO shall conduct and document an investigation of the conditions and circumstances involved.

3.3.4 Frequency of Surveys.

- a. Controlled Areas should be surveyed semi-monthly.
- b. Restricted Areas should be surveyed at least monthly.
- c. Any area in which radioactive material is in use should be surveyed at least weekly, or more frequently as appropriate, or as directed by the RSO.
- d. Hot Cell after evolutions that could significantly alter the radiological conditions in the cell.

3.3.5 Areas to be Surveyed.

- a. The attached data sheets list the minimum areas to be surveyed. These surveys should be completed in their entirety at the specified frequency regardless of other surveys performed.
- b. Surveys performed in addition to the minimum areas and frequencies should be recorded on separate data sheets.
- c. All surveys should be forwarded to the RSO for review and filing.

## ISP-2A

<u>RAD</u>	<u>LEVEL</u>	<u>GCPM</u>	<u>CCPM</u>	<u>DPM</u>
1	1	1	1	1
2	2	2	2	2
3	3	3	3	3
4	4	4	4	4
5	5	5	5	5
6	6	6	6	6
7	7	7	7	7
8	8	8	8	8
9	9	9	9	9
10	10	10	10	10
11	11	11	11	11
12	12	12	12	12
13	13	13	13	13
14	14	14	14	14
15	15	15	15	15
16	16	16	16	16
17	17	17	17	17
18	18	18	18	18
19	19	19	19	19
20	20	20	20	20
21	21	21	21	21
22	22	22	22	22
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31	31	31	31	31
32	32	32	32	32
33	33	33	33	33
34	34	34	34	34
35	35	35	35	35
36	36	36	36	36
37	37	37	37	37
38	38	38	38	38
39	39	39	39	39
40	40	40	40	40
41	41	41	41	41
42	42	42	42	42
43	43	43	43	43
44	44	44	44	44
45	45	45	45	45
46	46	46	46	46
47	47	47	47	47
48	48	48	48	48
49	49	49	49	49
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51	51	51	51	51
52	52	52	52	52
53	53	53	53	53
54	54	54	54	54
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81	81	81	81	81
82	82	82	82	82
83	83	83	83	83
84	84	84	84	84
85	85	85	85	85
86	86	86	86	86
87	87			

1. Top Landing of Front Stairwell
2. Entrance Level of Stairwell
3. Basement Level of Stairwell
4. Outside Change Room Interlock Door
5. Manipulator Control Station
6. Cell Control Office
7. Hall in Front of Office
8. Doorway Outside Shielded Work Room
9. Conference Room - East
10. Conference Room - West
11. Hallway to Cage Area
12. Outside Airlock Doors
13. Outside Counting Room
14. South of Counting Station
15. Counting Station
16. West Doorway Inside Counting Room
17. Outside Isotope Warehouse Overhead Door
18. Loading Dock Area
19. Scale Area
20. Fire Door to Warehouse
21. East Side of LLWS Area (When in Use)
22. Middle of LLWS Area (When in Use)
23. West Side of LLWS Area (When in Use)
24. Outside Building Restricted Boundary  
(Rad only)

Performed by: \_\_\_\_\_ Date: \_\_\_\_\_

SURVEY METER: \_\_\_\_\_ S/N: \_\_\_\_\_ CAL DUE: \_\_\_\_\_

COUNTING INST.: \_\_\_\_\_ S/N: \_\_\_\_\_ CAL DUE: \_\_\_\_\_

COUNTING EFFICIENCY: \_\_\_\_\_ % BACKGROUND: \_\_\_\_\_ CPM

ACTION LEVELS: 1000 DPM/100CM<sup>2</sup>  
0.5MR/HR

Reviewed by RSO: \_\_\_\_\_ Date: \_\_\_\_\_

# CONTROLLED AREA SURVEY DATA SHEET

ISP-2B

<u>LOCATION</u>	<u>RAD LEVEL</u>	<u>GCPM</u>	<u>CCPM</u>	<u>DPM</u>
FIRST FLOOR				
1. Change Room Near Lockers	_____	_____	_____	_____
2. Change Room Near Showers	_____	_____	_____	_____
3. Change Room Near Sinks	_____	_____	_____	_____
4. Change Room Entrance to ISA	_____	_____	_____	_____
5. Warehouse Office - East	_____	_____	_____	_____
6. Warehouse Office - Center	_____	_____	_____	_____
7. Warehouse Office - West	_____	_____	_____	_____
8. Cage Area - East	_____	_____	_____	_____
9. Cage Area - Center	_____	_____	_____	_____
10. Cage Area - West	_____	_____	_____	_____
11. Outside Isotope Warehouse	_____	_____	_____	_____
SECOND FLOOR				
1. Outside Washroom Door	_____	_____	_____	_____
2. Office at Southeast Corner	_____	_____	_____	_____
3. East Wall Near Stairwell	_____	_____	_____	_____
4. Center of Office Area	_____	_____	_____	_____
5. Northwest Corner of Office	_____	_____	_____	_____
6. Outside Clean Equipment Room	_____	_____	_____	_____

Performed by: \_\_\_\_\_ Date: \_\_\_\_\_

SURVEY METER: \_\_\_\_\_ S/N: \_\_\_\_\_ CAL DUE: \_\_\_\_\_

COUNTING INST.: \_\_\_\_\_ S/N: \_\_\_\_\_ CAL DUE: \_\_\_\_\_

COUNTING EFFICIENCY: \_\_\_\_\_% BACKGROUND: \_\_\_\_\_CPM

ACTION LEVELS: 1000 DPM/100CM<sup>2</sup>  
0.5MR/HR

Reviewed by RSO: \_\_\_\_\_ Date: \_\_\_\_\_

# RESTRICTED AREA SURVEY DATA SHEET

ISP-2C

<u>LOCATION</u>	<u>HOT SPOT</u>	<u>RAD LEVEL</u>	<u>GCPM</u>	<u>CCPM</u>	<u>DPM</u>
1. HEPA Room North	_____	_____	_____	_____	_____
2. HEPA Room Middle	_____	_____	_____	_____	_____
3. HEPA Room South	_____	_____	_____	_____	_____
4. Stairs to HEPA Room	_____	_____	_____	_____	_____
5. Doorway to Washroom	_____	_____	_____	_____	_____
6. Doorway to Frisking Station	_____	_____	_____	_____	_____
7. Middle of Large Office	_____	_____	_____	_____	_____
8. Inside Doorway to Stairwell	_____	_____	_____	_____	_____
9. Inside Doorway of CER	_____	_____	_____	_____	_____
10. West of Boiler in CER	_____	_____	_____	_____	_____
11. Inside Doorway to Roof of CER	_____	_____	_____	_____	_____
12. Outside ISA Door	_____	_____	_____	_____	_____
13. ISA/Cell Wall	_____	_____	_____	_____	_____
14. ISA/Decon Room Wall	_____	_____	_____	_____	_____
15. West Wall Near SEC	_____	_____	_____	_____	_____
16. Source Garden	_____	_____	_____	_____	_____
17. Top Landing to Basement	_____	_____	_____	_____	_____
18. ISA/Landing to Basement	_____	_____	_____	_____	_____
19. Outside Basement Door	_____	_____	_____	_____	_____
20. Hallway Outside WHUT Room	_____	_____	_____	_____	_____
21. By WHUT Room Entrance	_____	_____	_____	_____	_____
22. North Side of Back Basement	_____	_____	_____	_____	_____
23. West Side of Back Basement	_____	_____	_____	_____	_____
24. Outside Decon Room Doors	_____	_____	_____	_____	_____
25. By Hot Cell Door in Decon Rm.	_____	_____	_____	_____	_____
26. Outside Airlock Doors	_____	_____	_____	_____	_____
27. Dirty Side of Airlock	_____	_____	_____	_____	_____
28. Clean Side of Airlock	_____	_____	_____	_____	_____
29. Inside Airlock Doors to Cage	_____	_____	_____	_____	_____
30. By Airlock Doors in Isotope Warehouse	_____	_____	_____	_____	_____
31. East of Isotope Warehouse	_____	_____	_____	_____	_____
32. Middle of Isotope Warehouse	_____	_____	_____	_____	_____
33. West of Isotope Warehouse	_____	_____	_____	_____	_____
34. Tank Room Front Basement	_____	_____	_____	_____	_____
35. Entrance Hall of Front Bsmt.	_____	_____	_____	_____	_____
36. Chart Room in Front Basement	_____	_____	_____	_____	_____
37. Back Entrance to Front Bsmt.	_____	_____	_____	_____	_____
38. HLWS Entrance Hall	_____	_____	_____	_____	_____
39. HLWS Center of Room	_____	_____	_____	_____	_____
40. ISA Restricted Roofs	_____	_____	_____	_____	_____
41. Outside Building Restricted Areas (Rad only)	_____	_____	_____	_____	_____

Performed by: \_\_\_\_\_ Date: \_\_\_\_\_

SURVEY METER: \_\_\_\_\_ S/N: \_\_\_\_\_ CAL DUE: \_\_\_\_\_  
 COUNTING INST.: \_\_\_\_\_ S/N: \_\_\_\_\_ CAL DUE: \_\_\_\_\_  
 COUNTING EFFICIENCY: \_\_\_\_\_% BACKGROUND: \_\_\_\_\_cpm  
 ACTION LEVELS: 40,000 dpm/100cm<sup>2</sup>

Areas >100MR/HR must be locked and posted as a High Radiation Area.

Reviewed by RSO: \_\_\_\_\_ Date: \_\_\_\_\_



B. Liquid Waste Storage and Processing Room

These rooms are sealed and will not be unsealed until their radiation levels are low enough to permit decontamination.

III. Accidents and Emergency Techniques

In the event of accidental leakage or spillage from potentially hazardous amounts of radioactive material, the following measures should be taken at once:

- A. Stop the leak or spill taking care not to put yourself in a hazardous situation. Notify the RSO as soon as possible.
- B. Where liquids or solids are involved, no immediate attempt should be made to clean up the area.
- C. Local exhaust ventilation should be maintained where radioactive gases are involved. Ask the RSO whether the building ventilating system should remain on.
- D. Everyone should leave the room and the doors should be closed and locked.
- E. If powdered sources are involved, the doors and all the other openings leading into the room should be sealed with wide masking tape or other suitable material.
- F. It shall be assumed that all personnel within the accident area have been contaminated until checked out with adequate monitoring equipment.
- G. Entrance to the Contaminated Area is prohibited until the RSO can be called in and his advice followed.

PROTECTIVE CLOTHING

The company furnishes a complete change of clothing which must be worn by any personnel performing work in a Restricted Area where radioactive contamination is known to exist or is suspected.

## CHAPTER 5 - TRANSPORTATION OF ISOTOPES

Transferring or shipping of licensed quantities of isotopes outside the company itself, should be authorized only by the Isotope Committee. Transportation of these isotopes to other areas, or from one area in the building to another, is permissible when such transportation procedures have been covered by the RSO in the initial programming of the work.

GENERAL TRANSPORTATION PROCEDURES

- A. All radioactive isotopes must be transported in containers that are suitably designed for use as temporary or permanent storage.
- B. If isotopes are in glass containers, transportation containers must be large enough to contain the volume of material should the glass break. If gases are involved, containers must have a tight seal.
- C. Material must never be left unattended during transportation between facilities.
- D. Whenever practical, transport isotopes through the building at periods of least congestion and use the most direct route practicable.
- E. All licensed by-product material being transported must be labelled as prescribed by current regulations.

SPECIFIC TRANSPORTATION PROCEDURES

- A. Receiving of Isotopes - All incoming shipments of radioisotopes are to be received at the London Road facility. Radiation monitoring of the article is required before removing from the truck. Operating procedure ISP-13 specifies the actions to be performed when isotopes are received.
- B. Shipment of Isotopes - Outgoing shipments of radioactive isotopes are to be prepared for transportation by individuals authorized under AMS's NRC license. All packages must comply with current NRC and Department of Transportation (DOT) regulations. Quality assurance procedure QA1014 specifies the actions to be performed when preparing a shipment. For depleted Uranium, refer to operating procedure ISP-21. Once properly packaged, any authorized AMS employee may release a radioactive shipment to the carrier.

# ADVANCED MEDICAL SYSTEMS OPERATING PROCEDURE

## AIR MONITOR SYSTEM CHECK

ISP-7 Rev. 05/95

Page 1 of 3

1.0 PURPOSE: To ensure that the air monitor system is functioning properly.

2.0 PRECAUTIONS AND LIMITATIONS:

2.1 This procedure is a routine safety check. It is to be performed monthly or any time there is an abnormal increase on the monitor.

2.2 The filter paper removed is to be considered a contaminated item. Proper handling procedures must be followed to limit personnel exposure and to prevent the spread of contamination.

2.3 The RSO is to be promptly notified of any system malfunctions.

3.0 INSTRUCTIONS:

3.1 Shut down the air sample vacuum pump.

3.2 Advance the filter paper and remove the old filter. Record the date and time on Form ISP-7A.

3.3 Restart the air vacuum pump.

3.4 Determine the total elapsed time (in minutes) since the last check was performed.

3.5 Calculate the total volume of air in milliliters.

Volume of air = Flowrate x Elapsed time.

Flowrate = 4 cfm or  $1.133 \times 10^5$  ml/min.

---

Prepared by: Robert Meschter

Approved by:

Date:

---

- 3.6 Count the old filter in a well counter and record the activity in cpm on Form ISP-8A.
- 3.7 Calculate activity per ISP-4.
- 3.8 Calculate the average concentration of activity in the discharged air as follows:
- $$\text{uCi/ml} = \frac{\text{filter cpm} - \text{bkg cpm}}{(\text{total volume})(2.22 \times 10^6)(C_{\text{eff}})}$$
- 3.9 The average concentration of discharged air should not exceed  $5 \times 10^{-11}$  uCi/ml. Notify RSO if 10% of this value is exceeded.
- 3.10 Record all information of Form ISP-7A and submit the form to the RSO for review.

# AIR MONITOR SYSTEM CHECK

ISP-7A

## SAMPLE DATA

DATE: \_\_\_\_\_ TIME: \_\_\_\_\_

DATE LAST CHECK: \_\_\_\_\_ TIME: \_\_\_\_\_

TOTAL ELAPSED TIME: \_\_\_\_\_ minutes

TOTAL VOLUME: \_\_\_\_\_ milliliters

## COUNTING DATA

COUNTER: \_\_\_\_\_ SER #: \_\_\_\_\_ CAL DUE: \_\_\_\_\_

EFF: \_\_\_\_\_ BKG: \_\_\_\_\_ MDC: \_\_\_\_\_ \*

COUNTED BY: \_\_\_\_\_ DATE/TIME: \_\_\_\_\_

GCPM: \_\_\_\_\_ CCPM: \_\_\_\_\_ ACTIVITY: \_\_\_\_\_ uCi/ml

$$\text{ACTIVITY} = \frac{\text{CCPM}}{(2.22 \times 10^6)(C_{\text{eff}})(\text{volume})}$$

ACTION LEVEL >  $5 \times 10^{-12}$  uCi/ml - NOTIFY RSO.

COMMENTS: \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

\*Ref: ISP-4

Performed by: \_\_\_\_\_ Date: \_\_\_\_\_

Reviewed by RSO: \_\_\_\_\_ Date: \_\_\_\_\_

# ADVANCED MEDICAL SYSTEMS OPERATING PROCEDURE

## AIR MONITOR CALIBRATION

ISP-8 Rev. 05/95

Page 1 of 2

1.0 PURPOSE: To ensure that the air monitor system is functioning properly.

2.0 PRECAUTIONS AND LIMITATIONS:

2.1 This procedure is a routine safety check. It is to be performed quarterly.

2.2 Use care when handling source to prevent damage.

3.0 INSTRUCTIONS:

3.1 Notify ADT prior to performing this procedure.

3.2 Set alarms at the maximum set points to avoid spurious alarms.

3.3 Record background level for ten (10) minutes by removing probe from air monitor. Use extreme caution to protect the probe and associated wiring from damage.

3.4 Set the ratemeter to X10 range.

3.5 Place the source against the probe face and allow the system to record for ten (10) minutes.

3.6 Determine detector efficiency ( $C_{eff}$ ) as follows:

$$C_{eff} = \frac{\text{Source cpm} - \text{Background cpm}}{\text{dpm of Source}}$$

3.7 Compare the ratemeter, chart recorder and ampmeter for similar readings.

---

Prepared by: Robert Meschter

Approved by:

Date:

---

3.8 Set the alarm trip points to a value slightly below the source readings and verify proper alarm responses on the Master Alarm Panel and ADT Control Panel.

3.9 Remove the planchet source, replace the probe and set the alarm set point as follows:

Sample Volume (SV) is based on continuous operation for twenty four (24) hours at four (4) cfm, therefore;

$$SV = 4 \frac{\text{cf}}{\text{min}} \times 24 \text{ hrs} \times \frac{60 \text{ min}}{\text{hour}} \times 2.83 \times 10^4 \frac{\text{ml}}{\text{cf}} \quad \text{or,}$$

$$\text{Sample Volume} = 1.63 \times 10^8 \text{ milliliters}$$

$$C_{cpm} = (1.0 \times 10^{-8})(SV)(2.22 \times 10^6)(C_{eff})$$

10% of  $C_{cpm}$  is the value above background that the alarm set point should be set.

3.10 Report any discrepancies to the RSO immediately for the appropriate actions or repairs.

NOTE: The ratemeter is calibrated separately every six (6) months.

# ADVANCED MEDICAL SYSTEMS OPERATING PROCEDURE

## ENTERING THE HOT CELL

ISP-11 Rev. 05/95

Page 1 of 4

- 1.0 PURPOSE: To provide for proper evaluation of the radiation hazard to personnel and to insure that all work performed is planned before exposure takes place.
- 2.0 PRECAUTIONS AND LIMITATIONS:
  - 2.1 This procedure is to be followed each time the Hot Cell door is opened.
  - 2.2 The Hot Cell is a Restricted Area of high activity. All safety procedures are to be followed in order to keep personnel exposure ALARA.
  - 2.3 This procedure requires a minimum of three (3) individuals.
    1. One to enter the Hot Cell.
    2. One to act as an assistant.
    3. One in the Cell Control Area to monitor activities and time.
  - 2.4 Badges, dosimeter and survey meter should be sealed in plastic bags to prevent contamination.
  - 2.5 The RSO should be physically present to supervise the operation and to verify that the Hot Cell entry operation is reasonably safe to prevent an overexposure. If the RSO is not available, the senior isotope handler may supervise the cell entry with prior specific authorization of the RSO.

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Prepared by: Robert Meschter

Approved by:

Date:

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- 2.6 No individual should enter the Hot Cell unless they have been adequately trained to this procedure, and the RWP written for the entry.
- 2.7 An RWP is required for all work inside the Hot Cell.
- 2.8 Minimum dosimetry requirements are 0-200 MR SRPD, 0-5R SRPD, film badge, alarming dosimeter, extremety badge.

### 3.0 INSTRUCTIONS:

#### 3.1 Preparations for an Entry

- 3.1.1 All sources or source material must be placed in the shielded floor containers and the container lids put in place.
- 3.1.2 The Hot Cell should be remotely decontaminated as completely as practicable. The remote manipulators should be used to wipe all accessible areas as appropriate.
- 3.1.3 Remove all waste that can be passed out through the Hot Cell ports.
- 3.1.4 An air sample should be taken as per ISP-9.
- 3.1.5 Perform a radiation survey of the expected work area(s) using a remote instrument and probe (or equipment as appropriate).
- 3.1.6 A plan of action shall be formulated and approved by the RSO. It must include the following:
  - a. The tasks to be performed should be evaluated to minimize personnel exposure.
  - b. Personnel radiation exposure records should be reviewed to insure that the exposure limits of 10CFR20.1201 will not be exceeded. The alarming dosimeters will be set to alarm at an accumulated dose equal to one half ( $1/2$ ) (4500mrem minus total dose for the year) or as determined by the RSO. When the alarming dosimeter alarms, the individual should immediately leave the Hot Cell and not reenter until the exposure is assessed and a determination is made that it is safe to reenter.

- c. Individuals will be assigned specific tasks to perform.

- 3.1.7 The plan of action will be reviewed with all participants. As needed, additional training will be offered in the proper techniques to be used as well as in the operation of equipment.

### 3.2 Opening the Hot Cell

- 3.2.1 Maintain communications via intercom for the complete entry.
- 3.2.2 Open the Hot Cell door. This requires simultaneous operation of the two (2) interlock switches - one on the Hot Cell door and one in the Cell Control Area.
- 3.2.3 Verify radiation levels by taking a survey meter reading at the door opening. If the radiation level is less than 20Rem/hr, work may proceed.

**CAUTION:** If the reading is greater than 20Rem/hr, then the door must be closed immediately and personnel must withdraw to the Isotope Shop Area. Further efforts to remotely decontaminate the Hot Cell will be made. If this fails, all further action must be submitted to and approved by the Chairman of the Isotope Committee.

### 3.3 Entering the Hot Cell

- 3.3.1 Unless unavoidable, only one individual should be in the Hot Cell at any particular moment.
- 3.3.2 The time that an individual is in the Hot Cell should be monitored by the individual in the Cell Control Area.
- 3.3.3 Personnel should monitor exposure periodically as directed by the RSO.
- 3.3.4 Complete the work assignment.

3.4 Close the Hot Cell Door

- 3.4.1 Protective clothing is to be removed on the contaminated side of the step-off pad.
- 3.4.2 Perform a whole body frisk at determined frisking station.
- 3.4.3 Notify the RSO of any abnormalities.

# ADVANCED MEDICAL SYSTEMS OPERATING PROCEDURE

## EXHAUST FILTER CHANGE IN THE CELL MACHINERY ROOM

ISP-12 Rev. 05/95

Page 1 of 4

- 1.0 PURPOSE: To provide a detailed description of a routine maintenance task that must be performed in a High Radiation Area. To insure that proper protective measures are taken.
- 2.0 PRECAUTIONS AND LIMITATIONS:
  - 2.1 This procedure is to be followed each time the filters are changed.
  - 2.2 The Cell Machinery Room is a Restricted Area of relatively high activity. Changing filters may create high levels of airborne contamination.
  - 2.3 This procedure requires a minimum of two (2) individuals.
    - a. One to enter the Cell Machinery Room.
    - b. One who remains outside and acts as an assistant.
  - 2.4 A breathing zone air sample shall be taken during the entire working period.
  - 2.5 Film badges, dosimeters and survey meter must be sealed in plastic bags to prevent contamination.
  - 2.6 A specific RWP is required for this job.

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Prepared by: Robert Meschter

Approved by:

Date:

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2.7 HEPA filters (or prefilter as appropriate) should be changed when intake plenum housing reads  $\sim 3000\text{mrem/h}$  or a D.P. of 3" W.G. whichever comes first.

2.8 The RSO or designee shall monitor this entire operation.

### 3.0 INSTRUCTIONS:

3.1 Ensure all isotopes in the Hot Cell are removed or placed in the shielded floor containers.

3.2 Tape plastic or wrapping paper over the landings and steps immediately outside the Cell Machinery Room.

3.3 All doors in the area shall be kept closed at all times except for necessary passage of personnel or equipment and supplies.

3.4 Enter the room and evaluate the radiation level using a calibrated high range detector. A pre-entry air sample is not required for this particular job. The individual acting as the assistant also monitors the time.

3.5 Notify ADT that the fans will be shut down.

3.6 Begin the breathing zone air sample.

3.7 Re-enter the room and commence work.

3.8 With the fans running, the exposed ductwork on the intake side of the filters should be tapped to loosen dust particles. The fans will draw the particles into the filters.

3.9 Shut down the Hot Cell fans.

3.10 Filter removal.

3.10.1 Remove the bolts from the side to the Hot Cell HEPA shroud. Take care not to drop the shroud cover.

3.10.2 Carefully remove the prefilter on the right side of HEPA by sliding it toward you.

3.10.3 Place the prefilter in a plastic bag.

3.10.4 Remove the top and bottom latches for the HEPA filter.

- 3.10.5 Draw the filter out, placing the pre-cut cardboard cover on the intake side.
  - 3.10.6 Place the filter into a plastic bag held by the assistant at the doorway. Take care not to contaminate the outside of the bag by allowing it to be touched by either the filter or the individual inside the room.
  - 3.10.7 Seal the bag and place it in a special radioactive filter box.
  - 3.10.8 The assistant now seals the box and sets it on a piece of paper as far away as possible.
- 3.11 Record personal dosimeter readings and resurvey the area. The RSO will review these readings and authorize further work.
- 3.12 Filter installation.
- 3.12.1 The new filter is passed into the room and installed, paying close attention to the proper direction of airflow.
  - 3.12.2 Install a new prefilter.
  - 3.12.3 Bolt the filter into place, grease the fan motor and examine the belts for proper tension and wear. Replace the belts, if necessary.
  - 3.12.4 Place the fan back into operation. Verify that it is operating properly. Check the pressure differential and record the reading.
- 3.13 Shut down the Lab exhaust fan.
- 3.14 Repeat steps 3.10, 3.11 and 3.12.
- NOTE: The filters for this fan are a bank of four (4) in a 2 X 2 array, mounted on a cart which rolls out from the shrouds. When the new filters are installed, it is necessary to tape the joints between filters to prevent leakage.
- 3.15 Stop the breathing zone air sample, remove the filter paper and package for evaluation.
- 3.16 Job completion.
- 3.16.1 Remove trash and tools from the area.

- 3.16.2 Remove protective clothing and place it in the waste receptacle inside the HEPA Room. Step out of the area and shut the door.
- 3.16.3 Place respirator in a separate bag and seal the bag.
- 3.16.4 Place the shoes in a third plastic bag and seal the bag.
- 3.16.5 Put on clean coveralls.
- 3.16.6 Carefully remove the taped down paper or plastic and seal it inside a plastic bag.
- 3.16.7 Place all waste bags inside waste disposal cartons and seal the cartons.
- 3.16.8 Perform a whole body frisk before leaving the area.
- 3.16.9 Proceed to the Locker Room for removal of coveralls, another whole body frisk and donning of street clothes.
- 3.16.10 Notify ADT that the fans are again operational.
- 3.16.11 Perform a contamination survey of the steps to the Cell Machinery Room, the floor of the outer area and in any other area where personnel involved in this operation may have walked.

# ADVANCED MEDICAL SYSTEMS OPERATING PROCEDURE

## ALARA PROGRAM

ISP-14 Rev. 05/95

Page 1 of 5

- 1.0 PURPOSE: AMS is committed to keeping exposures (individual and collective) As Low As Reasonably Achievable (ALARA). In accord with this commitment, we hereby describe an administrative organization for radiation safety. The organization will include an Isotope Committee and a Radiation Safety Officer (RSO).
- 2.0 PRECAUTIONS AND LIMITATIONS:
- 2.1 Modifications to operating and maintenance procedures and to equipment and facilities will be made where they will reduce exposures unless the cost, in our judgement, is considered to be unjustified. We will be able to demonstrate, if necessary, that improvements have been implemented where reasonable. Where modifications have been recommended but not implemented, we will document the reasons for not implementing them.
- 2.2 In addition to maintaining doses to individuals as far below the limits as is reasonable achievable, the sum of the doses received by all exposed personnel will also be maintained ALARA. It would not be desirable, for example, to hold the highest doses to individuals to some fraction of the applicable limit if this involved exposing additional people and significantly increasing the sum of radiation doses received by all involved individuals.
- 2.3 We will inform our personnel of our commitment to the ALARA concept.

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Prepared by: Robert Meschter

Approved by:

Date:

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### 3.0 INSTRUCTIONS:

#### 3.1 Isotope Committee

- 3.1.1 The Isotope Committee should include representatives from management, safety, engineering, purchasing and the RSO.
- 3.1.2 The Isotope Committee should meet quarterly.
- 3.1.3 Duties and responsibilities.
  - a. Be familiar with all pertinent NRC regulations, the terms of the license, its amendments and supporting documents.
  - b. Determine the need for license amendments, review the content of all proposed amendments and insure that the license is amended prior to implementation of changes.
  - c. Review and approve all requests for purchase and use of radioactive material within the company.
  - d. Review the qualifications of all individuals who use radioactive material to insure that they are capable of performing their duties safely and in accordance with the regulations and the conditions of the license.
  - e. Delegate to the RSO the authority to enforce safe plant operation and the ALARA Program.
  - f. Support the RSO in those instances where it is necessary to assert his authority. Where the RSO has been overruled, the Isotope Committee will record the basis for action in the minutes of the quarterly meeting.
  - g. Encourage all employees to review current procedures and develop new procedures, as appropriate, to implement the ALARA concept.

- h. Perform a quarterly review of occupational radiation exposure. The principal purpose of this review is to assess trends in occupational exposure as an index of the ALARA Program quality and to decide if action is warranted.
- i. Evaluate the company's overall efforts for maintaining exposures ALARA on an annual basis. This review will include the efforts of the RSO, authorized users and workers as well as those of management.
- j. Recommend remedial action to correct any deficiencies identified in the radiation safety program.
- k. Maintain written records of all committee meetings, actions, recommendations and decisions. The RSO should retain the records.
- l. Relative to the isotope operation, approve all new operating procedures or changes to existing operating procedures.

### 3.2 Radiation Safety Officer (RSO)

- 3.2.1 The RSO shall have knowledge of the origin of radiation exposures in the facility.
- 3.2.2 Periodic reviews.
  - a. Perform an annual review of the radiation safety program for adherence to ALARA concepts. Reviews of specific procedures may be conducted on a more frequent basis.
  - b. Review at least quarterly the radiation exposures of authorized users and workers to determine that their exposures are ALARA.
  - c. Review radiation level survey records quarterly. The RSO will review the radiation levels in Controlled and Restricted Areas to determine that they were at ALARA levels during the previous quarter.

3.2.3 Education responsibilities for ALARA Program.

- a. The RSO will schedule briefings and educational sessions to inform workers of ALARA Program efforts when appropriate.
- b. The RSO will ensure that authorized vendors, workers and ancillary personnel who may be exposed to radiation will be instructed in the ALARA philosophy and informed that management, the Isotope Committee and the RSO are committed to implementing the ALARA concept.

3.2.4 Cooperative efforts for development of ALARA procedures.

- a. The RSO will be in close contact with all users and workers in order to develop ALARA procedures for working with radioactive materials.
- b. The RSO will establish procedures for receiving and evaluating the suggestions of individual workers for improving health physics practices and will encourage the use of those procedures.

3.2.5 Reviewing instances of deviation from good ALARA practices.

- a. The RSO will investigate all known instances of deviation from good ALARA practices, and if possible, will determine the causes. When the cause is known, the RSO will evaluate changes in the program to maintain exposures ALARA.

3.2.6 Equipment and supplies.

- a. The RSO is responsible for insuring that proper equipment and supplies are available, maintained in good working order and are used properly.

3.3 Persons Who Receive Occupational Radiation Exposure

- 3.3.1 The workers will be instructed in the ALARA concept and its relationship to working procedures and work conditions.
- 3.3.2 The workers will know what recourses are available if they feel that ALARA is not being promoted on the job.

# ADVANCED MEDICAL SYSTEMS OPERATING PROCEDURE

## CONTROL OF TRANSIENT COMBUSTIBLES

ISP-15 Rev. 05/95

Page 1 of 8

- 1.0 PURPOSE: To establish the administrative controls for the use of essential transient combustible materials, the temporary staging of transient combustibles and control of hot work (i.e., welding and cutting operations).
- 2.0 PRECAUTIONS AND LIMITATIONS:
  - 2.1 This procedure applies to transient combustible materials placed or staged inside a Controlled Area.
  - 2.2 Limitations and controls are placed on transient combustibles to avoid unnecessary fire hazards and to prevent overtaxing fire suppression capability.
  - 2.3 The handling, use and temporary staging of ordinary transient combustible materials or other combustible supplies shall be governed by the RSO.
  - 2.4 The RSO is responsible for control of transient combustibles and hot work in Restricted Areas.
  - 2.5 The RSO is responsible for review of designated storage areas to determine limitations of existing fire protection features and/or recommend additional fire protection features.

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Prepared by: Robert Meschter

Approved by:

Date:

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### 3.0 INSTRUCTIONS:

#### 3.1 Transient Combustibles

##### 3.1.1 General provisions for the use of transient combustibles are as follows:

- a. Transient combustibles should be removed or protected from ignition sources in all areas.
- b. In accordance with radwaste ALARA concerns, combustible packing materials should be removed or containerized prior to transport of the item into its appropriate storage area.
- c. The use and storage of flammable and/or combustible liquids, such as copier toner and cleaning supplies, and ordinary combustibles in office areas do not require authorization by the RSO. Flammable/combustible liquids in office areas must be in their original shipping container or other approved flammable liquid container.

##### 3.1.2 The following areas should be reviewed by the RSO prior to staging transient combustibles. In all cases, the staging is for work to be performed and not for storage of transient combustibles.

- a. Isotope Shop Area.
- b. Hot Cell Ventilation Room.
- c. Clean Equipment Room.
- d. Decontamination Room.
- e. Basement Areas.
- f. Isotope Airlock.

#### 3.2 Special Requirements for Handling Flammable Liquids

##### 3.2.1 All AMS employees must follow the guidelines for handling flammable liquids.

- a. When flammable liquid is being dispensed, a well ventilated area, free from possible ignition, should be provided between the dispensing equipment and the container being filled.
- b. All spills involving flammable liquids must be disposed of quickly and safely by appropriate means such as absorption and cleaning. Spills should be reported to the RSO immediately.

NOTE: Any material used to clean a spill should be disposed of properly.

- c. While flammable liquids are not being used, the contents should remain covered in their containers.
- d. Smoking should not be permitted in any area where flammable liquids are stored or handled.
- e. UL listed safety cans should be used for storing and dispensing small quantities of flammable liquids in the facility.
- f. When not in use, safety cans containing flammable liquids should be stored in a flammable liquids storage cabinet. Cabinets shall be labeled in conspicuous lettering "Flammable Storage Cabinet".

### 3.3 Special Requirements for Handling Flammable Gases

#### 3.3.1 All AMS employees must follow the guidelines for handling flammable gases.

- a. In areas where flammable gases are used and/or handled, smoking should not be permitted.
- b. Flammable gases should be removed from the buildings or returned to a designated storage area upon completion of the job activity.

3.4 Special Requirements for Handling Flammable/Combustible Materials

- 3.4.1 Ordinary combustible limits, up to one hundred (100) pounds, are intended to identify single trash collection containers that are emptied on a regular basis. Ordinary combustibles staged to support job activities must be stored in non-combustible containers and removed at the completion of the job activity.
- 3.4.2 Protective clothing limits, up to fifty (50) sets, are intended to allow short term staging of protective clothing only when immediately needed to support non-routine work activities.
- 3.4.3 To allow for decontamination of the Hot Cell and associated equipment, approximately one (1) box of cleaning towels can be in the Hot Cell. To reduce ignition sources during source-handling related activities, the paper towels should be removed or stored in covered containers to prevent ignition.
- 3.4.4 The RSO or designee should be contacted anytime flammable/combustible materials are staged in safety-related areas to determine the need for authorization.

3.5 Designated Storage Areas

- 3.5.1 AMS personnel in need of designated storage areas should notify the RSO for instructions.
- 3.5.2 The RSO or designee should inspect areas where combustibles are stored, on a monthly basis, to ensure that all containers are properly sealed.
  - a. This inspection should be documented on Form ISP-15A and Form ISP-15B.
  - b. Any deficiencies should be documented on Form ISP-15C.

3.6 Conducting Hot Work

- 3.6.1 All personnel should notify the RSO prior to commencing any hot work at the London Road facility. Under most circumstances, a fire watch will be utilized.



- 3.6.2 The primary responsibility of the fire watch is to ensure the hot work does not cause ignition of any material other than what is being worked on. This responsibility relates to the area of work and adjacent areas (i.e., other sides of walls, if the potential exists).
- 3.6.3 The fire watch should use appropriate protective devices and have an appropriate fire extinguisher. The fire watch should not look at flame or welding arc.

# MONTHLY FIRE INSPECTION LOG

ISP-15A

## FIRST FLOOR

	1		2		3		4		5		6		7		8	
	S	U	S	U	S	U	S	U	S	U	S	U	S	U	S	U
Area/Floor																
Electrical																
Housekeeping																
Non-Designated Storage																
Trans. Comb. Containment																
Fire Protection Equipment																
Observed Conditions																
Miscellaneous																

*Isotope Shop should be inspected in conjunction with Restricted Area survey.*

### Area Description:

1. Isotope Shop, High Level Storage and Locker Room Area.
2. Cell Control Office Area.
3. Conference and Office Area.
4. Isotope Warehouse Area.
5. Loading Dock Area.
6. Cage and Count Room Area.
7. Large Warehouse Area.
8. Storage Office Area.

Comments: \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_

Performed by: \_\_\_\_\_ Date: \_\_\_\_\_

Reviewed by RSO: \_\_\_\_\_ Date: \_\_\_\_\_

# MONTHLY FIRE INSPECTION LOG

ISP-15B

## SECOND FLOOR, BASEMENT, ATTIC

	1		2		3		4		5		6		7		8	
	S	U	S	U	S	U	S	U	S	U	S	U	S	U	S	U
Area/Floor																
Electrical																
Housekeeping																
Non-Designated Storage																
Trans. Comb. Containment																
Fire Protection Equipment																
Observed Conditions																
Miscellaneous																

*Basement, HEPA Room and Clean Equipment Room should be inspected in conjunction with Restricted Area survey.*

### Area Description:

1. Basement Clean/Hot Area.
2. HEPA Room Area.
3. Clean Equipment Room Area.
4. Offices/HEPA Room Area.
5. Mezzanine Office Area.
6. Second Floor Lab Area.
7. Second Floor Storage Area.
8. Attic Area.

Comments: \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_

Performed by: \_\_\_\_\_ Date: \_\_\_\_\_

Reviewed by RSO: \_\_\_\_\_ Date: \_\_\_\_\_

# FIRE INSPECTION REPORT

ISP-15C

Date: \_\_\_\_\_

## ELECTRICAL

Wiring/Emergency Lighting	_____	Temp. Installations	_____
Circuits/Fuses/Junction Boxes	_____	Minimum Clearance	_____
Cords/Motors/Small Appliances	_____	Other	_____

## HOUSEKEEPING

Accumulation of Rubbish	_____	Leaking Equipment	_____
Work Area Cleanliness	_____	Other	_____

## NON-DESIGNATED STORAGE

Combustible Liquids	_____	Compressed Gases	_____
Flammable Liquids	_____	Other	_____
Packing Materials	_____		

## FIRE PROTECTION

Fire Extinguishers	_____	Fire Alarms	_____
Sprinkler/Standpipe System	_____	Fire Doors	_____
Damaged/Blocked Equipment	_____	Other	_____

## OBSERVED CONDITIONS

Improper Use of Flammable Liquids	_____
Impaired Fire Protection Devices/Systems	_____
Protective Clothing Stations/Supply Areas	_____
Designated Storage Areas	_____

## MISCELLANEOUS

Blocked Aisleways	_____	Blocked Doorways	_____
Abandoned Flammables	_____	Other	_____
Abandoned Combustibles	_____		

Description of Deficiency: \_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

Deficiency to be Resolved by RSO: \_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

Reported by: \_\_\_\_\_ Date: \_\_\_\_\_

Reviewed by RSO: \_\_\_\_\_ Date: \_\_\_\_\_

# ADVANCED MEDICAL SYSTEMS OPERATING PROCEDURE

## PACKAGING AND LABELING DEPLETED URANIUM PARTS AND SUBASSEMBLIES

ISP-21 Rev. 05/95

Page 1 of 4

- 1.0 PURPOSE: To ensure that the applicable regulations regarding the shipment of depleted Uranium are met.
- 2.0 PRECAUTIONS AND LIMITATIONS:
- 2.1 This procedure applies to each shipment of a depleted Uranium part, subassembly or assembly containing such a part.
  - 2.2 Depleted Uranium is a radioactive material. Precautions for proper handling must be followed.
  - 2.3 Do not guess at any data required. If assistance is needed, contact the RSO.
  - 2.4 This procedure applies to each separate package containing depleted Uranium, even if part of a larger shipment.
  - 2.5 By the definition given in 49CFR173.403(n), Depleted Uranium (DU) is an LSA (Low Specific Activity) material. As received from our supplier, DU parts are shipped as LSA in DOT Spec 7A Type A packages.

Once the DU components are incorporated into the machine head or rotor subassemblies, they can be shipped under 49CFR173.424, Excepted Articles, if all the pertinent requirements in 173.421 and 173.421-1 are met.

---

Prepared by: Robert Meschter

Approved by:

Date:

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### 3.0 INSTRUCTIONS:

#### 3.1 Excepted Articles (assemblies and subassemblies)

- 3.1.1 Package the item(s) to be shipped.
- 3.1.2 With the survey meter, perform a survey of all exposed surfaces of the package.
  - a. Verify that the highest surface reading is less than or equal to 0.5mrem/hr.
  - b. If it exceeds this limit, then repackage the items to reduce surface readings.
  - c. Record the highest surface reading found.
- 3.1.3 Take a smear of the package surface.
  - a. If removable contamination does not exceed 2,200 dpm/100cm<sup>2</sup> then the package qualifies as an excepted article.
- 3.1.4 Mark the outside of the package "Radioactive".
- 3.1.5 Certify the package as being acceptable for shipment by having the following written notice in or on the package:

"This package conforms to the conditions and limitations specified in 49CFR173.424 for excepted radioactive material, articles manufactured from depleted Uranium, UN 2910."
- 3.1.6 No other labeling, shipping paper or certification requirements are required for transportation. (49CFR173.424)

#### 3.2 LSA Material (DU Parts)

- 3.2.1 Package the item(s) in a DOT Spec 7A Type A package. (Ref. 49CFR178.350)

NOTE: Type A packaging must be tested per 49CFR173.465. Documentation of the testing results must be on file. (49CFR173.415)

3.2.2 Mark the outside of each package as follows:

"USA DOT 7A TYPE A"  
"RADIOACTIVE MATERIAL"

NOTE: Use letters at least one half (1/2) inch high.

3.2.3 Perform a survey of all exposed surfaces of the package.

- a. Record the highest surface reading found.
- b. Maximum reading is 200mrem/hr.  
(49CFR173.441)

3.2.4 Determine the Transport Index (see 49CFR173.403 (bb)) for the package by repeating the survey at a distance of one (1) meter from each point on the package surface and rounding the highest reading up to the first decimal place. The proper label to affix to the package is based upon both the radiation level at the surface of the package and the Transport Index. (49CFR172.403 (b))

NOTE: The label to be applied shall be the highest category required for either of the above determining conditions.

<u>Transport Index</u>	<u>Radiation Level (surface)</u>	<u>Label</u>
0	≤0.5mrem/hr	<del>White</del> I
≤1.0	>0.5mrem/hr but ≤50mrem/hr	Yellow II
>1.0	>50mrem/hr	Yellow III

- a. Apply two (2) of the appropriate labels to the package, on any two opposing sides.
- b. Enter the Transport Index on both labels.

3.2.5 Take a smear of the package surface. Removable contamination may not exceed 2,200 dpm/100cm<sup>2</sup>. (49CFR173.443)

3.2.6 Determine the Curie content of the packaged parts.

NOTE: The Curie content of depleted Uranium is very small.

- a. Refer to the following chart for the Curie content of one (1) part:

<u>Part #</u>	<u>Curie/part</u>
46411	0.0024
46879	0.0056
58429A	0.0385
58430	0.0064
58531A	0.0039
200670	0.0079

- b. Multiply the number of parts by the Curie/part.
- c. Enter this number on the labels.

3.2.7 Prepare the Bill of Lading

- a. Shipment of LSA material requires the use of a hazardous material bill of lading.
- b. Enter the description of the radioactive material as specified in 49CFR172.101 - "Radioactive material, low specific activity, n.o.s. UN2912, U238 Depleted Uranium Solid Form."
- c. Enter the Curie content.
- d. Enter the category of label applied to each package in the shipment (i.e. Radioactive I, II or III).
- e. Enter the Transport Index assigned to each package in the shipment bearing Radioactive II or III labels.
- f. Enter the total weight of the hazardous material.
- g. Sign the shippers certification statement.

3.2.8 Placarding per 49CFR173.466 is required only for Radioactive III labeled material.



# ADVANCED MEDICAL SYSTEMS OPERATING PROCEDURE

## CALIBRATION OF PORTABLE RADIATION DETECTION INSTRUMENTS

ISP-23 Rev. 05/95

Page 1 of 4

- 1.0 PURPOSE: The purpose of the procedure is to provide uniform and documented proof of calibration of the survey instruments and dosimeters used.
- 2.0 PRECAUTIONS AND LIMITATIONS:
  - 2.1 This procedure applies to all survey meters and dosimeters in active use.
  - 2.2 Calibration sources are to be stored only in Controlled Areas of the Isotope Facility.
  - 2.3 Film badges and pocket dosimeters should be worn when calibrating equipment.
  - 2.4 Keep as much distance from the calibration source as possible.
  - 2.5 Instrument calibration frequency is once per 6 months.
- 3.0 INSTRUCTIONS:
  - 3.1 Calibration of Portable Survey Meters
    - 3.1.1 Ensure meter is free of removable contamination and  $<1\text{mrem/hr}$  fixed contamination.
    - 3.1.2 Package the meter for shipment.
    - 3.1.3 Ship the meter to a vendor for calibration.

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Prepared by: Robert Meschter

Approved by:

Date:

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### 3.2 Calibration of Pocket Dosimeters.

3.2.1 Dosimeters may be calibrated in two ways:

- a. Use of an outside calibration service.
- b. Use of a commercially available dosimeter calibrator.

3.2.2 Set the dosimeter to zero and record the serial number on Form ISP-23A, Dosimeter Calibration Form.

3.2.3 Calculate the exposure rate of the calibrator and record on ISP-23A.

3.2.4 Calculate the exposure time by the following formula:

$$\text{Exposure time} = \frac{3/4 \text{ dosimeter scale, mrem}}{\text{exposure rate, mrem/hr}}$$

3.2.5 Calculate the exposure by multiplying the exposure rate times the exposure time.

3.2.6 Place the dosimeter in one of the holes of the calibrator.

3.2.7 Expose the dosimeter to the calibration source for the calculated exposure time.

3.2.8 At the end of the exposure time, read and record the actual dosimeter reading on Form ISP-23A.

3.2.9 Calculate the accuracy of the dosimeter by the following formula:

$$\% \text{ accuracy} = \frac{\text{calc. exposure-dosimeter reading}}{\text{calculated exposure}} \times 100$$

3.2.10 Any dosimeter with an accuracy greater than  $\pm 15\%$  shall be replaced.

3.2.11 Record all applicable information on Form ISP-23A.

3.2.12 Perform a Drift Check as follows:

- a. Zero the pocket dosimeter.

- b. Store the dosimeter in a low dose area.
- c. After at least twenty four (24) hours, read the dosimeter.
- d. Calculate the Drift by the following:  
$$\% \text{ Drift} = \frac{\text{dosimeter reading}}{\text{dosimeter scale}} \times 100$$
- e. The dosimeter passes the Drift Check if the % Drift is less than 2%.

3.2.13 Apply a dated calibration label to the dosimeter which indicates the next calibration due date.

# DOSIMETER CALIBRATION FORM

ISP-23A

Calibration Source: \_\_\_\_\_ Exposure Rate: \_\_\_\_\_

Serial Number	Calc. Reading	Act. Reading	%Acc.	%Drift

Performed by: \_\_\_\_\_ Date: \_\_\_\_\_

Reviewed by RSO: \_\_\_\_\_ Date: \_\_\_\_\_

# ADVANCED MEDICAL SYSTEMS OPERATING PROCEDURE

## PACKAGING OF SOLID RADIOACTIVE WASTE

ISP-25 Rev. 05/95

Page 1 of 5

1.0 PURPOSE: To ensure that solid radioactive waste is safely and properly packaged in preparation for shipment.

2.0 PRECAUTIONS AND LIMITATIONS:

2.1 This procedure applies to all contaminated solid material that must be disposed of at an authorized radioactive waste disposal site.

2.2 No liquid material is to be packaged. The waste disposal site will not accept liquids. Liquids must be solidified using approved methods prior to transportation.

2.3 To reduce airborne contamination, material which has been in the Hot Cell should be bagged before extensive handling or compaction.

2.4 Waste is to be packaged on an ongoing basis. It should not accumulate.

2.5 This procedure requires that protective clothing and personal dosimetry equipment be worn when working in a contaminated area.

2.6 Minimize stay time near high level waste materials.

3.0 INSTRUCTIONS:

3.1 Packaging waste when removed from

3.1.1 Prepare a steel drum for loading by removing the lid, inserting a poly bag liner and placing the drum on kraft paper on the step off line in the air lock.

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Prepared by: Robert Meschter

Approved by:

Date:

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CAUTION: Be careful not to contaminate the drum.

- 3.1.2 A second individual, situated on the clean side of the airlock, is required for packaging.
- 3.1.3 Move the compacted waste bags out from the lab and place them inside the lined drum. Four bags will easily fit into one drum.
- 3.1.4 Survey the drum surfaces to insure that no reading is greater than 800mrem/hr.
- 3.1.5 Fold the excess poly liner onto the top of the bags and replace the drum lid.

### 3.2 Contamination Control

- 3.2.1 Wipe down the drum exterior prior to surveying.
- 3.2.2 Smears of the drum exterior shall be taken and recorded on Form ISP-25A. Smears should be taken on the drum top and ring area, on the side of the drum and along the bottom of the drum.
- 3.2.3 No drum shall be removed from the airlock if any smears shows contamination in excess of 1,000 dpm/100cm<sup>2</sup>.
- 3.2.4 If any smear indicates contamination greater than 1,000 dpm/100cm<sup>2</sup>, then the drum must be decontaminated and resurveyed until the contamination levels are below the above limits.
- 3.2.5 If the drum surface contamination is below the limit, then it should be marked with an ID number and removed from the airlock to a low background area for surveying.

### 3.3 Survey

- 3.3.1 Survey the package surfaces and record on Form ISP-34A the highest readings found on the top, side and bottom surfaces. If the survey meter readings are in the upper 90% of the scale, the next higher scale should be used.

**CAUTION:** Readings that fall within 20% of the maximum (800mrem/hr) will be verified with at least one other instrument.

- 3.3.2 Mark the package hot spot with spray paint.

- 3.3.3 Survey the package at a distance of one (1) foot from all surfaces. For purposes of documentation, divide the package into quadrants and record the highest reading in each quadrant on Form ISP-25A.

- 3.3.4 Compute the average of the four (4) quadrant readings and record on Form ISP-25A.

- 3.3.5 Survey the package at a distance of one (1) meter and record under Transport Index on Form ISP-34A.

NOTE: Not needed for LSA exclusive use.

### 3.4 Package Description

- 3.4.1 Apply a permanent ID number sticker to the package and record it on Form ISP-25A.

- 3.4.2 Weigh the package and record the weight.

- 3.4.3 Describe the contents of the drum (i.e. compacted trash, cell waste, cardboard, wood, used protective clothing, etc.).

- 3.4.4 Apply a "Class A Waste" label to the top of the package.

### 3.5 Storage

- 3.5.1 Transfer the package to the designated waste storage area and place it so that the ID number is readily visible.

- 3.5.2 High activity packages (greater than 200mrem/hr contact) should be segregated from lower activity packages.

### 3.6 Documentation

- 3.6.1 Calculate the Curie content of the package using the 6CE formula following:

$$\text{mR/hr@1foot} = 6 \times \text{Curie content} \times \text{Gamma Energy}$$

$$\text{or Curies} = \frac{\text{mrem/hr @ one foot}}{6 \times \text{Gamma Energy}}$$

EXAMPLE: For Cobalt-60

$$\text{Curies} = \frac{\text{mrem/hr @ one foot}}{6 \times (1.33 + 1.17)} \quad \text{or} \quad \frac{\text{mrem/hr @ one foot}}{15}$$



# SOLID RADWASTE DATA SHEET

ISP-25A

Drum ID#: \_\_\_\_\_ Weight: \_\_\_\_\_

Contents: \_\_\_\_\_

\_\_\_\_\_  
\_\_\_\_\_

## SURVEY RESULTS

Meter used: \_\_\_\_\_ Ser. #: \_\_\_\_\_ Cal due: \_\_\_\_\_

### Surface Readings

Top \_\_\_\_\_ mrem/hr Bottom \_\_\_\_\_ mrem/hr Sides \_\_\_\_\_ mrem/hr

Readings @ 1 foot (by quadrants)

\_\_\_\_\_ mrem/hr \_\_\_\_\_ mrem/hr \_\_\_\_\_ mrem/hr \_\_\_\_\_ mrem/hr

Average 1 foot reading \_\_\_\_\_ mrem/hr

Transport Index: \_\_\_\_\_ Curie content: \_\_\_\_\_ Ci

## SURFACE CONTAMINATION

Top \_\_\_\_\_ dpm/100cm<sup>2</sup> Bottom \_\_\_\_\_ dpm/100cm<sup>2</sup> Sides \_\_\_\_\_ dpm/100cm<sup>2</sup>

Highest smear \_\_\_\_\_ dpm/100cm<sup>2</sup>

Performed by: \_\_\_\_\_ Date: \_\_\_\_\_

Reviewed by RSO: \_\_\_\_\_ Date: \_\_\_\_\_

# ADVANCED MEDICAL SYSTEMS OPERATING PROCEDURE

## SHIPMENT OF SOLID RADIOACTIVE WASTE

ISP-26 Rev. 5/95

Page 1 of 11

- 1.0 PURPOSE: To ensure that the solid radioactive waste is Shipped in accordance with the current federal, state and local regulations and requirements.
- 2.0 PRECAUTIONS AND LIMITATIONS:
  - 2.1 This procedure applies to all shipments of solid radioactive waste.
  - 2.2 The shipment of radioactive material is a highly regulated activity. The shipper must be familiar with the current rules and regulations in order to prevent violations and penalties.
  - 2.3 It is prudent to communicate with the Regulatory affairs personnel at the disposal site prior to shipment in order to answer any questions they may raise regarding the material being shipped and determine any special local requirements.
- 3.0 INSTRUCTIONS:
  - 3.1 For Each Package or Container
    - 3.1.1 Determine the radionuclide(s) present.
    - 3.1.2 Determine whether the material is normal or special form. (49CFR173.403)

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Prepared by: Robert Meschter

Approved by:

Date:

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3.1.3 Determine the DOT subtype (type quality).

<u>Subtype</u>	<u>Cobalt 60</u>
Limited Quantity	$\leq 0.007\text{Ci}$
Type A Quantity	$\leq 7\text{Ci}$
Type B Quantity	$> 7$ but $< 21,000\text{Ci}$
Highway Route Controlled	$> 21,000\text{Ci}$

3.1.4 Determine if the material is LSA.

- a. Convert the activity to mCi.
- b. Determine the  $A_2$  value for each nuclide.  
(49CFR173.435)
- c. Determine the LSA limit for each nuclide.  
(49CFR713.403(n))

NOTE: For Cobalt 60 the LSA limit is 0.3mCi/g.

- d. Determine the weight of the package contents in grams. (454g/lb) Do not include the weight of the drum, cask, shielding, etc.
- e. Determine specific activity for each nuclide by dividing total activity of nuclide by total gram weight of package contents.
- f. For each nuclide, divide the specific activity, as determined in step e, by the LSA limit.
- g. For single nuclide waste, if the result of step f is less than or equal to one (1), then the material qualifies as LSA.
- h. For mixtures of nuclides, if the sum of the fractions determined in step f is less than or equal to one (1), then the material qualifies as LSA.
- i. If the result in step f is greater than one (1), the material would be a Type A, B or HRC Quantity.

- j. For LSA material, determine if it is an LSA Type A or LSA Type B quantity.

For each nuclide, divide the total activity, in Curies, by the  $A_2$  value.

For single nuclide waste, if the result is less than or equal to one (1), the material is LSA Type A.

For mixtures of nuclides, if the sum of the fractions is less than or equal to one (1), the material is LSA Type A.

If the result is greater than one (1), the material is LSA Type B.

3.2 Determine the packaging required for transport

- 3.2.1 The following chart summarizes the type packaging required for each DOT subtype quantity.

DOT SUBTYPES	LIMITED QUANTITY	TYPE A QUANTITY	TYPE B QUANTITY	LSA TYPE A EXCLUSIVE USE	LSA TYPE A NON-EXCLUSIVE USE	LSA TYPE B NON-EXCLUSIVE USE	LSA TYPE B EXCLUSIVE USE
TYPE PACKAGING	STRONG TIGHT CONTAINER	TYPE A PACKAGING	TYPE B PACKAGING	TYPE A PACKAGING	STRONG TIGHT CONTAINER	TYPE B PACKAGING	TYPE A PACKAGING WITH NRC
REGULATORY AGENCY	DOT	DOT	NRC	DOT	DOT	NRC	NRC
<u>DOT REGS.</u>							
173.24	X	X	X	X	X	X	X
173.411		X	X	X	X	X	X
173.412		X	X	X except (a)(b)(d) & ( )		X	X
173.413			X			X	
173.415		X		X			
173.416			X			X	
173.465		X	X	X		X	X
173.466		X					
<u>NRC REGS.</u>							
71.43			X			X	X
71.45			X			X	X
71.51			X			X	
71.52							X
71.71			X			X	X
71.73			X			X	

Note that the steel drums typically used to contain radioactive waste are a DOT specification packaging; however, they do not qualify as Type A packaging. Therefore, they must either be transported in a Type A package or an exclusive use vehicle.

- 3.2.2 Multiple types of packages may be transported on the same vehicle as long as they are appropriate for the material being shipped.
- 3.3 Obtain the proper packaging and load the radioactive material.
- 3.4 Package Limits and Communication Requirements
  - 3.4.1 The package may be any of the following:
    - a. Type A packaging with contents.
    - b. Type B packaging with contents.
    - c. Strong tight container containing either LSA Type A material or limited quantity material.
  - 3.4.2 Radiation level limits.
    - a. Survey the package on all surfaces including the bottom. Readings that are equal to or greater than 80% of the maximum limits shall be verified with at least one other instrument. Document the results.
    - b. Packages with any reading equal to or greater than 90% of the maximum limits will not be released for shipment.

Strong tight containers containing LSA Type A quantity material that read equal to or greater than 90% of the maximum limits will be held for shipment in a cask with adequate shielding.

Casks that read equal to or greater than 90% of the maximum limits will have the particular material causing the high reading removed or repositioned in order to bring the reading down.

3.4.3 Contamination limits.

- a. Smears shall be taken in the locations most likely to yield significant removable contamination.
- b. The maximum permissible contamination limit is 2,200 dpm/100cm<sup>2</sup>.

3.4.4 Specification marking

- a. DOT subtypes "Limited Quantity" and "LSA exclusive use" are excepted from the specification marking requirements.
- b. DOT subtypes "Type A", "Type B" and "Highway Route Controlled Quantity" are required to be marked with the following:

Proper shipping name and ID number  
Consignee's or Consignor's name and address  
Gross weight  
"Type A", "Type B", "LSA", etc.

3.4.5 Labeling

- a. DOT subtypes "Limited Quantity" and "LSA exclusive use" are excepted from the labeling requirements.
- b. The proper label to be affixed is determined by surveying the package and applying the criteria of 49CFR172.403(c).
- c. Multiple hazards must be so labeled.

3.4.6 Waste classification.

- a. Each package of radioactive waste must be classified in accordance with the criterion of 10CFR61.55 and clearly labeled to identify its class.
- b. Each package must meet the minimum requirements for waste packages as specified in 10CFR61.56.

### 3.5 Transport Vehicle Communication Requirements

#### 3.5.1 Placarding requirements.

- a. Verify that placards are attached to transport vehicle (all 4 sides) if it is carrying any package with a Radioactive Yellow III label or an exclusive use LSA shipment.
- b. Verify that each placard is visible from the direction it faces.
- c. Photograph all sides of the transport vehicle before release to document that all placards were in place.

#### 3.5.2 Shipping paper requirements.

- a. Bill of Lading must contain the following:
  1. Proper shipping name prescribed for the material in 49CFR172.101 and 102.
  2. The hazard class "Radioactive" if not included in the proper shipping name.
  3. The identification number, "UN--" or "NA--".
  4. The total quantity of the hazardous material covered by the description.
  5. The name of each radionuclide.
  6. A description of the physical and chemical form of the material, if not special form.
  7. The activity contained in each package in the shipment in terms of Curies, millicuries or microcuries.

NOTE: If the Bill of Lading is accompanied by a manifest, then the total Curies in the shipment may be listed instead of individual packages.



8. The category of label applied to each package.
9. For a DOE or NRC approved package, a notation of the package identification marking.
10. A signed certification statement that the materials are properly classified, described, packaged, marked and labeled.
11. The emergency phone number currently in use. This may be a designated AMS, Inc. phone number or as provided by a contracted vendor for this purpose.

NOTE: In filling out the Bill of Lading, identify the hazardous material description by placing an "X" in the column captioned "HM".

b. Shipping manifest requirements.

Each disposal site has a shipping manifest document for itemizing the individual drums/packages that form the shipment. Instructions are provided with the documents. A copy of the completed manifest must accompany the shipment.

c. State notification forms.

The state(s) which have radioactive material disposal sites may have prior notification requirements, typically three (3) days prior to shipment. A copy of the notification form(s) must accompany the shipment.

d. State certification forms.

The state(s) which have radioactive material disposal sites may require that a state certification form be completed for each shipment. A copy of this certification form must accompany these shipments.

- e. Drivers' instructions for the maintenance of exclusive use certification.

See ISP-22

### 3.6 Transport Vehicle Requirements

#### 3.6.1 Non-exclusive use shipments.

- a. No package shall exceed 200mR/hr on any surface and have a Transport Index in excess of ten (10).

#### 3.6.2 Exclusive use shipments.

- a. No package shall exceed one thousand (1,000) mR/hr on any surface.
- b. Shipment shall be in a closed transport vehicle.
- c. The package(s) must be secured within the vehicle so that its position remains fixed.
- d. There shall be no loading or unloading operations between the beginning and the end of transportation.

#### 3.6.3 For exclusive use shipments, the radwaste packages shall be loaded onto the transport vehicle in such a manner that the following radiation levels are not exceeded:

- a. 200mR/hr at any point on outer surfaces of vehicle including top and bottom. For flatbed trailer, at any point on the vertical planes projected from the outer edges of the vehicle.
- b. 10mR/hr at any point two (2) meters from the outer lateral surfaces of the vehicle (excluding top and bottom). For flatbed trailers, at any point two (2) meters from the vertical planes projected from the outer edge of the vehicle.
- c. 2mR/hr in any normally occupied cab space.

- d. The surveys required shall be made with properly calibrated instruments by at least two (2) individuals utilizing different instruments. Readings will be taken along the entire surface.

The results of the surveys will be compared and any discrepancies investigated. Readings equal to or greater than 80% of the maximum limits will be verified.

- e. No vehicle with a reading equal to or greater than 90% of the maximum limits will be released for shipment.
- f. A copy of the Transportation Vehicle Survey, Form ISP-26A, should accompany the shipment.

# TRANSPORTATION VEHICLE SURVEY

ISP-26A

Shipment ID: \_\_\_\_\_ Shipment Date: \_\_\_\_\_

Meter used: \_\_\_\_\_ Cal Due: \_\_\_\_\_

Meter used: \_\_\_\_\_ Cal Due: \_\_\_\_\_

All readings in mR/hr

Comments: \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

## Maximum Allowable Readings

Surface - 200mR/hr  
@ 2 meters - 10mR/hr  
Cab - 2mR/hr

Performed by: \_\_\_\_\_ Date: \_\_\_\_\_

Performed by: \_\_\_\_\_ Date: \_\_\_\_\_

Reviewed by RSO: \_\_\_\_\_ Date: \_\_\_\_\_

# ADVANCED MEDICAL SYSTEMS OPERATING PROCEDURE

## INSPECTION AND PROCEDURE FOR CONTAINERS WITH OVERPACKS AUTHORIZED FOR THE SHIPMENT OF RADIOACTIVE MATERIAL

ISP-33 Rev. 05/95

Page 1 of 4

### 1.0 REQUIREMENTS AND DESCRIPTION:

1.1 In order to comply with NRC/DOT regulations concerning shipment of radioactive materials, this inspection procedure must be completed for each shipment of radioactive materials prior to movement of the material to the carrier for transportation. Defects found during inspections must be corrected prior to material movement.

1.2 The requirements are applicable when moving radioactive material in authorized containers from one customer location to another, from the field back to the Isotope facility, to the field from the Isotope Facility.

### 1.3 Authorized Shipping Containers

#### 1.3.1 Cobalt 60 Shipments

1.3.1.1 590C, D, E, F and G Head in Overpack No. 181375.

1.3.1.2 C-12 Head in Overpack No. D-MEH-00-00004.

1.3.1.3 3320 AR Exchange Container in Overpack No. 181361.

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Prepared by: Robert Meschter

Approved by:

Date:

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1.3.2 Cesium 137 shipments - 3320B Exchange Container in Overpack No. 181361.

1.4 Audit

In accordance with 10CFR 71.137, the Radiation Safety Officer will make an audit of the maintenance of the containers and overpacks according to the checklist. The audit shall be on an unannounced basis at intervals not to exceed one (1) year.

2.0 INSPECTIONS

2.1 The Inspection Data Sheet for Radioactive Material Containers and Overpacks (QA1014A) must be completed and forwarded to the Radiation Safety Officer and Isotope Facility for audit and record retention. Field operations are to return the Inspection Data Sheet in the pre-stamped, self-addressed envelope along with the waybill copy of the return shipment.

2.2 The only personnel permitted to perform the inspection and maintenance are those individuals qualified under the conditions of the license. Repairs may be permitted by an outside contractor; however, these repairs must be inspected before use.

3.0 HEAD OR SOURCE EXCHANGE CONTAINER PROCEDURE

Perform each inspection step as indicated. Defects found during inspection must be corrected and reinspected. Repairs must be listed on the Data Sheet along with the signature of the inspector. A check mark (✓) is to be placed on the Stat Sheet after each step.

3.1 Perform a preliminary radiation survey of the container. Results should be 200mrem/hour or less on the surface and 10mrem/hour or less at 1 meter from the surface.

3.2 Make a wipe survey of the external surface of the container. Field operations are to use a Victoreen 491 or equal to evaluate the wipe. The meter must read less than 220 DPM/100cm<sup>2</sup> when the wipe is held 1/4" from the Geiger Tube (Beta shield open). Factory operations are to use a well counter to determine wipe activity. Results must indicate 220 DPM/100cm<sup>2</sup> or less of removable contamination.

3.3 Verify that the shutter or drawer is locked.

- 3.4 Verify that the gaskets on 3320 AR are in good condition.
- 3.5 Inspect the lifting loops on 3320 AR. Loops must be in good condition, not bent, and welds must not exhibit cracks.
- 3.6 Inspect the container to insure there is no mechanical damage which will affect the radiation integrity of the unit.

#### 4.0 OVERPACK PROCEDURE

Perform each inspection step as indicated. Defects found during inspection must be corrected and reinspected. Repairs must be listed on the Data Sheet along with signature of the inspector. A check mark (✓) is to be placed on the Data Sheet after each step.

- 4.1 Inspect the overpack for the following mechanical characteristics:
  - 4.1.1 All wood joints inside the overpack must be tight. Tighten reinforcing bars if necessary.
  - 4.1.2 The wood joints inside the overpack should be free of holes and voids. Holes can be filled with wood plugs.
  - 4.1.3 Lifting loops should be free of damage.
  - 4.1.4 Welds on the framework must be free of cracks and damage.
  - 4.1.5 Inspect the skid runners for damage.
- 4.2 Inspect the container hold-down system to insure it is properly secure.
- 4.3 Inspect that the bolts securing the overpack cover to the skid are tight, but not stripped.
- 4.4 Inspect the package and insure it is seal wired.
- 4.5 Survey the package with container inside. The radiation level must be less than 10mrem/hour at any point 1 meter from the surface of the container and 200mrem/hour or less at the surface.

4.6 Inspect the outside package for the following labels:

- 4.6.1 Two yellow Radioactive III diamond labels filled out indicating the radioactive material, number of curies and transport index (maximum radiation units at 1 meter) as measured in 4.5. These labels must be on opposite sides of the package.
- 4.6.2 Verify that the overpack bears an 11" x 18" yellow sign with magenta lettering listing AMS, Cleveland, Ohio, U.S.A., part number of the overpack, Package I.D. Number, gross and empty weights, Made in U.S.A. and Radiation Symbols. All markings must be clear and legible.
- 4.6.3 Verify that the opening instructions have been included with the package.





UNITED STATES  
NUCLEAR REGULATORY COMMISSION  
REGION III  
801 WARRENVILLE ROAD  
LISLE, ILLINOIS 60532-4351

JUN 20 1995

Advanced Medical Systems, Inc.  
ATTN: Mr. Robert Meschter  
Radiation Safety Officer  
1020 London Road  
Cleveland, OH 44110

Dear Mr. Meschter:

Enclosed is Amendment No. 35 to your NRC Material License No. 34-19089-01 in accordance with your request.

Please review the enclosed document carefully and be sure that you understand all conditions. If there are any errors or questions, please notify the U.S. Nuclear Regulatory Commission, Region III office so that we can provide appropriate corrections and answers.

As requested in your May 15, 1995 letter and subsequent letter dated June 13, 1995, we have amended License Condition Numbers 19.B., D., E. and F.

Note that we have added License 19.G. This condition contains two parts. Condition G.i. requires that you contact us no later than July 14 to advise us on the status of the completion of projects described in License Condition Numbers 19.B., D. and E. Condition G.ii. requires that you also notify us no later than July 14 to confirm initiation of the remediation project described in License Condition 19.F.

Please be advised that your license expires at the end of the day, in the month, and year stated in the license. Unless your license has been terminated, you must conduct your program involving byproduct materials in accordance with the conditions of your NRC license, representations made in your license application, and NRC regulations. In particular, note that you must:

1. Operate in accordance with NRC regulations 10 CFR Part 19, "Notices, Instructions and Reports to Workers; Inspections," 10 CFR Part 20, "Standards for Protection Against Radiation," and other applicable regulations.

2. Notify NRC, in writing, within 30 days:
  - a. When Radiation Safety Officer permanently discontinues performance of duties under the license or has a name change; or
  - b. When the licensee's mailing address changes (no fee is required if the location of byproduct material remains the same).
3. In accordance with 10 CFR 30.36(b) and/or license condition, notify NRC, promptly, in writing, and request termination of the license when you decide to terminate all activities involving materials authorized under the license.
4. Request and obtain a license amendment before you:
  - a. Change Radiation Safety Officers;
  - b. Order byproduct material in excess of the amount, or radionuclide, or form different than authorized on the license;
  - c. Add or change the areas of use or address or addresses of use identified in the license application or on the license; or
  - d. Change ownership of your organization.
5. Submit a complete renewal application with proper fee or termination request at least 30 days before the expiration date of your license. You will receive a reminder notice approximately 90 days before the expiration date. Possession of byproduct material after your license expires is a violation of NRC regulations. A license will not normally be renewed, except on a case-by-case basis, in instances where licensed material has never been possessed or used.

In addition, please note that NRC Form 313 requires the applicant, by his/her signature, to verify that the applicant understands that all statements contained in the application are true and correct to the best of the applicant's knowledge. The signatory for the application should be the licensee or certifying official rather than a consultant.

You will be periodically inspected by NRC. Failure to conduct your program in accordance with NRC regulations, license conditions, and representations made in your license application and supplemental correspondence with NRC will result in enforcement action against you. This could include issuance of a notice of violation, or imposition of a civil penalty, or an order suspending, modifying or revoking your license as specified in the General Policy and Procedures for NRC Enforcement Actions, 10 CFR Part 2, Appendix C. Since serious consequences to employees and the public can result from failure to comply with NRC requirements, prompt and vigorous enforcement action will be

taken when dealing with licensees who do not achieve the necessary meticulous attention to detail and the high standard of compliance which NRC expects of its licensees.

Sincerely,

A handwritten signature in black ink, appearing to read "K. G. Null". The signature is written in a cursive, somewhat stylized font.

Kevin G. Null  
Nuclear Materials Licensing Section

License No.: 34-19089-01  
Docket No.: 030-16055/040-08764/030-17154

Enclosure: Amendment No. 35

## MATERIALS LICENSE

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, 36, 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		In accordance with letter dated May 15, 1995, and followup letter dated June 13, 1995	
1. Advanced Medical Systems, Inc.		3. License Number 34-19089-01 is amended in its entirety to read as follows:	
2. 1020 London Road Cleveland, OH 44110		4. Expiration Date December 31, 1994	
		5. Docket or Reference No. 030-16055/040-08764/030-17154	
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. Cobalt-60	A. Solid Metal	A. 150,000 curies	
B. Cobalt-60	B. Sealed sources (teletherapy/ radiography sealed sources which have been evaluated and approved for commercial distribution by the NRC or an Agreement State)	B. 135,000 curies (no single source to exceed 13,700 curies)	
C. Cesium-137	C. Sealed sources (teletherapy/ radiography sealed sources which have been evaluated and approved for commercial distribution by the NRC or an Agreement State)	C. 40,000 curies (no single source to exceed 2,200 curies)	
D. Depleted Uranium	D. Nickel Plated	D. 4,040 kilograms	
E. Cobalt-60	E. Sealed Sources	E. 15,000 curies	

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- |   |                                  |  |
|---|----------------------------------|--|
| 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 |
|---|----------------------------------|--|

F. Cobalt-60

F. Sealed Sources  
(any sealed source  
approved by the NRC  
or an Agreement  
State)

F. 15 millicuries

9. Authorized Use:

- A. For storage only incident to waste disposal or transfer to an authorized recipient. This license does not authorize the manufacture of sealed sources.
- B. For installation, maintenance of, dismantling and servicing of Picker Corporation and Advanced Medical Systems, Inc. teletherapy units and Picker Model 6145 radiography units possessed by licensees authorized to possess the radioactive material pursuant to a specific license issued by the Commission or an Agreement State. For installation and removal of sealed sources into Picker Corporation, Advanced Medical Systems, Inc. and Keleket Barnes teletherapy units of licensees authorized to possess the radioactive material pursuant to a specific license issued by the Commission or an Agreement State. For training Hospital or Clinic personnel for in-house service operations on teletherapy equipment, on unit model per course, in accordance with letter dated August 15, 1988 and September 29, 1988.
- C. For installation, maintenance, dismantling and servicing of Picker Corporation and Advanced Medical Systems radiography and teletherapy units of licensees authorized to possess the radioactive material pursuant to a specific license issued by the Commission or an Agreement State.
- D. Shielding material in Picker Corporation and Advanced Medical System, Inc., radiography and teletherapy devices.
- E. For storage only, those non-NRC approved sources in the possession of the licensee prior to the issuance of this amendment.
- F. For use in devices (including Tech OP Model 571 Calibrator described in application dated November 12, 1984) approved by the Nuclear Regulatory Commission or an Agreement State to calibrate radiation survey instruments.

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CONDITIONS

10. Licensed material in Items 6.A., 6.E. and 6.F. shall be used only at the licensee's facility at 1020 London Road, Cleveland, Ohio. Licensed material in Items 6.B. and 6.C. shall be used only at 1020 London Road, Cleveland, Ohio and at facilities of customers who possess a specific license from the NRC authorizing possession of the licensed material. Licensed material in Item 6.D. shall be used only at the licensee's facilities at 1020 London Road, Cleveland, Ohio or 121 North Eagle Street, Geneva, Ohio, and at facilities of customers who possess a specific license from the NRC authorizing possession of the licensed material.

11. A. The Radiation Protection Officer for service operations described in Subitems 9.B. and 9.C. and routine health physics activities is Robert Meschter.

The licensee shall not perform service operations described in Subitems 9.B. and 9.C. until Robert Meschter has completed the required training.

- B. Licensed material shall be used by, or under the supervision of and in the physical presence of users listed in the table below. The users are only authorized to perform the indicated services on the teletherapy or radiography units specified in the table below:

AMS/PICKER TELETHERAPY/RADIOGRAPHY UNITS MODELS

	CS 600	C 1000	C 2000	C 3000	C 5000	C 10,000	C4	C8	C9	C12	Cyclops
USER											
Curtis Perry				3	1.2	1.2	1.2	1.2	1.2		1.2
Haddock	5	5	5	5	5	5	5	5	5	5	5

AMS/PICKER TELETHERAPY/RADIOGRAPHY UNITS MODELS

	V 1000	V 2000	V 3000	V 10,000	C V4	C V9					
USER											
Curtis Perry		1.2	1.2	1.2	1.2	1.2					
Haddock	5	5	5	5	5	5					

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11. (Continued)

1. Authorizes the servicing of AMS/Picker units, excluding source exchange.
2. Authorizes sealed source exchange.
3. Authorizes removal of unit and head from customer sites only.
4. Authorizes the training of AMS personnel in the manufacture of AMS/Picker sealed sources.
5. Authorizes the handling of sealed sources only.

12. A. (1) Each sealed source acquired from another person and containing licensed material, other than hydrogen-3, with a half-life greater than 30 days and in any form other than gas shall be tested for contamination and/or leakage before use. In the absence of a certificate from a transfer indicating that a test has been made within 6 months before the transfer, a sealed source received from another person shall not be put into use until tested.
- (2) Notwithstanding the periodic leak test required by this condition, any licensed sealed source is exempt from such leak tests when the source contains 100 microcuries or less of beta and/or gamma emitting materials or 10 microcuries or less of alpha emitting material.
- (3) Except for alpha sources, the periodic leak test required by this condition does not apply to sealed sources that are stored and not being used. The sources excepted from this test shall be tested for leakage before any use or transfer to another person unless they have been leak tested within 6 months before the date of use or transfer.
- B. Each sealed source fabricated by the licensee shall be inspected and tested for construction defects, leakage, and contamination prior to use or transfer as a sealed source. If the inspection or test reveals any construction defects or 0.005 microcurie or greater of contamination, the source shall not be used or transferred as a sealed source until it has been repaired, decontaminated and retested.
- C. Each sealed source containing licensed material, other than hydrogen-3, with a half-life greater than 30 days and in any form other than gas shall be tested for leakage and/or contamination at intervals not to exceed 6 months except that each source designated for the purpose of emitting alpha particles shall be tested at intervals not to exceed 3 months.
- D. The test shall be capable of detecting the presence of 0.005 microcurie of radioactive material on the test sample. The test sample shall be taken from the sealed source or from the surfaces of the device in what the sealed source is permanently or semi-permanently mounted or stored on which one might expect contamination to accumulate. Records of leak test results shall be kept in units of microcuries and maintained for inspection by the Commission. Records may be disposed of following Commission inspection.

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**12. (Continued)**

- E. If the test required by Subsection A. or C. of this condition reveals the presence of 0.005 microcurie or more of removable contamination, the licensee shall immediately withdraw the sealed source from use and shall cause it to be decontaminated and repaired or to be disposed of in accordance with Commission regulations. A report shall be filed within 5 days of the date the leak test result is known with the U.S. Nuclear Regulatory Commission, Region III, 801 Warrenton Road, Lisle, Illinois 60532-4351, ATTN: Chief, Nuclear Materials Safety Branch, describing the equipment involved, the test results, and the corrective action.
13. The licensee may transport licensed material in accordance with the provisions of 10 CFR Part 71, "Packaging and Transportation of Radioactive Material."
14. Inventory Requirements:
- A. An inventory system will be established that accounts for the receipt, movement, transfer and disposal of all radioactive material possessed under this license. Records of inventories will be maintained for 10 years from the date of each inventory.
- B. A complete examination of records will be completed every six months to confirm the location of all radioactive material and ensure that possession is within the limits specified in this license.
- C. A physical inventory of all radioactive material possessed under this license will be conducted on or before June 1, 1993. Thereafter, a physical inventory of all radioactive material possessed under this license will be completed within 60 months of the previous physical inventory.
15. The licensee's field service audits (as described in the ATC Medical Group Management Plan, revised April 1, 1989, and submitted with letter dated April 17, 1989) shall be performed unannounced by the Radiation Protection Officer (i.e., Radiation Safety Officer).
16. The licensee shall follow the recommended survey frequencies outlined in Regulatory Guide 8.21, Revision 1, October 1979, in work areas where radioactive materials are handled or used.
17. The licensee shall maintain records of information important to safe and effective decommissioning at 1020 London Road, Cleveland, Ohio per the provisions of 10 CFR 30.35(g) until this license is terminated by the Commission.



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18. The licensee shall maintain and execute the response measure of their Emergency Plan dated October 25, 1991 and revised January 1992, May 27, 1992 and April 26, 1993. The licensee shall make no change in the emergency plan submitted pursuant to 10 CFR [30.32(i), 40.31(j), 70.22(i)] that would decrease the effectiveness of the plan without prior Commission approval. The licensee may make changes to its Emergency Plan without prior Commission approval if the changes do not decrease the effectiveness of the plan. The licensee shall maintain records of changes that are made to the plan without prior approval for a period of three years from the date of the changes and shall furnish the Chief, Medical, Academic, and Commercial Use Safety Branch, Division of Industrial and Medical Nuclear Safety, NMSS, U.S. Nuclear Regulatory Commission, Washington, DC 20555, and the appropriate NRC Regional Office specified in Appendix D of 10 CFR 20, a report, within six months after the change is made, containing a description of each change.
19. The licensee is authorized to begin the following activities no sooner than March 17, 1995, and must complete them by the date specified in each item in accordance with letters dated January 27, February 2, 10, and 14, and March 1, 3, 8, and 10, 1995, wherein the licensee proposed and clarified its plans for: (1) dealing with the accumulation of ground water in and around its facility basement; (2) immobilizing and/or remediating contamination that has collected in below ground sewer piping and manholes; and (3) processing future ground water that builds up around the facility. These plans address the following actions the licensee will take.
- A. Process water that is currently stored outside its facility in above-ground tanks.
- Tanked water will be processed in-situ using a submersible water treatment system that includes filtration and ion-exchange demineralization as described in letters dated March 1, 3, 8, and 10, 1995.
  - Water will be treated until it contains no detectable non-soluble cobalt-60 and less than 1000 pCi/l of soluble cobalt-60 as determined by a contract analytical laboratory. The licensee may continue to pump treated water to the collapsible storage containers prior to receiving results of solubility tests from the contract laboratory. The treated water will subsequently be pumped to 25,000 gallon storage containers located in the facility warehouse, as described in letters dated March 3, 8 and 10, 1995.
- B. Simultaneously pump and process water currently residing in the sewer manhole and lateral, building sump pit and basement. This project shall be completed by June 30, 1995.
- Pumping will be sequenced as described in letter dated March 1, 1995, to ensure a positive hydrostatic pressure is maintained from outside to inside the facility's basement.

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19. (Continued)

- ii. Water in the sewer manhole, lateral, building sump pit, and basement will be pumped to a radiologically controlled area of the facility and processed using a skid mounted, multi-stage filtration and ion-exchange system as described in letters dated March 1, 3, 8 and 10, 1995. Spill procedures and radiological controls will be implemented as described in letter dated February 14, 1995, and Attachment 2 to letter dated March 1, 1995.
- iii. Water removed from the sewer manhole, lateral, building sump pit, and basement will be treated to contain no detectable non-soluble cobalt-60 and less than 1000 pCi/l soluble cobalt-60 as determined by a contract analytical laboratory. The licensee may continue to pump treated water to the collapsible storage containers prior to receiving results of solubility tests from the contract laboratory. The treated water will subsequently be pumped to 25,000 gallon storage containers located in the facility warehouse, as described in letters dated March 3, 8, and 10, 1995.
- C. Water sampling and analytical protocols will be as described in letter dated February 2, 1995, as clarified in letters dated February 14, and March 3, 1995. Solubility of cobalt-60 in samples containing detectable activity will be demonstrated in accordance with the reference in Supplement 2 to letter dated March 3, 1995. All solid radwaste generated from the water processing activities, including filter and demineralizer resin wastes, will be collected and stored at the London Road facility pending its ultimate disposal as radioactive waste.
- D. Excavate areas around the facility to allow (i) access to the radioactively contaminated four-inch waste discharge line; and (ii) the radiological evaluation of the facility's underdrain system and surrounding soils. This project shall be completed by July 7, 1995.
- i. Excavate the soil in the vicinity of the building's four-inch waste discharge line and underdrains and disconnect these drains as described in letter dated March 1, 1995. Evaluate the radiological contamination status of the underdrain system and remediate or replace the system. Reconnect the underdrain system to the building sump pit and pump, test and process the underdrain system waters as described in letter dated March 1, 1995. The testing and processing of water pumped from the underdrain system will continue until sampling of the water consistently reveals no detectable non-soluble cobalt-60 and less than 200 pCi/l soluble cobalt-60.
- ii. Evaluate the radiological status of the soil in the vicinity of the underdrain system and building sump pit as described in the letter dated March 1, 1995.

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**19. (Continued)**

**E. Immobilize the radioactive contamination present in the sewer manhole, lateral and four-inch discharge line. This project shall be completed by July 7, 1995.**

**i. Completely grout-in the radioactively contaminated four-inch sewer discharge line and the manhole and lateral up to the sewer interceptor as described in "Issue 4" of letter dated January 27 and letter dated March 1, 1995. The grouting will render the existing sewer discharge piping system inoperable, and immobilize (fix) the radioactive contamination that resides in the system.**

**ii. Develop and implement a sub-surface radiological monitoring program to assess contamination migration as described in letter dated February 10, 1995. The program must be submitted in writing and approved by the NRC.**

**F. Remediate the London Road Interceptor in the vicinity of the abandoned lateral, as described in letter dated January 27, 1995. The remediation activities will be coordinated with the Northeast Ohio Regional Sewer District. This project shall begin no later than July 8, 1995.**

**G. i. The licensee shall notify the NRC Region III office no later than July 14, 1995, regarding the status of the completion of License Condition Numbers 19.B., 19.D., and 19.E.**

**ii. The licensee shall notify the NRC Region III office no later than July 14, 1995, to confirm initiation of the remediation project described in License Condition Number 19.F., and provide an estimated completion date.**

**20. 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 November 12, 1984;**

**B. Letters dated November 12, 1984 (excluding Item 4), February 12, 1985, June 7, 1985 (excluding letter Item 4), September 6, 1985 (excluding change to Page 29 of ISP-1 manual);**

**C. Letters dated May 29, 1986 (Response to Enclosure A, Significant Licensing Deficiencies of NRC letter dated March 7, 1986);**

**D. Letter dated July 23, 1986 (Response to Enclosure B, Additional Licensing Issues for Renewal Applications of NRC letter dated March 7, 1986) excluding approval of the licensee's in-house training program;**

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## 20. (Continued)

- E. Letters dated August 22, 1986, October 28, 1986, November 13, 1986, November 14, 1986 and December 4, 1986 (with Revised ISP-1 Manual, Appendices A and B attached), May 7, 1987, August 3, 1987, December 31, 1987, January 15, 1988 (Item V only), August 15, 1988 (with attached course manual), September 29, 1988 (with attachments) and November 21, 1988; and
- F. Letters dated March 29, 1989 (except Section 3.4 "Hot Cell Entry and Action Levels"), April 7, 1989, August 25, 1989 (except Item B(4)), July 23, 1990 (except Sections 3.0 and 5.0 of ISP-14 procedure), March 1, 1991 (with attachments), March 27, 1991 (with attachments), May 9, 1991, May 14, 1991, February 27, 1992, February 28, 1992, March 2, 1992, and March 5, 1992.
- G. Letters dated April 16, 1992 (with enclosures), June 15, 1992 (with attachments), August 10, 1992, September 18, 1992, December 29, 1992 (with enclosures), January 20, 1993, March 30, 1993, March 31, 1994 (with enclosure), April 11, 1994, and September 21, 1994.
- H. Letters with attachments dated January 27, 1995, February 2, 10, and 14, 1995, and March 1, 3, 8, and 10, 1995.

Notwithstanding any reference to the specific activities in the above listed letters, the following activities are not addressed by this license.

- i. The evaporation of treated water or its discharge to the sanitary sewer system.
  - ii. Installation of a composite sampler and flow gage.
  - iii. Conventional disposal of excavated soils exhibiting cobalt-60 concentrations greater than 8 pCi/g.
  - iv. Re-connection of the foundation underdrain system to the proposed new manhole and lateral.
- I. Letters dated May 3, 1995, May 17, 1995, June 6, 1995 (excluding Item 3) and June 13, 1995.

FOR THE U.S. NUCLEAR REGULATORY COMMISSION

Date

6/16/95

By

K. G. N. II  
Materials Licensing Section, Region III



UNITED STATES  
NUCLEAR REGULATORY COMMISSION

REGION III  
801 WARRENVILLE ROAD  
LISLE, ILLINOIS 60532-4351

June 21, 1995

Advanced Medical Systems, Inc.  
ATTN: Mr. Robert Meschter  
Radiation Safety Officer  
1020 London Road  
Cleveland, OH 44110

Dear Mr. Meschter:

Enclosed is Amendment No. 36 to your NRC Material License No. 34-19089-01 in accordance with your request.

Please review the enclosed document carefully and be sure that you understand all conditions. If there are any errors or questions, please notify the U.S. Nuclear Regulatory Commission, Region III office so that we can provide appropriate corrections and answers.

This amendment authorizes the following items: (1) Subitem iv. of License Condition 21.H.iv. (previously License Condition 20.H.iv.) has been removed; (2) License Condition 20. has been added allowing you to re-connect the foundation under drain system to a new manhole and lateral for the purpose of collecting water from the existing under drain system to be pumped for storage and analysis for cobalt-60 concentration; and (3) Your letter dated June 14, 1995 has been tied down in License Condition No. 21.I. to allow the RSO to make minor changes to the provisions of RWP No. 95-10 and the work plan as described in Attachment 3, Item G of your June 14 letter. However, please note that the issuance of this amendment does not preclude you from the requirement to continue to collect and analyze foundation water to ensure 10 CFR Part 20 criteria has been met, to assure that surrounding soil is free of contamination.

Finally, we have received your June 16, 1995 response to our June 14, 1995 deficiency letter and will make every effort to review your response in an expeditious manner. We will notify you if we have additional questions. Again, please note that we have only approved the installation of a new manhole and lateral and its re-connection to the existing under drain system. We will need to evaluate all of the other issues regarding cobalt-60 contamination within the existing under drain system and soils both under the building and in the vicinity of the under drain system prior to discharge of collected water.

Please be advised that your license expires at the end of the day, in the month, and year stated in the license. Unless your license has been terminated, you must conduct your program involving byproduct materials in accordance with the conditions of your NRC license, representations made in your license application, and NRC regulations. In particular, note that you must:

June 21, 1995

1. Operate in accordance with NRC regulations 10 CFR Part 19, "Notices, Instructions and Reports to Workers; Inspections," 10 CFR Part 20, "Standards for Protection Against Radiation," and other applicable regulations.
2. Notify NRC, in writing, within 30 days:
  - a. When Radiation Safety Officer permanently discontinues performance of duties under the license or has a name change; or
  - b. When the licensee's mailing address changes (no fee is required if the location of byproduct material remains the same).
3. In accordance with 10 CFR 30.36(b) and/or license condition, notify NRC, promptly, in writing, and request termination of the license when you decide to terminate all activities involving materials authorized under the license.
4. Request and obtain a license amendment before you:
  - a. Change Radiation Safety Officers;
  - b. Order byproduct material in excess of the amount, or radionuclide, or form different than authorized on the license;
  - c. Add or change the areas of use or address or addresses of use identified in the license application or on the license; or
  - d. Change ownership of your organization.
5. Submit a complete renewal application with proper fee or termination request at least 30 days before the expiration date of your license. You will receive a reminder notice approximately 90 days before the expiration date. Possession of byproduct material after your license expires is a violation of NRC regulations. A license will not normally be renewed, except on a case-by-case basis, in instances where licensed material has never been possessed or used.

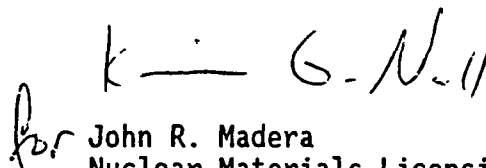
In addition, please note that NRC Form 313 requires the applicant, by his/her signature, to verify that the applicant understands that all statements contained in the application are true and correct to the best of the applicant's knowledge. The signatory for the application should be the licensee or certifying official rather than a consultant.

You will be periodically inspected by NRC. Failure to conduct your program in accordance with NRC regulations, license conditions, and representations made in your license application and supplemental correspondence with NRC will

June 21, 1995

result in enforcement action against you. This could include issuance of a notice of violation, or imposition of a civil penalty, or an order suspending, modifying or revoking your license as specified in the General Policy and Procedures for NRC Enforcement Actions, 10 CFR Part 2, Appendix C. Since serious consequences to employees and the public can result from failure to comply with NRC requirements, prompt and vigorous enforcement action will be taken when dealing with licensees who do not achieve the necessary meticulous attention to detail and the high standard of compliance which NRC expects of its licensees.

Sincerely,

  
for John R. Madera  
Nuclear Materials Licensing Section

License No.: 34-19089-01  
Docket No.: 030-16055/040-08764/  
030-171554

Enclosure: Amendment No. 36

## MATERIALS LICENSE

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, 36, 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. Advanced Medical Systems, Inc.

2. 1020 London Road  
Cleveland, OH 44110In accordance with letter dated  
June 14, 19953. License Number 34-19089-01 is amended in  
its entirety to read as follows:

4. Expiration Date December 31, 1994

5. Docket or  
Reference No. 030-16055/040-08764/030-17154Byproduct, Source, and/or  
Special Nuclear Material

A. Cobalt-60

B. Cobalt-60

C. Cesium-137

D. Depleted Uranium

E. Cobalt-60

7. Chemical and/or Physical  
Form

A. Solid Metal

B. Sealed sources  
(teletherapy/  
radiography sealed  
sources which have  
been evaluated and  
approved for  
commercial  
distribution by the  
NRC or an Agreement  
State)C. Sealed sources  
(teletherapy/  
radiography sealed  
sources which have  
been evaluated and  
approved for  
commercial  
distribution by the  
NRC or an Agreement  
State)

D. Nickel Plated

E. Sealed Sources

8. Maximum Amount that Licensee  
May Possess at Any One Time  
Under This License

A. 150,000 curies

B. 135,000 curies  
(no single source  
to exceed 13,700  
curies)C. 40,000 curies (no  
single source to  
exceed 2,200  
curies)

D. 4,040 kilograms

E. 15,000 curies

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|--|--|--|
| <p>6. Byproduct, source, and/or special nuclear material</p> <p>F. Cobalt-60</p> | <p>7. Chemical and/or physical form</p> <p>F. Sealed Sources<br/>(any sealed source approved by the NRC or an Agreement State)</p> | <p>8. Maximum amount that licensee may possess at any one time under this license</p> <p>F. 15 millicuries</p> |
|--|--|--|
9. Authorized Use:
- A. For storage only incident to waste disposal or transfer to an authorized recipient. This license does not authorize the manufacture of sealed sources.
  - B. For installation, maintenance of, dismantling and servicing of Picker Corporation and Advanced Medical Systems, Inc. teletherapy units and Picker Model 6145 radiography units possessed by licensees authorized to possess the radioactive material pursuant to a specific license issued by the Commission or an Agreement State. For installation and removal of sealed sources into Picker Corporation, Advanced Medical Systems, Inc. and Keleket Barnes teletherapy units of licensees authorized to possess the radioactive material pursuant to a specific license issued by the Commission or an Agreement State. For training Hospital or Clinic personnel for in-house service operations on teletherapy equipment, on unit model per course, in accordance with letter dated August 15, 1988 and September 29, 1988.
  - C. For installation, maintenance, dismantling and servicing of Picker Corporation and Advanced Medical Systems radiography and teletherapy units of licensees authorized to possess the radioactive material pursuant to a specific license issued by the Commission or an Agreement State.
  - D. Shielding material in Picker Corporation and Advanced Medical System, Inc., radiography and teletherapy devices.
  - E. For storage only, those non-NRC approved sources in the possession of the licensee prior to the issuance of this amendment.
  - F. For use in devices (including Tech OP Model 571 Calibrator described in application dated November 12, 1984) approved by the Nuclear Regulatory Commission or an Agreement State to calibrate radiation survey instruments.

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CONDITIONS

10. Licensed material in Items 6.A., 6.E. and 6.F. shall be used only at the licensee's facility at 1020 London Road, Cleveland, Ohio. Licensed material in Items 6.B. and 6.C. shall be used only at 1020 London Road, Cleveland, Ohio and at facilities of customers who possess a specific license from the NRC authorizing possession of the licensed material. Licensed material in Item 6.D. shall be used only at the licensee's facilities at 1020 London Road, Cleveland, Ohio or 121 North Eagle Street, Geneva, Ohio, and at facilities of customers who possess a specific license from the NRC authorizing possession of the licensed material.

11. A. The Radiation Protection Officer for service operations described in Subitems 9.B. and 9.C. and routine health physics activities is Robert Meschter.

The licensee shall not perform service operations described in Subitems 9.B. and 9.C. until Robert Meschter has completed the required training.

- B. Licensed material shall be used by, or under the supervision of and in the physical presence of users listed in the table below. The users are only authorized to perform the indicated services on the teletherapy or radiography units specified in the table below:

AMS/PICKER TELETHERAPY/RADIOGRAPHY UNITS MODELS

	CS 600	C 1000	C 2000	C 3000	C 5000	C 10,000	C4	C8	C9	C12	Cyclops
USER											
Curtis Perry				3	1,2	1,2	1,2	1,2	1,2		1,2
Haddock	5	5	5	5	5	5	5	5	5	5	5

AMS/PICKER TELETHERAPY/RADIOGRAPHY UNITS MODELS

	V 1000	V 2000	V 3000	V 10,000	C V4	C V9					
USER											
Curtis Perry		1,2	1,2	1,2	1,2	1,2					
Haddock	5	5	5	5	5	5					

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SUPPLEMENTARY SHEET**

License number

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Docket or Reference number

030-16055/040-08764/030-17154

Amendment No. 36

**11. (Continued)**

1. Authorizes the servicing of AMS/Picker units, excluding source exchange.
2. Authorizes sealed source exchange.
3. Authorizes removal of unit and head from customer sites only.
4. Authorizes the training of AMS personnel in the manufacture of AMS/Picker sealed sources.
5. Authorizes the handling of sealed sources only.

12. A.
  - (1) Each sealed source acquired from another person and containing licensed material, other than hydrogen-3, with a half-life greater than 30 days and in any form other than gas shall be tested for contamination and/or leakage before use. In the absence of a certificate from a transfer or indicating that a test has been made within 6 months before the transfer, a sealed source received from another person shall not be put into use until tested.
  - (2) Notwithstanding the periodic leak test required by this condition, any licensed sealed source is exempt from such leak tests when the source contains 100 microcuries or less of beta and/or gamma emitting materials or 10 microcuries or less of alpha emitting material.
  - (3) Except for alpha sources, the periodic leak test required by this condition does not apply to sealed sources that are stored and not being used. The sources excepted from this test shall be tested for leakage before any use or transfer to another person unless they have been leak tested within 6 months before the date of use or transfer.
- B. Each sealed source fabricated by the licensee shall be inspected and tested for construction defects, leakage, and contamination prior to use or transfer as a sealed source. If the inspection or test reveals any construction defects or 0.005 microcurie or greater of contamination, the source shall not be used or transferred as a sealed source until it has been repaired, decontaminated and retested.
- C. Each sealed source containing licensed material, other than hydrogen-3, with a half-life greater than 30 days and in any form other than gas shall be tested for leakage and/or contamination at intervals not to exceed 6 months except that each source designated for the purpose of emitting alpha particles shall be tested at intervals not to exceed 3 months.
- D. The test shall be capable of detecting the presence of 0.005 microcurie of radioactive material on the test sample. The test sample shall be taken from the sealed source or from the surfaces of the device in what the sealed source is permanently or semi-permanently mounted or stored on which one might expect contamination to accumulate. Records of leak test results shall be kept in units of microcuries and maintained for inspection by the Commission. Records may be disposed of following Commission inspection.

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Amendment No. 36

## 12. (Continued)

- E. If the test required by Subsection A. or C. of this condition reveals the presence of 0.005 microcurie or more of removable contamination, the licensee shall immediately withdraw the sealed source from use and shall cause it to be decontaminated and repaired or to be disposed of in accordance with Commission regulations. A report shall be filed within 5 days of the date the leak test result is known with the U.S. Nuclear Regulatory Commission, Region III, 801 Warrenville Road, Lisle, Illinois 60532-4351, ATTN: Chief, Nuclear Materials Safety Branch, describing the equipment involved, the test results, and the corrective action.

The licensee may transport licensed material in accordance with the provisions of 10 CFR Part 71, "Packaging and Transportation of Radioactive Material."

## 14. Inventory Requirements:

- A. An inventory system will be established that accounts for the receipt, movement, transfer and disposal of all radioactive material possessed under this license. Records of inventories will be maintained for 10 years from the date of each inventory.
- B. A complete examination of records will be completed every six months to confirm the location of all radioactive material and ensure that possession is within the limits specified in this license.
- C. A physical inventory of all radioactive material possessed under this license will be conducted on or before June 1, 1993. Thereafter, a physical inventory of all radioactive material possessed under this license will be completed within 60 months of the previous physical inventory.

15. The licensee's field service audits (as described in the ATC Medical Group Management Plan, revised April 1, 1989, and submitted with letter dated April 17, 1989) shall be performed unannounced by the Radiation Protection Officer (i.e., Radiation Safety Officer).
16. The licensee shall follow the recommended survey frequencies outlined in Regulatory Guide 8.21, Revision 1, October 1979, in work areas where radioactive materials are handled or used.
17. The licensee shall maintain records of information important to safe and effective decommissioning at 1020 London Road, Cleveland, Ohio per the provisions of 10 CFR 30.35(g) until this license is terminated by the Commission.

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18. The licensee shall maintain and execute the response measure of their Emergency Plan dated October 25, 1991 and revised January 1992, May 27, 1992 and April 26, 1993. The licensee shall make no change in the emergency plan submitted pursuant to 10 CFR [30.32(i), 40.31(j), 70.22(i)] that would decrease the effectiveness of the plan without prior Commission approval. The licensee may make changes to its Emergency Plan without prior Commission approval if the changes do not decrease the effectiveness of the plan. The licensee shall maintain records of changes that are made to the plan without prior approval for a period of three years from the date of the changes and shall furnish the Chief, Medical, Academic, and Commercial Use Safety Branch, Division of Industrial and Medical Nuclear Safety, NMSS, U.S. Nuclear Regulatory Commission, Washington, DC 20555, and the appropriate NRC Regional Office specified in Appendix D of 10 CFR 20, a report, within six months after the change is made, containing a description of each change.
19. The licensee is authorized to begin the following activities no sooner than March 17, 1995, and must complete them by the date specified in each item in accordance with letters dated January 27, February 2, 10, and 14, and March 1, 3, 8, and 10, 1995, wherein the licensee proposed and clarified its plans for: (1) dealing with the accumulation of ground water in and around its facility basement; (2) immobilizing and/or remediating contamination that has collected in below ground sewer piping and manholes; and (3) processing future ground water that builds up around the facility. These plans address the following actions the licensee will take.
- A. Process water that is currently stored outside its facility in above-ground tanks.
- i. Tanked water will be processed in-situ using a submersible water treatment system that includes filtration and ion-exchange demineralization as described in letters dated March 1, 3, 8, and 10, 1995.
- ii. Water will be treated until it contains no detectable non-soluble cobalt-60 and less than 1000 pCi/l of soluble cobalt-60 as determined by a contract analytical laboratory. The licensee may continue to pump treated water to the collapsible storage containers prior to receiving results of solubility tests from the contract laboratory. The treated water will subsequently be pumped to 25,000 gallon storage containers located in the facility warehouse, as described in letters dated March 3, 8 and 10, 1995.
- B. Simultaneously pump and process water currently residing in the sewer manhole and lateral, building sump pit and basement. This project shall be completed by June 30, 1995.
- i. Pumping will be sequenced as described in letter dated March 1, 1995, to ensure a positive hydrostatic pressure is maintained from outside to inside the facility's basement.

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Amendment No. 36

19. (Continued)

E. Immobilize the radioactive contamination present in the sewer manhole, lateral and four-inch discharge line. This project shall be completed by July 7, 1995.

i. Completely grout-in the radioactively contaminated four-inch sewer discharge line and the manhole and lateral up to the sewer interceptor as described in "Issue 4" of letter dated January 27 and letter dated March 1, 1995. The grouting will render the existing sewer discharge piping system inoperable and immobilize (fix) the radioactive contamination that resides in the system.

ii. Develop and implement a sub-surface radiological monitoring program to assess contamination migration as described in letter dated February 10, 1995. The program must be submitted in writing and approved by the NRC.

F. Remediate the London Road interceptor in the vicinity of the abandoned lateral, as described in letter dated January 27, 1995. The remediation activities will be coordinated with the Northeast Ohio Regional Sewer District. This project shall begin no later than July 8, 1995.

G. i. The licensee shall notify the NRC Region III office no later than July 14, 1995, regarding the status of the completion of License Condition Numbers 19.B., 19.D. and 19.E.

ii. The licensee shall notify the NRC Region III office no later than July 14, 1995, to confirm initiation of the remediation project described in License Condition Number 19.F., and provide an estimated completion date.

20. The licensee is authorized to install a new manhole and lateral and re-connect this to the existing under drain system. The purpose of the new manhole is strictly to act as a means of collecting water from the under drain system which will be pumped to storage containers and subsequent analysis for cobalt-60 concentration.

21. 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 November 12, 1984;

B. Letters dated November 12, 1984 (excluding Item 4), February 12, 1985, June 7, 1985 (excluding letter Item 4), September 6, 1985 (excluding change to Page 29 of ISP-1 manual);

C. Letters dated May 29, 1986 (Response to Enclosure A, Significant Licensing Deficiencies of NRC letter dated March 7, 1986);

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030-16055/040-08764/030-17154

Amendment No. 36

**19. (Continued)**

- ii. Water in the sewer manhole, lateral, building sump pit, and basement will be pumped to a radiologically controlled area of the facility and processed using a skid mounted, multi-stage filtration and ion-exchange system as described in letters dated March 1, 3, 8 and 10, 1995. Spill procedures and radiological controls will be implemented as described in letter dated February 14, 1995, and Attachment 2 to letter dated March 1, 1995.
  - iii. Water removed from the sewer manhole, lateral, building sump pit, and basement will be treated to contain no detectable non-soluble cobalt-60 and less than 1000 pCi/l soluble cobalt-60 as determined by a contract analytical laboratory. The licensee may continue to pump treated water the collapsible storage containers prior to receiving results of solubility tests from the contract laboratory. The treated water will subsequently be pumped to 25,000 gallon storage containers located in the facility warehouse, as described in letters dated March 3, 8, and 10, 1995.
- C. Water sampling and analytical protocols will be as described in letter dated February 2, 1995, as clarified in letters dated February 14, and March 3, 1995. Solubility of cobalt-60 in samples containing detectable activity will be demonstrated in accordance with the reference in Supplement 2 to letter dated March 3, 1995. All solid radwaste generated from the water processing activities, including filter and demineralizer resin wastes, will be collected and stored at the London Road facility pending its ultimate disposal as radioactive waste.
- D. Excavate areas around the facility to allow: (i) access to the radioactively contaminated four-inch waste discharge line; and (ii) the radiological evaluation of the facility's underdrain system and surrounding soils. This project shall be completed by July 7, 1995.
- i. Excavate the soil in the vicinity of the building's four-inch waste discharge line and underdrains and disconnect these drains as described in letter dated March 1, 1995. Evaluate the radiological contamination status of the underdrain system and remediate or replace the system. Reconnect the underdrain system to the building sump pit and pump, test and process the underdrain system waters as described in letter dated March 1, 1995. The testing and processing of water pumped from the underdrain system will continue until sampling of the water consistently reveals no detectable non-soluble cobalt-60 and less than 200 pCi/l soluble cobalt-60.
  - ii. Evaluate the radiological status of the soil in the vicinity of the underdrain system and building sump pit as described in the letter dated March 1, 1995.

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Amendment No. 36

21. (Continued)

- D. Letter dated July 23, 1986 (Response to Enclosure B, Additional Licensing Issues for Renewal Applications of NRC letter dated March 7, 1986) excluding approval of the licensee's in-house training program;
- E. Letters dated August 22, 1986, October 28, 1986, November 13, 1986, November 14, 1986 and December 4, 1986 (with Revised ISP-1 Manual, Appendices A and B attached), May 7, 1987, August 3, 1987, December 31, 1987, January 15, 1988 (Item V only), August 15, 1988 (with attached course manual), September 29, 1988 (with attachments) and November 21, 1988; and
- F. Letters dated March 29, 1989 (except Section 3.4 "Hot Cell Entry and Action Levels"), April 7, 1989, August 25, 1989 (except Item B(4)), July 23, 1990 (except Sections 3.0 and 5.0 of ISP-14 procedure), March 1, 1991 (with attachments), March 27, 1991 (with attachments), May 9, 1991, May 14, 1991, February 27, 1992, February 28, 1992, March 2, 1992, and March 5, 1992.
- G. Letters dated April 16, 1992 (with enclosures), June 15, 1992 (with attachments), August 10, 1992, September 18, 1992, December 29, 1992 (with enclosures), January 20, 1993, March 30, 1993, March 31, 1994 (with enclosure), April 11, 1994, and September 21, 1994.
- H. Letters with attachments dated January 27, 1995, February 2, 10, and 14, 1995, and March 1, 3, 8, and 10, 1995.

Notwithstanding any reference to the specific activities in the above listed letters, the following activities are not addressed by this license.

- i. The evaporation of treated water or its discharge to the sanitary sewer system.
  - ii. Installation of a composite sampler and flow gage.
  - iii. Conventional disposal of excavated soils exhibiting cobalt-60 concentrations greater than 8 pCi/g.
- I. Letters dated May 3, 1995, May 17, 1995, June 6, 1995, June 13, 1995 and June 14, 1995.

FOR THE U.S. NUCLEAR REGULATORY COMMISSION

Date

6/21/95

By

K. G. N. II

Materials Licensing Section, Region III

COPY





UNITED STATES  
NUCLEAR REGULATORY COMMISSION  
REGION III  
801 WARRENVILLE ROAD  
LISLE, ILLINOIS 60532-4351

JUN 29 1995

Advanced Medical Systems, Inc.  
ATTN: David Cesar  
Treasurer  
121 North Eagle Street  
Geneva, OH 44041

Dear Mr. Cesar:

The NRC and its contractor have completed the review of your "modified and restated" standby trust agreement which you submitted to replace one that was previously submitted to the NRC.

Your March 1995 standby trust agreement differs substantially from that recommended in Regulatory Guide 3.66. The modifications necessary to make the submitted agreement suitable for use under the decommissioning financial assurance requirements would entail almost a complete redrafting of the agreement. Therefore, to ensure adequate protection for NRC, we recommend that you replace the submitted standby trust agreement with one that closely matches the recommended wording of Regulatory Guide 3.66 (enclosed). The NRC believes that this can be easily accomplished if you return to your November 16, 1992, standby trust agreement and revise it as requested in our letter of March 13, 1995 (enclosed).

- I. The submitted agreement contains many fundamental flaws that make it inappropriate for use as a financial assurance mechanism for NRC. For example, the agreement does not satisfy a number of conditions specified on pages 3-12 and 3-13 of Regulatory Guide 3.66 that must be met if the agreement is to be acceptable to NRC:
  - A. The trust must be a three-party agreement whereby the licensee transfers assets to a trustee "to hold on behalf of the beneficiary, the Commission or State agency." The submitted agreement does not establish that NRC is the beneficiary, nor does it reference NRC in all appropriate places.
  - B. The agreement "should state that the fund will be disbursed to the licensee only upon presentation to the trustee of {certain certifications}." Although Section 4 of the agreement seems to require presentation of the necessary certifications, additional language in the same section and in other sections seems to require only that the grantor provide the trustee with written instruction of payment.
  - C. The trustee should be replaced "only by mutual agreement of the Commission or State agency, the licensee, and the trustee." Under the submitted agreement, however, AMS may replace the trustee unilaterally.

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- II. In addition, AMS has added a considerable amount of text to the wording recommended in Regulatory Guide 3.66. Many of these additions may not serve NRC's best interests, such as the following examples:
- A. The agreement contains several added paragraphs at the beginning of the agreement referencing other trust agreements and amendments. The agreement states it is being used to "restate in its entirety the trusts upon which and the uses and purposes for which the property now held or hereafter acquired by the Trustee shall be held, managed, and controlled." The purposes and language of the previous trusts may not be compatible with NRC's interests. In addition, the paragraphs do not mention the most recent agreement (dated November 16, 1992), and they erroneously date the July 1992 standby agreement as July 1994.
  - B. The agreement contains an added paragraph (paragraph 3 on page 2) which states that "the property now held in said Trust shall be disbursed to the Grantor." Although this paragraph may apply only to property in the trust being replaced (this is unclear due to the uncertain status of the earlier trust), it could be interpreted to direct the trustee to disburse any property in the fund to the grantor, including funds needed for decommissioning.
  - C. The agreement adds an unacceptable condition in its delineation of the trustee's investment responsibilities (Section 5a). The agreement directs the trustee to invest and reinvest money "without being limited by any statute or rule of law of the State of Ohio regarding investments by trustees now or hereafter in effect." State laws and statutes may provide important protections for beneficiaries and may also establish minimal acceptable standards for trustees.
  - D. The agreement specifically allows the trustee "to borrow money and mortgage or pledge any property, at any time constituting a portion of said trust upon such terms and conditions as said Trustee shall deem wise." Such activity, however, could preclude funds in the trust from being available when needed for decommissioning.
- III. Finally, in numerous instances the agreement revises or omits wording recommended in Regulatory Guide 3.66. Problematic examples of such revisions include the following:
- A. The agreement does not adequately cite NRC's authority for requiring decommissioning financial assurance. For example, in paragraph 3 on page 1, the agreement fails to cite the Atomic Energy Act of 1954, as amended, and the Energy Reorganization Act of 1974. In addition, the paragraph cites only "certain regulations applicable to the Grantor, requiring that an owner or operator of a hot-cell facility shall provide assurance when

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needed for decommissioning the facility." This reference does not specifically identify NRC's regulations in Title 10, Chapter 1 of the Code of Federal Regulations, Part 30, 40, 70, and 72" as called for by the recommended wording. These references are necessary to ensure that the mechanism was executed to assure only decommissioning costs. The paragraph also ensures that NRC regulations will be considered as applicable to interpreting any ambiguities in the terms of the mechanism.

- B. The agreement modifies the recommended wording regarding the trustee's use of counsel (in Section 8) to state that such counsel "shall be counsel to the Grantor." Although the section goes on to say that the trustee "may" consult with independent counsel in the event of a conflict of interest on the part of grantor's counsel, the effect of the section is to require the trustee to consult at least with grantor's counsel, even in the event of a conflict of interest.
- C. The agreement omits numerous references to NRC. For example, in Section 11 the agreement omits the sentence "If the NRC issues orders, requests, or instructions to the Trustee these shall be in writing, signed by the NRC, or its designees, and the Trustee shall act and shall be fully protected in acting in accordance with such orders, requests, and instructions." Such omissions may diminish NRC's powers and protections. In this example, the omission precludes NRC from directing the Trustee regarding the trust.
- D. The trust agreement does not state a "due diligence" standard, as recommended in Regulatory Guide 3.66 that "the Trustee shall discharge its duties . . . solely in the interest of the beneficiary and with the care, skill, prudence, and diligence . . . which persons of prudence, acting in a like capacity and familiar with such matters, would use in the conduct of an enterprise of a like character and with like aims."
- E. The agreement does not require 90 days notice, or any notice, to NRC prior to the resignation of trustee.
- F. The agreement does not include the recommended severability provision "If any parts of this agreement are invalid, it shall not affect the remaining provisions which will remain valid and enforceable." Consequently, there is increased risk that the entire agreement could be invalidated due to errors in some sections.

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Due to the many substantive differences in protection provided by the submission relative to the recommended standby trust agreement in Regulatory Guide 3.66, please submit a new standby trust agreement along with all related documents (such as evidence that the party signing the agreement is authorized to represent the company) that closely follows the terms and conditions recommended in Regulatory Guide 3.66, or return to your November 16, 1992, standby trust agreement and revise it as requested in our March 13, 1995 letter.

We will continue our review of your application upon receipt of this information. Please reply in duplicate, within 30 days, and refer to Control Number 00209.

If you have any questions or require clarification on any of the information stated above, you may contact us at (708) 829-9887.

Sincerely,

*K - G. N. 4*  
*for*

John R. Madera, Chief  
Nuclear Materials Licensing Section

License No. 34-19089-01  
Docket No. 030-16055

Enclosures:

1. Ltr dated 3/13/95
2. Regulatory Guide 3.66



# REGULATORY GUIDE

OFFICE OF NUCLEAR REGULATORY RESEARCH

## REGULATORY GUIDE 3.66 (Task DG-3002)

### STANDARD FORMAT AND CONTENT OF FINANCIAL ASSURANCE MECHANISMS REQUIRED FOR DECOMMISSIONING UNDER 10 CFR PARTS 30, 40, 70, AND 72

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#### USNRC REGULATORY GUIDES

Regulatory Guides are issued to describe and make available to the public methods acceptable to the NRC staff of implementing specific parts of the Commission's regulations, to delineate techniques used by the staff in evaluating specific problems or postulated accidents, or to provide guidance to applicants. Regulatory Guides are not substitutes for regulations, and compliance with them is not required. Methods and solutions different from those set out in the guides will be acceptable if they provide a basis for the findings requisite to the issuance or continuance of a permit or license by the Commission.

This guide was issued after consideration of comments received from the public. Comments and suggestions for improvements in these guides are encouraged at all times, and guides will be revised, as appropriate, to accommodate comments and to reflect new information or experience.

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### VALUE/IMPACT STATEMENT

A draft value/impact statement was published with the draft of this regulatory guide, DG-3002, when it was published for public comment in January 1990. No changes were necessary, so a separate value/impact statement for the final guide has not been prepared. A copy of the draft value/impact statement is available for inspection and copying for a fee at the Commission's Public Document Room at 2120 L Street NW., Washington, DC, under Task DG-3002.

## 1. INTRODUCTION

The Nuclear Regulatory Commission (NRC) has established technical and financial regulations for decommissioning licensed nuclear facilities (53 FR 24018, June 27, 1988). The regulations address decommissioning planning needs, timing, funding methods, and environmental review requirements for public and private facilities holding licenses under 10 CFR Parts 30, 40, 50, 70, and 72, with the exception of uranium mills. The intent of the regulations is to ensure that the decommissioning of all licensed facilities will be accomplished in a safe and timely manner and that licensees will provide adequate funds to cover all costs associated with decommissioning.

The purpose of this regulatory guide, "Standard Format and Content of Financial Assurance Mechanisms Required for Decommissioning Under 10 CFR Parts 30, 40, 70, and 72," is to provide guidance acceptable to the NRC staff on the information to be provided for establishing financial assurance for decommissioning and to establish a standard format for presenting the information. Use of the standard format will (1) help ensure that the financial instruments contain the information required by 10 CFR Parts 30, 40, 70, and 72, (2) aid the applicant and NRC staff in ensuring that the information is complete, and (3) help persons reading the financial instruments to locate information.

This guide addresses financial assurance for decommissioning of facilities under materials licenses granted under Parts 30, 40, 70, and 72. These parts include licensees in the following categories:

- Part 30 - Byproduct Material,
- Part 40 - Source Material,
- Part 70 - Special Nuclear Material, and
- Part 72 - Independent Spent Fuel Storage Installations

Other guidance will address the decommissioning requirements for licensees regulated under 10 CFR Part 50, production and utilization facilities, and describe specific procedures required during decommissioning.

The financial assurance requirements of the decommissioning rule became effective on July 27, 1988, 30 days after the regulation was promulgated. Holders of licenses issued before July 27, 1990, must provide financial assurance on or before July 27, 1990 [10 CFR 30.35(c)(2), 40.36(c)(2), and 70.25(c)(2)]. Applicants for licenses on or after July 28, 1988, generally must provide financial assurance when their license is issued. Independent spent fuel storage installations (ISFSIs) are required by current regulations (10 CFR 72.22) to have made financial arrangements for decommissioning.

NRC licensees initiate decommissioning activities when they decide to terminate licensed activity at a facility. The rule defines "decommissioning" as "remov[ing] (as a facility)<sup>1</sup> safely from service and reduc[ing] residual radioactivity to a level that permits release of the property for unrestricted use and termination of license" (10 CFR 30.4(aa)).

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<sup>1</sup>"Facility" is derived from the definition for decommissioning provided in the final rule and refers to the property and structures associated with materials licenses issued under 10 CFR Parts 30, 40, 70, and ISFSI licenses issued under Part 72.

NRC has designed its decommissioning financial assurance requirements to provide reasonable assurance that the technical and environmental components of decommissioning are carried out and unrestricted use of a facility is possible at the conclusion of such activities. Generally, these requirements specify that a facility licensee or applicant either must set aside money for decommissioning activities or must provide a guarantee through a third party that funds will be available. This regulatory guide is organized in the following manner:

- Section 1 describes the general financial assurance requirements imposed by the rule and clarifies several issues related to compliance with the rule;
- Section 2 describes the specific financial assurance requirements that public and private licensees must meet under Parts 30, 40, 70, and 72, including the amount of financial assurance that is required and the timing of submitting financial assurance instruments;
- Section 3 describes the instruments that are available to licensees to provide financial assurance; and
- Section 4 provides proposed text of the available financial assurance instruments.

Several exhibits and appendices are included in the guide to assist licensees in complying with the financial assurance requirements associated with decommissioning. These exhibits and appendices include the following:

- Exhibits 2-1 through 2-3 summarize the financial assurance requirements for facilities licensed under 10 CFR Parts 30, 40, 70, and 72. Specifically, the exhibits distinguish between the financial assurance requirements for holders of or applicants for licenses; the type of material possessed and used by the licensee; and the amount of material possessed and used by the licensee. The exhibits also explain whether the licensee must submit a decommissioning funding plan (DFP) or certification of financial assurance, when financial assurance must be submitted, and the financial instruments that are available to meet the financial assurance requirements.
- Exhibits 3-1 through 3-9 are checklists of the criteria that should be considered when submitting and reviewing each financial assurance mechanism.
- Appendices A-E provide checklists of the documents that must be submitted to comply with the financial assurance requirements depending on the financial instrument used. Appendix A is a master checklist to be used by all applicants and licensees for materials licenses under 10 CFR Parts 30, 40, 70, and 72. Appendices B-E are checklists of documents to be submitted when a particular financial instrument is used.
- Appendix F provides a worksheet on the procedures that licensees should use to develop site-specific decommissioning cost estimates for submission in a decommissioning funding plan.

- Appendix G provides a radionuclide conversion table for determining the amount of financial assurance certification that must be provided.

Any information collection activities mentioned in this regulatory guide are contained as requirements in 10 CFR Parts 30, 40, 70, or 72, which provide the regulatory basis for this guide. The information collection requirements in 10 CFR Parts 30, 40, 70, and 72 have been cleared under OMB Clearance Nos. 3150-0017, 3150-0020, 3150-0009, and 3150-0132, respectively.

## **1.1 COMPLYING WITH FINANCIAL ASSURANCE REQUIREMENTS**

The financial assurance requirements outlined in the final decommissioning rule vary depending on several factors, including:

- The type of licensee (i.e., public vs. private);
- The type of NRC license that a licensee holds (i.e., 10 CFR Part 30, 40, 70, or 72);
- When the NRC license was issued;
- The amount of material a licensee is authorized to possess and use; and
- The financial assurance instrument that a licensee chooses to comply with the regulations.

Based on these factors, NRC licensees under Parts 30, 40, 70, or 72 may be required to:

- Submit financial assurance in amounts ranging from \$75,000 to \$750,000, or in amounts based on site-specific decommissioning cost estimates (Part 72 licensees must provide cost estimates);
- Submit a decommissioning funding plan (DFP) or certification of financial assurance (Part 72 licensees must submit DFPs);
- Demonstrate financial assurance immediately (i.e., applicants for an NRC license), or by July 27, 1990 (i.e., holders of NRC licenses issued before July 27, 1990).

The remainder of this section describes basic concepts about decommissioning financial assurance, including the difference between a DFP and certification of financial assurance and when and how financial assurance must be submitted to the NRC. Section 1.2 describes the cost estimating procedures that must be used when filing a DFP; Section 1.3 describes decommissioning financial assurance requirements for facilities using more than one type of nuclear material; and Section 1.4 describes recordkeeping requirements for financial assurance.

### **1.1.1 Decommissioning Funding Plan and Certification of Financial Assurance**

The final decommissioning rule specifies that certain NRC licensees are required to demonstrate financial assurance for decommissioning either through a decommissioning funding plan (DFP) or through certification of financial

assurance, depending on the 10 CFR part under which the license is issued and the amount of material that a license authorizes a licensee to possess and use. This section explains when a DFP is required and when certification of financial assurance is permitted.

#### 1.1.1.1 Decommissioning Funding Plan

Paragraphs 30.35(e), 40.36(d), 70.25(e), and 72.30(b) specify the contents of what must be submitted to NRC in a decommissioning funding plan for licensees or applicants under Parts 30, 40, 70, and 72 respectively. In each case, the regulations specify that a DFP must contain the following three components:

- A site-specific cost estimate for decommissioning (see Section 1.2 of this guidance for information about developing the cost estimate);
- A description of the method(s) of assuring funds for decommissioning (i.e., financial assurance instrument(s)); and
- A description of the methods that will be used to adjust the site-specific cost estimate periodically over the life of the facility (also discussed in Section 1.2 of this guidance).

The description of the methods of assuring funds for decommissioning should include the text of the financial assurance instrument(s) that a licensee has chosen to comply with the financial assurance requirements. Proposed wording for the text of each instrument is included in Section 4 of this guide. The licensee should provide an executed copy of the financial instrument at the time of renewal application submission which states that the instrument will be effective at the time the licensee takes possession of the licensed material.

The amount of financial assurance that a licensee must provide when submitting a DFP must be equal at least to the amount of the site-specific cost estimate developed as part of the DFP. Subsequently, the amount of financial assurance required of a licensee must be adjusted at the same time to match any required, periodic adjustments in the site-specific cost estimate (as required in the DFP).

#### 1.1.1.2 Certification of Financial Assurance

Sections 30.35, 40.36, and 70.25 provide that certain NRC licensees may submit certification of financial assurance, either instead of a DFP (e.g., for licensees who possess smaller amounts of nuclear material) or until a DFP is required (e.g., for licensees who hold an NRC license issued before July 27, 1990, and who do not have to submit a DFP until the time of their next license renewal). Part 72 does not authorize certification for ISFSIs. A certification of financial assurance consists of the following two parts:

- A statement that the applicant is providing financial assurance in the amount prescribed by the regulation (see Exhibit 1-1); and
- A copy of the financial assurance instrument(s) obtained by the applicant.

Exhibit 1-1

RECOMMENDED WORDING FOR CERTIFICATION OF FINANCIAL ASSURANCE

CERTIFICATION OF FINANCIAL ASSURANCE

Principal: [Legal names and business address of licensee or applicant]

NRC License Number, name and address of the facility

Issued to: U.S. Nuclear Regulatory Commission

This is to certify that [name of applicant] is licensed to possess [type of material] in the following amounts [amounts], and that financial assurance in the amount prescribed by 10 CFR [Part 30, 40, or 70], [amount prescribed] has been obtained for the purpose of decommissioning.

Signature(s) and title(s) of official(s) of institution.

Corporate seal.

Date.

A licensee or applicant providing a certification of financial assurance should provide an executed copy of the financial instrument which states that the instrument will be effective at the time the licensee takes possession of the licensed material [10 CFR 30.35(b)(2), 40.36(b)(2), and 70.25(b)(2)].

Certification of financial assurance does not require a site-specific cost estimate. Instead, based on the 10 CFR part under which the license is issued and the amount of nuclear material that a facility is authorized to possess and use, the regulation prescribes an amount of financial assurance that an applicant or licensee must provide.

Certification amounts will not change unless:

- the NRC adjusts the amounts of certification (which will be done periodically);
- the licensee submits a DFP; or
- the licensee prepares a decommissioning plan.

The prescribed amounts of financial assurance associated with certification must be adjusted when a facility notifies NRC that it will terminate activities under the license and decommission the facility. At this time, a licensee must submit a decommissioning plan (not the same as a DFP) that contains "an updated detailed cost estimate for decommissioning, comparison of that estimate with present funds set aside for decommissioning, and plan for assuring the availability of adequate funds for completion of decommissioning" (10 CFR 30.36(c)(2)(iii)(D), 40.42(c)(2)(iii)(D), and 70.38(c)(2)(iii)(D)). The methods used to adjust the amount of certification are discussed in Section 1.2.

#### 1.1.2 Timing for Submitting Financial Assurance

The decommissioning regulations establish different time schedules for submitting financial assurance, depending on whether a licensee was a holder of an NRC license issued before July 27, 1990, a holder of an NRC license issued on or after July 27, 1990, or an applicant for a new NRC license on or after July 27, 1988 (10 CFR 30.35(a)-(c), 40.36(a)-(c), and 70.25(a)-(c)).

Holders of NRC licenses issued before July 27, 1990, have until July 27, 1990, to submit certification of financial assurance in amounts prescribed by the rule or a DFP. Those holders of licenses that must submit a DFP (e.g., holders of Part 40 licenses authorized to possess and use more than 100 mCi of readily dispersible source material) are not required to submit the DFP with a site-specific cost estimate until the time of the next license renewal if certification is submitted by July 27, 1990.

Applicants for NRC licenses on or after July 27, 1988, are required to submit certification of financial assurance or a DFP when they are applying for the license. At all times, licensees must have an amount of financial assurance equal to or greater than the site-specific cost estimate in the DFP, if used, or the appropriate amount of certification. Whenever a licensee intends to change the instrument(s) used to provide financial assurance, the licensee must notify

NRC at least 90 days in advance and submit the details (e.g., text of the instrument) of the new instrument before the instrument in place expires. Additional notification and demonstration requirements for each instrument are discussed in Section 3.

### 1.1.3 Financial Assurance Mechanisms

All NRC applicants or licensees may use one or more of three financial mechanisms to demonstrate financial assurance regardless of whether a DFP or certification of financial assurance is required or when financial assurance must be submitted (e.g., immediately, upon license renewal, or by July 27, 1990). Federal, State, or local government applicants or licensees may use a fourth option to provide financial assurance, a statement of intent. The mechanisms, specified in 10 CFR 30.35(f), 40.36(e), 70.25(f), and 72.30(c), are the following:

- Prepayment Methods - Trust fund, escrow account, certificate of deposit, government fund and/or deposit of government securities;
- Surety/Insurance/Guarantee - Surety bond, letter of credit, line of credit, or a parent company guarantee based on a financial test;
- External Sinking Fund - A set-aside of money coupled with a surety method or insurance; and/or
- Statement of Intent - Available for Federal, State, and local government licensees, a statement of intent is a promise by a government to provide adequate funding for decommissioning activities when required.

Each of these mechanisms, and restrictions on their use (e.g., the parent company guarantee may not be used in combination with any other instrument), is described in more detail in Section 3 of this guide. Licensees also should refer to Appendices A-E of the guide for checklists of the documents that must be submitted to demonstrate financial assurance.

### 1.1.4 Licensee Categories

Section 2 of this guide discusses in detail the financial assurance requirements for licensees under 10 CFR Parts 30, 40, 70, and 72. In general, however, requirements for facilities possessing similar amounts of nuclear material under each of these parts are the same, and licensees can be divided into three categories which, although not specified in the regulation, are useful for discussing the effect that the regulation will have on licensees:

- Category A Licensees - Category A licensees include holders of specific NRC licenses issued before July 27, 1990, and applicants for specific licenses on or after July 27, 1988, that are allowed to possess nuclear material in the following amounts:
  - Unsealed byproduct material greater than 120 day half-life and in quantities greater than  $10^5$  times the applicable amounts specified in 10 CFR Part 20, Appendix C (source or byproduct material from thorium or uranium mills not included);



- Source material in readily dispersible form in amounts greater than 100 mCi (source or byproduct material from thorium or uranium mills not included); or
- Unsealed special nuclear material in amounts greater than  $10^5$  times the applicable amounts specified in 10 CFR Part 20, Appendix C.

Holders of Category A licenses issued before July 27, 1990, must submit certification of financial assurance in the amount of \$750,000 (not required if DFP submitted on or before July 27, 1990) on or before July 27, 1990, and a DFP at the time of their next license renewal occurring after July 27, 1990. New applicants for Category A licenses must submit a DFP at the time of their license application.

- Category B Licensees - Category B licensees are holders of specific licenses issued before July 27, 1990, and applicants for specific licenses on or after July 27, 1988, that are allowed to possess nuclear material in amounts less than or equal to the thresholds specified for Category A licensees and greater than the following amounts:

- Unsealed byproduct material greater than 120 day half-life and in quantities greater than  $10^3$  times the applicable amounts specified in 10 CFR Part 20, Appendix C (source or byproduct material from thorium or uranium mills not included);
- Byproduct materials in sealed sources or plated foils less than 120 day half-life and less than  $10^{10}$  times the applicable amounts in Appendix C;
- Source material in readily dispersible form greater than 10 mCi (source or byproduct material from thorium or uranium mills not included); or
- Unsealed special nuclear material greater than  $10^3$  times the applicable amounts specified in 10 CFR Part 20, Appendix C.

Category B licensees may submit either certification of financial responsibility in amounts prescribed by the regulation or a DFP [10 CFR 30.35(b), 40.36(b), and 70.25(b)]. Holders of Category B licenses issued before July 27, 1990, must submit either certification of financial assurance or a DFP on or before July 27, 1990 [10 CFR 30.35(c)(3), 40.36(c)(3), 70.25(c)(3)]. New applicants for Category B licenses must submit either a certification or a DFP at the time of their license application.

- Category C Licensees - Applicants or licensees in Category C (nuclear material in amounts less than threshold limits specified for Category A and B licensees) do not have to submit financial assurance because they are not authorized to possess and use nuclear material in amounts above the threshold levels specified in the regulation. Licenses must include a possession limit that ensures threshold limits will not be exceeded.

Appendix G provides a conversion table showing the isotopes and threshold limits associated with different levels of financial assurance.

## **1.2 COST ESTIMATING FOR DECOMMISSIONING FUNDING PLAN**

The final decommissioning rule of July 27, 1988, establishes very general requirements with respect to cost estimating procedures for financial assurance and does not explicitly specify broad categories of the cost components that should be included (10 CFR 30.35(e), 40.36(d), 70.25(e), and 72.22(e)(3)). Preparation of cost estimates is required only when applicants are submitting a decommissioning funding plan. In developing this guide, other NRC documents listed below were consulted.

- Regulatory Guide 3.65, "Standard Format and Content of Decommissioning Plans for Licensees Under 10 CFR Parts 30, 40, and 70";
- Technology, Safety, and Costs of Decommissioning Reference Non-Fuel-Cycle Nuclear Facilities (NUREG/CR-1754, 1981);
- Technology and Cost of Termination Surveys Associated with Decommissioning of Nuclear Facilities (NUREG/CR-2241, 1982);
- Final Generic Environmental Impact Statement on Uranium Milling Project M-25 (NUREG-0706, 1980);
- Branch Technical Position: Disposal or On-site Storage of Residual Thorium or Uranium (NRC, 1981, 46 FR 52061).

These documents elaborate on methods of implementing financial responsibility requirements, including preparing cost estimates. Major decommissioning activities identified, for example, include:

- planning and preparation of the facility and site for decommissioning;
- decontamination and dismantling of radioactive facility components;
- packaging, shipment, and disposal of radioactive wastes; and
- a final radiation survey.

Decommissioning activities do not include removal/disposal of non-radioactive structures and materials beyond that necessary to terminate the NRC license.

A cost estimating table that organizes and provides a format for determining decommissioning cost components and activities is illustrated in Appendix F. This table can be easily adapted by licensees. It provides an extensive checklist of decommissioning activities that must be included in the decommissioning cost estimate. Costs that should be included in the estimate are:

- labor;
- equipment and supplies;

- radioactive waste disposal;
- contractor overhead and profit;
- miscellaneous expenses (e.g., license fees, insurance, taxes); and
- contingencies.

Major considerations involved in preparing site-specific estimates include the need to base estimates on reasonable costs expected under routine facility conditions, the need for periodic updating of estimates, and the issue of salvage value.

### 1.2.1 Inflation

The decommissioning rule specifies that licensees who submit decommissioning funding plans are required to adjust cost estimates and associated funding levels "periodically" over the life of the facility. Factors creating the need for cost estimate adjustments include inflation, changes in facility conditions, and changes in expected decommissioning procedures. Adjustments to cost estimates should be made for inflation and site-specific factors at the time of license renewal or when the amounts/types of material at the facility change. Inflation adjustments should be made by calculating costs in current dollars. Current dollar estimates are based on prices applicable to goods and services in the year that they are purchased (e.g., 1988 current dollar estimates would be based on 1988 prices). Current dollar adjustments involve updating cost estimates with current prices for goods and services.

### 1.2.2 Salvage Value

The rule does not specify whether licensees may deduct the potential salvage value of recovered materials or decontaminated equipment (or high value materials found on the equipment) from their decommissioning cost estimate. For those who do account for salvage value, a significant gap in coverage could occur if the expected credits are not fully realized. Therefore, in order to ensure the adequacy of funds for decommissioning, cost estimates should not incorporate any salvage value that may be realized with the sale of potential assets.

## 1.3 LICENSEES USING MORE THAN ONE TYPE OF NUCLEAR MATERIAL

Some licensees are authorized to use more than one type of nuclear material in the same facility, and in many cases, use these materials in the same operations. It would be difficult to require separate decommissioning plans and financial responsibility requirements in circumstances where there is an interdependence of facilities, operations, or projected decommissioning activities.

Under these circumstances, the licensee must provide financial assurance in an amount consistent with the 10 CFR part under which the nuclear materials are licensed (where combinations of isotopes are involved, the ratio and quantity of isotopes is used to determine the certification amount, see Exhibits 2-1, 2-2, and 2-3).

The financial assurance requirements of multiple 10 CFR parts should be combined to determine the total financial assurance required. For example, if a licensee holds one license for byproduct material (Part 30) and one license

for source material (Part 40) and each license meets the requirement for \$750,000 financial assurance, the licensee would be required to submit \$1,500,000 total financial assurance. In addition, if a Part 30 license authorizes possession of enough sealed and unsealed byproduct material to require financial assurance for both forms of material, the required dollar amounts would also be combined. However, the licensee would have the option of submitting a consolidated decommissioning funding plan with a site-specific cost estimate demonstrating an actual cost lower than the amounts prescribed in the regulations.

NRC also will permit a licensee to file a consolidated decommissioning funding plan if that licensee operates multiple independent facilities and/or sites under a single materials license. A consolidated plan, however, would have to delineate procedures and cost estimates for each facility and/or site.

#### 1.4 RECORDKEEPING

The recordkeeping requirements for licensees are contained in 10 CFR 30.35(g), 40.36(f), 70.25(g), and 72.30(d). At a minimum, licensees must keep records of:

- Spills or other unusual occurrences where contamination remains after any cleanup procedure or when contaminants may have spread to inaccessible areas. These records must include information on nuclides, quantities, forms, and concentrations;
- As-built drawings and modifications of structures and equipment in restricted areas where radioactive materials are used/stored;
- Records of the cost estimate performed for the decommissioning funding plan or of the amount certified for decommissioning, and records of the funding methods used for assuring funds; and
- A copy of the financial assurance mechanism and, if applicable, the supporting standby trust fund arrangement or other supporting documentation, such as letters from the firm's chief financial officer and/or a certified public accountant.

Timely notification should be given to NRC in the following situations:

- The occurrence of any changes, revisions, and adjustments to the underlying cost estimates and to the financial assurance mechanisms, including a change from one mechanism to another.
- Commencement of bankruptcy action involving the licensee
  - Written notification of commencement of bankruptcy proceedings, as required by 10 CFR 30.34(h), 40.41(f), 70.32(a)(9), and 72.44(b)(6).
- Use of a state-required mechanism
  - Evidence of establishment of mechanism

- Written request for approval of use of this mechanism

Reports must also be submitted certifying completion of the activities for which financial assurance is provided before the financial assurance mechanism may be cancelled.

## 2. FINANCIAL ASSURANCE REQUIREMENTS FOR DECOMMISSIONING

This section describes the specific financial assurance requirements with which NRC licensees regulated under 10 CFR Parts 30, 40, 70, and 72 must comply. Specifically, this section describes the applicability of decommissioning financial assurance requirements, the timing for the submission of information evidencing compliance with the financial assurance requirements, and the mechanisms allowed.

### 2.1 FINANCIAL ASSURANCE FOR LICENSEES UNDER 10 CFR PART 30

The financial assurance requirements for decommissioning for holders of or applicants for NRC licenses under 10 CFR Part 30 vary based on the amount and type of materials that a licensee is authorized to possess. Exhibit 2-1 summarizes the financial assurance requirements for licensees under this part.

The financial assurance requirements established under Part 30, including whether an applicant or holder of a license must submit a decommissioning funding plan or has the option to submit certification of financial assurance, generally are based on whether an applicant possesses unsealed or sealed byproduct material.

#### 2.1.1 Unsealed Byproduct Material

Holders of specific NRC licenses issued under 10 CFR Part 30 on or after July 27, 1990, and applicants for specific licenses under this part who are allowed to possess and use unsealed byproduct material must submit a decommissioning funding plan as specified in 10 CFR 30.35(a) when:

- (1) The half-life of the material is greater than 120 days and is held in quantities greater than  $10^5$  times the applicable amounts listed in Appendix C of 10 CFR Part 20; or
- (2) A combination of isotopes is involved if  $R$  divided by  $10^5$  is greater than 1 (unity rule), where  $R$  is the sum of the ratios of the quantity of each isotope to the applicable value in Appendix C.

While not stated in the rule, it should be noted that sealed source licensees authorized to receive and possess leaky or damaged sources should be subject to unsealed material criteria.

Holders of a Part 30 NRC license issued before July 27, 1990 who are allowed to possess and use unsealed byproduct material in amounts specified in paragraph (1) or (2) above have the option to submit either a decommissioning funding plan or certification of financial assurance in the amount of \$750,000, as specified in 10 CFR 30.35(c)(2). Such licensees must demonstrate financial assurance on or before July 27, 1990. If a licensee chooses to submit a certification of financial assurance on or before July 27, 1990, the licensee must submit a decommissioning funding plan in any application for a license renewal.

#### 2.1.2 Byproduct Material

Holders of licenses issued under 10 CFR Part 30 who possess and use unsealed or sealed byproduct material in specified quantities, or applicants for such a license, must submit either a decommissioning funding plan or a certification of financial assurance, as specified in 10 CFR 30.35(b) and 30.35(c)(1) or (c)(3).

**DECOMMISSIONING FINANCIAL RESPONSIBILITY REQUIREMENTS**  
**Nuclear Regulatory Commission (NRC) Licensees Under 10 CFR Part 30**

Party Affected (Citation)	Type of Material	Quantity of Material	Decommissioning Funding Plan	Amount of Certification	Timing	Methods Available
Applicant* for specific license (\$30.35(a))	Unsealed Byproduct Material	Half-life >120 days and in quantities >10 <sup>5</sup> times the applicable amounts in 10 CFR Part 20, Appendix C; or for a combination of isotopes if $R^{**}/10^5 > 1$	Required of all licensees	Not required	When applying for license	For all licensees, choice of the following options:  1) Prepayment; 2) Surety/Insurance/Guarantee; 3) External Sinking Fund and Surety/Insurance Method; or 4) Statement of Intent (public licensees only)
Applicant* for specific license (\$30.35-(b)(1)(2))	Unsealed Byproduct Material	Half-life >120 days and in quantities >10 <sup>4</sup> times and < 10 <sup>5</sup> times amounts in Appendix C; or for a combination of isotopes if $R^{**}/10^4 > 1$ and $R^{**}/10^5$ is $\leq 1$	Required for all licensees if certification not submitted	\$750,000 required if DFP not submitted	When applying for license	Same as above
Applicant* for specific license (\$30.35-(b)(1)(2))	Unsealed Byproduct Material	Half-life >120 days and in quantities >10 <sup>3</sup> times but < 10 <sup>4</sup> times the applicable amounts in Appendix C; or for a combination of isotopes if $R^{**}/10^3 > 1$ and $R^{**}/10^4$ is $\leq 1$ .	Required for all licensees if certification not submitted	\$150,000 required if DFP not submitted	When applying for license	Same as above
	Byproduct Material in Sealed Sources or Plated Foils	Half-life >120 days and in quantities >10 <sup>10</sup> times the applicable amounts in Appendix C; or for a combination of isotopes if $R^{**}/10^{10} > 1$	Required for all licensees if certification not submitted	\$75,000 required if DFP not submitted	When applying for license	Same as above
Holder of specific license issued on or after July 27, 1990 (\$30.35-(c)(1))	Unsealed Byproduct Material	Half-life >120 days and in quantities >10 <sup>5</sup> times the applicable amounts in Appendix C; or for a combination of isotopes if $R^{**}/10^5 > 1$	Required of all licensees	Not required	When applying for license	Same as above

\* Applicant refers only to new applicants and not to existing license holders applying for renewal license.

\*\*R is the sum of the ratios of the quantity of each isotope to the applicable value in Appendix C.

Exhibit 2-1 (continued)

DECOMMISSIONING FINANCIAL RESPONSIBILITY REQUIREMENTS  
Nuclear Regulatory Commission (NRC) Licensees Under 10 CFR Part 30

Party Affected (Citation)	Type of Material	Quantity of Material	Decommissioning Funding Plan	Amount of Certification	Timing	Methods Available
Holder of specific license issued on or after July 27, 1990 (\$30.35-(c)(1))	Unsealed Byproduct Material	Half-life >120 days and in quantities >10 <sup>4</sup> times and < 10 <sup>5</sup> times applicable amounts in Appendix C; or for a combination of isotopes if $R^{**}/10^4 > 1$ and $R^{**}/10^5$ is $\leq 1$	Required for all licensees if certification not submitted	\$750,000 if DFP not submitted	When applying for license	For all licensees, choice of the following options:  1) Prepayment; 2) Surety/Insurance/Guarantee; 3) External Sinking Fund and Surety/Insurance Method; or 4) Statement of Intent (public licensees only)
Holder of specific license issued on or after July 27, 1990 (\$30.35-(c)(1))	Unsealed Byproduct Material	Half-life >120 days and in quantities >10 <sup>3</sup> times but < 10 <sup>4</sup> times the applicable amounts in Appendix C; or for a combination of isotopes if $R^{**}/10^3 > 1$ and $R^{**}/10^4$ is $\leq 1$ .	Required for all licensees if certification not submitted	\$150,000 if DFP not submitted	When applying for license	Same as above
2-3	Byproduct Material in Sealed Sources or Plated Foils	Half-life >120 days and in quantities >10 <sup>10</sup> times the applicable amounts in Appendix C; or for a combination of isotopes if $R^{**}/10^{10} > 1$	Required for all licensees if certification not submitted	\$75,000 if DFP not submitted	When applying for license	Same as above
Holder of specific license issued before July 27, 1990 (\$30.35-(c)(2))	Unsealed Byproduct Material	Half-life >120 days and in quantities >10 <sup>5</sup> times the applicable amounts in Appendix C; or for a combination of isotopes if $R^{**}/10^5 > 1$	Required for all licensees if certification not submitted	\$750,000 if DFP not submitted by July 27, 1990	Certification required on or before July 27, 1990 (only if DFP not submitted on or before July 27, 1990); DFP required when submitting next license renewal after July 27, 1990.	Same as above
Holder of specific license issued before July 27, 1990 (\$30.35-(c)(3))	Unsealed Byproduct Material	Half-life >120 days and in quantities >10 <sup>4</sup> times and < 10 <sup>5</sup> times applicable amounts in Appendix C; or for a combination of isotopes if $R^{**}/10^4 > 1$ and $R^{**}/10^5$ is $\leq 1$	Required for all licensees if certification not submitted	\$750,000 if DFP not submitted	On or before July 27, 1990	Same as above

\*\*R is the sum of the ratios of the quantity of each isotope to the applicable value in Appendix C.



## Exhibit 2-1 (continued)

DECOMMISSIONING FINANCIAL RESPONSIBILITY REQUIREMENTS  
Nuclear Regulatory Commission (NRC) Licensees Under 10 CFR Part 30

Party Affected (Citation)	Type of Material	Quantity of Material	Decommissioning Funding Plan	Amount of Certification	Timing	Methods Available
Holder of specific license issued before July 27, 1990 (\$30.35-(c)(3))	Unsealed Byproduct Material	Half-life >120 days and in quantities >10 <sup>3</sup> times but < 10 <sup>4</sup> times the applicable amounts in Appendix C; or for a combination of isotopes if $R^{**}/10^3 > 1$ and $R^{**}/10^4$ is $\leq 1$ .	Required for all licensees if certification not submitted	\$150,000 if DFP not submitted	On or before July 27, 1990	For all licensees, choice of the following options:  1) Prepayment; 2) Surety/Insurance/Guarantee; 3) External Sinking Fund and Surety/Insurance Method; or 4) Statement of Intent (public licensees only)
	Byproduct Material in Sealed Sources or Plated Foils	Half-life >120 days and in quantities >10 <sup>10</sup> times the applicable amounts in Appendix C; or for a combination of isotopes if $R^{**}/10^{10} > 1$	Required for all licensees if certification not submitted	\$75,000 if DFP not submitted	On or before July 27, 1990	Same as above
Holder or applicant* for specific license	Byproduct Material	< threshold limits specified	Not required	Not required	Not applicable	Not applicable

\* Applicant refers only to new applicants and not to existing license holders applying for renewal license.

\*\*R is the sum of the ratios of the quantity of each isotope to the applicable value in Appendix C.

The licensee must submit certification of financial assurance in the following amounts if a DFP is not submitted:

- \$750,000 If the unsealed byproduct material is held in quantities greater than  $10^4$  and less than or equal to  $10^5$  times the applicable quantities in Appendix C of 10 CFR Part 20, or if the material is a combination of isotopes, if R (as defined in 10 CFR 30.35(a)) divided by  $10^4$  is greater than 1 but R divided by  $10^5$  is less than or equal to 1;
- \$150,000 If the unsealed byproduct material is held in quantities greater than  $10^3$  and less than or equal to  $10^4$  times the applicable quantities in Appendix C of 10 CFR Part 20, or if the material is a combination of isotopes, if R (as defined in 10 CFR 30.35(a)) divided by  $10^3$  is greater than 1 but R divided by  $10^4$  is less than or equal to 1;
- \$75,000 If the byproduct material is held in sealed sources or plated foils in quantities greater than  $10^{10}$  times the applicable quantities in Appendix C of 10 CFR Part 20, or if the material is a combination of isotopes, if R (as defined in 10 CFR 30.35(a)), divided by  $10^{10}$  is greater than 1.

When submitting certification of financial assurance, the applicant may state that the financial instrument will be obtained after the application for the license has been approved but before the material covered under the license is received. Although the instrument does not have to be in place when the license application is made or in the period after the license is granted, it must be in force before actual possession and use of the byproduct material. The possession of byproduct material allowed by the license is contingent upon submittal of appropriate financial assurance.

Licensees or applicants under 10 CFR Part 30 may submit financial assurance using one or more of the following mechanisms:

- Prepayment
- Surety/Other Guarantee/Insurance
- External Sinking Fund combined with Surety or Insurance
- Statement of Intent (Federal, State, or local government licensees only)

## 2.2 FINANCIAL ASSURANCE FOR LICENSEES UNDER 10 CFR PART 40

The financial assurance requirements for decommissioning for holders of or applicants for NRC licenses under 10 CFR Part 40 also vary based on the amount and type of source material that a licensee is allowed to possess. Exhibit 2-2 summarizes the financial assurance requirements promulgated in the June 27, 1988, rule for licensees under 10 CFR Part 40.

As shown in Exhibit 2-2, there are four separate licensee circumstances specified in the decommissioning financial assurance requirements under 10 CFR Part 40. These circumstances are the following:

- Holders of NRC licenses under 10 CFR Part 40 issued on or after July 27, 1990, and applicants for licenses for source material under this

Exhibit 2-2

DECOMMISSIONING FINANCIAL RESPONSIBILITY REQUIREMENTS  
Nuclear Regulatory Commission (NRC) Licensees Under 10 CFR Part 40

Party Affected (Citation)	Type of Material	Quantity of Material	Decommissioning Funding Plan	Amount of Certification	Timing	Methods Available
Applicant* for specific license (\$40.36(a))	Source Material in readily dispersible form	> 100 mCi	Required of all licensees	Not required	When applying for license	For all licensees, choice of the following options:  1) Prepayment; 2) Surety/Insurance/Guarantee; 3) External Sinking Fund and Surety/Insurance Method; or 4) Statement of Intent (public licensees only)
Applicant* for specific license (\$40.36-(b)(1)(2))		> 10 mCi, but ≤ 100 mCi	Required for all licensees if certification not submitted	\$150,000 if DFP not submitted	When applying for license	Same as above
Holder of specific license issued on or after July 27, 1990 (\$40.36-(c)(1))		> 100 mCi	Required of all licensees	Not required	When applying for license	Same as above
		> 10 mCi, but ≤ 100 mCi	Required for all licensees if certification not submitted	\$150,000 if DFP not submitted	When applying for license	Same as above
Holder of specific license issued before July 27, 1990 (\$40.36-(c)(2))	Source Material in readily dispersible form	> 100 mCi	Required for all licensees if certification not submitted	\$750,000 if DFP not submitted by July 27, 1990	Certification required on or before July 27, 1990 (only if DFP not submitted on or before July 27, 1990); DFP required when submitting next license renewal after July 27, 1990.	Same as above
Holder of specific license issued before July 27, 1990 (\$40.36-(c)(3))		> 10 mCi, but ≤ 100 mCi	Required for all licensees if certification not submitted	\$150,000 if DFP not submitted	On or before July 27, 1990	Same as above
Holder or applicant* for specific license		Less than threshold limits specified (<10 mCi)	Not required	Not required	Not applicable	Not applicable

\*Applicant refers only to new applicants and not to existing license holders applying for a new license.

Part must submit a decommissioning funding plan as specified in 10 CFR 40.36(a) if they are allowed to possess and use source material in readily dispersible form in quantities greater than 100 mCi.

- Holders of NRC licenses under 10 CFR Part 40 issued on or after July 27, 1990, and applicants for licenses for source material under this Part have the option of submitting a decommissioning funding plan or certification of financial assurance in the amount of \$150,000 as specified in 10 CFR 40.36(b) if they are allowed to possess and use source material in readily dispersible form in quantities greater than 10 mCi and less than or equal to 100 mCi.
- Holders of an NRC license under Part 40 issued before July 27, 1990, for source material in a readily dispersible form and with possession limits greater than 100 mCi have the option to submit either a decommissioning funding plan or certification of financial assurance in the amount of \$750,000, as specified in 10 CFR 40.36(c)(2). In either case, the licensee must submit the financial assurance on or before July 27, 1990. If the licensee chooses to submit a certification of financial assurance, the licensee must submit a decommissioning funding plan in any application for a license renewal.
- Holders of an NRC license under Part 40 issued before July 27, 1990, for source material in a readily dispersible form and with possession limits greater than 10 mCi and less than or equal to 100 mCi have the option to submit either a decommissioning funding plan or certification of financial assurance in the amount of \$150,000, as specified in 10 CFR 40.36(c)(3). In either case, the licensee must submit the financial assurance on or before July 27, 1990.

Licensees or applicants under 10 CFR Part 40 may submit financial assurance using one or more of the following mechanisms:

- Prepayment
- Surety/Other Guarantee/Insurance
- External Sinking Fund combined with Surety or Insurance
- Statement of Intent (Federal, State, or local government licensees only)

## **2.3 FINANCIAL ASSURANCE FOR LICENSEES UNDER 10 CFR PART 70**

The decommissioning financial assurance requirements for holders of or applicants for NRC licenses under 10 CFR Part 70 depend on the amount and type of special nuclear materials (e.g., sealed or unsealed) that a licensee is allowed to possess. Exhibit 2-3 summarizes the financial assurance requirements promulgated in the June 27, 1988, rule for licensees under this 10 CFR Part 70.

### **2.3.1 Unsealed Special Nuclear Material**

As shown in Exhibit 2-3, each applicant for a license under 10 CFR Part 70 authorizing the possession and use of unsealed special nuclear material in quantities exceeding  $10^5$  times the applicable quantities set in Appendix C to 10 CFR Part 20 must submit a DFP as specified in 10 CFR 70.25(a). The applicant also must submit a DFP when a combination of isotopes is involved, if R divided

## Exhibit 2-3

DECOMMISSIONING FINANCIAL RESPONSIBILITY REQUIREMENTS  
Nuclear Regulatory Commission (NRC) Licensees Under 10 CFR Part 70

Party Affected (Citation)	Type of Material	Quantity of Material	Decommissioning Funding Plan	Amount of Certification	Timing	Methods Available
Applicant* for specific license (\$70.25-(a))	Unsealed Special Nuclear Material	> $10^5$ times the applicable quantities in Appendix C; or for a combination of isotopes if $R^{**}/10^5 > 1$	Required of all licensees	Not required	When applying for license	For all licensees, choice of the following options:  1) Prepayment; 2) Surety/Insurance/Guarantee; 3) External Sinking Fund and Surety/Insurance Method; or 4) Statement of Intent (public licensees only)
Applicant* for specific license (\$70.25-(b)(1)(2))		> $10^4$ but < $10^5$ times the applicable quantities; or for a combination of isotopes if $R^{**}/10^4 > 1$ , but $R^{**}/10^5 \leq 1$	Required for all licensees if certification not submitted	\$750,000 if DFP not submitted	When applying for license	Same as above
Applicant* for specific license (\$70.25-(b)(1)(2))	Unsealed Special Nuclear Material	> $10^3$ but < $10^4$ times the applicable quantities; or for a combination of isotopes if $R^{**}/10^3 > 1$ , but $R^{**}/10^4 \leq 1$	Required for all licensees if certification not submitted	\$150,000 if DFP not submitted	When applying for license	Same as above
Holder of specific license on or after July 27, 1990 (\$70.25-(c)(1))		> $10^5$ times the applicable quantities; or for a combination of isotopes if $R^{**}/10^5 > 1$	Required of all licensees	Not required	When applying for license	Same as above
Holder of specific license issued on or after July 27, 1990 (\$70.25-(c)(1))	Unsealed Special Nuclear Material	> $10^4$ , but < $10^5$ times the applicable quantities; or for a combination of isotopes if $R^{**}/10^4 > 1$ , but $R^{**}/10^5 \leq 1$	Required for all licensees if certification not submitted	\$750,000 if DFP not submitted	When applying for license	Same as above

\* Applicant refers only to new applicants and not to existing license holders applying for a new license.

\*\*R is the sum of the ratios of the quantity of each isotope to the applicable value in Appendix C.

Exhibit 2-3 (continued)

DECOMMISSIONING FINANCIAL RESPONSIBILITY REQUIREMENTS  
Nuclear Regulatory Commission (NRC) Licensees Under 10 CFR Part 70

Party Affected (Citation)	Type of Material	Quantity of Material	Decommissioning Funding Plan	Amount of Certification	Timing	Methods Available
	Unsealed Special Nuclear Material	$> 10^3$ , but $< 10^4$ times the applicable quantities; or for a combination of isotopes if $R^{**}/10^3 > 1$ , but $R^{**}/10^4 \leq 1$	Required for all licensees if certification not submitted	\$150,000 if DFP not submitted	When applying for license	For all licensees, choice of the following options:  1) Prepayment; 2) Surety/Insurance/Guarantee; 3) External Sinking Fund and Surety/Insurance Method; or 4) Statement of Intent (public licensees only)
Holder of specific license issued before July 27, 1990 (\$70.25-(c)(2))		$> 10^5$ times the applicable quantities; or for a combination of isotopes if $R^{**}/10^5 > 1$	Required for all licensees if certification not submitted	\$750,000 if DFP not submitted by July 27, 1990	Certification required on or before July 27, 1990 (only if DFP not submitted on or before July 27, 1990); DFP required when submitting next license renewal after July 27, 1990.	Same as above
Holder of specific license issued before July 27, 1990 (\$70.25-(c)(3))		$> 10^4$ , but $< 10^5$ times the applicable quantities; or for a combination of isotopes if $R^{**}/10^4 > 1$ , but $R^{**}/10^5 \leq 1$	Required for all licensees if certification not submitted	\$750,000 if DFP not submitted	On or before July 27, 1990	Same as above
Holder of specific license issued before July 27, 1990 (\$70.25-(c)(3))	Unsealed Special Nuclear Material	$> 10^3$ , but $< 10^4$ times the applicable quantities; or for a combination of isotopes if $R^{**}/10^3 > 1$ , but $R^{**}/10^4 \leq 1$	Required for all licensees if certification not submitted	\$150,000 if DFP not submitted by July 27, 1990	On or before July 27, 1990	Same as above
Holder of or applicant* for specific license	Sealed Special Nuclear Material	Not applicable	Not required	Not required	Not applicable	Not applicable
Holder of or applicant* for specific license	Unsealed Special Nuclear Material	$<$ threshold limits specified	Not required	Not required	Not applicable	Not applicable

\* Applicant refers only to new applicants and not to existing license holders applying for a new license.

\*\*R is the sum of the ratios of the quantity of each isotope to the applicable value in Appendix C.

by  $10^5$  is greater than 1, where R is defined as the sum of the ratios of the quantity of each isotope to the applicable value in Appendix C. Each holder of a license of the type described above issued on or after July 27, 1990, must also submit a DFP as specified in 10 CFR 70.25(c)(1).

Holders of such a license issued before July 27, 1990, must submit the certification of financial assurance in the amount of \$750,000 or the DFP on or before July 27, 1990. These licensees then must submit a DFP in any application for a license renewal.

Applicants for licenses authorizing possession of unsealed special nuclear material in quantities specified in 70.25(d) and holders of such licenses issued on or after July 27, 1990, must submit either a certification of financial assurance or a DFP as specified in 10 CFR 70.25(b) and 70.25(c)(i).

The amount of financial assurance required depends on the amount of unsealed special nuclear material that a licensee is authorized to possess. The licensee must submit certification, if the certification option is used, in the following amounts:

- \$750,000 If the unsealed special nuclear material is held in quantities greater than  $10^4$  and less than or equal to  $10^5$  times the applicable quantities in Appendix C of 10 CFR Part 20, or if the material is a combination of isotopes, if R (as defined in 10 CFR 70.25(a)) divided by  $10^4$  is greater than 1 and R divided by  $10^5$  is less than or equal to 1; and
- \$150,000 If the unsealed special nuclear material is held in quantities greater than  $10^3$  and less than or equal to  $10^4$  times the applicable quantities in Appendix C of 10 CFR Part 20, or if the material is a combination of isotopes, if R (as defined in 10 CFR 70.25(a)) divided by  $10^3$  is greater than 1 and R divided by  $10^4$  is less than or equal to 1.

Holders of licenses issued before July 27, 1990, that authorize the possession of special nuclear material in these amounts must submit certification of financial assurance on or before July 27, 1990. These facilities also have the option to submit a DFP instead of certification.

Applicants under 10 CFR Part 70 may submit financial assurance using one or more of the following mechanisms:

- Prepayment
- Surety/Other Guarantee/Insurance
- External Sinking Fund combined with Surety or Insurance
- Statement of Intent (Federal, State, or local government licensees only)

### 2.3.2 Sealed Special Nuclear Material

All licensees authorized to possess sealed special nuclear material are considered to be Category C facilities because these facilities are not addressed by the financial assurance requirements of 10 CFR 70.25, and therefore, they do not have to submit financial assurance for decommissioning.

## 2.4 FINANCIAL ASSURANCE FOR LICENSEES UNDER 10 CFR PART 72

Part 72 licensees are not allowed to submit certifications; all such licensees must prepare and submit cost estimates as part of decommissioning funding plans. The applicant for a license to possess power reactor spent fuel and other radioactive materials associated with spent fuel storage in an independent spent fuel storage installation (ISFSI) must submit estimated decommissioning costs and proof of the necessary financial arrangements to provide reasonable assurance prior to licensing that decommissioning will be carried out after the removal of spent fuel from storage.

Applicants under 10 CFR Part 72 may submit financial assurance using one or more of the following mechanisms:

- Prepayment
- Surety/Other Guarantee/Insurance
- External Sinking Fund combined with Surety or Insurance
- Statement of Intent (Federal, State, or local government licensees only)
- Electric utility licensees may use the methods allowed by 10 CFR 50.75(e)(1) and (3). In particular, this allows the use of an external sinking fund without having to combine it with a surety method.



### 3. FINANCIAL ASSURANCE MECHANISMS

#### 3.1 INTRODUCTION

This section describes the financial mechanisms licensees and applicants may use under 10 CFR Parts 30, 40, 70, and 72 to demonstrate financial assurance for decommissioning. Descriptions of the allowable categories of financial assurance mechanisms are followed by explanations of each allowable instrument. A checklist of criteria detailing the provisions that should be included in each specific instrument is contained in an exhibit following the discussion of the instrument. Section 4 of the guide contains samples of recommended wording for allowable instruments. In addition, Appendices B through E list the documents that should be submitted to comply with decommissioning financial assurance requirements, depending on the particular financial instrument used.

##### 3.1.1 Mechanisms Available to Types of Licensees or Applicants

All applicants for, or holders of licenses, under 10 CFR Parts 30, 40, 70, and 72 may use one or more of three kinds of mechanisms to comply with the financial assurance requirements for decommissioning:

###### 3.1.1.1 Prepayment Method

Prepayment is a deposit by the licensee or applicant prior to the start of operation into a segregated account outside the licensee's or applicant's control. The deposit must be cash or liquid assets<sup>2</sup> that will retain their value over the projected operating life of the facility in an amount sufficient to pay estimated or certified decommissioning costs. Prepayment mechanisms include trust funds, escrow accounts, certificates of deposit, government funds, and deposits of government securities.

###### 3.1.1.2 Surety, Insurance, or Parent Company Guarantee Method

A surety method, insurance, or parent company guarantee is an assurance that decommissioning costs will be paid by another party should the licensee default on the responsibility to carry out decommissioning. In addition to insurance, surety methods include payment surety bonds, letters of credit, lines of credit, and parent company guarantees.

###### 3.1.1.3 External Sinking Fund (Combination of Sinking Fund Account and Surety Mechanism or Insurance)

An external sinking fund has two components: (1) a sinking fund account and (2) insurance or a surety mechanism such that the total of both components at least equals, at all times, the cost of decommissioning. The sinking fund account is a segregated account outside the licensee's or applicant's control. Any of the prepayment mechanisms can be used to hold the assets for the sinking fund account. Thus, the sinking fund account may be in the form of a trust, escrow account, government fund, certificate(s) of deposit, or deposit

<sup>2</sup>Liquid assets are cash or assets readily convertible into cash, such as marketable securities, notes, accounts receivable, or certificates of deposit.

of government securities. The second component of the external sinking fund can be insurance or a surety mechanism, i.e., a letter of credit, line of credit, or surety bond. As the proportion of the total that is held in the sinking fund account increases over time, however, the amount in insurance or a surety mechanism can decrease.

Part 72 licensees that are electric utilities may use an external sinking fund that is not combined with a surety mechanism or insurance (10 CFR 72.30(c)(5)).

### **3.1.2 Government Licensees or Applicants**

In addition to the mechanisms described above, Federal, State, and local government licensees or applicants may provide financial assurance with a statement of intent. A government licensee or applicant may also combine a statement of intent with another form of financial assurance to satisfy decommissioning financial assurance requirements.

A statement of intent is a statement from the appropriate Federal, State, or local government entity indicating that funds for decommissioning will be obtained when necessary. The statement of intent should also include an estimate of decommissioning costs or state the amount of financial assurance required by the certification mechanism.

### **3.2 DESCRIPTION OF FINANCIAL ASSURANCE MECHANISMS**

Three categories of financial assurance mechanisms are available to all licensees or applicants for licenses under 10 CFR Parts 30, 40, and 70, and with slight variations, Part 72: (1) prepayment mechanisms; (2) surety methods, insurance, and parent company guarantees; and (3) external sinking fund coupled with surety bond or insurance. Government licensees or applicants may also use a statement of intent to satisfy decommissioning financial assurance requirements.

All mechanisms used to comply with decommissioning financial assurance requirements must be at least equal in amount to the estimated or certified decommissioning costs for the facility. If several mechanisms are used in combination, their sum must at least equal the total amount required for decommissioning. The mechanisms may be used singly or in combination, except for the parent company guarantee which may not be combined with another financial assurance instrument.

Under the decommissioning regulations, "the surety method or insurance must be payable to a trust established for decommissioning costs" [10 CFR 30.35(f)(2)(ii), 40.36(e)(2)(ii), 70.25(f)(2)(ii), and 72.30(c)(2)(ii)]. This is because, by law, the Commission and agencies of some States cannot hold segregated funds or accounts, but instead must deposit funds received in the Federal or State treasury as general revenues. Such funds may not be available for decommissioning as required. Therefore, a special trust is created in which the funds can be held and from which they can be taken and used when necessary without being treated as general revenues. The trust established to receive funds from other financial instruments is referred to in this guide as a "standby" trust to distinguish it from a trust fund used as a stand-alone prepayment financial assurance mechanism. Standby trust funds must be established if the following instruments are used: letters or lines of credit and surety bonds.

Standby trust funds should be used with a parent company guarantee. Although not required by the regulation, licensees that use some prepayment mechanisms, i.e., certificates of deposit or government securities deposits, should also establish a standby trust or an escrow account to avoid the same problem. If the licensee defaults on decommissioning requirements, the issuer or provider will draw on the funds held in these instruments and deposit them directly into the standby trust or escrow account for use as required for decommissioning.

### **3.2.1 Prepayment Mechanisms**

Prepayment, in accordance with the decommissioning regulations, is the deposit of an amount of cash or liquid assets sufficient to pay decommissioning costs at the time required. If used by an applicant for a license, prepayment must be deposited prior to the start of operations. If used by a current license holder, the prepayment must be deposited prior to the submission of proof of financial assurance (i.e., on or before July 27, 1990, or at the time the license is renewed, whichever is earlier).

The prepayment must be deposited into an account that is segregated from the licensee's or applicant's other assets and outside the licensee's or applicant's control. Several acceptable mechanisms can be used to segregate cash or liquid assets from other assets. These are:

- escrow agreements,
- certificates of deposit,
- government funds, and
- deposits of government securities, and
- trust funds.

Certain prepayment mechanisms (i.e., cash deposits, certificates of deposit, or instruments held by banks in trust or escrow arrangements) are subject to the dollar limitation of insurance provided by the Federal Deposit Insurance Corporation (FDIC) or the Federal Savings and Loan Insurance Corporation (FSLIC). Accordingly, the deposit in each bank will only be insured up to the basic amount of \$100,000 per deposit. The limitations also apply to the interest earned on deposits. If the principal is equal to the limit, therefore, the interest is uninsured. Thus, if a licensee is required to have financial assurance in an amount exceeding \$100,000, deposits should be split among several institutions so that all funds are fully insured by the FDIC or FSLIC. For example, if a licensee is using certificates of deposit to demonstrate financial assurance, he can procure the CDs directly from different institutions so that each CD is fully insured. The licensee or applicant can also purchase fully insured CDs issued by various banks through a broker. If \$750,000 in financial assurance is required, the licensee or applicant must procure at least eight insured CDs whose total value at the time of financial assurance certification is at least equal to \$750,000.

#### **3.2.1.1 Escrow Agreements**

An escrow account is an account containing funds deposited by the licensee or applicant and held by a bank or other financial institution. An escrow account differs from similar accounts in that the licensee or applicant provides funds that are held by the escrow until the happening of a contingency or the

performance of a condition, and then released to the grantee. The applicant or licensee deposits cash or other liquid assets in an amount at least equal to the certified or estimated cost of decommissioning in an escrow account. The bank or other institution where the funds are deposited is the escrow agent. The escrow itself is the agreement between the applicant or licensee and the escrow agent that specifies that the funds are to be held by the escrow agent until they are required for decommissioning activities or there is a determination by the Commission or State authority of failure by the licensee to satisfactorily perform decommissioning activities.

The escrow fund will be disbursed to the licensee upon presentation of certification to the escrow agent that (1) decommissioning is proceeding according to an approved plan, (2) the funds withdrawn will be expended for activities undertaken pursuant to the plan, and (3) the NRC has been given 30 days prior notice of the licensee's intent to withdraw funds from the escrow.

If the licensee defaults or is otherwise unable to carry out decommissioning, the Commission or State regulatory agency will order the escrow agent to release the funds to pay decommissioning costs. The escrow agreement should state that if the licensee does not default or if any funds remain in the escrow when decommissioning is complete, the escrow will be terminated and the funds returned to the licensee.

To be valid an escrow account must be supported by an underlying contractual agreement. For purposes of financial assurance, the underlying contract in this instance would be the NRC licensing agreement. The escrow becomes irrevocable when the applicant or licensee delivers the deposit to the escrow agent accompanied by the escrow agreement. The escrow remains irrevocable for the length of time stated in the escrow agreement. The terms may be amended, however, by mutual consent of the licensee or applicant and the Commission or State agency.

A checklist of review criteria for an escrow arrangement is provided in Exhibit 3-1. Samples of an escrow agreement and supporting contract are provided in Section 4.

#### 3.2.1.2 Certificates of Deposit

A certificate of deposit (CD) is a bank's written acknowledgement of the receipt and deposit of a sum of money by the licensee or applicant and its promise of repayment. When using a CD to demonstrate financial assurance for decommissioning, the licensee deposits with a bank funds sufficient to cover the cost of decommissioning the licensed facility and receives a CD.

The wording of the CD may vary, provided it acknowledges the receipt of the licensee's deposit and contains a promise to pay the funds to the holder or named payee upon surrender of the certificate properly endorsed. The licensee or applicant must establish a standby trust or escrow account to receive funds drawn from the CD in the event of default. The Commission or State agency will draw on certificate(s) of deposit used as financial assurance instruments only if the licensee defaults on decommissioning obligations.

EXHIBIT 3-1

CHECKLIST OF CRITERIA FOR REVIEW OF ESCROW AGREEMENTS

- Copy of corporate by-laws or other evidence indicating that parties signing the financial instrument (for the applicant) are authorized to represent the organization in the transaction.
- Evidence that the financial instrument is an originally signed duplicate (e.g., an executed copy of the instrument).
- Introduction explaining the nature of the agreement between the parties and referring to the NRC license agreement concerning the regulatory obligations of the licensee or applicant.
- Identification of the escrow agent:
  - 1. Name and address of escrow agent;
  - 2. Position of escrow agent;
  - 3. Duties and liabilities of escrow agent.
- Recital of delivery of items placed in escrow to be disbursed in accordance with the directions, terms, and conditions that follow.
- Terms and conditions upon which escrowed items will be disbursed.
  - 1. Disbursement to licensee upon proper certification;
  - 2. Conditions that constitute default;
  - 3. Rights of parties upon default;
  - 4. Rights and duties of escrow agent upon default;
  - 5. Persons or names or positions to which funds may be released.
- Recital of irrevocability of escrow arrangement.
- Escrow agent's rights and duties.
- Annual valuation requirement.
- Method for amending or terminating escrow agreement upon mutual consent of the parties and notice to escrow agent.
- Compensation and expenses of escrow agent.
- Amendment of the escrow agreement.
- Interpretation of escrow agreement.
- Termination of escrow.
- Acceptance of appointment by escrow agent.
- Signatures of parties and escrow agent.

CDs may be either negotiable or non-negotiable. If a CD is negotiable, the issuing bank is obligated to pay the holder, whoever it is, when the CD falls due. If a CD is non-negotiable, the bank is obligated to pay the designated payee identified on the certificate.

- Both negotiable and non-negotiable CDs may be used to comply with decommissioning financial assurance requirements. If a negotiable CD is used, the trustee of a concurrently created standby trust or the escrow agent of an escrow account should have possession of the CD. If a non-negotiable CD is used, the trustee of a concurrently created standby trust or the escrow agent for an escrow account should be named as payee, unless the appropriate State agency can hold the funds without depositing them in State general revenues.
- The CD should be for a limited time period, such as 1 to 5 years, so that the face value can be adjusted for inflation and changes in decommissioning costs.
- Either time or demand CDs may be used for financial assurance. CDs can be payable either at a certain time (time deposits) or on demand after a specified period of time (usually 30 to 90 days) has elapsed (demand deposits). The demand CD allows the holder to withdraw funds at will at any time after the specified period has elapsed. The demand CD, therefore, may be better suited to the contingency requirements of a decommissioning financial assurance mechanism. Time CDs may be used, however, if their value is sufficient to cover decommissioning costs even if a penalty is incurred for withdrawal prior to the date specified on the certificate(s).
- CDs should include automatic renewal provisions and provisions requiring notice, in writing, prior to withdrawal of funds. Under such provisions, the certificate will continue indefinitely until the licensee defaults and the issuer receives written notice of default or of termination of the license by the Commission.

The bank issuing the CD generally has a set-off right to the funds that are deposited. A set-off right refers to the general rule that a bank may look to deposits it holds for the repayment of any indebtedness to it on the part of the depositor and may apply the debtor's deposit on his debts to the bank as they become due.

The set-off right does not apply, however, to special deposits. When money is deposited for a special purpose, a bank is ordinarily precluded from exercising the right of set-off. In addition, in order to warrant a set-off, it is ordinarily necessary that the money deposited belong to the depositor. Thus, the set-off rule does not apply where a bank has knowledge that the funds are deposited by the depositor for the use of another, or where the bank has knowledge of facts sufficient to put it on notice as to the ownership by someone other than the depositor.

To avoid a bank's right of set-off, licensees or applicants using non-negotiable CDs as financial assurance instruments should (1) name the trustee

of a standby trust or the escrow agent of an escrow account or the State regulatory agency (if the agency can hold special accounts) as payee, and (2) inform the issuing bank that the certificate is being used to demonstrate financial assurance in compliance with a regulatory requirement. Licensees using negotiable CDs should also inform issuers of the purpose for which the CDs are being obtained.

Criteria for review of certificates of deposit are provided in Exhibit 3-2. Examples of certificates of deposit are provided in Section 4.2.

#### 3.2.1.3 Government Securities

The licensee wishing to use this mechanism will deposit government securities that have, at the time of deposit, a fair market value at least equal to the certified or estimated cost of decommissioning. In order to ensure that the securities deposited provide the greatest probability of full value at maturity, securities should be limited to securities that are guaranteed by the full faith and credit of the Federal government and adequately rated State or municipal bonds. These securities could be held by a trustee or an appropriate Federal or State agency. The security holder should be determined during licensing.

Acceptable securities backed by the Federal government include:

- Treasury bills;
- Treasury notes, and bonds;
- Government National Mortgage Association pass-through certificates (GNMAs); and
- Mortgage-backed bonds issued by the Federal National Mortgage Association (FNMA) and the Federal Home Loan Mortgage Corporation.

Acceptable State or municipal bond ratings are:

- BBB or higher as rated by Standard and Poor's Corporation; or
- Baa or higher as rated by Moody's Investors Service, Inc.

A licensee or applicant wishing to use securities to provide evidence of financial responsibility should comply with the following:

- The types of securities to be used must be approved during the licensing process. If used by an applicant for a license, securities must be transferred before the facility becomes operational. If used by a current license holder, securities must be transferred at the time financial assurance is certified.
- The licensee or applicant should establish a standby trust to receive funds if the bonds are cashed so that they will be available to the Commission or the State agency if needed for decommissioning.

If the licensee or applicant uses Treasury securities for financial assurance, procedures for receipt and possible reinvestment of interest should also be established. Interest payments on registered Treasury notes and bonds

EXHIBIT 3-2

CHECKLIST OF CRITERIA FOR  
REVIEW OF CERTIFICATES OF DEPOSIT

- Copy of corporate by-laws or other evidence indicating that parties signing the financial instrument (for the applicant) are authorized to represent the organization in the transaction.
- Evidence that the financial instrument is an originally signed duplicate (e.g., an executed copy of the instrument).
- Time or demand deposit.
- Negotiable or non-negotiable instrument.
- Terms and conditions include:
  1. Name and address of bank;
  2. Number of certificate;
  3. Date of creation;
  4. Name of depositor;
  5. Name or position of payee;
  6. Sum deposited;
  7. Rate of interest;
  8. Renewable or nonrenewable at maturity;
  9. Period of renewal;
  10. Power of bank not to renew;
  11. Limitations on withdrawal;
  12. Notice requirements.
- Deposit insurance.



are mailed to the address furnished with the tender or subscription letter, and a special form must be completed if the mailing address changes. The proper registrant for Treasury securities would be either the Commission or the State regulatory agency, the trustee of a standby trust, or the escrow agent for an escrow account.

Deposit of government securities into a trust fund, escrow account, or specific State government account will require the careful attention of the trustee, escrow agent, or State fiduciary with respect to:

- Proper registration and endorsements;
- Reinvesting interest payments;
- Handling instruments with varying maturity dates;
- Reinvesting funds from matured and redeemed instruments; and
- Filing proper forms in a timely fashion with the appropriate government agencies. (A list of forms is provided in Section 4.4.)

To be certain that the financial assurance provided by a deposit of securities is adequate, the Commission or State regulatory agency should review the trust or escrow agreement or special government account to ensure that the trustee, escrow agent, or State fiduciary is aware of the special requirements for such securities. For example, Section 8(c) of the sample trust agreement provided in Section 4.3 of this guide expressly authorizes the trustee to make required securities transactions.

Exhibit 3-3 provides a checklist of criteria for review of government securities.

#### 3.2.1.4 Special Government Funds or Accounts

Some State regulatory agencies may have the authority to establish special segregated government funds or accounts to receive and hold cash for specified purposes. To use this mechanism, the licensee or applicant and the State agency would agree that decommissioning funds in an amount at least equal to the decommissioning cost would be held in a special State account with the State agency acting as trustee or escrow agent for the funds. The licensee or applicant would deposit the required amount of cash or liquid assets in the special account prior to beginning facility operations. The State agency should provide written verification of its agreement to use funds solely to carry out decommissioning. The trust or escrow account should satisfy the criteria described under those titles in this guide and should contain the provisions detailed in the respective checklists. If the licensee defaults, the State regulatory agency would arrange for the necessary decommissioning work to be completed by 1) ordering the licensee to decommission the site, 2) ordering the trustee to select a decommissioning contractor, or 3) choosing a contractor themselves. In the event that the State agency was unable to exercise its options, the Commission would select the contractor. The special account or fund would terminate when decommissioning was complete, the license was terminated, and the facility site is available for unrestricted use for any public or private purpose. (Exhibit 3-4 provides a checklist of criteria for review of special government funds or accounts.)

EXHIBIT 3-3

CHECKLIST OF CRITERIA FOR REVIEW OF GOVERNMENT SECURITIES

- Copy of corporate by-laws or other evidence indicating that parties signing the financial instrument (for the applicant) are authorized to represent the organization in the transaction.
- Evidence that the financial instrument is an originally signed duplicate (e.g., an executed copy of the instrument).
- List of securities deposited:

Federal Treasury bills, notes, and bonds:

- Government National Mortgage Association certificates (GNMAs).
- Federal National Mortgage Association certificates (FNMA's).
- Federal Home Loan Mortgage Corporation (FHLM) bonds.

State or municipal bonds rated:

- BBB or higher as rated by Standard and Poor's Corporation; or
- Baa or higher as rated by Moody's Investors Service, Inc.
- Date when securities were transferred to trust or escrow account.
- Current market value of securities deposited.
- Certified or estimated cost of decommissioning.
- Documentation of standby trust, including trust agreement and acknowledgement.

or

- Documentation of escrow account established to hold government securities.

EXHIBIT 3-4

CHECKLIST OF CRITERIA FOR REVIEW OF  
SPECIAL GOVERNMENT FUNDS OR ACCOUNTS

- Copy of corporate by-laws or other evidence indicating that parties signing the financial instrument (for the applicant) are authorized to represent the organization in the transaction.
- Evidence that the financial instrument is an originally signed duplicate (e.g., an executed copy of the instrument).
- List of assets deposited with State agency.
- Date on which assets were transferred to the special account.
- Value of assets deposited.
- Letter from State agency stating that use of funds will be restricted to covering the costs of decommissioning upon the licensee's default.
- Documentation of trust fund established to hold assets, including trust agreement and acknowledgement;

or

- Documentation of established escrow account.

### 3.2.1.5 Trust Fund

Trust funds can be used by themselves to provide financial assurance. A trust that is acceptable to the Commission to satisfy decommissioning financial assurance requirements is an irrevocable three-party agreement whereby the licensee or applicant, called the grantor or trustor, transfers assets at least equal to the cost of decommissioning to a trustee, such as a bank, to hold on behalf of the beneficiary, the Commission or State agency. Decommissioning financial assurance regulations require that the trust and trustee must be acceptable to the Commission or the State regulatory agency. Acceptable trustees include appropriate State or Federal government agencies and entities that have the authority to act as trustees and whose trust operations are regulated and examined by a Federal or State agency [10 CFR 30.35(f)(2)(ii), 40.36(e)(2)(ii), 70.25(f)(2)(ii), and 72.30(c)(2)].

The terms and conditions of the trust are governed by a trust agreement. The trust agreement should identify the licensed facility and the decommissioning costs. It should also describe the property used to establish the trust fund and clearly indicate the grantor's intention that the property is to be held by a trustee. The trust agreement should also specify in detail all important aspects of the execution and administration of the trust and the disposition of the trust property. The document should state that the fund will be disbursed to the licensee only upon presentation to the trustee of certification that (1) decommissioning is proceeding according to a Commission-approved plan; (2) the funds withdrawn will be expended for activities undertaken pursuant to the plan; and (3) the Commission has been given 30 days prior notice of the licensee's intent to withdraw funds from the trust.

A trust can hold more than interest-bearing cash deposits. Other property, such as securities or government notes, can be placed in trust. If assets without a face value are used to fund the trust, the trustee will be required to sell them and place their cash value into the trust. The trust must contain sufficient assets to complete decommissioning activities at all times. After payment has been made into the trust, the trustee should annually, at least 30 days before the anniversary date of receipt of payment, furnish the licensee and the Commission or the State regulatory agency a statement confirming the value of the trust. Within 60 days of receiving the trustee's evaluation, the licensee must adjust the value of the fund, if necessary, to provide for increased cost due to inflation or new decommissioning cost estimates.

The trustee is generally empowered to invest the funds during the existence of the trust. Trustee investments, unless specified in the trust agreement, are governed by a "reasonably prudent investor standard" as defined in the statutes or case law of the jurisdiction where the trust is located. Any investment income accrues to the trust. The licensee may change the trustee if dissatisfied with the trustee's performance. A change in trustee does not affect the existence of the trust but a change can be made only by mutual agreement of the Commission or State agency, the licensee, and the trustee. Arrangement for a new trustee or for an alternate financial assurance mechanism should be made 60 days before the expiration of the trust agreement.

The trustor usually pays a fee for the initiation of the trust and for subsequent trust services.

#### 3.2.1.6 Standby Trusts

Under decommissioning regulations, a licensee or applicant wishing to use a surety bond, letter of credit, line of credit, or insurance must (and a parent company guarantee should) establish a standby trust fund (see explanation in Section 3.2). (Licensees or applicants that use CDs or government securities should establish a standby trust or an escrow account.) The purpose of the standby trust is to receive any funds that are drawn from these financial assurance mechanisms by the issuing institutions and hold them until they are required for decommissioning. To satisfy the decommissioning requirements, a standby trust should satisfy the conditions specified above for trust funds. The wording of the standby trust should specify that its purpose is to receive and hold funds from a financial mechanism for use to satisfy the licensee's decommissioning obligations. The document should state that the fund will be disbursed to the licensee only upon presentation to the trustee of certification that (1) decommissioning is proceeding according to a Commission-approved plan; (2) the funds withdrawn will be expended for activities undertaken pursuant to the plan; and (c) the Commission has been given 30 days prior notice of the licensee's intent to withdraw funds from the trust.

(Exhibit 3-5 provides criteria for review of trust funds and standby trust agreements. Recommended wording for trust documents is provided in Section 4.)

#### 3.2.2 Surety, Insurance, or Parent Company Guarantee Mechanisms

Surety methods for providing evidence of financial responsibility include surety bonds, letters of credit, or lines of credit. A licensee may also use a parent company guarantee based on the authorized financial test that is contained in Appendix A of 10 CFR Part 30 and referenced in 10 CFR Parts 40, 70, and 72. (The test is in this guide in sections 4.7.3 and 4.7.4.) A parent company guarantee may not be used in combination with other financial methods to satisfy decommissioning financial responsibility requirements.

Any surety method or insurance used to comply with decommissioning requirements must satisfy the following conditions:

The surety method or insurance must be open-ended. If written for a specified term, such as 5 years, the instrument must be renewed automatically unless 90 days or more prior to the renewal date, the issuer of the instrument notifies the Commission, the beneficiary, and the licensee of its intention not to renew. The instrument must also provide that the full face amount be paid to the beneficiary automatically prior to expiration without proof of forfeiture if the licensee fails to provide a replacement acceptable to the Commission within 30 days after receipt of notification of cancellation.

Financial assurance must remain in effect until the Commission has terminated the license. The licensee must provide continuous financial assurance from the time compliance with decommissioning financial assurance requirements is first demonstrated to the time decommissioning is complete, the facility license has been terminated, and the facility site is available for unrestricted use for any private or public purpose. If the licensee, issuer, or provider cancels or fails to renew an instrument, the licensee must provide alternative financial assurance within 30 days of giving or receiving notice of cancellation or non-renewal.

EXHIBIT 3-5

CHECKLIST OF CRITERIA FOR REVIEW OF TRUST AGREEMENTS<sup>a</sup>

- Copy of corporate by-laws or other evidence indicating that parties signing the financial instrument (for the applicant) are authorized to represent the organization in the transaction.
- Evidence that the financial instrument is an originally signed duplicate (e.g., an executed copy of the instrument).
- Evidence that the financial institution has authority to act as a trustee.
- Purpose of trust ("whereas" clauses).
  - 1. Description
- Grantor or grantors (introductory paragraph).
  - 1. Names
  - 2. Addresses
- Trustee or trustees.
  - 1. Names and addresses
  - 2. Bank or corporate trustee (introductory paragraph)
- Identification of facilities and cost estimates (Section 2).<sup>b</sup>
- Words of transfer, conveyance, and delivery in trust (Section 3).
- Payments constituting the trust fund (Section 4).
- Duration of trust.
- Description of trust property.
  - 1. Property described in attached schedule (Schedule B)
  - 2. Cash
  - 3. Stock and other securities
- Additions to trust.
- Distribution of trust principal (Section 5).
  - 1. Disbursement to licensee upon proper certification
  - 2. Payment for activities at NRC's direction in writing

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<sup>a</sup>Adapted from 17A Am Jur Legal Forms 2d (Rev) §251.94.

<sup>b</sup>References are to recommended wording for trust agreements provided in Section 4.3 of this guide.

EXHIBIT 3-5 (continued)

3. Refund to grantor at NRC's specification in writing after completion of decommissioning activities
- Trust management (Sections 6-8).
    1. Discretionary powers
    2. Fiduciary duty
    3. Commingling and investment
    4. Sale or exchange of trust property
    5. Scope of investments
    6. Express powers of trustee
    7. Borrowing money and encumbering trust assets
  - (Optional provisions)
    8. Insurance
    9. Operation of business
    10. Compromise of claims
  - Taxes and expenses (Section 9).
  - Annual valuation (Section 10).
  - Advice of counsel (Section 11).
  - Authority, compensation, and tenure of trustees (Sections 12-14).
    1. Trustee compensation
    2. Successor trustee
    3. Instructions to trustee
  - Amendment of agreement (Section 15).
  - Irrevocability and termination (Section 16).
  - Immunity and indemnification (Section 17).
  - Law to govern construction and operation of trust (Section 18).
  - Interpretation and severability (Section 19).
  - Date (signature block).
  - Signatures (signature block).
  - Acknowledgements, seals or attestations, if necessary or desired (witness by notary public).
  - Acceptance of trust by trustee or trustees (acknowledgment).

The instrument must be payable to a standby trust. An applicant or licensee wishing to use a surety bond, letter of credit, line of credit, or insurance must (and a parent company guarantee should) also establish a standby trust fund. The purpose of the standby trust is to receive any funds that are drawn from these financial assurance mechanisms and hold them until they are required for decommissioning.

The following text describes surety methods, parent company guarantees, and insurance.

#### 3.2.2.1 Surety Bond

A surety bond that satisfies decommissioning financial assurance requirements is a contract that the licensee or applicant (the principal) enters into with a qualified surety company (the surety) to assure the Commission or State regulatory agency that the licensee will fulfill its decommissioning obligations or, in the event of the licensee's default, the surety guarantees that decommissioning costs will be paid. Surety bonds written as payment bonds are acceptable for decommissioning financial assurance. These bonds are financial guarantee bonds that guarantee payment.

Licensees or applicants must acquire financial guarantee surety bonds from qualified sureties. For purposes of compliance with the decommissioning regulations, qualified sureties are those listed by the Department of the Treasury in the most recent edition of Circular 570. Circular 570, which lists qualified sureties, is published annually on approximately July 1, and updated in the Federal Register. The circular includes the underwriting limitation, that is, the maximum amount that each listed surety can guarantee in one bond. A surety can only exceed this amount if it brings another surety company into the agreement to share the risk. Several sureties acting together may not exceed the sum of their individual underwriting limitations. Circular 570 also lists the States in which each qualified surety is licensed to enter into surety bonds. A surety bond used to meet the decommissioning financial assurance requirements must be signed in a State where the surety company is licensed.

A surety is "jointly and severally" liable for the guaranteed payment, which means that the surety assumes the licensee's obligation as its own and can be sued jointly with the licensee for the obligation. Consequently, most surety bonds include an indemnification provision that requires the principal (the licensee) to reimburse the surety for costs incurred in satisfaction of the principal's obligations. (Criteria for review of surety bonds are provided in Exhibit 3-6.)

The surety bond limits the liability of the surety company to the face amount of the bond (sometimes called the penal sum). The penal sum of the bond must be an amount at least equal to the cost of decommissioning. The bond may provide, by an optional rider, that the penal sum can be increased up to 20 percent in any year without a new agreement between the parties. An applicant or licensee wishing to use a surety bond should verify during the licensing review that the amount and the terms and conditions are satisfactory to the Commission.



## EXHIBIT 3-6

### CHECKLIST OF CRITERIA FOR REVIEW OF SURETY BONDS

- Copy of corporate by-laws or other evidence indicating that parties signing the financial instrument (for the applicant) are authorized to represent the organization in the transaction.
- Evidence that the financial instrument is an originally signed duplicate (e.g., an executed copy of the instrument).
- Copy of Circular 570 of the U.S. Department of Treasury.
- Copy of broker/agent's power of attorney authorizing the broker/agent to issue bonds.
- Signed statement from applicant indicating that they will notify NRC if the surety company intends to cancel or go bankrupt.
- Date of execution of bond and effective date.
- Name and address of licensee (principal).
- Type of business organization; State of incorporation, if appropriate.
- NRC license number, identification of licensed facility(ies), decommissioning costs.
- Identification of corporate or individual surety(ies).
  1. Name;
  2. State of incorporation;
  3. Qualification in jurisdiction where facility covered by the surety bond is located.
- Designation of obligee (NRC or State regulatory agency).
- Recitation of consideration (fee paid for surety bond).
- Liability of surety.
  1. Penal sum
  2. Limitation of liability
  3. Condition(s) of liability
  4. Statement of joint and several liability
- Statement of licensee's or applicant's regulatory obligations as reason for bond.
- Scope and duration of bond.
  1. Restricted to single obligation
  2. Continuing
  3. Provisions for renewal

EXHIBIT 3-6 (Continued)

- Termination.
  1. By surety
  2. By principal
  3. Effective date of termination or revocation
- Adjustment of penal sum.
- Date.
- Signatures.
- Premium.

The licensee must establish a standby trust fund at the same time that it enters into the surety contract. The surety bond must contain terms requiring that any funds drawn under it will be placed directly into the standby trust fund by the surety company. Both the bond and the trust agreement should be submitted as evidence of financial responsibility. The wording of the surety bond and the wording of the standby trust should be similar to the wording of each recommended in Sections 4.5 and 4.3.2, respectively.

#### 3.2.2.2 Letters of Credit

A standby letter of credit that is acceptable as evidence of financial responsibility is a binding arrangement by which the issuing party, such as a bank, agrees on behalf of the applicant or licensee (the account party) to place funds in the standby trust or to pay the State authority in the event of any default by the licensee in the performance of decommissioning. The standby letter of credit specifies the document(s) necessary to establish the fact of the licensee's failure to decommission as required, and the issuer must pay the beneficiary upon presentation of the document(s). The issuer extends this credit in exchange for a fee paid by the applicant or licensee. The arrangement also requires that the applicant or licensee repay, with interest, any funds drawn through the letter of credit. (Criteria for review of letters of credit are provided in Exhibit 3-7.)

The issuer should be an institution that has the authority to issue a letter of credit and whose letter-of-credit operations are regulated and examined by a Federal or State agency. All domestic commercial banks and savings banks, chartered U.S. branches of foreign banks operating in the United States, credit unions, and some savings and loan associations satisfy this requirement.

Under the letter of credit, the Commission or State authority will direct that funds be placed in the standby trust to pay the costs of decommissioning if the licensee fails to decommission as required. The funds in the standby trust would be used to pay the costs of decommissioning. Terms of the letter of credit must specify that funds withdrawn will be placed by the issuer directly into a standby trust fund upon presentation of a draft or other documents specified in the letter of credit. Both the letter of credit and the trust agreement should be submitted to evidence financial assurance. The exact terms of the arrangement between the licensee or applicant and the issuer will depend on individual circumstances, but the wording of the letter of credit should be similar to the instrument presented in Section 4.6.

#### 3.2.2.3 Lines of Credit

A standby line of credit, sufficient to satisfy decommissioning financial responsibility requirements, is an arrangement of the licensee with a lender (generally a bank) in which the lender agrees to provide funds required for decommissioning of the licensee's facility. The maximum amount of credit stated in the contract between the applicant or licensee and the lender must be sufficient to at least equal the certified or estimated cost of decommissioning. Lines of credit are generally contingent on the continuing credit worthiness of the licensee, as analyzed by the issuer. To satisfy the financial responsibility requirements, however, the line of credit for decommissioning must not be contingent on the licensee's financial condition but must be provided without

EXHIBIT 3-7

CHECKLIST OF CRITERIA FOR REVIEW OF LETTERS OF CREDIT

- Copy of corporate by-laws or other evidence indicating that parties signing the financial instrument (for the applicant) are authorized to represent the organization in the transaction.
- Evidence that the financial instrument is an originally signed duplicate (e.g., an executed copy of the instrument).
- Evidence that the financial institution is regulated by Federal or State agency (e.g., member of FDIC, Federal Reserve System, etc.).
- The instrument must be entitled a letter of credit.
- The letter should be limited in amount.
- The letter of credit must contain a specified expiration date or be written for a definite term.
- The issuer's obligation to pay the beneficiary should arise only upon presentation of a draft or other documents specified in the letter of credit.
- The bank must not be called upon to determine a question of fact or law at issue between the licensee and the Commission or State regulatory agency.
- The licensee should have an unqualified obligation to reimburse the issuer for payments made under the letter of credit.

reservation. Accordingly, the licensee or applicant should obtain from the lender a written commitment to provide funds without reservation as necessary for decommissioning. Also, a standby trust must be created to receive funds from the line of credit in the event of the licensee's default on decommissioning obligations. The standby trust agreement and documentation of the line of credit must be submitted as evidence of financial assurance.

#### 3.2.2.4 Insurance

An insurance policy sufficient to satisfy the decommissioning financial assurance requirements must insure, at the time it is acquired, the entire estimated or certified cost of decommissioning. An annuity policy, therefore, that would gradually increase in value over time to equal decommissioning costs would not be acceptable unless accompanied by some other mechanism to make up any shortfalls. The beneficiary of the insurance policy should be the trustee of the standby trust established to receive the insured funds when they are needed for decommissioning.

#### 3.2.2.5 Parent Company Guarantees

A guarantee is a promise by one party (the guarantor) to pay specified debts or perform specified obligations of another party (the principal) in the event that the principal fails to satisfy the debts or obligations. When a guarantee is used to provide evidence of financial responsibility in a regulatory program, the primary obligation consists of the regulatory requirements the principal must satisfy. Decommissioning financial responsibility requirements may be satisfied by the use of a corporate guarantee, whereby the applicant's or licensee's parent corporation agrees to guarantee to provide specified dollar amounts to fund performance of decommissioning in the event of the licensee's default.

To be acceptable to the Commission, a parent company guarantee must satisfy the following conditions:

- The guarantee must be provided by the corporate parent of the licensee, and the parent must be able to demonstrate that they have majority control of the licensee's voting stock.
- The financial statement of the guarantor must be submitted in substantiation of its financial position.
- The guarantor must demonstrate that it has adequate resources to cover the costs of the decommissioning activities using Alternative I or II of the financial test included in Sections 4.7.3 and 4.7.4.
- After the initial financial test, the parent company must repeat the passage of the test within 90 days after the close of each succeeding fiscal year.
- The corporate guarantor's financial statements must be audited by an independent certified public accountant.
- On the basis of financial statements or other pertinent materials, the corporate parent may no longer meet the financial test criteria. If so,

the licensee must provide alternative financial assurance within 90 days after receiving notification of the determination. If the licensee fails to do so, the guarantor must provide alternative assurance in the name of the licensee.

(A checklist of review criteria for parent company guarantees is provided in Exhibit 3-8.)

#### 3.2.2.6 Financial Test

A financial test is an accounting ratio requirement, net worth requirement, bond rating requirement, or similar requirement or combination of requirements that measures the financial strength of a firm providing financial assurance. The financial test is used by a firm that provides a guarantee to a licensee to show its own financial strength and its ability to support the guarantee. The corporate guarantee financial test requirements may be satisfied by meeting either of two alternative financial tests specified in 10 CFR Part 30, Appendix A, II.A.1 or II.A.2.

A special auditor's report must be submitted as part of the financial test (10 CFR Part 30, Appendix A, II.B). To satisfy the requirement, "the parent company's independent certified public accountant must have compared the data used by the parent company in the financial test, which is derived from the independently audited year end financial statements for the latest fiscal year, with the amounts in such financial statement." In connection with this, the licensee must inform NRC within 90 days of any matters coming to the auditor's attention which cause the auditor to believe that the data specified in the financial test should be adjusted and that the company no longer passes the test (10 CFR Part 30, Appendix A, II.B). This test must be repeated within 90 days after the closing of each succeeding fiscal year. In the event that the parent company no longer meets the financial test, 10 CFR Part 30, Appendix A, II.C, identifies notification and alternative financial assurance requirements. (Recommended wording for the parent company guarantee documents is provided in Section 4.7.6.)

#### 3.2.3 External Sinking Fund

The external sinking fund is a mechanism for providing decommissioning financial assurance by combining a sinking fund account with a surety method (i.e., letter or line of credit or surety bond) or insurance. The sinking fund account can be in the form of mechanisms, such as cash deposits in an escrow or trust agreement, certificates of deposit, or deposit of government securities. The sinking fund account, whatever its form, must be segregated from the licensee's or applicant's other assets and outside the licensee's or applicant's control. It is established and maintained by setting aside funds and adding to the account periodically. The sinking account funds in combination with the surety mechanism or insurance must at all times at least equal the cost of decommissioning the facility at the time termination of operation is expected. As the amount held in the sinking fund increases over time, however, the amount of insurance or the amount of the surety mechanism can decrease correspondingly. Prepayment mechanisms and surety methods are described in detail in Sections

### EXHIBIT 3-8

#### CHECKLIST OF CRITERIA FOR REVIEW OF PARENT COMPANY GUARANTEES

- Copy of letter from the chief executive officer of the licensee, verifying that it is a going concern\* with positive tangible net worth (submitted annually at same time as parent company financial test in Sections 4.7.3 and 4.7.4 of this guide).
- Copy of corporate by-laws or other evidence indicating that parties signing the financial instrument (for the applicant) are authorized to represent the organization in the transaction.
- Evidence that the financial instrument is an originally signed duplicate (e.g., an executed copy of the instrument).
- Evidence that the corporate parent has majority control of the applicant's voting stock.
- Name and address of guarantor.
- Name and address of the licensee.
- Name and address of the regulatory agency.
- Recitation of the guarantor's authority to provide the guarantee, such as ownership of the licensee.
- Identification of the facilities for which the guarantee provides financial assurance and amounts guaranteed for decommissioning activities.
- Description of the primary obligation (decommissioning requirements).
- Unequivocal statement of guarantee.
  - a. Recitation of the consideration for the guarantee.
  - b. Liability of the guarantor.
    - a. Limitation of liability
    - b. Condition(s) of liability
    - c. Effect on liability of a change in the status of the licensee
- Statement that guarantor remains bound despite amendment or modification of license or decommissioning funding plan, reduction or extension of time of performance of required activities, or any other modification or alteration of an obligation of licensee.

\*A "going concern" is a firm that is expected to continue operating at least long enough for current expectations and plans to be carried out and for the reasonably foreseeable future period after that.

EXHIBIT 3-8 (Continued)

- Notice requirements.
- Discharge of the guarantor.
- Termination and revocation.
  1. Termination on occurrence of contingency
  2. Voluntary revocation by guarantor
  3. Effective date of termination or revocation
- Date.
- Signatures.



3.2.1 and 3.2.2, respectively. (To review the instruments used in the external sinking funds, reviewers should use the criteria provided in the checklist for each respective instrument.)

#### 3.2.4 Statement of Intent

A statement of intent may be used by Federal, State, or local government licensees to provide evidence of financial responsibility for decommissioning. The purpose of the statement of intent is to ensure that, early in the life of the licensed facility, government licensees make their funding bodies aware of decommissioning requirements and costs and the eventual need for funding. The statement must identify the facility(ies) for which it guarantees financial assurance and the corresponding decommissioning costs. Also, it must indicate that funds for decommissioning costs will be requested and obtained sufficiently in advance of decommissioning to prevent delay of required activities. The statement of intent should include evidence of the authority of the officials of the Federal, State, or local government entity to sign the statement of intent. (A checklist of review criteria for Statements of Intent is provided in Exhibit 3-9.)

#### 3.2.5 Combinations of Financial Mechanisms

Financial assurance mechanisms described in the previous section can be used in combination with one another. The parent company guarantee, however, is an exception and cannot be used in combination with other mechanisms (10 CFR 30.35(f)(2), 40.36(e)(2), 70.25(f)(2), and 72.30(c)(2)).

EXHIBIT 3-9

CHECKLIST OF CRITERIA FOR REVIEW OF STATEMENTS OF INTENT

- Copy of evidence indicating that parties signing the financial instrument (for the applicant) are authorized to represent the organization in the transaction.
- Evidence that the statement of intent is an originally signed duplicate.
- Identification of Federal, State, or local government licensee.
- Description of facilities for which Statement of Intent provides financial assurance and corresponding decommissioning costs.
- Statement that funds for decommissioning will be obtained when necessary.
- Recitation of authority to sign the Statement of Intent.
- Date.
- Names and positions of signatories.
- Signatures.

#### 4. RECOMMENDED WORDING FOR FINANCIAL ASSURANCE INSTRUMENTS

The following financial instruments provide recommended language and provisions for compliance with decommissioning financial assurance requirements. Although the sample language is not required by decommissioning regulations, except for certain provisions in the parent guarantee, applicants will find that its use will simplify the application process and expedite Commission review.

#### 4.1 RECOMMENDED WORDING FOR AN ESCROW AGREEMENT

ESCROW NUMBER \_\_\_\_\_

##### Paragraph 1. Establishment of Escrow Account

It is agreed between the parties that [insert name of licensee], licensee, has elected to establish an escrow account with [insert name, address, and position of escrow agent] to provide financial assurance for decommissioning of the facility(ies) in the amounts shown below:

[For each facility for which financial assurance is provided by the escrow agreement, list facility name, address, and license number, corresponding estimated or certified decommissioning costs, and indicate amount of financial assurance provided by the escrow account.]

##### Paragraph 2. Description of Property in Escrow Account

It is hereby acknowledged by the parties that [list the assets that have been delivered to the escrow agent and indicate the value of each item] has (have) been delivered to escrow and will remain in the escrow account created by this agreement until one of the two conditions stated in Paragraph 3 of this agreement has been satisfied.

[Insert name of licensee] warrants to and agrees with [insert name of escrow agent] that, unless otherwise expressly set forth in this Agreement: there is no security interest in the property in the escrow account or any part thereof; no financing statement under the Uniform Commercial Code is on file in any jurisdiction claiming a security interest in or describing (whether specifically or generally) the escrow account or any part thereof; and the escrow agent shall have no responsibility at any time to ascertain whether or not any security interest exists or to file any financing statement under the Uniform Commercial Code with respect to the escrow account or any part thereof.

##### Paragraph 3. Conditions of Escrow Agreement

The property described in Paragraph 2, above, will remain in the escrow account created by this agreement until one of the two following conditions has been satisfied: (1) the decommissioning activities required by 10 CFR [insert 30, 40, 70, or 72] have been completed, the license has been terminated, the facility site is available for unrestricted use for any public or private purpose, and the escrow account has been terminated by joint notice, in writing, from [insert name of licensee] and [insert NRC or name of the State regulatory agency]; or (2) the escrow agent, [insert name of the escrow agent], has been notified by the [insert NRC or name of the State regulatory agency], in writing, that the licensee, [insert name of licensee], has defaulted on the agreed obligation to carry out the decommissioning for the above listed facility(ies).

#### 4.1 Escrow Agreement (Continued)

##### Paragraph 4. Disbursement of Property in Escrow Account

The [insert name of escrow agent] shall make payments from the escrow account upon the presentation of a certificate duly executed by the Secretary of the [insert name of licensee] attesting to the occurrence of the events, and in the form set forth in the attached Specimen Certificate, and upon presentation of a certification attesting to the following conditions:

- (1) that decommissioning is proceeding pursuant to an NRC-approved plan,
- (2) that the funds withdrawn will be expended for activities undertaken pursuant to that plan, and
- (3) that the NRC has been given 30 days prior notice of [insert name of licensee]'s intent to withdraw funds from the escrow account.

No withdrawal from the account can exceed \_\_\_ percent of the outstanding balance of the escrow account or \_\_\_\_\_ dollars, whichever is greater, unless NRC approval is attached.

Or upon [insert name of escrow agent] receiving written notification of licensee's default from the [insert NRC or State regulatory agency], [insert name of escrow agent] shall make payments from the escrow account as the [insert NRC or name of State regulatory agency] shall direct, in writing, to provide for the payment of the costs of the required decommissioning activities covered by this agreement. The escrow agent shall reimburse the licensee or other persons as specified by the [insert NRC or State regulatory agency] from the escrow account for expenses for required activities in such amounts as the [insert NRC or name of the State regulatory agency] shall direct in writing. In addition, the escrow agent shall refund to [insert name of licensee] such amounts as the [insert NRC or the name of the State regulatory agency] specifies, in writing. Upon refund, such funds shall no longer constitute part of the escrow account as described in paragraph 2, above.

##### Paragraph 5. Irrevocability

It is also agreed between the parties that this escrow became irrevocable upon delivery to [insert name of escrow agent], the escrow agent, and will remain irrevocable and in full force and effect until the occurrence of one of the conditions described in Paragraph 3, above.

##### Paragraph 6. Powers of the Escrow Agent

The only powers and duties of the escrow agent shall be to hold the escrow property and to invest and dispose of it in accordance with the terms of this agreement.

#### 4.1 Escrow Agreement (Continued)

##### Escrow Account Management

The escrow agent shall invest and reinvest the principal and income of the escrow account and keep the escrow account invested as a single fund, without distinction between principal and income, in accordance with general investment policies and guidelines which the [insert name of licensee] may communicate in writing to the escrow agent from time to time, subject, however, to the provisions of the escrow account; the escrow agent shall discharge its duties with respect to the escrow account solely in the interest of [insert the NRC or the name of the State regulatory agency] and with the care, skill, prudence, and diligence, under the circumstances then prevailing, that persons of prudence, acting in like capacity and familiar with such matters, would use in the conduct of an enterprise of like character and with like aims; except that:

- (a) Securities or other obligations of the licensee, or any other owner or operator of the licensed facility(ies), or any of their affiliates as defined in the Investment Company Act of 1940, as amended (15 U.S.C. 80A-2(a)), shall not be acquired or held, unless they are securities or other obligations of the Federal government;
- (b) The escrow agent is authorized to invest the escrow account in time or demand deposits to the extent insured by an agency of the Federal government; and
- (c) The escrow agent is authorized to hold cash, awaiting investment or distribution uninvested, for a reasonable time and without liability for the payment of interest thereon.

##### Express Power of the Escrow Agent

Without in any way limiting the powers and discretion conferred upon the escrow agent by other provisions of this agreement or by law, the escrow agent is expressly authorized and empowered:

- (a) To register any securities held in the escrow account in its own name and to hold any security in bearer form or in book entry, or to deposit or arrange for the deposit of any securities issued by the U.S. Government, or any agency or instrumentality thereof, with a Federal Reserve bank, but the books and records of the escrow agent shall at all times show that all such securities are part of the escrow account;
- (b) To deposit any cash in the escrow account in interest-bearing accounts or savings certificates to the extent insured by an agency of the Federal government;
- (c) To pay taxes, from the account, of any kind that may be assessed or levied against the escrow account and all brokerage commissions incurred by the escrow account.

#### 4.1 Escrow Agreement (Continued)

##### Paragraph 7. Annual Valuation

After delivery has been made into this escrow account, the escrow agent shall annually, at least 30 days before the anniversary date of receipt of the property into the escrow account, furnish to the licensee and to the [insert NRC or the name of the State regulatory agency] a statement confirming the value of the escrow account. Any securities in the account shall be valued at market value as of no more than 60 days before the anniversary date of the establishment of the escrow account. The failure of the licensee to object in writing to the escrow agent within 90 days after the statement has been furnished to the licensee shall constitute a conclusively binding assent by the licensee, barring the licensee from asserting any claim or liability against the escrow agent with respect to the matters disclosed in the statement.

##### Paragraph 8. Successor Escrow Agent

Upon 90 days prior notice to the [insert NRC or State agency] and the licensee, [insert name of licensee], the escrow agent may resign; upon 90 days notice to the [insert NRC or State agency] and the escrow agent, the licensee, [insert name of licensee], may replace the escrow agent upon 30 days prior notice to the [insert NRC or State regulatory agency]; provided that such resignation or replacement is not effective until the escrow agent has appointed a successor escrow agent and this successor accepts the appointment. The successor escrow agent shall have the same powers and duties as those conferred upon the escrow agent under this agreement. Upon the successor's acceptance of the appointment, the escrow agent shall assign, transfer, and pay over to the successor the funds and properties then constituting the escrow account. If for any reason the licensee cannot or does not act in the event of the resignation of the escrow agent, the escrow agent may apply to a court of competent jurisdiction for the appointment of a successor, or for instructions. The successor escrow agent shall specify the date on which it assumes administration of the escrow account in a writing sent to the licensee, [insert the NRC or the name of the State regulatory agency], and the current escrow agent by certified mail 10 days before the change becomes effective. Any expenses incurred by the escrow agent as a result of any of the acts contemplated by this paragraph shall be paid as provided in Paragraph 10 of this agreement.

##### Paragraph 9. Instructions to the Escrow Agent

All orders, requests, and instructions from the licensee to the escrow agent shall be in writing, signed by such persons as are signatories to this agreement, or such other designees as the licensee or [insert the NRC or the name of the State regulatory agency] may designate in writing. All orders, requests, and instructions from the [insert the NRC or the name of the State regulatory agency] shall be in writing, signed by the designees of the [insert NRC or the name of the State regulatory agency]. The escrow agent shall be fully protected in acting in accordance with such orders, requests, and instructions. The escrow agent shall have the right to assume, in the absence of written notice to the contrary, that no event constituting a change or a

#### 4.1 Escrow Agreement (Continued)

termination of the authority of any person to act on behalf of the licensee or [insert the NRC or the name of the State regulatory agency] under this agreement has occurred. The escrow agent shall have no duty to act in the absence of such orders, requests, and instructions from the licensee and/or [insert the NRC or the name of the State regulatory agency], except as provided in this agreement.

##### Paragraph 10. Compensation and Expenses of the Escrow Agent

The fee of the escrow agent for its services in establishing the escrow account shall be \$\_\_\_\_\_, payable at the time of the execution of this agreement, to be borne by [insert the name of the licensee], licensee.

Expenses of the escrow agent for the administration of the escrow account, the compensation of the escrow agent for services subsequent to the establishing of the escrow account to the extent not paid directly by the licensee, and all other proper charges and disbursements shall be paid from the escrow account.

##### Paragraph 11. Amendment to this Agreement

This agreement may be amended by an instrument in writing executed by the licensee and the escrow agent provided that the licensee has given 30 days prior notice to [insert NRC or State regulatory agency].

##### Paragraph 12. Termination

This agreement can be terminated by written notice of termination to the escrow agent signed by [insert the name of licensee], licensee, and the [insert NRC or the name of the State regulatory agency], or by the [insert NRC or the name of the State regulatory agency] alone, if the licensee has ceased to exist.

##### Paragraph 13. Interpretation

This escrow agreement constitutes the entire agreement between [insert the name of licensee] and [insert the name of the escrow agent]. The escrow agent shall not be bound by any other agreement or contract entered into by [insert name of licensee] and the only document that may be referenced in case of ambiguity in this escrow agreement is the licensing agreement between [insert name of licensee] and [the United States Nuclear Regulatory Commission or the State regulatory agency], or its successor.

##### Paragraph 14. Acceptance of Appointment by Escrow Agent

[Insert name, address, and position of escrow agent] does hereby acknowledge its appointment by [insert name of licensee], the licensee, to serve as escrow agent for the escrow account created under this agreement and agrees to carry out its obligations and duties as stated in this escrow agreement.



4.1 Escrow Agreement (Continued)

Paragraph 15. Severability

If any part of this agreement is invalid, it shall not affect the remaining provisions that will remain valid and enforceable.

Paragraph 16.

This agreement shall not become effective (and the escrow agent shall have no responsibility hereunder except to return the escrow property to the [insert name of licensee] until the escrow agent shall have received the following and shall have advised [insert name of licensee] in writing that the same are in form and substance satisfactory to the escrow agent:

Certified resolution of its Board of Directors authorizing the making and performance of this Agreement;

Certificate as to the names and specimen signatures of its officers or representative authorized to sign this Agreement and notices, instructions and other communications hereunder.

[Signatures and positions of the designees of the licensee and the escrow agent.]

[Insert name of escrow agent]

[Insert name of licensee]

By \_\_\_\_\_

By \_\_\_\_\_

Name \_\_\_\_\_

Name \_\_\_\_\_

Title \_\_\_\_\_

Title \_\_\_\_\_

Date.

Witness by Notary Public.

#### 4.1.1 Specimen Certificate of Events

[Insert name and address of escrow agent]

Attention: Escrow Division

Gentlemen:

In accordance with the terms of the Agreement with you dated \_\_\_\_\_, I, \_\_\_\_\_, Secretary of [insert name of licensee], hereby certify that the following events have occurred:

1. [Insert name of licensee] is required to commence the decommissioning of its facilities located at [insert location of facility] (hereinafter called the decommissioning).
2. The plans and procedures for the commencement and conduct of the decommissioning have been approved by the United States Nuclear Regulatory Commission, or its successor, on \_\_\_\_\_ (copy of approval attached).
3. The Board of Directors of [insert name of licensee] has adopted the attached resolution authorizing the commencing of the decommissioning.

\_\_\_\_\_  
Secretary of [insert name of licensee]

\_\_\_\_\_  
Date

#### 4.1.2 Specimen Certificate of Resolution

I, \_\_\_\_\_, do hereby certify that I am Secretary of [insert name of licensee], a [insert state of incorporation] corporation, and that the resolution listed below was duly adopted at a meeting of this Corporation's Board of Directors on \_\_\_\_\_, 19\_\_.

IN WITNESS WHEREOF, I have hereunto signed my name and affixed the seal of this Corporation this \_\_\_\_ day of \_\_\_\_\_, 19\_\_.

\_\_\_\_\_  
Secretary of [insert name of licensee]

RESOLVED, that this Board of Directors hereby authorizes the President, or such other employee of the Company as he may designate [insert, as appropriate, "to enter into an escrow agreement" or "to commence decommissioning activities at (name of facility)], with the [insert name of escrow agent] in accordance with the terms and conditions described to this Board of Directors at this meeting and with such other terms and conditions as the President shall approved with and upon the advice of Counsel.

#### 4.2 CERTIFICATES OF DEPOSIT

##### 4.2.1 Draft Negotiable Certificate of Deposit Payable at the Expiration of a Specified Time

\_\_\_\_\_ Bank of \_\_\_\_\_

Place \_\_\_\_\_

No. \_\_\_\_\_

\_\_\_\_\_  
(Date)

[Insert name of licensee or applicant] has deposited not subject to check \_\_\_\_\_ Dollars (\$ \_\_\_\_\_) payable to the order of the holder in current funds (not less than 30 days) \_\_\_\_\_ days after date, upon surrender of this certificate properly endorsed, with interest at the rate of \_\_\_\_\_ percent per annum from date to maturity only. The rate of interest payable hereunder is subject to change by the bank to such extent as may be necessary to comply with requirements of the Federal Reserve Board made from time to time pursuant to the Federal Reserve Act.

These funds are deposited for the purpose of providing financial assurance for the cost of decommissioning activities as required under Title 10 of the Code of Federal Regulations Part [insert 30, 40, 70, or 72]. Accordingly, this certificate will be renewed automatically unless written notice of (1) the default of the [insert name of licensee or applicant] on these obligations; (2) the termination of the facility license; or (3) the substitution of another financial assurance mechanism is received from [the name of licensee or applicant].

\_\_\_\_\_  
Cashier

4.2.2 Draft Non-negotiable Certificate of Deposit Payable on a Certain Date

CERTIFICATE OF DEPOSIT

Certificate of Deposit \_\_\_\_\_, 19\_\_

[Insert name of licensee or applicant] has deposited in the bank the sum of \_\_\_\_\_ Dollars (\$\_\_\_\_\_) payable to [State regulatory agency (if the agency can hold special funds under applicable state law), trustee of standby trust, or escrow agent], \_\_\_\_\_ months after date, with interest thereon at the rate of \_\_\_\_\_ percent per annum from date, upon presentation of this certificate properly endorsed. These funds are deposited for the purpose of providing financial assurance for the cost of decommissioning activities as required under Title 10 of the Code of Federal Regulations Part [insert 30, 40, 70, or 72]. Accordingly, this certificate will be renewed automatically unless written notice of (1) the default of the [insert name of licensee or applicant] on these obligations; (2) the termination of the facility license; or (3) the substitution of another financial assurance mechanism is received from [the name of the licensee or applicant].

The deposit documented in this certificate is insured by the Federal Deposit Insurance Corporation.

\_\_\_\_\_  
Cashier

### 4.3 RECOMMENDED WORDING FOR TRUST FUND AND STANDBY TRUST AGREEMENTS

#### 4.3.1 Trust Fund Agreement

##### TRUST AGREEMENT

TRUST AGREEMENT, the Agreement entered into as of [date] by and between [name of NRC licensee], a [name of State] [insert "corporation," "partnership," "association," or "proprietorship"], herein referred to as the "Grantor," and [name and address of a national bank or other Trustee acceptable to the Commission or State regulatory agency], the "Trustee."

WHEREAS, the U.S. Nuclear Regulatory Commission (NRC), an agency of the U.S. Government, pursuant to the Atomic Energy Act of 1954, as amended, and the Energy Reorganization Act of 1974, has promulgated regulations in Title 10, Chapter I of the Code of Federal Regulations, Part [30, 40, 70, or 72]. These regulations, applicable to the Grantor, require that a holder of, or an applicant for a material license issued pursuant to 10 CFR Part [30, 40, 70, or 72] provide assurance that funds will be available when needed for required decommissioning activities.

WHEREAS, the Grantor has elected to use a trust fund to provide [insert "all" or "part"] of such financial assurance for the facilities identified herein;

WHEREAS, the Grantor, acting through its duly authorized officers, has selected the Trustee to be the trustee under this Agreement, and the Trustee is willing to act as trustee,

NOW, THEREFORE, the Grantor and the Trustee agree as follows:

#### Section 1. Definitions. As used in this Agreement:

- (a) The term "Grantor" means the NRC licensee who enters into this Agreement and any successors or assigns of the Grantor.
- (b) The term "Trustee" means the trustee who enters into this Agreement and any successor Trustee.

Section 2. Costs of Decommissioning. This Agreement pertains to the costs of decommissioning the materials and activities identified in License Number [insert license number] issued pursuant to 10 CFR Part [30, 40, 70, or 72] as shown in Schedule A (see Schedule A following Standby Trust Agreement).

Section 3. Establishment of Fund. The Grantor and the Trustee hereby establish a trust fund (the Fund) for the benefit of [insert NRC or the name of the State agency]. The Grantor and the Trustee intend that no third party shall have access to the Fund except as provided herein.

Section 4. Payments Constituting the Fund. Payments made to the Trustee for the Fund shall consist of cash, securities, or other liquid assets acceptable to the Trustee. The Fund is established initially as consisting of the property, which is acceptable to the Trustee, described in Schedule B (see Schedule B following Standby Trust Agreement) attached hereto. Such property and any other property subsequently transferred to the Trustee are referred to

#### 4.3.1 Trust Fund Agreement (Continued)

as the "Fund," together with all earnings and profits thereon, less any payments or distributions made by the Trustee pursuant to this Agreement. The Fund shall be held by the Trustee, IN TRUST, as hereinafter provided. The Trustee shall not be responsible nor shall it undertake any responsibility for the amount of, or adequacy of the Fund, nor any duty to collect from the Grantor, any payments necessary to discharge any liabilities of the Grantor established by the NRC.

Section 5. Payment for Required Activities Specified in the Plan. The Trustee shall make payments from the Fund to the Grantor upon presentation to the Trustee of the following:

- a. A certificate duly executed by the Secretary of the Depositor attesting to the occurrence of the events, and in the form set forth in the attached Specimen Certificate (see sample certificate in Section 4.3.2.1 following standby trust), and
- b. A certificate attesting to the following conditions;
  - (1) that decommissioning is proceeding pursuant to an NRC-approved plan.
  - (2) that the funds withdrawn will be expended for activities undertaken pursuant to that Plan, and
  - (3) that the NRC has been given 30 days' prior notice of [insert name of licensee]'s intent to withdraw funds from the escrow fund.

No withdrawal from the fund can exceed \_\_\_\_ percent of the outstanding balance of the Fund or \_\_\_\_\_ dollars, whichever is greater, unless NRC approval is attached.

In the event of the Grantor's default or inability to direct decommissioning activities, the Trustee shall make payments from the Fund as the NRC shall direct, in writing, to provide for the payment of the costs of required activities covered by this Agreement. The Trustee shall reimburse the Grantor or other persons as specified by the NRC, or State agency, from the Fund for expenditures for required activities in such amounts as the NRC, or State agency, shall direct in writing. In addition, the Trustee shall refund to the Grantor such amounts as the NRC specifies in writing. Upon refund, such funds shall no longer constitute part of the Fund as defined herein.

Section 6. Trust Management. The Trustee shall invest and reinvest the principal and income of the Fund and keep the Fund invested as a single fund, without distinction between principal and income, in accordance with general investment policies and guidelines which the Grantor may communicate in writing to the Trustee from time to time, subject, however, to the provisions of this section. In investing, reinvesting, exchanging, selling, and managing

#### 4.3.1 Trust Fund Agreement (Continued)

the Fund, the Trustee shall discharge its duties with respect to the Fund solely in the interest of the beneficiary and with the care, skill, prudence, and diligence under the circumstances then prevailing which persons of prudence, acting in a like capacity and familiar with such matters, would use in the conduct of an enterprise of a like character and with like aims; except that:

- (a) Securities or other obligations of the Grantor, or any other owner or operator of the facilities, or any of their affiliates as defined in the Investment Company Act of 1940, as amended (15 U.S.C. 80a-2(a)), shall not be acquired or held, unless they are securities or other obligations of the Federal or a State government;
- (b) The Trustee is authorized to invest the Fund in time or demand deposits of the Trustee, to the extent insured by an agency of the Federal government; and
- (c) For a reasonable time, not to exceed 60 days, the Trustee is authorized to hold uninvested cash, awaiting investment or distribution, without liability for the payment of interest thereon.

Section 7. Commingling and Investment. The Trustee is expressly authorized in its discretion:

- (a) To transfer from time to time any or all of the assets of the fund to any common, commingled, or collective trust fund created by the Trustee in which the Fund is eligible to participate, subject to all of the provisions thereof, to be commingled with the assets of other trusts participating therein; and
- (b) To purchase shares in any investment company registered under the Investment Company Act of 1940 (15 U.S.C. 80a-1 et seq.), including one that may be created, managed, underwritten, or to which investment advice is rendered, or the shares of which are sold by the Trustee. The Trustee may vote such shares in its discretion.

Section 8. Express Powers of Trustee. Without in any way limiting the powers and discretion conferred upon the Trustee by the other provisions of this Agreement or by law, the Trustee is expressly authorized and empowered:

- (a) To sell, exchange, convey, transfer, or otherwise dispose of any property held by it, by public or private sale, as necessary for prudent management of the Fund;
- (b) To make, execute, acknowledge, and deliver any and all documents of transfer and conveyance and any and all other instruments that may be necessary or appropriate to carry out the powers herein granted;
- (c) To register any securities held in the Fund in its own name, or in the name of a nominee, and to hold any security in bearer form or



#### 4.3.1 Trust Fund Agreement (Continued)

in book entry, or to combine certificates representing such securities with certificates of the same issue held by the Trustee in other fiduciary capacities, to reinvest interest payments and funds from matured and redeemed instruments, to file proper forms concerning securities held in the Fund in a timely fashion with appropriate government agencies, or to deposit or arrange for the deposit of such securities in a qualified central depository even though, when so deposited, such securities may be merged and held in bulk in the name of the nominee or such depository with other securities deposited therein by another person, or to deposit or arrange for the deposit of any securities issued by the U.S. Government, or any agency or instrumentality thereof, with a Federal Reserve bank, but the books and records of the Trustee shall at all times show that all such securities are part of the Fund;

- (d) To deposit any cash in the Fund in interest-bearing accounts maintained or savings certificates issued by the Trustee, in its separate corporate capacity, or in any other banking institution affiliated with the Trustee, to the extent insured by an agency of the Federal government; and
- (e) To compromise or otherwise adjust all claims in favor of or against the Fund.

Section 9. Taxes and Expenses. All taxes of any kind that may be assessed or levied against or in respect of the Fund and all brokerage commissions incurred by the Fund shall be paid from the Fund. All other expenses incurred by the Trustee in connection with the administration of this Trust, including fees for legal services rendered to the Trustee, the compensation of the Trustee to the extent not paid directly by the Grantor, and all other proper charges and disbursements of the Trustee shall be paid from the Fund.

Section 10. Annual Valuation. After payment has been made into this trust fund, the Trustee shall annually, at least 30 days before the anniversary date of receipt of payment into the trust fund, furnish to the Grantor and to the NRC a statement confirming the value of the Trust. Any securities in the Fund shall be valued at market value as of no more than 60 days before the anniversary date of the establishment of the Fund. The failure of the Grantor to object in writing to the Trustee within 90 days after the statement has been furnished to the Grantor and the NRC, or State agency, shall constitute a conclusively binding assent by the Grantor, barring the grantor from asserting any claim or liability against the Trustee with respect to the matters disclosed in the statement.

Section 11. Advice of Counsel. The Trustee may from time to time consult with counsel with respect to any question arising as to the construction of this Agreement or any action to be taken hereunder. The Trustee shall be fully protected, to the extent permitted by law, in acting on the advice of counsel.

#### 4.3.1 Trust Fund Agreement (Continued)

Section 12. Trustee Compensation. The Trustee shall be entitled to reasonable compensation for its services as agreed upon in writing with the Grantor. (See Schedule C in Section 4.3.3 following Standby Trust.)

Section 13. Successor Trustee. Upon 90 days notice to the [insert NRC or State agency], the Trustee may resign; upon 90 days notice to [insert NRC or State agency] and the Trustee, the Grantor may replace the Trustee; but such resignation or replacement shall not be effective until the Grantor has appointed a successor Trustee and this successor accepts the appointment. The successor Trustee shall have the same powers and duties as those conferred upon the Trustee hereunder. Upon the successor Trustee's acceptance of the appointment, the Trustee shall assign, transfer, and pay over to the successor Trustee the funds and properties then constituting the Fund. If for any reason the Grantor cannot or does not act in the event of the resignation of the Trustee, the Trustee may apply to a court of competent jurisdiction for the appointment of a successor Trustee or for instructions. The successor Trustee shall specify the date on which it assumes administration of the trust in a writing sent to the Grantor, the NRC or State agency, and the present Trustee by certified mail 10 days before such change becomes effective. Any expenses incurred by the Trustee as a result of any of the acts contemplated by this section shall be paid as provided in Section 9.

Section 14. Instructions to the Trustee. All orders, requests, and instructions by the Grantor to the Trustee shall be in writing, signed by such persons as are signatories to this agreement or such other designees as the Grantor may designate in writing. The Trustee shall be fully protected in acting without inquiry in accordance with the Grantor's orders, requests, and instructions. If the NRC or State agency issues orders, requests, or instructions to the Trustee these shall be in writing, signed by the NRC, State agency, or their designees, and the Trustee shall act and shall be fully protected in acting in accordance with such orders, requests, and instructions. The Trustee shall have the right to assume, in the absence of written notice to the contrary, that no event constituting a change or a termination of the authority of any person to act on behalf of the Grantor, the NRC, or State agency, hereunder has occurred. The Trustee shall have no duty to act in the absence of such orders, requests, and instructions from the Grantor and/or the NRC, or State agency, except as provided for herein.

Section 15. Amendment of Agreement. This Agreement may be amended by an instrument in writing executed by the Grantor and the Trustee. All amendments shall meet the relevant regulatory requirements of the NRC.

Section 16. Irrevocability and Termination. Subject to the right of the parties to amend this Agreement as provided in Section 15, this trust shall be irrevocable and shall continue until terminated at the written agreement of the Grantor, the Trustee, and the NRC or State agency, or by the Trustee and the NRC or State agency, if the Grantor ceases to exist. Upon termination of the trust, all remaining trust property, less final trust administration expenses, shall be delivered to the Grantor or its successor.

Section 17. Immunity and Indemnification. The Trustee shall not incur personal liability of any nature in connection with any act or omission, made

#### 4.3.1 Trust Fund Agreement (Continued)

in good faith, in the administration of this trust, or in carrying out any directions by the Grantor, the NRC, or State agency, issued in accordance with this Agreement. The Trustee shall be indemnified and saved harmless by the Grantor or from the trust fund, or both, from and against any personal liability to which the Trustee may be subjected by reason of any act or conduct in its official capacity, including all expenses reasonably incurred in its defense in the event the Grantor fails to provide such defense.

Section 18. This Agreement shall be administered, construed, and enforced according to the laws of the State of [insert name of State].

Section 19. Interpretation and Severability. As used in this Agreement, words in the singular include the plural and words in the plural include the singular. The descriptive headings for each section of this Agreement shall not affect the interpretation or the legal efficacy of this Agreement. If any part of this agreement is invalid, it shall not affect the remaining provisions which will remain valid and enforceable.

IN WITNESS WHEREOF the parties have caused this Agreement to be executed by the respective officers duly authorized and the incorporate seals to be hereunto affixed and attested as of the date first written above.

ATTEST:

[Insert name of licensee (Grantor)]  
[Signature of representative  
of Grantor]  
[Title]

[Title]  
[Seal]

[Insert name of Trustee]  
[Signature of representative  
of Trustee]  
[Title]

ATTEST:

[Title]  
[Seal]

#### 4.3.2 Standby Trust Agreement

### STANDBY TRUST AGREEMENT

TRUST AGREEMENT, the Agreement entered into as of [date] by and between [name of NRC licensee], a [name of State] [insert "corporation," "partnership," "association," or "proprietorship"], herein referred to as the "Grantor," and [name and address of a national bank or other Trustee acceptable to the Commission or State regulatory agency], the "Trustee."

WHEREAS, the U.S. Nuclear Regulatory Commission (NRC), an agency of the U.S. Government, pursuant to the Atomic Energy Act of 1954, as amended, and the Energy Reorganization Act of 1974, has promulgated regulations in Title 10, Chapter I of the Code of Federal Regulations, Part [30, 40, 70, or 72]. These regulations, applicable to the Grantor, require that a holder of, or an applicant for, a Part 30, 40, 70, or 72 license provide assurance that funds will be available when needed for required decommissioning activities.

WHEREAS, the Grantor has elected to use a [insert "letter of credit," "line of credit," "surety bond," "insurance policy," "parent guarantee," "certificate of deposit," or "deposit of government securities"] to provide [insert "all" or "part"] of such financial assurance for the facilities identified herein; and

WHEREAS, when payment is made under a [insert "letter of credit," "line of credit," "surety bond," "insurance policy," "certificate(s) of deposit," "deposit of government securities," or "parent guarantee"], this standby trust shall be used for the receipt of such payment; and

WHEREAS, the Grantor, acting through its duly authorized officers, has selected the Trustee to be the trustee under this Agreement, and the Trustee is willing to act as trustee,

NOW, THEREFORE, the Grantor and the Trustee agree as follows:

#### Section 1. Definitions. As used in this Agreement:

- (a) The term "Grantor" means the NRC licensee who enters into this Agreement and any successors or assigns of the Grantor.
- (b) The term "Trustee" means the trustee who enters into this Agreement and any successor Trustee.

Section 2. Costs of Decommissioning. This Agreement pertains to the costs of decommissioning the materials and activities identified in License Number [insert license number] issued pursuant to 10 CFR Part [30, 40, 70, or 72] as shown in Schedule A.

Section 3. Establishment of Fund. The Grantor and the Trustee hereby establish a standby trust fund (the Fund) for the benefit of the NRC. The Grantor and the Trustee intend that no third party have access to the Fund except as provided herein.

#### 4.3.2 Standby Trust Agreement (Continued)

Section 4. Payments Constituting the Fund. Payments made to the Trustee for the Fund shall consist of cash, securities, or other liquid assets acceptable to the Trustee. The Fund is established initially as consisting of the property, which is acceptable to the Trustee, described in Schedule B attached hereto. Such property and any other property subsequently transferred to the Trustee are referred to as the "Fund," together with all earnings and profits thereon, less any payments or distributions made by the Trustee pursuant to this Agreement. The Fund shall be held by the Trustee, IN TRUST, as hereinafter provided. The Trustee shall not be responsible nor shall it undertake any responsibility for the amount of, or adequacy of the Fund, nor any duty to collect from the Grantor, any payments necessary to discharge any liabilities of the Grantor established by the NRC.

Section 5. Payment for Required Activities Specified in the Plan. The Trustee shall make payments from the Fund to the Grantor upon presentation to the Trustee of the following:

- a. A certificate duly executed by the Secretary of the Depositor attesting to the occurrence of the events, and in the form set forth in the attached Specimen Certificate, and
- b. A certificate attesting to the following conditions;
  - (1) that decommissioning is proceeding pursuant to an NRC-approved plan.
  - (2) that the funds withdrawn will be expended for activities undertaken pursuant to that Plan, and
  - (3) that the NRC has been given 30 days' prior notice of [insert name of licensee]'s intent to withdraw funds from the escrow fund.

No withdrawal from the fund can exceed \_\_\_\_ percent of the outstanding balance of the Fund or \_\_\_\_\_ dollars, whichever is greater, unless NRC approval is attached.

In the event of the Grantor's default or inability to direct decommissioning activities, the Trustee shall make payments from the Fund as the NRC shall direct, in writing, to provide for the payment of the costs of required activities covered by this Agreement. The Trustee shall reimburse the Grantor or other persons as specified by the NRC, or State agency, from the Fund for expenditures for required activities in such amounts as the NRC, or State agency, shall direct in writing. In addition, the Trustee shall refund to the Grantor such amounts as the NRC specifies in writing. Upon refund, such funds shall no longer constitute part of the Fund as defined herein.

Section 6. Trust Management. The Trustee shall invest and reinvest the principal and income of the Fund and keep the Fund invested as a single fund,

#### 4.3.2 Standby Trust Agreement (Continued)

without distinction between principal and income, in accordance with general investment policies and guidelines which the Grantor may communicate in writing to the Trustee from time to time, subject, however, to the provisions of this section. In investing, reinvesting, exchanging, selling, and managing the Fund, the Trustee shall discharge its duties with respect to the Fund solely in the interest of the beneficiary and with the care, skill, prudence, and diligence under the circumstances then prevailing which persons of prudence, acting in a like capacity and familiar with such matters, would use in the conduct of an enterprise of a like character and with like aims; except that:

- (a) Securities or other obligations of the Grantor, or any other owner or operator of the facilities, or any of their affiliates as defined in the Investment Company Act of 1940, as amended (15 U.S.C. 80a-2(a)), shall not be acquired or held, unless they are securities or other obligations of the Federal or a State government;
- (b) The Trustee is authorized to invest the Fund in time or demand deposits of the Trustee, to the extent insured by an agency of the Federal Government, and in obligations of the Federal Government such as GNMA, FNMA, and FHLB bonds and certificates or State and Municipal bonds rated BBB or higher by Standard and Poors or Baa or higher by Moody's Investment Services; and
- (c) For a reasonable time, not to exceed 60 days, the Trustee is authorized to hold uninvested cash, awaiting investment or distribution, without liability for the payment of interest thereon.

Section 7. Commingling and Investment. The Trustee is expressly authorized in its discretion:

- (a) To transfer from time to time any or all of the assets of the fund to any common, commingled, or collective trust fund created by the Trustee in which the Fund is eligible to participate, subject to all of the provisions thereof, to be commingled with the assets of other trusts participating therein; and
- (b) To purchase shares in any investment company registered under the Investment Company Act of 1940 (15 U.S.C. 80a-1 et seq.), including one that may be created, managed, underwritten, or to which investment advice is rendered, or the shares of which are sold by the Trustee. The Trustee may vote such shares in its discretion.

Section 8. Express Powers of Trustee. Without in any way limiting the powers and discretion conferred upon the Trustee by the other provisions of this Agreement or by law, the Trustee is expressly authorized and empowered:

- (a) To sell, exchange, convey, transfer, or otherwise dispose of any property held by it, by public or private sale, as necessary to allow duly authorized withdrawals at the joint request of the Grantor and the NRC or to reinvest in securities at the direction of the Grantor;

#### 4.3.2 Standby Trust Agreement (Continued)

- (b) To make, execute, acknowledge, and deliver any and all documents of transfer and conveyance and any and all other instruments that may be necessary or appropriate to carry out the powers herein granted;
- (c) To register any securities held in the Fund in its own name, or in the name of a nominee, and to hold any security in bearer form or in book entry, or to combine certificates representing such securities with certificates of the same issue held by the Trustee in other fiduciary capacities, to reinvest interest payments and funds from matured and redeemed instruments, to file proper forms concerning securities held in the Fund in a timely fashion with appropriate government agencies, or to deposit or arrange for the deposit of such securities in a qualified central depository even though, when so deposited, such securities may be merged and held in bulk in the name of the nominee or such depository with other securities deposited therein by another person, or to deposit or arrange for the deposit of any securities issued by the U.S. Government, or any agency or instrumentality thereof, with a Federal Reserve bank, but the books and records of the Trustee shall at all times show that all such securities are part of the Fund;
- (d) To deposit any cash in the Fund in interest-bearing accounts maintained or savings certificates issued by the Trustee, in its separate corporate capacity, or in any other banking institution affiliated with the Trustee, to the extent insured by an agency of the Federal government; and
- (e) To compromise or otherwise adjust all claims in favor of or against the Fund.

Section 9. Taxes and Expenses. All taxes of any kind that may be assessed or levied against or in respect of the Fund and all brokerage commissions incurred by the Fund shall be paid from the Fund. All other expenses incurred by the Trustee in connection with the administration of this Trust, including fees for legal services rendered to the Trustee, the compensation of the Trustee to the extent not paid directly by the Grantor, and all other proper charges and disbursements of the Trustee shall be paid from the Fund.

Section 10. Annual Valuation. After payment has been made into this standby trust fund, the Trustee shall annually, at least 30 days before the anniversary date of receipt of payment into the standby trust fund, furnish to the Grantor and to the NRC a statement confirming the value of the Trust. Any securities in the Fund shall be valued at market value as of no more than 60 days before the anniversary date of the establishment of the Fund. The failure of the Grantor to object in writing to the Trustee within 90 days after the statement has been furnished to the Grantor and the NRC, or State agency, shall constitute a conclusively binding assent by the Grantor, barring the grantor from asserting any claim or liability against the Trustee with respect to the matters disclosed in the statement.

Section 11. Advice of Counsel. The Trustee may from time to time consult with counsel with respect to any question arising as to the construction of this Agreement or any action to be taken hereunder. The Trustee shall be fully protected, to the extent permitted by law, in acting on the advice of counsel.

#### 4.3.2 Standby Trust Agreement (Continued)

Section 12. Trustee Compensation. The Trustee shall be entitled to reasonable compensation for its services as agreed upon in writing with the Grantor. (See Schedule C.)

Section 13. Successor Trustee. Upon 90 days notice to the [insert NRC or State agency], the Trustee may resign; upon 90 days notice to [insert NRC or State agency] and the Trustee, the Grantor may replace the Trustee; but such resignation or replacement shall not be effective until the Grantor has appointed a successor Trustee and this successor accepts the appointment. The successor Trustee shall have the same powers and duties as those conferred upon the Trustee hereunder. Upon the successor Trustee's acceptance of the appointment, the Trustee shall assign, transfer, and pay over to the successor Trustee the funds and properties then constituting the Fund. If for any reason the Grantor cannot or does not act in the event of the resignation of the Trustee, the Trustee may apply to a court of competent jurisdiction for the appointment of a successor Trustee or for instructions. The successor Trustee shall specify the date on which it assumes administration of the trust in a writing sent to the Grantor, the NRC or State agency, and the present Trustee by certified mail 10 days before such change becomes effective. Any expenses incurred by the Trustee as a result of any of the acts contemplated by this section shall be paid as provided in Section 9.

Section 14. Instructions to the Trustee. All orders, requests, and instructions by the Grantor to the Trustee shall be in writing, signed by such persons as are signatories to this agreement or such other designees as the Grantor may designate in writing. The Trustee shall be fully protected in acting without inquiry in accordance with the grantor's orders, requests, and instructions. If the NRC or State agency issues orders, requests, or instructions to the Trustee these shall be in writing, signed by the NRC, or State agency, or their designees, and the Trustee shall act and shall be fully protected in acting in accordance with such orders, requests, and instructions. The Trustee shall have the right to assume, in the absence of written notice to the contrary, that no event constituting a change or a termination of the authority of any person to act on behalf of the Grantor, the NRC, or State agency, hereunder has occurred. The Trustee shall have no duty to act in the absence of such orders, requests, and instruction from the Grantor and/or the NRC, or State agency, except as provided for herein.

Section 15. Amendment of Agreement. This Agreement may be amended by an instrument in writing executed by the Grantor, the Trustee and the NRC, or State agency, or by the Trustee and the NRC or State Agency, if the Grantor ceases to exist.

Section 16. Irrevocability and Termination. Subject to the right of the parties to amend this Agreement as provided in Section 15, this trust shall be irrevocable and shall continue until terminated at the written agreement of the Grantor, the Trustee, and the NRC or State agency, or by the Trustee and the NRC or State agency, if the Grantor ceases to exist. Upon termination of the trust, all remaining trust property, less final trust administration expenses, shall be delivered to the Grantor or its successor.



#### 4.3.2 Standby Trust Agreement (Continued)

Section 17. Immunity and Indemnification. The Trustee shall not incur personal liability of any nature in connection with any act or omission, made in good faith, in the administration of this trust, or in carrying out any directions by the Grantor, the NRC, or State agency, issued in accordance with this Agreement. The Trustee shall be indemnified and saved harmless by the Grantor or from the trust fund, or both, from and against any personal liability to which the Trustee may be subjected by reason of any act or conduct in its official capacity, including all expenses reasonably incurred in its defense in the event the Grantor fails to provide such defense.

Section 18. This Agreement shall be administered, construed, and enforced according to the laws of the State of [insert name of State].

Section 19. Interpretation and Severability. As used in this Agreement, words in the singular include the plural and words in the plural include the singular. The descriptive headings for each section of this Agreement shall not affect the interpretation or the legal efficacy of this Agreement. If any part of this agreement is invalid, it shall not affect the remaining provisions which will remain valid and enforceable.

IN WITNESS WHEREOF the parties have caused this Agreement to be executed by the respective officers duly authorized and the incorporate seals to be hereunto affixed and attested as of the date first written above.

ATTEST:

[Insert name of licensee (Grantor)]  
[Signature of representative  
of Grantor]  
[Title]

[Title]  
[Seal]

[Insert name of Trustee]  
[Signature of representative  
of Trustee]  
[Title]

ATTEST:

[Title]  
[Seal]

4.3.2.1 Specimen Certificate of Events

[Insert name and address of trustee]

Attention: Trust Division

Gentlemen:

In accordance with the terms of the Agreement with you dated \_\_\_\_\_, I, \_\_\_\_\_, Secretary of [insert name of licensee], hereby certify that the following events have occurred:

1. [Insert name of licensee] is required to commence the decommissioning of its facility located at [insert location of facility] (hereinafter called the decommissioning).
2. The plans and procedures for the commencement and conduct of the decommissioning have been approved by the United States Nuclear Regulatory Commission, or its successor, on \_\_\_\_\_ (copy of approval attached).
3. The Board of Directors of [insert name of licensee] has adopted the attached resolution authorizing the commencement of the decommissioning.

\_\_\_\_\_  
Secretary of [insert name of licensee]

\_\_\_\_\_  
Date

#### 4.3.2.2 Certificate of Resolution

I, \_\_\_\_\_, do hereby certify that I am Secretary of [insert name of licensee], a [insert state of incorporation] corporation, and that the resolution listed below was duly adopted at a meeting of this Corporation's Board of Directors on \_\_\_\_\_, 19\_\_.

IN WITNESS WHEREOF, I have hereunto signed my name and affixed the seal of this Corporation this \_\_\_\_ day of \_\_\_\_\_, 19\_\_.

\_\_\_\_\_  
Secretary

RESOLVED, that this Board of Directors hereby authorizes the President, or such other employee of the Company as he may designate, to commence decommissioning activities at [insert name of facility] in accordance with the terms and conditions described to this Board of Directors at this meeting and with such other terms and conditions as the President shall approve with and upon the advice of Counsel.

#### 4.3.3 Sample Trust Agreement Schedules

### TRUST AGREEMENT SCHEDULE

#### SAMPLE SCHEDULE A

This Agreement demonstrates financial assurance for the following cost estimates for the following licensed activities:

<u>U.S. NUCLEAR REGULATORY COMMISSION LICENSE NUMBER</u>	<u>NAME AND ADDRESS OF LICENSEE</u>	<u>ADDRESS OF LICENSED ACTIVITY</u>	<u>COST ESTIMATES FOR REGULATORY ASSURANCES DEMONSTRATED BY THIS AGREEMENT</u>
--	---	---	--

The cost estimates listed here were last adjusted and approved by the NRC on [date].

#### SAMPLE SCHEDULE B

AMOUNT \_\_\_\_\_

AS EVIDENCED BY \_\_\_\_\_

#### SAMPLE SCHEDULE C

\_\_\_\_\_, Trustee's fees shall be \$ \_\_\_\_\_.

4.3.4 Sample of Acknowledgement

ACKNOWLEDGEMENT

[The following is an example of the acknowledgement that must accompany the trust agreement for a standby trust fund or trust fund.]

STATE OF \_\_\_\_\_

To Wit: \_\_\_\_\_

CITY OF \_\_\_\_\_

On this \_\_\_\_\_ day of \_\_\_\_\_, before me, a notary public in and for the city and State aforesaid, personally appeared \_\_\_\_\_, and she/he did depose and say that she/he is the [title], of [ \_\_\_\_\_ ], national banking association, Trustee, which executed the above instrument, that she/he knows the seal of said association; that the seal affixed to such instrument is such corporate seal; that it was so affixed by order of the association; and that she/he signed her/his name thereto by like order.

\_\_\_\_\_  
[Signature of notary  
public]

My Commission Expires: \_\_\_\_\_

[Date]

#### 4.4 FORMS REQUIRED FOR GOVERNMENT SECURITIES TRANSACTIONS

One or more of the following special forms may be required by the Bureau of the Public Debt for various actions concerning U.S. Treasury securities, depending on the type of security and action being taken.

<u>Form</u>	<u>Title and Purpose</u>
PD-345.	Description of Registered Securities. Used to change the address of the owner of registered Treasury (T) notes and bonds.
PD 1001.	Power of Attorney by Individual Authorizing Disposition of Registered Transferable Securities. Used to show that an individual has appointed another as his attorney-in-fact to act on his behalf.
PD-1003.	Power of Attorney by Corporation or Unincorporated Association Authorizing Disposition of Registered Transferable Securities. Used to show that a corporation or unincorporated association has appointed someone other than one of its officers as its attorney-in-fact to act on its behalf.
PD 1006.	Specific Power of Substitution Under Power of Attorney Granted to an Individual to Dispose of Registered Securities. Used as power of substitution to show that a corporation acting under power of attorney has appointed a substitute to act on its behalf.
PD 1010.	Resolution by Governing Body of an Organization Authorizing Assignment and Disposition of Specified Securities Owned in Its Own Right or in a Fiduciary Capacity. Used to authorize certain officers of an organization to act on its behalf.
PD 1014.	Certificate of Incumbency of Officers (Corporation or unincorporated association). Used to certify the incumbency of holders of the various offices of either a corporation or unincorporated association.
PD 1071.	Certificates of Ownership of United States Bearer Securities. Used to substantiate ownership of bearer Treasury securities when requesting payment of principal after (a) three months past maturity on T notes of less than seven years or (b) six months past maturity on T notes and bonds of more than seven years.
PD 1832.	Special Form of Detached Assignment for United States Registered Securities. Used to transfer registration of Treasury securities.

#### 4.4 Forms Required for Government Securities Transactions (Continued)

- PD 2446. Certificate of Incumbency for Fiduciaries. Used to certify the incumbency of the fiduciaries of any trust estate, public or private committee, or other body not appointed by the court and designated by name in the registration of registered Treasury Securities.
- PD 3095. Request for Securities Transaction. Used to redeem, exchange registered securities for coupon issues, or exchange coupon securities for registered issues.
- PD 4632-1. Tender for Treasury Bills in Book-Entry Form at the Department of the Treasury (52-week bills). Used to purchase 52-week T bills at public auction.
- PD 4632-2. Tender for Treasury Bills in Book-Entry Form at the Department of the Treasury (26-week bills). Used to purchase 26-week T bills at public auction.
- PD 4632-3. Tender for Treasury Bills in Book-Entry Form at the Department of the Treasury (13-week bills). Used to purchase 13-week T bills at public auction.
- PD 4633. Request for Transactions in Book-Entry Treasury Bills Maintained by the Bureau of the Public Debt.
- PD 4633-1. Request for Reinvestment of Book-Entry Treasury Bills. Used to request reinvestment of either 13-, 26-, or 52-week book-entry T bills.
- PD 4633-2. Request for Reinvestment of Book-Entry Treasury Bills (IBM card). Same use as Form PD 4633-1.
- PD 4989. Statement of Account for Treasury Bills. Used to describe book-entry T bill account.

4.5 RECOMMENDED WORDING FOR PAYMENT SURETY BOND

PAYMENT SURETY BOND

Date bond executed: \_\_\_\_\_

Effective date: \_\_\_\_\_

Principal: [legal name and business address of licensee or applicant]

Type of organization: [insert "proprietorship," "joint venture,"  
"partnership" or "corporation"]

State of incorporation: \_\_\_\_\_ (if applicable)

NRC license number, name and address of facility, and amount(s) for  
decommissioning activity guaranteed by this bond: \_\_\_\_\_

Surety(ies) [name(s) and business address(es)]

Type of organization: [insert "proprietorship," "joint venture,"  
"partnership" or "corporation"]

State of incorporation: \_\_\_\_\_ (if applicable)

Surety's qualification in jurisdiction where licensed facility(ies) is (are  
located).

Surety's bond number: \_\_\_\_\_

Total penal sum of bond: \$ \_\_\_\_\_

Know all persons by these presents, That we, the Principal and Surety(ies) hereto, are firmly bound to the [insert U.S. Nuclear Regulatory Commission (hereinafter called NRC), or the name of the State agency] in the above penal sum for the payment of which we bind ourselves, our heirs, executors, administrators, successors, and assigns jointly and severally; provided that, where the Sureties are corporations acting as co-sureties, we, the Sureties, bind ourselves in such sum "jointly and severally" only for the purpose of allowing a joint action or actions against any or all of us, and for all other purposes each Surety binds itself, jointly and severally with the Principal, for the payment of such sum only as is set forth opposite the name of such Surety; but if no limit of liability is indicated, the limit of liability shall be the full amount of the penal sum.

WHEREAS, the U.S. Nuclear Regulatory Commission, an agency of the U.S. Government, pursuant to the Atomic Energy Act of 1954, as amended, and the Energy Reorganization Act of 1974, has promulgated regulations in Title 10, Chapter I of the Code of Federal Regulations, Part [30, 40, 70, or 72], applicable to the Principal, which require that a license holder or an



#### 4.5 Payment Surety Bond (Continued)

applicant for a facility license provide financial assurance that funds will be available when needed for facility decommissioning;

NOW, THEREFORE, the conditions of the obligation are such that if the Principal shall faithfully, before the beginning of decommissioning of each facility identified above, fund the standby trust fund in the amount(s) identified above for the facility;

Or, if the Principal shall fund the standby trust fund in such amount(s) after an order to begin facility decommissioning is issued by [insert "the NRC" or the name of the State agency] or a U.S. district court or other court of competent jurisdiction;

Or, if the Principal shall provide alternative financial assurance and obtain the written approval of the [insert "NRC" or the name of the State agency] of such assurance, within 30 days after the date a notice of cancellation from the Surety(ies) is received by both the Principal and the [insert "NRC" or the name of the State agency], then this obligation shall be null and void; otherwise it is to remain in full force and effect.

The Surety(ies) shall become liable on this bond obligation only when the Principal has failed to fulfill the conditions described above. Upon notification by the [insert "NRC" or the name of the State agency] that the Principal has failed to perform as guaranteed by this bond, the Surety(ies) shall place funds in the amount guaranteed for the facility(ies) into the standby trust fund.

The liability of the Surety(ies) shall not be discharged by any payment or succession of payments hereunder, unless and until such payment or payments shall amount in the aggregate to the penal sum of the bond, but in no event shall the obligation of the Surety(ies) hereunder exceed the amount of said penal sum.

The Surety(ies) may cancel the bond by sending notice of cancellation by certified mail to the Principal and to the [insert "NRC" or the name of the State agency] provided, however, that cancellation shall not occur during the 90 days beginning on the date of receipt of the notice of cancellation by both the Principal and the [insert "NRC" or the name of the State agency], as evidenced by the return receipts.

The Principal may terminate this bond by sending written notice to the [insert "NRC" or name of State agency] and to Surety(ies) 90 days prior to the proposed date of termination, provided, however, that no such notice shall become effective until the Surety(ies) receive(s) written authorization for termination of the bond from the [insert "NRC" or the name of the State agency].

The Principal and Surety(ies) hereby agree to adjust the penal sum of the bond yearly so that it guarantees a new amount, provided that the penal sum does not increase by more than 20 percent in any one year, and no decrease in the penal sum takes place without the written permission of the [insert "NRC" or the name of the State agency].

#### 4.5 Payment Surety Bond (Continued)

If any part of this agreement is invalid, it shall not affect the remaining provisions which will remain valid and enforceable.

In Witness Whereof, the Principal and Surety(ies) have executed this financial guarantee bond and have affixed their seals on the date set forth above.

The persons whose signatures appear below hereby certify that they are authorized to execute this surety bond on behalf of the Principal and Surety(ies).

Principal

[Signature(s)]

[Name(s)]

[Title(s)]

[Corporate seal]

Corporate Surety(ies)

[Name and address]

State of incorporation: \_\_\_\_\_

Liability limit: \$ \_\_\_\_\_

[Signature(s)]

[Name(s) and title(s)]

[Corporate seal]

[For every co-surety, provide signature(s), corporate seal, and other information in the same manner as for Surety(ies) above.]

Bond premium: \$ \_\_\_\_\_

#### 4.6 RECOMMENDED WORDING FOR IRREVOCABLE STANDBY LETTER OF CREDIT

##### IRREVOCABLE STANDBY LETTER OF CREDIT NO. [INSERT NO.]

This Credit Expires [insert date]

Issued To: [Insert U.S. Nuclear Regulatory Commission; Washington, DC 20555,  
or name and address of appropriate State agency.]

Dear Sir or Madam:

We hereby establish our Irrevocable Standby Letter of Credit No. \_\_\_\_\_ in your favor, at the request and for the account of [applicant's name and address] up to the aggregate amount of [in words], U. S. dollars \$ \_\_\_\_\_, available upon presentation of:

- (1) your sight draft, bearing reference to this Letter of Credit No. \_\_\_\_\_, and
- (2) your signed statement reading as follows: "I certify that the amount of the draft is payable pursuant to regulations issued under authority of \_\_\_\_\_."

This letter of credit is issued in accordance with regulations issued under the authority of the U.S. Nuclear Regulatory Commission (NRC), an agency of the U.S. Government, pursuant to the Atomic Energy Act of 1954, as amended, and the Energy Reorganization Act of 1974. The NRC has promulgated regulations in Title 10, Chapter I of the Code of Federal Regulations, Part [30, 40, 70, or 72], which require that a holder of, or an applicant for, a license issued under 10 CFR Parts [30, 40, 70, or 72] provide assurance that funds will be available when needed for decommissioning.

This letter of credit is effective as of [date] and shall expire on [date at least 1 year later], but such expiration date shall be automatically extended for a period of [at least 1 year] on [date] and on each successive expiration date, unless, at least 90 days before the current expiration date, we notify both you and [licensee's name], by certified mail, as shown on the signed return receipts. If [licensee's name] is unable to secure alternative financial assurance to replace this letter of credit within 30 days of notification of cancellation the NRC may draw upon the full value of this letter of credit prior to cancellation. The bank shall give immediate notice to the applicant and the [insert "NRC" or name of State agency] of any notice received or action filed alleging (1) the insolvency or bankruptcy of the financial institution or (2) any violations of regulatory requirements that could result in suspension or revocation of the bank's charter or license to do business. The financial institution also shall give immediate notice if the bank, for any reason, becomes unable to fulfill its obligation under the letter of credit.

#### 4.6 Irrevocable Standby Letter of Credit (Continued)

Whenever this letter of credit is drawn on under and in compliance with the terms of this letter of credit, we shall duly honor such draft upon its presentation to us within 30 days, and we shall deposit the amount of the draft directly into the standby trust fund of [licensee's name] in accordance with your instructions.

Each draft must bear on its face the clause: "Drawn under Letter of Credit No. \_\_\_\_\_, dated \_\_\_\_\_, and the total of this draft and all other drafts previously drawn under this letter of credit does not exceed [fill in amount]."

[Signature(s) and title(s) of official(s) of issuing institution]

[Date]

This credit is subject to [insert "the most recent edition of the Uniform Customs and Practice for Documentary Credits, published by the International Chamber of Commerce," or "the Uniform Commercial Code"].

4.7 RECOMMENDED WORDING FOR DOCUMENTS RECOMMENDED TO SUPPORT CORPORATE GUARANTEE

4.7.1 Recommended Wording for Letter from Chief Executive Officer of Applicant or Licensee, Certifying that Applicant or Licensee Is a Going Concern with Positive Tangible Net Worth

(Address to U. S. Nuclear Regulatory Commission or State regulatory agency)

I am the chief executive officer of [name and address of firm], a [insert "proprietorship," "joint venture," "partnership," or "corporation"]. This letter is in support of this firm's use of the financial test to demonstrate financial assurance, as specified in 10 CFR Part [30, 40, 70, or 72].

I hereby certify that [name of firm] is currently a going concern, and that it possesses positive tangible net worth in the amount of \_\_\_\_\_.

This firm [insert "is required" or "is not required"] to file a Form 10K with the U.S. Securities and Exchange Commission for the latest fiscal year. This fiscal year of this firm ends on [month, day].

I hereby certify that the content of this letter is true and correct to the best of my knowledge.

[Signature]

[Name]

[Title]

[Date]

4.7.2 Recommended Wording for Letter from Chief Financial Officer of Corporate Parent, Including Cost Estimates and Data from Audited Financial Statements

(Address to U. S. Nuclear Regulatory Commission or State regulatory agency)

I am the chief financial officer of [name and address of firm], a [insert "proprietorship," "joint venture," "partnership," or "corporation"]. This letter is in support of this firm's use of the financial test to demonstrate financial assurance, as specified in 10 CFR Part [30, 40, 70, or 72].

[Complete the following paragraph regarding facility(ies) and associated cost estimates or certified amounts. For each facility, include its license number, name, address, and current cost estimates for the specified activities.]

This firm guarantees, through the parent company guarantee submitted to demonstrate compliance under 10 CFR Part [30, 40, 70, or 72], the decommissioning of the following facility(ies) owned or operated by subsidiary(ies) of this firm. The current cost estimates or certified amounts for decommissioning, so guaranteed, are shown for each facility:

<u>Name of Facility</u>	<u>Location of Facility</u>	<u>Certified Amount or Current Cost Estimates</u>
-------------------------	-----------------------------	---

This firm [insert "is required" or "is not required"] to file a Form 10K with the U.S. Securities and Exchange Commission for the latest fiscal year.

This fiscal year of this firm ends on [month, day]. The figures for the following items marked with an asterisk are derived from this firm's independently audited, year-end financial statements and footnotes for the latest completed fiscal year, ended [date].

[Insert completed Alternative I or Alternative II.]

I hereby certify that the content of this letter is true and correct to the best of my knowledge.

[Signature]

[Name]

[Title]

[Date]

#### 4.7.3 Financial Test: Alternative I

1.	Decommissioning cost estimates or certified amounts for facility [insert license number] (total of all cost estimates or certified amounts shown in paragraphs above)	\$	_____
*2.	Total liabilities (if any portion of the cost estimates for decommissioning is included in total liabilities on your firm's financial statement, deduct the amount of that portion from this line and add that amount to lines 3 and 4)	\$	_____
*3.	Tangible net worth**	\$	_____
*4.	Net worth	\$	_____
*5.	Current assets	\$	_____
*6.	Current liabilities	\$	_____
*7.	Net working capital (line 5 minus line 6)	\$	_____
*8.	The sum of net income plus depreciation, depletion, and amortization	\$	_____
*9.	Total assets in United States (required only if less than 90 percent of firm's assets are located in the United States)	\$	_____
		<u>Yes</u>	<u>No</u>
10.	Is line 3 at least \$10 million?	_____	_____
11.	Is line 3 at least 6 times line 1?	_____	_____
12.	Is line 7 at least 6 times line 1?	_____	_____
13.	Are at least 90 percent of firm's assets located in the United States? If not, complete line 14.	_____	_____
14.	Is line 9 at least 6 times line 1? (Guarantor must meet two of the following three ratios)	_____	_____
15.	Is line 2 divided by line 4 less than 2.0?	_____	_____
16.	Is line 8 divided by line 2 greater than 0.1?	_____	_____
17.	Is line 5 divided by line 6 greater than 1.5?	_____	_____

\*Denotes figures derived from financial statements.

\*\*Tangible net worth is defined as net worth minus goodwill, patents, trademarks, and copyrights.

4.7.4 Financial Test: Alternative II

1. Decommissioning cost estimates or certified amounts for facility [insert license number] (total of all cost estimates or certified amounts shown in paragraphs above) \$ \_\_\_\_\_
  2. Current bond rating of most recent issuance of this firm and name of rating service \_\_\_\_\_ \$ \_\_\_\_\_
  3. Date of issuance of bond \_\_\_\_\_
  4. Date of maturity of bond \_\_\_\_\_
  - \*5. Tangible net worth\*\* (If any portion of estimates for decommissioning is included in total liabilities on your firm's financial statements, add the amount of that portion to this line.) \$ \_\_\_\_\_
  - \*6. Total assets in United States (required only if less than 90 percent of firm's assets are located in the United States) \$ \_\_\_\_\_
- |  | <u>Yes</u> | <u>No</u> |
|--|------------|-----------|
| 7. Is line 5 at least \$10 million?  | _____      | _____     |
| 8. Is line 5 at least 6 times line 1?  | _____      | _____     |
| *9. Are at least 90 percent of firm's assets located in the United States? If not, complete line 10. | _____      | _____     |
| 10. Is line 6 at least 6 times line 1?   | _____      | _____     |

---

\*Denotes figures derived from financial statements.

\*\*Tangible net worth is defined as net worth minus goodwill, patents, trademarks, and copyrights.



#### 4.7.5 Sample of Auditor's Special Report by Certified Public Accountant

##### CONFIRMATION OF CHIEF FINANCIAL OFFICER'S LETTER

We have examined the financial statements of [company name] for the year ended [date], and have issued our report thereon dated [date]. Our examination was made in accordance with generally accepted auditing standards and, accordingly, included such tests of the accounting records and such other auditing procedures as we considered necessary.

The [company name] has prepared documents to demonstrate its financial responsibility under the NRC's financial assurance regulations, 10 CFR Part [30, 40, 70, or 72]. This letter is furnished to assist the licensee [insert NRC license number and name] in complying with these regulations and should not be used for other purposes.

The attached schedule reconciles the specified information furnished in the chief financial officer's (CFO's) letter in response to the regulations with the company's financial statements. In connection therewith, we have

1. Confirmed that the amounts in the column "Per Financial Statements" agree with amounts contained in the company's financial statements for the year ended [date];
2. Confirmed that the amounts in the column "Per CFO's Letter" agree with the letter prepared in response to the NRC's request;
3. Confirmed that the amounts in the column "Reconciling Items" agree with analyses prepared by the company setting forth the indicated items; and
4. Recomputed the totals and percentages.

Because the procedures in 1-4 above do not constitute a full examination made in accordance with generally accepted auditing standards, we do not express an opinion on the manner in which the amounts were derived in the items referred to above. In connection with the procedures referred to above, no matters came to our attention that cause us to believe that the chief financial officer's letter and supporting information should be adjusted.

\_\_\_\_\_  
Signature

\_\_\_\_\_  
Date

4.7.5 Sample of Auditor's Special Report by Certified Public Accountant  
(Continued)

SAMPLE SCHEDULE RECONCILING AMOUNTS CONTAINED IN  
CHIEF FINANCIAL OFFICER'S LETTER WITH AMOUNTS IN FINANCIAL STATEMENTS

XYZ COMPANY

YEAR ENDED DECEMBER 31, 19XX

<u>Line Number</u> <u>in</u> <u>CFO's Letter</u>		<u>Per</u> <u>Financial</u> <u>Statements</u>	<u>Recon-</u> <u>ciling</u> <u>Items</u>	<u>Per</u> <u>CFO's</u> <u>Letter</u>
6	Total current liabilities	X		
	Long-term debt	X		
	Deferred income taxes	X		
		<u>XX</u>		
	Accrued decommissioning costs included in current liabilities		X	
	Total liabilities (less accrued decommissioning costs)			X
4	Net worth	XX		
	Less: Cost in excess of value of tangible assets acquired	X		
		<u>XX</u>		
	Accrued decommissioning costs included in current liabilities		X	
	Tangible net worth (plus decommissioning costs)			XX

(Balance of schedule is not illustrated.)

This illustrates the form of schedule that is contemplated. Details and reconciling items will differ in specific situations.

#### 4.7.6 Recommended Wording for Parent Company Guarantee

##### PARENT COMPANY GUARANTEE

Guarantee made this [date] by [name of guaranteeing entity], a [insert "proprietorship," "joint venture," "partnership," or "corporation"] organized under the laws of the State of [insert name of State], herein referred to as "guarantor," to the U.S. Nuclear Regulatory Commission (NRC), or State agency found acceptable to the NRC, [insert name of State agency], obligee, on behalf of our subsidiary [licensee] of [business address].

##### Recitals

1. The guarantor has full authority and capacity to enter into this guarantee [if guarantor is a corporation, add the following phrase "under its bylaws, articles of incorporation, and the laws of the State of [insert guarantor's state of incorporation], its State of incorporation."]. [If the guarantor has a Board of Directors, insert the following: "Guarantor has approval from its Board of Directors to enter into this guarantee."]
2. This guarantee is being issued to comply with regulations issued by the NRC, an agency of the U.S. Government, pursuant to the Atomic Energy Act of 1954, as amended, and the Energy Reorganization Act of 1974. NRC has promulgated regulations in Title 10, Chapter I of the Code of Federal Regulations, Part [insert 30, 40, 70, or 72] which require that a holder of, or an applicant for, a materials license issued pursuant to 10 CFR Part [30, 40, 70, or 72] provide assurance that funds will be available when needed for required decommissioning activities.
3. The guarantee is issued to provide financial assurance for decommissioning activities for [identify licensed facility(ies)] as required by 10 CFR Part [insert 30, 40, 70, or 72]. The decommissioning costs for which are as follows: [insert amount of decommissioning cost guaranteed for each identified facility].
4. The guarantor meets or exceeds the following financial test criteria [insert statement indicating which financial test is being used] and agrees to comply with all notification requirements as specified in 10 CFR Part [30, 40, 70, or 72].

The guarantor shall meet one of the following two financial tests:

- (a) (i) A current rating of its most recent bond issuance of AAA, AA, A or BBB as issued by Standard and Poor's, or Aaa, Aa, A or Baa as rated by Moody's; and
- (ii) Tangible net worth is at least \$10 million and at least six times the current decommissioning cost estimate (or prescribed amount if a certification is used); and

4.7.6 Parent Company Guarantee (Continued)

- (iii) Assets located in the United States amounting to at least 90 percent of its total assets or at least six times the current decommissioning cost (or prescribed amount if certification is used).

or

- (b) (i) Net working capital and tangible net worth each at least six times the current decommissioning cost estimates (or prescribed amount if certification is used); and
  - (ii) Assets located in the United States amounting to at least 90 percent of its total assets or at least six times the amount of the current decommissioning cost estimates (or prescribed amount if certification is used); and
  - (iii) Meets two of the following three ratios: a ratio of total liabilities to net worth less than 2.0; a ratio of the sum of net income plus depreciation, depletion, and amortization to total liabilities that is greater than 0.1; and a ratio of current assets to current liabilities that is greater than 1.5; and
  - (iv) Tangible net worth of at least \$10 million.
5. The guarantor has majority control of the voting stock for the following licensee(s) covered by this guarantee. [List for each licensee: name, address, the facility(ies) owned or operated by each licensee, and the corresponding license number(s).]
6. Decommissioning activities as used below refers to the activities required by 10 CFR Part [30, 40, 70, or 72] for decommissioning of facility(ies) identified above.
7. For value received from [licensees], [If the guarantor is a corporation, add "and pursuant to the authority conferred upon the guarantor by ("the unanimous resolution of its directors" or "the majority vote of its shareholders"), a certified copy of which is attached,"] the guarantor guarantees to the [insert "NRC" or the name of the State agency] that if the licensee fails to perform the required decommissioning activities, as required by License No. [insert license number], the guarantor shall
- (a) carry out the required activities, or
  - (b) set up a trust fund in favor of the above identified beneficiary in the amount of these current cost estimates for these activities.

#### 4.7.6 Parent Company Guarantee (Continued)

[If a State is the named beneficiary, the guarantee documentation should include written verification from the State agreeing to use the trust funds to carry out the required decommissioning activities for the named facility(ies).]

8. The guarantor agrees to submit revised financial statements, financial test data, and a special auditor's report and reconciling schedule annually within 90 days of the close of the parent guarantor's fiscal year.
9. The guarantor agrees that if, at the end of any fiscal year before termination of this guarantee, it fails to meet the financial test criteria, the licensee shall send within 90 days of the end of the fiscal year, by certified mail, notice to the [insert "NRC" or the name of the State agency] that the licensee intends to provide alternative financial assurance as specified in 10 CFR [Part 30, 40, 70, or 72]. Within 120 days after the end of the fiscal year, the guarantor shall establish such financial assurance if the [licensee] has not done so.
10. The guarantor also agrees to notify the beneficiary promptly if the ownership of the licensee or the parent firm is transferred and to maintain this guarantee until the new parent firm or the licensee provides alternative financial assurance acceptable to the beneficiary.
11. The guarantor agrees that within 30 days after it determines that it no longer meets the financial test criteria or it is disallowed from continuing as a guarantor for the facility under License No. [insert license number], it shall establish an alternative financial assurance as specified in 10 CFR Part 30, 40, 70, or 72 as applicable, in the name of [licensee] unless [licensee] has done so.
12. The guarantor as well as its successors and assigns agree to remain bound jointly and severally under this guarantee notwithstanding any or all of the following: amendment or modification of license or NRC-approved decommissioning funding plan for that facility, the extension or reduction of the time of performance of required activities, or any other modification or alteration of an obligation of the licensee pursuant to 10 CFR Part [30, 40, 70, or 72].
13. The guarantor agrees that all bound parties shall be jointly and severally liable for all litigation costs incurred by the beneficiary [insert name] in any successful effort to enforce the agreement against the guarantor.
14. The guarantor agrees to remain bound under this guarantee for as long as [licensee] must comply with the applicable financial assurance requirements of 10 CFR Part [30, 40, 70, or 72], for the previously listed facility(ies), except that the guarantor may cancel this guarantee by sending notice by

#### 4.7.6 Parent Company Guarantee (Continued)

certified mail to the [insert "NRC" or the name of the State agency] and to [licensee], such cancellation to become effective no earlier than 120 days after receipt of such notice by both the [insert "NRC" or the name of the State agency] and [licensee] as evidenced by the return receipts.

15. The guarantor agrees that if [licensee] fails to provide alternative financial assurance as specified in 10 CFR Part [30, 40, 70, or 72], as applicable, and obtain written approval of such assurance from the [insert "NRC" or the name of the State agency] within 90 days after a notice of cancellation by the guarantor is received by both the [insert "NRC" or the name of the State agency] and [licensee] from the guarantor, the guarantor shall provide such alternative financial assurance in the name of [licensee] or make full payment under the guarantee.
16. The guarantor expressly waives notice of acceptance of this guarantee by the [insert "NRC" or the name of the State agency] or by [licensee]. The guarantor also expressly waives notice of amendments or modification of the decommissioning requirements and of amendments or modifications of the license.
17. If the guarantor files financial reports with the U.S. Securities and Exchange Commission, then it shall promptly submit them to the [insert "NRC" or the name of the State agency] during each year in which this guarantee is in effect.

I hereby certify that this guarantee is true and correct to the best of my knowledge.

Effective date: \_\_\_\_\_

[Name of guarantor]

[Authorized signature for guarantor]

[Name of person signing]

[Title of person signing]

Signature of witness or notary: \_\_\_\_\_

## BIBLIOGRAPHY

Code of Federal Regulations, Title 10, "Energy," U.S. Government Printing Office, Washington, D.C., revised annually.

International Chamber of Commerce, Uniform Customs and Practice for Documentary Credits, Paris, France, 1983 (updated about every 8 years).

Lawyers' Cooperative Publishing Co., "Uniform Commercial Code," Rochester, NY, 1985, updated annually through 1987.

U.S. Department of the Treasury, Circular 570, "Companies Accepted on Federal Boards," Washington, D.C. 20220. Annually published in Federal Register, always in July.

U.S. Nuclear Regulatory Commission, "Standard Format and Content Guide for Financial Assurance Mechanisms Required for Decommissioning Under 10 CFR Parts 30, 40, 70, and 72," NUREG-1336, Revision 1, August 1989.

APPENDIX A  
CHECKLIST FOR DECOMMISSIONING FINANCIAL ASSURANCE

NAME OF LICENSEE OR APPLICANT \_\_\_\_\_

MAILING ADDRESS \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

**A. Licensee Part (check one of the following):**

\_\_\_\_\_ Part 30 Licensee or Applicant      \_\_\_\_\_ Part 70 Licensee or Applicant  
\_\_\_\_\_ Part 40 Licensee or Applicant      \_\_\_\_\_ Part 72 Licensee or Applicant

**B. Check appropriate item in each category (if applicable)**

1. \_\_\_\_\_ Date of Financial Assurance Submission
2. \_\_\_\_\_ Public Entity  
\_\_\_\_\_ Private Entity
3. \_\_\_\_\_ Certification of Financial Assurance  
\_\_\_\_\_ Decommissioning Funding Plan
4. (a) \_\_\_\_\_ Prepayment Option (See Appendix B)  
\_\_\_\_\_ Trust Fund  
\_\_\_\_\_ Escrow Account  
\_\_\_\_\_ Certificate of Deposit  
\_\_\_\_\_ Government Fund  
\_\_\_\_\_ Deposit of Government Securities  
  
(b) \_\_\_\_\_ Surety/Insurance/Other Guarantee (See Appendix C)  
\_\_\_\_\_ Surety bond  
\_\_\_\_\_ Letter of Credit  
\_\_\_\_\_ Line of Credit  
\_\_\_\_\_ Parent Company Guarantee/Financial Test\*  
  
(c) \_\_\_\_\_ External Sinking Fund, Sinking Account and Surety/  
Insurance (See Appendix D)  
\_\_\_\_\_ Trust Fund  
\_\_\_\_\_ Escrow Account  
\_\_\_\_\_ Certificate of Deposit  
\_\_\_\_\_ Government Fund  
\_\_\_\_\_ Deposit of Government Securities  
\_\_\_\_\_ Surety Bond  
\_\_\_\_\_ Letter of Credit  
\_\_\_\_\_ Line of Credit  
  
(d) \_\_\_\_\_ Statement of Intent (public entities only)

\*May not be used in combination with any other instrument.



APPENDIX B  
CHECKLIST FOR SUBMISSION OF PREPAYMENT

A. Check Appropriate Form of Prepayment

- ☐ Trust Fund
- ☐ Escrow Account
- ☐ Certificate(s) of Deposit
- ☐ Special Government Fund
- ☐ Deposit of Government Securities

B. Check Documents Submitted for Each Prepayment Mechanism

1. Trust Fund
  - ☐ Trust Agreement
  - ☐ Acknowledgement
2. Escrow Account
  - ☐ Escrow Agreement
3. Certificate(s) of Deposit
  - ☐ Certificate(s) of Deposit
  - ☐ Trust Agreement
  - ☐ Acknowledgement

or

  - ☐ Escrow Agreement\*
4. Special Government Fund
  - ☐ Written Verification

and either

  - ☐ Trust Agreement and
  - ☐ Acknowledgement

or

  - ☐ Escrow Agreement\*
5. Deposit of Government Securities
  - ☐ Verification of Approval of Securities

and either

  - ☐ Trust Agreement and
  - ☐ Acknowledgement

or

  - ☐ Escrow Agreement\*

\* With verification.

## APPENDIX C

### CHECKLIST FOR SUBMISSION OF SURETY/INSURANCE/PARENT COMPANY GUARANTEE

#### A. Check Appropriate Form of Surety/Insurance/Guarantee

- ☐ Surety Bond
- ☐ Letter of Credit
- ☐ Line of Credit
- ☐ Parent Company Guarantee/Financial Test\*
- ☐ Insurance

#### B. Check Documents Submitted for Surety/Insurance/Guarantee

1. Surety Bond
  - ☐ Surety Bond
  - ☐ Standby Trust Agreement
  - ☐ Acknowledgement
2. Letter of Credit
  - ☐ Letter of Credit
  - ☐ Standby Trust Agreement
  - ☐ Acknowledgement
3. Line of Credit
  - ☐ Verification
  - ☐ Standby Trust Agreement
  - ☐ Acknowledgement
4. Parent Company Guarantee
  - ☐ Letter from Chief Executive Officer of Applicant or Licensee
  - ☐ Letter from Chief Financial Officer of Parent Company
  - ☐ Financial Test: Alternative [I or II]
  - ☐ Auditor's Special Report and Attached Schedule
  - ☐ Corporate Guarantee
  - ☐ Standby Trust Agreement
  - ☐ Acknowledgement
5. Insurance
  - ☐ Certificate of Insurance
  - ☐ Standby Trust Agreement
  - ☐ Acknowledgement

\*May not be used in combination with any other instrument.

APPENDIX D

CHECKLIST FOR SUBMISSION OF EXTERNAL SINKING FUND

A. Check Mechanism in which Sinking Account will be held:\*

- ☐ Trust Fund
- ☐ Escrow Account
- ☐ Certificate(s) of Deposit
- ☐ Special Government Fund
- ☐ Deposit of Government Securities

B. Check Appropriate Surety Method:\*, \*\*

- ☐ Surety Bond
- ☐ Letter of Credit
- ☐ Line of Credit
- ☐ Insurance

---

\*See checklists for documents that should be submitted for mechanisms used in external sinking fund under the checklist for each respective mechanism.

\*\*Part 72 electric utility licensees are exempt from Part B of this Appendix D.

APPENDIX E  
CHECKLIST FOR STATEMENT OF INTENT

A. Type of Licensee (check one):

- ☐ Federal Government Licensee
- ☐ State Government Licensee
- ☐ Local Government Licensee

B. Check Documents Submitted for Statement of Intent

- ☐ Statement Guaranteeing Decommissioning
- ☐ Description of Authority of Government Entity to Make Statement of Intent

APPENDIX F  
COST ESTIMATING TABLES

1. Planning and Preparation

Table 1

<u>Task</u>	<u>Supervisor</u>	<u>Work Days</u> <u>Foreman</u>	<u>H.P.</u>	<u>Clerical</u>	<u>Total</u>	<u>Total</u> <u>Cost</u>
1. Preparation of Documentation for Regulatory Agencies	_____	_____	_____	_____	_____	_____
2. Submittal of Decommissioning Plan to NRC when required by 10 CFR 30.36(c)(2), 40.42(c)(2), or 70.38(c)(2)*	_____	_____	_____	_____	_____	_____
3. Development of Work Plans	_____	_____	_____	_____	_____	_____
4. Procuring of Special Equipment	_____	_____	_____	_____	_____	_____
5. Staff Training	_____	_____	_____	_____	_____	_____
6. Characterization of Radiological Condition of the Facility (Including soil and tailings analysis or ground-water analysis, if applicable)	_____	_____	_____	_____	_____	_____
7. Other	_____	_____	_____	_____	_____	_____
8. Total	_____	_____	_____	_____	_____	_____

\* For assistance in preparation of cost estimate for 10 CFR Part 72, consult NRC Office of Nuclear Material Safety and Safeguards.

APPENDIX F (Continued)  
COST ESTIMATING TABLES

Table 2

<u>Position</u>	<u>Unit Cost for Workers</u>		<u>Worker Cost/year</u>
	<u>Basic Salaries (\$/yr)</u>	<u>Overhead Rate (%)</u>	
Supervisor	_____	_____	_____
Foreman	_____	_____	_____
Craftsman	_____	_____	_____
Technician	_____	_____	_____
Health Physicist	_____	_____	_____
Laborer	_____	_____	_____
Clerical	_____	_____	_____
Other	_____	_____	_____

2. Decontamination and/or Dismantling of Radioactive Facility Components\*

	<u>No.</u>	<u>Dimensions</u>		<u>No.</u>	<u>Dimensions</u>
Glove Boxes	___	(m <sup>3</sup> )	Amount of Floor Space	___	(m <sup>2</sup> )
Fume Hood	___	(m <sup>3</sup> )	Ventilation Ductwork	___	(m)
Hot Cells	___	(m <sup>3</sup> )	Amount of Wall Space	___	(m <sup>2</sup> )
Lab Benches	___	(m)	Other	___	_____
Sink and Drain	___	(m)		___	_____

Table 3

Work Days

<u>Task</u>	<u>Super- visor</u>	<u>Fore- man</u>	<u>Tech- nicians</u>	<u>H.P.</u>	<u>Crafts- men</u>	<u>La- borer</u>	<u>Total</u>	<u>Total Cost</u>
1. Decon/Dis- mantle Major Components and/or Proc- essing and Storage Tanks	_____	_____	_____	_____	_____	_____	_____	_____
2. Decon/Dis- mantle Laboratories, Fume Hoods, Glove Boxes, Benches, etc.	_____	_____	_____	_____	_____	_____	_____	_____

\*Indicate whether component is to be decontaminated to unrestricted release levels or packaged and disposed of at a low-level waste site.

APPENDIX F (Continued)  
COST ESTIMATING TABLES

Table 3 (continued)

<u>Task</u>	<u>Work Days</u>						<u>Total</u>	<u>Total Cost</u>
	<u>Super- visor</u>	<u>Fore- man</u>	<u>Tech- nicians</u>	<u>H.P.</u>	<u>Crafts- men</u>	<u>La- borer</u>		
3. Decon/Dis- mantle Waste Areas	_____	_____	_____	_____	_____	_____	_____	_____
- Radwaste Areas								
- Scrap Recovery Areas								
- Other								
4. Decon/Dis- mantle Service Facilities	_____	_____	_____	_____	_____	_____	_____	_____
- Maintenance Shop								
- Decontamination Areas								
- Ventilation Systems								
- Other								
5. Decon/Dis- mantle Waste Treatment Facilities and Storage Areas on the Site (Including exhume and package contaminated soil and tail- ings, if any)	_____	_____	_____	_____	_____	_____	_____	_____
- Fluoride Lagoons								
- Nitrate Lagoons								
- CaF <sub>2</sub> Waste Recovery								
- Ground Water Restoration								
- Other								

APPENDIX F (Continued)  
COST ESTIMATING TABLES

Table 3 (continued)

<u>Task</u>	<u>Work Days</u>						<u>Total</u>	<u>Total Cost</u>
	<u>Super- visor</u>	<u>Fore- man</u>	<u>Tech- nicians</u>	<u>H.P.</u>	<u>Crafts- men</u>	<u>La- borer</u>		
6. Monitor for compliance, reclean and remonitor, if necessary	_____	_____	_____	_____	_____	_____	_____	_____
7. Other (e.g., contractor fees)	_____	_____	_____	_____	_____	_____	_____	_____

Table 4

<u>Equipment/Supply</u>	<u>Quantity</u>	<u>Cost</u>
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____

3. Packaging, Shipping, and Disposal of Radioactive Wastes

Table 5

<u>Waste Type</u>	<u>Volume (m<sup>3</sup>)</u>	<u>No. of Containers</u>	<u>Type of Containers</u>	<u>Unit Cost of Container</u>	<u>Cost of Container</u>
_____	_____	_____	_____	_____	_____
_____	_____	_____	_____	_____	_____
_____	_____	_____	_____	_____	_____
<u>Total</u>	_____	_____	_____	_____	_____

Table 6

Distance Shipped			_____ (miles)		
Unit cost for shipment			_____ (\$/mile/truckload)		
Additional charges					
Overweight			_____ (\$/mile)		
Surcharges			_____ (\$/mile)		
<u>Waste Type</u>	<u>No. of Shipments</u>	<u>Unit Cost for Shipping</u>	<u>Distance Shipped</u>	<u>Surcharge</u>	<u>Transportation Cost</u>
_____	_____	_____	_____	_____	_____
_____	_____	_____	_____	_____	_____
_____	_____	_____	_____	_____	_____
<u>Total</u>	_____	_____	_____	_____	_____



**APPENDIX F (Continued)**  
**COST ESTIMATING TABLES**

Table 7

Burial Charges				(\$/m <sup>3</sup> )
Surcharges				
Per container				(\$)
Disposal				(\$/m <sup>3</sup> )
<u>Waste Type</u>	<u>Burial Volume</u>	<u>Unit Cost of Burial</u>	<u>Surcharge</u>	<u>Burial Cost</u>
_____	_____	_____	_____	_____
_____	_____	_____	_____	_____
_____	_____	_____	_____	_____
<u>Total</u>	_____	_____	_____	_____

**4. Restoration of Contaminated Areas on Facility Ground**

Table 8

<u>Task</u>	<u>Supervisor</u>	<u>Work Days</u>		<u>Clerical</u>	<u>Total</u>	<u>Total Cost</u>
		<u>Foreman</u>	<u>H.P.</u>			
Backfill and Restore Site	_____	_____	_____	_____	_____	_____
_____	_____	_____	_____	_____	_____	_____
_____	_____	_____	_____	_____	_____	_____

**5. Final Radiation Survey**

Table 9

<u>Task</u>	<u>Supervisor</u>	<u>Work Days</u>		<u>Clerical</u>	<u>Total</u>	<u>Total Cost</u>
		<u>Foreman</u>	<u>H.P.</u>			
_____	_____	_____	_____	_____	_____	_____
_____	_____	_____	_____	_____	_____	_____
<u>Total</u>	_____	_____	_____	_____	_____	_____

APPENDIX F (Continued)  
COST ESTIMATING TABLES

6. Site Stabilization, Long-Term Surveillance (if applicable)

Table 10

<u>Task</u>	<u>Supervisor</u>	<u>Work Days</u>		<u>Clerical</u>	<u>Total</u>	<u>Total Cost</u>
		<u>Foreman</u>	<u>H.P.</u>			
_____	_____	_____	_____	_____	_____	_____
_____	_____	_____	_____	_____	_____	_____
_____	_____	_____	_____	_____	_____	_____

# APPENDIX G

## CONVERSION TABLE FOR DETERMINING AMOUNT OF FINANCIAL ASSURANCE REQUIRED AS A FUNCTION OF RADIONUCLIDE ACTIVITY LEVELS

### RADIONUCLIDE CONVERSION TABLE

ISOTOPE	10 CFR Part 20, App. C Activities ( $\mu$ Ci)	Decomm. Funding Plan Required (unsealed) ( $>10^5 \times$ App. C)	\$150,000 (unsealed) ( $>10^3, \leq 10^4$ )	\$750,000 (unsealed) ( $>10^4, \leq 10^5$ )	\$75,000 (sealed sources, plated sources) ( $>10^{10}$ )
Americium-241	0.01	$>1$ mCi	$>.01$ mCi, $\leq .1$ mCi	$>.01$ mCi, $\leq 1.0$ mCi	$>100$ Ci
Antimony-125	10	$>1$ Ci	$>10$ mCi, $\leq 100$ mCi	$>100$ mCi, $\leq 1$ Ci	$>100,000$ Ci
Barium-133	10	$>1$ Ci	$>10$ mCi, $\leq 100$ mCi	$>100$ mCi, $\leq 1$ Ci	$>100,000$ Ci
Cadmium-109	10	$>1$ Ci	$>10$ mCi, $\leq 100$ mCi	$>100$ mCi, $\leq 1$ Ci	$>100,000$ Ci
Calcium-45	10	$>1$ Ci	$>10$ mCi, $\leq 100$ mCi	$>100$ mCi, $\leq 1$ Ci	$>100,000$ Ci
Carbon-14	100	$>10$ Ci	$>100$ mCi, $\leq 1$ Ci	$>1$ Ci, $\leq 10$ Ci	$>1,000,000$ Ci
Cerium-144	1	$>100$ mCi	$>1$ mCi, $\leq 10$ mCi	$>10$ mCi, $\leq 100$ mCi	$>10,000$ Ci
Cesium-134	1	$>100$ mCi	$>1$ mCi, $<10$ mCi	$>10$ mCi, $\leq 100$ mCi	$>10,000$ Ci

Appendix G. Radionuclide Conversion Table (Continued)

ISOTOPE	10 CFR Part 20, App. C Activities ( $\mu$ Ci)	Decomm. Funding Plan Required (unsealed) ( $>10^5 \times$ App. C)	\$150,000 (unsealed) ( $>10^3, \leq 10^4$ )	\$750,000 (unsealed) ( $>10^4, \leq 10^5$ )	\$75,000 (sealed sources, plated sources) ( $>10^{10}$ )
Cesium-135	10	$>1$ Ci	$>10$ mCi, $\leq 100$ mCi	$>100$ mCi, $\leq 1$ Ci	$>100,000$ Ci
Cesium-137	10	$>1$ Ci	$>10$ mCi, $\leq 100$ mCi	$>100$ mCi, $\leq 1$ Ci	$>100,000$ Ci
Chlorine-36	10	$>1$ Ci	$>10$ mCi, $\leq 100$ mCi	$>100$ mCi, $\leq 1$ Ci	$>100,000$ Ci
2-9 Cobalt-60	1	$>100$ mCi	$>1$ mCi, $\leq 10$ mCi	$>10$ mCi, $\leq 100$ mCi	$>10,000$ Ci
Europium-152	1	$>100$ mCi	$>1$ mCi, $\leq 10$ mCi	$>10$ mCi, $\leq 100$ mCi	$>10,000$ Ci
Europium-154	1	$>100$ mCi	$>1$ mCi, $\leq 10$ mCi	$>10$ mCi, $\leq 100$ mCi	$>10,000$ Ci
Europium-155	10	$>1$ Ci	$>10$ mCi, $\leq 100$ mCi	$>100$ mCi, $\leq 1$ Ci	$>100,000$ Ci
Gadolinium-153	10	$>1$ Ci	$>10$ mCi, $\leq 100$ mCi	$>100$ mCi, $\leq 1$ Ci	$>100,000$ Ci
Hydrogen-3	1000	$>100$ Ci	$>1$ Ci, $\leq 10$ Ci	$>10$ Ci, $\leq 100$ Ci	$>10,000,000$ Ci
Indium-155	10	$>1$ Ci	$>10$ mCi, $\leq 100$ mCi	$>100$ mCi, $\leq 1$ Ci	$>100,000$ Ci

# Appendix G. Radionuclide Conversion Table (Continued)

ISOTOPE	10 CFR Part 20, App. C Activities ( $\mu$ Ci)	Decomm. Funding Plan Required (unsealed) ( $>10^5 \times$ App. C)	\$150,000 (unsealed) ( $>10^3, \leq 10^4$ )	\$750,000 (unsealed) ( $>10^4, \leq 10^5$ )	\$75,000 (sealed sources, plated sources) ( $>10^{10}$ )
Iodine-129	0.1	$>10$ mCi	$>0.1$ mCi, $\leq 1$ mCi	$>1$ mCi, $\leq 10$ mCi	$>1,000$ Ci
Iron-55	100	$>10$ Ci	$>100$ mCi, $\leq 1$ Ci	$>1$ Ci, $\leq 10$ Ci	$>1,000,000$ Ci
Krypton-85	100	$>10$ Ci	$>100$ mCi, $\leq 1$ Ci	$>1$ Ci, $\leq 10$ Ci	$>1,000,000$ Ci
Ⓒ Manganese-54	10	$>1$ Ci	$>10$ mCi, $\leq 100$ mCi	$>100$ mCi, $\leq 1$ Ci	$>100,000$ Ci
Nickel-59	100	$>10$ Ci	$>100$ mCi, $\leq 1$ Ci	$>1$ Ci, $\leq 10$ Ci	$>1,000,000$ Ci
Nickel-63	10	$>1$ Ci	$>10$ mCi, $\leq 100$ mCi	$>100$ mCi, $\leq 1$ Ci	$>100,000$ Ci
Niobium-93m	10	$>1$ Ci	$>10$ mCi, $\leq 100$ mCi	$>100$ mCi, $\leq 1$ Ci	$>100,000$ Ci
Platinum-193	100	$>10$ Ci	$>100$ mCi, $\leq 1$ Ci	$>1$ Ci, $\leq 10$ Ci	$>1,000,000$ Ci
Plutonium-239	0.01	$>1$ mCi	$>0.01$ mCi, $\leq 0.1$ mCi	$>0.1$ mCi, $\leq 1.0$ mCi	_____
Polonium-210	0.1	$>10$ mCi	$>0.1$ mCi, $\leq 1$ mCi	$>1$ mCi, $\leq 10$ mCi	$>1,000$ Ci

# Appendix G. Radionuclide Conversion Table (Continued)

ISOTOPE	10 CFR Part 20, App. C Activities ( $\mu$ Ci)	Decomm. Funding Plan Required (unsealed) ( $>10^5 \times$ App. C)	\$150,000 (unsealed) ( $>10^3, \leq 10^4$ )	\$750,000 (unsealed) ( $>10^4, \leq 10^5$ )	\$75,000 (sealed sources, plated sources) ( $>10^{10}$ )
Promethium-147	10	$>1$ Ci	$>10$ mCi, $\leq 100$ mCi	$>100$ mCi, $\leq 1$ Ci	$>100,000$ Ci
Radium-226	0.01	$>1$ mCi	$>0.01$ mCi, $\leq 0.1$ mCi	$>0.1$ mCi, $\leq 1.0$ mCi	$>100$ Ci
Rubidium-87	10	$>1$ Ci	$>10$ mCi, $\leq 100$ mCi	$>100$ mCi, $\leq 1$ Ci	$>100,000$ Ci
G-4 Ruthenium-106	1	$>100$ mCi	$>1$ mCi, $\leq 10$ mCi	$>10$ mCi, $\leq 100$ mCi	$>10,000$ Ci
Samarium-151	10	$>1$ Ci	$>10$ mCi, $\leq 100$ mCi	$>100$ mCi, $\leq 1$ Ci	$>100,000$ Ci
Silver-110m	1	$>100$ mCi	$>1$ mCi, $\leq 10$ mCi	$>10$ mCi, $\leq 100$ mCi	$>10,000$ Ci
Strontium-90	0.1	$>10$ mCi	$>0.1$ mCi, $\leq 1$ mCi	$>1$ mCi, $\leq 10$ mCi	$>1,000$ Ci
Technetium-97	100	$>10$ Ci	$>100$ mCi, $\leq 1$ Ci	$>1$ Ci, $\leq 10$ Ci	$>1,000,000$ Ci
Technetium-99	10	$>1$ Ci	$>10$ mCi, $\leq 100$ mCi	$>100$ mCi, $\leq 1$ Ci	$>100,000$ Ci
Thallium-204	10	$>1$ Ci	$>10$ mCi, $\leq 100$ mCi	$>100$ mCi, $\leq 1$ Ci	$>100,000$ Ci

# Appendix G. Radionuclide Conversion Table (Continued)

ISOTOPE	10 CFR Part 20, App. C Activities ( $\mu$ Ci)	Decomm. Funding Plan Required (unsealed) ( $>10^5 \times$ App. C)	\$150,000 (unsealed) ( $>10^3, \leq 10^4$ )	\$750,000 (unsealed) ( $>10^4, \leq 10^5$ )	\$75,000 (sealed sources, plated sources) ( $>10^{10}$ )
Thorium (natural)	Readily disper- sible	$>100$ mCi	$>10$ mCi, $\leq 100$ mCi	_____	_____
Thulium-170	10	$>1$ Ci	$>10$ mCi, $\leq 100$ mCi	$>100$ mCi, $\leq 1$ Ci	$>100,000$ Ci
Thulium-171	10	$>1$ Ci	$>10$ mCi, $\leq 100$ mCi	$>100$ mCi, $\leq 1$ Ci	$>100,000$ Ci
Tungsten-181	10	$>1$ Ci	$>10$ mCi, $\leq 100$ mCi	$>100$ mCi, $\leq 1$ Ci	$>100,000$ Ci
Uranium (natural)	Readily disper- sible	$>100$ mCi	$>10$ mCi, $\leq 100$ mCi	_____	_____
Uranium-233	0.01	$>1$ mCi	$>0.01$ mCi, $\leq 0.1$ mCi	$>0.1$ mCi, $\leq 1.0$ mCi	_____
Uranium- 234/235	0.01	$>1$ mCi	$>0.01$ mCi, $\leq 0.1$ mCi	$>0.1$ mCi, $\leq 1.0$ mCi	_____
Zinc-65	10	$>1$ Ci	$>10$ mCi, $\leq 100$ mCi	$>100$ mCi, $\leq 1$ Ci	$>100,000$ Ci
Zirconium-93	10	$>1$ Ci	$>10$ mCi, $\leq 100$ mCi	$>100$ mCi, $\leq 1$ Ci	$>100,000$ Ci

# Appendix G. Radionuclide Conversion Table (Continued)

ISOTOPE	10 CFR Part 20, App. C Activities ( $\mu$ Ci)	Decomm. Funding Plan Required (unsealed) ( $>10^5 \times$ App. C)	\$150,000 (unsealed) ( $>10^3, \leq 10^4$ )	\$750,000 (unsealed) ( $>10^4, \leq 10^5$ )	\$75,000 (sealed sources, plated sources) ( $>10^{10}$ )
Any alpha emitting radionuclide not listed above or mixtures of alpha emitters of unknown composition (with a half-life greater than 120 days)	0.01	$>1$ mCi	$>0.01$ mCi, $\leq 0.1$ mCi	$>0.1$ mCi $\leq 1.0$ mCi	$>100$ Ci
Any radionuclide other than alpha emitting radionuclides not listed above or mixtures of beta emitters of unknown composition (with a half-life greater than 120 days)	0.1	$>10$ mCi	$>0.1$ mCi $\leq 1.0$ mCi	$>1.0$ mCi $\leq 10$ mCi	$>1,000$ Ci