



OFFICE OF THE  
GENERAL COUNSEL

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

April 15, 1997

DOCKETED  
USNRC

Marshall E. Miller  
Presiding Officer  
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Mountain View, Ca 94040

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Special Assistant  
1564 Burton Avenue  
St. Paul, MN 55108

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

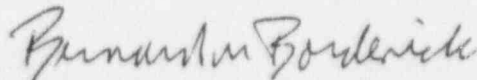
Dear Administrative Judges:

Pursuant to 10 C.F.R. § 2.123(c), enclosed are the following documents to be included in the hearing file for this proceeding. The NRC staff is still reviewing the license renewal application which is the subject of this proceeding.

108. Letter with attachments to J. R. Madera, Chief, Nuclear Materials Licensing Section, Region III, U.S. Nuclear Regulatory Commission from Stephen J. Haddock, RSO, Advanced Medical Systems, Inc. re: Physical Inventory of Sealed Sources (License No. 34-19089-01) dated February 21, 1997.
109. Letter to Stephen J. Haddock, Radiation Safety Officer, Advanced Medical Systems, Inc. from John R. Madera, Chief, Nuclear Materials Licensing Section, Region III, U.S. Nuclear Regulatory Commission responding to a December 13, 1996 letter addressing revised versions of RSP-018, RSP-019 as well as a new quality assurance procedure in RSP-022 dated February 27, 1997.
110. Letter with attachment to Roy Caniano, U.S. Nuclear Regulatory Commission, Region III from Stephen J. Haddock, RSO, Advanced Medical Systems, Inc. regarding AMS annual provisional safety training for first responders dated March 4, 1997.
111. Letter with attachments to John R. Madera, Chief, Nuclear Materials Licensing Branch, U.S. Nuclear Regulatory Commission from Stephen J. Haddock, RSO, Advanced Medical Systems, Inc. re: USNRC License No 34-19089-01 dated March 4, 1997.
112. Letter to John R. Madera, Chief, Nuclear Materials Licensing Branch, U.S. Nuclear Regulatory Commission from Stephen J. Haddock, RSO, Advanced Medical Systems, Inc. re: Physical Inventory of Sealed Sources (License No. 34-19039-01) dated March 5, 1997.

113. Letter to Lawrence K. English, Assistant General Counsel, Northeast Ohio Regional Sewer District from Cynthia D. Pederson, Director, Division of Nuclear Materials Safety, Region III, U.S. Nuclear Regulatory Commission dated March 5, 1997.
114. Letter with enclosure to Edward Svigel, Chairman, Radiation Safety Committee, Advanced Medical Systems, Inc. from Ms. Cynthia D. Pederson, Director, Division of Nuclear Materials Safety, U.S. Nuclear Regulatory Commission re: NRC INSPECTION REPORT NO. 03-16055/97001(DNMS) dated March 7, 1997.
115. Letter with enclosure to Stephen J. Haddock, Radiation Safety Officer, Advanced Medical Systems, Inc. from Michael J. Weber, Nuclear Materials Licensing Branch, U.S. Nuclear Regulatory Commission regarding amendment request from Stephen J. Haddock dated March 12, 1997.
116. Letter to John R. Madera, Chief, Nuclear Materials Licensing Branch, U.S. Nuclear Regulatory Commission from Stephen J. Haddock, RSO, Advanced Medical Systems, Inc. re: USNRC License No. 34-19089-01 dated March 13, 1997.
117. Letter to John R. Madera, Chief, Nuclear Materials Licensing Branch, U.S. Nuclear Regulatory Commission from Christopher Reed, ARSO, Advanced Medical Systems, Inc. re: USNRC License No. 34-19089-01 dated March 20, 1997.
118. Letter to Cynthia D. Pederson, Director, Division of Nuclear Materials Safety, U.S. Nuclear Regulatory Commission, Region III from Lawrence K. English, Assistant General Counsel, Northeast Ohio Regional Sewer District re: Cobalt-60 Contamination At Advanced Medical Systems dated March 25, 1997.
119. Letter to John R. Madera, Chief, Nuclear Materials Licensing Branch, U.S. Nuclear Regulatory Commission from Stephen J. Haddock, RSO, Advanced Medical Systems, Inc. re: USNRC License No. 34-19089-01 dated March 31, 1997.

Sincerely,



Bernard M. Bordenick  
Counsel for NRC Staff

cc w/encls.: Service List

# Advanced Medical Systems, Inc.

1020 London Road  
Cleveland, Ohio 44110  
(216) 692-3270  
Fax (216) 692-3269

February 21, 1997

Mr. J. R. Madera, Chief  
Nuclear Materials Licensing Section  
United States Nuclear Regulatory Commission  
801 Warrenville Road  
Lisle, Illinois 60523-4351

## Re: Physical Inventory of Sealed Sources (License No. 34-19089-01)

Dear Mr. Madera:

The purpose of this letter is to address Provision 14(c) of License No. 34-19089-01 wherein it states that a physical inventory of all licensed radioactive material possessed by Advanced Medical Systems, Inc. (AMS) be performed by June 1, 1993 and every five years thereafter. While AMS was unable to demonstrate compliance with this requirement in 1993 for reasons that are described below, it was our intent to resolve this issue by June of 1998. However, recent activities associated with the Building Recovery Project have permitted early resolution.<sup>1</sup> Included herein is a brief discussion of the circumstances surrounding this issue, followed by a description of the current status of the AMS sealed source inventory.

### Background

In 1993, as required in Provision 14(c) of License No. 34-19089-01, AMS performed a physical inventory of the sealed sources in its possession. As part of that inventory, a records review was performed. The result of that review was that seven (7) sealed sources appeared to have come into the facility with no subsequent record of departure or re-encapsulation. However, these sources could not be located in those source storage locations that were accessible by AMS personnel (e.g., the Source Garden, shipping containers, or the rear well of the Hot Cell.)

The only other storage location at the London Road facility was the front well of the Hot Cell. Previously, the front well plug had become lodged in the well, rendering it impossible to inspect the well's contents. While the 1993 inventory records were corrected to show that the likely storage location of the seven (7) sources was under the front plug of the Hot Cell, AMS was unable to fully satisfy provision 14(c) of its license at that time.

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<sup>1</sup> Advanced Medical Systems, Inc., "Building Recovery Project - A Proposal to the U. S. Nuclear Regulatory Commission", June 10, 1996.

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REGION III

Am 7-21 00

MAC 11 11

After several unsuccessful attempts to dislodge the front plug by means that would not incur significant damage to the Hot Cell's capabilities, AMS solicited the services of a vendor to remove the front plug using a more aggressive (destructive) approach. The specifications for this work were prepared and a contract was issued. However, subsequent operational and business issues demanded that AMS maintain the integrity of the Hot Cell to support on-going licensed operations and the Building Recovery Project.

The USNRC was informed of the decision to delay the removal of the stuck plug in an August 29, 1995 meeting at the offices of Stavole & Miller (legal counsel to AMS), in the "Strategic Plan for the London Road Facility" (Strategic Plan), in the quarterly revisions to the Strategic Plan, and in the Building Recovery Project proposal. To avoid non-compliance with provision 14(c) of its license, AMS expressed its intent to submit a license amendment application requesting an exemption to the 1998 physical inventory requirement for the seven (7) sources until after the stuck plug could be removed.

#### **Current Status**

On July 8, 1996, AMS submitted an application to amend its USNRC license to permit commercial disposal of all accessible sealed sources and canisters of bulk cobalt. This action was approved by the USNRC on November 5, 1996.

In December of 1996, AMS and its waste broker began implementing the USNRC-approved procedures for placing each sealed source into a specific location of a shipping cask liner. It was critical to both AMS and the broker that the identity of each source be positively determined for reasons of accountability and for compliance with USDOT regulations for transport.<sup>2</sup> Every source that was stored in the Hot Cell, in the GE-500 cask, in the "blue" cask, in the Source Garden, or in other shipping containers was first transferred into the Hot Cell, the identity of the source was confirmed by both AMS and the broker, and the source was placed into the proper location in the liner. Attachment 1 contains the checklist that was used to track and document the these steps while they were on-going.

By January 1, 1997, all accessible sealed sources at the AMS facility (with the exception of one calibration source) and all accessible canisters of bulk cobalt were packaged and shipped to the Barnwell Low Level Waste facility. It was not until the radioactive materials inventory was debited to reflect those sources that were positively identified and shipped that AMS discovered that it had accounted for all of the sources listed on the 1993 inventory.

Attachment 2 contains a February 21, 1997 inventory sheet showing the disposition of the sealed sources disposed of under Task 1 of the Building Recovery Project. These sheets show that the sources physically identified by both AMS and the broker included the seven (7) sealed sources previously assumed to reside under the stuck plug of the Hot Cell.

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<sup>2</sup> The procedures followed by AMS and the broker were described in detail in AMS's July 8th amendment application and in a September 19, 1996 transmittal to you from AMS.

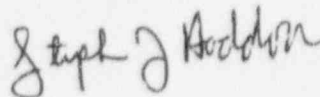


AMS initiated another search of its records to determine if there were any other sealed sources received at the London Road facility that were unaccounted for on production or shipping records. This search reveal any unaccounted-for sources.<sup>3</sup>

The inventory sheets in Attachment 2 also show that, in addition to the waste and residual radioactivity inventory, only one (1) sealed source currently exists at the AMS facility. This is Source No. 2466, located in the Isotope Shop Warehouse of the London Road facility, and used for routine calibration purposes. As required in provision 14(c) of its license, AMS intends to physically confirm and document the identity of this and any other sealed sources present at the London Road facility in June of 1998, and every five (5) years thereafter. This commitment has been incorporated into Radiation Safety Procedure No. RSP-008, "Instrumentation and Surveillance".

By submission of this letter, AMS maintains that it has satisfied the 1993 physical inventory requirement in provision 14(c) of License No. 34-19089-01. AMS also considers Task 7 of the Building Recovery Project (i.e., Request Exemption from Physical Inventory Requirements) and the pending removal of the stuck plug in the Hot Cell by aggressive means (see Revision 5 of the "Strategic Plan for the London Road Facility") to be unnecessary and requiring no further action. If you have any questions or if I can provide you with additional information, please call me at (216) 692-3270.

Sincerely,



Stephen J. Haddock, R.S.O.

cc: E. Svigel  
D. Miller - Stavole & Miller  
C. Berger - IEM

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<sup>3</sup> Haddock, S. J., memo to Building Recovery Project Team regarding "Sources that are Unresolved from Post Disposal", February 5, 1997.

**ATTACHMENT 1**  
**SOURCE LOADING CHECKLIST FOR LINER L-1 AND L-2**

SOURCE LOADING CHECKLIST FOR 1-13 LINER # L-1

	T-1	Int.	T-2	Int.	T-3	Int.	T-4	Int.	T-5	Int.	T-6	Int.
14			644 X 196.96	✓	2388 ✓ 247.87	✓	2338 X 246.14	✓				
13			T121 X 171.34	✓	2245 ✓ 225.87	✓	T21 X 149.94	✓			22 X 242.96	✓
12	2522 X 230.61	✓	NSN X 166.22	✓	T121 ✓ 210.14	✓	T162 X 157.63	✓	22 X 260.12	✓	FX216 X 121.67	✓
11	2411 X 982.64	✓	NSN X 109.26	✓	048/1801 ✓ 290.14	✓	FX284 X 103.10	✓	288 X 131.02	✓	2117 X 204.56	✓
10	T320 X 469.52	✓	FX142 X 60.51	✓	T52 ✓ 142.12	✓	NSN X 106.57	✓	777 X 129.21	✓	824 X 100.82	✓
9	53817 X 1842.29	✓	FX12 X 22.03	✓	803 ✓ 68.24	✓	2588 X 152.76	✓	787 X 125.20	✓	T177 X 245.67	✓
8	T942 X 467.24	✓	FX132 X 20.01	✓	FX440 ✓ 20.21	✓	529 X 44.21	✓	816 X 132.91	✓	215 X 100.82	✓
7	T909 X 719.52	✓	FX207 X 20.11	✓	FX374 ✓ 18.32	✓	2002 X 44.66	✓	2076 X 103.61	✓	FX411 X 42.93	✓
6	T X 1702.55	✓	B11 X 191.62	✓	B106 ✓ 130.54	✓	FX458 X 34.92	✓	581 X 60.51	✓	FX137 X 29.56	✓
5	T X 1402.55	✓	B10 X 292.80	✓	B103 X 242.14	✓	B101 X 187.82	✓	B113 X 145.32	✓	FX142 X 41.91	✓
4	T X 1802.55	✓	B108 X 49.57	✓	2592 ✓ 340.47	✓	B102 X 44.89	✓	B105 X 288.17	✓	B112 X 126.42	✓
3	T X 1402.55	✓	B107 X 49.54	✓	C112 ✓ 157.63	✓	2236 X 103.50	✓	B104 X 120.28	✓	CER267 X 44.58	✓
2	2476 X 907.82	✓	CA200 X 201.26	✓	2 X 200	✓	OUT 15-15 X 154.63	✓	1289 X 33.12	✓	B114 X 445.80	✓
1	226 X 526.67	✓	2 X 200	✓	2 X 278.22	✓	2 X 212.64	✓	T232 X 172.43	✓	B107 X 152.12	✓

SOURCE LOADER:  
 (Signature)

Stephen J. Hordford

DATE: 12-3-96

\*DATA RECORDER:  
 (Signature)

[Signature]

DATE: 12-2-96

\* N/A if not used.

To Carol Burger IEM  
 from C-Road AMS

Here are the Source Loading

Shots

SOURCE LOADING CHECKLIST FOR 1-13 LINER # L-2

	T-1	Int.	T-2	Int.	T-3	Int.	T-4	Int.	T-5	Int.	T-6	Int.
16					2108 56.90	X	2922 451.03	X	PX348 54.96	X	JALAPA 378.42	X
15			958 880.86	X	PX134 68.52	X	664 80.61	X	1302 800.78	X	NPS 65.37	X
14			PX446 84.48	X	7589 886.52	X	616 94.49	X	7187 830.96	X	NPS 28.73	X
13			PX430 94.33	X	PX448 15.4	X	1679 29.75	X	7540 326.10	X	PX449 20.60	X
12	XXIV 1124.85	X	7182 473.67	X	PX237 21.59	X	724 854.86	X	6106 20.60	X	7377 251.36	X
11	7993 787.65	X	PX372 15.11	X	879 51.01	X	PX040 36.48	X	PX399 95.93	X	PX372 15.85	X
10	2810 810.73	X	PX119 40.72	X	1363 82.02	X	PX397 47.78	X	PX428 20.11	X	PX128 31.65	X
9	034367 1345.32	X	PX406 43.92	X	7187 348.43	X	7249 265.57	X	USN 62.64	X	362 283.15	X
8	2583 2030.57	X	7472 449.38	X	1513 67.65	X	032/74101 104.36	X	2408 410.95	X	018/7310 131.39	X
7	7672 813.06	X	4746 370.02	X	95 20.11	X	7514 564.75	X	USN 23.72	X	PX401 44.19	X
6	7263 549.46	X	726 86.37	X	7204 417.21	X	PX063 37.44	X	PX456 33.83	X	PX433 61.15	X
5	7275 560.47	X	441 70.61	X	PX419 52.54	X	USN 309.29	X	PX440 51.15	X	7062 48.19	X
4	7445 617.64	X	PX469 24.20	X	PX452 50.13	X	USN 424.80	X	PX104 28.82	X	7205 297.32	X
3	7 656.90	X	PX43 4.36	X	636 48.42	X	PX406 44.66	X	PX376 20.11	X	7145 425.44	X
2	XXIII 496.64	X	2006 51.81	X	745 364.47	X	PX318 40.31	X	7288 511.07	X	W87 14.77	X
1	XXII 1232.32	X	50 477.24	X	191 15.85	X	687 48.73	X	PX481 26.60	X	PX477 19.32	X
	8		14		16		16		16		6	

SOURCE LOADER:  
(Signature)Joseph J. MaddenDATE: 12-3-96\*DATA RECORDER:  
(Signature)[Signature]DATE: 12-2-96

\* N/A if not used.



**ATTACHMENT 2**  
**RADIOACTIVE MATERIALS INVENTORY AS OF FEBRUARY 21, 1997**

							Total Inventory (C)	1863.35
Type	Identifier	Type	Storage Location	Curies	As of (date)	Date Shipped	Activity (today)	Form (S or N)
AMS Blk Co	B461	Bulk	Blue Cask	611	10/01/90	12/03/96	0.00	N
AMS Blk Co	B458	Bulk	Hot Cell (FP)	2764	04/01/90	12/06/96	0.00	N
AMS Blk Co	B457	Bulk	Blue Cask	3080	11/15/89	12/06/96	0.00	N
AMS Blk Co	B453	Bulk	Blue Cask	3153	01/01/88	12/06/96	0.00	N
AMS Blk Co	B450	Bulk	Hot Cell (FP) ?	1544	12/01/87	12/03/96	0.00	N
AMS Blk Co	B449	Bulk	Blue Cask	2101	12/01/87	12/06/96	0.00	N
AMS Blk Co	B430	Bulk	Blue Cask	6274	01/01/86	12/03/96	0.00	N
AMS Blk Co	B408	Bulk	Hot Cell (FP)	1533	05/01/83	01/01/01	0.00	N
AMS Blk Co	B386	Bulk	Hot Cell (FP)	2943	12/01/80	12/03/96	0.00	N
AMS Blk Co	B381	Bulk	Hot Cell (FP)	2470	08/01/80	12/03/96	0.00	N
AMS Blk Co	B378	Bulk	Blue Cask	8525	07/01/79	12/06/96	0.00	N
AMS Blk Co	B366	Bulk	Blue Cask	3578	07/01/78	12/06/96	0.00	N
AMS Blk Co	B308	Bulk	Hot Cell (FP)?	8441	06/01/74	12/03/96	0.00	N
AMS Blk Co	StdWtrSrce	Bulk	Hot Cell (FP)	316	09/23/71	12/03/96	0.00	S
Blk in Ge-500	B354	Bulk Target	GE-500	4454	03/18/77	12/03/96	0.00	S
Blk in Ge-500	B344	Bulk Target	GE-500	1852	08/01/76	12/03/96	0.00	S
Blk in Ge-500	B341	Bulk Target	GE-500	2062	01/01/76	12/03/96	0.00	S
Blk in Ge-500	B331	Bulk Target	GE-500	5393	09/01/75	12/03/96	0.00	S
Blk in Ge-500	B329	Bulk Target	GE-500	4024	06/01/75	12/03/96	0.00	S
Blk in Ge-500	B323	Bulk Target	GE-500	4225	01/01/75	12/03/96	0.00	S
Blk in Ge-500	B309	Bulk Target	GE-500	2765	06/01/74	12/03/96	0.00	S
Blk in Ge-500	B290	Bulk Target	GE-500	5345	12/01/73	12/03/96	0.00	S
Blk in Ge-500	B281	Bulk Target	GE-500	6048	07/01/73	12/03/96	0.00	S
Blk in Ge-500	B270	Bulk Target	GE-500	2901	12/01/72	12/03/96	0.00	S
Picker Pellets	PX446	WaterSource	8-Y-2	1846	01/31/66	12/06/96	0.00	S
Picker Pellets	PX43	WaterSource	4-U-1	11.4	04/01/95	12/06/96	0.00	S
Picker Pellets	PX452	WaterSource	4-U-3	2823	03/03/66	12/06/96	0.00	S
Picker Pellets	PX439	WaterSource	4-U-2	2996	01/31/66	12/06/96	0.00	S
Picker Pellets	PX377	WaterSource	7-V-2	2807	02/15/65	12/06/96	0.00	S
Picker Pellets	PX-466	WaterSource	1-W-2	2502	03/13/66	12/06/96	0.00	S
Picker Pellets	PX376	WaterSource	1-W-1	1315	01/30/65	12/06/96	0.00	S
Picker Pellets	PX456	WaterSource	3-V-2	1854	04/15/66	12/06/96	0.00	S
Picker Pellets	PX372	WaterSource	3-V-3	1071	12/30/64	12/06/96	0.00	S
Picker Pellets	PX477	WaterSource	4-T-1	958	07/15/66	12/06/96	0.00	S
Picker Pellets	PX375	WaterSource	6-Y-1	1007	01/30/65	12/06/96	0.00	S
Picker Pellets	PX239(1239)	WaterSource	7-V-1	1750	04/18/63	12/06/96	0.00	S
Picker Pellets	PX453	WaterSource	2-Y-2	2255	10/31/65	12/06/96	0.00	S
Picker Pellets	PX257	WaterSource	GE-500	1626	07/01/63	12/03/96	0.00	S
Picker Pellets	PX1249(010249)	WaterSource	7-X-3	2200	06/08/63	12/06/96	0.00	S

Type	Identifier	Type	Storage Location	Curies	As of (date)	Date Shipped	Total Inventory (Ci) Activity (today)	1863.35 Form (S or N)
Picker Pellets	PX1386(OLD385)	WaferSource	GE-500	1678	03/15/65	12/03/96	0.00	S
Picker Pellets	PX447	WaferSource	GE-500	844	01/31/66	12/06/96	0.00	S
Picker Pellets	PX318	WaferSource	1-W-3	2829	05/28/64	12/06/96	0.00	S
Picker Pellets	PX428	WaferSource	7-X-1	1179	10/31/65	12/06/96	0.00	S
Picker Pellets	PX405	WaferSource	4-Y-3	2664	06/30/65	12/06/96	0.00	S
Picker Pellets	PX1364(OLD364)	WaferSource	8-V-3	4364	11/30/64	12/06/96	0.00	S
Picker Pellets	PX1426(OLD426)	WaferSource	GE-500	2469	10/30/65	12/06/96	0.00	S
Picker Pellets	PX1410(OLD410)	WaferSource	3-X-1	3110	07/30/65	12/06/96	0.00	S
Picker Pellets	PX1404	WaferSource	2-V-1	4843	06/30/65	12/06/96	0.00	S
Picker Pellets	PX374	WaferSource	GE-500	1175	01/30/65	12/03/96	0.00	S
Picker Pellets	PX1394	WaferSource	3-Y-1	1980	03/15/65	12/06/96	0.00	S
Picker Pellets	PX1433(OLD433)	WaferSource	2-X-2	2960	11/30/65	12/06/96	0.00	S
Picker Pellets	PX1251(OLD251)	WaferSource	GE-500	2128	06/20/63	12/06/96	0.00	S
Picker Pellets	PX1379(OLD379)	WaferSource	GE-500	1920	02/15/65	12/03/96	0.00	S
Picker Pellets	PX399	WaferSource	7-Y-1	5939	05/31/65	12/06/96	0.00	S
Picker Pellets	PX1425(OLD425)	WaferSource	GE-500	3561	10/30/65	12/03/96	0.00	S
Picker Pellets	PX1289(OLD289)	WaferSource	Blue Cask	2673	01/15/64	12/03/96	0.00	S
Picker Pellets	PX184	WaferSource	2-W-2	2633	08/26/62	12/06/96	0.00	S
Picker Pellets	PX1458(OLD458)	WaferSource	GE-500	3317	04/15/66	12/03/96	0.00	S
Picker Pellets	PX440	WaferSource	GE-500	1698	01/31/66	12/03/96	0.00	S
Picker Pellets	PX1317(OLD317)	WaferSource	7-Z-2	6448	05/25/64	12/06/96	0.00	S
Picker Pellets	PX12	WaferSource	GE-500	2680	05/12/60	12/03/96	0.00	S
Picker Pellets	PX1411(OLD411)	WaferSource	GE-500	2985	07/30/65	12/03/96	0.00	S
Picker Pellets	PX430	WaferSource	8-Z-3	5553	10/31/65	12/06/96	0.00	S
Picker Pellets	PX2169	WaferSource	S/e 106	2827	12/01/75	12/03/96	0.00	S
Picker/AMS Sealed	664	SealedSource	WH590C-179	3060	10/15/68	12/06/96	0.00	S
Picker/AMS Sealed	879	SealedSource	6-U-3	1416	09/01/71	12/06/96	0.00	S
Picker/AMS Sealed	725	SealedSource	3-W-1	3121	07/01/69	12/06/96	0.00	S
Picker/AMS Sealed	PX269	SealedSource	3-Z-1	2030	09/15/63	12/06/96	0.00	S
Picker/AMS Sealed	2002	SealedSource	GE-500	982	05/01/73	12/03/96	0.00	S
Picker/AMS Sealed	665	SealedSource	3-W-2	4033	10/15/68	12/03/96	0.00	S
Picker/AMS Sealed	95	SealedSource	3-X-3	1990	10/25/61	12/06/96	0.00	S
Picker/AMS Sealed	2066	SealedSource	2-Z-3	6370	07/01/73	12/06/96	0.00	S
Picker/AMS Sealed	1363(OLD163)	SealedSource	5-U-1	99.9	04/01/95	12/06/96	0.00	S
Picker/AMS Sealed	887	SealedSource	8-V-1	2716	10/01/71	12/03/96	0.00	S
Picker/AMS Sealed	789	SealedSource	2-X-3	4422	05/14/70	12/03/96	0.00	S
Picker/AMS Sealed	883	SealedSource	GE-500	1855	09/01/71	12/03/96	0.00	S
Picker/AMS Sealed	191	SealedSource	1-V-3	1434	09/09/62	12/06/96	0.00	S
Picker/AMS Sealed	1513(OLD513)	SealedSource	4-Z-1	3389	12/31/66	12/06/96	0.00	S

Type	Identifier	Type	Storage Location	Curies	As of (date)	Date Shipped	Total Inventory (Ci) Activity (today)	1863.35 Form (S or N)
Picker/AMS Sealed	581	SealedSource	GE-500	2735	12/01/67	12/03/96	0.00	S
Picker/AMS Sealed	644	SealedSource	Blue Cask	7990	08/15/68	12/03/96	0.00	S
Picker/AMS Sealed	636	SealedSource	1-Z-1	2641	07/01/68	12/06/96	0.00	S
Picker/AMS Sealed	2168	SealedSource	9-Y-1	893	12/01/75	12/06/96	0.00	S
Picker/AMS Sealed	949	SealedSource	6-Z-2	2812	05/01/73	12/03/96	0.00	S
Picker/AMS Sealed	816	SealedSource	1-X-2	4288	09/15/70	12/03/96	0.00	S
Picker/AMS Sealed	2076	SealedSource	1-X-3	1953	07/01/74	12/03/96	0.00	S
Picker/AMS Sealed	587	SealedSource	6-Y-3	5763	12/15/67	12/03/96	0.00	S
Picker/AMS Sealed	871	SealedSource	3-X-2	1979	06/25/71	12/06/96	0.00	S
Picker/AMS Sealed	1679(OLD679)	SealedSource	9-Z-2	2986	01/01/69	12/06/96	0.00	S
Picker/AMS Sealed	PX784	SealedSource	6-Z-3	5983	02/15/70	12/03/96	0.00	S
Picker/AMS Sealed	PX450	SealedSource	7-U-2	7001	04/15/66	12/06/96	0.00	S
Picker/AMS Sealed	616	SealedSource	9-Y-3	4023	05/01/68	12/06/96	0.00	S
Picker/AMS Sealed	557	SealedSource	GE-500	1895	09/01/67	12/03/96	0.00	S
Picker/AMS Sealed	2117	SealedSource	1-V-1	3374	05/01/75	12/03/96	0.00	S
Picker/AMS Sealed	687	SealedSource	1-V-1	1878	02/01/69	12/06/96	0.00	S
Picker/AMS Sealed	2407	SealedSource	3-Z-1	3202	03/10/81	12/06/96	0.00	S
Picker/AMS Sealed	2394(OLD2060)	SealedSource	1-X-1	3001	03/15/74	12/03/96	0.00	S
Picker/AMS Sealed	2476	SealedSource	Blue Cask	5531	12/14/82	12/03/96	0.00	S
Picker/AMS Sealed	2532	SealedSource	Blue Cask	1564	03/05/85	12/03/96	0.00	S
Picker/AMS Sealed	2411	SealedSource	Hot Cell	7113	04/15/81	12/03/96	0.00	S
Picker/AMS Sealed	2245	SealedSource	Hot Cell	4978	05/01/77	12/03/96	0.00	S
Picker/AMS Sealed	2387	SealedSource	Hot Cell	2869	09/19/80	12/03/96	0.00	S
Picker/AMS Sealed	2285	SealedSource	Hot Cell	3862	01/19/78	12/03/96	0.00	S
Picker/AMS Sealed	PX2337	SealedSource	Hot Cell	2411	05/16/79	12/03/96	0.00	S
Picker/AMS Sealed	2487	SealedSource	Hot Cell	2704	03/14/83	12/06/96	0.00	S
Picker/AMS Sealed	2236	SealedSource	Blue Cask	2456	01/19/77	12/03/96	0.00	S
Picker/AMS Sealed	1202(OLD 2021)	SealedSource	9-W-3	5865	09/04/73	12/06/96	0.00	S
Picker/AMS Sealed	2527	SealedSource	Hot Cell	3436	12/20/84	12/03/96	0.00	S
Picker/AMS Sealed	PX347	SealedSource	9-V-1	2990	09/24/64	12/06/96	0.00	S
Picker/AMS Sealed	2466	SealedSource	WHSE113	7532	06/20/82		1117.13	S
Shielded Drum	8903	Waste	Basement	0.14	12/16/96		0.14	N
Shielded Drum	8904	Waste	Basement	0.11	12/16/96		0.11	N
Shielded Drum	8906	Waste	Basement	0.08	12/16/96		0.08	N
Shielded Drum	8908	Waste	Basement	280	12/16/96		273.32	N
Shielded Drum	8909	Waste	Basement	5.25	12/16/96		5.12	N
Shielded Drum	9646	Waste	Basement	101	12/16/96		98.59	N
Shielded Drum	9647	Waste	Basement	144	12/16/96		140.57	N
Shielded Drum	9648	Waste	Basement	18.3	12/16/96		17.86	N



Type	Identifier	Type	Storage Location	Curies	As of (date)	Date Shipped	Total Inventory (Ci) Activity (today)	1863.35 Form (S or N)
Shielded Drum	9649	Waste	Basement	6.45	12/16/96		6.30	N
Shielded Drum	9650	Waste	Basement	1.6	12/16/96		1.56	N
Shielded Drum	9657	Waste	Basement	1.24	12/16/96		1.21	N
Shielded Drum	9658	Waste	Basement	0.12	12/16/96		0.12	N
Shielded Drum	9659	Waste	Basement	25	12/16/96		24.40	N
Shielded Drum	9660	Waste	Basement	0.29	12/16/96		0.28	N
Shielded Drum	9661	Waste	Basement	42	12/16/96		41.00	N
Shielded Drum	9673	Waste	Basement	2.08	12/16/96		2.03	N
Shielded Insert	D11	Waste	Basement	2.27	12/16/96		2.22	N
Shielded Insert	D12	Waste	Basement	2.27	12/16/96		2.22	N
Shielded Insert	D13	Waste	Basement	1.36	12/16/96		1.33	N
Shielded Insert	D14	Waste	Basement	0.76	12/16/96		0.74	N
55-Gal Drum	9603	Waste	HLWS	0.017	12/16/96		0.02	N
55-Gal Drum	9604	Waste	HLWS	0.001	12/16/96		0.00	N
55-Gal Drum	9605	Waste	HLWS	0.002	12/16/96		0.00	N
55-Gal Drum	9606	Waste	HLWS	0.001	12/16/96		0.00	N
55-Gal Drum	9607	Waste	HLWS	0.011	12/16/96		0.01	N
55-Gal Drum	9608	Waste	HLWS	0.001	12/16/96		0.00	N
55-Gal Drum	9628	Waste	HLWS	0.02	12/16/96		0.02	N
55-Gal Drum	9629	Waste	HLWS	0.002	12/16/96		0.00	N
55-Gal Drum	9630	Waste	HLWS	0.077	12/16/96		0.08	N
55-Gal Drum	9631	Waste	HLWS	0.057	12/16/96		0.06	N
55-Gal Drum	9632	Waste	HLWS	0.26	12/16/96		0.25	N
55-Gal Drum	9633	Waste	HLWS	0.001	12/16/96		0.00	N
55-Gal Drum	9634	Waste	HLWS	0.018	12/16/96		0.02	N
55-Gal Drum	9635	Waste	HLWS	0.013	12/16/96		0.01	N
55-Gal Drum	9636	Waste	HLWS	0.003	12/16/96		0.00	N
55-Gal Drum	9637	Waste	HLWS	0.007	12/16/96		0.01	N
55-Gal Drum	9638	Waste	HLWS	0.031	12/16/96		0.03	N
55-Gal Drum	9639	Waste	HLWS	0	12/16/96		0.00	N
55-Gal Drum	9641	Waste	HLWS	0.012	12/16/96		0.01	N
55-Gal Drum	9643	Waste	HLWS	0.003	12/16/96		0.00	N
55-Gal Drum	9644	Waste	HLWS	0.35	12/16/96		0.34	N
55-Gal Drum	9645	Waste	HLWS	0.1	12/16/96		0.10	N
55-Gal Drum	9662	Waste	HLWS	0.002	12/16/96		0.00	N
55-Gal Drum	9663	Waste	HLWS	0.001	12/16/96		0.00	N
55-Gal Drum	9664	Waste	HLWS	0.001	12/16/96		0.00	N
55-Gal Drum	9665	Waste	HLWS	0.002	12/16/96		0.00	N
55-Gal Drum	9666	Waste	HLWS	0.001	12/16/96		0.00	N

Type	Identifier	Type	Storage Location	Curies	As of (date)	Date Shipped	Total Inventory (Ci) Activity (today)	1863.35 Form (S or N)
55-Gal Drum	9667	Waste	HLWS	0.001	12/16/96		0.00	N
55-Gal Drum	9668	Waste	HLWS	0.001	12/16/96		0.00	N
55-Gal Drum	9669	Waste	HLWS	0.001	12/16/96		0.00	N
55-Gal Drum	9670	Waste	HLWS	0.003	12/16/96		0.00	N
55-Gal Drum	9671	Waste	HLWS	0.001	12/16/96		0.00	N
55-Gal Drum	9672	Waste	HLWS	0.001	12/16/96		0.00	N
55-Gal Drum	9674	Waste	HLWS	0.098	12/16/96		0.10	N
55-Gal Drum	9675	Waste	HLWS	0.031	12/16/96		0.03	N
55-Gal Drum	9676	Waste	HLWS	0.003	12/16/96		0.00	N
55-Gal Drum	9677	Waste	HLWS	0.016	12/16/96		0.02	N
55-Gal Drum	9678	Waste	HLWS	0.007	12/16/96		0.01	N
55-Gal Drum	9679	Waste	HLWS	0.707	12/16/96		0.69	N
55-Gal Drum	9680	Waste	HLWS	0.003	12/16/96		0.00	N
55-Gal Drum	9681	Waste	HLWS	90.377	12/16/96		88.22	N
55-Gal Drum	9682	Waste	HLWS	0.142	12/16/96		0.14	N
55-Gal Drum	9683	Waste	HLWS	0.058	12/16/96		0.06	N
55-Gal Drum	9684	Waste	HLWS	-0.002	12/16/96		-0.00	N
55-Gal Drum	9685	Waste	HLWS	0.006	12/16/96		0.01	N
55-Gal Drum	9686	Waste	HLWS	0.048	12/16/96		0.05	N
55-Gal Drum	9687	Waste	HLWS	0.665	12/16/96		0.65	N
Drummed ResinCharcoal	9501	Waste	LLWS	0.003	07/10/96		0.00	N
Drummed ResinCharcoal	9502	Waste		0.03	07/10/96		0.03	N
Drummed ResinCharcoal	9503	Waste		0.02	07/10/96		0.02	N
Drummed ResinCharcoal	9504	Waste		0.0003	09/07/96		0.00	N
Drummed ResinCharcoal	9505	Waste		0.00028	09/27/96		0.00	N
Drummed ResinCharcoal	9506	Waste		0.00016	09/27/96		0.00	N
Drummed ResinCharcoal	9507	Waste		4.8E-05	09/27/96		0.00	N
Drummed ResinCharcoal	9509	Waste		6.7E-05	09/27/96		0.00	N
Drummed ResinCharcoal	9510	Waste		0.00145	11/08/96		0.00	N
Drummed ResinCharcoal	9511	Waste		0.0031	07/10/96		0.00	N
Drummed ResinCharcoal	9512	Waste		0.000575	09/27/96		0.00	N
Drummed ResinCharcoal	9513	Waste		0.000615	09/27/96		0.00	N
Drummed ResinCharcoal	9514	Waste		0.00143	09/12/96		0.00	N
Drummed ResinCharcoal	9515	Waste		0.00115	09/27/96		0.00	N
Drummed ResinCharcoal	9516	Waste		0.00012	09/27/96		0.00	N
Drummed ResinCharcoal	9517	Waste		0.00133	09/26/96		0.00	N
Drummed ResinCharcoal	9518	Waste		0.00115	09/12/96		0.00	N
Drummed ResinCharcoal	9519	Waste		0.00115	09/26/96		0.00	N
Drummed ResinCharcoal	9520	Waste		0.00135	09/26/96		0.00	N

Type	Identifier	Type	Storage Location	Curies	As of (date)	Date Shipped	Total Inventory (Ci) Activity (today)	1863.35 Form (S or N)
Drummed ResinCharcoal	9521	Waste		0.0021	09/27/96		0.00	N
Drummed ResinCharcoal	9522	Waste		0.00335	11/08/96		0.00	N
Drummed ResinCharcoal	9523	Waste		0.0028	11/08/96		0.00	N
Drummed ResinCharcoal	9524	Waste		0.00215	11/08/96		0.00	N
Drummed ResinCharcoal	9525	Waste		4.8E-05	09/27/96		0.00	N
Drummed ResinCharcoal	9526	Waste		3.8E-05	09/26/96		0.00	N
Drummed ResinCharcoal	9527	Waste		3.8E-05	09/26/96		0.00	N
Drummed ResinCharcoal	9528	Waste		3.8E-05	09/26/96		0.00	N
Drummed ResinCharcoal	9529	Waste		0.000485	09/27/96		0.00	N
Drummed ResinCharcoal	9530	Waste		0.00054	09/26/96		0.00	N
Drummed ResinCharcoal	9531	Waste		0.000175	09/12/96		0.00	N
Drummed ResinCharcoal	9532	Waste		1.75E-05	09/12/96		0.00	N
Drummed ResinCharcoal	9533	Waste		0.013	07/10/96		0.01	N
Drummed ResinCharcoal	9534	Waste		0.024	07/10/96		0.02	N
Drummed ResinCharcoal	9535	Waste		0.0046	07/10/96		0.00	N
Drummed ResinCharcoal	9538	Waste		0.000819	09/12/96		0.00	N
Drummed ResinCharcoal	9539	Waste		0.00165	09/26/96		0.00	N
Drummed ResinCharcoal	9540	Waste		0.00144	09/12/96		0.00	N
Drummed ResinCharcoal	9541	Waste		0.00089	11/08/96		0.00	N
Drummed ResinCharcoal	9542	Waste		0.0014	09/12/96		0.00	N
Drummed ResinCharcoal	9543	Waste		0.000175	09/12/96		0.00	N
Drummed ResinCharcoal	9544	Waste		3.8E-05	09/12/96		0.00	N
Drummed ResinCharcoal	9545	Waste		0.000424	09/12/96		0.00	N
Drummed ResinCharcoal	9546	Waste		0.001	09/17/96		0.00	N
Drummed ResinCharcoal	9547	Waste		0.000239	09/12/96		0.00	N
Drummed ResinCharcoal	9601	Waste		4.8E-05	11/08/96		0.00	N
HEPA Filters	9603	Waste	HLWS	0.02	07/10/96		0.02	N
HEPA Filters	9604	Waste	HLWS	0.001	07/10/96		0.00	N
HEPA Filters	9605	Waste	HLWS	0.0019	07/10/96		0.00	N
HEPA Filters	9606	Waste	HLWS	0.0013	07/10/96		0.00	N
HEPA Filters	9607	Waste	HLWS	0.011	07/10/96		0.01	N
HEPA Filters	9608	Waste	HLWS	0.0015	07/10/96		0.00	N
HEPA Filters	9628	Waste	HLWS	0.02	07/11/96		0.02	N
HEPA Filters	9629	Waste	HLWS	0.0023	07/11/96		0.00	N
HEPA Filters	9630	Waste	HLWS	0.077	07/11/96		0.07	N
HEPA Filters	9631	Waste	HLWS	0.057	07/11/96		0.05	N
HEPA Filters	9632	Waste	HLWS	0.26	07/11/96		0.24	N
HEPA Filters	9633	Waste	HLWS	0.00072	07/11/96		0.00	N
HEPA Filters	9634	Waste	HLWS	0.018	07/11/96		0.02	N



							Total Inventory (Ci)	1863.35
Type	Identifier	Type	Storage Location	Curies	As of (date)	Date Shipped	Activity (today)	Form (S or N)
HEPA Filters	9635	Waste	HLWS	0.013	07/11/96		0.01	N
HEPA Filters	9636	Waste	HLWS	0.0032	07/11/96		0.00	N
HEPA Filters	9637	Waste	HLWS	0.0074	07/11/96		0.01	N
HEPA Filters	9638	Waste	HLWS	0.031	07/11/96		0.03	N
HEPA Filters	9639	Waste	HLWS	0.00011	07/11/96		0.00	N
HEPA Filters	9641	Waste	HLWS	0.012	07/11/96		0.01	N
HEPA Filters	9643	Waste	HLWS	0.0026	07/11/96		0.00	N
HEPA Filters	9644	Waste	HLWS	2.35	07/11/96		0.32	N
HEPA Filters	9645	Waste	HLWS	0.1	07/11/96		0.09	N
HEPA Filters	9662	Waste	HLWS	0.00185	12/23/96		0.00	N
HEPA Filters	9663	Waste	HLWS	0.001	12/23/96		0.00	N
HEPA Filters	9664	Waste	HLWS	0.000775	12/23/96		0.00	N
HEPA Filters	9665	Waste	HLWS	0.0015	12/23/96		0.00	N
HEPA Filters	9666	Waste	HLWS	0.00115	12/23/96		0.00	N
HEPA Filters	9667	Waste	HLWS	0.001	12/23/96		0.00	N
HEPA Filters	9668	Waste	HLWS	0.00121	12/23/96		0.00	N
HEPA Filters	9669	Waste	HLWS	0.00149	12/23/96		0.00	N
HEPA Filters	9670	Waste	HLWS	0.00298	12/23/96		0.00	N
HEPA Filters	9671	Waste	HLWS	0.000999	12/23/96		0.00	N
HEPA Filters	9672	Waste	HLWS	0.00101	12/23/96		0.00	N
HEPA Filters	9674	Waste	HLWS	0.0979	12/23/96		0.10	N
HEPA Filters	9675	Waste	HLWS	0.0309	12/23/96		0.03	N
HEPA Filters	9676	Waste	HLWS	0.00255	12/23/96		0.00	N
HEPA Filters	9677	Waste	HLWS	0.0157	12/23/96		0.02	N
HEPA Filters	9678	Waste	HLWS	0.00685	12/23/96		0.01	N
HEPA Filters	9679	Waste	HLWS	0.707	12/23/96		0.69	N
HEPA Filters	9680	Waste	HLWS	0.00308	12/23/96		0.00	N
HEPA Filters	9681	Waste	HLWS	0.377	12/23/96		0.37	N
HEPA Filters	9682	Waste	HLWS	0.14	12/23/96		0.14	N
HEPA Filters	9683	Waste	HLWS	0.0576	12/23/96		0.06	N
HEPA Filters	9684	Waste	HLWS	0.0019	12/23/96		0.00	N
HEPA Filters	9685	Waste	HLWS	0.00585	12/23/96		0.01	N
HEPA Filters	9686	Waste	HLWS	0.0475	12/23/96		0.05	N
HEPA Filters	9687	Waste	HLWS	0.665	12/23/96		0.65	N
Hot Cell	n.a.	Residual RA		2	08/29/96		1.88	n.a.
Source Garden	n.a.	Residual RA		8.54E-06	08/29/96		0.00	n.a.
Decontamination Room	n.a.	Residual RA		1.13E-06	08/29/96		0.00	n.a.
WHUT Room	n.a.	Residual RA		40	02/28/95		30.82	n.a.
Abandoned Lateral/Manhole	n.a.	Residual RA		0.0096	08/14/96		0.01	n.a.



Type	Identifier	Type	Storage Location	Curies	As of (date)	Date Shipped	Total Inventory (Ci)	1863.35
							Activity (today)	Form (S or N)
B-25 Boxes	8914	Waste	LLW	0.0575	10/14/96		0.05	N
B-25 Boxes	9549	Waste	LLW	0.106	12/19/96		0.10	N
B-25 Boxes	9602	Waste	LLW	0.03	10/14/96		0.03	N
B-25 Boxes	9646	Waste	LLW	0.00525	10/14/96		0.01	N
B-25 Boxes	9647	Waste	LLW	0.0062	10/14/96		0.01	N
B-25 Boxes	9648	Waste	LLW	0.0135	10/14/96		0.01	N
B-25 Boxes	9688	Waste	LLW	0.00158	12/30/96		0.00	N



UNITED STATES  
NUCLEAR REGULATORY COMMISSION

REGION III  
801 WARRENVILLE ROAD  
LISLE, ILLINOIS 60532-4351

February 27, 1997

Stephen Haddock  
Radiation Safety Officer  
Advanced Medical Systems, Inc.  
1020 London Road  
Cleveland, OH 44110

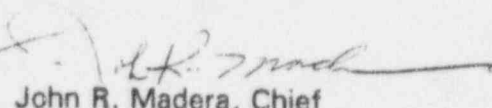
Dear Mr. Haddock:

I am responding to your December 13, 1996 letter, in which you provided revised versions of RSP-018, *Operation of the Gamma Spectrometer*, and RSP-019, *Assessment of Radioactivity in Water Samples*, as well as a new quality assurance procedure, RSP-022, *Quality Assurance for Radionuclide Analysis by Gamma Spectroscopy*. We have reviewed these procedures, and our detailed comments are enclosed. The general finding is that the procedures are substantially better than the ones they replaced, and they contain all of the basic elements needed to provide a basis for discharging water to the sewers.

However, despite the improved quality, we have additional questions with the technical aspects of the procedures which need to be addressed. These questions are detailed in the attachment. Please respond within 30 days from the date of this letter.

Please contact Mr. Sami Sherbini at 301-415-7902 if you have any questions concerning these matters.

Sincerely,

  
John R. Madera, Chief  
Nuclear Materials Inspection Branch 1

Enclosure: As stated

## COMMENTS ON AMS' PROCEDURES

### Procedure RSP-Q18, Operation of the Gamma Spectrometer

1. Most of the equations and quantities used in the procedure do not have units associated with them. The procedure moves from counts to nCi to pCi/L without any indication of the units involved. Units are needed to avoid confusion.
2. Sections 5.6, 5.7, and 5.8 describe the determination of the counting efficiency. Source numbers are given for the different geometries, but it is not clear from the procedure that these sources duplicate the counting geometries, such as Marinelli beakers for water and soil, and filter paper for insoluble materials. It should be noted that the sources must duplicate the counting geometries.
3. Section 5.2.1 states that energy response and regions of interest shall be determined daily, immediately prior to acquisition of background data. This implies a daily background determination. However, Sections 5.3.1, 5.4.1, and 5.5.1 state that background is to be determined at least weekly. There appears to be some inconsistency.
4. It should be clearly stated that Section 5.6, efficiency determination, should be implemented after energy and region of interest determinations.
5. The equation in Section 5.10.6 to calculate the MDA is incorrect. The quantity under the square root, as shown in the procedure, namely:

$$\sqrt{(R_B t_B (1 + t_s/t_B))}$$

should be,

$$\sqrt{(R_B t_s (1 + t_s/t_B))}$$

6. Contaminated beakers should not be counted, as is suggested in Section 5.9.6, note, because they do not duplicate the efficiency determination geometry.
7. Attachment 2 is titled "Daily Background Data", but the procedure indicates that the background is determined weekly. Which is the correct one, or is there an explanation?
8. Attachment 6 does not contain a column following the Decision Level column to indicate whether activity was or was not detected. This is necessary to indicate whether additional steps need be taken or the analysis is terminated at that point.

#### Procedure RSP-019, Assessment of Radioactivity in Water Samples

1. Section 5.5.1 states that all samples with detectable cobalt-60 activity in concentrations of less than 100 pCi per liter will be passed through a 0.45  $\mu$ m filter. It is not clear, however, what detectable activity means here. It presumably means activity that is above the decision level. If so, then this specific criterion should be given, rather than the vaguer "detectable activity."
2. Section 5.5.2 states that the "filter should be re-analyzed" after water is drawn through it. When was it analyzed before this re-analysis? If this re-analysis refers to the water, then the text should be changed to reflect this idea.
3. Sections 5.4.3, 5.4.4, and 5.5.4 are inconsistent. According to the logic presented in these sections, all samples with detectable activity less than 100 pCi/L will be filtered and the filtrate counted to an MDA of 15 pCi/L. Detectable activity in the water sample is determined using a setup that provides an MDA of 50 pCi/L. However, samples may well contain activity that is not detectable using an MDA of 50 pCi/L, but that is substantially above the 15 pCi/L level. The net result is that samples with activities between roughly 50 pCi/L and 15 pCi/L will be discharged as clean when in fact they do not meet the 15 pCi/L insoluble material criterion in Section 5.5.4. This situation should be corrected by lowering the MDA in Section 5.4.3 to 15 pCi/L.
4. Section 5.6.2.1 incorrectly uses the MDA to reach detection decisions. This section should state that analytical results greater than 100 pCi/L or showing results below the corresponding decision level shall be forwarded, etc.
5. As in Item 3 above, the MDA is incorrectly used to make detection decisions. This section should state that analytical results showing results above the corresponding decision level but less than 100 pCi/L, etc.
6. According to Section 5.7.3.1, water that does not contain any detectable activity cannot be discharged, since it would not meet this criterion, which must be met for any discharges according to the procedure.
7. The condition in Section 5.7.4 is not acceptable because it does not meet the 15 pCi/L criterion for insoluble material noted in various sections of the procedure, such as 5.7.3.3.

#### RSP-022, Quality Assurance for Radionuclide Analysis Gamma Spectroscopy

The sample to be analyzed for external intercomparison should be obtained from an external, reference source engaged in "round-robin" testing, rather than being generated in-house, because this will nullify the blind testing element of the comparison. In addition, the sample to be analyzed in this manner should have low-levels of activity, comparable to the levels expected in the water samples, that is, levels that are close to the MDA used in the various analyses.



### Technical Basis

1. The last paragraph on Page 8, and the ensuing conclusions, is inconsistent with Item 3 at the top of the same page. Item 3 states that water may be discharged if the insoluble fraction is shown to be less than 15 pCi/L. The last paragraph on the page, and the conclusion that follows from it, state that "as long as the AMS measurement system is capable of detecting at least 50 pCi of cobalt-60 in its discharges (presumably 50 pCi/L), AMS can ensure compliance..." However, it is not possible to show that insoluble activity is less than 15 pCi/L if the detection system is capable only of detecting 50 pCi/L.
2. For the same reasons discussed above, the conclusion is not acceptable. It states that "water below the decision level with MDAs of less than 50 pCi per liter ...". Such water discharges do not meet the insoluble activity criterion of less than 15 pCi/L.
3. At a detection efficiency of 2% for cobalt-60 in a Marinelli beaker, and a background count rate of 4.6 counts per second, it does not appear that AMS' system is capable of achieving an MDA of 50 pCi/L in a 4-hour count, as stated in your document. We suggest that the calculation for MDA be reviewed to ensure its accuracy.



# Advanced Medical Systems, Inc.

1020 London Road  
Cleveland, OH 44110  
(216) 692-3270

March 4, 1997

Mr. Roy Caniano  
U. S. Nuclear Regulatory Commission  
801 Warrenville Road  
Lisle, Illinois 60532-4351

Dear Mr. Caniano:

In the Emergency Plan for Advanced Medical Systems, Inc. (AMS), your organization is listed as a first responder to certain types of emergencies at the London Road facility. As required in that Plan, AMS must provide annual radiation safety training for first responders. This training will include a review of items of mutual interest and relevant changes in the Plan, instruction in emergency procedures, radiation protection guidelines, and your agency's anticipated role in an emergency. During the training session, the emergency response team activation scheme, notification procedures, and overall response coordination process will be reviewed. Your attendance at this training session is essential if we are to maintain an effective emergency response program.

AMS has scheduled the next annual training session for Wednesday, March 12, 1997 at 1:00 p.m. The location of the session will be at AMS's London Road facility, and the duration will be approximately three (3) hours. A make-up session will be given on Wednesday, March 19, 1997 at 1:00 p.m. for those agencies unable to attend the primary session.

Attached is a form that you may use to indicate your intent to participate in the training session and the listing of individuals from your agency that will be attending. Kindly complete this form and return it to me at the address shown above. In the meantime, if you have any questions or if I can provide you with additional information, please call me at (216) 692-3270. Thank you in advance for your participation. I am looking forward to seeing you at London Road for the training session.

Sincerely,

Stephen J. Haddock, R.S.O.

MAR 11 1997

**ADVANCED MEDICAL SYSTEMS, INC.  
EMERGENCY RESPONSE TRAINING**

Agency Name:			
Agency Address:			
Name of Primary Contact:			Telephone:
The following individuals will attend Emergency Response Training at the AMS London Road facility on behalf of this agency:			
Name (print)	Telephone	Preferred Session (check one)	
		<input type="checkbox"/> 3/12/97	<input type="checkbox"/> 3/19/97
		<input type="checkbox"/> 3/12/97	<input type="checkbox"/> 3/19/97
		<input type="checkbox"/> 3/12/97	<input type="checkbox"/> 3/19/97
		<input type="checkbox"/> 3/12/97	<input type="checkbox"/> 3/19/97
		<input type="checkbox"/> 3/12/97	<input type="checkbox"/> 3/19/97

Please return your completed form to: Stephen J. Haddock, R.S.O.  
 Advanced Medical Systems, Inc.  
 1020 London Road  
 Cleveland, Ohio 44110

Each attendee will receive a telephone call to confirm his/her attendance at the preferred session approximately two (2) weeks before the session.

# Advanced Medical Systems, Inc.

1020 London Road  
Cleveland, Ohio 44110  
(216) 692-3270  
Fax (216) 692-3269

March 4, 1997

Mr. John R. Madera, Chief  
Nuclear Materials Licensing Branch  
United States Nuclear Regulatory Commission  
801 Warrenville Road  
Lisle, Illinois 60523-4351

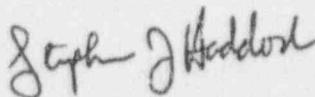
Re: USNRC License No. 34-19089-01

Dear Mr. Madera:

Advanced Medical Systems, Inc. (AMS) is in receipt of your letter dated February 27, 1997 wherein additional comments in regard to Radiation Safety Procedure RSP-018, "Operation of the Gamma Spectrometer", RSP-019, "Assessment of Radioactivity in Water Samples", and RSP-022, "Quality Assurance for Radionuclide Analysis by Gamma Spectroscopy" were provided. Enclosed are our responses to your comments, along with a description of our proposed follow-up actions. When AMS receives your approval, the three RSPs will be signed and implemented as described in RSP-003, "Control of Radiation Safety Procedures".

On March 1, 1995 and March 20, 1995, AMS submitted applications to amend the referenced license to permit release of ground/surface water that collects in the *remediated* foundation drainage system of the London Road facility. As of the date of this letter, USNRC authorization to proceed on this request has not yet been received. Please call me at (216) 692-3270 if you have any questions or if I can assist you in any way in expediting your review of our March 1, 1996 and March 20, 1996 amendment requests and subsequent supporting information. Timely USNRC action on this important but long-overdue issue would be greatly appreciated.

Sincerely,



Stephen J. Haddock, R.S.O.

cc: E. L. Svigel  
D. A. Miller, Esq. - Stavole & Miller  
C. D. Berger, C.H.P. - IEM

RECEIVED

MAR 10 1997

REGION III

pm: 3-5-97

MAR 10 1997



**ADVANCED MEDICAL SYSTEMS, INC.**  
**RESPONSE TO USNRC COMMENTS ON WATER DISCHARGE PROCEDURES**

**USNRC Comment 1 on Procedure RSP-018:** Most of the equations and quantities used in the procedure do not have units associated with them. The procedure moves from counts to nCi to pCi/l without any indication of the units involved. Units are needed to avoid confusion.

**AMS Response:** Concur.

**Action Taken:** Units will be included in the variable definitions for each equation.

**USNRC Comment 2 on Procedure RSP-018:** Sections 5.6, 5.7 and 5.8 describe the determination of the counting efficiency. Source numbers are given for the different geometries, but it is not clear from the procedure that these sources duplicate the counting geometries, such as Marinelli beakers for water and soil, and filter paper for insoluble materials. It should be noted that the sources must duplicate the counting geometries.

**AMS Response:** The purchase specifications for the calibration sources ensured that the source geometry was similar to the intended counting geometry. It is for this reason that the source number is specified in RSP-018. Nonetheless, the reviewer's request to specify the counting geometry will be accommodated.

**Action Taken:** The geometry for each of the numbered sources will be given in sections 5.6.2, 5.7.2 and 5.8.2, respectively.

**USNRC Comment 3 on Procedure RSP-018:** Section 5.2.1 states that energy response and regions of interest shall be determined daily, immediately prior to acquisition of background data. This implies a daily background determination. However, Sections 5.3.1, 5.4.1 and 5.5.1 state that background is to be determined at least weekly. There appears to be some inconsistency.

**AMS Response:** Concur.

**Action Taken:** Section 5.2.1 will be modified to read: "Energy response and regions of interest shall be determined daily prior to initial use."

**USNRC Comment 4 on Procedure RSP-018:** It should be clearly stated that Section 5.6 efficiency determination, should be implemented after energy and region of interest determinations.

**AMS Response:** Concur.

**Action Taken:** Sections 5.6.1, 5.7.1 and 5.8.1 will be modified to read: "The detection efficiency for water/soil/filters should be determined daily, at the start of each shift after the energy calibration and regions of interest are determined."

**USNRC Comment 5 on Procedure RSP-018:** The equation in Section 5.10.6 to calculate the MDA is incorrect. The quantity under the square root, as shown in the procedure should be:

$$\sqrt{R_g I_g (1 + I_g / I_b)}$$

**AMS Response:** Concur.

**Action Taken:** The typographical error that appeared in the equation in Section 5.10.6 has been corrected to read:

$$MDA = \frac{2.71 + 3.29 \sqrt{R_g I_g (1 + \frac{I_g}{I_b})}}{I_g \times E_{\text{meas}} \times 0.037 \times A}$$

**USNRC Comment 6 on Procedure RSP-018:** Contaminated beakers should not be counted, as is suggested in Section 5.9.6 note, because they do not duplicate the efficiency determination geometry.

**AMS Response:** Because the thickness of any residual contamination is likely to be small with respect to the Marinelli beaker size, because the gamma energies of interest at AMS are 1.17 and 1.32 MeV, and because of the stopping power of sodium iodide for these gamma energies is not great, the geometry difference posed by the reviewer, in light of other associated counting errors, is negligible and certainly not detectable. However, the presence of surface contamination on the outside of a beaker will cause the analytical result to be biased high. Therefore, the reviewer's recommendation will be accommodated.

**Action Taken:** The Note under Section 5.9.6 will be modified to read: "If contamination by a radionuclide other than  $^{60}\text{Co}$  or other non-radiological material is suspected, place the container in a thin-walled plastic bag prior to its placement on the detector".

**USNRC Comment 7 on Procedure RSP-018:** Attachment 2 is entitled "Daily Background Data", but the procedure indicates that the background is determined weekly. Which is the correct one, or is there an explanation?

**AMS Response:** Concur.

**Action Taken:** The title of Attachment 2 will be modified to read "Background Data".

**USNRC Comment 8 on Procedure RSP-018:** Attachment 6 does not contain a column following the Decision Level column to indicate whether activity was or was not detected. This is necessary to indicate whether additional steps need be taken or the analysis is terminated at that point.

**AMS Response:** The Note under Statement 5.10.3 states that "if  $R_g$  is less than  $DL(R_g)$ , the sample is assumed to contain no  $^{60}\text{Co}$ ". AMS maintains that this instruction is sufficient for decision-making and that an additional column in Attachment 6 is unnecessary. The remainder of the Attachment 6 entry must be completed regardless of whether the Decision Level is exceeded or not.

**USNRC Comment 1 on Procedure RSP-019:** Section 5.5.1 states that all samples with detectable cobalt-60 activity in concentrations of less than 100 pCi per liter will be passed through a 0.45  $\mu$ m filter. It is not clear, however, what detectable activity means here. It presumably means activity that is above the decision level. If so, then this specific criterion should be given, rather than the vaguer "detectable activity."

**AMS Response:** Concur.

**Action Taken:** Section 5.5.1 will be modified to read: "Samples that contain  $^{60}\text{Co}$  in concentrations of less than 100 pCi per liter shall be drawn (by vacuum pump) through a 0.45 micrometer filter".

**USNRC Comment 2 on Procedure RSP-019:** Section 5.5.2 states that the "filter should be re-analyzed" after water is drawn through it. When was it analyzed before this re-analysis? If this re-analysis refers to the water, then the text should be changed to reflect this idea.

**AMS Response:** Concur.

**Action Taken:** Section 5.5.2 will be modified to read: "The filter shall be analyzed pursuant to RSP-018".

**USNRC Comment 3 on Procedure RSP-019:** Sections 5.4.3, 5.4.4 and 5.5.4 are inconsistent. According to the logic presented in these sections, all samples with detectable activity less than 100 pCi/l will be filtered and the filtrate counted to an MDA of 15 pCi/l. Detectable activity in the water sample is determined using a setup that provides an MDA of 50 pCi/l. However, samples may well contain activity that is not detectable using an MDA of 50 pCi/l, but that is substantially above the 15 pCi/l level. The net result is that samples with activities between roughly 50 pCi/l and 15 pCi/l will be discharged as clean when in fact they do not meet the 15 pCi/l insoluble material criterion in Section 5.5.4. This situation should be corrected by lowering the MDA in section 5.4.3 to 15 pCi/l.

**AMS Response:** AMS assumes the reviewer is referring to some combination of Sections 5.4 and 5.5 in this comment. If that is the case, the reviewer's interpretation of the logic is correct. However, the recommendation given by the reviewer is not applicable. If samples are counted by the method of direct counting, which is less time-consuming than the method of filtering, and if no detectable radioactivity is present, RSP-019 states that the water may be discharged without regard for solubility. This means that it is, theoretically, possible for water containing insoluble  $^{60}\text{Co}$  in concentrations greater than 15 pCi per liter but less than the MDA to be discharged. However, the performance criterion for this counting system, as described in Attachment 1, "Technical Basis for Water Discharge Criteria", is intended to be 50 pCi per liter, not 15 pCi per liter. (See response to USNRC Comment 1 on the Technical Basis for additional information.) This criterion is a factor of four (4) lower than the drinking water standard for  $^{60}\text{Co}$  (40 CFR 141), and the methodology for its development is consistent with that contained in NUREG/CR-5814, "Evaluation of Exposure Pathways to Man from Disposal of Radioactive Materials into Sanitary Sewer Systems" (May, 1992).

**USNRC Comment 4 on Procedure RSP-019:** Section 5.6.2.1 incorrectly uses the MDA to reach detection decisions. This section should state that analytical results greater than 100 pCi/l or showing results below the corresponding decision level shall be forwarded, etc.

**AMS Response:** Concur.

**Action Taken:** Section 5.6.2.1 will be modified to read "Analytical results that are less than the decision level or greater than 100 pCi/liter shall be forwarded to the RSO and no additional analyses shall be necessary".

**USNRC Comment 5 on Procedure RSP-019:** As in Item 3 above, the MDA is incorrectly used to make detection decisions. This section should state that analytical results showing results above the corresponding decision level but less than 100 pCi/l, etc.

**AMS Response:** AMS assumes the reviewer is referring to Section 5.6.2.1, the response for which was presented in response to USNRC Comment 4 on Procedure RSP-019.

**USNRC Comment 6 on Procedure RSP-019:** According to section 5.7.3.1, water that does not contain any detectable activity cannot be discharged, since it would not meet this criterion, which must be met for any discharges according to the procedure.

**AMS Response:** Concur.

**Action Taken:** For clarity, Section 5.7.4 and 5.7.4 will be reversed. The new Section 5.7.4 will be modified to read: "Water that exhibits net count rates in excess of the Decision Level may be discharged if it contains *all* of the following:"

**USNRC Comment 7 on Procedure RSP-019:** The condition in section 5.7.4 is not acceptable because it does not meet the 15 pCi/l criterion for insoluble material noted in various sections of the procedure, such as 5.7.3.3.

**AMS Response:** The performance criterion for the AMS spectroscopy system for direct counting is 50 pCi per liter, not 15 pCi per liter. (See response to USNRC Comment 1 on the Technical Basis for additional information.) Therefore, AMS maintains that Section 5.7.4 is appropriate. However, for clarity, the reference to the MDA requirement for each counting event will be deleted.

**Action Taken:** Section 5.7.4.1 will be deleted.



**USNRC Comment on Procedure RSP-022(a):** The sample to be analyzed for external intercomparison should be obtained from an external, reference source engaged in "round robin" testing, rather than being generated in-house, because this will nullify the blind testing element of the comparison.

**AMS Response:** Section 5.5.6 does not require blind testing of the AMS spectroscopy system. It merely requires that a fraction of all sample results obtained by AMS be confirmed by an outside laboratory.

Because the AMS system is calibrated daily prior to use using a NIST-traceable standard of the only radionuclide and geometry of interest (i.e.,  $^{60}\text{Co}$ ), because a peak search or nuclide identification program is not used to complete an analysis, and because the results are obtained by simple comparison of net counts between a sample and the standard, AMS maintains that blind testing is not necessary.

**USNRC Comment on Procedure RSP-022(b):** In addition, the sample to be analyzed in this manner should have low levels of activity, comparable to the levels expected in the water samples, that is, levels that are close to the MDA used in the various analyses.

**AMS Response:** Concur.

**Action Taken:** The following statement will be added after section 5.6.3.2: "The sample selected for intercomparison shall have exhibited a net count rate by direct counting that was less than the Decision Level and an MDA of less than 50 pCi per liter".

**USNRC Comment 1 on Technical Basis:** The last paragraph on Page 8, and the ensuing conclusions, is inconsistent with Item 3 at the top of the same page. Item 3 states that water may be discharged if the insoluble fraction is shown to be less than 15 pCi/l. The last paragraph on the page, and the conclusion that follows from it, state that "as long as the AMS measurement system is capable of detecting at least 50 pCi of cobalt-60 in its discharges (presumably 50 pCi/l), AMS can ensure compliance . . ." However, it is not possible to show that insoluble activity is less than 15 pCi/l if the detection system is capable only of detecting 50 pCi/l.

**AMS Response:** Concur.

**Action Taken:** Item (3) will be modified to read: "If a sample exhibits a net count rate by direct counting that is greater than the Decision Level, and if the total  $^{60}\text{Co}$  concentration (soluble plus insoluble) is less than 100 pCi per liter, the water may be discharged if the insoluble fraction is shown to be less than 15 pCi per liter".

**USNRC Comment 3 on Technical Basis:** For the same reasons discussed above, the conclusion is not acceptable. It states that "water below the decision level with MDAs of less than 50 pCi per liter. . . ." Such water discharges do not meet the insoluble activity criterion of less than 15 pCi/l.

**AMS Response:** See response to USNRC Comment 1 on the Technical Basis.

**USNRC Comment 3 on Technical Basis:** At a detection efficiency of 2% for cobalt 60 in a Marinelli beaker, and a background count rate of 4.6 counts per second, it does not appear that AMS' system is capable of achieving an MDA of 50 pCi/l in a 4 hour count, as stated in your document. We suggest that the calculation for MDA be reviewed to ensure its accuracy.

**AMS Response:** As shown in Attachment 4 of our December 13, 1996 letter, the nominal background count rate in the regions of interest for the AMS spectroscopy system is approximately 0.46 counts per second, not 4.6 counts per second as cited by the reviewer.

AMS maintains that the equation used to calculate the MDA in Section 5.10.6 of RSP-018 is correct, and that an MDA of less than 50 pCi per liter is achievable by direct counting in a four-hour count time. The following is an example calculation for a one (1) liter sample, an efficiency of two (2) percent, and a background count rate of 0.46 counts per second, along with the nominal sample and background count times given in Attachment 4 of our December 13th letter:

$$MDA = \frac{2.71 + 3.29 \sqrt{R_B t_B (1 + \frac{t_S}{t_B})}}{t_S \times E_{\text{meas}} \times 0.037 \times A}$$

$$MDA = \frac{2.71 + 3.29 \sqrt{4.6 \times 10^{-1} \times 1.44 \times 10^4 (1 + \frac{1.44 \times 10^4}{2.88 \times 10^4})}}{1.44 \times 10^4 \times 2 \times 10^{-2} \times 0.037 \times 1}$$

$$MDA = \frac{330.66}{10.66}$$

$$MDA = 31.02$$

# Advanced Medical Systems, Inc.

1020 London Road  
Cleveland, Ohio 44110  
(216) 692-3270  
Fax (216) 692-3269

March 5, 1997

Mr. J. R. Madera, Chief  
Nuclear Materials Licensing Section  
United States Nuclear Regulatory Commission  
801 Warrenville Road  
Lisle, Illinois 60523-4351

Re: Physical Inventory of Sealed Sources (License No. 34-19089-01)

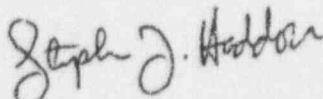
Dear Mr. Madera:

On February 21, 1997, Advanced Medical Systems, Inc. forwarded to you a letter that addressed the physical inventory requirement in Provision 14(c) of License No. 34-19089-01. On the top of the third page of that letter, two words were inadvertently omitted from one sentence. The following is the paragraph that contains the sentence in question, with the omitted words highlighted in bold/underlined type:

"AMS initiated another search of its records to determine if there were any other sealed sources received at the London Road facility that were unaccounted for on production or shipping records. This search did not reveal any unaccounted-for sources."

AMS regrets this error and hopes that it did not create confusion for you or other readers. If you have any questions or if I can provide you with additional information, please call me at (216) 692-3270.

Sincerely,



Stephen J. Haddock, R.S.O.

cc: E. Svigel  
D. Miller - Stavole & Miller  
C. Berger - IEM

RECEIVED  
MAR 17 1997  
REGION III

pm: 3-10-97

MAR 17 1997

March 5, 1997

Lawrence K. English  
Assistant General Counsel  
Northeast Ohio Regional Sewer District  
3826 Euclid Avenue  
Cleveland, OH 44115-2504

Dear Mr. English:

Thank you for the information which you provided to Mr. Geoffrey C. Wright of this office by letter dated December 30, 1996. Your letter raised several concerns regarding a letter dated December 13, 1996, sent from Advanced Medical Systems, Inc. (AMS) to Region III. Please note that Mr. Wright is no longer associated with the AMS case; his replacement is Mr. Roy J. Caniano.

Specifically, your concerns were that AMS was inaccurate when it stated that: (1) only three water storage tanks at its facility have shown cobalt-60 contamination; (2) prior to its discharge, water is confirmed to be "clean" by the NEO OSD; and (3) the contaminated water is a residue of AMS' 1995 water treatment project. In addition, you indicated that it was likely that the source of the contamination is the footer drains and soil around the AMS facility.

Our review of your concerns included the following: (1) an evaluation of the gamma spectroscopy results of analyses performed on AMS water samples by NRC, NEORSD, and AMS during 1996; (2) a review of the 1995 water treatment project; and (3) a review of AMS' 1995 footer drain replacement project. The results of our review were discussed with you by telephone on February 27, 1997. During this telephone conversation, you indicated that you had further questions about the source of the soluble cobalt-60 found in certain tanks and that you would provide these questions in writing at a later date.

Regarding the number of contaminated tanks at AMS, NRC confirmed that AMS is aware that at least eight tanks have shown non-zero concentrations of cobalt-60. However, of these tanks, only three have shown non-zero concentrations of insoluble cobalt-60. Title 10 CFR 20.2003, *Disposal by Release into Sanitary Sewerage*, allows cobalt-60 to be discharged if it is readily soluble in water and if its concentration is less than 30,000 picocuries per liter (pCi/l). To date, all tanks have shown cobalt-60 concentrations less than 100 pCi/l. According to NRC and AMS analyses, the following three tanks contained insoluble cobalt-60: Tank 880, Tank 164, and Tank 329. AMS was permitted to discharge Tank 880 only after its contents were filtered, and subsequent testing by NRC showed no insoluble cobalt-60. AMS has not been permitted to discharge Tanks 164 and 329.



Regarding the water discharged from AMS' storage tanks, we note your reluctance to characterize any water containing cobalt-60 as "clean." However, as referenced above, NRC regulations allow cobalt-60 to be discharged if it is readily soluble in water and if its concentration is less than 30,000 pCi/l. All of the discharged tanks met these criteria.

As of January 24, 1997, 86 tanks of water from AMS' footer drains have been discharged. As discussed above, Tanks 880, 164, and 329 contained insoluble cobalt-60 (picocurie levels). Our review revealed that these three tanks were used during the 1995 water clean-up project. Insoluble cobalt-60 has not been found in tanks which were installed after the completion of the water clean-up project. Therefore, it does appear likely that the source of the insoluble cobalt-60 is the tanks used during the water clean-up project.

Regarding the soil around the AMS facility, based on the gamma spectroscopy results discussed above, as well as NRC's inspections of the 1995 footer drain replacement project, it seems unlikely that there are significant levels of cobalt-60 contamination in the soil surrounding the footer drains. During the 1995 footer drain replacement project at AMS, NRC inspectors observed AMS contractors performing radiological surveys of the soil surrounding the footer drains. Any excavated soil which exhibited radiation levels near or above eight picocuries per gram (the unrestricted release limit for cobalt-60 in soil) was removed and later replaced with clean fill.

Please be assured that, at the time of decommissioning, the issue of soil contamination around the AMS facility will be thoroughly addressed by both AMS and NRC. This issue is also addressed in AMS' Decommissioning Funding Plan, which is part of its license renewal package currently being reviewed by NRC.

Again, thank you for informing us of your concerns. If you have any questions regarding these matters, please contact Mr. John Madera of my staff at 630-829-9834. Your cooperation with the NRC is greatly appreciated.

Sincerely,

Original Signed by Roy J. Caniano

Cynthia D. Pederson, Director  
Division of Nuclear Materials Safety

See Attached Distribution

DOCUMENT NAME: R:\LTRS2LIC\MTLS\030\97316055.L01

\* See Previous Concurrence

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OFFICE	*RIII	C	*RIII	C	*NMSS	C	*OGC	C
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DATE	02/27/97		02/27/97		02/21/97 via phone		02/10/97 via phone	
OFFICE	RIII	C	RIII BB		RIII		RIII	
NAME	HClayton <i>HC</i>		BBerson		RCaniano <i>RJC</i>		CPederson <i>CP</i>	
DATE	02/03/97		02/13/97		02/15/97		02/15/97	

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Regarding the water discharged from AMS' storage tanks, we note your reluctance to characterize any water containing cobalt-60 as "clean." However, as referenced above, NRC regulations allow cobalt-60 to be discharged if it is readily soluble in water and if its concentration is less than 30,000 pCi/l. All of the discharged tanks met these criteria.

As of January 24, 1997, 86 tanks of water from AMS' footer drains have been discharged. As discussed above, Tanks 880, 164, and 329 contained insoluble cobalt-60 (picocurie levels). Our review revealed that these three tanks were used during the 1995 water clean-up project. Insoluble cobalt-60 has not been found in tanks which were installed after the completion of the water clean-up project. Therefore, it does appear likely that the source of the insoluble cobalt-60 is the tanks used during the water clean-up project.

Regarding the soil around the AMS facility, based on the gamma spectroscopy results discussed above, as well as NRC's inspections of the 1995 footer drain replacement project, it seems unlikely that there are significant levels of cobalt-60 contamination in the soil surrounding the footer drains. During the 1995 footer drain replacement project at AMS, NRC inspectors observed AMS contractors performing radiological surveys of the soil surrounding the footer drains. Any excavated soil which exhibited radiation levels near or above eight picocuries per gram (the unrestricted release limit for cobalt-60 in soil) was removed and later replaced with clean fill.

Please be assured that, at the time of decommissioning, the issue of soil contamination around the AMS facility will be thoroughly addressed by both AMS and NRC. This issue is also addressed in AMS' Decommissioning Funding Plan, which is part of its license renewal package currently being reviewed by NRC.

Again, thank you for informing us of your concerns. If you have any questions regarding these matters, please contact Mr. John Madera of my staff at 630-829-9834. Your cooperation with the NRC is greatly appreciated.

Sincerely,

Cynthia D. Pederson, Director  
Division of Nuclear Materials Safety

See Attached Distribution

DOCUMENT NAME: G:\LTRS2LIC\MTLS\030\97316055.L01

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Northeast Ohio Regional Sewer District  
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Cleveland, OH 44115

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Cuyahoga County Board of Health  
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Michael Kalstrom, Secretary  
County of Cuyahoga  
Cuyahoga Emergency Management  
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Bernard Bordenick  
U.S. Nuclear Regulatory Commission  
Rockville, MD 20555

bcc:

C. Jones, NMSS  
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E-mail:

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UNITED STATES  
NUCLEAR REGULATORY COMMISSION

REGION III  
801 WARRENVILLE ROAD  
LISLE, ILLINOIS 60532-4351

March 7, 1997

Edward Svigel, Chairman  
Radiation Safety Committee  
Advanced Medical Systems, Inc.  
121 North Eagle Street  
Geneva, OH 44041

SUBJECT: NRC INSPECTION REPORT NO. 030-16055/97001(DNMS)

Dear Mr. Svigel:

This refers to the inspection conducted by members of this office on November 13 through December 6, 1996 at the London Road, Cleveland, Ohio facility. The purpose of the inspection was to determine whether activities authorized by the license regarding the source disposal project were conducted safely and in accordance with NRC requirements. At the conclusion of the inspection, the findings were discussed with those individuals identified in the enclosed report.

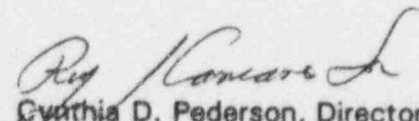
The areas examined during the inspection are identified in the report. Within these areas, the inspection consisted of selective examinations of procedures and representative records, interviews with personnel, and observation of activities in progress.

No violations of NRC requirements were identified during the inspection.

In accordance with 10 CFR 2.790 of the NRC's "Rules of Practice," a copy of this letter and its enclosure will be placed in the NRC Public Document Room.

We will gladly discuss any questions you have concerning this inspection.

Sincerely,

  
Cynthia D. Pederson, Director  
Division of Nuclear Materials Safety

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

Enclosure: Inspection Report  
No. 030-16055/97001(DNMS)

See Attached Distribution



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Cleveland, OH 44115

Jane Harf, Chairperson  
Ohio State Emergency Response  
Commission  
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P.O. Box 163669  
Columbus, OH 43216-3669

Bernard Bordenick  
U.S. Nuclear Regulatory Commission  
Rockville, MD 20555

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U.S. NUCLEAR REGULATORY COMMISSION

REGION III

Docket: 030-16055

License: 34-19089-01

Report: 030-16055/97001(DNMS)

Licensee: Advanced Medical Systems, Inc.

Location: 1020 London Road  
Cleveland, OH

Dates of Inspection: November 13 through December 6, 1996

Inspectors: Michael Weber, Radiation Specialist  
Mark Mitchell, Radiation Specialist  
Kevin Null, Senior Licensing Reviewer

Approved: John R. Madera, Chief  
Nuclear Materials Inspection Branch 1

Attachments: (1) Brief Chronology of Nov. 13-Dec. 6, 1996 Events  
(2) List of Persons Contacted, Inspection Procedures  
Used, and List of Acronyms Used

## EXECUTIVE SUMMARY

Advanced Medical Systems, Inc. (AMS)  
Cleveland, OH

NRC Inspection Report No. 030-16055/97001(DNMS)

During the week of December 1, 1996, Chem-Nuclear Systems, Inc. (CNSI) shipped via truck approximately 48,100 curies of cobalt-60 from AMS' Cleveland, Ohio facility to Barnwell, South Carolina, for disposal. The cobalt-60 was in the form of bulk sources (pellets contained in screw-top containers) and sealed sources. The sources were packaged in two lead/steel cylindrical liners, each of which was contained inside a CNSI 1-13G type B shipping cask.

Region III inspectors were on site when the sources were packaged and shipped, and during all Hot Cell entries. The inspectors performed confirmatory exposure rate and smear surveys of the cask and truck before the truck left the site. The survey results were far below applicable NRC and DOT limits.

AMS' current source inventory lists only a 1200 curie cobalt-60 calibration source. This is due to the fact that during and after the source disposal project, AMS performed a complete physical and records inventory of its sources and determined that its entire source inventory, with the exception of the calibration source referred to above, was shipped to Barnwell during the source disposal project. The AMS inventory process and records will be reviewed during the next routine inspection.

No violations of NRC requirements were identified during this inspection.

## Details

### 1. Program Overview

Prior to May 31, 1991, AMS was authorized to manufacture NRC approved sealed sources for use in teletherapy machines. Currently, AMS is only authorized to perform decommissioning and routine health physics activities.

According to AMS, the current inventory at the London Road facility consists of a 1200 curie sealed calibration source, and approximately 700 curies of packaged wastes.

The license issued to AMS was originally issued on November 2, 1979, and was renewed on December 13, 1989, with an expiration date of December 31, 1994. The license was most recently amended on February 19, 1997. In November 1994, AMS submitted a timely renewal application, and the existing license continues to be effective pending completion of the NRC review of the renewal application.

### 2. Source Disposal Project

#### Background

By letter dated June 10, 1996, AMS submitted to the NRC a *Building Recovery Project* report which discussed, among other things, its plan to dispose of all accessible bulk and sealed cobalt-60 sources (with the exception of a calibration source) at its London Road facility. On November 5, 1996, NRC issued amendment No. 46 to AMS' license which approved AMS' source disposal plan.

#### Project Summary

The source disposal project consisted of transferring the sources into the Hot Cell where they were placed into one of two shielded liners, and then transferring each liner into a Type B shipping cask which was subsequently transported via truck to Barnwell, South Carolina, for disposal. A total of approximately 48,100 curies of cobalt-60 was shipped to Barnwell. (See the Attachment for a detailed chronology.)

Three AMS workers were on site during the project, including the RSO (who is also the Isotope Handler) and his assistant, and a worker. Additional on site health physics support was provided by a contract health physics project manager, as well as a CNSI project manager and an additional worker. Region III inspectors were on site when the sources were packaged and shipped, and during all Hot Cell entries.

During the loading of the sources into the liners, it was important to maintain correct placement of the sources, due to curie content and heat dissipation requirements of the



liners and shipping casks<sup>1</sup>, as well as ALARA considerations. This was accomplished by performing a physical inventory of each source placed into the liners, and carefully following the previously formulated placement plan. In order to perform the inventory, a telescope attached to the Hot Cell was often used to read the serial number on a source.

Prior to the initiation of the source disposal project, AMS' inventory records showed that seven sources were stored in an inaccessible storage plug in AMS' Hot Cell. The remainder of the sources were stored in the Source Garden, two shipping casks, and several teletherapy heads and source exchange containers. During and after the source disposal project, AMS performed a complete physical and records inventory of its sources. During the inventory it was discovered that each of the seven sources believed to be in the inaccessible storage plug was accounted for in the Storage Garden, and was subsequently disposed of with the other sources. Therefore, AMS has concluded that its entire source inventory, with the exception a 1200 curie cobalt-60 calibration source, was shipped to Barnwell during the source disposal project. The AMS inventory process and records will be reviewed during the next routine inspection.

### 3. Pre-job Briefings and Training

The inspectors attended the majority of the pre-job briefings. For all non-routine, high risk activities, e.g., Hot Cell entries, source transfers using the Transfer Monster, and liner transfers, the applicable radiation work permit, work instructions and job assignments were reviewed and discussed line-by-line in what appeared to be a very effective manner.

The inspectors audited the radiation safety training given to a crane operator. The training appeared to be effective and appropriate.

No violations were identified.

### 4. Protective Clothing/Equipment and Personnel Dosimetry

The inspectors observed that workers wore appropriate protective clothing and equipment at all times, as required by the radiation work permit, while working in contaminated areas, such as the Hot Cell, Decon Room, and Isotope Shop. This included two pairs of coveralls, two hoods, at least two pairs of booties, many pairs of gloves, taped seams, breathing zone air monitors, and respirators (for Hot Cell entries).

The inspectors observed that workers wore proper dosimetry at all times during the disposal project, including: (1) at least one self-reading pocket dosimeter for all workers, including crane operators, (2) whole body TLDs for all workers who worked in a restricted area, (3) digital alarming dosimeters for all workers who entered the Hot

---

<sup>1</sup>Each liner was limited to a capacity of 27,000 curies of cobalt-60, and each shipping cask was limited to 600 watts decay heat rate.

Cell, (4) extremity TLDs for all workers who entered the Hot Cell.

The following dose readings were obtained from the dosimetry equipment worn by the workers:

Worker	Whole Body (mrem)	Extremity (mrem)
#1	540	700
#2	820	1630
#3	880	740
#4	550	770
#5	400	970
Crane operator #1	0	N/A
Crane operator #2	0	N/A
Total	3190	4810

No violations were identified.

5. Transportation

For each of the shipments, the inspectors reviewed the licensee's package receipt, loading, transfer and package preparation for shipment. The licensee and its contractor, CNSI, followed the Quality Assurance Program for use of the Type B Package. No violations were identified.

3. Licensee's Survey Results

During the source disposal project, the following areas and/or objects were surveyed by the workers: (1) Hot Cell, (2) Decon Room, (3) liners, (4) source casks, (5) shipping casks, and (6) truck. A table listing the maximum readings follows:

Location	Exposure rate	Contamination
Decon Room	100 mrem/hr	
Hot Cell opening	3 R/hr	
Hot Cell interior	20 R/hr	
Top of Liner 1 (loaded)	40 R/hr	< 220 dpm/100 cm <sup>2</sup>
Sides of Liner 1 (loaded)	22 R/hr	< 220 dpm/100 cm <sup>2</sup>

Bottom of shipping cask over pack (loaded with Liner 1)	1.4 mrem/hr	< 220 dpm/100 cm <sup>2</sup>
Sides of shipping cask over pack (loaded with Liner 1)	< 0.1 mrem/hr	< 220 dpm/100 cm <sup>2</sup>
Perimeter of truck bed (loaded with Liner 1 in cask)	< 0.1 mrem/hr	< 220 dpm/100 cm <sup>2</sup>
Top of Liner 2 (loaded)	50 R/hr	
Sides of Liner 2 (loaded)	7 R/hr	
Bottom of shipping cask over pack (loaded with Liner 2)	1.5 mrem/hr	< 220 dpm/100 cm <sup>2</sup>
Sides of shipping cask over pack (loaded with Liner 2)	< 0.1 mrem/hr	< 220 dpm/100 cm <sup>2</sup>
Perimeter of truck bed (loaded with Liner 2 in cask)	< 0.1 mrem/hr	< 220 dpm/100 cm <sup>2</sup>

No violations were identified.

#### 7. NRC's Confirmatory Measurements

All of the exposure rate measurements listed in the above table, with the exception of the Hot Cell and liner measurements, were confirmed by the inspectors. In addition, the inspectors took many smear samples of the loaded casks' over pack, and many areas of the truck. The results were all less than 220 dpm/100 cm<sup>2</sup>.

(Survey meters used: (1) Ludlum Model 3, NRC #046891, with Model 44-9 pancake probe and Model 44-38 energy compensated GM tube, within calibration period, and (2) Eberline Model PIC-6A Ion Chamber, NRC #034627, within calibration period. The smear samples were counted on the Region III Laboratory's gamma spectroscopy system.)

No violations were identified.

#### 8. Conclusion and Performance Assessment

The inspectors observed that the source disposal project was performed in accordance with NRC regulations (including AMS' license conditions and AMS' radiation work permit), DOT requirements, and good health physics practices. No violations of NRC requirements were observed during the inspection.

## ATTACHMENT 1

### BRIEF CHRONOLOGY OF NOV. 13-DEC. 6, 1996 EVENTS

Nov. 13, 1996

- Preparations for the job continue

Nov. 14, 1996

- Pre-job briefing
- Dry run - moving liners and Blue Cask into Hot Cell

Nov. 15, 1996

- Pre-job briefing
- Pre-Hot Cell entry surveys - workers, using a teletector, survey Decon Room, entrance to Hot Cell, and Hot Cell
- Hot Cell entry - workers transport Liner 1 into Hot Cell
- Hot Cell entry - workers transport Liner 2 into Hot Cell
- Hot Cell entry - workers transport Blue Cask into Hot Cell

Nov. 18, 1996

- Pre-job briefing
- Source transfer - majority of sources in Blue Cask are transferred into liners, using remote manipulators

Nov. 19, 1996

- Pre-job briefing
- Pre-Hot Cell entry surveys - workers, using a teletector, survey Decon Room, entrance to Hot Cell, and Hot Cell
- Hot Cell entry - workers transport Blue Cask out of Hot Cell
- Hot Cell entry - workers transport GE 500 Cask into Hot Cell

Nov. 20, 1996

- Pre-job briefing
- Source transfer - Sources in GE 500 Cask are transferred into liners, using remote manipulators

Nov. 21-22, 1996

- Pre-jcb briefings
- Source transfer - sources in Source Garden are transferred into Hot Cell, using Transfer Monster

Nov. 25, 1996

- Pre-job briefing
- Source transfer - sources in Source Garden are transferred into Hot Cell, using Transfer Monster
- Source transfer - sources are transferred into liners, using remote manipulators



Nov. 26-27, 1996

- Pre-job briefings
- Source transfer - sources in teletherapy heads and source exchangers are transferred into Hot Cell, using Transfer Monster

Dec. 1, 1996

- Pre-job briefing
- Source transfer - sources in teletherapy heads and source exchangers are transferred into Hot Cell, using Transfer Monster
- Source transfer - sources are transferred into liners, using remote manipulators

Dec. 2, 1996

- Pre-job briefing
- Pre-Hot Cell entry surveys - workers, using a teletector, survey Decon Room, entrance to Hot Cell, and Hot Cell
- Hot Cell entry - workers transport GE 500 Cask out of Hot Cell
- Hot Cell entry - workers transport Blue Cask into Hot Cell
- Source transfer - remainder of sources in Blue Cask are transferred into liners, using remote manipulators
- Hot Cell entry - workers transport Blue Cask out of Hot Cell
- Hot Cell entry - workers transport Liner 1 out of Hot Cell
- Decon - workers decontaminate Liner 1 to levels below 220 dpm/100 cm<sup>2</sup>

Dec. 3, 1996

- Pre-job briefing
- Training - crane operator is given radiation safety training by AMS' RSO
- Liner transfer - Liner 1 is transferred into shipping cask
- Surveys - loaded cask and truck are inspected and surveyed
- Truck, carrying 24.4 kilocuries of cobalt-60, leaves site

Dec. 5, 1996

- Pre-job briefing
- Hot Cell entry - workers transport Liner 2 out of Hot Cell
- Decon - workers decontaminate Liner 2 to levels below 220 dpm/100 cm<sup>2</sup>

Dec. 6, 1996

- Pre-job briefing
- Training - crane operator is given radiation safety training by AMS' RSO
- Liner transfer - Liner 2 is transferred into shipping cask
- Surveys - loaded cask and truck are inspected and surveyed
- Truck, carrying 23.7 kilocuries of cobalt-60, leaves site

## ATTACHMENT 2

### LIST OF PERSONS CONTACTED

Stephen Haddock - RSO (AMS)  
Christopher Reed - ARSO (AMS)  
Ronald Leuenberger - Worker (AMS)  
Alan Duff - Project Manager (IEM)  
Scott Johnson - Project Manager (CNSI)  
Ken Holcomb - Worker (CNSI)  
Drivers (CNSI)  
Crane Operators  
James Webb - Ohio Dept. of Health  
Anthony Schneider - Public Utilities Commission of Ohio  
Members of the Cleveland Fire Dept.

### INSPECTION PROCEDURES USED

IP 87110:	Industrial/Academic/Research Program
IP 83822:	Radiation Protection
IP 83726:	Control of Radioactive Material, Contamination, Surveys and Monitoring
IP 86740:	Inspection of Transportation Activities
IP 86750:	Solid Radioactive Waste Management and Transportation of Radioactive Materials.

### LIST OF ACRONYMS USED

AMS	Advanced Medical Systems, Inc.
ALARA	As Low As Is Reasonably Achievable
ARSO	Assistant Radiation Safety Officer
CNSI	Chem-Nuclear Systems, Inc.
DNMS	Division of Nuclear Materials Safety
DOT	U.S. Department of Transportation
dpm/100 cm <sup>2</sup>	disintegrations per minute per one hundred square centimeters
hr	hour
IEM	Integrated Environmental Management, Inc.
IP	Inspection Procedure
mrem	millirem
NRC	U.S. Nuclear Regulatory Commission
R	roentgen
RSO	Radiation Safety Officer
TLD	thermoluminescent dosimeter



UNITED STATES  
NUCLEAR REGULATORY COMMISSION

REGION III  
801 WARRENVILLE ROAD  
LISLE, ILLINOIS 60532-4351

MAR 12 1997

Stephen J. Haddock, RSO  
Advanced Medical Systems, Inc.  
1020 London Road  
Cleveland, OH 44110

Dear Mr. Haddock:

This refers to your amendment request dated January 7, 1997, and to our telephone conversation on February 13, 1997.

Enclosed is Amendment No. 47 to your NRC Material License No. 34-19089-01 in accordance with your request. This amendment grants Advanced Medical Systems, Inc. an additional thirty days to schedule the first Emergency Plan training session for first responders. During our telephone conversation on February 13, 1997, you indicated that the first session of this training is scheduled for March 12, 1997, with a make-up session scheduled for March 19, 1997.

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 at (630) 829-9887 so that we can provide appropriate corrections and answers.

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 the 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. Since serious consequences to employees and the public can result from failure to comply with NRC requirements,

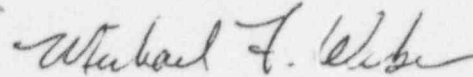


S. Haddock

-3-

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 cursive script, appearing to read "Michael F. Weber".

Michael F. Weber  
Nuclear Materials Licensing Branch

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

Enclosure: Amendment No. 47

## MATERIALS LICENSE

Amendment No. 47

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.

302264

Licensee		In accordance with the letter dated January 7, 1997
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

COPY

MATERIALS LICENSE  
SUPPLEMENTARY SHEET

License Number

34-19089-01

Docket or Reference Number

030-16055/040-08764/030-17154

Amendment No. 47

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

F. Cobalt-60

7. Chemical and/or  
physical form

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

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

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.

COPY

MATERIALS LICENSE  
SUPPLEMENTARY SHEET

License Number

34-19089-01

Docket or Reference Number

030-16055/040-08764/030-17154

Amendment No. 47

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 Stephen J. Haddock.

The Alternate Radiation Protection Officer for routine health physics activities only is Christopher Reed.

The licensee shall not perform service operations described in Subitems 9.B. and 9.C. until Stephen J. Haddock 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											
Stephen 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											
Stephen Haddock	5	5	5	5	5	5					

COPY



MATERIALS LICENSE  
SUPPLEMENTARY SHEET

License Number

34-19089-01

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Amendment No. 47

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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- 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.
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.
- 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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- 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.
- E. Immobilize the radioactive contamination present in the sewer manhole and lateral.

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- i. Completely grout-in the radioactively contaminated 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.
- 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.
- 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.
- H. The licensee shall notify the NRC Region III office in writing of any change in projected milestone dates specified in letter dated July 19, 1995 for the projects described in License Condition Nos. 19.D., E. & F. Included in the notification must be the reason for the change, and the revised milestone 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. The licensee is authorized to install and operate the water evaporation equipment described in letters dated March 22, 1995, June 8, 1995 and June 29, 1995.
22. Notwithstanding previous requirements, and based upon additional information provided in letters dated October 17, 1995, and December 11, 1995, the licensee is not required to grout-in the 4-inch sewer discharge line and the abandoned footer drain.
23. The licensee is authorized to perform Tasks 1 and 2 of the Building Recovery Project as described in letters dated June 10, 1996, July 8, 1996, September 18, 1996, October 3, 1996, October 11, 1996, and November 1, 1996.
24. The following are conditions under which the Building Recovery Project (BRP) funds may be used:
  - A. The BRP funds released from the collateral supporting the letter of credit dated January 27, 1995 shall be used solely for the purpose of completing Tasks 1 and 2 of the BRP.

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- B. Immediately after the release of funds, the licensee shall secure an amendment to the January 27, 1995 letter of credit to reflect the remaining balance of the supporting collateral. This shall be submitted to NRC for review immediately after the instrument is amended.
- C. Any funds remaining after Tasks 1 and 2 are completed shall be added to the collateral supporting the letter of credit, and the letter of credit must be revised to reflect the addition of the collateral. This shall be submitted to the NRC for review.
- D. The funds released from the collateral supporting the letter of credit shall not be used for implementation of Tasks 3 through 12 of the BRP.
25. 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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- II. Letters with attachments dated January 27, 1995, February 2, 10, and 14, 1995, and March 1, 1995 (excluding reference to grouting-in the four-inch sewer discharge line), and March 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.

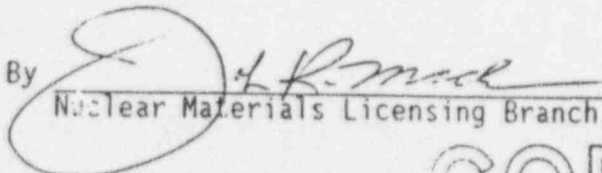
- i. The discharge of treated water to the sanitary sewer system.
  - ii. Installation of a composite sampler and flow gage.
  - iii. Conventional disposal of excavated soils exhibiting cobalt-60 concentrations greater than 8 pCi/g.
- I. Letters dated May 3, 1995, May 17, 1995, June 6, 1995, June 13, 1995 and June 14, 1995 (received June 21, 1995) March 22, 1995 (Item 1 related to water evaporation use and associated attachments), June 8, 1995, June 14, 1995 (received June 19, 1995), June 29, 1995, July 19, 1995 (excluding all references to grouting-in the four-inch sewer discharge line and the abandoned footer drain in the vicinity of the Source Garden), July 20, 1995, July 21, 1995, October 17, 1995, December 11, 1995 (with referenced photograph), June 10, 1996 (excluding the use of funds released from the collateral supporting the letter of credit to implement Tasks 3 through 12 of the Building Recovery Project), April 24, 1996, July 1, 1996, July 15, 1996 and January 7, 1997.
- J. Surveillance Plan for the London Road Facility submitted in letters dated September 5, 1995, December 18, 1995 and May 23, 1996.
- K. Tasks 1 and 2 of the Building Recovery Project submitted in letters (with attachments) dated June 10, 1996, July 8, 1996, September 18, 1996, October 3, 1996, October 11, 1996, and November 1, 1996.
- L. Emergency Plan for the London Road facility (as required by 10 CFR 30.32) submitted in letters (with attachments) dated September 21, 1995, March 21, 1996, June 7, 1996, and August 14, 1996.

FOR THE U.S. NUCLEAR REGULATORY COMMISSION

Date

2/19/97

By

  
Nuclear Materials Licensing Branch, Region III

COPY



# Advanced Medical Systems, Inc.

1020 London Road  
Cleveland, Ohio 44110  
(216) 692-3270  
Fax (216) 692-3269

March 13, 1997

Mr. John R. Madera, Chief  
Nuclear Materials Licensing Branch  
United States Nuclear Regulatory Commission  
801 Warrenville Road  
Lisle, Illinois 60523-4351

Re: USNRC License No. 34-19089-01

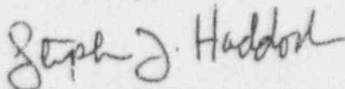
Dear Mr. Madera:

On March 4, 1997, Advanced Medical Systems, Inc. (AMS) provided responses to your February 27, 1997 comments in regard to Radiation Safety Procedure RSP-018, "Operation of the Gamma Spectrometer", RSP-019, "Assessment of Radioactivity in Water Samples", and RSP-022, "Quality Assurance for Radionuclide Analysis by Gamma Spectroscopy". Subsequent to that date, as discussed in your March 11, 1997 telephone conversation with Dwight Miller, Esq. (legal counsel to AMS), the following fundamental changes were made to our water collection/analysis/discharge procedures:

- All samples of underdrain water will be analyzed for *both* total  $^{60}\text{Co}$  content (e.g., soluble and insoluble) *and* for insoluble  $^{60}\text{Co}$  content using the methodology described in RSP-018.
- The following are the criteria for discharge of underdrain water into the regional sewer system based upon the sampling/analysis results:
  - i. Discharges of sampled water shall not exceed 25,000 gallons in a 24-hour period
  - ii. Water that contains total  $^{60}\text{Co}$  activity of greater than 100 pCi per liter shall not be discharged.
  - iii. Water that contains insoluble  $^{60}\text{Co}$  activity of greater than 15 pCi per liter shall not be discharged.
  - iv. Water that exhibits net *filter* count rates (e.g., insoluble activity) that are less than the decision level may be discharged without regard for solubility if the MDA for the analysis is no greater than 15 pCi of  $^{60}\text{Co}$ .

Under separate cover I will forward the referenced RSPs, revised to incorporate these changes and the commitments made in our March 4, 1997 response. When AMS receives USNRC approval, the three RSPs will be signed and implemented as described in RSP-003, "Control of Radiation Safety Procedures". In the meantime, if you have any questions or if I can provide you with additional information, please call me at (216) 692-3270. Timely USNRC action on this important issue would be greatly appreciated.

Sincerely,



Stephen J. Haddock, R.S.O.

cc: E. L. Svigel  
D. A. Miller, Esq. - Stavole & Miller  
C. D. Berger, C.H.P. - IEM

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REGION III

PM: 3-14-97



# Advanced Medical Systems, Inc.

1020 London Road  
Cleveland, Ohio 44110  
(216) 692-3270  
Fax (216) 692-3269

March 20, 1997

Mr. John R. Madera, Chief  
Nuclear Materials Licensing Branch  
United States Nuclear Regulatory Commission  
801 Warrenville Road  
Lisle, Illinois 60523-4351

Re: USNRC License No. 34-19089-01

Dear Mr. Madera:

On March 13, 1997, Advanced Medical Systems, Inc. (AMS) forwarded a description of changes to our water collection/analysis/discharge procedures. Included in those changes was the following criterion:

"Discharges of sampled water shall not exceed 25,000 gallons in a 24-hour period."

Since the intent of this criterion is simply to ensure that the program remains consistent with the "Technical Basis for Water Discharge Criteria" contained in Radiation Safety Procedure No. RSP-019, "Assessment of Radioactivity in Water Samples", such that the total discharge of water into the regional sewer system from the London Road facility does not exceed 25,000 gallons in a 24-hour period, AMS wishes to modify the criterion as follows:

"Discharges of water shall not exceed 25,000 gallons in a 24-hour period."

Please call me at (216) 692-3270 if I can answer any questions or provide you with additional information. AMS is awaiting USNRC action on this important issue.

Sincerely,



Christopher Reed, A.R.S.O.

cc: E. L. Svigel  
D. A. Miller, Esq. - Stavole & Miller  
C. D. Berger, C.H.P. - IEM

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f.m. 5-27-97

MAR 31 1997



# Northeast Ohio Regional Sewer District

3826 Euclid Avenue • Cleveland, OH 44115-2504 • (216) 881-6600 • FAX: (216) 881-4407

March 25, 1997

Cynthia D. Pederson, Director  
Division of Nuclear Materials Safety  
U. S. Nuclear Regulatory Commission, Region III  
801 Warrenville Road  
Lisle, IL 60532-4351

Re: Cobalt-60 Contamination At Advanced Medical Systems

Dear Ms. Pederson:

Your letter of March 5, 1997, ostensibly responded to my letter of December 30, 1997. Your letter deliberately ignores my letter's most important points that (a) many more tanks at Advanced Medical Systems, Inc. ("AMS") are contaminated with Cobalt-60 than were involved in the basement water clean-up, and (b) the Nuclear Regulatory Commission refuses to investigate where the contamination is coming from. Your own letter confirms that Cobalt-60 has been discovered in several more tanks than were involved in the basement clean-up. Because the levels of contamination did not exceed 30,000 pCi/L, however, the NRC chose not to investigate where this contamination came from.

Contamination continues to crop up in water collected by AMS for testing prior to discharge. As recently as yesterday it was confirmed that Tank 222 at AMS contained 265 pCi/L of total Cobalt 60 and 35 pCi/L of insoluble Cobalt 60. This contamination cannot have been from the water treatment project, inasmuch as this tank has been used and tested before with no showing of insoluble Cobalt-60. As indicated in my previous letter, it is obvious that the contamination is coming from the soil, ground water and footer drains around the AMS facility.

Even if the NRC is not concerned with concentrations of Co-60 in the 200-300 pCi/L range now being found in water from the new underdrain system, these concentrations are well above the concentrations agreed upon for the eventual establishment of

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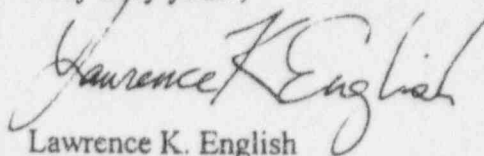
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sewer service to this facility or for a modified discharge/sampling protocol in the interim. Given this recent sample result, a full characterization and explanation of the source of this Cobalt will be required before the Northeast Ohio Regional Sewer District will consider reconnection or a modified protocol, regardless of future sample results.

The Cobalt-60 contained in the soil, ground water and footer drains present a real threat to the environment and the facilities of the Northeast Ohio Regional Sewer District. The NRC should take those steps necessary to characterize the extent of contamination around the AMS site, and then take those steps necessary to remove such contamination.

Please call me or Thomas E. Lenhart at (216) 881-6600 if you have any questions.

Very truly yours,



Lawrence K. English  
Assistant General Counsel

cc: J. Dodrill, City of Cleveland  
D. Kniss, OEPA  
Lt. M. Scott, Cleveland Fire Department Fire Prevention/Hazmat  
M. Withrow, Cuyahoga County Emergency Services  
R. Connelly, NEORSD  
W. Schatz, NEORSD  
T. Lenhart, NEORSD

# Advanced Medical Systems, Inc.

1020 London Road  
Cleveland, Ohio 44110  
(216) 692-3270  
Fax (216) 692-3269

March 31, 1997

Mr. John R. Madera, Chief  
Nuclear Materials Licensing Branch  
United States Nuclear Regulatory Commission  
801 Warrenville Road  
Lisle, Illinois 60523-4351

Re: USNRC License No. 34-19089-01

Dear Mr. Madera:

As follow-up to the March 31, 1997 telephone conversation between representatives of Advanced Medical Systems, Inc. (AMS) and the USNRC, the following is a summary of recent events at the London Road facility that pertain to water being pumped from the foundation drainage system:

- During the weekend of March 15, 1997, the pump used to remove water from the foundation drainage system failed. The cause of the failure was later determined to be the float switch.
- The failure was identified on Monday, March 17, 1997, when AMS personnel discovered approximately 1,000 gallons of water in the basement of the London Road facility.
- The water was collected from the basement and placed into a storage tank located in the Isotope Shop Warehouse. The  $^{60}\text{Co}$  concentration in the basement water is approximately two (2) microcuries per liter. The action plan for this water not yet determined.

The immediate follow-up actions taken by AMS include the following:

- Additional tank capacity was secured.
- The security service was asked to install sensor in manhole and basement that will alert AMS during off-hours if water levels rise.
- A duplex pump will be installed in the manhole in the place of the existing pump to ensure redundant operations.
- AMS personnel will check the status of the pump and basement once per day, including weekends, until the sensors and duplex pump are installed.
- A hydrogeologist was brought in for consultation, and has rendered the following initial opinion (to be confirmed during a pending on-site inspection). In general, he stated that the pump failure caused storm water to back up into the foundation drainage system. Because it was not possible to maintain a hydraulic gradient into the basement during the flooding event,  $^{60}\text{Co}$  was carried back into the system. During subsequent rainfall events, the  $^{60}\text{Co}$  will move preferentially through the footer drains and into the manhole, and over

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time, the  $^{60}\text{Co}$  concentrations in the manhole will decrease to those noted prior to the basement flooding event.

- An aggressive sampling program of water pumped from the foundation drainage system was instituted in order to track the contamination status of the system. To date, the  $^{60}\text{Co}$  concentrations have dropped from a high of 332 pCi per liter to less than 36 pCi per liter as determined by direct counting. There has been no evidence of the presence of insoluble  $^{60}\text{Co}$  above a nominal detection limit of nine (9) pCi per liter.

The longer-term actions to be instituted by AMS include the following:

- Immediately after the water sampling program demonstrates no detectable  $^{60}\text{Co}$  from the foundation drainage system (e.g., after 5,000 gallons of water are tanked and confirmed to contain no detectable  $^{60}\text{Co}$  above a nominal detection limit of 50 pCi per liter by direct counting and 15 pCi per liter by the filtration method), the soils in the immediate vicinity of the system will be sampled to confirm there is no residual contamination. The soils will be collected using a drill rig at specific points along the foundation drainage system. The  $^{60}\text{Co}$  concentration in the samples will be determined using a combination of in-house screening capability and confirmatory analyses by a commercial analytical laboratory.
- AMS will tank and sample all water that accumulates in the underdrain system prior to discharge until the soil sampling effort demonstrates there is no residual contamination in the underdrain system, and until 10,000 gallons of water are tanked and confirmed to contain no detectable  $^{60}\text{Co}$  above a nominal detection limit of 50 pCi per liter by direct counting and 15 pCi per liter by the filtration method. At that time, USNRC approval to "free release" the water from the foundation drainage system will be solicited.
- Once the 16 drums and 4 inserts of high-level waste are removed, the basement of the London Road facility will be decontaminated, and the WHUT Room will be hydrologically-stabilized as described in the June 10, 1996 Building Recovery Project proposal.
- Once the basement is remediated, the lateral connection from the AMS building for storm water and sanitary discharges to the regional sewer system will be re-established.

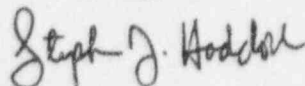
All of the  $^{60}\text{Co}$  that was released from the basement during the flooding event did not leave the underdrain system, thus there has been no impact on the environment or the surrounding population. Furthermore, residual contamination of the underdrain system is improbable because of the local hydrology, and because the  $^{60}\text{Co}$  at AMS has consistently demonstrated a lack of ionic strength.

Because our available tank space is limited, AMS request that the USNRC approve Radiation Safety Procedure RSP-018, "Operation of the Gamma Spectrometer", and RSP-019, "Assessment of Radioactivity in Water Samples", with the provision that AMS will only release water from the foundation drainage system that has been tanked, sampled, and confirmed to contain no residual  $^{60}\text{Co}$  above the release criteria contained in RSP-019 by the close of business on Friday, April 4, 1997. In addition, because AMS continues to be at risk of underdrain system contamination as long as the basement of the London Road facility remains contaminated, we are also asking for timely approval of our February 21, 1997 request for release of additional decommissioning funds in order to complete Task 2 (Waste Disposal) of the Building Recovery Project. (AMS has issued purchase orders for the disposal of all of its packaged waste with the exception of 16 shielded drums and 4 drum inserts of high-level waste that

are currently stored in the basement. The basement cannot be remediated until these drums are removed. Because the exposure rates associated with the handling of these drums are relatively high, AMS is desirous of moving them only once - from the basement to the vehicle that will be used to ship them to Barnwell. However, if additional funds are not released in a timely fashion, the drums will be moved from the basement to High Level Waste Storage until such time as funds become available for their disposal. At that time, they will be moved again to the transport vehicle.)

Please call me at (216) 692-3270 if I can answer any questions or provide you with additional information. Timely USNRC response on this request is imperative.

Sincerely,



Stephen J. Haddock, R.S.O.

cc: E. L. Svigel  
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