

U. S. NUCLEAR REGULATORY COMMISSION

REGION III

Report No. 030-16055/87-001(DRSS)

Docket No. 030-16055

License No. 34-19089-01

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

Inspection At: AMS
1020 London Road
Cleveland, OH 44110

Inspection Conducted: December 4, 1986 through February 18, 1987

Inspectors:	<i>Robert E. Burgin</i> Robert E. Burgin Senior Radiation Specialist	<u>3/2/87</u> Date
	<i>James L. Lynch</i> James L. Lynch Radiation Specialist	<u>3-2-87</u> Date
	<i>George M. McCann</i> George M. McCann Senior Licensee Reviewer	<u>3/2/87</u> Date
Approved By:	<i>Darrel G. Wiedeman</i> Darrel G. Wiedeman, Chief Nuclear Materials Safety Section 1	<u>3-2-87</u> Date
	<i>Bruce S. Mallett</i> Bruce S. Mallett, Ph.D., Chief Materials Licensing Section	<u>3-2-87</u> Date

Inspection Summary

Inspection on December 4, 1986 through February 18, 1987 (Report No. 030-16055/87-001(DRSS))

Areas Inspected: This was an announced special safety inspection initiated by an allegation received by NRC Region III representatives in November 1986. The inspection included a review of procedures and records, and interviews of AMS representatives.

Results: The allegation of improper disposal of Cobalt-60 into the sanitary sewers was not substantiated; no violations of NRC requirements were identified.

B703110227 B70304
REG-LIC30
34-19089-01 PDR

DETAILS

1. Persons Contacted

Howard Irwin, Radiation Safety Officer
Ted Hebert, Plant Manager
Josephine Powell, Secretary, Isotope Handler

2. Purpose of Special Inspection

This was an announced special inspection initiated by an allegation that AMS had been releasing cobalt-60 to the sanitary sewer system in excess of NRC limits. It was purported that this practice had been ongoing for several years.

3. Relevant Licensed Activities

In addition to the manufacturing and servicing of teletherapy units, AMS fabricates the sealed sources used in the teletherapy units for the treatment of humans. These sources are typically 4,000 to 12,000 curies of cobalt-60 (Co-60); however, some cesium-137 (Cs-137) sources have been fabricated. AMS is currently licensed to possess 300,000 curies of Co-60; 40,000 curies of Cs-137; and depleted uranium (as shielding).

4. Allegation Followup

Prior to March 1986, all liquid waste from the hot cell, decontamination room, isotope lab, laundry and change room (showers, sinks, etc.) was piped into a 600-gallon steel holding tank, located in a shielded maze in the basement ("hot" side).

Subsequent to March 1986, the system was modified so that water from the change room and laundry goes to a new collection tank on the "clean" side of the basement.

Disposal of liquid waste to the sanitary sewer system is made by batch process. A sample is drawn off the batch tank and counted on a well counter; release quantities are then calculated. AMS' procedure, "Release of Liquid Waste into Sanitary Sewerage System" (included as Attachment A), states "Once each year, the average sewage discharge for the past 12 months shall be computed. This average shall then be broken down into monthly and daily averages. These figures are to be used to calculate the limits of 10 CFR 20.303."

Therefore, daily release concentrations are calculated based on the average daily release of water discharged into the sanitary sewerage system during the previous 12 month period.

AMS' liquid waste disposal log is included as Attachment B (for the period May 15, 1980 through February 11, 1987). This log shows the quantity of cobalt-60 released that day (in microcuries); the year-to-date running total (in microcuries); and the quantity (in gallons) of

the contaminated waste water released. This quantity is the amount of liquid released from the batch tank only; it does not take into account the other water released from the plant that is used to dilute the waste release (and that is used in calculating released concentrations of radionuclides).

The licensee maintains records of total water used at the London Road facility (Attachment C). Using these figures, AMS calculates the maximum releases of radionuclides allowed. For the present, AMS uses the averages for water released during the period July 1985 through June 1986. These averages (Attachment D) are broken down into liters per year, liters per month, liters per day, and ultimately, microcuries releasable per day based on the dilution factors.

The amount of cobalt-60 released by AMS per year follows:

1980 - 10.605 millicuries
1981 - 15.616 millicuries
1982 - 5.056 millicuries
1983 - 59.065 millicuries
1984 - 29.609 millicuries
1985 - 45.777 millicuries
1986 - 51.157 millicuries
1987 - 2.861 millicuries (through February 11, 1987)

10 CFR 20.303 limits the total quantities and concentrations of radionuclides releasable to the sanitary sewage system. These limits for Co-60 are:

1. Daily: The greater of 10 microcuries total or concentrations not exceeding 1.0×10^{-3} microcuries per milliliter (10 CFR 20.303(b)(1) and (2)); and
2. Monthly: Concentrations not to exceed 1.0×10^{-3} microcuries per milliliter (10 CFR 20.303(c)); and
3. Annually: Not to exceed one curie (10 CFR 20.303(d)).

AMS' daily releases exceed the 10 microcurie limit; however, they are lower than the 1.0×10^{-3} microcuries per milliliter allowable concentration. Based on calculations of total water released (Attachment D), AMS may release 8,131 microcuries of Co-60 per day. The maximum actually released based on the above calculations has been 2,084 microcuries (greater total quantities have been released on a daily basis in previous years; however dilution factors applicable to that time period have also been greater).

AMS' maximum total annual release has been approximately 60 millicuries (in 1983), compared to one curie allowable.

A special inspection was conducted on October 21-24, 1985, with the assistance of Oak Ridge Associated Universities (ORAU), an NRC contractor. Part of this inspection included analysis of sludge from the sanitary sewer to determine reconcentration of radionuclides in the sewerage system. Results of the analysis showed < 4 picocuries/gram of Cs-137 and < 1.7 picocuries/gram of Co-60.*

* 1 picocurie = 1/1,000 of a microcurie
4 picocuries/gram and less are of no regulatory significance.

5. Findings/Conclusions

The allegation that AMS has released cobalt-60 to the sanitary sewerage system in excess of NRC limits was not substantiated; no violations of NRC regulations or specific license conditions were identified.

Attachments:

- A. AMS Operating Procedure: Release of Liquid Waste into Sanitary Sewerage System
- B. AMS Liquid Waste Log (May 15, 1980 through February 11, 1987)
- C. AMS Water Usage Log for London Road
- D. AMS Worksheet for Liquid Waste Releases

ADVANCED MEDICAL SYSTEMS

OPERATING PROCEDURE

TITLE: Release of liquid waste into
Sanitary Sewerage System

Procedure No: ISP - 12
Revision: A
Date Issued: 7 - 13 - 79

Page 1 of 2

1.0 PURPOSE:

To insure that liquid waste released into the Sanitary Sewer System does not exceed the limits of 10 CFR 20.303

2.0 SCOPE:

This procedure applies to all discharges of contaminated water, it is to be performed each time such water is discharged.

3.0 EQUIPMENT REQUIRED:

Batch tank, reference standards
Well counter
Film badge
Sample collector, log book

4.0 REQUIREMENTS & PRECAUTIONS:

4.1 Once each year, the average sewage discharge for the past 12 months shall be computed. This average shall then be broken down into monthly and daily averages. These figures are to be used to calculate the limits of 10 CFR 20.303

5.0 INSTRUCTIONS:

5.1 Limits per 10 CFR 20.303

Record, here, the limits as calculated in 4.1
Time period used as basis for calculations
_____ 19__ to _____ 19__

Daily: $1 \times 10^{-3} \mu \text{Ci/ml} \times \text{_____ liters/day} \times 10^3 \text{ ml/liter} = \text{_____} \mu \text{Ci}$
or $10 \mu \text{Ci}$, whichever is greater

Monthly: $1 \times 10^{-3} \mu \text{Ci/ml} \times \text{_____ liters/mcn} \times 10^3 \text{ ml/liter} = \text{_____} \mu \text{Ci}$

Yearly: 1 Ci/year

5.2 Sampling procedure per batch

5.2.1 Fill batch tank

5.2.2 Thoroughly agitate the solution by turning on the electric motor driven agitator and allowing it to run for 5 minutes

5.2.3 Draw off a sample through the sample valve

5.2.4 Count the sample and the standard in a well counter

5.2.5 A computer program is available to determine the number of gallons that may be discharged per day.

Prepared by

Approval

Revisions

Howard R. Smith 7-20-83

A 7 - 83 Format Change

ADVANCED MEDICAL SYSTEMS

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TITLE: Release of liquid waste into
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Page 2 of 2

5.0 INSTRUCTIONS: cont'd.

- 5.3 If the activity is within the limits of 10 CFR 20.303 (see 5.1) then the batch tank drain plug is removed and the specified amount of water is discharged into the sanitary sewer system.
- 5.4 Multiple batches of water may be discharged if the total activity does not exceed the limits of 10 CFR 20.303.
Each batch must be sampled per 5.2.
- 5.5 Recordkeeping
For each batch of contaminated water released, the following data must be recorded in the log book.

Date of discharge _____	Gallons discharged _____
CPM of Standard _____	μ Ci/ml of Std. _____
CPM of Sample _____	μ Ci discharged _____
Total μ Ci discharged to date _____	

Prepared by	Approval	Revisions
	<i>Harold R. Quinn 7-20-83</i>	A 7 - 83 Format Change

STANDARD	MC Pumped	MC	YEAR TO DATE
1.74 x 10 ⁻²	290	290	290
1.96 x 10 ⁻²	374	664	664
1.96 x 10 ⁻²	617	1281	1281
1.96 x 10 ⁻²	856	2137	2137
1.96 x 10 ⁻²	823	2960	2960
1.96 x 10 ⁻²	840	3800	3800
1.90 x 10 ⁻²	1480	5280	5280
1.90 x 10 ⁻²	1704	6984	6984
1.90 x 10 ⁻²	1818	8802	8802
1.90 x 10 ⁻²	1803	10605	10605

DATE	GALLONS	MI PUMPED	SAMPLE CPM	STD CPM
5-15-80	25	9.46 x 10 ⁴	8.16 x 10 ³	5.22 x 10 ⁴
5-16-80	40	1.51 x 10 ⁵	6.36 x 10 ³	5.04 x 10 ⁴
5-16-80	50	1.89 x 10 ⁵	8.38 x 10 ³	5.03 x 10 ⁴
5-16-80	50	1.89 x 10 ⁵	1.16 x 10 ⁴	5.03 x 10 ⁴
5-31-80	50	1.89 x 10 ⁵	1.12 x 10 ⁴	5.06 x 10 ⁴
6-11-80	50	1.89 x 10 ⁵	1.14 x 10 ⁴	5.02 x 10 ⁴
9-19-80	50	1.89 x 10 ⁵	2.00 x 10 ⁴	4.78 x 10 ⁴
9-20-80	50	1.89 x 10 ⁵	2.30 x 10 ⁴	4.85 x 10 ⁴
9-20-80	50	1.89 x 10 ⁵	2.47 x 10 ⁴	4.88 x 10 ⁴
9-20-80	50	1.89 x 10 ⁵	2.37 x 10 ⁴	4.72 x 10 ⁴
3-7-81	50	1.98	4.21 x 10 ⁴	3.18 x 10 ⁴
10-2-81	50	1.89 x 10 ⁵	2.47 x 10 ⁴	4.19 x 10 ⁴
10-2-81	45	1.70 x 10 ⁵	2.24 x 10 ⁴	4.20 x 10 ⁴
10-2-81	50	1.89 x 10 ⁵	2.41 x 10 ⁴	4.21 x 10 ⁴
10-2-81	50	1.89 x 10 ⁵	8.47 x 10 ⁴	4.19 x 10 ⁴
3-4-82	50	1.982	1.65 x 10 ⁴	3.76 x 10 ⁴
3-4-82	50	1.89 x 10 ⁵	1.34 x 10 ⁴	3.74 x 10 ⁴
3-4-82	50	1.89 x 10 ⁵	1.66 x 10 ⁴	3.78 x 10 ⁴
3-4-82	50	1.89 x 10 ⁵	1.76 x 10 ⁴	3.78 x 10 ⁴
1-20-83	50	1.89 x 10 ⁵	1.63 x 10 ⁴	2.71 x 10 ⁴
1-20-83	50	1.89 x 10 ⁵	1.54 x 10 ⁴	2.74 x 10 ⁴
1-20-83	50	1.89 x 10 ⁵	1.45 x 10 ⁴	2.76 x 10 ⁴
1-20-83	50	1.89 x 10 ⁵	1.58 x 10 ⁴	2.73 x 10 ⁴

DATE	GAL	ML PUMPED	SAMPLE CPM	STD CPM	STANDARD CONCENTRATION CALC (ML) ⁻²	MC LUMPED	MC YEAR TO
1-21-83	50	1.89 X 10 ⁵	1.72 X 10 ⁴	2.65 X 10 ⁴	1.37 X 10 ⁻²	1681	9597
1-21-83	50	1.89 X 10 ⁵	1.73 X 10 ⁴	2.62 X 10 ⁴	1.37 X 10 ⁻²	1719	11316
1-22-83	50	1.89 X 10 ⁵	1.63 X 10 ⁴	2.63 X 10 ⁴	1.37 X 10 ⁻²	1602	12918
1-22-83	50	1.89 X 10 ⁵	1.60 X 10 ⁴	2.66 X 10 ⁴	1.37 X 10 ⁻²	1560	14478
1-24-83	50	1.89 X 10 ⁵	1.22 X 10 ⁴	2.65 X 10 ⁴	1.37 X 10 ⁻²	1192	15670
1-24-83	50	1.89 X 10 ⁵	1.17 X 10 ⁴	2.67 X 10 ⁴	1.37 X 10 ⁻²	1141	16811
1-24-83	50	1.89 X 10 ⁵	1.21 X 10 ⁴	2.65 X 10 ⁴	1.37 X 10 ⁻²	1181	17911
1-24-83	50	1.89 X 10 ⁵	1.19 X 10 ⁴	2.66 X 10 ⁴	1.37 X 10 ⁻²	1160	19152
1-24-83	50	1.89 X 10 ⁵	1.22 X 10 ⁴	2.66 X 10 ⁴	1.37 X 10 ⁻²	1194	20346
1-25-83	50	1.89 X 10 ⁵	8.22 X 10 ³	2.67 X 10 ⁴	1.37 X 10 ⁻²	803	21149
1-25-83	50	1.89 X 10 ⁵	1.04 X 10 ⁴	2.70 X 10 ⁴	1.37 X 10 ⁻²	1005	22154
1-25-83	50	1.89 X 10 ⁵	9.60 X 10 ³	2.66 X 10 ⁴	1.37 X 10 ⁻²	921	23075
1-25-83	50	1.89 X 10 ⁵	8.81 X 10 ³	2.67 X 10 ⁴	1.37 X 10 ⁻²	859	23934
1-25-83	50	1.89 X 10 ⁵	9.36 X 10 ³	2.64 X 10 ⁴	1.37 X 10 ⁻²	907	24841
3-19-83	50	1.89 X 10 ⁵	8.97 X 10 ³	2.73 X 10 ⁴	1.37 X 10 ⁻²	852	25693
3-23-83	50	1.89 X 10 ⁵	1.06 X 10 ⁴	2.74 X 10 ⁴	1.37 X 10 ⁻²	1005	26698
4-30-83	50	1.89 X 10 ⁵	9.50 X 10 ³	2.90 X 10 ⁴	1.37 X 10 ⁻²	824	27522
4-31-83	50	1.89 X 10 ⁵	1.17 X 10 ⁴	2.85 X 10 ⁴	1.33 X 10 ⁻²	1036	28558
5-11-83	50	1.89 X 10 ⁵	7.80 X 10 ³	2.73 X 10 ⁴	1.33 X 10 ⁻²	719	29211
5-19-83	50	1.89 X 10 ⁵	7.71 X 10 ³	2.70 X 10 ⁴	1.33 X 10 ⁻²	719	29996
6-16-83	50	1.89 X 10 ⁵	1.06 X 10 ⁴	2.75 X 10 ⁴	1.33 X 10 ⁻²	974	30970
6-21-83	50	1.89 X 10 ⁵	2.74 X 10 ⁴	2.82 X 10 ⁴	1.33 X 10 ⁻²	2452	33422
6-21-83	50	1.89 X 10 ⁵	1.18 X 10 ⁴	2.82 X 10 ⁴	1.33 X 10 ⁻²	101	33523
8-11-83	50	1.89 X 10 ⁵	2.18 X 10 ⁴	2.81 X 10 ⁴	1.28 X 10 ⁻²	1883	35406
8-16-83	50	1.89 X 10 ⁵	8.11 X 10 ⁴	2.71 X 10 ⁴	1.28 X 10 ⁻²	7251	42657
9-27-83	50	1.89 X 10 ⁵	8.15 X 10 ⁴	2.72 X 10 ⁴	1.28 X 10 ⁻²	7270	49927
9-28-83	50	1.89 X 10 ⁵	4.29 X 10 ⁴	2.83 X 10 ⁴	1.28 X 10 ⁻²	3678	53605
9-29-83	50	1.89 X 10 ⁵	2.04 X 10 ⁴	2.96 X 10 ⁴	1.28 X 10 ⁻²	1616	55221
10-20-83	50	1.89 X 10 ⁵	1.36 X 10 ⁴	3.30 X 10 ⁴	1.21 X 10 ⁻²	1113	56334

DATE	GAL	ML Pumped	Sample CPM	STD CPM	MC / ML	MC Pumped	MC Year To Date
10-20-83	50	1.89 X 10 ⁵	9.47 X 10 ³	2.52 X 10 ⁴	1.24 X 10 ⁻²	882	57216
10-21-83	50	1.88 X 10 ⁵	1.19 X 10 ⁴	2.51 X 10 ⁴	1.24 X 10 ⁻²	1113	58329
10-22-83	50	1.89 X 10 ⁵	7.70 X 10 ³	2.45 X 10 ⁴	1.24 X 10 ⁻²	736	59065
1984							
1-5-84	50	1.89 X 10 ⁵	3.66 X 10 ³	2.48 X 10 ⁴	1.20 X 10 ⁻²	335	335
1-5-84	50	1.89 X 10 ⁵	6.11 X 10 ³	2.49 X 10 ⁴	1.20 X 10 ⁻²	559	894
2-27-84	50	1.89 X 10 ⁵	1.13 X 10 ⁵	2.4 X 10 ⁴	1.20 X 10 ⁻²	10462	11356
1-24-84	50	1.89 X 10 ⁵	4.41 X 10 ⁴	2.46 X 10 ⁴	1.20 X 10 ⁻²	4075	15131
6-30-84	25	9.46 X 10 ⁴	3.22 X 10 ⁴	1.97 X 10 ⁴	1.16 X 10 ⁻²	1792	17223
6-22-84	55	2.08 X 10 ⁵	1.20 X 10 ⁴	1.98 X 10 ⁴	1.16 X 10 ⁻²	1460	18683
10-18-84	50	1.89 X 10 ⁵	7.22 X 10 ⁴	2.15 X 10 ⁴	1.09 X 10 ⁻²	6929	25613
12-5-84	50	1.89 X 10 ⁵	2.18 X 10 ⁴	1.13 X 10 ⁴	1.09 X 10 ⁻²	3996	29609
10-25-84							
3-6-85	50	1.89 X 10 ⁵	4.60 X 10 ⁵	1.83 X 10 ⁴	1.05 X 10 ⁻²	4358	4358
12-12-85	55	2.08 X 10 ⁵	6.18 X 10 ⁴	1.81 X 10 ⁴	9.6 X 10 ⁻³	7528	11882
12-13-85	55	2.08 X 10 ⁵	3.31 X 10 ⁴	1.73 X 10 ⁴	9.6 X 10 ⁻³	3723	15609
12-13-85	55	2.08 X 10 ⁵	3.04 X 10 ⁴	1.7 X 10 ⁴	9.6 X 10 ⁻³	3369	12978
12-18-85	40	1.51 X 10 ⁵	7.05 X 10 ⁴	1.7 X 10 ⁴	9.6 X 10 ⁻³	6955	25733
12-10-85	50	1.89 X 10 ⁵	6.42 X 10 ⁴	1.57 X 10 ⁴	9.6 X 10 ⁻³	7355	12288
12-3-85	3	9.46 X 10 ³	1.29 X 10 ⁶	1.5 X 10 ⁴	9.6 X 10 ⁻³	7053	441
12-31-85	2	7.57 X 10 ³	1.28 X 10 ⁶	1.66 X 10 ⁴	9.6 X 10 ⁻³	5636	45777
12-28-85							
1-8-86	45	1.7 X 10 ⁵	6.5 X 10 ⁴	1.91 X 10 ⁴	9.4 X 10 ⁻³	7362	762
2-27-86	7	2.65 X 10 ⁴	1.6 X 10 ⁵	1.9 X 10 ⁴	1.41 X 10 ⁻¹	7396	1458
2-28-86	40	1.51 X 10 ⁵	4.3 X 10 ³	8.25 X 10 ⁴	1.41 X 10 ⁻¹	1112	1570
2-28-86	50	1.89 X 10 ⁵	3.07 X 10 ³	8.24 X 10 ⁴	1.41 X 10 ⁻¹	994	16064
2-28-86	55	2.08 X 10 ⁵	2.79 X 10 ³	8.19 X 10 ⁴	1.41 X 10 ⁻¹	1001	1785
2-28-86	55	2.08 X 10 ⁵	3.83 X 10 ³	7.93 X 10 ⁴	1.41 X 10 ⁻¹	1415	1920

FLOOR
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DATE	GAL	ML Pumped	SAMPLE CPm	STD CPm	CONCENTRATION μC/ML	μC Pumped	μC Year To Date
2-28-86	30	1.14x10 ⁵	3.63x10 ³	5 N ^o	1.41x10 ⁻¹	726	20006
3-5-86	22	8.33x10 ⁴	5.15x10 ⁴	5.1x10 ⁴	1.41x10 ⁻¹	724	21330
3-13-86	55	2.08x10 ⁵	9.06x10 ³	8.1x10 ⁴	1.41x10 ⁻¹	3496	30826
3-13-86	55	2.08x10 ⁵	2.77x10 ³	8.1x10 ⁴	1.41x10 ⁻¹	1011	31837
3-14-86	55	2.08x10 ⁵	2.85x10 ³	8.1x10 ⁴	1.42x10 ⁻¹	1037	32874
3-14-86	55	2.08x10 ⁵	1.5x10 ³	8.1x10 ⁴	1.42x10 ⁻¹	545	33419
3-24-86	35	1.32x10 ⁵	1.7x10 ²	1.92x10 ⁵	1.41x10 ⁻¹	17	33436
4-10-86	55	2.08x10 ⁵	4.77x10 ³	1.41x10 ⁵	1.36x10 ⁻¹	908	34344
4-10-86	55	2.08x10 ⁵	1.16x10 ²	1.54x10 ⁵	1.36x10 ⁻¹	213	34557
4-16-86	19	7.1x10 ⁴	5.09x10 ²	1.57x10 ⁵	1.36x10 ⁻¹	26	34583
6-25-86	42	1.59x10 ⁵	5.98x10 ²	1.22x10 ⁵	1.36x10 ⁻¹	71	34654
7-16-86	36	1.35x10 ⁵	3.95x10 ²	1.84x10 ⁵	1.33x10 ⁻¹	33	34887
9-11-86	90	3.41x10 ⁵	5.26x10 ³	2.71x10 ⁵	1.29x10 ⁻¹	812	35529
10-6-86	40	1.51x10 ⁵	1.785x10 ²	2.05x10 ⁵	1.28x10 ⁻¹	73	35602
1-2-87							5451
1-2-87	80	3.03x10 ⁵	2.29x10 ³	2.5x10 ⁵	1.29x10 ⁻¹	355	355
1-19-87	200	7.57x10 ⁵	1.31x10 ³	2.96x10 ⁵	1.24x10 ⁻¹	422	777
2-11-87	96	3.63x10 ⁵	1.20x10 ⁴	2.53x10 ⁵	1.21x10 ⁻¹	2084	2861

Water Usage London Road

6/81 - 9/81	172,000 CF
9/81 - 12/81	75,000 CF
12/81 - 3/82	48,000 CF
3/82 - 6/82	99,000 CF
6/82 - 9/82	137,000 CF
9/82 - 12/82	75,000 CF
12/82 - 3/83	13,000 CF
3/83 - 6/83	1,000 CF
6/83 - 9/83	78,000 CF
9/83 - 12/83	140,000 CF
12/83 - 3/84	17,000 CF
3/84 - 6/84	11,000 CF
6/84 - 10/84	25,300 CF
10/84 - 1/85	26,800 CF
1/85 - 3/85	24,700 CF
3/85 - 6/85	20,700 CF
6/85 - 10/85	30,300 CF
10/85 - 1/86	25,300 CF
1/86 - 3/86	23,100 CF
4/86 - 6/86	24,100 CF

* Water Co verified that meter working properly

9/86 Liquid Waste update

Water used 7/85 - 6/86 104,800 CF
X 28.32 l/CF = 2,967,936 l

Averages are 2,967,936 l/yr
247,328 l/mo
8131 l/day

8131 l/day X 100 l = 8131 μ Ci/day

Set Nuell program limit at 8100 μ Ci for
period through 6/87.

AMS Howard Irwin

2/18/87

Sources of waste water

- hot cell sink
 - floor drains, isotope shop
 - sink " "
 - laundry " "
 - locker room sinks & shower
- Small tank (100 gal)
- Large tank (500 gal)
- Blue Tank (200 gal)

Large & small tanks in hot area of basement
Blue tank in clean area of basement (since 2/86)

Large tank is probably empty
Small tank has some water
Blue tank almost empty

Water is pumped from tanks or floor
piped to 55 gal drum, mixed
sample removed, counted in well counter (5 ml)
Standard counted

~~HTD (CPM) = SAMPLE (5 ml) =~~

DATE	GALLONS	MI PUMPED	SAMPLE CPM	STD CPM	ST Conc
5-13-80	25	9.46×10^4	8.16×10^3	5.22×10^4	1.9
5-14-80	40	1.51×10^5	6.36×10^3	5.04×10^4	1.
5-16-80	50	1.89×10^5	8.38×10^3	5.03×10^4	1.
5-16-80	50	1.89×10^5	1.16×10^4	5.02×10^4	1.
5-31-80	50	1.89×10^5	1.12×10^4	5.06×10^4	1.
6-11-80	50	1.89×10^5	1.14×10^4	5.02×10^4	1.
9-19-80	50	1.89×10^5	2.00×10^4	4.78×10^4	
9-20-80	50	1.89×10^5	2.30×10^4	4.85×10^4	
9-20-80	50	1.89×10^5	2.47×10^4	4.88×10^4	
9-20-80	50	1.89×10^5	2.37×10^4	4.72×10^4	
		1981			
3-7-81	50	1.89×10^5	4.21×10^4	3.18×10^4	
10-2-81	50	1.89×10^5	2.47×10^4	4.19×10^4	
10-2-81	45	1.70×10^5	2.24×10^4	4.20×10^4	
10-2-81	50	1.89×10^5	2.41×10^4	4.21×10^4	
10-2-81	50	1.89×10^5	2.47×10^4	4.19×10^4	
		1982			
3-4-82	50	1.89×10^5	1.65×10^4	3.76×10^4	
3-4-82	50	1.89×10^5	1.34×10^4	3.74×10^4	
3-4-82	50	1.89×10^5	1.66×10^4	3.78×10^4	
3-4-82	50	1.89×10^5	1.76×10^4	3.78×10^4	
		1983			
1-20-83	50	1.89×10^5	1.63×10^4	2.71×10^4	
1-20-83	50	1.89×10^5	1.54×10^4	2.74×10^4	
1-20-83	50	1.89×10^5	1.45×10^4	2.76×10^4	
1-20-83	50	1.89×10^5	1.58×10^4	2.73×10^4	

STANDARD CONCENTRATION (MC/MI) CUMULATIVE DRAINAGE (MC/MI)	MC Pumped	MC YEAR TO DATE
1.74×10^{-2}	200	200
1.96×10^{-2}	270	270
1.96×10^{-2}	374	664
1.96×10^{-2}	617	1281
1.96×10^{-2}	856	2137
1.96×10^{-2}	823	2960
1.96×10^{-2}	840	3800
1.90×10^{-2}	1480	5280
1.90×10^{-2}	1704	6984
1.90×10^{-2}	1818	8802
1.90×10^{-2}	1803	10605
1.72×10^{-2}	4453	4453
1.6×10^{-2}	1798	6251
1.6×10^{-2}	1462	7713
1.6×10^{-2}	1746	9459
1.61×10^{-2}	6157	15616
1.57×10^{-2}	1304	1304
1.57×10^{-2}	1065	2369
1.57×10^{-2}	1303	3672
1.57×10^{-2}	1384	5056
1.37×10^{-2}	1565	1565
1.37×10^{-2}	1460	3025
1.37×10^{-2}	1358	4783
1.31×10^{-2}	1503	6286
1.37×10^{-2}	1630	7916

DATE	GAL	ML PUMPED	SAMPLE CPM	STD CPM	STA
1-21-83	50	1.89×10^5	1.72×10^4	2.65×10^4	
1-21-83	50	1.89×10^5	1.73×10^4	2.62×10^4	
1-22-83	50	1.89×10^5	1.63×10^4	2.63×10^4	
1-22-83	50	1.89×10^5	1.60×10^4	2.66×10^4	
1-24-83	50	1.89×10^5	1.22×10^4	2.65×10^4	
1-24-83	50	1.89×10^5	1.17×10^4	2.67×10^4	
1-24-83	50	1.89×10^5	1.21×10^4	2.65×10^4	
1-24-83	50	1.89×10^5	1.19×10^4	2.66×10^4	
1-24-83	50	1.89×10^5	1.22×10^4	2.66×10^4	
1-25-83	50	1.89×10^5	8.22×10^3	2.67×10^4	
1-25-83	50	1.89×10^5	1.04×10^4	2.70×10^4	
1-25-83	50	1.89×10^5	9.60×10^3	2.66×10^4	
1-25-83	50	1.89×10^5	8.81×10^3	2.67×10^4	
1-25-83	50	1.89×10^5	9.36×10^3	2.66×10^4	
3-18-83	50	1.89×10^5	8.97×10^3	2.73×10^4	
3-23-83	50	1.89×10^5	1.06×10^4	2.74×10^4	
4-30-83	50	1.89×10^5	9.50×10^3	2.90×10^4	
4-21-83	50	1.89×10^5	1.17×10^4	2.85×10^4	
5-11-83	50	1.89×10^5	7.80×10^3	2.73×10^4	
5-19-83	50	1.89×10^5	7.71×10^3	2.70×10^4	
6-16-83	50	1.89×10^5	1.06×10^4	2.75×10^4	
6-21-83	50	1.89×10^5	2.74×10^4	2.82×10^4	
8-11-83	50	1.89×10^5	1.18×10^4	2.82×10^4	
8-16-83	50	1.89×10^5	2.18×10^4	2.81×10^4	
8-27-83	50	1.89×10^5	8.11×10^4	2.71×10^4	
8-28-83	50	1.89×10^5	8.15×10^4	2.72×10^4	
9-27-83	50	1.89×10^5	4.39×10^4	2.83×10^4	
10-20-83	50	1.89×10^5	2.04×10^4	2.96×10^4	
10-21-83	50	1.89×10^5	1.36×10^4	2.86×10^4	

STANDARD CONCENTRATION
C (MC/ML)

MC PUMPED

MC YEAR TO DATE

1.37×10^{-2}

1681

9597

1.37×10^{-2}

1719

11316

1.37×10^{-2}

1602

12918

1.37×10^{-2}

1560

14478

1.37×10^{-2}

1192

15670

1.37×10^{-2}

1141

16811

1.37×10^{-2}

1181

17992

1.37×10^{-2}

1160

19152

1.37×10^{-2}

1194

20346

1.37×10^{-2}

803

21149

1.37×10^{-2}

1005

22154

1.37×10^{-2}

921

23075

1.37×10^{-2}

859

23934

1.37×10^{-2}

907

24841

1.37×10^{-2}

852

25693

1.37×10^{-2}

1005

26698

1.33×10^{-2}

824

27522

1.33×10^{-2}

1036

28558

1.33×10^{-2}

719

29277

1.33×10^{-2}

719

29996

1.33×10^{-2}

974

30970

1.33×10^{-2}

2452

33422

1.28×10^{-2}

101

33523

1.28×10^{-2}

1883

35406

1.28×10^{-2}

7251

42657

1.28×10^{-2}

7270

49927

1.28×10^{-2}

3678

53605

1.24×10^{-2}

1616

55221

1.24×10^{-2}

1113

56334

DATE	GAL	ML PUMPED	Sample CPM	STD CPM
12-20-83	50	1.89×10^5	9.47×10^3	2.52×10^4
12-21-83	50	1.89×10^5	1.19×10^4	2.51×10^4
12-22-83	50	1.89×10^5	7.70×10^3	2.45×10^4
1984				
1-5-84	50	1.89×10^5	3.66×10^3	2.48×10^4
1-5-84	50	1.89×10^5	6.11×10^3	2.49×10^4
2-22-84	50	1.89×10^5	1.13×10^5	2.4×10^4
2-22-84	50	1.89×10^5	4.41×10^4	2.4×10^4
6-20-84	25	9.46×10^4	3.22×10^4	1.97×10^4
6-22-84	55	2.08×10^5	1.20×10^4	1.98×10^4
10-18-84	50	1.89×10^5	7.22×10^4	2.15×10^4
12-5-84	50	1.89×10^5	2.18×10^4	1.13×10^4
1985				
3-6-85	50	1.89×10^5	4.00×10^5	1.83×10^4
12-12-85	55	2.08×10^5	6.81×10^4	1.81×10^4
12-13-85	55	2.08×10^5	3.31×10^4	1.75×10^4
12-13-85	55	2.08×10^5	3.04×10^4	1.71×10^4
12-18-85	40	1.51×10^5	7.05×10^4	1.67×10^4
12-20-85	50	1.89×10^5	6.42×10^4	1.59×10^4
12-31-85	3	9.46×10^3	1.29×10^6	1.5×10^4
12-31-85	2	7.57×10^3	1.28×10^6	1.66×10^4
1986				
1-8-86	45	1.7×10^5	6.5×10^4	1.41×10^4
2-27-86	7	2.65×10^4	1.6×10^5	8.1×10^4
2-28-86	40	1.51×10^5	4.3×10^3	8.25×10^4
2-28-86	50	1.89×10^5	3.07×10^3	8.24×10^4
2-28-86	55	2.08×10^5	2.79×10^3	8.19×10^4
2-28-86	55	2.08×10^5	3.83×10^3	7.93×10^4

M	STD CONCENT. MC / ML	MC Pumped	MC Year To Date	
4	1.24×10^{-2}	882	57216	
4	1.24×10^{-2}	1113	58329	
4	1.24×10^{-2}	736	59065	
4	1.20×10^{-2}	335	335	
4	1.20×10^{-2}	559	894	
4	1.20×10^{-2}	10462	11356	
4	1.20×10^{-2}	4075	15431	
4	1.16×10^{-2}	1792	17223	
4	1.16×10^{-2}	1460	18683	
4	1.09×10^{-2}	6929	25613	
4	1.09×10^{-2}	3996	29609	
	1.05×10^{-2}	4358	4358	
	9.6×10^{-3}	7528	11886	
	9.6×10^{-3}	3723	15609	
	9.6×10^{-3}	3369	19978	
	9.6×10^{-3}	6955	26933	
	9.6×10^{-3}	7355	34288	
	9.6×10^{-3}	7053	41341	
	9.6×10^{-3}	5636	47977	
	9.4×10^{-3}	7362	7362	
	1.41×10^{-1}	7396	14758	FLOOR
	1.41×10^{-1}	1112	15870	LG TANK
	1.41×10^{-1}	994	16864	LG TANK
	1.41×10^{-1}	1001	17865	LG TANK
	1.41×10^{-1}	1415	19280	LG TANK

DATE GAL ML Pumped SAMPLE CPM STD CPM

2-28-86	30	1.14×10^5	3.63×10^3	8×10^4
3-5-86	22	8.33×10^4	5.15×10^4	8.25×10^4
3-13-86	55	2.08×10^5	9.66×10^3	8.1×10^4
3-13-86	55	2.08×10^5	2.79×10^3	8.1×10^4
3-14-86	55	2.08×10^5	2.85×10^3	8.12×10^4
3-14-86	55	2.08×10^5	1.5×10^3	8.12×10^4
3-31-86	35	1.32×10^5	1.7×10^2	1.92×10^5
4-10-86	55	2.08×10^5	4.77×10^3	1.4×10^5
4-10-86	55	2.08×10^5	1.14×10^3	1.54×10^5
4-16-86	19	7.16×10^4	5.09×10^2	1.87×10^5
6-25-86	42	1.59×10^5	5.98×10^2	1.82×10^5
7-16-86	36	1.35×10^5	3.95×10^2	1.84×10^5
9-11-86	90	3.41×10^5	5.26×10^3	2.77×10^5
10-6-86	40	1.51×10^5	7.85×10^2	2.62×10^5
1.			2.	

1987.

1-2-87	80	3.03×10^5	2.29×10^3	2.5×10^5
1-19-87	200	7.57×10^5	1.31×10^3	2.96×10^5
2-11-87	96	3.63×10^5	1.20×10^4	2.53×10^5

STANDARD
concentration
PM $\mu\text{C}/\text{ML}$

μC Pumped To Date μC Year

STANDARD concentration $\mu\text{C}/\text{ML}$	μC Pumped	To Date	μC Year
1.41×10^{-1}	726	20006	FLOOR
1.41×10^{-1}	7324	27330	FLOOR
1.41×10^{-1}	3496	30826	LARGE TANK
1.41×10^{-1}	1011	31837	LARGE TANK
1.42×10^{-1}	1037	32874	LARGE
1.42×10^{-1}	545	33419	LARGE
1.41×10^{-1}	17	33436	BLUE
1.36×10^{-1}	908	34344	LARGE
1.36×10^{-1}	213	34557	LARGE
1.36×10^{-1}	26	34583	BLUE
1.36×10^{-1}	71	34654	Blue
1.33×10^{-1}	33	34687	Blue
1.29×10^{-1}	892	35529	Blue
1.28×10^{-1}	73	35602	Blue
		5951	
1.28×10^{-1}	355	355	BLUE
1.24×10^{-1}	422	777	Blue
1.21×10^{-1}	2084	2861	Blue

NUCLEAR REGULATORY COMMISSION

REGION III

Special Inspection Report No. 030-16055/87-002(DRSS)

Docket No. 030-16055

License No. 34-19089-01

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

Inspection Conducted On: April 29-30, 1987

Sample Analysis Completed: May 26, 1987

Inspection Conducted At: Northeastern Ohio Regional Sewer District
Cleveland, Ohio

Inspectors: *James L Lynch for*
R. E. Burgin
Senior Radiation Specialist

6-3-87
Date

M. A. Kunowski
M. A. Kunowski
Radiation Specialist

6-3-87
Date

Approved By: *James L Lynch for*
D. G. Wiedeman, Chief
Nuclear Materials Safety Section 1

6-3-87
Date

Inspection Summary

Inspection Conducted on April 29-30, 1987 (Report No. 030-16055/87-002(DRSS))

Areas Inspected: This was an unannounced special inspection conducted in accordance with Temporary Instruction 2800/9, "Reconcentration of Radionuclides in Sanitary Sewerage Systems," issued March 25, 1987. The special inspection consisted of sampling/analysis of settled solids and filter cake (treated dry waste) from the Northeastern Ohio Regional Sewer District for evidence of reconcentration of cobalt-60 and/or cesium-137 from the Advanced Medical Systems, Inc. facility in Cleveland, Ohio.

Results: The samples were analyzed (gamma spectroscopically) using a Region III multi-channel analyzer. The samples showed no detectable presence of cobalt-60 nor cesium-137.

9309230226

DETAILS

1. Contacts

James F. Weber, Manager, Northeastern Ohio Regional Sewer District (NEORSO)

Richard N. Connelly, Supervisor, Industrial Waste Section, NEORSO

James T. Laheta, Investigator, Industrial Waste Section, NEORSO

2. Purpose of Special Inspection

In accordance with Temporary Instruction 2800/9, "Reconcentration of Radionuclides in Sanitary Sewerage Systems," samples of untreated settled solids and filter cake (treated dry waste) were collected from the Northeastern Ohio Regional Sewer District for evidence of reconcentration of cobalt-60 (Co-60) and cesium-137 (Cs-137) from the Advanced Medical Systems' (AMS') cobalt-60 and cesium-137 teletherapy source fabrication facility in Cleveland, Ohio.

3. Results

The raw settled solids and filter cake were analyzed gamma-spectroscopically in Region III's multi-channel analyzer. The results indicate no presence of cobalt-60 nor cesium-137 (and therefore no apparent reconcentration of these radionuclides at the sanitary sewerage treatment plant as a result of source fabrication operations at Advanced Medical Systems, Cleveland, Ohio).

MAY 5 - 1988

Advanced Medical Systems, Inc.
 ATTN: Seymore S. Stein, Ph.D.
 President
 121 North Eagle Street
 Geneva, OH 44041

License No. 34-19089-01

Gentlemen:

This refers to the special safety inspection conducted by Mr. Robert E. Burgin of this office on April 13, 1988, of activities authorized by NRC Byproduct Material License No. 34-19089-01.

The inspection was initiated following our review of AMS' February 8, 1988 letter (with enclosures) proposing isolation of the Waste Hold Up Tank (WHUT) room at the London Road facility. Section J of Nuclear Support Services' (NSS) report, "Remedial Actions for the Waste Hold Up Tank Room at the London Road Facility," enclosed with the above-referenced letter, included results of surveys performed on January 21, 1988, in an unrestricted area in the sewerage system within AMS property lines. The survey indicated the presence of radiation levels as high as 70 millirem per hour.

The enclosed copy of our inspection report identifies areas examined during the inspection. Within these areas, the inspection consisted of a selective examination of procedures and representative records, observations, interviews with personnel, independent measurements and the collection of water and sludge samples subsequently analysed in our Region III laboratory.

During this inspection, certain of your activities appeared to be in violation of NRC requirements, as specified in the enclosed Notice. A written response is required.

In addition to the response required pursuant to 10 CFR 2.201, you are directed to address the following specific areas/concerns related to the violation:

- a. Characterize the contents of the referenced area resulting in elevated radiation levels.
- b. Describe your means for maintaining security of the area from approach via the City of Cleveland (main) sewerage system.
- c. Describe any plans for clean-up (decontamination) of the referenced area.
- d. Describe any potential for release of byproduct material to the main sewerage system.

IE07
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 A/3

Advanced Medical Systems, Inc.

2

MAY 5 - 1988

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

Sincerely,



D. G. Wiedeman, Chief
Nuclear Materials Safety Section 1

Enclosures:

1. Notice of Violation
2. Inspection Report
No. 030-16055/88001(DRSS)

cc w/enclosures:
DCD DCB (RIDS)

R111
R5B
Burgin/ky
5/4/88

YES-
R111
Wiedeman
5/5/88

NOTICE OF VIOLATION

Advanced Medical Services

License No. 34-19089-01

As a result of the inspection conducted on April 13, 1988, and in accordance with 10 CFR Part 2, Appendix C - General Statement of Policy and Procedure for NRC Enforcement Actions (1987), the following violation was identified:

10 CFR 20.105, "Permissible levels of radiation in unrestricted areas," states in paragraph (b):

Except as authorized by the Commission pursuant to paragraph (a) of this section, no licensee shall possess, use or transfer licensed material in such a manner as to create in any unrestricted area from radioactive material and other sources of radiation in his possession:

- (1) Radiation levels which, if an individual were continuously present in the area, could result in his receiving a dose in excess of two millirems in any one hour, or
- (2) Radiation levels which, if an individual were continuously present in the area, could result in his receiving a dose in excess of 100 millirems in any seven consecutive days.

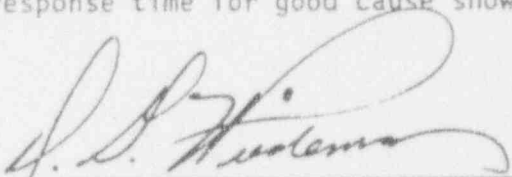
Contrary to the above, AMS licensed material (cobalt-60) in an unrestricted area (sewerage system) created radiation levels of 80 millirem per hour. The duration of this condition is not known at this time.

This is a Severity Level IV Violation (Supplement IV).

Pursuant to the provisions of 10 CFR 2.201, you are required to submit to this office within thirty days of the date of this Notice a written statement or explanation in reply, including for each violation: (1) corrective action taken and the results achieved; (2) corrective action to be taken to avoid further violations; and (3) the date when full compliance will be achieved. Consideration may be given to extending your response time for good cause shown.

MAY 5 - 1988

Dated _____



D. G. Wiedeman, Chief
Nuclear Materials Safety Section 1

U.S. NUCLEAR REGULATORY COMMISSION

REGION III

Report No. 030-16055/88001(DRSS)

Docket No. 030-16055

License No. 34-19089-01

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

Inspection Conducted: April 13-21, 1988

Inspection At: AMS' London Road Facility

Inspector: *Robert E. Burgin*
Robert E. Burgin
Senior Radiation Specialist

5/4/88
Date

Approved By: *D. G. Wiedeman*
D. G. Wiedeman, Chief
Nuclear Materials Safety
Section 1

5-5-88
Date

Inspection Summary

Inspection on April 13, 1988 (Report No. 030-16055/88001(DRSS))

Areas Inspected: This was an unannounced special safety inspection initiated following the NRC's review of survey records submitted with AMS' February 8, 1988 proposal to isolate the Waste Hold Up Tank Room at its London Road facility. These records indicated the presence of elevated radiation levels (as much as 70 millirem per hour) in an unrestricted area in the sewerage system within AMS property lines. The inspection consisted of a selective examination of procedures and representative records, observations, interviews with personnel, independent measurements and the collection of water and sludge samples subsequently analysed in the NRC Region III laboratory.

Results: Of the areas inspected, one violation was identified - 10 CFR 20.105(b)(2); radiation levels existed in an unrestricted area which, if an individual were continuously present, could have resulted in his receiving a dose in excess of 100 millirems in any seven consecutive days (Section 5).

DETAILS

1. Persons Contacted

*Robert A. Jucius, Principal Physicist
*Howard R. Irwin, Radiation Safety Officer

*Denotes those present at Exit Interview on April 13, 1988.

2. Licensed Activities

AMS is licensed by the NRC to possess up to 300 kCi of cobalt-60, 40 kCi of cesium-137 and 9,000 pounds of depleted uranium. License Number 34-19089-01 authorizes AMS to perform research, development, and processing of sealed sources for distribution to authorized recipients; to install, dismantle, service and maintain Picker Corporation and AMS teletherapy units, and Picker radiography units; to remove, install or exchange sources in Picker corporation, AMS Inc., and Keleket-Barnes teletherapy equipment; to develop and demonstrate equipment containing sealed sources; and to leak test sealed sources installed in Picker Corporation and AMS, Inc. devices.

3. Purpose of Special Inspection

The inspection was initiated following NRC Region III's review of AMS February 8, 1988 letter (with enclosures) proposing isolation of the Waste Hold Up Tank (WHUT) room at the London Road facility. This letter (with enclosures) is included as Attachment A.

Section J of Nuclear Support Services' (NSS) report, "Remedial Actions for the Waste Hold Up Tank Room at the London Road Facility," enclosed with the above-referenced letter, included results of surveys performed on January 21, 1988, in the sewerage system within AMS property lines. The survey indicated the presence of radiation levels as high as 70 millirem per hour in an unrestricted area.

4. NRC Followup

On April 13, 1988, the special inspection was conducted on-site and included a review of selected records, observations, interviews of licensee representatives, independent measurements and the collection of water and sludge samples subsequently analyzed in the NRC Region III Laboratory (counting results of the collected samples are discussed in Section 4.b).

a. Interview of Robert A. Jucius, Principal Physicist

Mr. Jucius was interviewed on April 13, 1988, and provided the following information:

During the performance of radiation level surveys outside the AMS London Road facility on January 20, 1988, Mr. Leland Schroeder Nuclear Support Services (NSS) identified a sewer (manhole) cover

reading 50k counts per minute. This survey was performed to determine the environmental impact of AMS' Waste Hold Up Tank (WHUT), and is documented in NSS' report enclosed with AMS' February 8, 1988 letter to the NRC (Attachment A).

Upon review of the NSS survey documents by AMS representatives, the high reading was observed on Mr. Schroeder's January 20, 1988 survey report (Attachment B). On January 21, 1988, Mr. Robert A. Jucius performed "verification surveys" in and around the manhole. Survey results (documented in Attachment C) indicated radiation levels as high as 70 millirem per hour (mrem/hr) at the bottom of the sewer pipe directly below the manhole. Smear (wipe) sample results of bottom sediment measured with a spectroscaler converted to 121,770 dpm/100 cm² (not enough sediment could be obtained to fit a good counting geometry on the more sophisticated quantification equipment).

Mr. Jucius stated that he placed a "Caution-Radiation Area" sign and contact instructions on the ladder inside the manhole, informing any individual entering the sewerage system from AMS property to contact AMS prior to entry (this posting was observed during the April 13, 1988 special inspection). While warning notices were placed in the manhole, access to the sewerage system was not restricted for another 1-1½ months, according to Mr. Jucius, when a locking bar was welded to the outer manhole pipe (a metal rod secured with a padlock).

When questioned about notifications possibly made in regard to the high radiation levels identified in the unrestricted area, Mr. Jucius stated that the topic was discussed with AMS' Radiation Safety Committee, and the decision was made not to report the situation to the NRC at that time (the information was provided to the NRC in the form of environmental surveys, Attachment C).

b. NRC Independent Measurements

On April 13, 1988, the NRC inspector performed radiation level surveys and collected water and sludge samples from the sewerage system. Radiation levels at the bottom of the AMS manhole ranged from 60-80 mR/hour, increasing in the direction of the facility. Levels off-site (at the mid-London Road manhole) were background.

A water sample (still) from the AMS sewerage system measured 8.855E-6 microcuries per milliliter*; the sludge sample measured 6.187E-2 microcuries per milliliter (both for cobalt-60). The main (City of Cleveland) sewer system water sample (fast moving) did not contain measurable amounts cobalt-60.

*10 CFR 20, Appendix B, allows cobalt-60 concentrations in unrestricted areas (water) of 3.0E-5 and 5.0E-5 uCi/ml for insoluble and soluble forms, respectively.

The NRC survey/sampling locations and results are identified in Attachments D and E, respectively. The sample analysis was completed by NRC laboratory representatives on April 21, 1988.

5. Apparent Violation

10 CFR 20.105, "Permissible levels of radiation in unrestricted areas," states in paragraph (b):

Except as authorized by the Commission pursuant to paragraph (a) of this section, no licensee shall possess, use or transfer licensed material in such a manner as to create in any unrestricted area from radioactive material and other sources of radiation in his possession:

- (1) Radiation levels which, if an individual were continuously present in the area, could result in his receiving a dose in excess of two millirems in any one hour, or
- (2) Radiation levels which, if an individual were continuously present in the area, could result in his receiving a dose in excess of 100 millirems in any seven consecutive days.

Contrary to the above, AMS licensed material (cobalt-60) in an unrestricted area (sewerage system) created radiation levels of 80 millirem per hour. The duration of this condition is not known at this time.

6. Exit Interview

A brief exit interview was held at the conclusion of this special inspection which included a discussion of the apparent violation and AMS corrective actions to date (posting inside the manhole and securing the manhole from non-AMS entry; even Cleveland Water Works employees would need to contact AMS to get into the manhole from AMS property).

Also briefly discussed were possible means to post and secure the 80 mR/hr area from entry via the main sewer system.

Sampling results (Section 4.b.) were not available at the time of the inspection.

Attachments:

- A. AMS letter dated February 8, 1988 (w/enclosure)
- B. NSS survey sheet dated January 20, 1988
- C. NSS survey sheet dated January 21, 1988
- D. NRC survey/sampling location schematic
- E. NRC Confirmatory Measurements