

From: Bruce A. Berson (BAB1), *RTII*  
To: JAG, JFC, SFC, WLA *gGraham, RTII gCordeo, OGC SCrockett,*  
Date: Friday, December 2, 1994 12:36 pm *OGC*  
Subject: AMS *WAXELSON,*

I spoke to the AMS attorney. He will not be filing a Touhy request for the *RTII*  
December 9 hearing. He may at a later date.

*B/30*

December 6, 1994

Advanced Medical Systems, Inc.  
ATTN: Mr. David Cesar, Treasurer  
1020 London Road  
Cleveland, Ohio 44110

SUBJECT: RESULTS OF NRC RADIOLOGICAL SURVEY AND SAMPLE ANALYSIS OF  
THE ADVANCED MEDICAL SYSTEMS, INC. (AMS) WASTE WATER PIPING  
AND ITS OUTFALL INTO THE CITY OF CLEVELAND SEWER (REPORT  
NO. 030-16055/94003(DRSS))

Dear Mr. Cesar:

This refers to the special inspection conducted by Messrs. Michael Kurth and Edward Kulzer of this office from August 17 through October 14, 1994. The special inspection was conducted to examine the radiological conditions of waste water exiting your facility through your waste water piping and into the City of Cleveland sewers in the vicinity of the sewage outfall from your facility. The inspection was prompted by the identification of exposure rates above background in the City of Cleveland sewer at the Advanced Medical Systems, Inc. (AMS) outfall. The results of this inspection were discussed with you at the conclusion of the inspection.

As described in the enclosed report, extensive radiation surveys and sampling of solid and liquid materials were conducted identifying cobalt-60 in the solid sediment from the city sewers and your waste water piping. Also, cobalt-60 was being carried in the waste water from the AMS outfall into the city sewers. This appears to represent a violation of 10 CFR 20.2003 which permits only the discharge of soluble material or readily dispersible biological material in water. The cobalt-60 emanating from your lateral is neither soluble or readily dispersible biological material.

We plan to meet with you in the near future to discuss these inspection findings. We will contact you at a later date to schedule this meeting. Following our meeting, a decision will be made on the appropriate enforcement action regarding the apparent violation. As such, no Notice of Violation is being issued at this time. While no Notice is being issued and no written response is required, we expect that prompt action has been or will be taken to correct this apparent violation.

In accordance with 10 CFR 2.790 of the Commission's regulations, a copy of this letter and the enclosed inspection report will be placed in the NRC Public Document Room.

OPTIONAL FORM 99 (7-90)

**FAX TRANSMITTAL**

# of pages **26**

To <b>Kathy Haney</b>	From <b>M. Weber</b>
Dept./Agency	Phone #
Fax #	Fax #

NSN 7540-01-317-7368

5099-101

GENERAL SERVICES ADMINISTRATION

**D/31**

9412150010 3 pp.

Mr. David Cesar

-2-

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

Sincerely,

Original Signed By  
R. J. Caniano for

W. L. Axelson, Director  
Division of Radiation Safety and Safeguards

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

Enclosure: Inspection Report No.  
030-16055/94003(DRSS)

cc w/encl: NEORS  
City of Cleveland

bcc w/encl: J. Turdici, OEDO  
J. T. Greeves, NMSS  
E. W. Brach, NMSS  
J. H. Austin, NMSS  
T. C. Johnson, NMSS  
M. Nalluswami, NMSS  
C. G. Jones, NMSS  
R. L. Fonner, OGC  
PUBLIC (IE07)

DOCUMENT NAME: B:\AMS94003.DSS

\* Concurrence via e-mail

See Previous Concurrences

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OFFICE	RIII		RIII		RIII		RIII		RIII		RIII	
NAME	Kurth		Kulzer		Slawinski		Madera		Grobe		Shear	
DATE	12/ /94		12/ /94		12/ /94		12/ /94		12/ /94		12/ /94	
OFFICE	RIII		NMSS	*	DWM	*	OGC	*	RIII			
NAME	Berson		Paperiello		Knapp		Chandler		Axelson			
DATE	12/ /94		12/ /94		12/ /94		12/ /94		12/6 /94			

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

Sincerely,

W. L. Axelson, Director  
Division of Radiation Safety  
and Safeguards

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

Enclosure: Inspection Report  
No. 030-16055  
/94003(DRSS)

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R. L. Fonner, OGC  
PUBLIC (IE07)

DOCUMENT NAME: B:\AMS3.ltr

\* Concurrence via e-mail

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OFFICE	RIII	E	RIII	E	RIII	E	RIII	E	RIII	E	RIII	N
NAME	Kurth		Kulzer		Slawinski		Madera		Grobe		Shear	GIS
TE	12/5/94		12/5/94		12/5/94		12/5/94		12/5/94		12/5/94	
OFFICE	RIII	E	NMSS	*	DWM	*	OGC	*	RIII		OE	E
NAME	Berser		Paperiello		Knapp		Chandler		Axelson		Lieberman	
DATE	12/5/94		12/1/94		12/1/94		12/23/94		12/1/94		12/1/94	

U. S. NUCLEAR REGULATORY COMMISSION

REGION III

Report No. 030-16055/94003(DRSS)

License No. 34-19089-01

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

Inspection At: City of Cleveland sewer interceptor (sewer interceptor)  
Intersection of sewer interceptor under London Road,  
upstream and downstream manholes, and the AMS manhole  
Cleveland, Ohio

Inspection Conducted: August 17 through October 14, 1994

Inspectors: Michael Kurth  
Michael Kurth  
Radiation Specialist

12/5/94  
Date

Edward Kulzer for  
Edward Kulzer  
Radiation Specialist

12/5/94  
Date

Reviewed by: John R. Madera  
John R. Madera, Chief  
Materials Licensing Section

12/5/94  
Date

Approved by: John A. Grobe  
John A. Grobe, Chief  
Nuclear Materials Inspection  
Section 2

12/5/94  
Date

Inspection Summary

Inspection on August 17 through October 14, 1994 (Report No. 030-16055/94003(DRSS))

Areas Inspected: This was a special inspection conducted to perform surveys of the City of Cleveland sewer interceptor in the location of the AMS facility, Cleveland, Ohio, and in the AMS manhole. The inspection was prompted by the identification of elevated exposure rates on the sewer interceptor surface below the AMS lateral in July 1994. Samples of sewer debris, water effluent, and a series of wipes were collected for analyses.

Results: The NRC inspectors, accompanied by the Northeast Ohio Regional Sewer District (NEORS), and NEORS contractors, B. Koh & Associates, Inc.,

identified four areas of elevated exposure rates. These areas are located: (1) below the intersection of the sewer interceptor and the AMS lateral; (2) within the processing drain line in the AMS sewer; (3) within the sanitary inlet into the AMS manhole; and (4) within the sanitary outlet from the AMS manhole into the sewer interceptor. The preliminary results of the sewer debris and wipe test analysis from the August 17, 1994 sampling identified positive cobalt-60 surface contamination levels ranging from 457 disintegrations per minute per 100 cm<sup>2</sup> (dpm/100 cm<sup>2</sup>) to  $2.7 \times 10^6$  dpm/100 cm<sup>2</sup>, partial levels which exceed the 1,000 dpm/100 cm<sup>2</sup> limit found in NRC's guidance document, "Guidelines for Decontamination of Facilities and Equipment Prior to Release for Unrestricted Use or Termination of Licenses for Byproduct, Sources, or Special Nuclear Materials," dated August 1987. Also, between July 5 and October 10, 1994, cobalt-60 was identified, by the NRC and the NEORSD, in the water effluent discharged from the AMS lateral into the sewer interceptor. The September 20, 1994 sampling analysis verified prior indications of cobalt-60 contamination. However, further water discharge samples taken from the location on September 20 and October 4, 1994, did not identify the presence of cobalt-60.

One apparent violation was identified:

Apparent failure to dispose of licensed material into the sanitary sewerage system that is readily soluble or is readily dispersible biological material in water is an apparent violation of 10 CFR 20.2003, which has been a requirement for this licensee since January 1, 1994 (Section 3. B. of this report).

Also, given that cobalt-60, which is not considered to be readily soluble or readily dispersible biological material in water, was identified in effluent discharged from the AMS lateral and, that cobalt-60 was deemed to be removable within the AMS lateral through the conduct of wipe sampling, the probability exists that future effluent discharges may develop into the disposal of licensed material into the sanitary sewerage system.

## DETAILS

### 1. Persons Contacted

Thomas Lenhart, Assistant General Counsel, NEORS  
\* Lawrence English, Assistant General Counsel, NEORS  
\* Richard Connelly, Manager Water Quality, NEORS  
\* Len Jufko, NEORS  
\* William Kasberg, NEORS  
\* Theodore Adams, Vice President, B. Koh & Associates, Inc.  
#@David Cesar, Treasurer, Advanced Medical Systems, Inc. (AMS)  
@ Joseph Michuta, Radiation Safety Officer, AMS  
@ Robert Neschter, Senior Radiation Technician, AMS  
@ Vincent Rocco, Radiation Technician, AMS

\*Denotes those present at interceptor sewer survey conducted August 17, and September 20, 1994.

@Denotes those present at the sewer survey conducted September 20, 1994.

#Denotes those present during the exit interview conducted by telephone on October 14, 1994.

### 2. Background

#### A. General History

In 1959, the Atomic Energy Commission issued License No. 34-07225-09 to Picker X-Ray Corporation (Picker Corp.), for the operation of an isotope manufacturing facility located at 1020 London Road, Cleveland, Ohio. The Picker Corp. license authorized possession of 150,000 curies of cobalt-60 and 3,000 curies of iridium-192 in solid metal form, and 40,000 curies and 100 curies of cesium-137 and thulium-170 respectively, as sealed sources. These licensed materials were authorized for: (1) processing incident to redistribution to authorized recipients; (2) radiation effects studies; and (3) research and development. The principal operation conducted under this license was the manufacture of cobalt-60 sealed sources for medical teletherapy and industrial radiography units, and subsequent distribution of the sources to authorized recipients throughout the world.

In 1979, the Picker Corp. London Road facility was purchased by Advanced Medical Systems, Inc. (AMS). License No. 34-07225-09 was terminated on November 9, 1979, at which time all licensed material possessed was transferred to AMS.

The NRC issued License No. 34-19089-01 to AMS on November 2, 1979. At this time, the licensed operations, facilities and equipment previously owned and operated by the Picker Corp. were assumed by AMS.



Both operations had released cobalt-60 through the London Road facility lateral into the sanitary sewer under the provisions of 10 CFR 20.303, "Disposal by Release into Sanitary Sewerage Systems," which was in effect through December 31, 1993. The NRC inspection in 1988 confirmed cobalt-60 contamination in the AMS sewer manhole on AMS property. At that time the radiation level ranged as high as 70 milliroentgen per hour (mR/hr) at the bottom of the manhole adjacent to the discharge pipe from the AMS building. The contaminated area was partially decontaminated and covered with a layer of concrete by the licensee. In May 1989, as stated in the NRC Inspection Report No. 030-16055/93002(DRSS), AMS discontinued the discharge of licensed material into the sanitary sewerage system. Also, AMS has not generated liquid waste for several years due to changes in its decontamination methods and termination of source manufacturing operations.

Beginning January 1, 1994, NRC licensees were required to comply with the revised 10 CFR Part 20, which contains more restrictive requirements for sanitary sewer disposal of liquid radioactive waste than previously existed.

The revised 10 CFR 20 specifies, in part, in 20.2003, "Disposal by Release into Sanitary Sewerage," that licensees may discharge licensed material into the sanitary sewerage system only if the material is readily soluble or is readily dispersible biological material in water.

In 1993, as documented in NRC Inspection Report No. 999-90003/93010(DRSS), an NRC inspector measured the exposure rates in the downstream manhole from the AMS facility in the London Road sewer interceptor. No detectable radiation exposure rates above background were identified. The location where the elevated exposure rate was identified in July 1994 by the NEORSR was inaccessible at the time of the 1993 NRC inspection and the NRC was unaware, in 1993, of the manhole's existence.

B. Specific History Prompting this Special Inspection

On July 5, 1994, surveys were conducted by the Northeast Ohio Regional Sewer District (NEORSR) contractors, B. Koh & Associates, Inc., along the City of Cleveland's interceptor sewer (interceptor sewer) in an area connecting with the AMS lateral under London Road. Elevated exposure rate readings were identified below the AMS lateral on the sewer interceptor brick and iron rungs. The NEORSR reported that the radiation exposure rate measured was approximately 7 mR/hr on contact. Residue deposits on the sewer interceptor brick and iron rungs below the AMS lateral were collected, resulting in the identification of cobalt-60 contamination ranging from 0.084 to 0.12 microcuries per gram. Also, during the performance of the surveys, the NEORSR discovered a manhole directly above the AMS lateral/sewer interceptor



intersection which was buried below the London Road surface. The NEORS D has since raised the level of the manhole to the street surface.

Attachment No. 1 of this report illustrates the pathway and proximity of the AMS lateral in relation to the AMS facility. The approximate length of the lateral from the AMS manhole to the sewer interceptor is 40 feet (12 m). The lateral is made of 4 to 5 foot (122-152 cm) long sections of precast clay/ceramic piping butted together forming the lateral. The lateral is approximately 18 inches (46 cm) in diameter. Attachment No. 2 contains a photograph of the AMS lateral protruding into the City of Cleveland sewer interceptor (sewer interceptor). The sewer interceptor is approximately 5 feet (1.5 m) in diameter and flows to the Easterly Wastewater Treatment Plant.

### 3. Survey and Sample Analysis Results

#### A. Survey Results

On August 17 and September 20, 1994, the NRC inspectors, accompanied by NEORS D personnel and NEORS D contractors, conducted a series of surveys in the sewer interceptor outside of the AMS facility under London Road. During those surveys there was a significant flow rate of waste water emanating from the AMS lateral into the interceptor. An assessment of the waste water flow rates is contained in NRC Inspection Report No. 030-16055 /94004(DRSS) issued November 29, 1994. Also, on September 20, 1994, surveys were conducted in both manholes immediately upstream and downstream from the AMS facility along London Road, and in the AMS manhole. The survey instruments used were a Ludlum Model 19 Micro R Meter, NRC Tag No. 014808, a Ludlum Model 12 Count Ratemeter with attached pancake probe, NRC Tag No. 047068, a <sup>1</sup>Bicron MicroRem, Serial No. B709J, and a <sup>2</sup>Ludlum Model No. 2221 Scaler Ratemeter (No Serial No. available) with attached pancake probe.

The background exposure rate measured at the London Road street surface above the AMS lateral/sewer interceptor intersection was 12 <sup>3</sup>microrentgen per hour ( $\mu$ R/hr). The surveys conducted in the sewer interceptor demonstrated elevated exposure rate readings. A sewer interceptor surface area approximately 1.5 feet (46 cm) by 3 feet (91 cm) located directly below the AMS lateral showed elevated readings averaging 1.0 to 10 mR/hr on contact with the sewer interceptor brick. Attachment No. 2 of this report

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<sup>1</sup>This instrument is owned and maintained by B. Koh & Associates, Inc.

<sup>2</sup>This instrument is owned and maintained by B. Koh & Associates, Inc.

<sup>3</sup>Assume that 1 roentgen = 1 Rem.

illustrates the location of the elevated exposure rates in the sewer interceptor. One spot was identified between the iron rungs on the sewer interceptor brick surface showing an exposure rate ranging from 20 to 25 mR/hr on contact. Also, a spot was identified on the rung below the AMS lateral showing an elevated exposure rate of 14 mR/hr on contact. An average exposure rate of 0.5 mR/hr was identified both 3 feet (91 cm) upstream and downstream from the AMS lateral in the center of the sewer interceptor. Also, an exposure rate ranging from 1.5 to 2.0 mR/hr was identified in the center of the sewer interceptor directly across (approximately 61 cm) from the elevated area below the AMS lateral. Attachment No. 3 of this report contains several photographs of the sewer interceptor wall in the area of the AMS lateral.

Surveys conducted of the first manholes immediately upstream and downstream from the AMS facility identified exposure rates ranging from 5 to 9  $\mu$ R/hr on the surface of London Road next to the manholes. Exposure rates ranging from 14 to 19.5  $\mu$ R/hr (includes the background rate) were identified in the center of the sewer interceptor and on contact with the interceptor brick in both manholes. The slightly elevated exposure rates were attributed to naturally occurring radioactive materials (NORM) in the sewer brick. (NORM, such as potassium-40, radium-226, and thorium-232, are found in very small quantities in brick.)

Elevated exposure rates were identified in the AMS manhole. Exposure rates ranging from 2 to 3 mR/hr were identified, on contact, approximately 2 to 4 inches (5 to 10 cm) into the processing drain line, and the sanitary inlet and outlet in the AMS manhole. A survey instrument was lowered into the AMS manhole demonstrating exposure rates of 0.5 to 1.0 mR/hr in the center of the AMS manhole.

#### B. Sampling Analysis Results

On July 5, 1994, the NEORSD collected three sediment samples from the sewer interceptor in the location of the AMS lateral outfall. Also, a water effluent sample was collected from waste water discharging from the AMS lateral. The analytical results of the sediment samples identified positive cobalt-60 concentrations ranging from 0.084 to 0.12 microcuries per gram. The result of the water sample identified a positive cobalt-60 concentration of 29 picocuries per liter (pCi/l).

The NRC collected numerous smears, sewage residues, and water samples on August 17 and September 20, 1994. Table No. 1 identifies the locations and analytical results of the smear and sewage residue samples collected on August 17, 1994. The samples were analyzed using the NRC Region III gamma spectroscopy system. On August 17, 1994, a total 4 smears and 4 sewage residue samples were collected.

As illustrated in Table No. 1, the analysis of the sewage residue samples demonstrated cobalt-60 contamination ranging from 4.29 to 1,230 nanocuries. Two of the 4 smears collected identified cobalt-60 contamination ranging from 2,750 to 103,840 disintegrations per 100 cm<sup>2</sup> (dpm/100 cm<sup>2</sup>). Each smear collected was assumed to cover a 100 cm<sup>2</sup> area. The acceptable surface contamination level for removable cobalt-60 is 1,000 dpm/100 cm<sup>2</sup>, as stated in the NRC document, "Guidelines for Decontamination of Facilities and Equipment Prior to Release for Unrestricted Use or Termination of Licenses for Byproduct, Source, or Special Nuclear Material," dated August 1987, which is included as Attachment No. 4 of this report. The water effluent sample collected demonstrated positive indications of cobalt-60 contamination of 35 picocuries per liter (pCi/l).

Table No. 2 identifies the locations and analytical results of the NRC smears collected on September 20, 1994. As illustrated in Table No. 2, a smear result of 16,852 dpm/100 cm<sup>2</sup> removable cobalt-60 contamination was identified on the sewer interceptor wall below the AMS lateral.

On September 20, 1994, smears were also collected from the sewer interceptor walls in the areas of the first sewer interceptor manholes immediately upstream and downstream from the AMS facility along London Road, and the AMS manhole. As illustrated in Table No. 2, general smears of the sewer interceptor walls from the sewer interceptor manholes located immediately upstream and downstream from the AMS facility along London Road did not identify removable cobalt-60 contamination. There was however, a surface contamination level of 97 dpm/100 cm<sup>2</sup> which was identified in the AMS manhole on the AMS lateral exiting into the sewer interceptor.

Table No. 3 identifies the dates, locations, and analytical results of the water effluent collected by the NRC and the NEORS. As illustrated in Table No. 3, water effluent samples taken from the upstream and downstream manholes, and from the AMS manhole, did not demonstrate positive indications of cobalt-60. However, water effluent collected from the outfall of the AMS lateral into the sewer interceptor on July 5, August 17, September 28, October 1, and October 10, 1994, demonstrated positive concentrations of cobalt-60 ranging from 13 to 306 pCi/l. Given that removable cobalt-60 was identified on the surface of the AMS lateral, it appears that the water effluent flowing through the AMS lateral sloughed the cobalt-60 from the lateral causing the release of licensed material into the sanitary sewerage system. The discharge of licensed material, cobalt-60, which is not readily soluble or is readily dispersible biological material in water into the sanitary sewerage system is an apparent violation of 10 CFR 20.2003 which has been a requirement for this licensee since January 1, 1994.

One apparent violation of NRC requirements was identified.

4. Exit Meeting

During the performance of surveys and sample collecting, the preliminary findings were provided to those individuals present during the August 17 and September 20, 1994, on-site inspections, as identified in Section 1 of this report. A summary of the areas surveyed and the forthcoming letter were discussed. Also, on October 14, 1994, the results of this inspection were discussed in a telephone conversation between Mr. Cesar and Mr. Caniano. The AMS and NEORSO employees did not identify any information provided during the inspection as proprietary.

- Attachments:
1. Illustration of pathway of AMS lateral into sewer interceptor
  2. Diagram of sewer interceptor
  3. Series of photographs of sewer
  4. Guideline for the Decontamination of Facilities and Equipment Prior to Release for Unrestricted Use or Termination of Licenses for Byproduct, Source, or Special Nuclear Material

TABLE NO. 1

## NRC SEWER SAMPLE RESULTS

SEWER SAMPLES FROM THE CITY OF CLEVELAND INTERCEPTOR  
IN THE IMMEDIATE AREA OF THE AMS LATERAL ON LONDON RD

SAMPLES TAKEN AUGUST 17, 1994

	SAMPLE LOCATION	RESULT $\pm 2\sigma$
1.	Debris and sludge from left (upstream) of rungs below the AMS lateral	*4,290 pCi $\pm$ 32 pCi
2.	Black debris off of top rung below the AMS lateral	*434,000 pCi $\pm$ 3,000 pCi
3.	Black debris off of brick wall below the AMS lateral	*1,230,000 pCi $\pm$ 7,000 pCi
4.	Red debris off of rung above the AMS lateral	*1,630 $\pm$ 20 pCi
5. a.	Smear: Rung immediately below the AMS lateral	less than 41 dpm
5. b.	Smear: NEORSD Sewer wall (sewer brick) below the AMS lateral	103,840 dpm $\pm$ 167 dpm
5. c.	Smear: NEORSD Sewer wall (sewer brick) above the AMS lateral	2,750 dpm $\pm$ 52 dpm
5. d.	Smear: Inside the AMS lateral	457 dpm $\pm$ 138 dpm

\*Note: The reported uncertainty refers only to counting statistics.

\*Note: Additional analysis error will be introduced due to the unique geometry associated with the debris. The geometry error is estimated to be less than 10 percent.

\*Note: disintegration per minute = dpm. Also, each smear result is estimated to be averaged over a 100 cm<sup>2</sup> area.



TABLE NO. 2

NRC SMEAR RESULTS  
SEWER SAMPLES FROM THE CITY OF CLEVELAND SEWER INTERCEPTOR  
IN THE AREA OF THE AMS FACILITY ON LONDON ROAD  
AND THE AMS SEWER

SAMPLES TAKEN SEPTEMBER 20, 1994

	LOCATION	RESULT $\pm 2\sigma$
1	Smear: Iron Rung Directly Below the AMS Lateral	*717 $\pm$ 17 dpm
2	Smear: Sewer Interceptor Brick Directly Below the AMS Lateral (between lateral and 1 <sup>st</sup> rung	16,852 $\pm$ 264 dpm
3	Smear: Sewer Interceptor Brick Directly Above the AMS Lateral	< 16 dpm
4	Smear: Approximately 1 foot inside the AMS Lateral between the positions of 12:00 and 3:00	56 $\pm$ 4 dpm
5	Smear: Outer Surface of the AMS Lateral between the positions of 12:00 and 3:00	< 23 dpm
6	Skipped No. 6	
7	Smear: Outer Surface of the AMS Lateral at the 6:00 position	490 $\pm$ 143 dpm
8	Smear: Inside the AMS Lateral Approximately 1 foot at the 5:00 position (as close to water line as possible)	161 $\pm$ 7 dpm
9	Smear: General Wipe of Upstream Sewer Interceptor	< 13 dpm
10	Smear: General Wipe of Downstream Sewer Interceptor	< 14 dpm
11	Smear: AMS Sewer- Floor of AMS Sewer	< 13 dpm
12	Smear: AMS Sewer- Outlet from Processing Drain (East Drain near waterline)	< 16 dpm
13	Smear: AMS Sewer- General Wipe of Sewer Wall	< 22 dpm
14	Smear: AMS Sewer- South Inlet to Manhole (near waterline)	< 23 dpm
15	Smear: AMS Sewer- AMS Sewer Outlet to Interceptor (near waterline)	97 $\pm$ 6 dpm



\*Note: The reported uncertainty refers only to counting statistics.

\*Note: Disintegrations per minute = dpm. Also, each result is estimated to averaged over a 100 cm<sup>2</sup> area.

TABLE NO. 3

## NRC AND THE NEORSD WATER EFFLUENT SAMPLE RESULTS

	SAMPLE	DATE COLLECTED - LOCATION	RESULT $\pm$ $^{*}2\sigma$
1	NEORSD	July 5, 1994 - AMS lateral outflow to sewer interceptor	29 pCi/l
<sup>1</sup> 2	NRC	August 17, 1994 - AMS lateral outflow to sewer interceptor	35 pCi/l $\pm$ 0.4 pCi/l
3	NEORSD	August 17, 1994 - AMS lateral outflow to sewer interceptor	33 pCi/l
4	NRC	September 20, 1994 - AMS lateral outflow to sewer interceptor	$^{*}<$ 10.3 pCi/l
5	NEORSD	September 20, 1994 - AMS lateral outflow to sewer interceptor	$^{*}<$ 20 pCi/l
6	NRC	September 20, 1994 - AMS manhole	$^{*}<$ 9.3 pCi/l
7	NRC	September 20, 1994 - Upstream manhole	$^{*}<$ 8.9 pCi/l
8	NRC	September 20, 1994 - Downstream manhole	$^{*}<$ 9.1 pCi/l
9	NEORSD	September 28, 1994 - AMS lateral outflow to sewer interceptor	13 pCi/l
10	NEORSD	October 1, 1994 - AMS lateral outflow to sewer interceptor	86 pCi/l
11	NEORSD	October 4, 1994 - AMS lateral outflow to sewer interceptor	$^{*}<$ 0.1 pCi/l
12	NEORSD	October 10, 1994 - AMS lateral outflow to sewer interceptor	306 pCi/l

\*Note: The reported uncertainty refers only to counting statistics.

\*Note: The analytical results demonstrating the less than symbol, "<", indicates that no measurable activity was identified below the minimum detectable level derived for that sample. The minimum detectable level for each sample in which no measurable activity was detected is recorded in the "RESULT" column.

<sup>1</sup>This sample was analyzed by the NRC. After conducting the analysis, the sample was provided to the NEORSD for analysis (Sample Result No. 3 of this table). Therefore, Sample Nos. 2 and 3 were the same samples analyzed independently.

ATTACHMENT NO. 1

ILLUSTRATION OF PATHWAY OF AMS LATERAL  
INTO SEWER INTERCEPTOR

N →

Not drawn  
to scale

MANDALAY STREET

↑  
FLOW PATHWAY OF  
Sewer Interceptor line

LONDON ROAD

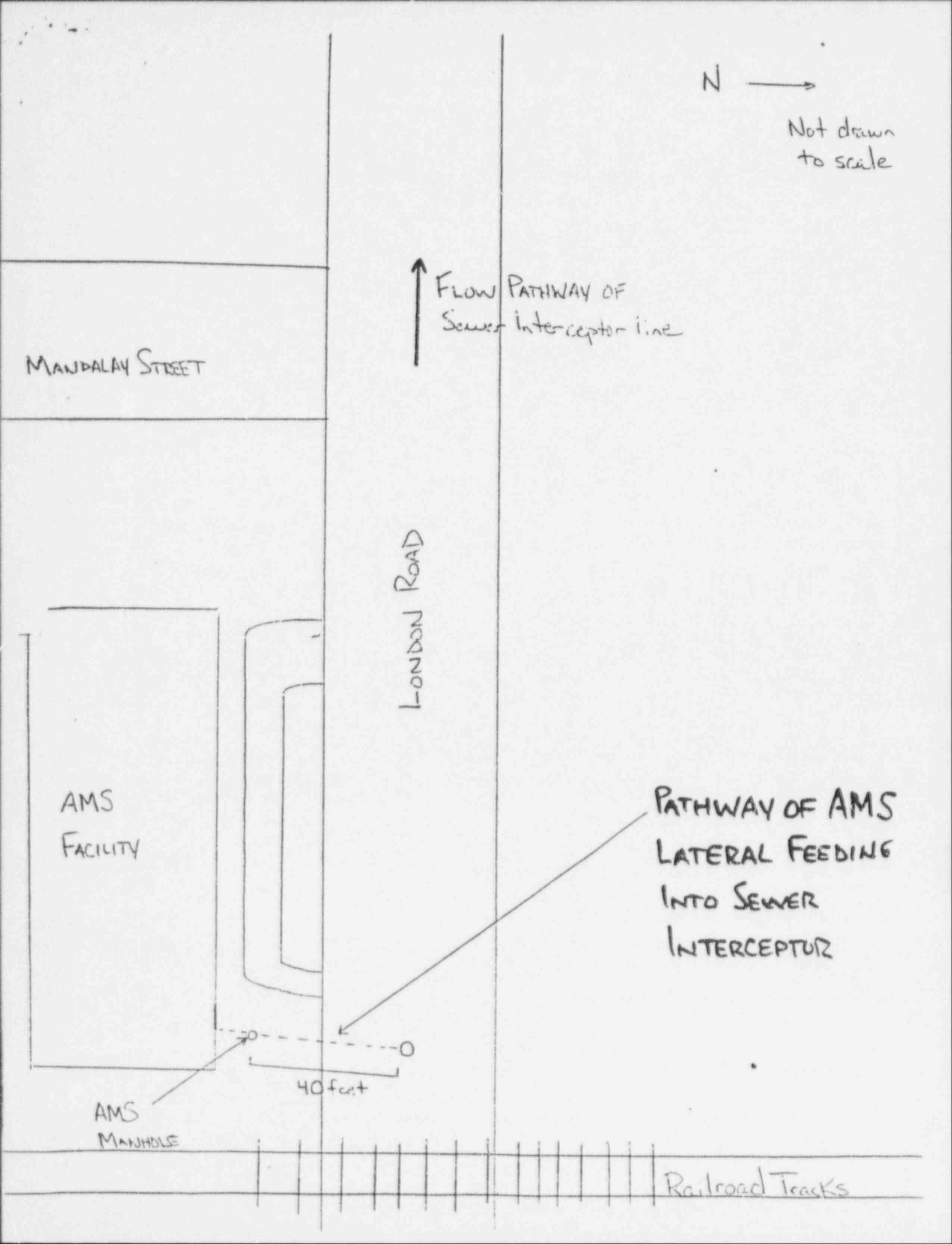
AMS  
FACILITY

PATHWAY OF AMS  
LATERAL FEEDING  
INTO SEWER  
INTERCEPTOR

AMS  
MANHOLE

40 feet

Railroad Tracks



ATTACHMENT NO. 2

DIAGRAM OF SEWER INTERCEPTOR

12 micro R/hr Surface of Street

0-25 mR/hr spot on contact.

2 ft

0.5 mR/hr

1 mR/hr

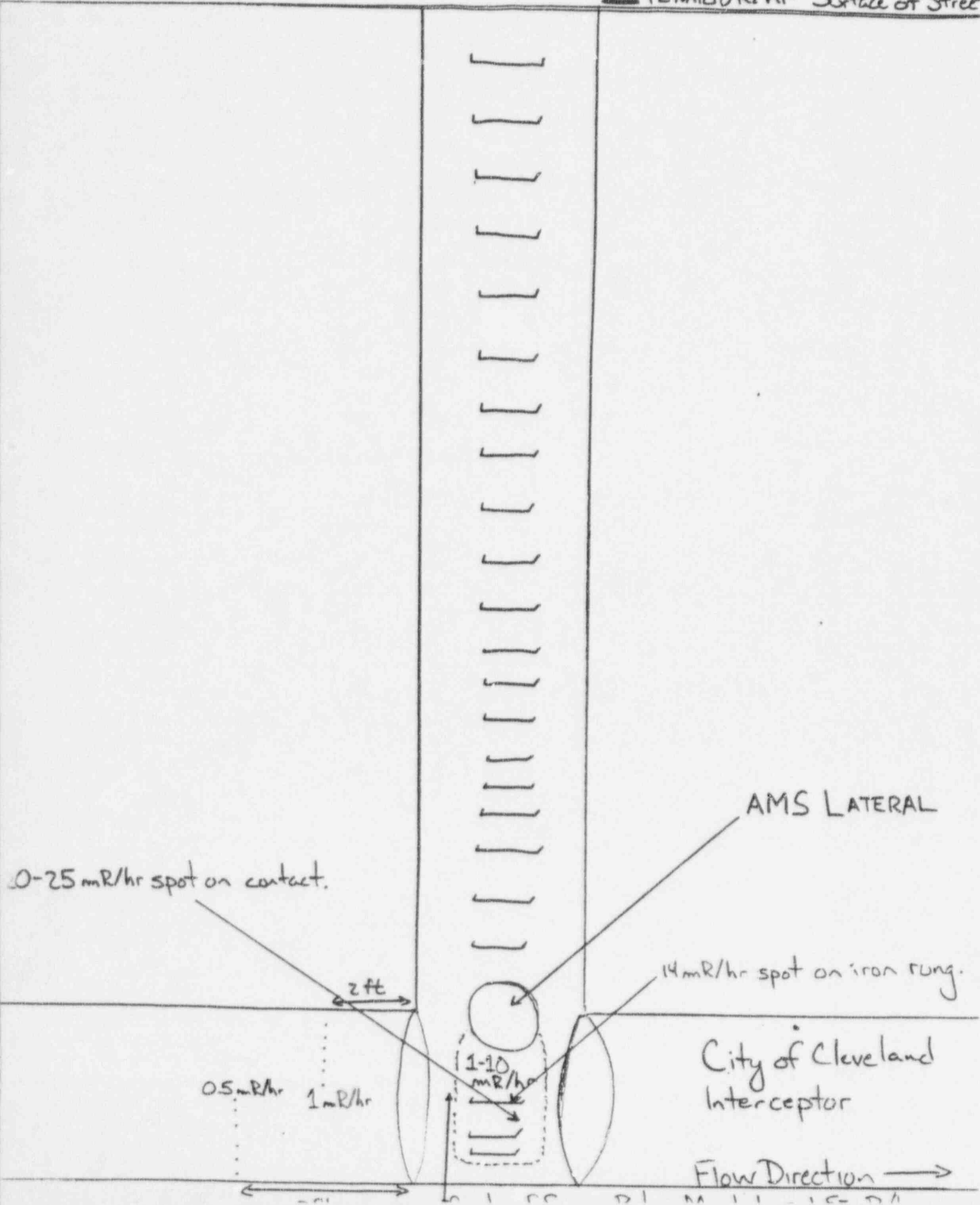
1-10  
mR/hr

AMS LATERAL

14 mR/hr spot on iron ring.

City of Cleveland  
Interceptor

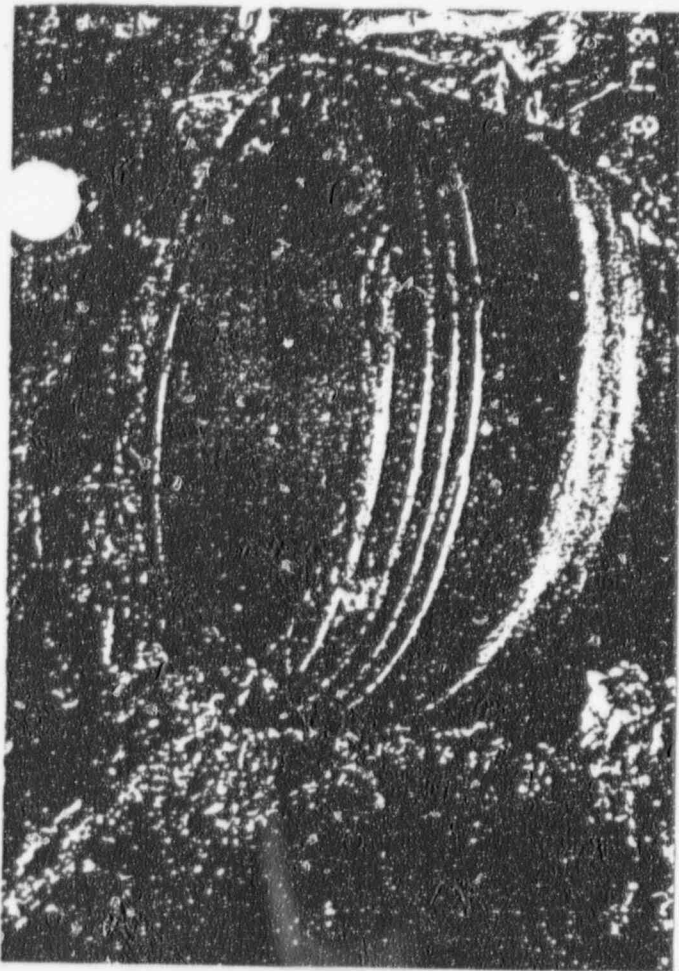
Flow Direction →





ATTACHMENT NO. 3

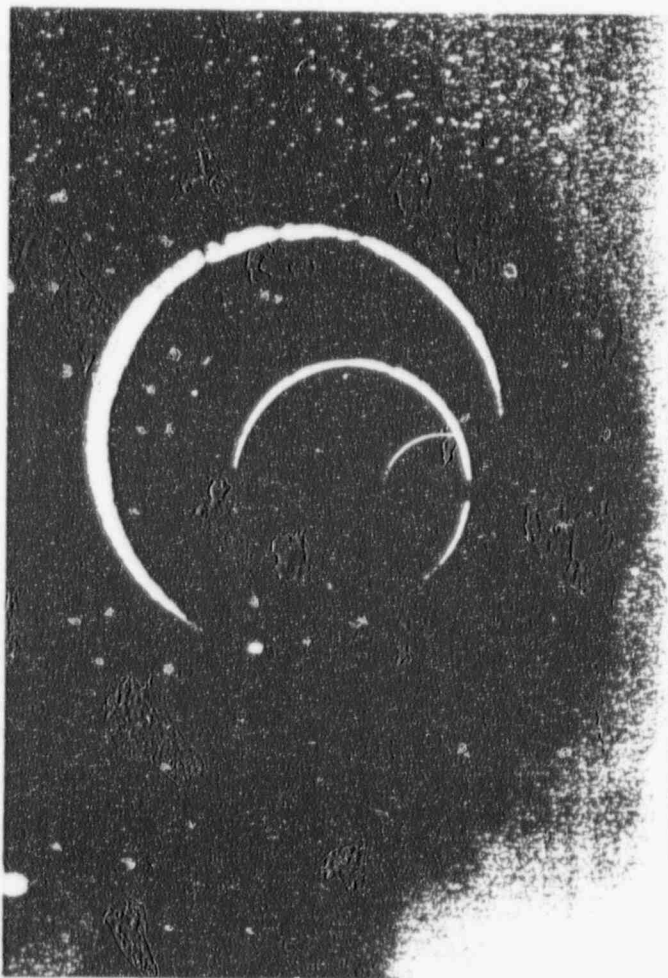
SERIES OF PHOTOGRAPHS OF SEWER



AMS Lateral Protruding Out into  
the City of Cleveland Sewer  
Interceptor



Sewer Interceptor and Iron  
Rungs Below the AMS Lateral



Pathway of the AMS Lateral from the Interceptor into the AMS Building

ATTACHMENT NO. 4

GUIDELINE FOR THE DECONTAMINATION OF FACILITIES AND EQUIPMENT  
PRIOR TO RELEASE FOR UNRESTRICTED USE OR TERMINATION  
OF LICENSES FOR BYPRODUCT, SOURCE,  
OR SPECIAL NUCLEAR MATERIAL

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GUIDELINES FOR DECONTAMINATION OF FACILITIES AND EQUIPMENT  
PRIOR TO RELEASE FOR UNRESTRICTED USE  
OR TERMINATION OF LICENSES FOR BYPRODUCT, SOURCE,  
OR SPECIAL NUCLEAR MATERIAL

U.S. Nuclear Regulatory Commission  
Division of Industrial and  
Medical Nuclear Safety  
Washington, DC 20555

August 1987

The instructions in this guide, in conjunction with Table 1, specify the radionuclides and radiation exposure rate limits which should be used in decontamination and survey of surfaces or premises and equipment prior to abandonment or release for unrestricted use. The limits in Table 1 do not apply to premises, equipment, or scrap containing induced radioactivity for which the radiological considerations pertinent to their use may be different. The release of such facilities or items from regulatory control is considered on a case-by-case basis.

1. The licensee shall make a reasonable effort to eliminate residual contamination.
2. Radioactivity on equipment or surfaces shall not be covered by paint, plating, or other covering material unless contamination levels, as determined by a survey and documented, are below the limits specified in Table 1 prior to the application of the covering. A reasonable effort must be made to minimize the contamination prior to use of any covering.
3. The radioactivity on the interior surfaces of pipes, drain lines, or ductwork shall be determined by making measurements at all traps, and other appropriate access points, provided that contamination at these locations is likely to be representative of contamination on the interior of the pipes, drain lines, or ductwork. Surfaces of premises, equipment, or scrap which are likely to be contaminated but are of such size, construction, or location as to make the surface inaccessible for purposes of measurement shall be presumed to be contaminated in excess of the limits.
4. Upon request, the Commission may authorize a licensee to relinquish possession or control of premises, equipment, or scrap having surfaces contaminated with materials in excess of the limits specified. This may include, but would not be limited to, special circumstances such as razing of buildings, transfer of premises to another organization continuing work with radioactive materials, or conversion of facilities to a long-term storage or standby status. Such requests must:
  - a. Provide detailed, specific information describing the premises, equipment or scrap, radioactive contaminants, and the nature, extent, and degree of residual surface contamination.
  - b. Provide a detailed health and safety analysis which reflects that the residual amounts of materials on surface areas, together with other considerations such as prospective use of the premises, equipment, or scrap, are unlikely to result in an unreasonable risk to the health and safety of the public.

## ACCEPTABLE SURFACE CONTAMINATION LEVELS

NUCLIDES <sup>a</sup>	AVERAGE <sup>b c f</sup>	MAXIMUM <sup>b d f</sup>	REMOVABLE <sup>b e f</sup>
U-nat, U-235, U-238, and associated decay products	5,000 dpm $\alpha$ /100 cm <sup>2</sup>	15,000 dpm $\alpha$ /100 cm <sup>2</sup>	1,000 dpm $\alpha$ /100 cm <sup>2</sup>
Transuranics, Ra-226, Ra-228, Th-230, Th-228, Pa-231, Ac-227, I-125, I-129	100 dpm/100 cm <sup>2</sup>	300 dpm/100 cm <sup>2</sup>	20 dpm/100 cm <sup>2</sup>
Th-nat, Th-232, Sr-90, Ra-223, Ra-224, U-232, I-126, I-131, I-133	1000 dpm/100 cm <sup>2</sup>	3000 dpm/100 cm <sup>2</sup>	200 dpm/100 cm <sup>2</sup>
Beta-gamma emitters (nuclides with decay modes other than alpha emission or spontaneous fission) except Sr-90 and others noted above.	5000 dpm $\beta\gamma$ /100 cm <sup>2</sup>	15,000 dpm $\beta\gamma$ /100 cm <sup>2</sup>	1000 dpm $\beta\gamma$ /100 cm <sup>2</sup>

<sup>a</sup>Where surface contamination by both alpha- and beta-gamma-emitting nuclides exists, the limits established for alpha- and beta-gamma-emitting nuclides should apply independently.

<sup>b</sup>As used in this table, dpm (disintegrations per minute) means the rate of emission by radioactive material as determined by correcting the counts per minute observed by an appropriate detector for background, efficiency, and geometric factors associated with the instrumentation.

<sup>c</sup>Measurements of average contaminant should not be averaged over more than 1 square meter. For objects of less surface area, the average should be derived for each such object.

<sup>d</sup>The maximum contamination level applies to an area of not more than 100 cm<sup>2</sup>.

<sup>e</sup>The amount of removable radioactive material per 100 cm<sup>2</sup> of surface area should be determined by wiping that area with dry filter or soft absorbent paper, applying moderate pressure, and assessing the amount of radioactive material on the wipe with an appropriate instrument of known efficiency. When removable contamination on objects of less surface area is determined, the pertinent levels should be reduced proportionally and the entire surface should be wiped.

The average and maximum radiation levels associated with surface contamination resulting from beta-gamma emitters should not exceed 0.2 mrad/hr at 1 cm and 1.0 mrad/hr at 1 cm, respectively, measured through not more than 7 milligrams per square centimeter of total absorber.



5. Prior to release of premises for unrestricted use, the licensee shall make a comprehensive radiation survey which establishes that contamination is within the limits specified in Table 1. A copy of the survey report shall be filed with the Division of Industrial and Medical Nuclear Safety, U. S. Nuclear Regulatory Commission, Washington, DC 20555, and also the Administrator of the NRC Regional Office having jurisdiction. The report should be filed at least 30 days prior to the planned date of abandonment. The survey report shall:

- a. Identify the premises.
- b. Show that reasonable effort has been made to eliminate residual contamination.
- c. Describe the scope of the survey and general procedures followed.
- d. State the findings of the survey in units specified in the instruction.

Following review of the report, the NRC will consider visiting the facilities to confirm the survey.

Sheet1

Co-60 Concentrations (pCi/L) in Discharges From AMS Lateral			
DATE	SUSPENDED	DISSOLVED	TOTAL
7/5/94			20.1
8/17/94	20	20	33.4
8/17/94			33.6
9/16/94			9
9/20/94			20
9/22/94			20
9/28/94			13.8
10/1/94	20	62.6	86.6
10/4/94			0.1
10/10/94	106	85.6	306
10/16/94	121	164	285
10/19/94	385	103	488
10/22/94	234	61.5	295.5
10/24/94	77.4	94.8	172
10/25/94	142	80	202
10/26/94	248	138	386
10/27/94	185	20	215
10/28/94	20	522	542
10/29/94	78.9	241	319.9
10/30/94	50.6	210	260.6

0.45  $\mu$

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December 7, 1994

# ADVANCED MEDICAL SYSTEMS, INC.

## STATUS OF WORK ITEMS

(Updated information is underlined)

### Inspection Issues

Status of Temporary Restraining Order regarding sewer discharges

- \* Roof work completed 11/21-Warehouse roof drains to three 22,000 gallon tanks, other roofs drain to Truck Dock.
- \* Will be sampling main tank and truck dock 11/28 and sending for analysis. First sample results showed no Co-60.
- \* No plans now to discharge to sewer due to TRO.

No update.

TRO 12/9 Hearing - Berson has been in contact with AMS attorneys and they will request an affidavit. Have not yet received their request. They changed their minds and will not request an affidavit.

Analysis of below floor cores of virgin soil (north, south and east sides of WHUT room) should be complete week of 11/28 (SEG). Sampling complete, analysis ongoing. One interesting issue--approximately one foot below the floor, after entering virgin soil, and impenetrable rock layer was hit in all three holes indicating that this building was built right on top of a rock ledge.

SEG drilling into WHUT room week of 11/28 and will survey and video inside of WHUT room. HP coverage adequate. Preliminary drilling/surveying/videoing complete yielding substantially reduced dose rates (max. approx. 300 R/hr). Activities ongoing.

Front plug milling - Aleron in week of 11/21 to plan job. AMS to access hot cell week of 12/5 to make specific measurements that Aleron needs to finalize proposal. Aleron subcontracting with Chicago based engineering firm who are familiar with nuclear work. Work delayed due to extension of WHUT room survey.

GE 500 cask with 12,000 Ci of contaminated non-leak tested sources in limbo - bolted and stored in overpack in secured warehouse. No update.

Hot cell radiological conditions as of 11/28 -

Hot cell general area - 12 R/hr

Front plug general area - 18 R/hr

Several hot spots ranging from 10s of R/hr up to 200 R/hr

Contamination into the millions of dpm per 100 cm<sup>2</sup>

No update.

SEG will be submitting an unsolicited proposal as discussed with AMS to develop scenario for emergency drill. Not sure 12/31 is achievable with everything else that is going on. We provided Reg Guide on E-plan

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drills...work is progressing.

Slawinski Inspection report issued 11/29.

Meeting with AMS to discuss 11/94 and 12/94 Slawinski inspection results will be scheduled in December. December 19 or 20 look like the best days. We will issue a daily staff note when the meeting occurs.

NRC structural assessment of AMS ongoing. First site visit 10/12. No significant issues identified. Second site visit necessary, but not scheduled yet. No update.

Memo to EICS regarding NEORSD allegation of illegal sewer discharges in final typing - will be issued after inspection report. Will be issued this week.

Letter from Cleveland regarding 11/94 Slawinski report findings - Slawinski drafting response. Will go out 12/8.

#### 10 CFR 2.206 Requests

- \* March 1993 - AMS to Pay for Remediation - Finkelstien has lead and is drafting Commission options paper.
- \* August 1994 - Sewer Discharge Radiation Monitor - DiCicco drafting response - Needs Picker files from 1974-1979 time frame - We are supporting.

No update.

### Licensing Issues

Renewal prepared and AMS to submit week of 11/28. DFP should be with renewal. Not submitted yet...TRO hearing dominating licensee management time.

### NEORSD and Effluent Issues

Kurth Report - In final concurrence in NMSS due 11/28. Concurrence in from OGC and NMSS/WM. Waiting for NMSS/IMNS. Outstanding question on solubility of cobalt-60 in wastewater. All issues resolved, report issued 12/6.

40 of 81 Southerly and Easterly samples counted as of 11/22. NO Co-60 detected. 11 samples had either detectable I-131 (up to 1.45 pCi/g) or Tl-201 (up to 65.7 Pci/g). Remainder of samples should be counted by 12/9. All samples counted, NO cobalt-60.

Attempting to recover AMS effluent sample for assessment of solubility. NEORSD has been recalcitrant in providing sample. Will discuss with Lenhart when he is in RIII on 12/2. Discussed with Lenhart...they will provide us their results which included filtering the sample with 0.45 micron mudia. Co-60 was measured both on the filter media and in the filtrate.

FOIA follow up - NEORSD will be in RIII on 12/2 to review AMS and Southerly files. Pearson and Kurth expunging withholdable stuff and coordinating closely with HQ FOIA folks. Done.

NEORDS/AMS Lawsuit - tentative date for first court action is mid-January 1995. NRC/Region III involvement not defined at this time. No update.

Rev'd  
12/9/94

TABLE NO. 1  
ANALYTICAL RESULTS FROM EASTERLY AND SOUTHERLY SAMPLING  
SAMPLES COLLECTED NOVEMBER 1, 1994

LOCATION	SAM PLE #	DAY	RESULT $\pm 2\sigma$ (pCi/g)
Sou. Lagoon A	1	11/1	Co-60 <MDA
Sou. Gravity Thickener Primary Sludge	2	11/1	Co-60 <MDA I-131 $0.8 \pm 0.2$
Sou. Gravity Thickened Excess Activated Sludge	3	11/1	Co-60 <MDA
Sou. Gravity Belt Excess Activated Sludge	4	11/1	Co-60 <MDA
Sou. Thermal Conditioning Thickened Sludge Tank No. 1	5	11/1	Co-60 <MDA I-131 $0.7 \pm 0.3$
Sou. Thermal Conditioning Thickened Sludge Tank No. 4	6	11/1	Co-60 <MDA
Sou. Thermal Conditioning Influent	7	11/1	Co-60 <MDA I-131 $1.3 \pm 0.3$
Sou. Vacuum Filter Cake East Belt	8	11/1	Co-60 <MDA
Sou. Vacuum Filter Cake West Belt	9	11/1	Co-60 <MDA I-131 $1.4 \pm 0.3$
Sou. Furnace No. 1 Ash	10	11/1	Co-60 <MDA Be-7 $13.8 \pm 4.0$ Tl-201 $75.7 \pm 15.0$ Ra-226 $10.0 \pm 3.0$
Sou. Furnace No. 2 Ash	11	11/1	Co-60 <MDA Be-7 $12.0 \pm 4.0$ Tl-201 $64.0 \pm 17.0$ Ra-226 $6.0 \pm 2.0$
Sou. Furnace No. 4 Ash	12	11/1	Co-60 <MDA Be-7 $14.0 \pm 4.0$ Tl-201 $58.0 \pm 15.0$ Ra-226 $10.0 \pm 2.0$
Sou. Big Creek Interceptor	13	11/1	Co-60 <MDA
Sou. Southwest Interceptor	14	11/1	Co-60 <MDA
Sou. Southerly Interceptor	15	11/1	Co-60 <MDA
Sou. Mill Creek Interceptor	16	11/1	Co-60 <MDA

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LOCATION	SAM PLE #	DAY	RESULT $\pm 2\sigma$ (pCi/g)
Sou. Cuyahoga Interceptor	17	11/1	Co-60 <MDA
Sou. Sludge Degrit No. 2	18	11/1	Co-60 <MDA
Sou. Sludge Degrit No. 3	19	11/1	Co-60 <MDA
Sou. Easterly Sludge Line	20	11/1	Co-60 <MDA I-131 $1.0 \pm 0.3$
Sou. Initial Grit	21	11/1	Co-60 <MDA
East. Grit Classifier	22	11/1	Co-60 <MDA
East. Easterly Inlet	23	11/1	Co-60 <MDA
East. Collinwood Inlet	24	11/1	Co-60 <MDA
East. Heights Inlet	25	11/1	Co-60 <MDA
East. Southerly Pumps	26	11/1	Co-60 <MDA
East. Pump Building-Waste Activated Sludge	27	11/1	Co-60 <MDA

\*The reported uncertainty refers only to counting statistics.

<sup>1</sup>The calculated Minimum Detectable Activity (MDA) for cobalt-60 ranged from 0.1 to 0.6 picocuries per gram for all samples collected.

TABLE NO. 2

## ANALYTICAL RESULTS FROM SOUTHERLY AND EASTERLY SAMPLING

SAMPLES COLLECTED NOVEMBER 2, 1994

LOCATION	SAM PLE #	DAY	RESULT $\pm 2\sigma$ (pCi/g)
Sou. Lagoon A	1	11/2	Co-60 <MDA
Sou. Gravity Thickener Primary Sludge	3	11/2	Co-60 <MDA
Sou. Gravity Thickened Excess Activated Sludge	2	11/2	Co-60 <MDA
Sou. Gravity Belt Excess Activated Sludge	NA		Shut Down for Maintenance on this day
Sou. Thermal Conditioning Thickened Sludge Tank No. 1	4	11/2	Co-60 <MDA
Sou. Thermal Conditioning Thickened Sludge Tank No. 2	5	11/2	Co-60 <MDA
Sou. Thermal Conditioning Thickened Sludge Tank No. 4	6	11/2	Co-60 <MDA
Sou. Thermal Conditioning Influent	7	11/2	Co-60 <MDA
Sou. Vacuum Filter Cake East Belt	8	11/2	Co-60 <MDA
Sou. Vacuum Filter Cake West Belt	9	11/2	Co-60 <MDA
Sou. Furnace No. 1 Ash	10	11/2	Co-60 <MDA Be-7 $18.0 \pm 5.0$
Sou. Furnace No. 2 Ash	11	11/2	Co-60 <MDA Be-7 $20.0 \pm 4.0$ Ra-226 $10.0 \pm 2.0$
Sou. Furnace No. 4 Ash	12	11/2	Co-60 <MDA Be-7 $22.0 \pm 4.0$ Ra-226 $10.0 \pm 2.0$
Sou. Big Creek Interceptor	20	11/2	Co-60 <MDA
Sou. Southwest Interceptor	22	11/2	Co-60 <MDA
Sou. Southerly Interceptor	21	11/2	Co-60 <MDA
Sou. Mill Creek Interceptor	23	11/2	Co-60 <MDA

LOCATION	SAM PLE #	DAY	RESULT $\pm$ $^{*}2\sigma$ (pCi/g)
Sou. Cuyahoga Interceptor	24	11/2	Co-60 <MDA
Sou. Sludge Degrit No. 1	16	11/2	Co-60 <MDA
Sou. Sludge Degrit No. 2	17	11/2	Co-60 <MDA
Sou. Sludge Degrit No. 4	18	11/2	Co-60 <MDA
Sou. Easterly Sludge Line	19	11/2	Co-60 <MDA
Sou. Initial Grit	25	11/2	Co-60 <MDA
East. Grit Classifier	28	11/2	Co-60 <MDA
East. Easterly Inlet	13	11/2	Co-60 <MDA
East. Collinwood Inlet	15	11/2	Co-60 <MDA
East. Heights Inlet	14	11/2	Co-60 <MDA
Easterly-Southerly Pumps	26	11/2	Co-60 <MDA
East. Pump Building-Waste Activated Sludge	27	11/2	Co-60 <MDA

\*The reported uncertainty refers only to counting statistics.

<sup>1</sup>The calculated Minimum Detectable Activity (MDA) for cobalt-60 ranged from 0.1 to 0.6 picocuries per gram for all samples collected.

TABLE NO. 3

## ANALYTICAL RESULTS FROM EASTERLY AND SOUTHERLY SAMPLING

SAMPLES COLLECTED NOVEMBER 3, 1994

LOCATION	SAM PLE #	DAY	RESULT $\pm$ $^*2\sigma$ (pCi/g)
Sou. Lagoon A	1	11/3	Co-60 <MDA
Sou. Gravity Thickener Primary Sludge	3	11/3	Co-60 <MDA
Sou. Gravity Thickened Excess Activated Sludge	2	11/3	Co-60 <MDA
Sou. Gravity Belt Excess Activated Sludge	NA		Shut Down for Maintenance on this day
Sou. Thermal Conditioning Thickened Sludge Tank No. 1	4	11/3	Co-60 <MDA
Sou. Thermal Conditioning Thickened Sludge Tank No. 2	6	11/3	Co-60 <MDA
Sou. Thermal Conditioning Thickened Sludge Tank No. 4	5	11/3	Co-60 <MDA
Sou. Thermal Conditioning Influent	7	11/3	Co-60 <MDA
Sou. Vacuum Filter Cake East Belt	8	11/3	Co-60 <MDA
Sou. Vacuum Filter Cake West Belt	9	11/3	Co-60 <MDA
Sou. Furnace No. 1 Ash	10	11/3	Co-60 <MDA Be-7 $32.0 \pm 5.0$ Tl-201 $12.0 \pm 5.0$ Ra-226 $3.0 \pm 1.0$
Sou. Furnace No. 2 Ash	11	11/3	Co-60 <MDA Be-7 $32.0 \pm 5.0$ Tl-201 $12.0 \pm 5.0$ Ra-226 $3.0 \pm 1.0$
Sou. Furnace No. 4 Ash	12	11/3	Co-60 <MDA Be-7 $32.0 \pm 5.0$ Tl-201 $12.0 \pm 5.0$ Ra-226 $3.0 \pm 1.0$
Sou. Big Creek Interceptor	16	11/3	Co-60 <MDA
Sou. Southwest Interceptor	17	11/3	Co-60 <MDA

LOCATION	SAM PLE #	DAY	RESULT $\pm$ $^{*}2\sigma$ (pCi/g)
Sou. Southerly Interceptor	18	11/3	Co-60 <MDA
Sou. Mill Creek Interceptor	19	11/3	Co-60 <MDA
Sou. Cuyahoga Interceptor	20	11/3	Co-60 <MDA
Sou. Sludge Degrit No. 1	13	11/3	Co-60 <MDA
Sou. Sludge Degrit No. 4	14	11/3	Co-60 <MDA
Sou. Easterly Sludge Line	NA	11/3	Sample Not Obtainable - Difficulty Getting Electric Switch To Work
Sou. Initial Grit	15	11/3	Co-60 <MDA
East. Grit Classifier	26	11/3	Co-60 <MDA
East. Easterly Inlet	24	11/3	Co-60 <MDA
East. Collinwood Inlet	25	11/3	Co-60 <MDA
East. Heights Inlet	23	11/3	Co-60 <MDA
East. Southerly Pumps	21	11/3	Co-60 <MDA
East. Pump Building-Waste Activated Sludge	22	11/3	Co-60 <MDA

\*The reported uncertainty refers only to counting statistics.

<sup>1</sup>The calculated Minimum Detectable Activity (MDA) for cobalt-60 ranged from 0.1 to 0.6 picocuries per gram for all samples collected.