Advanced Medical Systems, Inc.

INSTRUMENTATION AND SURVEILLANCE	Procedure: RSP-008	Revision No.: 000
	Page: 1 of 25	Date: August 15, 1996
	Approved by (Vice President):	
	Approved by (RSO):	
	Approved by (RSC Chair):	

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CONTROLLED COPY NO. : _____

1 PURPOSE

This procedure describes the requirements for calibration and use of radiation survey instruments, and for performing radiological surveillance at the Advanced Medical Systems, Inc. (AMS) facility on London Road.

2 SCOPE

This procedure applies to all radiological instrumentation and surveys conducted by AMS employees, visitors and contractors at the London Road facility pursuant to Radiation Protection Program Plan provisions, and for radiation protection purposes. Instruments that are not used for radiation protection purposes are exempt from the requirements of this procedure.

3 REFERENCES

3.1 U. S. Nuclear Regulatory Commission Radioactive Material License Number 34-19089-01

3.2 American National Standard Institute, "Radiation Protection Instrumentation Test and Calibration," N323-1978m, 1977.

3.3 Instrument instruction manuals published by the instrument manufacturers.

3.4 U.S. NRC Regulatory Guide 8.10, "Operating Philosophy for Maintaining Occupational Radiation Exposures As Low As is Reasonably Achievable".

3.5 U.S. NRC Regulatory Guide 8.21, "Health Physics Surveys for Byproduct Material at NRC-Licensed Processing and Manufacturing Plants," 1979.

3.6 National Bureau of Standards, "NVLAP Dosimetry LAP Handbook - Operational and Technical Requirements of the Laboratory Accreditation Program for Personnel Dosimetry Processors", NBS 85-3170, May, 1985.

3.7 American National Standards Institute, "Personnel Dosimetry Performance - Criteria for Testing", ANSI N13.11, 1983.

3.8 Advanced Medical Systems, Inc. Radiation Safety Procedure No. RSP-001, "Radiation Protection Program Plan".

3.9 Advanced Medical Systems, Inc. Radiation Safety Procedure No. RSP-004, "Radiation Protection Records".

3.10 Advanced Medical Systems, Inc. Radiation Safety Procedure No. RSP-009, "Contamination Control".

3.11 Advanced Medical Systems, Inc. Radiation Safety Procedure No. RSP-011, "Radiological Areas and Posting".

3.12 Advanced Medical Systems, Inc. Radiation Safety Procedure No. RSP-014, "Receipt, Handling and Identification of Radioactive Materials".

3.13 Advanced Medical Systems, Inc. Radiation Safety Procedure No. RSP-015, "Packaging and Transportation of Radioactive Materials".

3.14 Advanced Medical Systems, Inc. Radiation Safety Procedure No. RSP-019, "Operation of the AMS Smear Counter".

4 DEFINITIONS

The definition of terms used in this RSP that may not be commonly understood shall be found in RSP-002, "Definitions".

5 PROCEDURE

5.1 Responsibilities

5.1.1 The Vice President shall supply adequate resources to ensure compliance with this procedure.

5.1.2 The Radiation Safety Officer (RSO) shall:

5.1.2.1 Assure the adequacy of the radiation survey and instrumentation program.

5.1.2.2 Ensure current and proper calibration of all radiation detection instruments in the active inventory.

5.1.2.3 Maintain instrument calibration certificates on file for all radiation detection instruments in the active inventory.

5.1.2.4 Assure that all radiological surveillance is performed pursuant to this procedure.

5.1.2.5 Assure that all Radiation Protection Technicians are properly trained in the provisions of this procedure.

5.1.2.6 Verify compliance with this procedure during planned and periodic audits of the radiation protection program.

5.1.3 Radiation Protection Technicians shall:

5.1.3.1 Verify that only calibrated radiation detection instruments are used.

5.1.3.2 Follow this procedure when performing radiological surveillance activities.

5.1.3.3 Periodically review this procedure.

5.2 Survey Program

5.2.1 Radiation surveys shall be performed, as necessary, to evaluate:

5.2.1.1 The magnitude of radiation exposures to personnel performing routine operations, maintenance, and/or research and development.

5.2.1.2 Fixed and removable contamination on equipment and materials to be released from the London Road facility.

5.2.1.3 The radiological status of the London Road facility with respect to applicable USNRC licensing requirements.

5.2.1.4 Radiological conditions in the event of non-routine circumstances (e.g., spills, decontamination efforts, special activities).

5.2.2 Radiation surveys for official purposes shall be performed by Radiation Protection Technicians who are qualified in accordance with RSP-006.

5.2.3 All official radiation surveys shall be documented on a survey form (Attachment 1, or equivalent).

5.3 Radiation Survey Instruments

5.3.1 Instrumentation used by Radiation Protection Technicians shall be of sufficient sensitivity and accuracy to assess the radiation exposure rates from radioactive materials which may be found at the London Road facility; detect the presence of radioactive materials on tools, equipment, clothing, and personnel at all levels which may be found at AMS; and of sufficient quantity to support on-going or planned operations.

5.3.2 The basis for selection of instruments for use at AMS shall include:

5.3.2.1 Quality of radiation to be measured.

5.3.2.2 Sensitivity required.

5.3.2.3 Purpose of the survey.

5.3.3 Instruments maintained in the active inventory shall be evaluated and tested, and documentation obtained, as appropriate, for the following:

5.3.3.1 Physical construction

5.3.3.2 Effect of shock, sound, vibration, electric transients, RF energy, magnetic fields and high humidity

5.3.3.3 Extent of switching transients, capacitance effects, geotropism and static charge effects

5.3.3.4 Power supply, including stability and battery life

5.3.3.5 Range, sensitivity, linearity, detection limit, and response to overload conditions

5.3.3.6 Accuracy and reproducibility precision

5.3.3.7 Energy dependence

5.3.3.8 Angular dependence

5.3.3.9 Response to ionizing radiation other than those being measured

5.3.3.10 Temperature and pressure dependence on measurements

Note: These tests are normally performed by the manufacturer and credit may be taken for the manufacturer's evaluation and testing. If credit is taken for manufacturer's testing, a copy of the test results, in the form of instrumentation manuals or specification sheets, should be maintained along with instrument records.

5.4 Instrument Calibration

5.4.1 Instruments shall be calibrated every six (6) months and following significant repairs to the ratemeter and/or detector.

Note: Cable and battery changes may not necessitate re-calibration, depending upon whether such action induces response changes.

5.4.2 Each ratemeter should be calibrated with a specific detector, designated by the detector serial number.

Note: The use of a ratemeter with a different detector may constitute the use of an un-calibrated meter.

5.4.3 A contractor shall provide the calibration services using radiation sources which are traceable to the National Institute of Standards and Technology (NIST).

5.4.4 Instruments shall be calibrated according to the guidelines of ANSI-N323-1978, "Radiation Instrumentation Test and Calibration".

5.4.5 The contractor shall be the manufacturer of the instrument or an individual/firm that has been pre-qualified by the RSO.

5.4.6 Calibration schedules should be staggered to maintain at least one calibrated contamination survey meter, one calibrated ambient exposure rate instrument, one calibrated high-range exposure rate instrument, and one calibrated stationary smear counter at the London Road facility at all times.

5.5 Pre-operational Checks

5.5.1 Prior to each use, or daily when kept in use, each instrument shall be checked for the following, as applicable:

5.5.1.1 Battery function

5.5.1.2 Response to a reference source.

5.5.1.3 Reset Button function.

5.5.1.4 Audible response function.

5.5.1.5 Physical damage.

5.5.1.6 Current calibration sticker

5.5.1.7 Response to background radiation.

Note: response to background radiation should be determined at a location that is in the vicinity of but not near known radiation sources or radiation-producing machines.

5.5.2 Instruments failing any pre-operational check shall be taken out of service, segregated from other instruments, tagged as "out of service", and repaired prior to use.

5.5.3 Each instrument shall be labeled with a unique identifier (e.g., serial number of detector and ratemeter) to enable traceability to surveys and records.

5.6 Survey Methods for Determining Ambient Gamma (General Area) Exposure Rates

5.6.1 Surveys shall be performed with a portable radiation survey instrument that is sensitive to gamma radiation (e.g., sodium iodide detector, microR meter, ionization chamber).

5.6.2 The instrument shall be turned on and permitted to stabilize (approximately 30 seconds) before proceeding further.

5.6.3 Pre-operational checks, as described in Section 5.5, shall have been completed before proceeding further.

5.6.4 Surveys shall be conducted by walking slowly over the area of interest with the detector held at a height of approximately one meter above the ground (waist high).

5.6.4.1 An increase in the audible response or in the needle/indicator movement may indicate the presence of radioactivity.

5.6.4.2 The instrument shall be held stationary in the locations where the increased response is noted.

5.6.5 Readings shall be recorded on a survey form (Attachment 1 or equivalent).

Note: Carefully evaluate the position of the range selector switch when observing the meter reading.

5.6.5.1 Any comments and notations that may be necessary for interpretation of results should be recorded on the survey form.

5.6.5.2 The individual performing the survey shall sign and date the completed survey form.

5.7 Monitoring Methods for Determining Ambient Gamma (General Area) Exposure Rates

5.7.1 Ambient gamma exposure rates shall be measured using thermoluminescent dosimeters (calcium sulfate or equivalent with a nominal detection limit of one millirem, or lithium fluoride with a nominal detection limit of five millirem)

5.7.2 Dosimeters shall be packaged in a weather-proof container or casing and mounted at a height of one meter above the ground surface.

5.7.3 At least one "background" dosimeter shall be deployed at a location that is representative of but remove from the work site.

5.7.4 Dosimetry services for routine use and for area monitoring, including dosimeters and processing equipment, shall be accredited by the National Voluntary Laboratory Accreditation Program (NVLAP) in all applicable categories, except neutron.

5.7.5 The RSO shall ensure that dosimeter issuance, retrieval, handling, storage, and processing practices, personnel training and qualifications; quality assurance; documentation; calibration; and record keeping practices meet the minimum conditions for accreditation by NVLAP, and the requirements of ANSI N13.11.

5.7.6 The RSO shall ensure that the dosimetry devices are calibrated by the vendor to measure dose equivalent directly or indirectly through calibration factors.

5.7.7 Deployment, Storage, and Retrieval of Primary Dosimeters

5.7.7.1 The RSO shall ensure retrieval and processing of dosimetry devices at least once every calendar quarter.

5.7.7.2 Dosimetry devices may be processed less frequently than quarterly at the discretion of the RSO.

Note: If the results of quarterly monitoring are consistently below the device's detection limit, consideration should be given for extending the deployment period.

5.8 Survey Methods for Determining Contact Exposure Rates on Equipment Surfaces

5.8.1 Surveys shall be performed with a portable radiation survey instrument that is sensitive to gamma radiation (e.g., sodium iodide detector, microR meter).

5.8.2 The instrument shall be turned on and permitted to stabilize (approximately 30 seconds) before proceeding further.

5.8.3 Pre-operational checks, as described in Section 5.5, shall have been completed before proceeding further.

5.8.4 Surveys shall be conducted by holding the instrument stationary with the detector end of the instrument approximately 0.25 inch from the surface of the item being evaluated.

5.8.5 Readings shall be recorded on the survey form.

Note: Carefully evaluate the position of the range selector switch when observing the meter reading.

5.8.5.1 Any comments and notations that may be necessary for interpretation of the results should be recorded on the survey form.

5.8.5.2 The individual performing the survey shall sign and date the completed survey form.

5.9 Survey Methods for Determining the Extent of Total Contamination on Surfaces

5.9.1 Total (fixed plus removable) contamination shall be measured by direct survey with portable radiation survey instruments sensitive to beta/gamma radiation (e.g., Geiger-Mueller detector with a pancake detector) or alpha radiation (e.g., alpha scintillation detector)

5.9.2 The instrument shall be turned on and permitted to stabilize (approximately 30 seconds) before proceeding further.

5.9.3 Pre-operational checks, as described in Section 5.5, shall have been completed before proceeding further.

5.9.4 Surveys shall be conducted by moving the detector at a rate of approximately two inches per second at a distance of no greater than 0.25 inch above the surface.

5.9.4.1 An increase in the audible response or in the needle/indicator movement may indicate the presence of radioactivity.

5.9.4.2 The detector shall be held stationary over the areas where the increased response was noted.

5.9.5 Survey points with the highest count rates shall be identified and recorded on the survey form, along with an estimate of the physical dimensions of the area with elevated readings.

5.9.5.1 Any comments and notations that may be necessary for interpretation of the results should be recorded on the survey form.

5.9.5.2 The individual performing the survey shall sign and date the completed survey form.

Note: Carefully evaluate the position of the range selector switch when observing the meter reading.

5.10 Survey Methods for Determining the Extent of Loose Contamination on Surfaces

5.10.1 Loose contamination shall be measured with dry disc smears wiped over a surface area of at least 100 cm^2.

5.10.1.1 A filter paper disc shall be placed on the surface to be smeared.

5.10.1.2 The disc shall be moved over an "S"-shaped area using moderate pressure, covering approximately 100 cm^2 (16 in^2), or about 20 inches in length, or the entire surface, if it is less than 100 cm^2 in area.

5.10.1.3 The disc smear shall be placed in a sample holder such that individual smears are separated from each other to prevent cross contamination (e.g., smear booklet or glassine envelope).

5.10.2 Each smear may be submitted to an analytical laboratory for determination of gross alpha and/or gross beta activity (disintegrations per minute) or may be counted in-house pursuant to RSP-019.

5.11 Survey Methods for Determining Airborne Radioactivity

5.11.1 Airborne radioactivity shall be collected with an air pump connected to a filter cartridge.

5.11.1.1 Either low (2 lpm or less) or high (greater than 2 lpm) volume pumps may be used.

5.11.1.2 The flow rate shall be determined with a flow calibrator immediately prior to use of breathing zone samplers.

5.11.1.3 The battery status of battery-powered pumps shall be determined immediately prior to use.

5.11.1.4 The filter cartridge should contain a membrane filter, rather than a glass fiber filter.

5.11.2 Air shall be drawn through the filter for a pre-determined duration or until visible dust loading or decreased flow is noted.

5.11.3 The filter shall be removed from the cartridge and placed in a sample holder such that individual filters are separated from each other to prevent cross contamination (e.g., smear booklet or glassine envelope).

5.11.4 Each filter may be submitted to an analytical laboratory for determination of gross alpha activity (disintegrations per minute) or may be counted in-house pursuant to RSP-019.

5.12 Analysis of Samples by an Analytical Laboratory

5.12.1 A chain-of-custody record (Attachment 3) shall be initiated by the individual collecting or overseeing the collection of samples.

Note: A copy of this form should accompany the samples throughout transportation and analyses; any break in custody or evidence of tampering shall be documented.

5.12.2 Sample custody shall be assigned to one individual at a time in order to prevent confusion of responsibility.

Note: Custody is maintained when (1) the sample is under direct surveillance by the assigned individual, (2) the sample is maintained in a tamper-free or tamper-evident container, or (3) the sample is within a controlled-access facility.

5.12.3 Samples should be submitted to a radioanalytical laboratory for analysis, along with the completed "Request for Analysis" form used by the laboratory.

5.12.4 The samples shall be packaged and shipped to the laboratory by overnight carrier in order to demonstrate chain of custody.

Note: The "Request for Analysis" form and the chain of custody form shall accompany the shipment.

5.12.5 Each sample shall be analyzed for gross alpha and/or gross beta activity, with a nominal minimum detectable activity specification of 1.0 picocurie per sample.

5.12.6 The laboratory shall have written procedures that document the laboratory's analytical capabilities for gross alpha/beta activity and a QA/QC program which assures the validity of the analytical results.

5.13 Routine Surveillance Program

5.13.1 A surveillance program to assess the radiological status of the London Road facility shall be performed.

5.13.2 The surveillance program shall include the restricted and unrestricted areas shown in Attachments 3 through 10.

5.13.3 Ambient gamma exposure rates shall be measured as described in Sections 5.6 and 5.7.

5.13.4 Total contamination shall be measured by direct surveys as described in Section 5.9.

5.13.5 Loose contamination shall be measured with dry disc smears as described in Section 5.10.

5.13.6 Airborne radioactivity shall be measured as described in Section 5.11.

5.13.7 Other non-radiological checks, verifications and inspections may be performed as part of the radiological surveillance program.

5.13.8 The frequency of surveillance shall be as shown in Attachments 3 through 10.

6 EXEMPTION PROVISIONS

Variances and exceptions to the requirements of this RSP shall be permitted pursuant to the written authorization of the RSO and the Vice President.

7 DOCUMENTATION

7.1 All records pertinent to this procedure shall be maintained pursuant to RSP-004.

7.2 The following records shall be maintained:

7.2.1 Instrument calibration and maintenance records.

7.2.2 Manufacturer instruction manuals for each type of rate meter and detector.

7.2.3 Radiological Survey Forms

7.2.4 Reports from dosimeter processor(s)

8 ATTACHMENTS

8.1 Attachment 1 - Survey Form

8.2 Attachment 2 - Chain of Custody Form

8.3 Attachment 3 - Routine (Daily) Surveillance Program

8.4 Attachment 4 - Routine (Every Two Weeks) Surveillance Program

8.5 Attachment 5 - Routine (Monthly) Surveillance Program

8.6 Attachment 6 - Routine (Quarterly) Surveillance Program

8.7 Attachment 7 - Routine (Every Six Months) Surveillance Program

8.8 Attachment 8 - Routine (Annual) Surveillance Program

8.9 Attachment 9 - Routine (Every Two Years) Surveillance Program

8.10 Attachment 10 - Routine (Every Five Years) Surveillance Program

ATTACHMENT 1
RADIOLOGICAL SURVEY FORM

Instrument:	S/N:	Cal Due:	RWP No.	Date:	Time:
:ument:	S/N:	Cal Due:	Area:		
Instrument:	S/N:	Cal Due:	Purpose:		
Survey Performed By (Print):	Survey Performed By (Signature):	Reviewed by (Signature):	Review Date:		

Contamination Results (dpm/100 cm²)

No:	Location	Cor. CPM	DPM
1			
2			
3			
4			
5			
6			
7			
8			
9			
10			
11			
12			
13			
14			
15			
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30			

Symbols:

○ = Smear Location
□ = Air Sample Location
β = Beta Measurement
C = Contact Reading
⊠ = Step off Pad
◘ = Floor drain
-x-x- = Restricted Area Boundary
RM = Radioactive Materials Storage
R = Radiation Area
H = High Radiation Area
V = Very High Radiation Area

ATTA[illegible]ENT 2

ADVANCED MEDI[illegible]L SYSTEMS, INC.
ANALYSIS REQUEST AND CHAIN OF CUSTODY RECORD

Reference No. _____

Page 1 of

(1) Advanced Medical Systems, Inc.	(7) Samples Shipment Date	(5) Bill to:
(2) Sample Team Leader	(8) Lab Destination	
(3) Task No.	(9) Lab Contact	
(4) Project Manager	(12) Technical Contact/Phone	(10) Report to:
(6) Purchase Order No.	(13) Carrier/Waybill No.	
(11) Required Report Date		

ONE SAMPLE PER LINE

(14) Sample Number	(15) Sample Description/Type	(16) Date/Time Collected	(17) Container Type	(18) Sample Volume	(19) Preservative	(20) Requested Testing Program

(23) Special Instructions

(24) Possible Hazard Identification
Non-hazard ☐ Flammable ☐ Skin Irritant ☐ Poison B ☐ Unknown ☐

(25) Sample Disposal
Return to Client ☐ Disposal by Lab ☐ Archive _____ months

(26 Relinquished by: (signature, date, time):	Received by: (signature, date, time)
Relinquished by: (signature, date, time):	Received by: (signature, date, time)
Relinquished by: (signature, date, time):	Received by: (signature, date, time)

ATTACHMENT 2 (contd.)
INSTRUMENTATION FOR COMPLETING THIS FORM

. Advanced Medical Systems, Inc.
. **Sample Team Leader**: List the name of the team taking these samples.
. **Task No.**: Indicate the **AMS** task number, if applicable.
. **Project Manager**: Record the project manager's name.
. **Purchase Order No.**: Non-**AMS** personnel should use this space to record the purchase order number authorizing the analysis of these amples. **AMS** and **AMS** subcontractors should leave this space blank if a project number has been given for billing.
. **Samples Shipment Date**: Indicate the date these samples are shipped to the laboratory.
. **Lab Destination**: Indicate the laboratory designated for sample shipment. Do not list more than one lab on this form. Be certain before ending samples that the laboratory you are designating is aware of the shipment and is capable of accepting these sample types and has vailable capacity.
. **[illegible]ntact**: Give the name of the laboratory contact (typically the lab's project manager).
0. **[illegible]t to**: Give the name, address and phone number of the person to receive the data report for these samples.
1. **Required Report Date**: Record the date which you and the laboratory contact have determined the results will be reported (include verbal final report as appropriate).
2. **Technical Contact/Phone**: Indicate the name of the person to be contacted in case of any questions regarding these samples and the hone number where the contact may be reached the day the samples arrive in the laboratory.
3. **Carrier/Waybill Number**: If you are sending the samples by a commercial carrier such as Airborne or Federal Express, record the courier ompany name and the waybill or airbill number under which these samples will be shipped (Example - Fed-Ex/#513631771).
4. **Sample Number**: List the complete, unique identification number of each sample. These numbers must correspond with the identification umbers on the sample containers and the field sample collection document(s).
5. **Sample Description/Type**: Provide a short physical description of the sample and the sample type such as soil, sediment, sludge, water, ipe, air, concentrated waste or bulk.
6. **Date/Time Collected**: Record date and exact time each sample was collected. Use a 24-hour clock; i.e., 1645 not 4:45 p.m.
7. **Container Type**: Indicate the volume, color and type of the sample container used (Example - 1 gallon amber glass, 1 liter clear plastic, 0 milliliter clear glass).
8. **Sample Volume**: Estimate the amount of sample in the container. For air samples, indicate the volume of air sampled.
9. **Preservative**: Indicate what type of preservative, if any, has been used for the samples (Example - ice to 4°C nitric acid, hydrochloric id).
0. **Requested Testing Program**: List the analyses to be performed on each sample by method number or quotation number.
1. **Special Instructions**: Use this space to record any special instructions to the lab regarding the processing of these samples.
2. **Possible Hazard Identification**: Indicate all hazard classes associated with the sample(s).
3. **Sample Disposal**: Indicate how the samples should be disposed of following analysis. The lab may charge for packing, additional chiving and disposal.
4 **Signatures**: When releasing custody of these samples, use the "Relinquished By" space to sign your full legal name, date and time of ease. After verifying that all samples are present, the person receiving the samples must sign the "Received By" space to take custody the samples.

ATTACHMENT 3
ROUTINE (DAILY) SURVEILLANCE PROGRAM

Week Ending Sunday, _____

Item	Action	Comments	Completed by (Initials/date)						
			Mo	Tu	We	Th	F	Sa	Su
Air Monitor Chart	Inspect for abnormal readings								
Cell Manometer	Record reading	Limits are 0.2 to 0.4							
Panalarm	Visual inspection	Lights are dim							
Gamalarms	Visual inspection	Lights are green							
Boiler and Air Conditioner	Visual inspection								
Air Compressor	Blow down								
Stack sampler	Check flow and pressure								
Lab counters	background and source check	Smear counter and gamma spectrometer							
Check sources	Inventory								
Pump House Emergency Supplies	Inventory once per week	Confirm instrument calibration and functionality.							

ATTACHMENT 4
ROUTINE (EVERY TWO WEEKS) SURVEILLANCE PROGRAM

Month/Year________________________

Item	Action	Comments/Notes	Date Completed	Completed By (signature)
Emergency Generator	Start/test			
Emergency Lighting	Test			
Contaminated Area Accesses (doors)	Contamination Survey	Clean Side		

ATTACHMENT 5
ROUTINE (MONTHLY) SURVEILLANCE PROGRAM

Month/Year _____

Item	Action	Comments/Notes	Date Completed	Completed By (signature)
Restricted Areas	Contamination and Ambient Gamma Surveys	Ambient gamma only on roofs		
AMS-Controlled Areas	Contamination and Ambient Gamma Surveys			
Gamalarms	Source test and alarm check	Attach source/ distance calculate		
Air Monitoring System	Check			
WHUT Room	Visual Inspection			
Emergency Generator	Check battery			
tilation System	Visual Inspection			
Air Monitor Strip Chart	Change paper			
Personnel Dosimeters	Exchange	Whole body and extremity dosimeters		
Area dosimeters	Exchange	Building dosimeters		
Fire and Safety Systems	Visual Inspection	Security and Insurance Co. inspection		

ATTACHMENT 6
ROUTINE (QUARTERLY) SURVEILLANCE PROGRAM

Quarter/Year ____________________

Item	Action	Comments/Notes	Date Completed	Completed By (signature)
Non-AMS-Controlled Areas	Contamination and Ambient Gamma Surveys			
Radiation Safety Committee	Meeting			
Area Dosimeters	Exchange	Perimeter dosimeters		

ATTACHMENT 7
ROUTINE (EVERY SIX MONTHS) SURVEILLANCE PROGRAM

Year____________________

Item	Action	Comments/Notes	Date Completed	Completed By (signature)
Portable Survey Instruments	Calibration			
Facility Perimeter	Ambient gamma survey			
Calibration sources	Leak Test			
Materials Inventory	Correct for decay			
Self-reading Pocket Dosimeters	Calibration			
Stack Monitor	Calibration			

ATTACHMENT 8
ROUTINE (ANNUAL) SURVEILLANCE PROGRAM

Year_____

Item	Action	Comments/Notes	Date Completed	Completed By (signature)
Form USNRC-5	Prepare and mail	Mail to individuals and USNRC		
Radiation Protection Technician Training	Annual refresher			
Authorized User Training	Annual refresher			
Training Emergency Responders	Annual refresher	First responders only		
Routine Urine Bioassay Sampling	Collect and analyze samples			
andoned Lateral Surveillance	Annual review of Surveillance Plan by team members	Report 94009/G-125		
Abandoned Lateral Surveillance	Perform ambient gamma surveys at locations specified in Report 94009/G-125	Perform surveys in April or May		
Abandoned Lateral Surveillance	Collect and analyze water samples as specified in Report 94009/G-125	Collect samples in April or May		
Radiation Protection Program and Records	Internal Audit			

ATTACHMENT 9
ROUTINE (EVERY TWO YEARS) SURVEILLANCE PROGRAM

Year____________________

Item	Action	Comments/Notes	Date Due	Date Completed	Completed By (signature)
Radiation Protection Program and Records	External Audit				
Emergency Plan	Perform Emergency Drill				

ATTACHMENT 10
ROUTINE (EVERY FIVE YEARS) SURVEILLANCE PROGRAM

Item	Action	Comments/Notes	Date Due	Date Completed	Completed By (signature)
Hot Cell	Check automatic damper seals				
Sealed sources	Perform physical inventory				
USNRC License No. 34-19089-01	Submit renewal application				
Certification of Compliance for GE-500 Shipping Containers	Submit renewal application		1/1/2000		
ity Assurance am for GE-500 Shipping	Submit renewal application		1/1/2000		
IAEA Certificate	Submit renewal application		1/1/2000		
Certificate of Compliance for C/9 Head Packaging	Submit renewal application				

ATTACHMENT 3
PROPOSED REVISION TO ATTACHMENT 1 OF APPENDIX D

Proposed Revision to Attachment 1 of Appendix D

Event Type	Mechanism	Action Levels	Class	Notifications	Actions	I/E Report	Critique
F = Fire; X = Explosion; IJ = Injury; P - Personnel Exposure; SP = Spill; L = Loss/Theft; T = Transportation; NP = Natural Phenomenon; O = Other							
Building security compromised	L, IJ, P	Indication of unauthorized entry	Unusual Event	USNRC Region III	RSO secures condition.	No	no
	L, IJ, P	Confirmation of unauthorized entry with potential for intruder exposures in excess of 100 mR	Incident	USNRC Region III City of Cleveland Police Department	Operating staff to a state of readiness; provide off-site authorities with sequence of events	yes	no
	L, IJ, P	Confirmation of theft of less than 0.5 Ci of licensed material	Incident	USNRC Region III City of Cleveland Police Department	Operating staff to a state of readiness; provide off-site authorities with sequence of events; assist in return of materials.	yes	yes
	L, IJ, P	Confirmation of theft of greater than 0.5 Ci of licensed material	Alert	First Responders USNRC Command Center	Operating staff to a state of readiness; provide off-site authorities with sequence of events	yes	yes
Loss of Electrical Power	P	Hot cell door in open position with personnel exposures of less than 250 mrad	Unusual Event	Cleveland Public Power	RSO secures condition	no	no
	P	Hot cell door in open position with personnel exposures in excess of 250 mrad	Incident	Cleveland Public Power USNRC Region III	RSO secures condition	yes	no
Minor spill	SP, IJ, T	Unexpected Airborne activity in the building <10 DAC over 24 hours	Incident	None	RSO secures condition	yes	no
	SP, P, T	Unexpected exposure rates in the building < 20 mR/hr	Incident	None	RSO secures condition	yes	no
Major Spill	SP, IJ, P, T, F	Unexpected Airborne activity in the building > 10 DAC over 24 hours or exposure rates in the building > 20 mR/hr	Incident	USNRC Region III	Operating staff to state of readiness	yes	no

Event Type	Mechanism	Action Levels	Class	Notifications	Actions	I/E Report	Critique
F = Fire; X = Explosion; IJ = Injury; P - Personnel Exposure; SP = Spill; L = Loss/Theft; T = Transportation; NP = Natural Phenomenon; O = Other							
Minor Release	F,X	HEPA Room event up to mid-point of use cycle. (Projected emission of up to 25 mCi.)	Incident	USNRC Region III	Operating staff to a state of readiness; off-site emergency response agencies to a state of readiness; provide off-site authorities with status reports	yes	no
	NP,X	Loss of shielding around Source Garden. (Projected boundary dose of 100-500 mR.)	Incident	USNRC Region III	Operating staff to a state of readiness; dispatch monitoring personnel to south west corner of building; off-site emergency response agencies to a state of readiness; provide off-site authorities with status reports	yes	no
Major Release	F,X	HEPA Room event between mid-point and end of use cycle. (Projected emission of up to 50 mCi.)	Alert	First Responders USNRC Operations Center	Man response center; dispatch monitoring personnel to a distance of 100 meters and in direction of prevailing winds; mobilize offsite emergency response personnel; provide public information; provide off-site authorities with status reports	yes	yes
	NP	Loss of Hot Cell window. (Projected dose rate at door of building up to 500 mR/hr.)	Alert	First Responders USNRC Operations Center	Man response center; dispatch monitoring personnel to front of building; mobilize offsite emergency response personnel; block access to front of building; provide public information; provide off-site authorities with status reports	yes	yes
	NP,X	Loss of shielding around Source Garden. (Projected boundary dose of 500 to 1000 mR.)	Alert	First Responders USNRC Operations Center	Man response center; dispatch monitoring personnel to south west corner of building; mobilize offsite emergency response personnel; block access to southwest corner of building; provide public information; provide off-site authorities with status reports	yes	yes
	NP,X	Loss of shielding around Source Garden. (Projected boundary dose rate in excess of 100 mR/hr.)	Site Area Emergency	First Responders USNRC Operations Center	Man response center; dispatch monitoring personnel to south west corner of building; mobilize offsite emergency response personnel; block access to southwest corner of building; provide public information; provide off-site authorities with status reports	yes	yes

UNITED STATES
NUCLEAR REGULATORY COMMISSION
REGION III
801 WARRENVILLE ROAD
LISLE, IL 60532-4351
630-829-9887 (phone)
630-515-1259 (fax)

CONVERSATION RECORD

TIME: 3:00 am

DATE: 8/22/96

O VISIT O CONFERENCE X TELEPHONE X INCOMING OUTGOING

NAME OF PERSON(S) CONTACTED	ORGANIZATION (OFFICE, DEPT./ETC.)	TELEPHONE NO.
David Cesar, Dwight Miller, Carol Berger	AMS	

SUBJECT

Status report - AMS' building recovery project

SUMMARY

(1) Letter of credit - On Aug. 20, AMS' bank signed the amended Irrevocable Standby Letter of Credit which reduced the amount from $1.8 million to $940,000. I pointed out a typo on the document, and Mr. Miller indicated that he would contact the bank ASAP to have the typo corrected.

(2) Removal of sources - On Aug. 19, AMS rec'd a report and price list from ChemNuclear. AMS contractors (IEM) are presently studying the proposal. The price quote is for $413,500, which assumes two shipments will be made to Barnwell. AMS contractors are proposing to ship the sources in one shipment, which will save approx. $159,000. ChemNuclear will reply to AMS early next week re: one shipment vs. two shipments. Also, as soon as ChemNuclear sends its waste handling/shipping procedures to AMS, AMS will forward them to RIII (hopefully next week).

(3) Removal of wastes - AMS recently rec'd a report and price list from SEG. The report did not include removing the HEPA filters and 9-10 drums currently being stored in the basement, since the exposure rates from this material may be above SEG's limit. The price quote is for $278,000. AMS and SEG will work on the exposure rate issue, and, if SEG is unable to remove the material in question, then AMS will have ChemNuclear remove it.

(4) AMS is still planning on having the sources removed in Fall 1996, with the waste removal to occur shortly thereafter. If Barnwell raises its rates on Nov. 1, AMS will make a partial shipment of wastes before that date. The two AMS workers at London Rd. have been deconning various parts of the building, and thus have been "creating" additional rad waste. This will continue for some time.

(5) Water testing/disposal - To date, AMS has discharged 149,500 gallons of clean water. Mr. Cesar asked about AMS' amendment request to obtain relief from the current requirement of tanking and testing the water pumped from the under drain system. I answered that HQ was currently reviewing the request. Mr. Cesar indicated that the water processing was a waste of time and money, and AMS would rather spend the time and money on deconning the facility, etc. He then asked to have the request expedited.

ACTION REQUIRED

Brief management.

C/96

NAME OF PERSON DOCUMENTING CONVERSATION	SIGNATURE	DATE
Michael F. Weber	Michael F. Weber	8/23/96

UNITED STATES
NUCLEAR REGULATORY COMMISSION
REGION III
801 WARRENVILLE ROAD
LISLE, IL 60532-4351
630-829-9887 (phone)
630-515-1259 (fax)

CONVERSATION RECORD

TIME: 12:30 am

DATE: 8/29/96

O VISIT O CONFERENCE X TELEPHONE X INCOMING OUTGOING

NAME OF PERSON(S) CONTACTED | ORGANIZATION (OFFICE, DEPT.ETC.) | TELEPHONE NO.

David Cesar, Carol Berger - AMS
John Madera, Mike Weber - RIII

SUBJECT

Status report - AMS' building recovery project

SUMMARY

(1) Transfer/disposal of sources - Negotiations with ChemNuclear re: one shipment vs. two shipments have ended. Result: two shipments will be required. Cost: approx. $412,000. AMS has asked for ChemNuclear's procedures. As soon as AMS receives the procedures, we'll receive a copy for our review. AMS and ChemNuclear haven't signed a contract yet.

(2) Transfer/disposal of waste - AMS has asked ChemNuclear for a bid to remove all the waste material. ChemNuclear will send a worker to AMS in the very near future to gather information which will be used to develop the bid. SEG has already submitted a bid (SEG did not include the HEPA filters and 9-10 shielded drums).

(3) Ongoing work at AMS -The HEPA filters currently in place at AMS will be removed this week or next week (probably next week) by S. Haddock, C. Reed, and a contractor, A. Duff.

ACTION REQUIRED

Brief management.

NAME OF PERSON DOCUMENTING CONVERSATION | SIGNATURE | DATE

Michael F. Weber | Michael F. Weber | 8/29/96

C197

8/29 Briefing

AMS Chronology
11/94-8/96

11/94 Renewal (original) submitted, almost immediately rejected by RIII

12/94 Carol Berger hired as HP consultant

12/94 Basement H_2O (100K gallons in bladders, conc. 106 pCi/l < 0.5 EPA drinking H_2O)

1/95 Renewal (revised - 3 binders, including DFP and EP) submitted

6/95 Grouting of old manhole, lateral / replaced under drain system some of old is in place.

9/95 DFI (AMS' Strategy Plan, quarterly updates)

10/95 SERC/LEPC (SERC granted power over AMS re: emergency preparedness, Kalstrom) LEPC

11/95 Renewal (new, written by Carol Berger) submitted

1/96 Discharge of water / court order (100 pCi/l, trouble w/ contaminated storage tanks)

1/96 Part 20 / solubility (NMSS)

2/96 O'Deal letter (response to NEORSD's letter/videotape to EDO criticizing RIII's inspection report)

3/96 Shewmaker report re: structural integrity (AMS' response, NMSS acceptance)

4/96 Most recent inspection (one minor violation)

6/96 Building recovery project (transfer of licensed material to Barnwell)

7/96 RSO Meschter quits suddenly, ARSO Haddock becomes RSO

8/96 Amount of AMS' financial assurance instrument (letter of credit) reduced to fund building recovery project 940K now 1.8 million initially

"NRC in bed w/ AMS" - Misleading/inaccurate letters from NEORSD, Kalstrom, et. al., and 2.206 petitions.

Current activities at London Road - Water processing, decon. work (bldg. interior), HEPA filter removal (NEXT WEEK!)

Current activities - Building Recovery Project (BRP). As of 8/29/96:

- Paperwork to reduce collateral is done.
- Proposal from Chem-Nuclear to dispose of sources should be signed within a week or so.
- AMS is still negotiating w/ Chem-Nuclear re: waste removal. AMS already has a bid from SEG re: waste removal (minus HEPA filters & shielded drums)

Brandt TIAR

5-500# cannisters 50,000 curies total to go. Will have 3-4000 lbs. CURIES 50 IN WHAT CONT.?

C/98

AMS Licensing Issues as of 8/26/96

1. **Renewal** Deficiency letter to be issued by 9/30/96

2. **Conceptual Decommissioning Plan**

   TAR received back from HQ on 8/27. The following issues were addressed, and will be followed-up with a letter to AMS:

   a. Based on hydrogeologist's report, NRC feels that further sampling beneath the basement/WHUT room floors is not necessary. However, in the unlikely event widespread contamination is discovered in the future under the slab, we expect AMS to have a contingency plan that would involve increasing their cost estimate to clean it up. In our letter, we will require AMS make such a commitment.

   b. SAFSTOR will not be granted.

   c. NRC still feels AMS' cost estimate of $3.3 million is low. However, once they ship bulk Co-60 and waste to Barnwell we will requires that they recharacterize the site and resubmit a cost estimate for decommissioning. We will address this in the letter.

3. **Emergency Plan**

   Response to NRC deficiency letter received and forwarded to HQ for review. If shipment of material occurs, their inventory should be reduced to below that which requires an EP (5000 curies).

4. **Amendment to approve procedures related to shipment of waste off-site**

   Deficiency letter drafted. Main issue centers around AMS' request for flexibility to make changes to RSP's without amending their license.

Financial Assurance History

1. July 1992 AMS submitted Letter of Credit for 750,000 dollars.

2. January 1995 AMS submitted DFP with cost estimate for app. 1.8 million dollars. This was submitted with application for renewal.

3. March 30, 1995 NRC mailed def. letter re: DFP stating we felt cost estimate was low. Asked for re-evaluation.

4. May 30, 1995 response received. AMS states they feel their cost estimate is reasonable.

5. August 17, 1995 NRC mails def. letter. NRC still feels their cost estimate is low. NRC feels that AMS has not performed an adequate site characterization to support their conclusions.

6. September 1, 1995 letter from AMS. In response to our 8/17 letter and as a result of discussions between Region III and HQ MGMT., AMS states they will be submitting a conceptual decomm. funding plan.

7. October 20, 1995 AMS submits their conceptual decomm. funding plan. Two estimates are submitted: 1) DECON option = 3.3 million dollars, and 2) SAFSTOR option = 912,000 dollars. Siting that SAFSTOR (or Decay in storage) presents lowest overall radiological risk and is in keeping with concept of ALARA, AMS elects this option. They also site that for their facility, a storage period of 50 years is appropriate.

8. March 20, 1996 deficiency letter from NRC re: AMS' 10/20 letter. NRC sites GEIS, NUREG-0586 report that discusses SAFSTOR being appropriate for reactors and possibly source manufacturers using RAM that decay within a few weeks or months. Our letter also sites NRC policy stating that D-I-S should not be used as a substitute for disposal if access to a disposal site is available. Barnwell is open.

9. April 12, 1996 AMS response. TAR Sent to HQ.

10. TAR response received 8/29. Letter in draft 8/29.

AMS material inventory per 4/8/96 quarterly update of Strategic Plan

Bulk + sealed Co-60 = 54,375 curies

Bulk = 11,750 curies

Sealed Co-60 42,625 curies

Cobalt-60 waste and miscellaneous:

Solid waste packaged in LSA boxes and drums = 28 curies

Solid waste (packaged) generated during water treatment process = 0.4 curie

Sludge in WHUT room (unpackaged) = 51 curies

Total of bulk + sealed + waste + misc. = 54,454.4 curies

Front plug inventory as of 10/1/94:

Bulk = 2342 curies
Sealed Co-60 = 1009 curies
Sealed Cs-137 = 664 curies

4015 curies

If AMS disposes of bulk and sealed Co-60, with the exception of what is in the front plug, they will be below the limit (5,000 curies) for requiring an EP.

NRC'S DFI / AMS' STRATEGIC PLAN

(last update 8/8/96)

I. **DFI - 9/27/95**

A. Reduction of Inventory
   1. Offsite transfer of sealed byproduct material
   2. Offsite disposal of wastes
   3. Offsite transfer of unsealed byproduct material

B. Inventory
   1. Removal of the stuck plug of the front storage well
   2. Completion of the physical inventory

C. Emergency Exercise

D. Decommissioning/decontamination of the WHUT room

E. Decontamination
   1. Decontamination of the hot cell
   2. Decontamination of the basement
   3. Decontamination of the Isotope Shop
   4. Decontamination of the Isotope Warehouse
   5. Decontamination of the HEPA filter room
   6. Decontamination of other contaminated areas

II. **AMS' Response ("Strategic Plan - Revision 0") - 10/11/95**

A. High Priority Actions
   1. Complete the remediation report
   2. License renewal application
   3. Emergency plan
   4. Decommissioning funding plan

B. Intermediate Priority Actions
   1. Recover hot cell capabilities
   2. Return NPI sources
   3. Identify a market for remaining bulk material
   4. Train first responders in emergency plan provisions
   5. Stage emergency exercise and perform critique

C. Lower Priority Actions
   1. Remove plug in the hot cell
   2. Decontaminate the hot cell
   3. Complete/confirm the physical inventory and transfer/ship remaining sources
   4. Disposition of solid waste at the facility
   5. Disposition of treated water in collapsible storage tanks

D. On-going Actions
   1. Audit/Assessment of Radiation Protection Program
   2. Upgrade of Standard Operating Procedures
   3. Housekeeping Improvements
   4. Community Relations
   5. Reconnection of Sewer System to London Road Interceptor

III. **NRC Response 12/6/95**

A. Change to High Priority Actions:
1. Recover hot cell capabilities
2. Return NPI sources
3. Identify a market for remaining bulk material
4. Train first responders in emergency plan provisions
5. Stage emergency exercise and perform critique
6. Disposition of solid waste at the facility

B. Do the Following:
1. Request amendment to LC 14 (inventory)
2. Address decontamination/decommissioning of WHUT Room
3. Address decontamination of facility
4. Respond to structural integrity report

IV. **AMS' Revision 1 to "Strategic Plan" - 1/15/96**

A. High Priority Actions
1. Complete the remediation report - **ongoing**
2. License renewal application - **ongoing**
3. Emergency plan - **ongoing**
4. Decommissioning funding plan - **ongoing**
5. Train first responders in emergency plan provisions - **within 60 days of NRC approval of emergency plan**
6. Stage emergency exercise and perform critique - **within 60 days of completion of training**

B. Intermediate Priority Actions
1. Recover hot cell capabilities - **done**
2. Return 34 NPI sources - **two sources returned since 10/11/95**
3. Identify a market for remaining bulk material - **initiated discussions**

C. Lower Priority Actions
1. Remove plug in the hot cell
2. Decontaminate the hot cell
3. Complete/confirm the physical inventory and transfer/ship remaining sources
4. Disposition of solid waste at the facility
5. Disposition of treated water in collapsible storage tanks

V. **AMS' Revision 2 to "Strategic Plan" - 4/8/96**

A. High Priority Actions
1. Complete the remediation report - **ongoing**
2. License renewal application - **ongoing**
3. Emergency plan - **ongoing**
4. Decommissioning funding plan - **ongoing**
5. Train first responders in emergency plan provisions - **within 60 days of NRC approval of emergency plan**
6. Stage emergency exercise and perform critique - **within 60 days of completion of training**

B. Intermediate Priority Actions
1. Recover hot cell capabilities - **done**
2. Return 34 NPI sources - **four sources returned since 9/27/95 (~5000 Ci)**
3. Identify a market for remaining bulk material - **solicitations of interest distributed**

C. Lower Priority Actions
1. Remove plug in the hot cell
2. Decontaminate the hot cell
3. Complete/confirm the physical inventory and transfer/ship remaining sources
4. Disposition of solid waste at the facility
5. Disposition of treated water in collapsible storage tanks

VI. AMS' Response to Structural Integrity Report - 4/9/96

AMS is scheduling an independent evaluation of the facility's structural integrity. NRC will receive the report of the evaluation before 6/12/96.

VII. AMS' Response to 12/6/95 Letter - 4/24/96

A. Change to High Priority Actions:
1. Recover hot cell capabilities - **done**
2. Return NPI sources - **concur (7/15/96 update will show this)**
3. Identify a market for remaining bulk material - **concur (7/15/96 update will show this)**
4. Train first responders in emergency plan provisions - **concur**
5. Stage emergency exercise and perform critique - **concur**
6. Disposition of solid waste at the facility - **keep low priority**

B. Do the Following:
1. Request amendment to LC 14 (inventory) - **depends on timeliness of renewal**
2. Address decontamination/decommissioning of WHUT Room - **SAFSTOR**
3. Address decontamination of facility - **will be done in 7/15/96 update**
4. Respond to structural integrity report - **responded in 4/9/96 letter (see above)**

VIII. AMS' Response to Structural Integrity Report - 6/11/96

AMS evaluated the facility's structural integrity, and committed to implement a building movement monitoring program. NMSS reviewed the report and accepted its conclusions; however, NMSS indicated that NRC would reevaluate the condition of the building in 10 years.

IX. AMS' Revision 3 to "Strategic Plan" - 7/10/96

A. High Priority Actions
1. Complete the remediation report - **ongoing**
2. License renewal application - **ongoing**
3. Emergency plan - **ongoing (structural integrity report addressed some issues)**
4. Decommissioning funding plan - **ongoing (BRP amendment requests, etc.)**
5. Train first responders in emergency plan provisions - **within 60 days of NRC approval of emergency plan**
6. Stage emergency exercise and perform critique - **within 60 days of completion of training**

B. Intermediate Priority Actions
1. Recover hot cell capabilities - **done**
2. Return 34 NPI sources - **four sources returned since 9/27/95 (~5000 Ci)**
3. Identify a market for remaining bulk material - **solicitations of interest distributed (unsuccessful, subsequently submitted BRP)**

C. Lower Priority Actions

1. Remove plug in the hot cell
2. Decontaminate the hot cell
3. Complete/confirm the physical inventory and transfer/ship remaining sources **(BRP, also, in 5/98 will request license amendment to change inventory condition)**
4. Disposition of solid waste at the facility **(BRP)**
5. Disposition of treated water in collapsible storage tanks

RIII OUTSTANDING ACTIONS - AMS
8/29/96

- Decommisioning/Financial Assurance ($1.8M) - received by RIII in 1/95
  - RIII received AMS' "Conceptual Decommissioning Plan" - 10/30/95
  - RIII mailed deficiency letter - 3/20/96
  - RIII rec'd response - 4/17/96
  - RIII sent to NMSS - 5/[illegible]96
  - RIII recv'd response - 8/28/96
  - **Current Status: RIII is writing a deficiency letter**

- Disposal of sources
  - RIII mailed letter to AMS - 5/23/96
  - RIII received AMS' response (Building Recovery Project report) - 6/10/96
  - RIII sent report to NMSS - 6/11/96
  - NMSS, RIII, AMS telecon - 6/26/96

  Reduction of collateral
  - AMS submitted amendment request to reduce collateral - 7/1/96
  - NMSS and RIII complete the SER - 7/30/96
  - RIII approved amendment request to reduce collateral (Amend. 44) - 8/2/96
  - RIII received amended letter of credit from AMS' bank - 8/21/96, corrected copy 8/28/96.
  - **Current status: RIII sent amended letter of credit to NMSS for review - 8/29/96**

  Waste handling procedures
  - AMS submitted amendment request re: waste handling - 7/8/96
  - **Current status: RIII is writing a deficiency letter re: waste handling**

- TAR re: AMS' analysis procedures (also 4/19/96 Meschter letter to Wright re: counting procedures)
  - RIII sent TAR to NMSS - 2/23/96
  - RIII received 2nd TAR response from NMSS - 5/13/96
  - RIII mailed letter (NMSS' letter) to AMS - 5/31/96
  - RIII received response from AMS - 6/17/96
  - RIII sent response to NMSS - 6/18/96
  - RIII received response from NMSS - 8/20/96
  - **Current status: RIII is writing a deficiency letter to AMS**

- DFI - RIII received AMS' response - 10/19/95
  - RIII mailed response letter - 12/6/95
  - RIII received AMS' Rev. 1 to Strategic Plan - 1/15/96
  - RIII received AMS' Rev. 2 to Strategic Plan - 4/8/96
  - RIII received AMS' response to our 12/6/95 letter - 4/24/96
  - RIII received AMS' response re: structural integrity - 6/7/96
  - RIII received AMS' Rev. 3 to Strategic Plan - 7/10/96
  - **Current status: RIII is reviewing the responses**

- Renewal Application - RIII received AMS' application - 11/3/95
  - RIII mailed "preliminary deficiency letter" asking for rad protection procedures referenced (but not included) in renewal package - 12/5/95
  - RIII rec'd letters dated 12/28/96, 1/5/96, 2/13/96, 3/13/96 with ALL requested procedures
  - Current Status: RIII is evaluating the submittal

RIII "COMPLETED" ITEMS

*• Free release of water from under drain system
- RIII rec'd AMS' letter - 6/26/96.
- RIII sent TAR to NMSS - 7/10/96
- **Current status: NMSS is reviewing the TAR**

*• Structural integrity inspection
- RIII rec'd report from NMSS - 12/22/95
- RIII mailed letter w/ report to AMS - 3/12/96
- RIII rec'd AMS' response on 4/9/96. AMS will evaluate facility, complete report by 6/12/96.
- RIII received AMS' report on 6/11/96. AMS will monitor building movement.
- RIII sent report to NMSS - 6/12/96
- RIII rec'd NMSS' response - 8/2/96. NRC will check AMS' building monitoring, and reevaluate condition of building in 10 years.
- **Current status: RIII mailed acknowledgment/deficiency letter to AMS - 8/17/96**

*• EP - RIII received AMS' revised Emergency Plan - 9/28/95
- RIII mailed deficiency letter - 2/28/96
- RIII rec'd AMS' response - 3/26/96
- RIII sent AMS' response to NMSS for review - 3/27/95
- RIII received AMS' response re: engineer's report - 6/7/96
- RIII sent AMS' structural integrity report to NMSS - 6/12/96
- RIII rec'd NMSS' response - 6/17/96
- RIII mailed deficiency letter to AMS - 7/16/96
- RIII received response from AMS - 8/19/96
- **Current status: - RIII sent AMS' response to NMSS for review - 8/20/96**

• Commission paper on NEORSD's 2.206 petition
- **Current status: RIII provided comments - 7/26/96**

• Surveillance Plan amendment request - 5/23/96
- **Current status: RIII approved amendment request (Amend. 43) - 7/26/96**

• New RSO amendment request - 7/12/96
- **Current status: RIII approved amendment request (Amend. 42) - 7/16/96**

• Response to NOV - 5/24/96
- **Current status: RIII mailed thank you letter - 6/12/96**

• RIII Inspection letter (inspection performed April 29-30, 1996)
- **Current status: RIII mailed letter - 5/21/96**

• Meschter letter re: release of tank 695
- **Current status: RIII mailed letter - 5/20/96**

• English letter to Wright re: tanks 164 and 695 - 4/19/96
- **Current status: RIII mailed letter - 5/20/96**

• English letter to Mader re: tanks 164 and 695 - 4/18/96
- **Current status: RIII mailed letter - 5/20/96**

• English letter re: tank 880 - NRC promised full results in 2/26/96 ltr
- **Current status: RIII mailed letter - 5/8/96**

• Meschter letter re: release of tank 880
- **Current status: RIII mailed letter - 4/17/96**

- AMS letter dated 10/17/95 re: grouting of 4" line, etc., received 10/26/95
  - **Current status: RIII mailed Amendment No. 41 - 4/16/96**

- Meschter letter re: tank 880 - NRC promised full results in 2/22/96 ltr
  - **Current status: RIII mailed letter - 3/19/96**

*• Ohio DOH letter dated 1/30/96 re: LLW (dirt from excavation project) at AMS
  - **Current status: RIII mailed response letter - 3/18/96**

- NEORSD faxes dated 1/31/96, 2/1,5,7,12/96 re: AMS tanks 877, 222 & 880
  - **Current status: RIII mailed response letter - 2/26/96**

- NEORSD letter dated 12/21/95 to EDO re: Inspection Report 95005
  - **Current status: RIII mailed response letter - 2/1/96**

- Surveillance Plan - RIII received Plan - 9/5/95
  - **Current Status: RIII amended license (to include Plan) - 1/16/96**

- NEORSD letter dated 11/13/95 re: grouting of 4" line, etc., rec'd 11/17/95
  - **Current status: RIII mailed response letter - 12/20/95**

- NEORSD letter dated 11/14/95 re: 3000 gallon discharge, received 11/17/95
  - **Current status: RIII mailed response letter - 12/14/95**

- English response - RIII received English's letter - 10/9/95
  - **Current status: RIII mailed response letter - 12/13/95**

- Inspection Report covering 4/3/95-11/3/95 inspection
  - **Current status: RIII mailed report - 12/4/95**

- Kalstrom response - RIII received Kalstrom's letters - 8/23/95 and 9/29/95
  - **Current status: RIII mailed response letter - 11/20/95**

* still an open item

August 19, 1996

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

Dear Mr. Haddock:

We have received the June 7, 1996 letter from Robert Meschter that transmitted Advanced Medical Systems' (AMS') response to NRC Inspection Report No. 030-16055/95006(DNMS), concerning the structural integrity of the London Road facility. We have reviewed the response to the inspection report, and have one further question. The response indicated that AMS will institute a survey program to monitor the movement of the walls. Please indicate *when* AMS will institute this survey program, and *how* the program will be implemented. We will be following the progress and results of this survey program during future inspections.

Please call John Madera of my staff at (630) 829-9500 if you have any questions.

Sincerely,

Original signed by Cynthia D. Pederson

Cynthia D. Pederson, Director
Division of Nuclear Materials Safety

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

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DATE	08/ /96		08/ /96		08/ /96		08/19/96	

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

Dear Mr. Haddock:

We have received the June 7, 1996 letter from Robert Meschter that transmitted Advanced Medical Systems' (AMS') response to NRC Inspection Report No. 030-16055/95006(DNMS), concerning the structural integrity of the London Road facility. We have reviewed the response to the inspection report, and have one further question. The response indicated that AMS will institute a survey program to monitor the movement of the walls. Please indicate *when* AMS will institute this survey program, and *how* the program will be implemented. We will be following the progress and results of this survey program during future inspections.

Please call me at (630) 829-9500 if you need clarifications on any of the above items.

Sincerely,

Cynthia D. Pederson, Director
Division of Nuclear Materials Safety

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

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August 11, 1995

Ohio State Emergency Response Commission
ATTN: Jane Harf, Chairperson
1800 Watermark Drive
P.O. Box 163669
Columbus, Ohio 43216-3669

Dear Ms. Harf:

Thank you for the letter from Ms. Linda J. Fields of your staff dated June 30, 1995, which provided copies of the minutes of the State Emergency Response Commission (SERC) Executive Committee meeting on March 27, 1995, and the SERC meetings on April 12 and June 16, 1995, concerning the Cuyahoga County Local Emergency Planning Committee (LEPC) requests regarding the Advanced Medical Systems, Inc. (AMS) facility in Cleveland, Ohio. We have also received copies of several letters provided to the SERC regarding the AMS facility.

Recognizing that the SERC was becoming involved with county emergency planning requirements of a facility regulated by the NRC, we offered to provide information regarding NRC safety requirements and assessments of the facility. At your request, Mr. Jack Grobe and other NRC staff attended the March 27, 1995 SERC Executive Committee meeting and the April 12, 1995 SERC meeting. Mr. Grobe provided a briefing and answered questions concerning the AMS facility.

Several topics Mr. Grobe addressed are mentioned in the minutes of the SERC meetings and letters the SERC has received. Some of the statements in these documents concerning AMS' inventory of radioactive material, emergency response plan and exercises, and facility security required clarification. Enclosed is information which should be useful to you and other members of the SERC.

We will continue to closely monitor AMS activities to ensure that appropriate radiological controls are exercised in order to protect the health and safety of the public and the environment.

We will gladly discuss any questions you have concerning these matters.

Sincerely,

Original signed by
James L. Caldwell, Deputy Director
Division of Radiation Safety and Safeguards

Enclosure: As stated

See Attached Distribution

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1800 Watermark Drive
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Division of Radiation Safety and Safeguards

Enclosure: As stated

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ENCLOSURE

Clarifying Information

A. Inventory of Radioactive Materials

Several statements in the documents NRC received mentioned AMS' five year inventory requirement, AMS' failure to complete its inventory by June 1, 1993, and AMS' lack of a credible inventory.

AMS has three requirements in its NRC license regarding the radioactive material inventory. The first is to establish an inventory system, the second, to examine, every six months, its records to confirm the location and activity of all radioactive material and the third, to physically verify the location and activity of all licensed material by June 1, 1993, and every 60 months thereafter. The physical inventory, unlike the first two requirements, requires extensive effort involving several person-months of work.

AMS has complied with the first requirement to establish an inventory system, and the second requirement, to examine, every six months, its inventory records. In regard to the third requirement, the physical inventory of all accessible material was completed by May 1993. However, AMS was unable to physically confirm the location and quantity of a small amount (<6%) of its inventory that is isolated in a heavily shielded storage well in the hot cell. This resulted in AMS being cited by the NRC for failure to comply with this license condition. AMS has not been able to remove the cover of the storage well, despite several attempts with contractor assistance in 1993 and 1994. Region III is currently reviewing AMS' plans to mill out the well cover.

The current inventory of material at AMS is provided in Section 1.1 of the AMS License Renewal application, which Region III provided to the SERC per your request earlier this year. This inventory did not include the radioactive waste in the Waste Hold Up Tank room. That room is no longer used and was made inaccessible to workers in the late 1980s. The room will remain inaccessible until it is decommissioned. Based on radiological measurements performed by licensee contractors, NRC estimates that the amount of material in the room is less than 100 curies. Mr. Grobe included this estimate when he discussed the facility hazards during his presentations to the SERC.

B. Emergency Preparedness Plan

Several statements in the documents NRC received expressed concerns about AMS' failure to meet federal regulatory standards for emergency response planning.

The NRC emergency preparedness requirements for non-reactor facilities took effect in April 1990, and required that licensees submit an emergency plan at the time of license renewal (the AMS license expired on December 31, 1994). Previously, in response to NRC initiatives in 1986, AMS developed an emergency plan with the cooperation of the Cleveland Fire Department and other offsite response organizations. In 1986 approximately 50 Cleveland Fire Department fire fighters and officers were trained on the emergency plan and received tours of the AMS facility.

2/20/92 EP sent to CFD (LTR 3/12/92)

In 1991, in response to NRC initiatives, AMS proposed an updated emergency plan that included expanded response procedures for fire, security and medical emergencies. Offsite response organizations provided comments on the plan and the Cleveland Fire Department was trained in the revised plan.

10/94 [illegible] CFD toured AMS (LTR 11/2/94)

1993 invited CFD to inspect AMS (LTR 6/30/93)

In January 1995, as part of its license renewal application, AMS included an updated emergency plan. This plan, unlike the earlier plans, was reviewed against the new, comprehensive guidance contained in Regulatory Guide 3.67, "Standard Format and Content for Emergency Plans for Fuel Cycle and Materials Facilities," dated January 1992. When measured against the new guidance, NRC identified several deficiencies in the plan, and AMS has until August 17, 1995, to respond to these deficiencies. Included in the deficiencies is the expectation that AMS provide additional technical justification for their facility hazards analysis. Local response organizations were provided copies of the proposed plan according to NRC requirements and have provided comments on the plan. The NRC will assure that these comments are appropriately resolved.

C. Emergency Preparedness Exercise

Several statements in the documents NRC received mentioned AMS' failure to perform an emergency exercise.

The 1992 revision of AMS' emergency plan requires AMS to conduct an emergency exercise every two years. In October 1994, NRC inspectors identified that AMS had not performed the required emergency exercise. In addition, NRC identified AMS management weaknesses in the administration of its emergency plan, and determined that AMS had not maintained appropriate contacts with the Cleveland Fire Department and other offsite response organizations since 1992.
In a letter dated November 29, 1994, transmitting a Notice of Violation, NRC clearly communicated its expectation to AMS that it strengthen its management oversight of facility emergency planning and improve its interaction with the Cleveland Fire Department and other offsite response organizations. NRC staff has confirmed that the Cleveland Fire Department has been working with AMS to improve the design of the fire detection and protection systems at AMS' facility. NRC has observed that AMS is implementing those improvements. AMS has also provided additional training for fire department personnel. In addition, NRC understands that the Cleveland Fire Department is revising and updating its Fire Pre-Plan for the AMS facility to be consistent with the redesigned systems and updated knowledge of the facility.

By letter dated March 3, 1995, NRC agreed to allow AMS to defer the completion of its emergency exercise until it completes its work with the fire department in improving its emergency preparedness. However, NRC expects AMS to conduct an emergency exercise as soon as possible.

D. Facility Security

Several statements in the documents NRC received mentioned the lack of facility security at the AMS facility.

The AMS facility (building) has been equipped with an automatic security system for both physical protection of the facility and fire detection since at least 1989. In addition, during current facility construction activities, AMS is providing a security guard when AMS staff are not present at the facility.

November 17, 1995

Cuyahoga Emergency Management
Assistance Center
ATTN: Michael S. Kalstrom, Secretary
Cuyahoga County Local Emergency
Planning Committee
1255 Euclid Avenue, Room #102
Cleveland, Ohio 44115-1807

Dear Mr. Kalstrom:

I am writing in response to your letters dated August 23 and September 29, 1995, regarding Advanced Medical Systems' (AMS) London Road facility. In your letters, you indicate that: (1) AMS has not begun evaporation of its 100,000 gallons of processed water, (2) AMS has apparently made efforts to dispose of the water through another sewage treatment facility outside of the jurisdiction of the Northeast Ohio Regional Sewer District, and (3) the storage of this water presents a hazard to the neighborhood around the facility. Moreover, you express concern about "NRC's failure to hold AMS to its promises" to evaporate the water, and you ask NRC to "take those steps necessary and in your power to alleviate this present hazard."

First, with respect to your concern that NRC has failed "to hold AMS to its promises" to evaporate the water, License Condition 21 of the AMS license *authorizes* AMS to operate the evaporator; it does not *order* or *require* AMS to operate the evaporator. Moreover, in the letters referenced in License Condition 21, AMS requests an amendment to *permit* evaporation of the water; AMS does not state in the cover letters that evaporation will be the *only* means employed to dispose of the water.

Second, a licensee must receive permission from NRC prior to discharging wastes by methods other than those allowed by the regulations in Part 20. If this permission is granted, it does not preclude the licensee from making discharges in accordance with Part 20. Therefore, AMS may dispose of its water by evaporation per the license condition, or it may discharge the water into a sanitary sewerage system if the requirements in Part 20 are satisfied. However, nothing in Part 20 relieves AMS from complying with other applicable Federal, State, and local regulations governing any toxic or hazardous properties of materials that may be disposed of under Part 20.

Third, the NRC technical staff has carefully evaluated the radiological characteristics of this water and has concluded that the storage of this water does not present a radiological hazard to the neighborhood around the AMS facility. The water contains approximately 40 microcuries (μCi) of cobalt 60 (Co-60), thus the average Co-60 concentration is 106 picocuries per liter (pCi/l).

By way of comparison, this concentration is below that of the U.S. Environmental Protection Agency (EPA) drinking water standard of 218 pCi/l for Co-60[1].

Furthermore, making the extremely conservative (and highly improbable) assumption that the 40 μCi of Co-60 could be concentrated into a point source, the exposure rate at one meter, ignoring any shielding, would be 0.05 millirem per hour (mrem/hr). At a distance of 100 meters from the source (the approximate distance from AMS to the nearest residence), the exposure rate, again ignoring any shielding, would be 0.000005 mrem/hr. These exposure rates may be compared with: (1) the average background exposure rate in Cleveland of approximately 0.005-0.01 mrem/hr, and (2) the limits in 10 CFR 20.1301, which limit the total effective dose equivalent to members of the public to 100 mrem in a year, and 2 mrem in any one hour. Thus, NRC believes that the storage of this processed water at AMS does not present a radiological hazard.

We have been following the issues at AMS for some time. Recently, we issued a Demand for Information to AMS, requesting that the licensee prepare a comprehensive prioritization and schedule of intended action to be taken to reduce the overall risk posed by radioactive materials present at the facility. While we recognize that the accumulation of a substantial volume of water at the site may be a concern, we do not believe that the water poses a risk from a radiological perspective.

Should you have any further questions regarding AMS, please do not hesitate to contact me.

Sincerely,

Original signed by James L. Caldwell

James L. Caldwell, Deputy Director
Division of Nuclear Materials Safety

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[1] Federal Register, Vol. 56, No. 138, July 18, 1991, page 33120, Appendix B - Beta Particle and Photon Emitters.

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Gary Shear (GLS)
Mike Stein (MHS)
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Josie Piccone (JMP1)

February 1, 1996

Erwin J. Odeal
Executive Director
Northeast Ohio Regional
Sewer District
3826 Euclid Avenue
Cleveland, Ohio 44115-2504

Dear Mr. Odeal:

I am responding to your December 21, 1995 letter to Mr. James M. Taylor, NRC's Executive Director for Operations. Your letter discussed NRC Inspection Report No. 030-16055/95005 (DRSS), concerning Advanced Medical Systems, Inc. (AMS).

Your letter expresses the view that the inspection report does not reflect the real conditions at the AMS facility nor accurately relate the activities that have taken place there. In addition, you indicate that the videotape shows pervasive violations of NRC regulations, good health physics practices, and ordinary safe working procedures at the AMS facility during the time period covered by the inspection report.

We have carefully reviewed your letter and videotape. This includes having a radiation specialist not associated with this inspection perform an independent review of your letter and videotape, and the inspection report.

Some of your concerns, e.g., potentially unsafe excavation practices and potentially unsafe confined space entries, are under the jurisdiction of the Occupational Safety and Health Administration (OSHA). Per the Memorandum of Understanding between NRC and OSHA ("Worker Protection at NRC-Licensed Facilities," 53 Fed. Reg. 43950 (October 31, 1988)), we will forward your letter and a copy of the videotape to OSHA. These concerns are not addressed further in this letter.

The remaining concerns regarding contamination control, high radiation areas, handling of soil samples, radiation detection and analysis equipment, characterization of AMS site, abandoned footer drains, radiological control of material, and remediation of the London Road interceptor are under the jurisdiction of NRC. We have reviewed each concern including the characterization in your letter, the videotape, the inspection report, and other applicable documentation. The results of this review are presented in Enclosure 1 to this letter.

Based on our review, we have concluded that the inspection report reflects and accurately relates the real conditions at the AMS facility and the activities that have taken place there. Moreover, we do not find that sufficient

evidence exists to warrant further investigation of whether violations of NRC regulations occurred at AMS during the time period covered by the inspection. However, we note that examples of not following good health physics practices were evident at AMS, although they did not constitute violations of NRC requirements. This will be reviewed with AMS during the next inspection.

As a measure of how safely, from a radiological perspective, the projects at AMS were carried out, the thermoluminescent dosimeter (TLD) personnel exposure records were reviewed. As discussed in the inspection report, the doses received by the workers during the water processing project, and especially the excavation project, were very low, as shown in Enclosure 2, when compared to the 5000 millirem annual dose limit. The doses were especially low during the month of July, when nearly all the excavation work took place. Judging by this criteria, the conclusions of the inspection report are valid.

Finally, our report includes the statement that AMS has not yet been allowed to enter the NEORSD interceptor. Your letter indicates that this statement is grossly inaccurate and misleading, and alludes to an NRC official signing the inspection report knowing that this statement was false. We believe that the statement is factual, although it could be misinterpreted. NRC recognizes that AMS and NEORSD have failed to agree on arrangements for entrance into the interceptor. However, based on your assertion, we are forwarding a copy of your letter and this response to NRC's Office of the Inspector General for appropriate action.

Should you have any further questions regarding AMS, please do not hesitate to contact Geoffrey Wright, Acting Deputy Director, Division of Nuclear Materials Safety, Region III, who can be reached at (708) 829-9801.

Sincerely,

Original signed by
A. Bill Beach for
Hubert J. Miller
Regional Administrator

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

Enclosures:
1. Review of Concerns under Jurisdiction of NRC
2. External Exposures to AMS and Contract Workers
3. AMS Radiation Work Permit
4. Readings from Sodium Iodide Crystal Scintillation Detector

See Attached Distribution

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DATE	02/ /96	02/ /96	02/ /96	02/1 /96

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Enclosure 1

Review of Concerns Under Jurisdiction of NRC

A. Contamination Control

1. Use of protective equipment

Pursuant to 10 C.F.R. § 20.1101(b), licensees are required to use, to the extent practicable, procedures and engineering controls to achieve radiation doses to workers and members of the public that are as low as is *reasonably* achievable (ALARA). The inspection report covered two projects at AMS, the water processing project, and the excavation project. The radiological hazards associated with the water processing project were greater than those of the excavation project. This is especially true regarding the potential for personnel contamination resulting from airborne cobalt-60 (Co-60). Thus, the procedures and engineering controls used to achieve radiation doses ALARA to workers and members of the public for the water project were more stringent than those for the excavation project. This concept was incorporated into AMS' Radiation Work Permit (RWP) 95-10, as discussed below. (We have enclosed RWP 95-10 as Enclosure 3.)

During the water project, it was necessary for workers to occasionally enter the Isotope Shop and the basement, both of which are contaminated areas, located inside the AMS facility. Note that, at AMS, the phrase *contaminated area* has a precise meaning, an area where removable contamination levels exceed 1000 disintegrations per 100 square centimeters (dpm/100 cm^2).[1] According to AMS survey records, the average removable contamination levels in the Isotope Shop and basement were at least 50,000 dpm/100 cm^2. As discussed in the inspection report, the inspectors observed that, during the water processing project, workers wore full protective clothing (coveralls, hoods, booties, and gloves), in addition to using breathing zone air samplers, while working in those contaminated areas. This level of protective clothing and equipment was required by RWP 95-10 as well as AMS procedures.

For the excavation project, the Co-60 present in the soil and in the footer drains was not in a form which would likely cause an airborne problem. Thus, this type of contamination did not require the use of full protective clothing and air samplers, as was required for the water project. This flexibility regarding protective equipment was incorporated into RWP 95-10, under "Protective Equipment," as follows:

[1] AMS ISP Manual, issued January 1995, page 30.

Other Precautions and Special Instructions: Specific precautions and protective equipment needs to be determined by RSO as work progresses. Requirements subject to change based upon real-time survey results.

During the NRC inspection, the inspectors observed that radiological surveys were regularly performed in the trenches during the excavation work. This fact is supported by the videotape included with NEORSD's letter.

In order to determine if the workers and equipment became contaminated with Co-60, the workers were required to frisk themselves and their equipment prior to leaving a trench. The release criteria for personnel and equipment was the background radiation level. The inspectors observed that the workers properly conducted these frisks, as required. The inspectors did not observe any personnel frisks in which the background levels were exceeded. In addition, according to AMS, the release criteria was never exceeded by workers, and was exceeded only a few times by equipment, which was subsequently decontaminated.

2. Handling material without wearing gloves

The videotape shows workers, without gloves, handling potentially contaminated footer pipes. We agree; this is not a good health physics practice, and will be reviewed with AMS during the next inspection. However, the safety significance is mitigated by the fact that the workers properly frisked themselves and their equipment prior to leaving a trench, as discussed above. Please note that NRC's inspection program is based on selective observations of representative licensee activities. During the inspection, the inspectors did not observe AMS workers not wearing gloves when necessary. In fact, as documented in the inspection report, "The inspectors observed that workers wore proper dosimetry at all times, and wore latex gloves when handling soil and water samples." NRC inspectors were not continually present at AMS while these projects were underway, nor were they always observing the excavation work. While at AMS, the inspectors performed other duties such as surveying the excavated dirt and other areas, interviewing workers, observing the frisks referred to above, auditing radiation safety training, and assisting with a structural integrity inspection.

3. Splashing water onto a worker's face

The videotape shows a worker breaking the four inch line, and getting water splashed onto his face. The fact that the worker failed to use a face shield is not a good health physics practice, although it is not a violation of NRC requirements. This will be reviewed with AMS during the next inspection. However, our review of this incident indicates that the "contaminated water" to which NEORSD's letter refers was likely clean, ground water. The

videotape reveals that this incident occurred several days after: (1) the four inch line coming from the AMS building was broken, (2) the contaminated water from inside the pipe was either pumped into an outside storage tank or drained into the ground, and finally (3) the pipe was capped with cement and brick at both "broken ends." The AMS manhole, to which the other section of this four inch line was still connected, contained a small amount of ground water, from continual ground water seepage. Throughout the spring and summer of 1995, ground water entered this manhole, and was subsequently pumped to outdoor storage tanks. Throughout the same time period, samples from these storage tanks were collected and analyzed by AMS prior to processing. With the exception of some samples taken in late March 1995, the samples always had concentrations of Co-60 which were less than the EPA drinking water standard of 218 picocuries per liter (pCi/l). Thus, it is likely that the water which splashed onto the worker's face was clean, ground water. The fact that contamination was not identified on any worker leaving a trench supports this conclusion.

4. Unlined truck bed carrying contaminated soil

The dump truck used to transport contaminated soil at AMS did not have a liner in the truck bed. Rather than using a liner, AMS decided to implement a survey program, which required routine surveys of the truck. NRC inspectors observed that AMS workers routinely surveyed the truck for both external exposure and removable contamination. In addition, according to AMS, before the truck was allowed to leave AMS at the end of the project, it was thoroughly surveyed, and a few spots (which turned out to be clumps of dirt) with above background readings were decontaminated. Thus, the survey program negated the need for the truck liner.

B. High Radiation Areas

Certain outside areas at AMS were posted as high radiation areas. NEORSD's letter indicates that there was some confusion about which areas were high radiation areas. Our review of the videotape indicates that the high radiation area signs were held up by yellow tape, with the tape serving as the high radiation area boundary or marker. The high radiation areas which were visibly marked were located at the west side of the building, and outside the Source Garden. This method of marking radiation areas is standard practice, and was emphasized during the general radiation safety training given to the workers.

C. Handling of Soil Samples

The videotape shows an AMS contractor stating that certain soil samples were too "hot" for the NEORSD representatives present at AMS to handle. The contractor later states that the samples had radiation levels of 2-3 millirem per hour (mrem/hr).

After carefully reviewing this segment of the videotape, it appears that the contractor was suggesting that the NEORSD representatives refrain from taking these samples since: (1) the samples would have caused unnecessary exposure to the NEORSD representatives, and (2) the samples may have caused the NEORSD representatives to exceed their annual dose limits. The NEORSD representatives who were present at AMS are considered members of the public, not radiation workers. Members of the public may not receive more than 100 mrem per year total effective dose equivalent. Moreover, members of the public are generally not monitored for radiation exposure. Radiation workers, such as AMS contractors involved in this project, may receive up to 5000 mrem per year total effective dose equivalent, and are monitored for radiation exposure. Thus, it appears that the AMS contractor was exhibiting good health physics judgement in recommending that the NEORSD representatives not take these samples.

D. Radiation Detection and Analysis Equipment

1. Readings from scintillation detector

NEORSD's letter indicates that sodium iodide crystal scintillation detectors do not provide readings in picocuries per gram (pCi/g). We agree with that statement. The author of the inspection report chose not to discuss how AMS contract health physicists used detector efficiency and instrument software to calculate an equivalent reading in pCi/g. For clarification, an example of this type of calculation is shown in Enclosure 4.

2. Minimum detectable activities

NEORSD's letter indicates that the minimum detectable activities (MDAs) achieved by NRC counting equipment "are quite high, and do not seem to reflect best practices." As discussed in the inspection report, the inspection of the water processing project included NRC analyses of the processed water. NRC analyses were done to confirm the reasonableness of AMS' results. It was AMS' responsibility to analyze each sample of processed water to determine if the water could be pumped to a storage bladder. The MDAs obtained by AMS' contract laboratory were less than 20 pCi/l. The MDAs achieved by NRC counting equipment (20 to 60 pCi/l) were adequate for the purpose of confirming AMS' results.

E. Characterization of AMS Site

NEORSD's letter contains the statements: "No systematic evaluation of the facility or grounds approaching the NRC Draft Branch Technical Position on Site Characterization for Decommissioning Sites (NRC, 1992) has been conducted. Hence, this facility cannot be considered 'characterized'. Similarly, as nothing approaching the information contemplated by the Manual for Conducting Radiological Surveys in Support of License Termination, Draft NUREG/CR-5 849 (J.D. Berger, ORISE, June 1992) has been developed, no part of this facility can be

called 'released'." We agree with these statements; however, because AMS is neither decommissioning its site, nor terminating its NRC license, these types of evaluations are not necessary at this time. If and when AMS moves to decommission the site or terminate its license, the guidance in the referenced documents would be applicable.

AMS has stored on its grounds slightly contaminated soil from the excavation project. As explained below in Item G.2, NRC believes that the storage of this soil does not present a radiological hazard to the neighborhood around the AMS facility.

F. Abandoned Footer Drains

1. Contaminated footer drains left in ground

NEORSD's letter refers to the fact that some contaminated piping was left in the ground. This piping, actually a section of the footer drain, is located approximately 13 feet underground, in the vicinity of the Source Garden. The Source Garden is a storage area for radioactive sources, located at the corner of the basement of the AMS facility. By letter dated July 19, 1995, AMS indicated that due to the inventory of approximately 20,000 curies of Co-60 in the Source Garden, exposure rates in the vicinity of these footer drains were calculated to be 30,000 mrem/hr or more. The exposure rates above ground at waist level are less than 0.1 mrem/hr. This 300,000 to 1 reduction in exposure rate is due to the shielding effect of the ground, and the distance from the sources in the Source Garden. The decision to leave this footer drain in the ground as opposed to subjecting workers to a 30,000 mrem/hr radiation field was based on ALARA and good health physics principles. This issue will have to be addressed at the time of decommissioning.

2. Plastic tarp covers contaminated area

In NEORSD's letter, exception is taken to "covering a known contaminated area with a plastic tarp (July 24, 1995)." As described in AMS' July 19, 1995 letter, a copy of which was mailed to NEORSD, the plastic tarp covers the ground over the abandoned footer drains referred to above. The tarp extends between the AMS building and a trench filled with concrete known as the "slurry wall." This slurry wall meets the building's foundation and thus surrounds the abandoned footer drains. The tarp and slurry wall were designed to minimize the potential for water infiltration into the abandoned area (e.g., from rain and melting snow), and migration of contamination out of the abandoned area, respectively. The new footer drains were placed farther from the building, outside the slurry wall. Water from the new footer drains has been collected and subsequently analyzed by AMS' contract laboratory, as well as NEORSD, and found to be radiologically clean. This indicates that the contamination from the abandoned footer drains has not migrated into the new system.

The water in the footer drains will continue to be collected and monitored to determine if the new footer drains remain radiologically clean.

G. Radiological Control of Material

1. Materials removed from manhole

NEORSD's letter describes excerpts from the videotape where, on July 28, 1995, "It also appears that no radiological control is being exercised over materials being removed from the manhole." Our review of the videotape indicates that AMS workers adequately surveyed the materials removed from the manhole. Thus, it appears that radiological control was being exercised.

2. Storage of contaminated soil above ground

NEORSD's letter refers to the fact that AMS is storing contaminated soil above ground. During the excavation project, any excavated soil which exhibited radiation levels near or above 8 pCi/g was temporarily placed on a plastic tarp, in a posted, roped off area in the rear parking lot, near the building. The soil was covered with a plastic tarp when the excavation work was not in progress. By letter dated January 15, 1996, AMS indicated that a lined, wooden structure was being built at the AMS site to secure and house the soil.

During an NRC inspection on November 3, 1995, an inspector measured a maximum exposure rate of 0.06 mrem/hr at the boundary of the roped off area. At approximately 15 meters away from the boundary, the exposure rate from the soil is indistinguishable from the background radiation levels in Cleveland of approximately 0.005-0.01 mrem/hr. Thus, NRC believes that the storage of this soil does not present a radiological hazard to the neighborhood around the AMS facility.

H. Remediation of London Road Interceptor

1. Requirements of license condition

NEORSD's letter refers to NRC License Condition No. 19, which requires AMS to remediate the London Road interceptor. The initial activities of this remediation project include AMS making a confined space entry into the NEORSD system in order to evaluate the contamination of the interceptor. This evaluation is necessary for AMS to develop an appropriate remediation plan. These activities must be coordinated with NEORSD.

We have been monitoring the progress of the negotiations between AMS and NEORSD regarding the arrangements for entrance into the NEORSD system. We are aware of the fact that by December 1994,

negotiations between AMS and NEORSD were underway regarding the confined space entry. We are also aware that these negotiations have not yet concluded. Thus, the confined space entry into the NEORSD has not yet been made.

Regarding the aforementioned license condition, we consider the initiation of the project to include the negotiations between AMS and NEORSD regarding the arrangements for entrance into the NEORSD system. We continue to monitor the status of this project.

2. Entrance into interceptor

NEORSD objects to the statement in the inspection report which indicated that AMS has not yet been allowed to enter the NEORSD interceptor. Though the statement is factual, it could be misinterpreted. NRC recognizes that AMS and NEORSD have failed to agree on arrangements for entrance into the interceptor.

Enclosure 2

External Exposures to AMS and Contract Workers

Monthly External Exposure (millirem)						
Worker	Water Processing Project			Excavation Project		
	4/95	5/95	6/95	7/95	8/95	YTD Total
1	nd	20	nd	nd	nd	20
2	nd	nd	160	10	nd	200
3	nd	40	160	20	45	295
4	nd	nd	10	nd	30	40
5	20	50	20	--	--	90
6	10	60	170	nd	30	270
7	--	--	170	--	--	170
8	--	--	--	--	40	40
9	--	--	nd	nd	--	0
10	--	--	nd	nd	--	0
11	--	--	nd	nd	--	0
					Total	1125

NOTES:

(1) "YTD" means year to date.

(2) "nd" means the dose is below the dosimetry vendor's minimal measurable quantity. A value of zero was substituted for nd in the calculation of each worker's total dose.

Enclosure 3

AMS Radiation Work Permit (RWP) 95-10

RADIATION WORK PERMIT
ISP-38B

ermit No: 95-10 (Rev. 1)	Type: ☒ Job Specific ☐ Extended
xpiration Date: 6-15-95	

escription and Location of Work: Water Treatment and Remediation of Lateral Sewer Connection. Work locations are (a) ISA and ISA Basement Water removal, (b) site where water processing equipment is staged, and (c) site of excavations on exterior south and southeast wall of the building. Work procedures described elsewhere (see RSO).

SURVEY INFORMATION

eneral Area Dose Rates (mR/hr):
(a) Basement to 50; ISA to 60
(b) To be determined
(c) Less than 1

aximum Accessible Dose Rates (mR/hr):
(a) Basement to 1000; ISA to 200
(b) To be determined
(c) Less than 1

:movable Contamination (dpm/100 cm²):
(a) Basement to 10^6; ISA to 200,000, with 50,000 average
(b) To be determined
(c) To be determined. Dose rates and contamination status to be established during excavation and when water levels in manhole and pit drop.

ALARA REVIEW

timated Total Dose:	Actual Total Dose:
Job Briefing by: RSO and HP Technician	Post-Job Briefing by: RSO

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iorized by: R Prevatte 4-17-95

minated by:

ATTACHMENT 1 to RWP

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1. No activity or operation will be conducted unless its performance will produce a net positive benefit.

2. All radiation exposures will be kept as low as reasonably achievable (ALARA) considering economic and societal costs.

3. No individual will receive radiation doses in excess of federal or administrative limits.

In addition to administrative controls implicit in this Plan, close attention to the basic radiation protection principles of "time, distance, shielding, and contamination control" is required. Since the act of filtration and ion exchange tends to concentrate activity from a large volume of water into a much smaller confined space, the project manager will alert those in the vicinity of the operation that dose rates may (will) increase over a period of time during daily Tailgate Safety Training. Safeguards to minimize unnecessary exposure will include performance of ambient radiation surveys prior to entering the area, along with planned and periodic routine surveys to assess changing radiological conditions, and communication of survey results to all operations personnel. In addition, no maintenance will be performed on water treatment, excavating, or other equipment without performance of a pre-job survey. Finally, administrative requirements for exit surveys and personnel dosimetry will provide confirmation of the adequacy of the ALARA program.

ATTACHMENT 2 to RWP

Existing health and safety procedures and the provisions of the AMS Radiation Protection Program contain the worker protection requirements for any operations that occur at the London Road plant. Therefore, all work performed with licensed materials at the AMS facility will be completed under the direction of the AMS Radiation Safety Officer, the provisions of AMS License No. 34-19089-01, and the AMS ISP Manual. To address specific radiological issues during water treatment and sewer remediation, on-site health and safety will be monitored continuously by a health physics technician (HP Technician) operating under the direction of the AMS Radiation Safety Officer.

There will be one HP Technician for every 10 contractor personnel. The technician will provide tailgate safety training, implement the personnel monitoring program, perform release surveys for personnel and equipment as necessary, and maintain records generated as part of this work plan (Plan).

This Plan will remain in effect throughout the water treatment and sewer remediation operation.[1] Changes to the Plan to accommodate static or dynamic conditions may be made by the AMS Radiation Safety Officer after approval by the AMS Isotope Committee. The following are the health and safety responsibilities for each member of the operations team:

- The HP Technician is responsible for the implementation of this Plan.
- The AMS Radiation Safety Officer is responsible for providing oversight for implementation of this Plan and making changes to the Plan to reflect field situations that were not anticipated during the Plan's initial development. Changes in the Plan can only be made by the AMS Radiation Safety Officer and must be approved by the AMS Isotope Committee.
- The team leader of the contractor personnel is responsible for ensuring field implementation of the Plan. This includes communicating site requirements to all personnel on the job, field supervision, and consultation with the AMS Radiation Safety Officer regarding appropriate changes to the Plan.
- The team members are responsible for understanding and complying with all site health and safety requirements, including proper maintenance of health and safety equipment and facilities. This understanding will be documented by the signature of each team member on an attendance sheet for the briefing.

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[1] In the event of a discrepancy between this Plan and existing AMS Health and Safety policy, the AMS policy will prevail.

Site Entry

The HP Technician will enter the work area before any work begins in order to verify that work zones are established. The daily site entry procedure will include the following:

- Qualitatively assess the wind direction and stay apprised of it throughout the day, identifying the direction during the tailgate safety meeting;
- Confirm the proper placement of emergency information and operational status of equipment.
- Visually scan for signs of actual or potential life or health threatening hazards;
- Note the physical conditions of the site and determine potential exposure pathways;
- Identify new boundaries of the work zones; and
- Document site activities in a "Field Activity Daily Log", including observations related to field conditions and the site, and samples collected.

Employee Training

Employee training in radiation protection will be provided to each contractor employee prior to the start of water treatment and sewer remediation operations. Training will consist of an oral presentation, hand-out of materials, and completion of the form entitled "Statement of Training", ISA-37B. The oral presentation shall address the following:

- Potential contaminants which may be encountered;
- The hazards associated with the potential contaminants
- Protective measures described in this Plan and the provisions of the AMS site-wide Radiation Protection Program;
- Work zone setup and decontamination procedures; and
- Emergency procedures.

Tailgate safety meetings will be conducted at the beginning of each shift or whenever new personnel arrive at the job site in order to discuss health and safety procedures to be followed during the day's work activity. The information discussed will be recorded on a "Tailgate Safety Meeting" form and will serve as confirmation that the information was discussed with those persons whose signature is on the form.

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Any team member who develops a lost-time illness or sustains a lost-time injury during water treatment or sewer remediation operations will be examined by a physician. The physician must certify that the employee is fit to return to work before further participation in the effort.

Emergency Procedures

This Plan is established to allow operations to be conducted without adverse impacts on worker health and safety. In the event of an accident or other emergency situation, appropriate measures will be taken in order to reduce the impact on worker health and safety.

Minor accidents will be handled on site by the HP Technician and the team leader. The work area will have a first aid kit to handle minor incidents. Should there be an incident that cannot be handled by the team leader (e.g., a major accident, fire, or chemical release), then the AMS Radiation Safety Officer will be informed of the location and type of incident, and the need for assistance. The HP Technician will notify the AMS Radiation Safety Officer of all first aid cases so that the potential for radionuclide uptake through wounds can be assessed.

In the event that outside medical attention is needed, the hospital designated by the AMS Radiation Safety Officer will be used. Arrangements will be made by the AMS Radiation Safety Officer prior to the start of remediation activities for this hospital to accept injured personnel. The AMS Radiation Safety Officer (or designee) will accompany injured persons to the hospital to perform contamination monitoring prior to treatment, and to assist in decontamination activities as directed by the physician. A list of emergency response telephone numbers will be compiled and distributed during tailgate safety training. Prior to the start of each day's work activities, the nearest AMS telephone will be identified for use during an emergency. The list of emergency phone numbers will be readily available on site, along with a plant map and directions to the nearest hospital.

Contamination Controls

To assure radioactive materials remain under the control of AMS, each worker involved in water treatment or sewer remediation operations will be frisked prior to leaving the work area. Equipment and materials will be frisked and decontaminated, as necessary, prior to exiting the work area. The release criteria for personnel and equipment are 1,000 dpm/100 cm^2 removable activity, and 5,000 dpm/100 cm^2 total (fixed plus removable) activity, with the maximum total (fixed plus removable) activity not to exceed 15,000 dpm/100 cm^2 over an area of not more than 100 cm^2. Records of these actions will be maintained on a "Radiological Survey Form" and a "Radiological Survey Map". Contamination control during sample collection shall include the following:

- Personnel will wear latex gloves to collect and handle samples.
- The sample port will be located in an area readily accessible to personnel.
- An impervious area under the sample port from which water can be readily absorbed with rags should a small spill or drop occur.

- The drawing of the sample itself will be controlled with a valve that is manually-operated by the individual taking the sample.

Protective Clothing

The initial level of protection for on-site operations in contaminated areas will be tyvek coveralls, booties, and gloves, and other items as shown on the Radiation Work Permit. Activities involving liquids, fines, or heavy equipment require the use of hard hats, safety glasses with side shields, and steel-toed safety shoes. Upgrading of the level of protection will be based on ambient conditions as work proceeds. The AMS Radiation Safety Officer will be notified if it is deemed necessary to upgrade to a higher level of protection.

External Exposure Monitoring

Personnel shall be assigned a film-based dosimeter for use throughout the on-site operations. Assignment, use, retrieval, and processing shall be coordinated by the AMS Radiation Safety Officer pursuant to AMS Standard Operating Procedures for Radiation Protection. The Radiation Safety Officer shall evaluate the need for enclosing the dosimeters in protective covers (plastic bags), and shall document the methodology for use in interpreting the results of dosimeter processing. In addition, personnel will wear self-reading pocket dosimeters (or an equivalent self-reading device), with usage and readings recorded on a "RWP Sign-in Sheet", ISP-38C. Chambers with residual readings of 50% full scale will be re-charged prior to issue.

Release of Treated Water

Processed water will be stored, initially, in above-ground storage tanks. Samples will be collected from the tanks by a pre-determined procedure (see RSO). Samples shall be collected in large (two liter) bottles and/or one liter Marinelli beakers. No preservatives shall be used. Sufficient sample will be collected to permit it to be "split" (in volume) with the USNRC. Two samples will be collected per tank. The water will be dipped from the tank through the open manway or taken from a sample port on the recirculation pump when the tank has been "turned over" a pre-determined number of times. Sample ports shall not have a dead-leg or static line leading to the valve, so flushing prior to filling the sample bottle is not necessary.

For process control purposes, samples will be analyzed in the AMS gamma spectrometry system, using NIST-traceable sources (water equivalent density) of ^{60}Co for system calibration. For confirmatory analysis, as necessary, the samples shall be sent for analysis to Quanterra, Inc., a commercial analytical laboratory in (St. Louis, Missouri. There the ^{60}Co concentration will be determined by the methodology of gamma spectroscopy. A minimum detection limit of 20 to 30 pCi per liter has been specified. The solubility of ^{60}Co in samples containing "detectable" activity, up to a maximum of 200 pCi per liter, will be demonstrated by the methodology of the American Public Health Association's Method 7110, "Gross Alpha and Gross Beta Radioactivity (Total, Suspended, and Dissolved)" from Standard Methods for the Examination of Water and Wastewater.

Water in the storage tanks that meets the release criteria (e.g., consistent with Information Notice 94-07, "Solubility Criteria for Liquid Effluent Release to Sanitary Sewerage Under the Revised

10 CFR Part 20") may be discharged or stored in collapsible storage containers. (Water held in the collapsible storage tanks may be evaporated at a nominal rate of 300-700 gallons per 24-hour day.) Water that does not meet the release criteria will be re-processed or evaporated.

Solid Waste Management

Soils excavated or removed during remediation activities that contain ^{60}Co in concentrations in excess of eight (8) pCi/gram will be disposed of by conventional means at the discretion of the contractor personnel. Soils that exceed eight (8) pCi of ^{60}Co per gram, along with any other solid waste (resins, spent filters) containing detectable ^{60}Co, will be stored in the basement of the AMS facility. Protective clothing and other compactable items worn in a contaminated area will be frisked to determine the level of removable and total contamination. Those that do not meet the release criteria of 1,000 dpm/100 cm^2 removable activity, and 5,000 dpm/100 cm^2 total (fixed plus removable) activity will be placed into drums and stored in the basement of the AMS facility.

Noise Monitoring and Abatement

The water treatment and excavation contractors shall provide noise monitoring during heavy equipment operations pursuant to their procedures and specifications. As necessary, noise abatement methods and/or hearing protection shall be provided by the contractors.

Control of Fugitive Dust

The excavation contractor shall ensure that dust is controlled through the use of water spray or containment, if necessary.

Forms

All completed health and safety forms will be maintained on site by the HP Technician until completion of the project. At that time, they will be relinquished to the AMS Radiation Safety Officer who will maintain them as AMS records.

IEM
Integrated Environmental Management, Inc.

9040 Executive Park Drive, Suite 205
Knoxville, TN 37923
Phone: (615) 531-9140
Fax: (615) 531-9130

1680 East Gude Drive, Suite 305
Rockville, MD 20850
Phone: (301) 762-0502
Fax: (301) 762-0638

April 13, 1995

Mr. Robert Meschter, RSO
Advanced Medical Systems, Inc.
1020 London Road
Cleveland, Ohio 44110

Re: Radiation Work Permit for the Water Treatment Project

Dear Mr. Meschter:

Enclosed is Revision 1 of the referenced item. A change was made to the discussion on Contamination Controls (Attachment 2) to permit treatment contractors and other personnel knowledgeable of basic frisking techniques, to frisk themselves out of the controlled areas. This modification eliminates the need to have the HP perform all frisks, but still ensures that we will maintain our basic commitments to control contamination.

Pursuant to your in-house radiological safety procedures, I believe this revision must be approved by you and by the Advanced Medical Systems, Inc. Radiation Safety Committee prior to implementation. If you or the Committee require additional changes, please let me know and I will forward additional revisions to you immediately thereafter. At your earliest convenience and periodically thereafter, you should "re-visit" the entire contents of the RWP to ensure its continued applicability. The USNRC is interpreting the contents of the RWP strictly. Therefore, it is imperative that it be kept up to date.

Sincerely,

Carol D. Berger

Carol D. Berger, C.H.P.

cc: D. Cesar
D. Miller
File 94009

RADIATION WORK PERMIT
ISP-3SB

ermit No: 95-10 3-24-95	Type: ☒ Job Specific ☐ Extended
xpiration Date: 6-15-95	

escription and Location of Work:	Water Treatment and Remediation of Lateral Sewer Connection. Work locations are (a) ISA and ISA Basement Water removal, (b) site where water processing equipment is staged, and (c) site of excavations on exterior south and southeast wall of the building. Work procedures described elsewhere (see RSO).

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minated by:	R Meredith 4-17-95

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In the event that outside medical attention is needed, the hospital designated by the AMS Radiation Safety Officer will be used. Arrangements will be made by the AMS Radiation Safety Officer prior to the start of remediation activities for this hospital to accept injured personnel. The AMS Radiation Safety Officer (or designee) will accompany injured persons to the hospital to perform contamination monitoring prior to treatment, and to assist in decontamination activities as directed by the physician. A list of emergency response telephone numbers will be compiled and distributed during tailgate safety training. Prior to the start of each day's work activities, the nearest AMS telephone will be identified for use during an emergency. The list of emergency phone numbers will be readily available on site, along with a plant map and directions to the nearest hospital.

Contamination Controls

To assure radioactive materials remain under the control of AMS, each worker involved in water treatment or sewer remediation operations will be frisked by the HP Technician prior to leaving the work area. Equipment and materials will be frisked and decontaminated, as necessary, by the HP Technician prior to exiting the work area. The release criteria for personnel and equipment are 1,000 dpm/100 cm^2 removable activity, and 5,000 dpm/100 cm^2 total (fixed plus removable) activity, with the maximum total (fixed plus removable) activity not to exceed 15,000 dpm/100 cm^2 over an area of not more than 100 cm^2. Records of these actions will be maintained on a "Radiological Survey Form" and a "Radiological Survey Map". Contamination control during sample collection shall include the following:

- Personnel will wear latex gloves to collect and handle samples.
- The sample port will be located in an area readily accessible to personnel.
- An impervious area under the sample port from which water can be readily absorbed with rags should a small spill or drop occur.

- The drawing of the sample itself will be controlled with a valve that is manually-operated by the individual taking the sample.

Protective Clothing

The initial level of protection for on-site operations in contaminated areas will be tyvek coveralls, booties, and gloves, and other items as shown on the Radiation Work Permit. Activities involving liquids, fines, or heavy equipment require the use of hard hats, safety glasses with side shields, and steel-toed safety shoes. Upgrading of the level of protection will be based on ambient conditions as work proceeds. The AMS Radiation Safety Officer will be notified if it is deemed necessary to upgrade to a higher level of protection.

External Exposure Monitoring

Personnel shall be assigned a film-based dosimeter for use throughout the on-site operations. Assignment, use, retrieval, and processing shall be coordinated by the AMS Radiation Safety Officer pursuant to AMS Standard Operating Procedures for Radiation Protection. The Radiation Safety Officer shall evaluate the need for enclosing the dosimeters in protective covers (plastic bags), and shall document the methodology for use in interpreting the results of dosimeter processing. In addition, personnel will wear self-reading pocket dosimeters (or an equivalent self-reading device), with usage and readings recorded on a "RWP Sign-in Sheet", ISP-38C. Chambers with residual readings of 50% full scale will be re-charged prior to issue.

Release of Treated Water

Processed water will be stored, initially, in above-ground storage tanks. Samples will be collected from the tanks by a pre-determined procedure (see RSO). Samples shall be collected in large (two liter) bottles and/or one liter Marinelli beakers. No preservatives shall be used. Sufficient sample will be collected to permit it to be "split" (in volume) with the USNRC. Two samples will be collected per tank. The water will be dipped from the tank through the open manway or taken from a sample port on the recirculation pump when the tank has been "turned over" a pre-determined number of times. Sample ports shall not have a dead-leg or static line leading to the valve, so flushing prior to filling the sample bottle is not necessary.

For process control purposes, samples will be analyzed in the AMS gamma spectrometry system, using NIST-traceable sources (water equivalent density) of ^{60}Co for system calibration. For confirmatory analysis, as necessary, the samples shall be sent for analysis to Quanterra, Inc., a commercial analytical laboratory in (St. Louis, Missouri. There the ^{60}Co concentration will be determined by the methodology of gamma spectroscopy. A minimum detection limit of 20 to 30 pCi per liter has been specified. The solubility of ^{60}Co in samples containing "detectable" activity, up to a maximum of 200 pCi per liter, will be demonstrated by the methodology of the American Public Health Association's Method 7110, "Gross Alpha and Gross Beta Radioactivity (Total, Suspended, and Dissolved)" from Standard Methods for the Examination of Water and Wastewater.

Once the analytical results have been received and validated, water in the storage tanks that meets the release criteria (e.g., consistent with Information Notice 94-07, "Solubility Criteria for Liquid

Effluent Release to Sanitary Sewerage Under the Revised 10 CFR Part 20") may be discharged or stored in collapsible storage containers. (Water held in the collapsible storage tanks may be evaporated at a nominal rate of 300-700 gallons per 24-hour day.) Water that does not meet the release criteria will be re-processed or evaporated.

Solid Waste Management

Soils excavated or removed during remediation activities that contain ^{60}Co in concentrations in excess of eight (8) pCi/gram will be disposed of by conventional means at the discretion of the contractor personnel. Soils that exceed eight (8) pCi of ^{60}Co per gram, along with any other solid waste (resins, spent filters) containing detectable ^{60}Co, will be stored in the basement of the AMS facility. Protective clothing and other compactable items worn in a contaminated area will be frisked to determine the level of removable and total contamination. Those that do not meet the release criteria of 1,000 dpm/100 cm^2 removable activity, and 5,000 dpm/100 cm^2 total (fixed plus removable) activity will be placed into drums and stored in the basement of the AMS facility.

Noise Monitoring and Abatement

The water treatment and excavation contractors shall provide noise monitoring during heavy equipment operations pursuant to their procedures and specifications. As necessary, noise abatement methods and/or hearing protection shall be provided by the contractors.

Control of Fugitive Dust

The excavation contractor shall ensure that dust is controlled through the use of water spray or containment, if necessary.

Forms

The following pages are copies of the forms that may be used in addition to those specified in the AMS ISP Manual. All completed health and safety forms will be maintained on site by the HP Technician until completion of the project. At that time, they will be relinquished to the AMS Radiation Safety Officer who will maintain them as AMS records.

Enclosure 4

Readings from Sodium Iodide Crystal Scintillation Detector

Calculate the screening criteria[1] for a rectangular volume of soil containing a uniform distribution of 8 pCi/g of Co-60, with the following assumptions:

Soil volume: $61\,cm \times 61\,cm \times 5\,cm$

Soil density: $1.65\,g/cm^3$

Detector height: $100\,cm$

Activity: $\left(\frac{8\,pCi}{g}\right)\left(\frac{1.65\,g}{cm^3}\right)(5cm)\,(61cm)^2 = 2.5 \times 10^5\,pCi$

Instrument efficiency: $0.1\,mR/hr = 117{,}000\,counts/min$ (provided by the instrument manufacturer)

Exposure rate over soil: $2.6 \times 10^{-4}\,mR/hr$ (calculated using the Microshield code, using the assumptions listed above)

Equivalent count rate:

$$\left(\frac{2.6 \times 10^{-4}\,mR}{hr}\right)\left(\frac{117{,}000\,counts}{min}\right)\left(\frac{1}{0.1\,mR/hr}\right) = 304\,counts/min$$

Therefore, the screening criteria is 300 counts per minute above background.

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[1] As explained in the inspection report, workers surveyed the excavated soil with a sodium iodide crystal scintillation detector. Generally, each survey took place after each scoop of soil was removed from the ground by the backhoe. These surveys were not used to precisely determine the Co-60 concentration of the soil; rather, they were used to quickly determine if the soil contained Co-60 in concentrations near or above the 8 pCi/g unrestricted area limit. The screening criteria is the radiation level, in units of counts per minute, as measured by the scintillation detector, which was used to make this determination. If the readings from the soil were near or greater than the screening criteria, then the soil was assumed to be contaminated, and it was subsequently placed in a posted restricted area in AMS' back parking lot. On the other hand, if the readings from the soil were well below the screening criteria, the dirt was assumed to be free of contamination, and it was later used as clean fill in the excavated trenches.

December 14, 1995

Northeast Ohio Regional Sewer District
ATTN: Mr. William B. Schatz
General Counsel
3826 Euclid Avenue
Cleveland, Ohio 44115-2504

Dear Mr. Schatz:

This refers to your letter of November 14, 1995, addressed to Mr. John Madera of my staff, regarding Advanced Medical Systems, Inc. I wish to clarify and respond to the following items from your letter.

A. *"According to Lawrence English of my staff, you were informed on Wednesday, November 8, 1995, that your licensee Advanced Medical Systems, Inc. ("AMS") intended to discharge 3,000 gallons of water potentially contaminated with Cobalt-60."*

On November 8, 1995, we were informed by Mr. English that AMS intended to discharge 3,000 gallons of water from an outside storage tank which had been analyzed by AMS' contract laboratory and which showed no detectable cobalt-60 (Co-60).[4]

AMS' contract laboratory employs equipment with count times to achieve a Minimal Detectable Activity (MDA) of at least 20 picocuries per liter[5] (pCi/l) when analyzing water samples from AMS. Since the analysis of the water sample showed no detectable Co-60, the concentration of Co-60 in the water is less than 20 pCi/l. This is more than a factor of ten less than the U. S. Environmental Protection Agency (EPA) drinking water standard of 218 pCi/l for Co-60.[6] NRC does not consider this water to be contaminated with Co-60.

B. *"You were informed that such a discharge was contrary to standing prohibitions of the Northeast Ohio Regional Sewer District ("District"), and that such discharge had the potential to create an interference with the operations of the District. You chose to do nothing, stating that unless the discharge creates a health and safety violation, the Nuclear Regulatory Commission ("NRC") can do nothing."*

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[4] We note that on December 5, 1995, this water was discharged, after a temporary restraining order which was issued on November 13, 1995, barring AMS from discharging the water, was lifted.

[5] The actual MDA for this water sample, as listed in the fax AMS sent to NEORSD on 11/8/95, and to NRC on 11/17/95, is 6 pCi/l.

[6] Federal Register, Vol. 56, No. 138, July 18, 1991, page 33120, Appendix B - Beta Particle and Photon Emitters.

The NRC operates under Federal law. As we explained to Mr. English on November 8, 1995, NRC regulations do not prohibit AMS from discharging this water. NRC does not consider the discharge of 3,000 gallons of water with no detectable Co-60 to be an immediate threat to public health and safety, common defense and security, or the environment; therefore, no NRC action was warranted.

In addition, as explained to you in a letter dated June 16, 1994, "The Commission has expressed its view that the Atomic Energy Act of 1954 does not prohibit actions by state or local authority on bases other than protection of public health and safety from radiological hazards." In other words, NRC regulations that allow users of regulated materials to discharge to sanitary sewers do not compel a waste water treatment operator to accept those discharges. However, NRC does not have the legal authority to enforce the rules of waste water treatment operators.

C. *"The purpose of this letter is twofold. First, it is to expressly inform you that all discharges from this facility are indeed prohibited. We understand that AMS has represented to you that they will not undertake evaporation of the wastewater they have collected until it appears that no alternative course is available. As other disposal means are now prohibited, you should take those measures to ensure that evaporation is commenced."*

We understand that discharges from AMS to the NEORSD system are prohibited by NEORSD; however, as noted above, NRC does not have the legal authority to enforce that prohibition. Moreover, other disposal means are not prohibited, and there is no radiological health and safety basis to require that evaporation be commenced at this time.

D. *"Secondly, the purpose of this letter is to urge you to take those measures necessary to compel AMS to begin evaporation as soon as possible. At the TRO hearing, Dwight Miller, one of the attorneys for AMS, stated that if AMS did not get rid of the water it had accumulated, pressure on the facility will build up. This concerns us greatly, insofar as representatives of AMS have indicated repeatedly that should pressure build up on the facility, the facility is put in danger of imminent collapse."*

It is important to distinguish between the water stored outside the facility from the new underdrain system and manhole (rainwater and groundwater) and the water stored inside the facility (100,000 gallons of processed water from the basement and the old underdrain system and manhole). AMS has not indicated to NRC that it would evaporate the water from the new underdrain system and manhole. However, AMS has received permission from NRC to evaporate the processed water.

Regarding the pressure on the facility caused by rainwater and groundwater, NRC inspectors have confirmed that AMS has a system of pipes, pumps, and outdoor storage tanks in place which adequately removes groundwater so that the hydrostatic pressure on the facility is minimized. Thus, NRC does not believe that there is a risk of imminent collapse of the building.

E. *"Since there is existing NRC approval for AMS to evaporate the water accumulated at the facility, and other means of disposal are prohibited, the NRC should take those steps necessary to properly protect the neighborhood and environment around your licensee's facility by evaporating the collected wastewater."*

If "the collected wastewater" refers to the 3000 gallons of water AMS proposed to discharge, NRC does not consider this water to be contaminated with Co-60; thus NRC believes that the storage of this water does not present a radiological hazard.

If "the collected wastewater" refers to the 100,000 gallons of processed water stored inside the facility, the NRC technical staff has carefully evaluated the radiological characteristics of this water and has concluded that the storage of this water does not present a radiological hazard to the neighborhood around the AMS facility. The water contains approximately 40 microcuries (μCi) of Co-60, thus the average Co-60 concentration is 106 pCi/l. By way of comparison, this concentration is less than half of the EPA drinking water standard of 218 pCi/l for Co-60.

Furthermore, making the extremely conservative (and highly improbable) assumption that the 40 μCi of Co-60 could be concentrated into a point source, the exposure rate at one meter, ignoring any shielding, would be 0.05 millirem per hour (mrem/hr). At a distance of 100 meters from the source (the approximate distance from AMS to the nearest residence), the exposure rate, again ignoring any shielding, would be 0.000005 mrem/hr. These exposure rates may be compared with: (1) the average background exposure rate in Cleveland of approximately 0.005-0.01 mrem/hr, and (2) the limits in 10 CFR 20.1301, which limit the total effective dose equivalent to members of the public to 100 mrem in a year, and 2 mrem in any one hour. Thus, NRC believes that the storage of this processed water at AMS does not present a radiological hazard.

Should you have any further questions regarding AMS, please do not hesitate to contact me.

Sincerely,

Original signed by

Cynthia D. Pederson for
James L. Caldwell, Deputy Director
Division of Nuclear Materials Safety

See Attached Distribution

RIII Strategy
8/29/96

1) Monitor Building Recovery Project - **ongoing**

2) Monitor status of items discussed in DFI - **ongoing**

3) Complete technical review of renewal - **deficiency letter out by 9/30/96**

4) Continue routine inspections (last - 4/96) - **ongoing**

5) Continue to coordinate activities w/ NMSS & OGC - **ongoing**