ONSITE RADIOLOGICAL CONTINGENCY PLAN

FOR THE

CLEVELAND, OHIO FACILITY

USNRC LICENSE NO. 34-19089-01

ADVANCED MEDICAL SYSTEMS, INC.

October 25, 1991

Revised May 27, 1992

Revised January, 1995

Approved: Robert Meschter

ROBERT MESCHTER
Radiation Safety Officer
Advanced Medical Systems, Inc.
121 North Eagle Street
Geneva, Ohio 44041

TABLE OF CONTENTS

TABLE OF CONTENTS (Continued)

REVISION SHEET

Effective Date	Revision Letter	Pages Affected	Description of Change
10/18/91	Initial Release	All	Revised and Reformatted per Reg. Guide DG-3005
01/31/92	Revision "A"	1-7 1-8 2-7 2-8 2-9 3-1 3-2 3-3 4-2 4-3 5-1 5-2 5-5 5-6 6-1 7-1 8-1 8-2 9-1 9-2	Revised to Include Comments of Ohio Emergency Management Agency
05/27/92	Revision "B"	3-1 3-2 5-5 5-6 7-1 7-2	Revised and Reformatted per Reg. Guide DG-3005
		Appendix A: Emergency Contact Personnel Telephone List	Revised to Reflect Current Personnel
		2 3 5 7 9 12 13	Revised and Reformatted per Reg. Guide DG-3005

REVISION SHEET

Effective Date	Revision Letter	Pages Affected	Description of Change
01/95	C	IV	Add-Authority to Marshall the Resources to Control the Emergency
		All	Changed to Reflect Current Operations
		3-3	Add-Consultant's Hazard Analysis

STATEMENT OF POLICY

Authority and responsibility for the direction and control of emergency situations is hereby vested in the Radiation Safety Officer (RSO) of Advanced Medical Systems, Inc., London Road facility. The RSO's duties will include, but not be limited to, the following:

. . .Direct control of the situation, including termination of the emergency alarm condition;

. . .Management and coordination of the emergency response staff;

. . .Authority to obtain all information concerning the event;

. . .Authority to marshall the resources to control the emergency.

Approval: [signature]

Advanced Medical Systems, Inc.
121 North Eagle Street
Geneva, Ohio 44041

INTRODUCTION

The London Road facility of Advanced Medical Systems, Inc., utilizes radioactive material for the resale and transfer to third parties of encapsulated $Cobalt^{60}$ sources used in both teletherapy and radiography units. The material is used in accordance with U. S. Nuclear Regulatory Commission (USNRC) by-product license No. 34-19089-01. This license authorizes possession of up to 78K ci of $Cobalt^{60}$ for resale and transfer of encapsulated sources. AMS's license also permits possession of up to 665 curies of Cesium-137 sealed sources and up to 4,040 Kg of depleted uranium (nickel plated) which is used as shielding material. There is an additional 15 curies of radwaste stored in certain restricted areas of the facility.

This plan has been prepared in accordance with Regulatory Guide 3.67 (Task DG-3005).

1.0 General Description of the Plant/Licensed Activity

This chapter provides an overview of the Advanced Medical Systems, Inc., London Road facility.

Section 1.1 is a description of the types of radioactivity handled
Section 1.2 is a description of the site and facility
Section 1.3 is a description of the processes used at the facility for handling radioactive materials.

1.1 Licensed Activity Description

The London Road facility of Advanced Medical Systems, Inc., posseses sealed and encapsulated sources of $Cobalt^{60}$ for use in teletherapy and radiography machines manufactured by the Geneva, Ohio, facility. Sales are to USNRC licensed recipients or exported to other countries. The material is used under the supervision of the Radiation Safety Officer.

The types and quantities of licensed materials used or possessed by AMS are summarized below:

By-Product, Source or Special Nuclear Material	Form	Maximum Amount Allowed
$Cobalt^{60}$	Solid Metal (Bulk)	23,000 curies
$Cobalt^{60}$	Sealed Sources	75,000 curies
Cesium-137	Sealed Source	665 curies
Depleted Uranium	Nickel Plated	4,040 Kilograms
$Cobalt^{60}$	Sealed Calibration Sources	15 Millicuries

However, only approximately 29 curies of radioactive material are in a location and form that would allow the material to be dispersed in an emergency that would breach the facility. The majority of this dispersable radioactive material is stored in sealed 55-gallon drums or B-25 (steel) boxes.

1.2 Area and Facility Description

The London Road facility of Advanced Medical Systems, Inc., is a two-story controlled access building located at 1020 London Road on the east side of Cleveland, Ohio.

Figure 1-11 shows the region within approximately one (1) mile of the facility and identifies its relative proximity to near-site structures. Locations of schools, hospitals and fire stations are also shown on Figure 1-11.

The facility is located in a manufacturing and residential area. The areas to the west, south and east are mainly industrial facilities. The area to the north of the plant is a mix of small businesses and residential units.

The facility is approximately 80,000 square feet. Access to the property is from London Road which is located on the eastern edge of the property. In addition to a perimeter fence, site security is maintained by A.D.T. using remote security links.

Initial fire and emergency response is provided by the Cleveland City Fire Department. The Cleveland Fire Department HAZ-MAT team will respond to a radiation release at Advanced Medical Systems. Fire response is estimated to be within five (5) minutes.

Figure 1-8, First Floor, 1-9, Second Floor, and 1-10, Basement, are general building layouts of Advanced Medical Systems. Restricted areas are shaded. The entire basement is restricted.

Transient population within one (1) mile radius of the facility is primarily a function of employment associated with the surrounding factories/businesses.

1.2.1 Description of the Isotope Facility

The facility was specifically built as an Isotope facility for the manufacture of sealed sources. Rooms and restricted areas were designed to contain and confine emergency situations. **As AMS no longer manufactures sealed sources, the facility safeguards afford additional protection given current operations.**

The design of the facilities follows the philosophy of containment of activity within small working areas. Health and safety considerations have been based on minimum hazard in restricted areas and zero hazard in controlled areas. The Company actively strives to minimize restricted areas of the facility to confine emergency situations to the Isotope Shop Area.

The Isotope Facility is situated on 6.3 acres of land which lies on the boundary between industrial and residential areas. Because of proximity to these areas, special care has been exercised in planning the safety program. The Isotope Shop Area is located in the south end of the building on the first floor. There are no windows in the Isotope Shop Area because windows were felt to be of questionable value for a number of reasons. Safety considerations and protection against unauthorized entry into the Isotope Shop Area are simplified when there are no windows. The maintenance of proper air flow balance and of uniform lighting is also simplified. Other considerations were the noise transmission of windows from the adjacent railroad tracks and the special procedures required for cleaning windows inside controlled areas and the possible radiation hazards of cleaning windows on the outside.

The one-story projection of the southwest corner of the building contains the stairwell to the basement and the source storage garden. The door located in this stairwell is for emergency exit use only.

The enclosed layouts of the floor plans show the first floor of the facility which contains the isotope and shielded work areas. The controlled access areas are enclosed by the heavy dashed line. The location of the heavy shielding for the shielded work room, the cell provides an unbroken radiation barrier between the isotope areas and the high occupancy areas of the rest of the building.

The restricted activity centers of the facility are the high level hot cell, the shielded waste storage room and the isotope shop area and an isotope storage and irradiation facility (garden).

The areas in which radioisotopes are handled are reached through a changing area located in the southeast corner of the building.

1.2.2 The Shielded Waste Storage Room

The Shielded Waste Storage Room has minimum three (3) feet thick walls for concrete shielding and a labyrinth entrance. The broad corridor through the labyrinth entrance permits large objects to be moved into the room. The floor and ceiling are also concrete.

The room is used for storage of depleted uranium and RAD waste. Rad waste is packaged in 55-gallon drums. Used HEPA filters are also located in this closed room.

1.2.3 Hot Cell

The hot cell was designed and equipped to encapsulate the largest sources used for medical therapy and industrial radiography. AMS ceased source manufacturing in 1990.

The hot cell is six feet square inside, and has 5-1/2 foot concrete walls and 4 foot floor and ceiling. The floor pan is stainless steel and the inside walls are 1/4 inch steel plate to a height of 11 feet. The cell is closed at the rear by a 40-ton hinged door which provides a full 6-foot wide entrance to the cell when open. Numerous small access ports are located on the front and side faces of the cell, and a 20-inch square port opens from each side. Observation of cell operations is possible through a 60 inch glass and zinc bromide window. Remote handling is accomplished with a pair of Model 8 Manipulators and a 2 ton overhead crane.

All cell operating controls are located on the cell face, so that normal operation does not require entry into the contaminated isotope areas. The isotope areas may be observed from the cell control area by a window through the southeast corner of the cell in line with mirrors placed against the south wall. The isotope areas are connected to the control area by an intercom system.

The viewing window for the cell is removable from the outside of the cell. The viewing components consist of an 8 inch inside coverplate of non-browning glass, a 2-inch plate glass, 48 inches of zinc bromide solution and a 2-inch outside coverplate of safety glass. This construction provides shielding equivalent to 66 inches of 150 lb/ft^3 concrete with only two glass/zinc bromide interfaces. The entire metal structure in contact with the zinc bromide solution is coated to prevent introduction of impurities which might cloud the zinc bromide solution. The window was designed and constructed in 1984 by Hot Cell Services Corporation, Kent, Washington.

The Model 8 Master Slave Manipulators are mounted above the window using the roller-tube mounts. The roller tubes are positioned on 28-inch centers in concrete within a 24 by 58-inch steel-lined opening in the cell wall. This method of mounting in an oversized opening will permit installation of new types of manipulators as they become available, or relocation of the present manipulators to a different centerline if required by future operating conditions.

The cell door is located at the rear of the hot cell and opens into the decontamination room. The door is an internally braced steel tank filled with concrete. The upper and lower stub shafts of the door are mounted on bearings which permit the door to rotate about a vertical line through on end without touching the floor or ceiling at any point. This construction permits a smooth unbroken level floor into the cell over which heavy shipping containers can be easily moved. The 40-ton door is removable in case of bearing failure, but due to the low rotational speed and infrequent operation of the door, a long service life is anticipated. The turntable upon which the door rides contains a heavy-duty bearing mounted on a hemispherical ball-joint to permit alignment of the lower bearing with the upper

bearing. The upper hinge has the bearing mounted in a block which can be moved by means of wedges and power screws to obtain the necessary alignment for a true axis of rotation. The stub shaft connecting the upper hinge to the door is removable through a 9-foot vertical tube to the second floor level. The upper bearing is a sealed unit and should require no lubrication. The lower bearing, at floor level, may become dirty even though a neoprene wiper rides the edge of the turntable. The lower bearing may be lubricated, or flushed and lubricated if dirty, by means of a tube which runs beneath the floor level to the service trench on the south side of the cell. The door is opened and closed electrically by means of a motor mechanism mounted on the outside of the door. An electrical interlock prevents the electrical door drive from being actuated until the switch at the cell face and the drive motor switch are simultaneously operated. Release of either button stops the door opening. This safety feature makes it impossible for the cell door to be opened without the knowledge and consent of the cell operator, or for the cell to be opened by a person working alone. The two-ton overhead crane inside the hot cell is electrically powered and controlled. In order to cover the six-foot square floor area of the cell with a minimum of travel, an electrically powered trolley was mounted on an I-beam rail which can be rotated 180°. The crane assembly is mounted in a removable plug in the cell ceiling.

Storage facilities for isotopes within the cell are provided by two containers inserted in steel sleeves in the floor.

As mentioned previously, the hot cell is shielded by 5-1/2 feet of concrete, with 1/4-inch steel plate on the inside faces. The shielding thickness was chosen as sufficient to handle the largest sources currently available with complete safety, and to provide adequate shielding for the larger sources the future may require.

As the hot cell does not contain any flammable material, there is virtually no possibility of fire or explosion within the cell.

1.2.4 Hot Cell Supporting Facilities

The facilities supporting the operation of the hot cell are primarily concerned with the safety considerations necessary when this type of facility is located in a populated area.

Every effort is made to eliminate possible exposure to the public.

The air handling system has received special attention due to the location of a residential area within a block of the facility. The facility has separate systems for the isotope areas, first floor office control area, second floor office area and the lobby and reception area. The isotope shop area and hot cell have a once-through airflow system with carefully balanced flow gradient to the hot cell as the low pressure point of the system. The supply air to the isotope areas is filtered through Aerosolve prefilters before entering the building. The heavy burden of

industrial air wastes from neighboring plants and the railroad tracks is therefore removed at the point where filter changing is accomplished with the least difficulty. The supply air is distributed to the isotope areas by ventilating ducts containing manually adjustable dampers. The airflow pattern is adjusted initially by balancing the supply and exhaust systems to obtain the desired flow pattern, and periodic checks of manometers are made to assure the desired pattern is maintained. The doors at either end of the change area are electrically interlocked to prevent simultaneous opening which might disturb the air flow pattern. The doors at either end of the air lock, which are used to move shipping containers in and out of the isotope areas, are similarly interlocked. The exhaust system has two centrifugal blowers which are located on the second floor directly above the hot cell. Both blowers exhaust through separate filters and a common high-velocity stack. The larger blower removes air from all isotope areas except the hot cell, and requires a 2 x 2 array of absolute filters. The exhaust fan for the hot cell is independently operated, and has a single absolute filter. The balanced air flow pattern is from the change areas through the Isotope Shop area to the decontamination room and finally to the hot cell. The hot cell exhaust fan is driven by a two-speed motor which is controlled by the position of the double doors connecting the decontamination room with the Isotope Shop area. With the doors closed, the fan operates at normal speed and the decontamination room receives its air supply through a duct at the south side of the doorway. When the door is opened, the supply air is diverted from inside to outside the decontamination room by means of a switch which also increases the hot cell exhaust fan capacity by about 50%. This prevents reverse flow of the potentially contaminated air of the decontamination room into the lower level Isotope Shop area.

The air handling system is under continuous control by a monitoring and safety system. The air sampling tube is mounted across a diameter of the air exhaust stack about eight feet above the roof level. An air monitor located in the hot cell control area draws a continuous sample of 5 cfm minimum for analysis. Any increase of activity above the present level immediately stops the exhaust fans and the supply fan. The control system also includes automatic shutdown of either exhaust fan if a sudden pressure drop occurs across its absolute filters, indicating rupture to the filter media.

The operation of the air handling equipment, the monitoring facilities and the liquid waste facilities is insured in the event of electrical power failure by a natural gas burning emergency generator with automatic rapid changeover. An emergency lighting system is also powered by this generator.

All safety and monitor devices are connected to an alarm panel in the control area. Separate lights for each controlled item are always lit on the panel so that faulty operation of the panel itself is indicated by no light. When a controlled item

malfunctions, the alarm light increases in intensity and flashes on and off until an acknowledgement button is depressed. An audible alarm also sounds on the first and second floors until acknowledged. This type of alarm will therefore indicate the difficulty even though it has corrected itself before the operator has checked the panel, and the alarm signal will be erased only when the acknowledgement button has been depressed.

Alarms for fan shutdown, excessive heat or cold are also transmitted to a local burglar alarm company so that malfunctions during non-working hours are reported to a responsible person or agency.

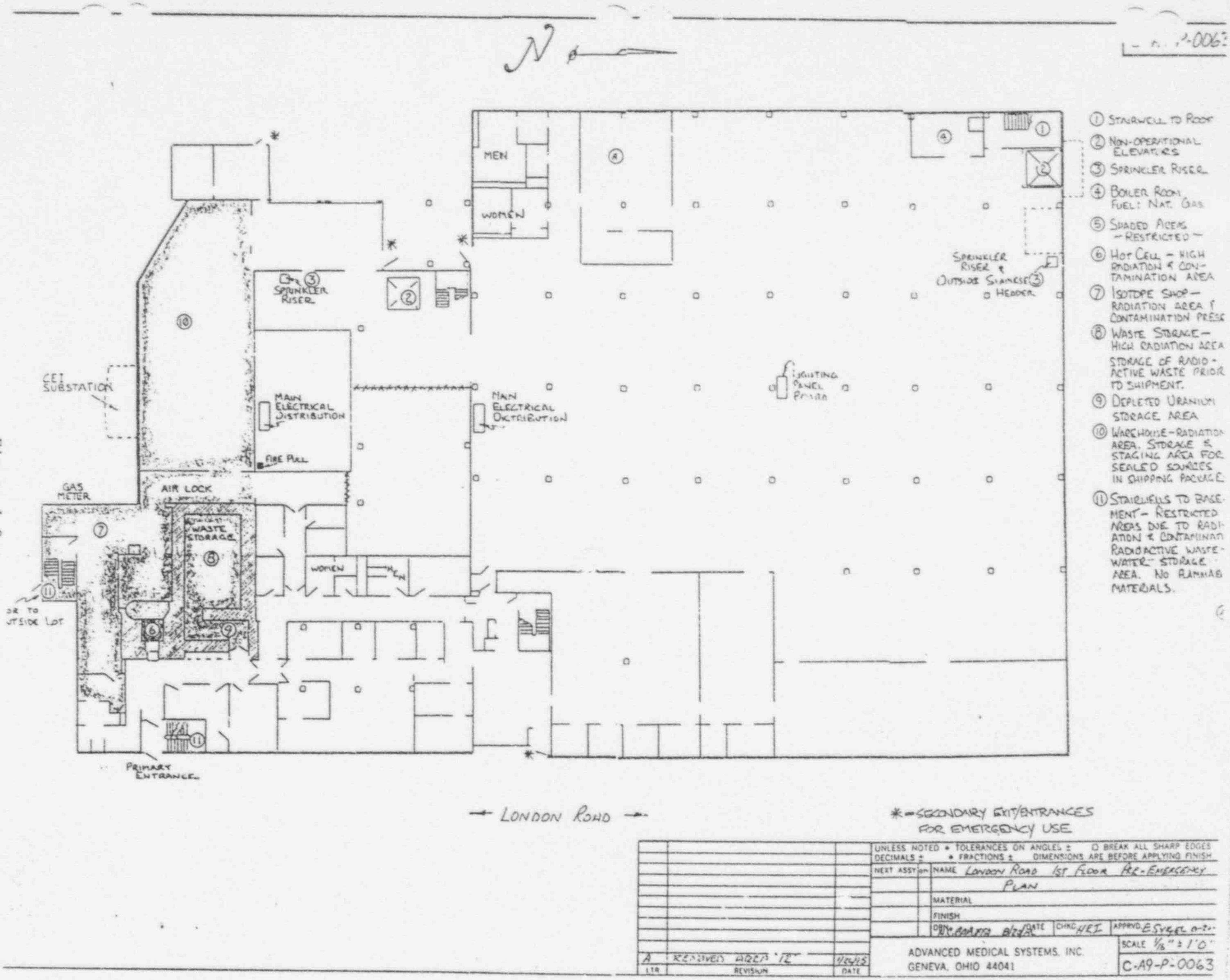
1.2.5 Storage Garden and Irradiation Facility

The facility is located in the southwest corner of the building and contains vertical storage tubes in a six foot square well extending from the first floor level to the basement floor level. An L-shaped shield around the well is provided by two sand filled shield rooms which are accessible through manholes in the first floor. Course concrete sand with a bulk density of 127 lb/ft^3 was used as the shielding material for a number of reasons. Immediate shielding requirements are easily handled by the use of sand, which can, of course, be replaced easily by a higher density material in the future, if desired. The rooms have been waterproofed and a well drilling point extends to the basement floor level beneath each manhole cover so that temporary additional shielding may be obtained by flooding the voids of the sand with water. Flooding increases the shield density by 7 lb/ft^3. If storage needs ever require it, the rooms can be emptied and filled with concrete, steel shot or other higher density material.

The storage "garden" is constructed with 54 vertical storage tubes in a rectangular array. The tubes are arranged in a 7 x 9 array with the center nine spaces left open. The center space is fitted with an irradiation plug which can be used to irradiate objects up to 8-1/2 inches square by 12 inches high. Each of the tubes marked "A" can also be used for irradiation by placing sources in the four tubes around each which have a common side. The two outer rows of seven tubes, marked by crosses, extend about two feet below the bottom of the tubes in the central 7 x 7 array. This permitted installation of an irradiation facility beneath the garden with two parallel rows of sources between which objects up to a 17 inch cube can be irradiated.

The source storage tubes terminate in a metal container through which cooling air is drawn from the room through the "garden" to the absolute filter exhaust system.

This area of the facility has an extremely low probability for an emergency situation.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① STAIRWELL TO ROOF
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③ SPRINKLER RISER
④ BOILER ROOM FUEL: NAT. GAS
⑤ SHADED AREAS - RESTRICTED -
⑥ HOT CELL - HIGH RADIATION & CONTAMINATION AREA
⑦ ISOTOPE SHOP - RADIATION AREA & CONTAMINATION PRESE
⑧ WASTE STORAGE - HIGH RADIATION AREA STORAGE OF RADIOACTIVE WASTE PRIOR TO SHIPMENT.
⑨ DEPLETED URANIUM STORAGE AREA
⑩ WAREHOUSE - RADIATION AREA. STORAGE & STAGING AREA FOR SEALED SOURCES IN SHIPPING PACKAGE.
⑪ STAIRWELLS TO BASEMENT - RESTRICTED AREAS DUE TO RADIATION & CONTAMINAT RADIOACTIVE WASTEWATER STORAGE AREA. NO FLAMMAB MATERIALS.
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MAIN ELECTRICAL DISTRIBUTION
LIGHTING PANEL
FIRE PULL
AIR LOCK
GAS METER
WASTE STORAGE
PRIMARY ENTRANCE
LONDON ROAD
* - SECONDARY EXIT/ENTRANCES FOR EMERGENCY USE
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SCALE 1/16" = 1'0"
A REVISED AREA "12"
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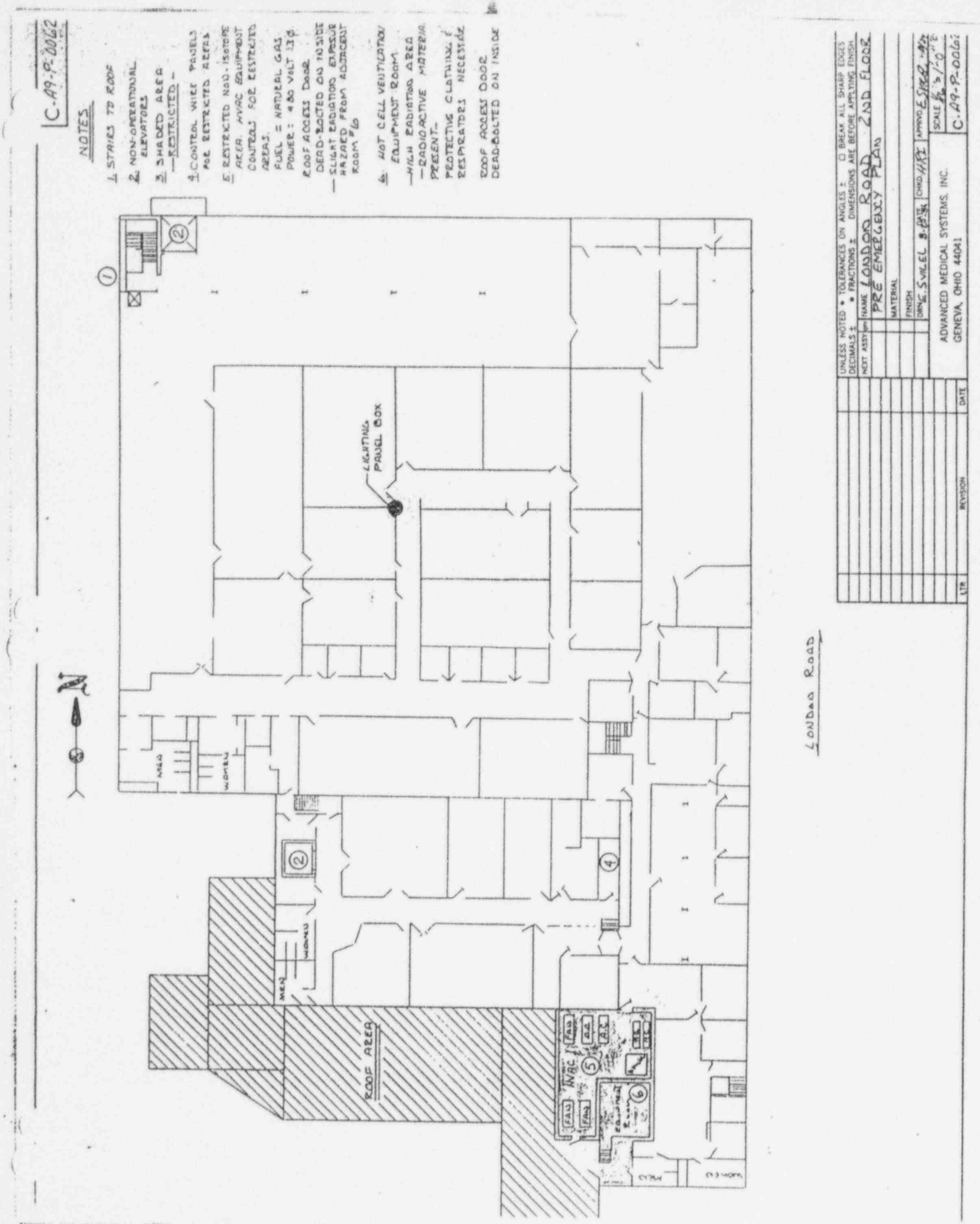
ADVANCED MEDICAL SYSTEMS, INC.
GENEVA, OHIO 44041
C-A9-P-0063

Figure 1-8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NOTES
1. STAIRS TO ROOF
2. NON-OPERATIONAL ELEVATORS
3. SHADED AREA —RESTRICTED—
4. CONTROL WIRE PANELS FOR RESTRICTED AREAS
5. RESTRICTED NON-ISOTOPE AREA. HVAC EQUIPMENT CONTROLS FOR RESTRICTED AREAS.
FUEL = NATURAL GAS
POWER: 480 VOLT 3Ø
ROOF ACCESS DOOR DEAD-BOLTED ON INSIDE
—SLIGHT RADIATION EXPOSURE HAZARD FROM ADJACENT ROOM #6
6. HOT CELL VENTILATION EQUIPMENT ROOM.
—HIGH RADIATION AREA
—RADIOACTIVE MATERIAL PRESENT—
PROTECTIVE CLOTHING & RESPIRATORS NECESSARY
ROOF ACCESS DOOR DEAD-BOLTED ON INSIDE
LIGHTING PANEL BOX
MEN
WOMEN
ROOF AREA
HVAC
LONDON ROAD
UNLESS NOTED • TOLERANCES ON ANGLES ± □ BREAK ALL SHARP EDGES
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NAME LONDON ROAD 2ND FLOOR PRE EMERGENCY PLAN
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ADVANCED MEDICAL SYSTEMS, INC.
GENEVA, OHIO 44041
C-A9-P-0062
REVISION
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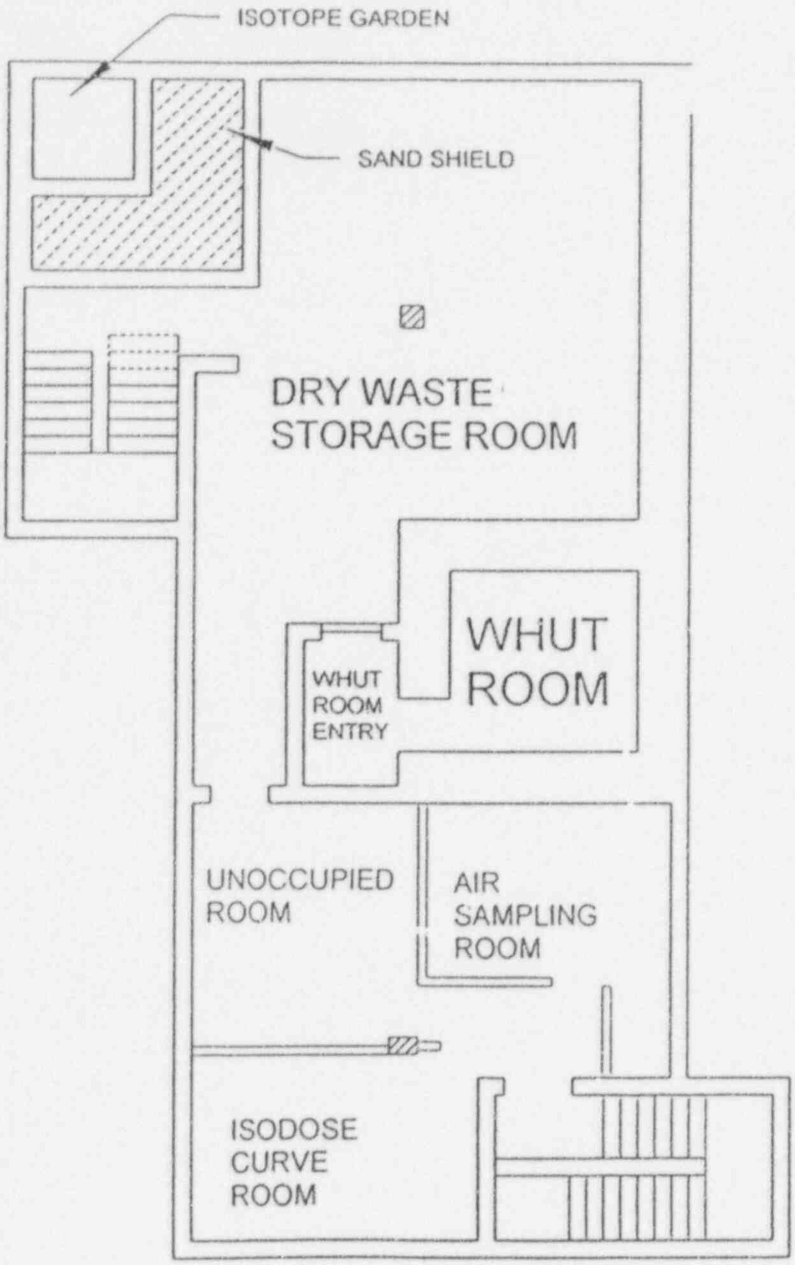
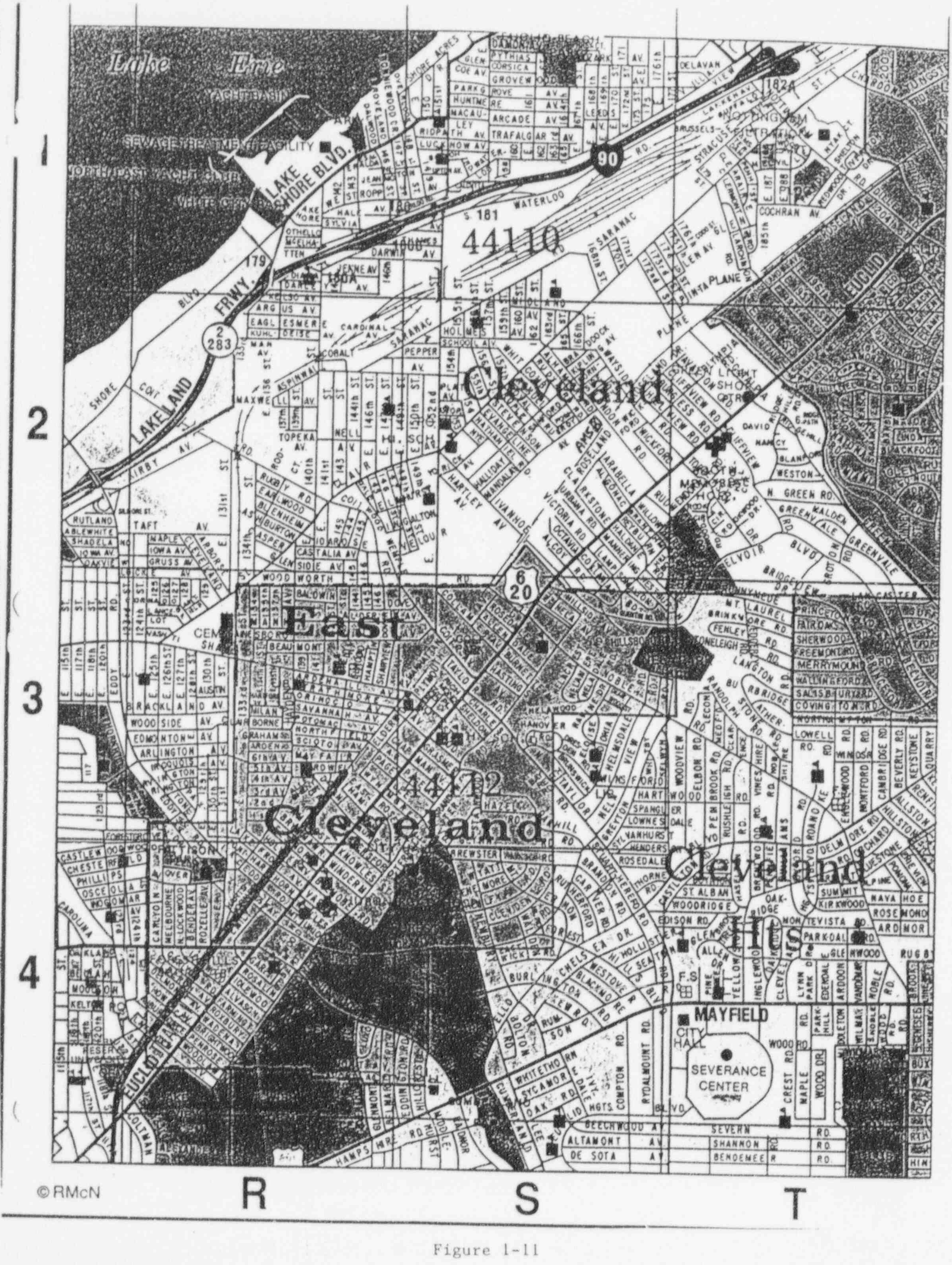
Figure 1-9



AMS Facility Basement

Figure 1-10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MAYFIELD
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Figure 1-11

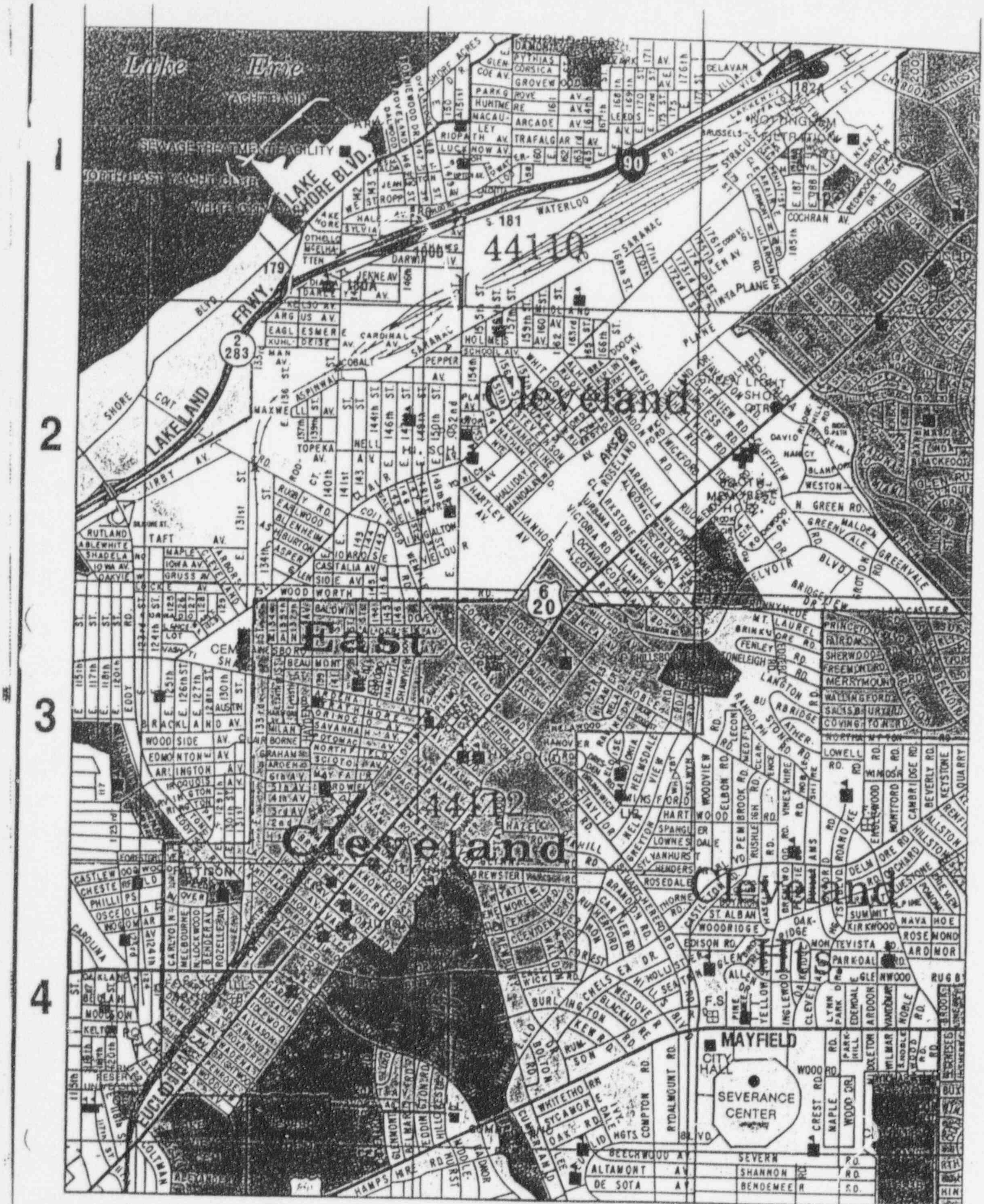

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Figure 1-11

RAND McNALLY

Cleveland & Vicinity

StreetFinder®

71	Interstate Highway
6	U.S. Highway
8	State Highway
80	Toll Road
	Controlled Access
	County Line
	Township Line
	City Limit Line
	School
	College
	Hospital
	Fire Station
	Post Office
	Shopping Center
	Point Of Interest
44111	Zip Code
237	Exit Number

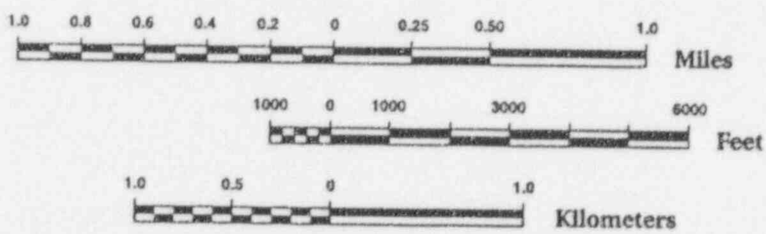

Figure 1-12

2.0 Engineered Provisions for Abnormal Conditions

This section describes facility process and central measures that are designed to detect accidental release, limit further releases and permit safe and prompt recovery actions.

2.1 Criteria for Accommodation of Abnormal Conditions

2.1.1 Operating Procedures

The company maintains Isotope Shop Procedures which discuss in detail the operating procedures for the facility. Facility personnel strictly follow the operating procedures (ISP's) and are well trained in these procedures, as well as overall plant safety. The operating procedures are designed to maintain conformance with accordance with certain operating federal regulations.

2.1.2 Alarm Systems and Release Prevention

The AMS London Road facility is equipped with a number of systems designed to prevent and detect releases of hazardous materials. These systems include ventilation, radioactive waste handling, fire alarms, personnel reporting, health physics procedures and stack monitors.

2.1.2.1 Master Alarm System

Six safety and monitor devices are connected to the Master Alarm Panel in the Cell Control area and to the Remote Alarm Panel in the Isotope Shop Area. The separate red lights for each controlled item are always dimly lit on the panel, so that faulty operation of the panel itself is indicated by no light. When a controlled item malfunctions, the alarm light is increased in intensity and flashes on and off. In addition, a loud buzzer sounds on and off in synchronism with the flashing lights. This will continue until the acknowledgement button is depressed, causing the buzzer to stop and the flashing light corresponding to the malfunctioning item to change to a steady bright red. The alarm can be erased only by correcting the difficulty after depressing the acknowledgement button. In addition, two other warning lights show on the Master Alarm Panel; one for the Equipment Room door and for the Cell Machinery Room door on the second floor, and one for the basement door in the Isotope Shop area. These will indicate steady bright red lights when the doors have been opened and indicate to the hot cell operator that personnel are in this area. Evaluation tests indicate that no unusual hazards exist in these areas under normal cell procedure, but the precautions should be taken nevertheless. On five of the six major systems, any alarm is transmitted to the local alarm monitoring company so that malfunctions during non-working hours are reported to a responsible person. The emergency generator will not trip the other five alarms if it restores power before the fans stop.

The following are six safety and monitoring systems and conditions which will cause an alarm:

A. Cell Exhaust Fan

1. Shut down from lack of power or switch turned off.

2. Sudden pressure drop across air filter indicating ruptured filter.

3. Improper pressure across filter indicating broken belts, fan inoperative or plugged filter.

4. Excessive radiation on the air monitor.

B. Isotope Shop Area Exhaust Fan

1. Shut down from lack of power or switch turned off.

2. Sudden pressure drop across air filters indicating ruptured filter.

3. Improper pressure across filter indicating broken belts, fan inoperative or plugged filters.

4. Excessive radiation on the air monitor.

C. Air Monitor

1. Excessive radiation on filter paper in air monitor or electronic malfunction of monitoring equipment.

D. Cell Temperature

1. Two thermostats, one located in Cell Control Area, and one located in Decontamination Room immediately behind the cell, are set to give an alarm signal for temperatures below 40^0 F. or above 85^0 F.

E. Supply Fan

1. A thermostat in the intake system after the heaters will give an alarm signal for temperatures below 50^0 F.

F. Emergency Generator

1. Signal given on power failure when generator starts.

Hot Cell Systems

A. Door Interlock: An electrical interlock secures the door in the closed position until two switches, one on the outside of the door and one on the cell face in the Cell Control Area, are depressed simultaneously. This safety feature makes it impossible for the cell door to be opened without the knowledge and consent of the cell operator, or for the door to be opened by a person working alone.

B. Cell Probe: A high energy probe, Victoreen Model 550 Series (or equivalent), is used within the cell to locate loose $Cobalt^{60}$ pellets and other high radiation levels. It is connected to Victoreen Model 510 Ratemeter (or equivalent) located on the cell face in the Cell Control Area. The Ratemeter is autoranging up to 2000 R/min.

C. Gamma Alarm: A Technical Operations Gamma Alarm Model 492C (or equivalent) is mounted opposite the cell face in the Cell Control Area. Since it is connected to a loud buzzer, it gives both an audible and a visible alarm (flashing red light) continuously when radiation levels are in excess of the preset level of approximately 2 mR/hr. The Gamma alarm features fail-safe circuitry to provide a signal at all times. Failure of any element either turns on the red lamp or turns off the green (safe) lamp, signaling improper operation.

Decontamination Room

A. The hot cell exhaust fan is driven by a two-speed motor which is controlled by the position of the double doors connecting the Decontamination Room with the Isotope Shop area. With the doors closed, the fan operates at normal speed which is indicated by a yellow light on the locked switch control at the cell face. With the doors opened, the fan speed is increased for about 50% greater capacity. This prevents reverse flow of potentially contaminated air of the Decontamination Room into the Isotope Shop area. High speed mode is indicated by a red light on the locked switch control at the cell face.

Isotope Shop Area

A. Gamma Alarm: A Technical Operations Gamma Alarm, Model 492D (or equivalent) is mounted on the west wall between the storage garden and the decontamination room adjacent to the source transfer operation. This will give a visible flashing red light when radiation exceeds the preset level of 5 mR/hr.

B. Basement Door: When the basement door is opened, a steady red light turns on above the door. Also, a steady red light shows on the Master Alarm Panel.

C. Air Locks:

1. The doors at either end of the change area are electrically interlocked to prevent simultaneous opening which might disturb the air flow pattern. The entrance to the change area from the cell control area is an air lock by itself. The first door is interlocked with the door on the opposite side of the change area leading into the Isotope Shop area.

2. The air lock on the west side of the Isotope Shop area has three (3) electrically interlocked doors. One set of doors leads to the Isotope Shop area, one set leads to the warehouse and the last set, on the north side of the air lock, leads to the unrestricted area. When the Isotope Shop area doors are open, the other two doors cannot be opened. When one of the other two doors is open, the Isotope Shop area doors cannot be opened.

Equipment Room

A. This room is directly above the shielded work room. This room contains the heating and intake air fan as well as the air conditioners. The floor is shielded with two (2) feet of concrete. A Technical Operations Gamma Alarm, Model 492B (or equivalent) set at approximately 2 mR/hr. is mounted in the center of the room. It remotely indicates a signal above the entrance to the room. No one is permitted to enter this room without permission of the Radiation Safety Officer or Supervisor. Also, PERSONNEL ARE NOT PERMITTED IN THIS ROOM WHEN THERE IS NO SIGNAL GREEN LIGHT OR WHEN THERE IS A RED LIGHT. In addition, when the door is opened, a steady red light shows on the Master Alarm Panel.

Shielded Work Room

A. Gamma Alarm: A Technical Operations Gamma Alarm, Model 492C (or equivalent) set at approximately 5 mR/hr. is mounted at the end of the maze in the room. A remote indication over the entrance shows red when the radiation level is in excess of 5 mR/hr. and white when the radiation level is below the preset level.

Doors

A. Only authorized personnel have keys to any isotope area. Doors to restricted areas are kept locked at all times. This includes the following:

1. Air lock from cell control area to change area.

2. Doors from the shop area to the air lock.

3. Doors from the warehouse to the above air lock.

4. Doors from the air lock to Isotope Shop area.

5. Doors from the warehouse to the shop area on the northeast side of warehouse.

6. Equipment room on second floor.

7. Cell Machinery Room on second floor.

8. Room adjacent to Cell Machinery Room.

9. Basement door opening to clean side of basement.

10. In addition to above, the perimeter of the entire facility is tied in with a local alarm monitoring company (ADT).

2.1.2.2 Ventilation System

The facility has a HEPA ventilation system. All air from potentially contaminated areas within the building is exhausted through this HEPA filter system. The hot cell ventilation system is redundant. If one system fails, the air flow from the hot cell is diverted through the Isotope Shop filter system. The filter banks, located in the cell equipment room have appropriate filters in series. All systems discharge through a common stack penetrating the roof. The HEPA system is connected to various monitoring devices for both local and remote alarms. The ventilation system is connected to the emergency generator which will allow the system to function in case of a power failure.

As a result of these air exhaust systems, all radiation process areas are under negative pressure. The hot cell is also at a greater negative pressure with respect to the other process/work areas. The pressure differential between the inlet and outlet end of the exhaust filters is continuously monitored. A portable HEPA system is available for special isolated area use.

2.1.2.3 Radioactive Waste Handling

Solid radioactive waste is collected and placed in a designated container. The waste is surveyed, drummed and stored in restricted locations. Access to these areas is controlled. The packaging and shipment of radioactive wastes are controlled by procedures ISP-25 and ISP-26.

2.1.2.4 Fire Systems

The facility is equipped with a fire alarm system and is an integral part of the fire protection system. The fire alarms are activated by either alarm sensors, pull boxes or when the sprinkler system is activated. The alarm system is connected to a commercial alarm company that notifies off-site fire organizations. In the event of a fire, personnel follow established routes of evacuation from the effected areas.

2.1.2.5 Personnel Reporting

The processing and handling of radioactive material requires the presence of personnel. These individuals are an essential part of the accident alarm system, since the person associated with an abnormal event knows immediately when such a situation has occurred. Following an incident, the individual would immediately report the incident to his/her supervisor.

2.1.2.6 Health Physics Procedures

Personnel check radiation levels throughout the facility in three ways: with wipe tests, air sampling and survey meters. The periodic checks of radiation levels in areas in which radioactivity is handled, alert the RSO and personnel to potential problems. In addition to these area surveys, meters for monitoring area and personnel contamination are located in the work areas. These meters are always on, and, therefore, constantly monitor radiation levels in those areas.

2.1.2.7 Stack Monitor

The exhaust stack is equipped with a stack monitor and chart recorder. The stack monitor is also connected to the ADT alarm panel. A sufficient increase in activity above the preset level immediately stops the exhaust and supply fans. The activation point is set such that if averaged over one year, the air concentrations would be less than the applicable maximum permissible concentrations in air from Appendix B 10CFR Part 20.

2.1.3 Support System

This section describes various support systems, including facility structures, confinement barriers, fire suppression and shielding.

2.1.3.1 Structural Performance

The facility was designed and built to conform with standard building codes and permit requirements of Cuyahoga County. In addition, the hot cell is constructed of concrete and steel walls six-foot thick and a zinc bromide viewing window.

2.1.3.2 Confinement Barriers and System

Confinement barriers in use at the London Road facility include the hot cell, ventilation system, shipping containers/casks and radioactive waste storage systems. The primary confinement for the radioactive material is the container that holds it.

Radioactive sources are moved using lead shielded transfer containers. The Isotope Shop area is under a negative pressure with respect to its surroundings. The ventilation systems that keep these areas under negative pressure are equipped with HEPA filters that confine radioactive material.

Solid radioactive waste is collected, surveyed and packaged and stored in a limited-access area prior to disposal.

Radioactive material is also confined by the source capsule in which it is contained. The shipping and packaging in which the final product is placed, provides further confinement of the radioactive material. All packages conform to USNRC or DOT regulations.

2.1.3.3 Access and Egress of Operational Personnel and Emergency Response Team

During minor incidents, no evacuation will be required and response team access will be through normal access routes. The RSO's staff is responsible for normal facility monitoring and are quite familiar with these routes.

2.1.3.4 Fire and Explosion Resistance and Suppression

The facility is constructed of concrete and steel and is therefore fire resistant. There is only a remote probability of a facility breach is a restricted area from fire. All areas, except the hot cell, isotope shop and cell equipment room, are equipped with a sprinkler system. In addition, a detection system has been installed in all areas including the cell equipment room. The system detects a sudden rate of temperature rise or smoke and electronically signals the security company. They in turn report the incident to the local fire department. Pressurized fire extinguishers for various class fires are located throughout the facility. The small amount of highly combustible material within the facility are stored in fire and explosion proof cabinets.

2.1.3.5 Shielding

The hot cell is built of concrete and steel. The walls are 5-1/2 feet of concrete with a 1/4-inch steel plate on the inside faces. The cell is 6' x 6' x 11' high. It has a 4' floor and 4' ceiling. The cell is closed by a 402-ton hinged door that provides a 6' entrance into the cell when opened. The hot cell will provide adequate shielding for the amount of radioactive material that the facility is licensed to possess.

2.1.4 Central Operations

To ensure the proper functioning of systems throughout the facility, AMS routinely checks and documents the performance of these systems. These systems include the ventilation systems, air sampling system and security system.

The alarm monitoring company performs monthly checks of the alarm system.

2.2 Demonstration of Engineered Provisions for Abnormal Conditions

This section addresses the anticipated performance, under abnormal conditions, of the systems described in Section 2.1.

2.2.1 Process Systems

As described in Section 2.1.1, operational personnel are the key aspect of control. Since all operating personnel are well trained, these personnel are expected to perform as trained under normal and abnormal conditions.

2.2.2 Alarm Systems and Release Prevention

All of the systems presented in Section 2.1, ventilation, fire and evacuation alarms, personnel reporting, health physics procedures and stack monitor, are expected to perform, except under the most severe conditions. Under most conditions, the ventilation systems would confine radioactivity by keeping areas under negative pressure and by removing radioactivity from effluent air with filters. **Failure of the ventilation system will not result in radioactive release due to the damper system.** Under the most severe conditions, the ventilation system cannot be expected to confine radioactivity.

The fire and area alarms are functional at all times since they are regularly checked and receive power from emergency systems.

Staff personnel are present at all times during which radioactivity is handled, and would generally give the first notification that an abnormal or emergency situation had occurred. During an abnormal situation, personnel would conduct radiation level surveys, according to emergency procedures.

The stack monitor is expected to be operational in all but the most severe conditions. The system receives back-up power from the emergency generator.

2.2.3 Support Systems

Because the facility building was designed and constructed with shielding for radioactive material and conforms to standard building codes, it is expected to maintain its structural integrity under all but the most severe natural phenomena. The same is true of the confinement, shielding and barrier systems in use throughout the facility. The ventilation systems should also be operational under all conditions except those resulting from extremely severe natural phenomena.

2.2.4 Control Operations

Because the systems designed to prevent the release of radioactivity are routinely checked to ensure their integrity, these systems should be fully operational under abnormal conditions. The safety assurance program that ensures that systems designed to prevent the release of radioactivity meet their performance goals are listed in 2.1.4

3.0 Classes of Radiological Contingencies

3.1 Classification System

The classification system for radiological contingencies is that recommended by the USNRC in their standard format document for radiological contingency plans. Minor changes have been made so that the classification scheme reflects facility-specific conditions.

Section 3.3 of this plan relates the classification scheme to potential accidents within the AMS London Road facility.

3.2 Classification

3.2.1 Class I - Alert

Class Description	OffSite License Action
Events are in process or have occurred which involve an actual or potential minor degradation of the level of safety of the plant. Any releases are expected to be limited to a small fraction of those permitted by 10CFR Part 20.	1. Notify Ohio Emergency Management Agency, Columbus, Ohio, providing information contained in OEMA Radiological Incident Response Checklist, Attachment 2 to Emergency Preplan. 2. Notify the NRC Operations Center at (301) 816-5100 within one (1) hour of declaration of alert. 3. Augment resources and bring key personnel to stand-by status 4. Assess and Respond 5. Calculate periodic dose rates for actual release 6. Escalate to a more severe class if appropriate 7. Close out upon completion of duties

3.2.2 Class II - Site Area Emergency

Class Description	License Action
Events are in process or have occurred which involve actual or likely failures of plant functions needed for protection of the public. Offsite releases are not expected to exceed those permitted by 10CFR Part 20 except near the site boundary.	1. Notify OEMA, Columbus, and local authorities of site area emergency status and reason for emergency as soon as discovered. Provide OEMA with information requested in OEMA Radiological Incident Response, Checklist Appendix A, Exhibit 2. 2. Notify the NRC Operations Center at (301) 816-5100 within one (1) hour of declaration of site area emergency. 3. Augment resources and bring key personnel to stand-by status 4. Assess and respond 5. Conduct onsite monitoring 6. Provide dose estimates to offsite authorities for actual releases 7. Provide release and dose projections based on available plant condition information and foreseeable contingencies 8. Close out or reduce class of emergency based on results of actions

3.3 Range of Postulated Accidents

The range of accidents that can be postulated for the AMS London Road facility can be categorized as follows:

*Fire
*Natural disaster
*Vandalism

Fire

Fires in the AMS London Road facility are very unlikely due to: (1) The fire resistant nature of the structure; (2) the fire suppression system; (3) the small quantities of combustibles used in the operations; and (4) fire prevention program established at AMS. Minor fires, such as refuse fires, would most likely not result in release. Fires in the ventilation system are quite unlikely because the HEPA filters are fire-resistant and because of the lack of combustibles located in the hot cell. A fire that could result in major emergencies would be major fires engulfing large portions of the building. This scenario is unlikely as the majority of the facility is protected by a sprinkler system.

Major fires are extremely difficult to postulate due to their low probability of occurrence. Major fires have been included in this plan due to the potential for offsite impacts. Any major fire requiring building evacuation and offsite fire fighting assistance, will result in the RSO immediately declaring a "Site Area Emergency". The fire fighting crews will be monitored with personnel monitoring devices. Fire fighters and rescue teams entering the building will use appropriate respiratory equipment and will be accompanied by an AMS employee or offsite support personnel trained in the use of and equipped with portable radiation detection equipment. All persons leaving the building will be monitored to control contamination. Re-entry and recovery will be strictly controlled so to limit personnel exposures to regulatory limits.

It is recommended fires within restricted areas be fought with dry chemicals - CO_2, Halon or equivalent - to prevent possible run-off of contaminated water. Unrestricted areas can be suppressed with water. The water run-off would be uncontaminated as unrestricted areas have no detectable contamination.

Natural Disaster

The risk from tornadoes and earthquakes is in the low range in this area. If a tornado strikes or an earthquake causes visible damage to any of the AMS London Road building, the RSO will declare an "ALERT" condition. Escalation to a more severe class will depend on the results of assessments made through monitoring of the site.

Vandalism

While scavenging and vandalism of radioactivity is pluasible, it is not a likely scenario considering the lack of economic value of the materials.

3.4 Consultant's Report

Discusses each postulated accident in detail and dose assessment from a "worse-case" release of Cobalt-60 from the London Road facility.

IEM
Integrated Environmental Management, Inc.

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P.O. Box 50785
Knoxville, TN 37950-0785
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January 25, 1995

Dwight Miller, Esq.
Stavole & Miller
Attorneys and Counsellors at Law
55 Public Square, Suite 1604
Cleveland, Ohio 44113

Re: Dose Assessment from a "Worst-Case" Release of ^{60}Co from the London Road Facility

Dear Mr. Miller:

Pursuant to the request of Mr. David Cesar, I have performed a preliminary assessment of the maximum radiation dose to the nearest neighbor of Advanced Medical System's (AMS) London Road facility in the event of a catastrophic release of ^{60}Co from the facility. The purpose of this letter is to transmit my findings.

The potential radiation dose that workers or the general public may incur from exposure to radioactive materials is influenced by a number of factors. These include the amount of radioactivity involved, the types of radiation emitted by the material, the chemical and physical form of the material, the solubility of the material, the particle size distribution, the duration of the exposure, the inhalation pathways (including both airborne material and resuspended material), the ingestion pathways involving contaminated water, food stuffs and animal feeds, and the demographic and physiological characteristics of the population exposed.

It is my understanding that the inventory of dispersible radioactivity[1] at AMS has been assessed at approximately 29 curies, with about 15 curies contained in the basement (e.g., in steel drums and LSA boxes), about 10 curies in a high-level storage location, about one curie from decontamination efforts, and the remainder as residual contamination in the restricted areas as a result of past operations.[2] Potential accidents resulting in release of this radioactivity might include spills, rupture of containers, scavenging, fire, or explosion. The following is a brief discussion of the types of accidents and a qualitative assessment of their likely consequences.

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1 The radioactivity contained in the hot cell was not included in this analysis since it is sealed inside a heavy concrete and steel containment that is not likely to be breached by conventional (e.g., fires) or esoteric (e.g., explosions) external means. Furthermore, a scenario for rupture from within cannot be postulated since the material itself (cobalt) is not flammable, and there are no flammable/combustable materials inside of the cell. Therefore, the ^{60}Co in the hot cell is not considered to be dispersible.

2 Cesar, D., Advanced Medical Systems, Inc., personal communication to C. D. Berger, Integrated Environmental Management, Inc., January 17, 1995.

Loss of Control of Radioactive Materials
During handling of radioactive materials, rupture of a container or storage bin would result in release of the materials. However, the rupture of a single container within the facility walls would result in the release of only a fraction of the total activity at the site, and could be quickly cleaned up before contamination could spread. Although the major effect of such an accident would be short-term dispersion of the material within the AMS facility, the impact is not expected to be great, and no measurable off-site consequence is expected.

Fires are a common occurrence in man-made structures of all types and locations. In anticipation of the potential for fires, AMS maintains a fire safety program for routine and emergency operations. Furthermore, agreements with local fire departments will ensure that fires in the restricted areas are swiftly controlled using gas, rather than water, suppression systems. Finally, the form of the radioactive materials stored at AMS is incapable of combustion on its own, and no flammable materials are stored or used in the vicinity of storage locations. Therefore, dispersion of a significant quantity of radioactivity by fire is not considered to be a credible accident scenario.

Natural Disasters
At plants such as AMS, there is the potential for impacts to the environment as a result of unpredictable, non-routine natural events such as lightening-induced fires and/or natural disasters such as floods, tornadic storms or seismic activity. The types of accidents which might reasonably be expected to negatively impact the environment and the surrounding community are a tornado which destroys the AMS building and disperses radioactive material along its path, or a major storm erodes the structural integrity of the building such that radioactive materials are moved away from the plant along water (runoff) pathways. Although severe natural disasters could conceivably compromise the protective nature of the building and its radioactive materials storage areas, the geographic location of the facility is not predisposed to frequent occurrences of floods or tornadic storms. Also, the majority of the ^{60}Co inventory at the site is in primary containment (steel containers or cells) that is resistant to ready release. Furthermore, the physical form of the material (e.g., dense and insoluble) is not conducive to movement, and any activity released as a result of a tornado would be dispersed widely by the tornado. Even under the worst of such events, it is not likely that a significant quantity of radioactive materials would be released to the environment.

Scavenging or Vandalism
While scavenging of radioactivity at the AMS facility is plausible, it is not considered to be a likely scenario considering the lack of economic value of the materials in question, and the fact that the exposure of scavengers of significant quantities could be consequential while the exposure of the nearest off-site residents would be small. Another scenario would be for an intruder with a full gasoline tanker truck to enter the AMS facility by breaching the security system, enter the basement through locked doors, open the steel drums and LSA boxes, pump the entire contents of the tanker truck into them, and ignite the fluid.[3] Again, this is not a plausible scenario but it could result in a fraction of the stored radioactivity becoming immediately airborne, after which could be dispersed and

---

3 The ability to create such an explosion by any other scenario in other restricted areas of the plant is deemed unlikely.

deposited in the vicinity of the plant depending upon atmospheric conditions at the time of the explosion.

Of all of the above, the single accident condition that is not readily controlled, and that might result in exposure of the general public, is the vandalism scenario. This condition, while unlikely, would create conditions that could not be quickly controlled by plant personnel or emergency workers, thus it is considered to be the "worst possible case".

To evaluate the impact of this case on a member of the general public, a radiological dose assessment must be performed. For this assessment, the CAP88-PC computer code was used. The CAP-88 (Clean Air Act Assessment Package 1988) model permits assessments of both collective population dose, and maximally exposed individual dose. CAP88-PC uses a modified Gaussian plume equation to estimate the average dispersion of radionuclides released from up to six sources, which may be either elevated stacks or uniform area sources.[4]

The program computes radionuclide concentrations in air, rates of deposition on ground surfaces, concentrations in food, and intake rates to people from ingestion of food produced in the assessment area. Estimates of the radionuclide concentrations in produce, leafy vegetables, milk and meat consumed by humans are made by coupling the output of the atmospheric transport models with the USNRC Regulatory Guide 1.109 terrestrial food chain models. A library of meteorological data for most major cities is supplied with the code. The following assumptions were used as input to the CAP88 code for estimating off-site doses from the worst-case accident scenario at the London Road facility:

- Meteorological data from Cleveland, Ohio (Cleveland Airport) were deemed applicable to conditions at the AMS plant.
- The annual average rainfall amount is 89.9 cm per year.[5]
- The annual average temperature is 10° C.[6]
- The emission source is assumed to follow a stack model with a ground level (one meter) release height.[7]
- A momentum plume rise was assumed.
- Agricultural usage fits an "Urban" scenario.

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4 U. S. Environmental Protection Agency, "User's Guide for CAP88-PC, Version 1.0", by Barry S. Parks, Report No. 402-B-92-001, Office of Radiation Programs, March, 1992.

5 World Almanac, Holt, Reinhart & Winston, New York, 1989.

6 World Almanac, Holt, Reinhart & Winston, New York, 1989.

7 This is a conservative assumption since the heat of the explosion will elevate the radioactivity significantly before it is dispersed off of the AMS property, which makes "plume touchdown" at a distance of 100 meters from the plant unlikely.

- The total activity released during the explosion is equivalent to the entire contents of the basement room, or 15 curies of ^{60}Co.

- A 5×10^{-3} release fraction for nonvolatiles in flammable liquid is assumed.[8]

- The fire is assumed to burn, uncontrolled, until the entire released fraction of 0.08 curies is dispersed.

- The distance to the nearest off-site receptor is 100 meters north of the AMS facility.[9]

- An annual-average release with no follow-up remediation of the local land area is assumed.[10]

The results of this assessment shows that the member of the general population that is nearest to the AMS facility might incur a radiation dose of 38 millirem within one year after this catastrophic event occurs. Attachment 1 contains the output report from the CAP88-PC code.[11] [12]

The International Commission on Radiological Protection (ICRP) provides guidance on when and how to institute countermeasures and recovery actions in the event of a major radiation accident.[13] However, the ICRP also acknowledges that the countermeasures and recovery actions themselves involve some risk to the public. Consequently, to ensure that the "cure is not more harmful than the illness", they have set a population dose limit below which they recommend that no follow-up action whatsoever be taken. The ICRP dose limit for early-phase countermeasures ranges from 500 to 5,000 millirem for sheltering, and 5,000 to 50,000 for evacuation. The lowest limit of 500 millirem is also consistent with the maximum permissible dose to maximally-exposed members of the general public promulgated by the USNRC.[14]

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8 NUREG-1140.

9 Cesar, D., Advanced Medical Systems, Inc., personal communication to C. D. Berger, Integrated Environmental Management, Inc., January 17, 1995.

10 It is conservative to assume that the entire annual average dose calculated by CAP88-PC is delivered over the duration of the release.

11 The intent of this assessment was to establish a conservative exposure scenario (i.e., well above the average case) that is still within the range of possibility. Whenever possible, assumptions to complete the dose assessment were selected conservatively such that the maximum reasonable dose would result.

12 The potential radiation dose to fire fighters and rescue workers was evaluated similarly, by assuming they remained constantly and continuously at a distance of eight (8) meters from the AMS facility until the entire release fraction of 0.08 curies is dispersed. If it is also assumed that the fire fighters received an entire annual-average dose from all pathways over the duration of the release, the maximum possible dose is estimated to be 422 millirem. However, this dose estimate is exceedingly conservative because the duration of the fire fighter's exposure is only a fraction of that of the resident, a fire fighter would wear protective clothing, and a fire fighter would not be subject to the same exposure pathways (e.g., ingestion of food products) as would the resident.

13 International Commission on Radiological Protection, "Protection of the Public in the Event of Major Radiation Accidents: Principles for Planning", ICRP Publication 40, 1984.

Therefore, for the worst-case accident scenario at the AMS site, wherein an individual 100 meters to the north of the facility might receive up to 38 millirem, countermeasures or recovery actions for purposes of protecting that individual are not indicated.

It is important to note, however, that the dose estimate of 38 millirem reflects the maximum exposure *potential* for the nearest off-site resident. The likelihood that such a dose would actually be incurred is remote, at best. From the assumptions made regarding exposure circumstances for the nearest resident, it is clear that no radiation dose in excess of what is considered safe by international standards groups[15] and regulatory agencies (USNRC[16], OSHA[17] and USEPA[18]) will occur. Even after application of generous assumptions, the radiological conditions in the immediate vicinity of the AMS facility in the event of catastrophic release are not conducive to adverse health effects.

I hope that this information is of interest to you. If I can answer any questions or provide you with additional information, please do not hesitate to call me at (?01) 762-0502. It has been a pleasure assisting you in this effort, and I am looking forward to speaking with you again soon.

Sincerely,

Carol D. Berger, C.H.P.

94009

14 (...continued)
14 Title 10, Code of Federal Regulations, Part 20.1301.

15 International Commission on Radiological Protection, "Radiation Protection - Recommendations of the International Commission on Radiological Protection ", ICRP Publication 26, 1976.

16 Title 10, Code of Federal Regulations, Part 20, "Standards for Protection Against Radiation".

17 Title 29, Code of Federal Regulations, Part 1910.96, "Ionizing Radiation".

18 Title 40, Code of Federal Regulations, Part 191.04(a)(1) "Environmental Standards for Management and Storage".

ATTACHMENT 1: CAP88-PC SUMMARY OUTPUT

C A P 8 8 - P C

Version 1.00

Clean Air Act Assessment Package - 1988

S Y N O P S I S   R E P O R T

Non-Radon Individual Assessment
Jan 24, 1995   4:04 pm

Facility: Advanced Medical Systems
Address: 1020 London Road
City: Cleveland
State: OH   Zip: 44110

Effective Dose Equivalent
(mrem/year)

3.81E+01

At This Location: 100 Meters North
Source Category:
Source Type: Stack
Emission Year: 1995

Comments: Vandalism Scenario Involving the WHUT Room

Dataset Name: ams-fire
Dataset Date: Jan 24, 1995   4:04 pm
Wind File: WNDFILES\CLE1140.WND

MAXIMALLY EXPOSED INDIVIDUAL

Location Of The Individual: 100 Meters North
Lifetime Fatal Cancer Risk: 9.51E-04

ORGAN DOSE EQUIVALENT SUMMARY

Organ	Dose Equivalent (mrem/y)
GONADS	4.27E+01
BREAST	3.88E+01
R MAR	3.33E+01
LUNGS	4.10E+01
THYROID	4.10E+01
ENDOST	3.48E+01
RMNDR	3.46E+01
EFFEC	3.81E+01

RADIONUCLIDE EMISSIONS DURING THE YEAR 1995

uclide	Class	Size	Source #1 Ci/y	TOTAL Ci/y
)-60	Y	1.00	8.0E-02	8.0E-02

SITE INFORMATION

Temperature:	10 degrees C
Precipitation:	90 cm/y
Mixing Height:	1000 m

SOURCE INFORMATION

Source Number:	1
Stack Height (m):	1.00
Diameter (m):	0.00
Plume Rise	
Momentum (m/s): (Exit Velocity)	0.00E+00

AGRICULTURAL DATA

	Vegetable	Milk	Meat
Fraction Home Produced:	0.076	0.000	0.008
Fraction From Assessment Area:	0.924	1.000	0.992
Fraction Imported:	0.000	0.000	0.000

Food Arrays were not generated for this run.
Default Values used.

DISTANCES USED FOR MAXIMUM INDIVIDUAL ASSESSMENT

100

C A P 8 8 - P C

Version 1.00

Clean Air Act Assessment Package - 1988

G E N E R A L   D A T A

Non-Radon Individual Assessment
Jan 24, 1995   4:04 pm

Facility: Advanced Medical Systems
Address: 1020 London Road
City: Cleveland
State: OH   Zip: 44110

Source Category:
Source Type: Stack
Emission Year: 1995

Comments: Vandalism Scenario Involving the WHUT Room

Dataset Name: ams-fire
Dataset Date: Jan 24, 1995   4:04 pm
Wind File: WNDFILES\CLE1140.WND

VALUES FOR RADIONUCLIDE-DEPENDENT PARAMETERS

Nuclide	Clearance Class	Particle Size (microns)	Scavenging Coefficient (per second)	Dry Deposition Velocity (m/s)
CO-60	Y	1.0	8.99E-06	1.80E-03

VALUES FOR RADIONUCLIDE-DEPENDENT PARAMETERS

Nuclide	DECAY CONSTANT (PER DAY) Radio-active (1)	Surface	Water	TRANSFER COEFFICIENT Milk (2)	Meat (3)
CO-60	0.00E+00	5.48E-05	0.00E+00	2.00E-03	2.00E-02

FOOTNOTES: (1) Effective radioactive decay constant in plume; set to zero if less than 1.0E-2

(2) Fraction of animal's daily intake of nuclide which appears in each L of milk (days/L)

(3) Fraction of animal's daily intake of nuclide which appears in each kg of meat (days/kg)

VALUES FOR RADIONUCLIDE-DEPENDENT PARAMETERS

	CONCENTRATION UPTAKE FACTOR		GI UPTAKE FRACTION	
Nuclide	Forage (1)	Edible (2)	Innalation	Ingestion
CO-60	2.00E-02	3.00E-03	5.00E-02	3.00E-01

FOOTNOTES: (1) Concentration factor for uptake of nuclide from soil for pasture and forage (in pCi/kg dry weight per pCi/kg dry soil)

(2) Concentration factor for uptake of nuclide from soil by edible parts of crops (in pCi/kg wet weight per pCi/kg dry soil)

VALUES FOR RADIONUCLIDE-INDEPENDENT PARAMETERS

HUMAN INHALATION RATE	
Cubic centimeters/hr	9.17E+05
SOIL PARAMETERS	
Effective surface density (kg/sq m, dry weight) (Assumes 15 cm plow layer)	2.15E+02
BUILDUP TIMES	
For activity in soil (years)	1.00E+02
For radionuclides deposited on ground/water (days)	3.65E+04
DELAY TIMES	
Ingestion of pasture grass by animals (hr)	0.00E+00
Ingestion of stored feed by animals (hr)	2.16E+03
Ingestion of leafy vegetables by man (hr)	3.36E+02
Ingestion of produce by man (hr)	3.36E+02
Transport time from animal feed-milk-man (day)	2.00E+00
Time from slaughter to consumption (day)	2.00E+01
WEATHERING	
Removal rate constant for physical loss (per hr)	2.90E-03
CROP EXPOSURE DURATION	
Pasture grass (hr)	7.20E+02
Crops/leafy vegetables (hr)	1.44E+03
AGRICULTURAL PRODUCTIVITY	
Grass-cow-milk-man pathway (kg/sq m)	2.80E-01
Produce/leafy veg for human consumption (kg/sq m)	7.16E-01
FALLOUT INTERCEPTION FRACTIONS	
Vegetables	2.00E-01
Pasture	5.70E-01
GRAZING PARAMETERS	
Fraction of year animals graze on pasture	4.00E-01
Fraction of daily feed that is pasture grass when animal grazes on pasture	4.30E-01

VALUES FOR RADIONUCLIDE-INDEPENDENT PARAMETERS

ANIMAL FEED CONSUMPTION FACTORS	
Contaminated feed/forage (kg/day, dry weight)	1.56E+01
DAIRY PRODUCTIVITY	
Milk production of cow (L/day)	1.10E+01
MEAT ANIMAL SLAUGHTER PARAMETERS	
Muscle mass of animal at slaughter (kg)	2.00E+02
Fraction of herd slaughtered (per day)	3.81E-03
DECONTAMINATION	
Fraction of radioactivity retained after washing for leafy vegetables and produce	5.00E-01
FRACTIONS GROWN IN GARDEN OF INTEREST	
Produce ingested	1.00E+00
Leafy vegetables ingested	1.00E+00
INGESTION RATIOS:	
IMMEDIATE SURROUNDING AREA/TOTAL WITHIN AREA	
Vegetables	7.60E-02
Meat	8.00E-03
Milk	0.00E+00
MINIMUM INGESTION FRACTIONS FROM OUTSIDE AREA	
(Minimum fractions of food types from outside area listed below are actual fixed values.)	
Vegetables	0.00E+00
Meat	0.00E+00
Milk	0.00E+00
HUMAN FOOD UTILIZATION FACTORS	
Produce ingestion (kg/y)	1.76E+02
Milk ingestion (L/y)	1.12E+02
Meat ingestion (kg/y)	8.50E+01
Leafy vegetable ingestion (kg/y)	1.80E+01
SWIMMING PARAMETERS	
Fraction of time spent swimming	0.00E+00
Dilution factor for water (cm)	1.00E+00

4.0 Organization for Control of Radiological Contingencies

This chapter describes the organization for radiological contingencies, how the organization is activated and the authorities and responsibilities of the organization.

4.1 Normal Plant Operations

The RSO has overall responsibilities for all aspects of the facility.

4.2 Onsite Radiological Contingency Response Organization

This section describes the organizational structure and functions for radiological contingencies. The authority of the contingency organization to perform the functions described herein has received corporate approval as indicated by the Statement of Policy included with this plan.

4.2.1 Direction and Coordination

The RSO will be responsible for all offsite notification and reporting. In his absence, the emergency personnel on call will contact offsite authorities. The Emergency Manager, a role filled by the RSO, will have direct control over emergency operations. The Emergency Manager will serve as the first line of communication with the operating and emergency staffs.

Since some classes of radiological contingencies require that offsite authorities be informed of the situation, the RSO is necessarily involved in each of the contingencies. The class of contingency, however, does determine the level of onsite and/or offsite support needed to deal with the situation.

For radioactive material spills, the operational personnel report such an incident to the RSO. The RSO will assess the event and will take appropriate action. In general, the RSO will be capable of handling these situations entirely with no further onsite or offsite support.

In the event of a major fire or severe natural phenomenon, the RSO activates the onsite emergency response. The RSO also informs local/state authorities and the NRC of the situation.

4.2.2 Plant Staff Radiological Contingency Assignments

During an emergency, assignments for the contingency staff are on two levels: local and plant-wide. The RSO is responsible for plant-wide direction of emergency situations. The normal operational staff will provide initial reporting and information and further assistance as requested by the RSO.

4.2.2.1 Radiation Safety Officer (RSO)

The primary responsibility of the RSO will be:

*Coordination of first aid and medical transport
*Coordination of evacuation
*Coordination of offsite fire assistance
*Coordination of rescue operations.

Staff for medical assistance, fire fighting and rescue operations will be offsite personnel. Area personnel will aid in evacuation, including personnel accountability.

4.2.2.2 Radiation Safety Officer (RSO) and Supporting Staff

The primary responsibility of the RSO and the supporting staff will be the radiological protection of onsite and offsite personnel and assessment of the emergency. Specific responsibilities include:

*Assessment of accidental releases and doses
*Personnel monitoring (on and offsite personnel)
*Personnel and facility decontamination
*Radiological surveys
*Assisting in post-accident assessments
*Overall maintenance of the Radiological
*Contingency Plan

4.2.2.3 Facility Employees

Facility employees will serve as the first line of communication following radioactivity spills and will assist in evacuation and personnel accountability, as discussed above.

4.3 Offsite Assistance to Facility

In the event of a radiological emergency, it may become necessary to use offsite assistance to supplement the onsite emergency organization. Advanced Medical has arrangements with the local police and fire departments and with local hospitals and ambulance services to respond to these emergencies. Letters indicating to whom this plan has been sent are contained in an Appendix B to this plan. The RSO, through communications with facility employees, assesses the need for offsite support services. He, or his designee, contacts the appropriate offsite organization by telephone to request support.

4.4 Coordination with Participating Government Agencies

The State of Ohio Emergency Management Agency, located in Columbus, Ohio maintains a Governor's response team for radiation accidents.

5.0 Radiological Contingency Measures

This section provides a general description of the measures to be taken during a radiological contingency. The emergency procedures enclosed as an Appendix provide details of the steps to be taken.

5.1 Activation of Radiological Contingency Response Organization

The initial step in any emergency is the activation of the radiological contingency response organization. As described in Section 1.0 of this plan, all radioactive material processing involves operating personnel. As such, the initial reporting of most incidents will depend on these personnel. The activation steps taken from the initial incident through notification of the Emergency Manager/RSO will depend on the incident. Once the Emergency Manager/RSO is notified, further activation and communication will be his/her responsibility. Procedures detailing the activation of the response organization are included as an Appendix to this plan.

5.1.1 Initial Incident Reporting

The initial incident reporting for each type of accident is presented below.

Ventilation System Incidents

Failure of the ventilation system will result in evacuation of the affected area but does not constitute a radiological emergency. Any incident in which ventilation flow is stopped will be reported to the RSO by the individual observing the ventilation system problems. The RSO will perform an initial assessment of the incident.

Major Fire or Severe Natural Phenomenon

All incidents of this type will be reported to the Emergency Manager/RSO by plant personnel or the offsite security company. The personnel will be aware of fire through the fire alarm system and of severe natural phenomena by the phenomenon itself. Plant personnel will use the intercom system as the first line of communication. During normal working hours, the Emergency Manager/RSO will be contacted through office phones. During off hours, the Emergency Manager/RSO (or his alternate) will be contacted at home. Also during off hours, the RSO will contact other key personnel summoning them to the site as required.

5.1.2 Response Organization Activation

Incidents Other Than Major Fires and Severe Natural Phenomenon

For all such incidents the RSO will report immediately to the affected area and assess the situation. The RSO, based on his assessment, will determine what class of emergency, if any, is applicable. The action to be taken under each emergency class are outlined in Section 3.2 and detailed in the attached procedures. The RSO will contact by telephone the Director of Regulatory Affairs, the Cleveland Fire Department, the Ohio Emergency Management Agency and the USNRC, as detailed in Section 8.3. These parties will be instructed to place a return call and repeat the information provided by the RSO to authenticate the call.

Major Fires and Severe Natural Phenomenon

These classes of incidents are described in Section 3.3. The Emergency Manager/RSO will receive reports of these types of incidents from plant personnel or the offsite security company. The Emergency Manager/RSO will immediately declare an "ALERT". He will assure that the facility is being evacuated. He will instruct his personnel to assess the emergency via environmental monitoring. He will then activate the emergency response team and make offsite contacts as described above.

5.2 Assessment Actions

Assessment of the emergency condition will be the primary responsibility of the RSO. The initial step in each emergency sequence will be on initial assessment by the RSO. This assessment will be via three (3) methods depending on the severity of the accident:

1. Inspection
2. Release estimates
3. Air monitoring and dose monitoring

The simplest method is visual observation. For all incidents, the RSO will report to the affected area and determine what has happened. He will characterize the incident as a contained spill, ventilation system failure, fire or natural phenomenon. He will also assess the extent of physical damage and injuries.

For all but the most severe incident, the RSO will estimate the amount of radioactivity that has been released through inspection of process records and discussion with the operating personnel.

Air and dose monitoring is the most reliable assessment method. Air monitoring will be performed for all accidents of "Site Area Emergency". This type of monitoring will occur around the site as well as inside the structure to collect samples of airborne particulates in filter paper for analysis: (ie. air concentrations).

Throughout any emergency situation external doses will be monitored continuously for the purpose of protecting personnel. This monitoring will include personnel film badges and self-reading dosimeters as well as portable survey instruments.

5.3 Corrective Actions

As described in Chapter 3, there are three (3) types of accidents that have been postulated for the AMS London Road facility: spills, fire and natural phenomena. The corrective actions that follow each of these incidents are presented below. Similar corrective action will be taken for localized fires in which release of radioactivity are suspected. In addition, fires will not be of sufficient severity to cause breach of containment. Corrective action for ventilation failure is to have personnel restore proper airflow.

In the event of an all-engulfing fire or tornado or earthquake, there are essentially no corrective actions that can be taken. Actions to be taken are of a recovery nature, after the initiating event has ceased. One corrective action, however, is for the RSO to survey around the affected building to locate any contamination. If such areas are located, the RSO will mark and decontaminate them.

5.4 Protective Actions

This section discusses the action necessary to prevent or minimize exposure to radiation during the emergency.

5.4.1 Personnel Evacuation from Site and Accountability

The incident producing the emergency determines if building evacuation is necessary. When material is spilled inside the hot cell, evacuation will not be necessary. When material is spilled outside of the hot cell, that area will be evacuated. For any other emergency (fires, tornadoes, etc.), evacuation of the building will be immediately ordered. Personnel will follow established routes, and reassemble at designated areas as described in the attached procedures. The RSO or his designate will check for missing persons. At the assembly point, the RSO will survey individuals to determine whether any evacuees should be decontaminated. The RSO or his designate will also assess the need for medical attention.

5.4.2 Use of Protective Equipment and Supplies

Respiratory devices and protective clothing are located in various areas throughout the facility. This equipment is also part of the Emergency Response Kit located in the Advanced Medical Systems fire pumphouse approximately 300 feet west of the London Road facility on Mandalay Avenue. Personnel are trained in the use of the equipment as part of their initial radiation protection training. The RSO will determine the need for using this equipment. Appropriate respiratory devices will be worn for corrective action during fires. Protective clothing will be worn during corrective actions for any material spills. All other equipment will be used as needed.

5.4.3 Contamination Control Measures

To prevent further spread of radioactive materials and thereby minimize exposure due to these materials, the area in which the emergency occurred will be marked and secured by personnel under the direction of the RSO. Only personnel designated by the Emergency Manager/RSO will be permitted to enter the area.

Inside the marked area, the RSO will determine the extent and location of contamination and will appropriately mark those areas. Once the areas have been marked and decontamination operations have begun, full scale recovery operations will commence. In order for the facility to return to normal use, contamination must be controlled to the extent that personnel exposure will not exceed normal limits:

Loose surface contamination levels:

Restricted Areas	<40,000 DPM/100cm^2
Unrestricted Areas	<1,000 DPM/100cm^2

5.5 Exposure Control in Radiological Contingencies

The primary goal of radiological contingency response is to control personnel exposure. In the event of an emergency, however, it may be necessary for members of the emergency response team to receive exposures up to the EPA guidelines: i.e., less than 75 Rem for either a lifesaving action or less than 25 Rem for entry into hazardous areas to protect the facility or control fires.

5.5.1. Emergency Exposure Control

For any accident involving Cobalt^{60}, emergency workers are required to wear appropriate respiratory equipment. To remove injured persons, undertake corrective actions, perform assessment actions or provide first aid, exposures will be limited to 75 Rem. Preliminary decontamination of non-life threatening injured personnel will occur prior to transport, so that the medical and ambulance service personnel exposure will be less than 3 Rem in the event the injury is life threatening. The primary emphasis is on medical attention and secondary emphasis on decontamination. A total exposure of 75 Rem will be allowed for lifesaving activities.

5.5.2 Radiation Protection Program

The Emergency Manager/RSO is the only individual who can authorize workers to receive emergency radiation doses. During the emergency, trained workers will carry survey meters to determine dose rates in the areas in which they are working. The workers, therefore, may not work in areas where the dose rate multiplied by the amount of time spent in the area exceeds 5 Rem. For lifesaving activities, the dose rate multiplied by the amount of time spent in the area may not exceed 25 Rem.

5.5.3 Monitoring

All emergency response personnel, including firefighters, will wear self-reading dosimeters. Team members will also carry radiation survey meters and pocket dosimeters.

5.5.4 Decontamination of Personnel

Initial decontamination of personnel at the facility will consist of workers removing their normal protective clothing and depositing clothing in a specified location. If decontamination of injured personnel is required, it will be conducted at the contracted hospital. There, individuals will be decontaminated to background levels. Appropriate decontamination procedures and decontaminates will be used. Radioactive wastes generated during decontamination procedures will be deposited in standard radioactive waste containers or bagged in plastic until such containers are available.

5.6 Medical Transportation

Preliminary first aid will be provided by AMS personnel. All transportation of injured personnel will be provided by the City of Cleveland Fire Department or a commercial ambulance service. They may also provide limited first aid, if possible. Limited decontamination of persons with non-life threatening injuries may be performed by the RSO and his staff prior to transport as described in Section 5.5.4.

5.7 Medical Treatment

The following hospitals in the area of the facility are equipped to treat radiological emergency individuals. AMS has arrangements with the facilities to care for injuries involved radiological contamination.

HOSPITAL	APPROXIMATE TRAVEL DISTANCE	APPROXIMATE TRAVEL TIME
University Hospital 11100 Euclid Avenue Cleveland, OH 44106 Phone: (216) 844-3835	6 Miles	15 Minutes

The AMS staff member will provide information assistance as requested.

5.8 Recommended Fire Supression Method

It is recommended fires within restricted areas be fought with dry chemicals - CO_2, Halon or equivalent - to prevent possible run-off of contaminated water. Unrestricted areas can be suppressed with water. The water run-off would be uncontaminated as unrestricted areas have no detectable contamination.

6.0 Equipment and Facilities

This chapter describes AMS's equipment and facilities designated for use during a radiological emergency.

6.1 Control Point

During a radiological contingency with possible offsite impact, emergency response control will be conducted from the fire pumphouse on Mandalay Avenue, approximately 300 feet west of the facility. This location should be minimally affected by an accident inside the facility.

6.2 Communication Equipment

During normal operations at the London Road facility telephone and P.A. systems are used for communications. In addition, fire alarms, discussed in an earlier chapter, inform the personnel of the need to evacuate the building. During an emergency, the RSO would be working closely with the City of Cleveland Fire Department and their response teams, and communications would be made through their system at the site.

6.3 Facility for Assessment Teams

Assessment teams will also operate out of the fire pumphouse. The equipment and supplies located in this building are described in Section 6.4.

6.4 Onsite Medical Facilities and Contamination Control Equipment

Any injuries requiring medical attention will receive first aid from offsite ambulance crews, although initial first aid will be provided by onsite personnel. Injured individuals will be taken offsite to the facilities with which AMS has arrangements.

Offsite supplies for personnel decontamination are stored in the fire pumphouse located on Mandalay Avenue, approximately 300 feet west of the facility.

The supplies located in the fire pumphouse include:

- Emergency Plan, Emergency Procedures and extra Report Forms
- Frisker
- Survey Meter
- Flashlight
- Batteries for above
- Respirator
- Air Sampler
- 100-foot Extension Cord
- Pocket Dosimeters - 200Mr and 5R
- Dosimeter Charger
- Protective Clothing - Shoe Covers, Head Covers, Coveralls and Gloves
- 20-inch Masking Tape
- Contamination Wipes, Soap, Spray Bottle
- Rope, Signs and Placards
- Ziploc Plastic Bags
- Polydrum Liners - 6 Mil.
- Marking Pens
- Graphite Pencils
- Survey Data Forms
- Facility Drawings
- Emergency Phone Numbers
- $3.00 in Quarters
- Building Keys

6.5 Emergency Monitoring Equipment

Equipment for assessing and handling the emergency include:

*Pocket Dosimeter and Dosimeter Charger
*Low and High Level Survey Meters
*Anti-Contamination Clothing and Respirators
*Friskers

All emergency equipment is calibrated and checked regularly according to normal ISP practices. Equipment should, therefore, be operational at the time of use.

7.0 Maintenance of Radiological Contingency Preparedness Capability

This chapter describes the administrative procedures for maintaining, reviewing and testing the radiological contingency plan.

7.1 Written Procedures

To ensure that the written implementing procedures for the radiological contingency plan uniformly address the duties and actions of each individual or group responding to an emergency condition, the Radiation Safety Officer has been designated as the planning coordinator for the Radiological Contingency Plan. In this capacity, the Radiation Safety Officer also reviews the Contingency Plan and procedures annually and updates them as needed. It is the responsibility of the Radiation Safety Officer to forward the Plan and procedures to all individuals responsible for implementing the Plan.

7.2 Training

Onsite operating personnel are introduced to their responsibilities during an emergency as part of their formal job training, which includes basic radiation protection. Since their only responsibility during an emergency is initial reporting of an abnormal occurrence, no further training is required. Staff with limited emergency responsibilities receive basic radiation protection training as well as limited emergency response training.

The Radiation Safety Officer will ensure onsite operating personnel are trained in basic radiation protection. The RSO will also provide training for emergency response.

7.3 Drills, Exercises and Communication Checks

AMS will conduct in-house drills with AMS personnel at the discretion of the RSO. These drills are designed to test AMS emergency response functions.

AMS will conduct full scale exercises with onsite and offsite personnel. These exercises will be conducted periodically. The interval will be determined through communication with all affected personnel and agencies participating in the exercise.

A full scale biennial exercise will be conducted with AMS emergency response personnel and offsite emergency response personnel. The NRC shall be invited to participate or observe this exercise. The NRC shall be provided with the exercise objectives and scenario at least sixty (60) days before the exercise. This is done to allow the NRC to comment on the exercise.

The RSO or alternate shall conduct quarterly communication checks with offsite response organizations. This is done to verify and update all necessary phone numbers.

7.4 Critiques

AMS will prepare a critique for each drill and exercise conducted. The critique will evaluate the emergency plan procedures, emergency equipment, personnel training and overall effectiveness. The RSO and/or the Isotope Committee will evaluate the critique or determine if any revisions to the emergency procedures, training or equipment need to be made.

7.5 Audits

AMS will have an annual audit to review our emergency response program. The audit will include the emergency plan procedures, training, equipment and supplies. Records associated with offsite support agencies in accordance with Section 7.3 above shall also be audited. Any discrepancy discovered during an audit will be addressed at the next quarterly Safety Committee meeting and corrective action initiated within 90 days of that Safety Committee meeting.

7.6 Maintenance and Inventory of Radiological Emergency Equipment, Instrumentation and Supplies

To assure that emergency equipment and instrumentation are in working condition and that the stock of emergency supplies is maintained.

These items will be inventoried and checked quarterly. Instruments will be calibrated twice yearly. Inoperable or missing equipment will be repaired or replaced as soon as possible.

7.7 Review and Updating of the Plan and Procedures

The RSO is responsible for reviewing the plan annually and/or amend the plan to reflect changes in facilities, personnel and processes. Revisions and updates to the plan will be transmitted to the USNRC and relevant emergency response agencies.

8.0 Records and Reports

8.1 Records of Incidents

All incidents which result in a declaration of any of the emergency classes discussed in Section 3.2 of this plan will be recorded and reported in accordance with emergency procedures. During the incident, records will be maintained so that an incident report, including the following, can be prepared:

*Cause of event
*Extent of damage and/or personnel injuries
*Radiological data
*Personnel and/or equipment (physical plant) involved
*Corrective action taken
*Offsite assistance requested and received
*Fraction of response equipment used
*Records of offsite contacts
*Re-entry/recovery plans

This information will be compiled on forms which will be used as post incident reports. These reports along with supporting documentation will be maintained as emergency records until the license is terminated. A Radiological Incident Response Checklist found in Appendix A, Attachment 2, will also be completed.

8.2 Records of Preparedness Assurance

Section 7.0 of this plan details the steps that will be taken to assure radiological contingency preparedness. Records documenting this preparedness will be maintained for a five (5) year period following the activity being recorded. These records will include:

*Attendance records of training and retraining
*Report forms and critiques for drills and exercises
*Inventory check-off sheets
*Test and maintenance records for emergency equipment
*Review and update records for the plan and procedures

All reviews and updates of the plan and associated procedures will be scheduled so that annual retraining will include all such changes.

8.3 Reporting Arrangements

Offsite reporting related to the radiological contingency plan will be the responsibility of the RSO and will include:

*The plan itself as well as updates
*Initial reporting and subsequent status updates for emergencies
*Post incident reports

For distribution of the plan and subsequent updates, a list of holders of the plan will be maintained. Individuals receiving the plan and update will acknowledge receiving the material.

Initial offsite reporting and subsequent status reports of radiological contingencies will be made by the RSO. The initial report will be made within one hour of the initiating event. The RSO will make the initial report in the following order:

1. State of Ohio Emergency Management Agency
2. U.S. Nuclear Regulatory Commission - Emergency Operations Center

The report will be made following specific procedures and will include the following information:

*Contingency Class
*The cause of the contingency
*The status of the facility
*Personnel exposure and injuries
*Offsite doses
*Recovery steps taken

Post incident reports will be prepared by the RSO and the support staff and submitted in accordance with Section 3.2 of this plan. The content of these reports is outlined in Section 8.1.

9.0 Recovery

Recovery from a radiological accident will involve re-entering the facility, restoring the facility and the resumption of normal operations. All of these activities will be conducted in such a way as to minimize personnel exposures and radioactivity releases.

9.1 Re-entry

Re-entry obviously applies to emergencies which involve evacuation. For minor, uncontained radioactive material spills (i.e., airborne contamination in the HEPA Room) limited areas will be evacuated. Re-entry will be made by the RSO's staff at the direction of the Emergency Manager/RSO to assess the level of contamination and to perform corrective actions (decontamination). The staff will be equipped with appropriate respiratory equipment to limit internal exposures. Whole body exposures will be limited to 3 Rem/quarter during re-entry and restoration following such an accident.

During a major fire, or immediately following a severe natural phenomena, re-entry will only occur to save human life. Exposures for re-entry personnel will be consistent with the EPA Emergency Worker and Lifesaving Activity Protective Action Guides (EPA 520/1-75/001) of less than 25 Rem whole body gamma for either emergency workers or lifesaving activities. The use of appropriate respiratory equipment by all re-entry personnel will limit hazards of inhaled radioactive material. Re-entry following such an accident will be at the direction of the RSO. Re-entry personnel will be equipped with portable radiation detectors.

The decision to re-enter the facility is based on an evaluation by the RSO and other supervisors that emergency conditions have terminated or have stabilized to a level that would safely permit re-entry. Re-entry teams will make the initial assessment of the extent of contamination and damage. This assessment will form the basis of plans for plant restoration.

9.2 Plant Restoration

During all plant restoration operations, all personnel radiation exposures will be kept as low as reasonably achievable (ALARA) so that the exposures will be below the limits of 10 CFR Part 20.

Restoration falls into three categories: regulatory compliance, maintenance and health and safety. The supervisor of each of these sections is responsible for plant restoration involving each of these categories. The specific restoration plans for these categories are presented below.

The Radiation Safety Officer ensures that:

*Contaminated areas have been defined and posted and decontamination operations are proceeding

*Radiation detection equipment, especially survey meters, are functioning properly and all restoration parties are trained and equipped with these meters

*Ensures that all enclosures and shielding used to contain radioactivity are functional

*Ensures that the ventilation systems and their associated alarms are functional

The RSO's staff will make certain that:

*Evacuation and fire alarms are functional

*The contents of the emergency lockers have been replenished

Based on information provided to the Emergency Manager/RSO by these individuals, the Emergency Manager/RSO will declare that the plant has been safely restored.

9.3 Resumption of Operations

Following the plant restoration, described in Section 9.2, operations will not be resumed until precautions have been taken to prevent recurrence of the incident. An investigation into the cause of the incident will be conducted by the RSO, who will report his/her findings to the Radiation Safety Committee. The investigation will identify any actions that could have been taken to prevent the accident, and the RSO will ensure that these actions are taken.

For all accidents other than minor spills, radiation surveys and engineering checks of all process, alarm and support systems will be conducted prior to the resumption of operations to be certain that all facility equipment conforms to the specifications described in Chapter 2 of this report.