CONCEPTUAL DECOMMISSIONING PLAN FOR THE LONDON ROAD FACILITY

Submitted to:

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INTRODUCTION

Background

Advanced Medical Systems, Inc. (AMS) manufactured and fabricated sealed sources of ^{60}Co for teletherapy and radiography machines at its facility at 1020 London Road, Cleveland, Ohio. Under the provisions of U. S. Nuclear Regulatory Commission (USNRC) license No. 34-19089-01, AMS currently possesses 60,974 curies of ^{60}Co, and 2,200 kilograms of depleted uranium (nickel plated) for use as shielding material. The types and quantities of all licensed materials in the AMS inventory are shown in Table 1.

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Purpose/Scope

Recently, AMS submitted an application to renew license No. 34-19089-01. As part of the renewal process, and pursuant to 10 CFR 40.36, a decommissioning funding plan is required. This report, which supplements the renewal application, describes the AMS plan to decommission the London Road facility after licensed activities are terminated. The extent of the decommissioning efforts described herein are intended to ensure that short- and long-term radiation exposures to workers and members of the general population after license termination are as low as reasonably achievable, and that the volume of radioactive waste to be disposed of is minimized. Included in this report is a description of the decommissioning objective for the AMS facility, the conceptual plan for decommissioning the site, an ALARA analysis to demonstrate that the preferred decommissioning methodology is consistent with the requirements of 10 CFR 20.1101, and a conservative estimate of the cost for achieving the decommissioning objective. The decommissioning funding plan for AMS, submitted under separate cover, is based upon the findings of this report.

where??

No - this is a DP (30.36) - not a DFP

ITEMS TO BE DECOMMISSIONED

The AMS operation, which occupies approximately 25% of an 80,000 square foot warehouse and manufacturing building at the London Road address, is contained on three floors. The main floor includes an office area, the Isotope Shop area, a hot cell, a source storage area and irradiation facility, a shielded work room, and miscellaneous unoccupied areas. The second floor contains additional unoccupied office space, a mechanical equipment room, and the ventilation system equipment room. The basement contains a waste storage areas, additional unoccupied space, and a liquid waste holdup tank room (WHUT Room). The majority of the 6.3-acre property is covered with asphalt or concrete.

The AMS facility was built specifically for the manufacture and distribution of sealed sources. Licensed radioactive materials are located in specific areas within the AMS building. The following is a description of the various areas of the building, along with conservative estimates of the quantity of radioactive material that exists in each area as of the date of this report. This information is also summarized in Table 2.

Hot Cell

The Hot Cell was designed and equipped to encapsulate sources of radioactive material used for medical therapy and industrial radiography. The cell is six (6) feet square and has 5.5-foot thick concrete walls and a four-foot thick floor and ceiling. There is a stainless steel floor pan in the cell, and 0.25-inch thick by 11 foot tall steel wall plates. The cell has a six foot wide, 42-ton hinged door at the rear. There is a 60-inch thick viewing window at the cell front.

Remote handling is accomplished with a pair of manipulators and a two-ton overhead crane. Every item of equipment in the cell and every item in the cell structure is removable. The location of the Hot Cell on the first floor of the AMS building.

The Hot Cell is a "Restricted Area". It currently contains approximately 4,000 curies of ^{60}Co and less than one (1) curie of residual surface contamination. Because of the structural integrity of the hot cell, this radioactivity is not readily dispersible in the event of a fire, flood or building damage.[1] The average ambient exposure rates within the cell are approximately 12 R per hour, with rates up to 200 R per hour on contact with certain surfaces.

[1] Denega, J. W., Neff & Associates, letter to D. A. Miller, Stavole & Miller regarding "Structural Analysis of WHUT Room and Hot Cell", July 25, 1995.

Isotope Shop

The Isotope Shop is located on the first floor next to the Hot Cell. This area has a concrete floor, ceiling, and interior walls. The exterior walls are of painted brick. Cobalt-60 sources are transported around this area in shielded containers.[2] The Isotope Shop also contains a table-mounted hood, a table, a sink, an old trash compactor, and three-ton overhead hoist with trolley, and a Tow Motor.[3] Within the Isotope Shop is the Source Garden.

The Isotope Shop is a "Restricted Area". However, with the exception of the Source Garden, it does not contain a significant inventory of licensed material. The radiation exposure rates in this area currently average between five (5) and 10 mR per hour, with a maximum of 80 mR per hour on the outside of the Decontamination Room doors.

The contamination levels in the Isotope Shop currently average about 50,000 disintegrations per minute (dpm) per 100 cm^2. If it is conservatively assumed that the flat surfaces in the Isotope Shop are uniformly contaminated at this level, and that the area consists of 85 m^2, there is a total of $1.91 x 10^{-4}$ curies of residual contamination currently in this area.

Source Garden

The Source Garden is located in the southwest corner of the building within the Isotope Shop area. This storage location houses 54 vertical tubes in a six-foot square well that extends from the first floor to the basement. An L-shaped shield around the well at the basement level is provided by two sand-filled compartments which are accessible through manholes in the first floor. The high-density concrete walls containing the sand shield are two-feet thick.

The 54 storage tubes in the Source Garden are arranged in a nine-by-seven rectangular array. The nine center spaces of the array are open and fitted with an irradiation plug which accommodates objects up to 8.5 inches square by 12 inches high. The source tubes terminate in a metal container through which cooling air is drawn from the room to the high-efficiency particulate air- (HEPA-) filtered exhaust system.

The Source Garden is in a "Restricted Area". It currently contains approximately 30,000 curies of ^{60}Co in a non-dispersible (sealed) form. Exposure rates over the Source Garden are approximately 200 mR per hour.

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[2] One such container is the "transfer monster", which is used to move sources in and out of the Hot Cell.

[3] The Tow Motor is an electric fork lift.

The contamination levels in the Source Garden currently average about 50,000 disintegrations per minute (dpm) per 100 cm^2. If it is conservatively assumed that the flat surfaces in the Source Garden are uniformly contaminated at this level, and that the area consists of 38 m^2, there is a total of 8.54×10^{-5} curies of residual contamination currently in this area.

Decontamination Room

The Decontamination Room is located behind the Hot Cell and at the side of the Isotope Shop. This area has a concrete floor and walls. The room provides space enough for opening the Hot Cell door into the ventilation controlled space of the Decontamination Room.

The room is equipped with water outlets and a floor drain which was used during previous decontamination operations. This drain has since been sealed. In this area is a vault that contains ancillary Hot Cell items and lead blankets, along with beam shields made of lead.

The Decontamination Room is a "Restricted Area" that contains approximately two (2) millicuries of activity. The average ambient exposure rates are approximately 80 to 100 mR per hour.

The contamination levels in this 12 ft. by 12 ft. room are approximately 3,000,000 dpm per 100 cm^2. If it is conservatively assumed that the flat surfaces in the Decontamination Room are uniformly contaminated at this level, and that the area consists of 18 m^2, there is a total of 2.43×10^{-3} curies of residual contamination currently in this area.

High Level Waste Storage Room

The High Level Waste Storage Room is located next to the Hot Cell on the first floor. This room has a concrete floor, walls and ceiling. There are drums of waste stored here, along with spent HEPA filters. The area in the front of the shield wall positioned in the room serves as storage.

The High Level Waste Storage Room is a "Restricted Area" that contains approximately 10 curies of activity. It currently has average ambient exposure rates of about 300 to 400 mR per hour. Contamination levels are insignificant (e.g., below the site release criteria).

Clean Equipment Room

The Clean Equipment Room is located on the second floor. This room has a concrete floor, walls and ceiling. It contains all of the facility service equipment with the exception of the HEPA ventilation equipment.

The Clean Equipment Room is a "Restricted Area", however it does not contain any dispersible activity. It currently has average ambient exposure rates of less than one (1) mR per hour, with a maximum exposure rate of 30 mR per hour on the wall that adjoins the HEPA Equipment Room. Contamination levels are insignificant.

HEPA Equipment Room

The HEPA Equipment Room is located on the second floor of the facility. This room has a concrete floor, walls and ceiling. It contains the facility HEPA ventilation equipment. There is one large HEPA exhaust blower that holds four two-foot by two-foot HEPA filters in a housing. This system services all of the isotope areas except the Hot Cell. There is also a small HEPA exhaust blower with only one HEPA filter in its housing. This system services the Hot Cell.

The HEPA Equipment Room is a "Restricted Area" that currently contains approximately two (2) curies of activity. It has average ambient exposure rates of about 80 mR per hour, with a maximum of 2,000 mR per hour on the exhaust duct from the Hot Cell.

Contamination levels in the area average 11,000 dpm per 100 cm^2. If it is conservatively assumed that the flat surfaces in the HEPA Equipment Room are uniformly contaminated at this level, and that the area consists of 20 m^2, there is a total of 9.91x10 curies of residual contamination currently in this area.

Back Basement

The Back Basement is located in the basement. This room has a concrete floor and walls. There is a drum storage area along one wall, with temporary shielding erected between the storage area and the main part of the room. There are approximately 500 high-density concrete blocks in the room that are positioned to provide shielding from the WHUT Room.

The Back Basement is a "Restricted Area" that contains approximately 15 Ci of activity. It currently has average ambient exposure rates of about 10 mR per hour, with a maximum of 50 mR per hour. Drums located behind the storage shield have contact exposure rates that range from 100 to 1,000 R per hour.

Contamination levels in this area average 10,000 dpm per 100 cm^2. If it is conservatively assumed that the flat surfaces in the Back Basement are uniformly contaminated at this level, and that the area consists of 82 m^2, there is a total of 3.69x10 curies of residual contamination currently in this area.

WHUT Room

The Waste Hold-Up Tank (WHUT) Room is located in the basement directly under the Hot Cell. This room has a concrete floor, walls and ceiling. The room walls are three feet thick to provide shielding from the room's contents.

The room contains a 100-gallon and a 500-gallon tank for liquid wastes. When the room was still in use, wastes were "held up" in the tanks until sampling/analysis confirmed that they could be discharged to the sewer system. However, in 1989 AMS ceased discharging liquid radioactive waste to the sewer system. Shortly thereafter, the WHUT Room was sealed.

The WHUT Room is a "Restricted Area" that contains approximately 53 curies of activity. The exposure rates in the room currently range from 50 to 240 R per hour.

Front Basement

The Front Basement is located on the east side of the basement next to the WHUT Room. It consists of three rooms: the passageway between the front and back basement, the Chart Room, and the Blue Tank Room. The rooms have concrete floors, ceiling, and exterior walls. The interior walls are wood-framed with painted drywall surfaces. There are 45 high-density concrete blocks in the Blue Tank Room that are positioned to provide additional shielding from the WHUT room.

The Front Basement is a "Restricted Area", however it does not contain significant residual activity. It currently has average ambient exposure rates of about one (1) mR per hour, with a maximum exposure rate of 20 mR per hour in the Blue Tank Room.

Contamination levels average about 1,250 dpm per 100 cm^2. If it is conservatively assumed that the flat surfaces in the Front Basement are uniformly contaminated at this level, and that the area consists of 63 m^2, there is a total of 3.55×10^{-6} curies of residual contamination currently in this area.

Miscellaneous Restricted Areas

There are a number of miscellaneous areas within the AMS facility. These include the air lock, the Isotope Shop warehouse, portions of a caged storage area, and office areas on the second floor. These areas have been designated as "Restricted Areas". The average ambient exposure rates in these areas currently range from "background" to one (1) mR per hour (isotope warehouse and caged storage area).

Average contamination levels range from zero to 5,000 dpm per 100 cm^2 in the contaminated side of the air lock. If it is conservatively assumed that the flat surfaces in the miscellaneous restricted areas are uniformly contaminated at this level, and that the area consists of 1,184 m^2, there is a total of 2.67×10^{-4} curies of residual contamination currently in this area.

Miscellaneous Unrestricted Areas

There are a number of other miscellaneous areas within the AMS facility that are not restricted for purposes of radiological control. These are a former chemistry laboratory, the Hot Cell control office, the first floor office areas, portions of a caged storage area, and the counting room. The exposure rates and contamination levels in these areas are not distinguishable from background.

Areas Outside of the Building

AMS and its predecessor disposed of ^{60}Co into the sanitary sewer system under the provisions of Title 10, Code of Federal Regulations, Part 20.303. All discharges were accounted for and below permissible limits.

As part of a 1989 decommissioning effort, the lateral connection from the AMS facility to the sewer system interceptor owned by the Northeast Ohio Regional Sewer District (NEORSD) was partially decontaminated and covered with a layer of concrete in order to stabilize residual materials. In May of 1989, AMS ceased generating any liquid radioactive waste, and discontinued the disposal of licensed material into the sanitary sewerage system.

Between August 17 and October 14, 1994, the USNRC performed a special inspection of the London Road interceptor and the lateral connection from the AMS building to the interceptor.[4] During this inspection, samples of sewer debris, water effluent, and a series of wipes were collected and analyzed. The findings of the inspection were that residual radioactive materials in excess of the criteria contained in USNRC Regulatory Guide 1.86, "Guidelines for Decontamination of Facilities and Equipment Prior to Release for Unrestricted Use or Termination of Licenses for Byproduct, Source, or Special Nuclear Material" were present in the interceptor in the immediate vicinity (outfall) of the AMS lateral connection.[5] However, there was no

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[4] The connection is comprised of a sewer line, a manhole, and a lateral.

[5] Removable activity in excess of 1,000 dpm per 100 cm^2 was found on the sewer interceptor brick directly below the AMS lateral. Other locations (e.g., the iron ladder below the lateral, the outer surfaces of the lateral, and at the 2:00 position of the lateral approximately one foot into the lateral from the interceptor) demonstrated measurable activity, but at levels well below the release criterion.

evidence of removable ^{60}Co activity above the release criteria in the outlet from the AMS processing drain, the sewer walls, or inside the lateral itself.[6]

Later in 1994, NEORSD intentionally isolated AMS from the sewage treatment system. This action rendered the facility storm- and ground-water drainage system non-functional, increased the hydrostatic pressure on the foundation structure, and caused groundwater to leak into the basement of the AMS facility. AMS instituted remedial actions for "isolation and remediation of the radioactively contaminated manhole and sewer line exiting the facility to the London Road Interceptor", and recovery of the facility drainage system.

During the remedial activities, it was discovered that the foundation drainage system (e.g., drain tile and gravel layer) was contaminated with ^{60}Co. Removable activity as high as 100,000 dpm/100 cm^2 was noted in the drain tile during excavation and investigation efforts. However, the shale layer upon which the building is built and which forms the base of the footer drains, did not contain detectable ^{60}Co. In fact, no ^{60}Co was identified other than between the drain tile and the shale. This finding confirms that contaminant migration did not occur.

The footer drains along the east (front) and south sides of the building were replaced and the area back-filled with clean gravel and soil. However, the footer drains in the vicinity of the Source Garden could not be replaced because of the presence of high ambient gamma exposure rates in the work area.[7] Also, prior to abandoning the lateral connection that runs from the west side of the AMS facility to the London Road interceptor, the four-inch discharge line from the AMS building, the AMS manhole and the 15-inch lateral connection were filled with grout. In advance of this action, the ambient exposure rates within the lateral were measured and found to be approximately one (1) milliR per hour. The exposure rate in the manhole prior to grouting ranged from 0.2 to 0.5 milliR per hour, with a maximum measured exposure rate of four (4) milliR per hour at the base. The contamination status of the lateral was determined using dry disk smears and a pancake GM detector. The results from this effort were negative for removable activity.

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[6] A site characterization study performed by ORISE in 1989 confirms the lack of significant residual activity in the AMS system. During this study, ambient gamma exposure rates in excess of background were not identified in the vicinity of the lateral. Furthermore, soil samples collected in this area were negative for the presence of ^{60}Co.

[7] A concrete wall constructed between the abandoned drains and the new foundation drains, and the presence of an impermeable liner on the ground surface above the drainage systems serve to fully isolate the residual contamination in the abandoned drains from the new drainage system.

If it is assumed that 20 linear feet of foundation drains remain outside the Source Garden, and that this length is uniformly contaminated to levels of 100,000 dpm per 100 cm^2, approximately 8.76×10^{-4} curies remain in this location.

If it is also assumed that the contamination inside the abandoned lateral and the manhole is evenly distributed, the Microshield code can be used to generate "dose rate-to-activity" conversion factors.[8] Applying these factor to the measured exposure rate of one (1) millirem per hour in the lateral and 0.5 milliR per hour in the manhole, translates into approximately 6.92×10^{-4} and 4.02×10^{-4} curies, respectively, of residual radioactivity at this locations.[9]

Depleted Uranium Inventory

AMS currently possesses approximately 2200 kilograms of depleted uranium for use as shielding materials and in the form of parts for teletherapy machines. The form of this material is stable and easily sold/transferred to other licensees. Therefore, this material is not addressed further in this report.

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[8] Grove Engineering, Inc. Microshield 4.10, dated October, 1993.

[9] As of the date of this report, AMS is in the process of determining whether residual radioactive materials are present beneath the basement slab of the London Road building. When there is evidence to support the presence of sub-basement activity, this report will be modified accordingly.

DECOMMISSIONING OBJECTIVE

A critical step in the decommissioning process is determining the objective of the action. The objective typically refers to the maximum acceptable dose limit that will be incurred by members of the general public after all action is complete and the USNRC license is terminated.

There are a number of dose limits promulgated by standards groups and regulatory agencies that are considered to present negligible risk, any one of which would constitute an acceptable objective for decommissioning of the London Road facility. The following are a few examples:

- The National Council on Radiation Protection and Measurements recommends a dose limit of 100 millirem per year from manmade sources for individual members of the public.[10] This limit is based on scientific recommendations developed through an impartial consensus process.
- The USNRC, in a 1991 Final Rule, adopted the recommendations of the NCRP as its basic dose limit applicable to any licensed facility.[11]
- The U. S. Environmental Protection Agency (USEPA) imposes a limit of 25 millirem per year to any member of the public from nuclear fuel cycle facilities.[12]
- In 1994, the USNRC issued proposed radiological criteria for decommissioning.[13] The goal of these criteria, which are based upon a dose objective of 15 millirem per year, is to ensure that residual radioactivity from decommissioned sites is "indistinguishable from background".
- In 1990, the USNRC issued a Policy Statement which established the framework within which the USNRC would make licensing decisions to exempt some or all

[10] National Council on Radiation Protection and Measurements, "Ionizing Radiation Exposure of the Population of the United States", NCRP Report No. 93, September, 1987.

[11] Title 10, Code of Federal Regulations, Part 20, "Standards for Protection Against Radiation", January 1, 1994.

[12] Title 40, Code of Federal Regulations, Part 190, "Environmental Radiation Protection Standards for Nuclear Power Operations", 1991.

[13] Title 10, Code of Federal Regulations, Part 20, Proposed Rule, "Radiological Criteria for Decommissioning", FR 59, No. 161, 43220, August 22, 1994.

regulatory controls over certain practices involving radioactive materials.[14] This Statement set a "below regulatory concern" dose criterion of 10 millirem per year, which was based upon what the USNRC considered to be an acceptable hypothetical lifetime risk of cancer of 3.5×10^{-4} per rem of ionizing radiation dose. However, this policy statement was subsequently withdrawn.

- In addition to meeting the proposed decommissioning dose objective of 15 millirem, the USNRC's proposed decommissioning rule would also require the licensee to demonstrate that the dose from residual radioactivity at the decommissioned facility is ALARA.[15] However, to minimize the burden of documentation and analysis, the proposed rule would allow the licensee to comply with the ALARA requirement by showing that the TEDE to the average member of the population does not exceed three (3) millirem per year.

For this assessment, a dose objective of three millirem is deemed applicable and is used as the basis for the following calculations. The reasons for selecting this objective are threefold: It is the lowest of the values listed above and demonstrates a desire to implement conservative radiological protection practices; it provides a regulatory basis for development of release criteria; and the intent is consistent with federal requirements that licensed radioactive materials be handled and released in a manner that ensures that exposures are as low as is reasonably achievable (ALARA) taking into account economic and societal factors.[16]

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[14] U. S. Nuclear Regulatory Commission, "Below Regulatory Concern Policy Statement", 55 FR 27522 (July 3, 1990).

[15] Title 10, Code of Federal Regulations, Part 20, Proposed Rule, "Radiological Criteria for Decommissioning", FR 59, No. 161, 43220, August 22, 1994.

[16] The definition of ALARA is taken from Title 10, Code of Federal Regulations, Part 20, "Standards for Protection Against Radiation".

CONCEPTUAL DECOMMISSIONING PLAN

Decommissioning Alternatives

Once a USNRC-licensed facility reaches the end of its useful operating life, it will be decommissioned. This typically means that the facility will be safely removed from service, and all radioactive materials in excess of levels which would permit unrestricted use of the facility will be disposed of. However, the USNRC has determined that several decommissioning alternatives will potentially satisfy this general requirement. These are "No Action", DECON, SAFSTOR and ENTOMB.[17] The following are brief descriptions of each of these alternatives:

- No Action - This implies that AMS would simply abandon or leave the facility after ceasing operations.

- DECON - This option is to remove all radioactive materials such that residual levels permit the property to be released for unrestricted use. DECON will lead to termination of the facility license and facility re-use shortly after cessation of facility operations. Since DECON is generally completed within a few months or years following facility shutdown, personnel radiation exposures are generally higher than for options that spread the decommissioning work over longer time periods to take advantage of radioactive decay. Similarly, larger commitments of money and waste disposal site space are also required for DECON.

- SAFSTOR - This alternative places and maintains the facility in a condition that ensures the risk to members of the general public is acceptable, that the facility can be safely maintained in a shutdown condition to allow for radioactive decay, and that it can be subsequently decontaminated and released for unrestricted use (deferred decontamination). SAFSTOR consists of a short period of preparation for safe storage, a variable safe storage period of continuing care consisting of security, surveillance, and maintenance, and a short period of deferred decontamination.

- ENTOMB - This alternative requires the encasement of the facility in concrete to protect the public from radiation exposure until its radioactivity has decayed to levels permitting unrestricted use of the facility.

[17] Terms and definitions taken from NUREG-0568 (U. S. Nuclear Regulatory Commission, Office of Standards Development, "Draft Generic Environmental Impact Statement on Decommissioning of Nuclear Facilities", NUREG-0568, January, 1981).

The "no action" alternative is clearly unacceptable to both AMS, regulatory agencies, and state/local officials. Given the short half-life of the radioactivity at AMS, ENTOMB is also not considered to be a viable alternative for the AMS facility. Therefore, at AMS, only DECON and SAFSTOR are considered to be potentially applicable decommissioning alternatives.

DECON is the more traditional approach to facility decommissioning. Its primary advantages are that it is relatively uncomplicated, eliminates the need for continued monitoring, and releases the facility for other uses within a relatively short time frame.[18] Activities under this option would include removal of contaminated equipment (hot cell contents, ventilation systems, packaged materials, sources), and decontamination of remaining room surfaces to eliminate residual radioactive materials above the release criteria, and performance of a final release survey. However, DECON would require a large initial commitment of money, maximize personnel radiation exposures, and result in a higher disposal volume than as would be required for SAFSTOR. Table 3 shows the manpower estimate for the DECON alternative.

SAFSTOR satisfies the requirements for protection of the public while minimizing initial commitments of time, labor, money, occupational radiation exposure, and waste disposal. Modifications to the facility would be limited to those which ensure the security of the building against intruders, and ensure containment of the licensed inventory. As a result of radioactive decay of this material, reductions in personnel exposure and simplifications in the complexity of operations can be achieved by deferring major decontamination efforts for 50 years. Also, because much of the residual radioactivity present in the facility will have decayed to background levels after the storage period, the volume of material that must be packaged for disposal, if any, will be significantly reduced.

The primary disadvantage of SAFSTOR is that personnel familiar with the facility at the time of deferred decontamination may not be available. Consequently, more time for training and orientation would be needed if the procedures for final license termination are extensive. Other disadvantages might include the fact that the site could be tied up in a non-useful purpose for an extended period, regulatory uncertainties in the future, possible interferences by state or local agencies, and the continuing need for maintenance, security and surveillance. Table 3 shows the manpower estimate for the SAFSTOR alternative.

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[18] Other advantages of DECON include the availability of a work force highly knowledgeable about the facility, and elimination of the need for long-term security, maintenance and surveillance.

Short-term Risks

Both DECON and SAFSTOR were evaluated with respect to their potential for increasing health and safety risks for members of the general public and workers involved in implementing the alternative. For this assessment, it was assumed that the general public will be protected from exposures by administrative and procedural controls. Therefore, the short-term impacts on this population group are considered to be negligible. It was also assumed that workers will follow ALARA procedures and all OSHA regulations, and that internal exposures will be prevented.

For the DECON option, the goal will be to maintain radiation exposures to decommissioning workers to below regulatory limits. At AMS, the critical exposure time will be during source packaging and shipment, the removal/dismantling of the hoods, ventilation system, hot cell, source garden, and high-level waste disposition. For the work durations and exposure rates shown in Table 4, the total worker dose for the DECON alternative is estimated to be 1037 person-rem.

For the SAFSTOR option, only minimal personnel exposures are anticipated as the facility is placed into a safe storage mode. Assuming that these activities are on-going for the person-days shown in Table 4, the total worker dose from external radiation is estimated to be 0.4 person-rem.

Long-Term Risks

The primary long-term risk incurred by humans after decommissioning is complete is exposure to the radioactive materials at the location of final deposition. For the DECON option, the long-term risks to members of the general public will be negligible. Also, for the ^{60}Co that is maintained inside of the building under SAFSTOR, the long-term risks to members of the general public will also be negligible. A previous assessment of the impact of the residual radioactivity that exists in the abandoned lateral and footer drains on members of the general public confirmed this conclusion.[19] Therefore, the relative long-term risks of DECON and SAFSTOR are equivalent, and will result in individual doses of members of the general population that are well-below the decommissioning objective.

Waste Disposal

Both of the decommissioning options entail disposal of radioactive materials at an off-site disposal location. For DECON, a total of 3,600 cubic feet and 70 curies will be disposed of as radioactive

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[19] Integrated Environmental Management, Inc., "ALARA Analysis for Remediation of the AMS Lateral Connection to the Sewer System", Report No. 94009/G-115, January 10, 1995.

waste. For SAFSTOR, a total of 100 cubic feet and 0.22 curies will be disposed of as radioactive waste.

Decommissioning Cost Estimates

The following assumptions were used for developing the decommissioning cost estimates for the DECON and SAFSTOR options as shown in Table 3:

- The AMS building will not be demolished during the decommissioning (i.e., the building structure will remain intact).

- There is no evidence that the soil underneath the building is contaminated. Any residual radioactivity that may exist in this area is clearly not mobile and will remain in place until eventual demolition of the building. Because the soil activity will have decayed to negligible levels by this time, no removal action is required.

- The inventory of Co-60 sources and depleted uranium at the facility will be shipped off site to another licensee.

- To ensure pricing consistency, all radioactive materials sent for disposal will be assumed to disposed of at the radioactive burial facility located in Barnwell, South Carolina, and asbestos waste will be disposed of at the facility in Clive, Utah.

- The final release surveys will be performed pursuant to the guidance contained in NUREG/CR-5849, "Manual for Conducting Radiological Surveys in Support of License Termination", USNRC Division of Regulatory Applications, Washington D.C., 1990.

- The following unit costs were assumed: Local technician labor at \$30/hour; local supervisory labor and licensing/regulatory support at a mean rate of at \$60 per hour; B-25 box cost at \$500 per box; personnel protective equipment at \$20 per day per person; waste transport at \$2.75 per mile; radioactive waste disposal costs at \$340 per cubic foot; and asbestos waste disposal costs at \$150 per cubic foot.

For the SAFSTOR option, it is assumed that the WHUT Room, the HEPA equipment room, and the hot cell will be placed in a safe storage condition for 50 years to allow decay of the radioactive materials present in those rooms. It is also assumed that radioactive waste materials will be stored on site for the entire 50 year SAFSTOR period, and that four hours per week (labor) are required for facility maintenance/surveillance during this period. It is also assumed that additional security systems and facility alarms will be installed to detect intrusion into the facility, water leakage, the presence of smoke/fire, and other incursions. Finally, since the lateral connection to the sewer,

old manhole, and abandoned drain tile are adequately isolated, it is assumed they will remain in place until the end of the 50 year SAFSTOR period.

For the DECON option, it is assumed that all radioactive wastes generated during the decommissioning and all the waste in the inventory, excluding WHUT Room materials and the sealed sources, will be sent for disposal. It is also assumed that 3,000 cubic feet of the 9,000 cubic feet of soil generated during the sewer remediation project is contaminated such that off-site disposal is required. All contaminated areas of the facility are assumed to be decommissioned in the DECON option.

Table 3 shows the decommissioning cost estimates for DECON and SAFSTOR. These are based on a variety of cost-estimating data, including curves, generic unit costs, vendor information, conventional cost estimating guides, and prior similar estimates as modified by site-specific information. Both capital and operation and maintenance (O&M) costs were considered, where appropriate, along with O&M costs that may continue beyond implementation of the decommissioning action. Present-worth analysis was used.[20] Using the above assumptions, and assuming a 25% contingency, the estimates are $3,304,474 and $912,860, respectively.

Cost/Benefit Analysis

According to the International Commission on Radiological Protection (ICRP), most decisions about human activities are based on an implicit form of balancing the costs and benefits leading to the conclusion that the conduct of a chosen practice is "worthwhile".[21] Thus the ICRP - as well as the USNRC - recommends that:

- No practice shall be adopted unless its introduction produces a positive net benefit;
- All exposures to ionizing radiation shall be kept as low as reasonably achievable, economic and societal factors being taken into account; and
- The dose equivalent to individuals shall not exceed applicable regulatory dose limits.

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[20] Since AMS will set aside cash to fund decommissioning in an interest-bearing account, the effects of inflation on the present-day costs are negated.

[21] International Commission on Radiological Protection, ICRP Publication 55, "Optimization and Decision-Making in Radiological Protection", Pergamon Press, 1989.

With respect to radiological impacts only, a simple cost-benefit analysis can be performed by evaluating the following:

$$X + \alpha S = Minimum$$

where X = the cost of achieving the decommissioning objective, S = the collective dose associated with the decommissioning activities, and α = a constant expressing the cost assigned to the unit collective dose.[22] Table 5, which is a summary of the cost-benefit analysis for the two decommissioning options, clearly demonstrates that the SAFSTOR option provides the greatest benefit at the lowest cost when radiological impacts are considered.

Description of the Methodology

When ready to decommission, the residual radioactivity of interest at AMS will consist primarily of residual materials generated as a result of source manufacturing, sealed sources, and bulk ^{60}Co. In its current state, the hazards to the general population from this licensable inventory are negligible. Furthermore, the short half-life of the materials demands consideration for delayed decommissioning in order to take advantage of radioactive decay.

Consistent with the ALARA concept, SAFSTOR presents the lowest overall radiological risk, results in the smallest volume of solid waste to be disposed of, and ensures that radiation exposures will be maintained as low as reasonably achievable with economic benefits taken into account. Therefore, SAFSTOR is the preferred decommissioning methodology for the AMS facility.

There are several subcategories of SAFSTOR. These are custodial SAFSTOR,[23] passive SAFSTOR,[24] and hardened SAFSTOR.[25] The following are brief descriptions of each:

- Custodial SAFSTOR - requires a minimum cleanup and decontamination effort initially, followed by a period of continuing care with the active protection systems kept in service throughout the storage period. Full-time onsite surveillance by

[22] A value of $1,000 per person-rem for α from Title 10, Code of Federal Regulations, Part 50, Appendix I, Section II.D is assumed to be valid for this assessment.

[23] Nomenclature taken from Schneider, K. J. And C. E. Jenkins, Technology, Safety and Costs of Decommissioning a Reference Nuclear Fuel Reprocessing Plant, NUREG-0278, October, 1977.

[24] Nomenclature taken from U. S. Nuclear Regulatory Commission, Regulatory Guide 1.86, "Termination of Operating Licenses for Nuclear Reactors", June, 1974.

[25] Nomenclature taken from Manion, W. J. And T. S. LaGuardia, "An Engineering Evaluation of Nuclear Power Reactor Decommissioning Alternatives", AIF/NESP-009, Atomic Industrial Forum, November, 1976.

operating and security forces is required to carry out radiation monitoring, to maintain the equipment, and to prevent accidental or deliberate intrusion into the facility and the subsequent exposure to radiation or the dispersal of radioactivity beyond the confines of the facility.

- Passive SAFSTOR - requires a more comprehensive cleanup and decontamination effort initially, sufficient to permit deactivation of the active protective (ventilation) systems during the safe storage period. All structures are secured and electronic surveillance is provided to detect accidental or deliberate intrusion. Periodic monitoring and maintenance of the integrity of the structure is also required.

- Hardened SAFSTOR (temporary entombment) - requires comprehensive cleanup and decontamination, and the construction of barriers around areas containing significant quantities of radioactivity. These barriers should be of sufficient strength to make accidental intrusion impossible and deliberate intrusion extremely difficult. Surveillance requirements are limited to detection of attack upon the barriers, maintenance of the integrity of the structures, and infrequent monitoring.

All three categories of safe storage require some positive action at the conclusion of the period of continuing care to release the property for unrestricted use and terminate the license for radioactive materials. Depending on the amount of residual radioactivity, these actions may range from completion of the final termination survey only, to dismantlement and removal of residual radioactive materials prior to the termination survey. Maintenance of the facility's structures and an ongoing program of environmental surveillance are also necessary for all categories of SAFSTOR.

Custodial SAFSTOR was deemed to be inappropriate for the AMS facility because of the need for ventilation systems and other support systems to remain operational to support AMS source exchange operations. Hardened SAFSTOR was deleted as an alternative because the existing AMS physical layout and security structure is sufficient to preclude intrusion into the facility.

The methodology of passive SAFSTOR is deemed appropriate because AMS intends to maintain a qualified staff on site to handle teletherapy source exchanges. This will require some of the systems at AMS to remain operational, such as the ventilation system, fire, security, and alarm system, and other equipment, to allow for source exchanges to take place. The on-site staff will conduct radiation monitoring, maintain equipment, prevent intrusion into the facility and deter release of materials from the facility.

Duration of Safe Storage Period

The duration of the storage and surveillance period under SAFSTOR can vary from a few years to approximately 100 years, depending on the type of facility. For the London Road facility, a safe storage period of 50 years is deemed appropriate. This period is based on consideration of such factors as desirability of terminating the license, radiation dose reductions, and cost. It is also consistent with the USEPA policy on institutional control reliance for radioactivity containment. Since the value of the property is small, even if released for unrestricted use, there is little incentive to decontaminate the facility earlier than would otherwise be dictated by the decay of radioactivity within the facility.[26]

Procedures

The AMS facility will be placed in a passive SAFSTOR mode by taking the following actions:

- With the exception of the WHUT Room, the basement of the AMS facility will have a gross decontamination performed.[27] This will require the removal and containerization of all unusable contaminated materials and equipment, removal of the removable surface contamination on floors and walls by strip coating or wiping, and performance of a contamination survey for the decontaminated areas. The basement will remain a restricted area.

- First floor areas (isotope shop, isotope shop warehouse, airlock, decontamination room) will undergo a gross decontamination. This will require the removal and containerization of all contaminated materials and equipment, removal of removable surface contamination from wall and floor surfaces, and the performance of a contamination survey of the decontaminated areas. These areas will remain restricted areas.

- Contaminated HEPA filters will be removed, containerized, and replaced with new filters. A gross decontamination will be performed in the HEPA equipment room with strip coat or by wiping and the room will be surveyed upon completion. The HEPA equipment room will remain a restricted area.

- The WHUT Room will be completely isolated from the basement by sealing all openings with concrete patch. No entry will be made into the WHUT Room during preparations for SAFSTOR.

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[26] U. S. Nuclear Regulatory Commission, "Draft Generic Environmental Impact Statement on Decommissioning of Nuclear Facilities", NUREG-0586, January, 1981.

[27] The USNRC recommends, in NUREG-0586, that gross decontamination be performed prior to placing a facility into a safe-storage mode. While these actions may result in personnel exposure in the short-term, they will reduce or eliminate the potential for future exposures and/or spread of contamination to other areas.

- Prior to sealing rooms in the basement, alarming level devices will be installed to indicate water incursion.

- The Hot Cell will be surveyed for contamination and radiation levels, sealed shut, and placed out of service. The manipulators will be rendered inoperable and placed out of service as well. All water and electric utilities to the Hot Cell will be removed from service.[28]

- All waste materials will be containerized and stored either in the high level waste storage room or in other areas for lower activity materials, as appropriate.

Final Release Survey

A final release survey will be performed upon completion of the safety storage period and prior to any area restoration. In general, the survey methodology will be designed in accordance with the recommendations of NUREG/CR-5849.[29] The objective of the survey will be to demonstrate that the radiological conditions at the AMS site meet the decommissioning objective, that surface radioactivity in the building is less than the site-specific release criteria, and that radiation doses to members of the general population will not exceed 15 millirem per year. These conditions will be demonstrated at the 95% confidence level. The survey data will also be used to calculate the total inventory of residual radioactivity at the London Road facility.

---

[28] The only lighting for inspection of the area will be through the Hot Cell window.

[29] Berger, J. D., "Manual for Conducting Radiological Surveys in Support of License Termination", Draft Report for Comment, NUREG/CR-5849, ORAU-92/C57, 1992.

REVIEW SCHEDULE

This conceptual decommissioning plan will be reviewed at least annually by the AMS Radiation Safety Officer (RSO) to determine if it requires revision due to any changes in the status of the AMS facility. This review will also include a review of the Decommissioning Funding Plan if changes have taken place that might impact the cost estimates presented herein. This plan may be reviewed more frequently if significant events take place, such as a reduction in the inventory of sources at the facility, decontamination of an area specifically addressed in this plan, or an incident involving the spread of contamination to previously uncontaminated areas of the facility occurs.

Should events at the AMS facility warrant a revision to this plan or the Decommissioning Funding Plan, the RSO will present the proposed changes to the Radiation Safety Committee for their review and approval. Revised plans will be submitted to the USNRC shortly thereafter.

TABLES

TABLE 1 - RADIOACTIVE MATERIALS INVENTORY

Item	Form	Material Description	Estimated Activity (Ci)
Licensed Material	Solid	Bulk ^{60}Co Metal	11747
Licensed Material	Solid	Sealed ^{60}Co Sources	49133
Licensed Material	Solid	Depleted Uranium Inventory	2175.52 kg
Packaged waste	Solid	^{60}Co-contaminated materials contained in high-level waste storage, boxes in the Isotope Shop and drums in the basement of the facility.	29
Packaged waste	Solid	^{60}Co in solid waste generated during the water treatment project.	0.4
Unpackaged waste	Solid/sludge	^{60}Co- contaminated materials contained in WHUT Room	53
Surface contamination	Solid	Estimate of uncharacterized surface ^{60}Co activity in the restricted areas of the facility	<11
		TOTALS (excluding uranium)	61033

TABLE 2 - AREAS TO BE DECOMMISSIONED [30]

Area	Current Activity (Ci)		Projected (50 years) Activity (Ci) Assuming No Removal Action	
	Solids or Sources	Other Residual Activity	Solids or Sources	Other Residual Activity
Hot Cell	4000.00	1.00e+00	5.80	1.45e-03
Isotope Shop	0.00	1.91e-04	0.00	2.77e-07
Isotope Shop Warehouse	22648.00	0.00e+00	32.84	0.00e+00
Source Garden	34232.00	8.54e-05	49.64	1.24e-07
Decontamination Room	2.00	2.43e-03	0.00	3.52e-06
High Level Waste Storage Room	15.00	0.00e+00	0.02	0.00e+00
Clean Equipment Room	0.00	0.00e+00	0.00	0.00e+00
HEPA Equipment Room	2.00	9.91e-06	0.00	1.44e-08
Back Basement	15.00	3.69e-05	0.02	5.35e-08
WHUT Room	0.00	5.30e+01	0.00	7.69e-02
Front Basement	0.00	3.55e-06	0.00	5.15e-09
Miscellaneous Restricted Areas	0.00	2.67e-04	0.00	3.87e-07
Miscellaneous Unrestricted Areas	0.00	0.00e+00	0.00	0.00e+00
Areas Outside Building	0.00	1.97e-03	0.00	2.86e-06
Totals	60914.00	5.40e+01	88.33	7.83e-02

[30] Excludes depleted uranium inventory.

TABLE 3 - MANPOWER AND COST ESTIMATES

Action	Person-days Required	Labor Costs ($)	Other Costs ($)	Total Cost ($)
DECON Option				
Hot Cell	180	43200	54600	97800
Isotope Shop and Source Garden	160	38400	34600	73000
Decontamination Room	90	21600	17300	38900
Clean Equipment Room	5	1200	5000	6200
HEPA Equipment Room	90	21600	19800	41400
Basement	360	86400	65200	151600
WHUT Room	180	43200	114600	157800
Excavate Outside Areas	60	14400	56300	70700
All Other Areas	200	48000	24000	72000
Ship Sources Offsite	60	14400	30000	44400
Building Release Survey	180	43200	11000	54200
Outdoor Release Survey	60	14400	7000	21400
Planning, Training, Mobilization	400	160000	2000	162000
Supervision	400	192000	4000	196000
Waste Disposal		10000	1446179	1456179
	Subtotal	752000	1891579	2643579
			25%Contingency	660895
			Total	3304474

Decon

TABLE 3 - CONTINUED

Action	Person-days Required	Labor Costs ($)	Other Costs ($)	Total Cost ($)
SAFSTOR Option				
Hot Cell	5	1200	1000	2200
WHUT Room	60	14400	8000	22400
HEPA Equipment Room	35	8400	4000	12400
Gross Decon. Of other areas	240	57600	5000	62600
Decon. Surveys	40	9600	2000	11600
On-going building maintenance and surveys	(50 yr)	312000	50000	362000
Decontamination at end of SAFSTOR	70	16800	25000	41800
Outdoor Release Survey	180	43200	11000	54200
Building Release Survey	60	14400	7000	21400
Waste Disposal	5	2000	38544	40544
Planning, training, mobilize	150	60000	1000	61000
Supervision	75	36000	2000	38000
	Subtotal	575600	154544	730144
			25% Contingency	182536
			Total	912680

SAFSTOR

TABLE 4 - COLLECTIVE DOSE ESTIMATE FOR DECON AND SAFSTOR

Action	Person-days Required	Average Exposure Rate (decay-corrected where necessary) per Task (mR/hr)	Collective Dose (person-rem)
DECON Option			
Hot Cell	180	12000	864 [31]
Isotope Shop and Source Garden	160	10	12.8
Decontamination Room	90	100	72
Clean Equipment Room	5	1	0.04
HEPA Equipment Room	90	80	57.5
Basement	360	10	28.8
WHUT Room	180	145000	0 [32]
Excavate Outside Areas	60	0	0
All Other Areas	200	0	0
Ship Sources Offsite	60	1	0.48
Building Release Surveys	180	0	0
Outdoor Release Surveys	60	0	0
Planning, Training, Mobilization	400	0	0
Supervision	500	0	0
Waste Disposal	30	5	1.2
		Total	1036.92

[31] Assumes that five (5) percent of the person-days required to perform the work required in DECON are spent in the hot cell.

[32] There will be no entries into the WHUT Room during DECON.

TABLE 4 - CONTINUED

Action	Person-days Required	Average Exposure Rate (decay-corrected where necessary) per Task (mR/hr)	Collective Dose (person-rem)
SAFSTOR Option			
Hot Cell	5	17.4	0.0348 [33]
WHUT Room	60	0.5	0.012 [34]
HEPA Equipment Room	35	0.1	0.028
Gross Decon. Of other areas	240	0.1	0.192
Decon. Surveys	40	1.4e-3	0.000448
On-going building maintenance and surveys	2000	1.4e-3	0.0224
Decontamination at end of SAFSTOR	70	0.1	0.056
Final Release Survey	240	0	0
Waste Disposal	5	0.01	0.0004
Planning, training, mobilize	150	0	0
Supervision	75	0	0
		Total	0.35

[33]. Assumes that five (5) percent of the person-days required to perform the work required in SAFSTOR are spent in the hot cell.

[34] Assumes that five (5) percent of the person-days required to perform the work required in SAFSTOR are spent in the WHUT Room.

TABLE 5 - COST-BENEFIT ANALYSIS

Option	**X ($)**	S **(Person-Rem)**	α **($ per Person-Rem)**	**Solution ($)**
DECON	3304474	1036.92	$1,000	4341394
SAFSTOR	912680	0.35	$1,000	913030

This report was prepared under the direction of
Advanced Medical Systems, Inc.

by

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and

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MAR 20 1996

David Cesar, Vice President
Advanced Medical Systems, Inc.
121 North Eagle Street
Geneva, Ohio 44041

Dear Mr. Cesar:

We have reviewed your letter dated October 20, 1995 with its accompanying "Conceptual Decommissioning Plan" (Plan). The letter and Plan were submitted in response to our August 17, 1995, deficiency letter.

The purpose of this letter is to summarize our review of your response. We will address: (1) the requirement for decommissioning financial assurance, (2) our August 17 letter and your response, and (3) the AMS Plan - SAFSTOR vs. DECON.

As you are aware, decommissioning financial assurance for the possession of byproduct material is required pursuant to 10 CFR Part 30, Section 35. This regulation requires certain licensees to submit a decommissioning funding plan (DFP), which includes a cost estimate and a financial assurance instrument, to cover the costs of future decommissioning <u>in the event that decommissioning is required at the present time</u>. In other words, the cost estimate and financial assurance instrument must cover the decommissioning costs if decommissioning began <u>today</u>, as opposed to a projected decommissioning date in the future. The amount of financial assurance required is based upon the quantity of material authorized on a license.

Our August 17 letter primarily discussed two issues which pertain to the cost estimate AMS submitted in support of decommissioning financial assurance. To summarize, the issues are: (1) NRC's request that AMS revise its facility characterization to include an assessment of the radiological conditions of the soil under the basement and WHUT room floors, and (2) incorporation of the current disposal costs at Barnwell into AMS' DFP. In your October 20 letter, you did not address issue (1). As stated in our letter, we are not confident that the three core samples taken through the basement slab <u>prior to the flood</u> are representative of the current radiological conditions of the soil under the basement and WHUT room floors. The presence of radioactivity under the floor would presumably increase the quantity of licensed material and therefore, increase the cost estimate for decommissioning financial assurance. Enclosed is a copy of our August 17 letter. Please submit an evaluation of the radiological conditions of the soil under the basement and WHUT room floors, or justify why the three core samples should be considered representative of the current radiological conditions.

~~9603220091~~ XA 3pp.

Contained within your Plan is a description of two methods for decommissioning the AMS facility - SAFSTOR and DECON, and the associated costs required for each method (910,000 dollars for the SAFSTOR option, and approximately 3.3 million dollars for the DECON option). After comparing and contrasting these two options, AMS proposes to establish approximately 910,000 dollars financial assurance based on a SAFSTOR approach using a 50 year storage period. The deferment of decommissioning through implementation of SAFSTOR is only applicable to power reactors. The Statement of Considerations for the 1988 decommissioning rulemaking (53 FR 24018) states, "The intent of the rule is to provide the necessary guidelines with regard to use of decommissioning alternatives in a manner which protects the public health and safety." In the 1988 rulemaking, provisions for deferring dismantlement are applicable only to power reactors where up to a 60 year period is specifically allowed. Deferred decommissioning for materials licensees and non-power reactors is not specifically allowed.

The supporting analyses in the "Generic Environmental Impact Statement on Decommissioning Nuclear Facilities" (GEIS), NUREG-0586, indicates that there may be cases for materials licensees where deferred decommissioning may be the most protective of public health and safety. In Chapter 14 of the GEIS, it is stated that deferred dismantlement could be a preferred option for source manufacturers which use short-lived nuclides that decay within <u>a few weeks or months</u>. However, longer SAFSTOR periods are not discussed as being suitable. In comparison to the utilities, the financial stability of many materials licensees is uncertain. Therefore, by providing decommissioning financial assurance below a level that would fund complete remediation of the facility at any time during the SAFSTOR period, the public taxpayer would be forced to accept a decommissioning obligation that substantially exceeds the proposed level of funding.

As presented in your plan, SAFSTOR is equivalent to decay-in-storage. Current NRC policy limits authorization for decay-in-storage to radionuclides with half-lives no greater than 120 days. NRC considers storage of radioactive waste with half-lives greater than 120 days as extended interim storage. Extended interim storage requires specific authorization. Furthermore, NRC policy states that extended interim storage of low level waste should not be a substitute for disposal to a licensed waste facility if access is available.

Therefore, unless a materials licensee does not have access to a disposal facility, all radioactive waste with half-lives exceeding 120 days should be shipped off-site. As stated in our October 31, 1995, letter regarding your application for renewal, we feel strongly that AMS should take the opportunity to ship its radioactive waste to Barnwell.

Table 3 to your Conceptual Decommissioning Plan entitled "Manpower and Cost Estimates" lacks the specificity the NRC needs to verify your cost estimate. A cost estimating table that organizes and provides an acceptable format to

the NRC for determining decommissioning cost components and activities is illustrated in Appendix F to Regulatory Guide 3.66 (enclosed). It provides an extensive checklist of decommissioning activities that must be included in a decommissioning cost estimate. Resubmit your cost estimating table using the format provided in Appendix F.

We will continue our review of your application upon receipt of the information requested in this letter. Please reply in duplicate, within 30 days, and refer to Control Number 98507.

If you have any questions or require clarification on any of the information stated above, you may contact us at (708) 829-9887.

Sincerely,

Original Signed By
John R. Madera, Chief
Nuclear Materials Licensing Branch

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

Enclosures: As stated

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K

Advanced Medical Systems, Inc.
1020 London Rd.
Cleveland, Ohio 44110
216-692-3270

April 12, 1996

Mr. John R. Madera, Chief
Nuclear Materials Licensing Section
U. S. Nuclear Regulatory Commission
801 Warrenville Road
Lisle, Illinois 60532-4351

Re: Conceptual Decommissioning Plan for Advanced Medic Systems Inc. (License No. 34-19089-01, Control No. 98507

Dear Mr. Madera:

Advanced Medical Systems, Inc. (AMS) is in receipt of your March 20, 1996 letter to David Cesar wherein comments on our Conceptual Decommissioning Plan were provided. Enclosed are our responses to your comments, along with a description of our proposed follow-up actions.

Once you have approved these comments, the Plan will be funded by the corporation and reviewed for continued applicability at the agreed-upon schedule. In the meantime, if you have any questions or if I can provide you with additional information, please call me at (216) 692-3270.

Sincerely,

Robert Meschter

Robert Meschter, R. S. O.

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

RECEIVED
APR 17 1996
REGION III
APR 17 1996

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RESPONSE TO USNRC COMMENTS ON THE AMS CONCEPTUAL DECOMMISSIONING PLAN

Agency Comment: The cost estimate and financial assurance instrument must cover the decommissioning costs if decommissioning began today, as opposed to a projected decommissioning date in the future.

> **AMS Response:** The Conceptual Decommissioning Plan forwarded to you on October 3, 1995 was based upon the SAFSTOR decommissioning methodology. The intent of the Conceptual Decommissioning Plan, in concert with the decommissioning funding requirement of 10 CFR 40.36, is that the USNRC would implement a similar decommissioning methodology should it be forced to draw on the financial assurance. Included in the cost estimate (Table 3) is $362,000 dollars dedicated to weekly facility surveillance and maintenance for the duration of the safe storage period. The eventual goal of SAFSTOR is release of the site for unrestricted use. Therefore, the cost of on-going surveillance/maintenance, eventual decontamination and waste disposal is included in the cost estimate shown in Table 3 of the conceptual Decommissioning Plan. Because these funds are already dedicated, there would be no additional financial burden to the taxpayers of the state in the unlikely event of an AMS default during the term of its license.
>
> **Action Taken:** No additional action required.

Agency Comment: The amount of financial assurance required should be based upon the quantity of material authorized on a license.

> **AMS Response:** Concur. However, on November 9, 1995, AMS submitted a revised license renewal application wherein a materials limit for ^{60}Co of 93,110 Ci was requested[1]. To date, the USNRC has taken no action on this application. The current license limit is 300,000 Ci, but it has been at least three (3) years since AMS has had in excess of 100,000 Ci of material in site. Therefore, it is inappropriate to require AMS to provide financial assurance for an inventory that is significantly above the likely inventory at any point in time simply because action has not yet been taken on AMS's application to modify the limit.
>
> **Action Taken:** No additional action required. However, timely USNRC action on our November 9, 1995 renewal application would be greatly appreciated.

Agency Comment: Please submit an evaluation of the radiological conditions of the soil under the basement and WHUT room floors or justify why the three core samples should be considered representative of the current radiological condition.

> **AMS Response:** AMS maintains that the soils upon which the London Road building was constructed have the same radiological character now as they did before the 1995 flood. The following are our reasons for this position:

---

[1] The requested limit was set to accommodate possession and sale of sealed sources as well as the radioactivity that exists in solid waste and residual radioactivity on building surfaces.

(1) Throughout the period of time that the basement of the London Road flooded due to the NEORSD's intentional blocking of all discharge paths, AMS maintained a minimal pressure differential between the inside and outside water levels in order to minimize uplift on the floor slab and eliminate the possibility of "back flow" of contaminated water to areas outside of the building. AMS's pumping efforts clearly provided the necessary level of pressure control. In fact, USNRC Inspection Report No. 030-16055/95006(DNMS) stated that, with the exception of one location on the second floor of the building, "the reinforced concrete core structure of the 1958 building that forms the hot cell, the WHUT room, the original radiography room, the source garden and the front and back basements was found to be in good condition". Furthermore, the inspector found "no additional signs of distress" on the basement slab, and concluded that "there was no observable significant impact on the structural integrity of the 1958 building as a result of the basement flooding event". Therefore, the structural evidence supports our that the radiological conditions of the soil under the basement and the WHUT room have not changed since the three core samples were taken in 1994 (e.g., before the flooding).

(2) During the 1995 sewer remediation project, AMS determined that the shale layer upon which the building is built and which formed the base of the existing footer drains, did not contain detectable radioactivity. In fact, no detectable activity was identified during the remediation other than that in the existing drain tile and fill material upon which they rested. Therefore, the radiological evidence from the remediation project supports our that the radiological conditions of the soil under the basement and the WHUT room are equivalent to the pre-flood conditions.

(3) Between the 1995 completion date of the sewer remediation project and the date of this letter, over 80,000 gallons of water have been pumped from the foundation drainage system, confirmed to be "clean" through laboratory analyses, and discharged.[2] This indicates that no mobile contamination is under the basement or in the new drainage system.

(4) Included herein as Attachment 1 is a Registered Hydrogeologist's report wherein he concludes that the new foundation drain is hydraulically connected to the soils under the basement floor, and that it is unlikely that contamination migrated from the basement to these soils.

In summary, the findings of the USNRC Inspection Report, the fact that the water being pumped from the foundation drains is radiologically benign, and the hydraulic connection between the soils under the building and the foundation drain all serve to support our position that the soils were not contaminated from the basement flood. Until the basement has been fully decontaminated, attempts to breach the integrity of the floor for the sole purpose of securing additional confirmation runs the risk of injecting contamination into the sub-basement environment where none currently appears to exist.

Action Taken: Page 8, line 14 of the Conceptual Decommissioning Plan will be modified to read: ". . . did not occur. However, if information is obtained at some time in the future to invalidate this assumption (e.g., if contamination is detected in the remediated foundation drainage system),

---

[2] Cobalt-60 was identified in one 3,000-gallon batch (e.g., hold-up tank No. 880), as I reported in my letter of February 26, 1996 to Cynthia Pederson, USNRC Region III. However, the source of this material was the tank itself, which was used as a process tank during the water treatment project. The residual cobalt-60 that was in the tank when the foundation drain water was transferred to it was later removed by filtration.

this Plan will be revised to include the cost of addressing the additional contamination during decommissioning."

Agency Comment: The deferment of decommissioning through impl...nentation of SAFSTOR is only applicable to power reactors. The GEIS (NUREG-0586) indicates that deferred dismantlement could be a preferred option only for radionuclides that decay within a few weeks or months. By providing decommissioning financial assurance below a level that would fund complete remediation of the facility at any time during the SAFSTOR period, the public taxpayer would be forced to accept a decommissioning obligation that substantially exceeds the proposed level of funding.

AMS Response: AMS takes exception to this comment for the following reasons:

(1) The GEIS shows that SAFSTOR is an acceptable decommissioning alternative for "short lived radionuclides" at power reactors *as well as* for materials licensees (see page 0-4, section 0.2.4 and page 14-9, section 14.3.2.2).[3] Furthermore, on page G-8 of the GEIS, the definition of short-lived radionuclides is given as "those radioactive isotopes with half-lives less than about 10 years". Since the ^{60}Co at AMS, a materials licensee, has a radiological half life of approximately five (5) years, the GEIS is supportive of decommissioning by the methodology of SAFSTOR for materials licensees.

(2) The GEIS does state that use of a "safe storage period of a few days to a few months may allow the radioactivity to decay to low enough levels that no further decontamination required" (see page 14-9, section 14.3.2.2) for a reference sealed source and radiochemical manufacturer. But the GEIS also states that while generic criteria were used for development of the report, "each facility can present problems that are unique to its decommissioning" (see page 14-4, section 14.2). The reference facility used to derive the findings for sealed source production was a generic manufacturer of sealed sources that carried "out their operations in small batches in glove boxes, hoods or remote operation cells, and contamination outside these structures is limited almost entirely to the ventilation ducts and filters" (see pages 14-4 and 14-5, section 14.2). The radiological conditions at AMS are distinctly different since there is extensive area contamination, significant solid waste recovered from remediation of the old sewer system, and there is a facility that was closed to all access under the authorization of the USNRC (e.g., the WHUT Room). Therefore, strict application of the GEIS' recommendations for the reference sealed source manufacturer to all sealed source manufacturers is inappropriate.

(3) In evaluating decommissioning alternatives, there are considerations that go beyond immediate license termination and release of the site for unrestricted use. Both DECON and SAFSTOR will result in unrestricted release of the site. However, the GEIS clearly states that the overwhelming advantage of SAFSTOR at a facility like AMS is the reduction in occupational exposure and the quantities of radioactive waste from radioactive decay. The ALARA analysis shown on page 16 of the Conceptual Decommissioning Plan further demonstrates this advantages.

[3] U. S. Nuclear Regulatory Commission, "Draft Generic Environmental Impact Statement on Decommissioning of Nuclear Facilities", NUREG-0586, January, 1981.

(4) The mission of the USNRC is to ensure adequate protection of the public health and safety, the common defense and security, and the environment from the use of nuclear materials in the United States. The USNRC and its licensees share a common responsibility to protect the public health and safety. Once a facility like AMS has reached the end of its useful life, there is no question that it must be decommissioned. However, decommissioning means that the facility must be placed in a conditi·· such that there is no unreasonable risk to public health and safety. It would be contrary to t.. mission of the USNRC to categorically reject the SAFSTOR option as a decommissioning alternative for AMS. Furthermore, since the eventual goal of SAFSTOR is release of the site for unrestricted use, and since the cost of on-going surveillance maintenance, as well as eventual decontamination and waste disposal is included in the cost estimate for the Conceptual Decommissioning Plan, there would be no additional financial burden to the taxpayers of the state.

(5) The USNRC, in its October 20, 1988 letter to Dr. Seymour S. Stein (AMS), concurred with AMS's February 8, 1988 and July 6, 1988 request to delay decontamination of the WHUT Room until personnel exposure rates are reduced significantly. (In the July 6th letter, AMS stated that: "To move this material from its present safe concealment through the general public environment merely to deposit it at another safe concealment presents unreasonable and unnecessary man-rem exposure and risk to the public health and safety at an unjustifiable exposure".) Since the Conceptual Decommissioning Plan that is the subject of this letter was developed with similar concerns in mind, AMS respectfully requests that the USNRC reconsider its current position on SAFSTOR in light of its previous position that "isolation can be carried out safely with some benefit in the reduction in occupational exposure and waste requiring disposal" (see page 1 of the October 20, 1988 letter from A. Bert Davis to Dr. Stein).

Action Taken: None required.

Agency Comment: Table 3 to your Conceptual Decommissioning Plan entitled "Manpower and Cost Estimates" lacks the specificity the NRC needs to verify your cost estimate. Resubmit your cost estimating table using the format provided [citation given].

AMS Response: Concur.

Action Taken: Included herein as Attachment 2 is additional cost information for the SAFSTOR option. This information is presented in the same format as Appendix F of USNRC Regulatory Guide 3.66, "Standard Format and Content of Financial Assurance Mechanisms Required for Decommissioning Under 10 CFR Parts 30, 40, 70 and 72" (June, 1990).

ATTACHMENT 1

*Q*uality
*E*nvironmental
*S*olutions, Inc.

April 11, 1996

Ms. Carol D. Berger
Integrated Environmental Management, Inc.
1680 East Guide Drive
Suite 305
Rockville, Maryland 20850

Dear Carol:

I have reviewed the letter dated March 20, 1996 from the U. S. Nuclear Regulatory Commission (NRC) to your customer, AMS, regarding the Conceptual Decommissioning Plan of the AMS Facility. It is my opinion that, based upon the effect of the hydraulic gradient in the vicinity of the basement when the basement contained water, the additional sampling of soils below the basement and the WHUT room floors should not be required. According to the evidence, it is unlikely that contamination migrated from the building to these soils, and, therefore, conditions in the soils would not have changed due to the flooding of the basement referenced in the NRC's letter.

Following is a brief recap of the evidence and the historical events:

1. Prior to the flooding, three core samples were obtained from native soils under the basement in the vicinity of the WHUT room. Contamination was not discovered in any of the samples;

2. Based upon a suspected discharge of radioactive contamination, the outfall of the AMS Building basement drainage system was plugged by the local sewer authority. As a result, ground water that normally was carried off site by the drainage system began to accumulate and enter the basement;

3. Prior to the removal of the water from the basement, monitoring records show the water elevation in the drainage system to be higher than the water level in the basement. Additionally, during the removal of water from the basement, the surface elevation of the basement water was intentionally maintained below the water elevation in the drain system;

4. Since the flooding, the basement drainage system was closed in place and has been replaced with a new subsurface perimeter-drain system; and,

5. The new drain system is utilized to remove ground water from the soils around the basement by pumping collected water into aboveground storage. Contamination has not been discovered in the removed water, and the water has been discharged to the local sewer. Since the initiation of the pumping, the basement has been dry.

Corporate Office
134 Holiday Court, Suite 306 • Annapolis, MD 21401
Telephone: (410) 841-5552 • Fax: (410) 266-5588

My conclusion that soil conditions did not change during the period when the basement was flooded is based upon the following:

1. The original drainage system created a local sink, collecting ground water from the basement vicinity and maintaining the ground water level below the basement floor. The water level observed in the drain is representative of conditions in the surrounding soils. In addition to intercepting ground water flowing toward the basement, the new drainage system is also hydraulically connected to the soils surrounding the basement floor;

2. The differential water levels between the drainage system and the basement during the period in which the basement contained water indicate a positive hydraulic gradient from the surrounding soils toward the basement. Water would not leak out of the basement under these conditions; and.

3. If water was leaking from the basement, contamination could be expected to show up in the water that is collected by the new drain system. Therefore, the lack of contamination in the removed water also indicates that the ground-water flow was toward the basement during its flooded period.

Thank you for the opportunity to be of service on this project. Please call me at 410-841-5552 if you have any questions regarding this letter.

Sincerely,

Donald E. Jones, P.G.
Registered Hydrogeologist

ATTACHMENT 2

Cost Estimating Table - SAFSTOR Alternative
(USNRC Regulatory Guide 3.66, Appendix F)

Table 1

Planning and Preparation						
Task	Work Days					Total Cost ($)
	Supervisor	Foreman	HP	Clerical	Total	
Preparation of Documentation for Regulatory Agencies	4	4	2	0.5	10.5	4560
Submittal of Decommissioning Plan to NRC when required by 10 CFR 30.36	10	10	10	1	31	14560
Development of work plans	10	10	10	1	31	14560
Procurement of Special equipment	2	2	0	0.5	4.5	1680
Staff training	1	1	1	0.5	3.5	1620
Characterization of radiological condition of the facility (including soil and tailings analysis or groundwater analysis, if applicable)	20	20	5	2	47	19520
Other	0	0	0	0	0	0
Total	47	47	28	5.5	127.5	56400

Table 2

Position	Unit Cost for Workers		Worker Cost/year ($)
	Basic Salaries ($/yr)	Overhead Rate (%)	
Supervisor	60000	100	120000
Foreman	40000	100	80000
Craftsman	30000	100	60000
Technician	30000	100	60000
Health Physicist	80000	100	160000
Laborer	30000	100	60000
Clerical	20000	100	40000

Decontamination and/or dismantling of Radioactive Facility components					
	No.	Dimensions		No.	Dimensions
Glove Boxes	0	n/a	Amount of Floor Space	–	200 m^2
Fume Hood	0	n/a	Ventilation ductwork	–	50 m
Hot Cells	1	27 m^3	Amount of Wall Space	–	3100 m^2
Lab Benches	0	n/a	Other	–	–
Sink and Drain	2	25 m		–	–

Table 3

Task	Work Days							Total Cost ($)
	Super visor	Forem an	Techni cians	HP	Crafts men	Labor er	Total	
Decon/dismantle major components and/or processing storage tanks (Hot cell SAFSTOR and decon after SAFSTOR)	10	10	20	2	0	15	57	17680
Decon/dismantle laboratories, fume hoods, glove boxes, benches, etc.	--	--	--	--	--	--	--	--
Decon/dismantle waste areas (radwaste area, scrap recovery, other) WHUT room	3	12	15	3	0	15	48	14400
Decon/dismantle service facilities (maintenance shop, decontamination areas, ventilation systems, other) includes HEPA system and misc. Areas	14	55	65	8	22	65	229	65920
Decon/dismantle waste treatment facilities and storage areas on site (including exhume and package contaminated soil and tailings, if any)	--	--	--	--	--	--	--	--
Monitor for compliance, reclean and monitor, if necessary	2	8	10	2	0	10	32	9600
Other (e.g., contractor fees)	80	0	0	0	0	0	80	38400

Table 4

Equipment/supply	Quantity	Cost
Personnel protective equipment	1 lot	18000
Misc. Decon supplies	1 lot	20000
Security system upgrade SAFSTOR	1ea	2000
Office supplies, misc. other	1 lot	2000
Survey equipment	1 lot	4000
Decon equipment rental	4 mo.	20000
Misc. items for 50 yr. SAFSTOR	1 lot	50000
Total		116000

Table 5

Waste type	Volume (m^3)	No. Of containers	Type of Container	Unit Cost of Container	Cost of Container
LLW	2.83	1	B-25	500	500
Asbestos	0.59	4	Drum	35	140
Total	3.42	5	--	--	640

Table 6

Distance shipped			2525 (miles)		
Unit Cost for shipment			2.65 ($/mile/truckload)		
Additional Charges - Overweight			0 ($/mile)		
Additional Charges - Surcharge			0 ($/mile)		
Waste Type	**No. Of shipments**	**Unit Cost for shipping ($)**	**Distance Shipped (miles)**	**Surcharge ($)**	**Transportation Cost ($)**
LLW	1	2.654	700	0	1855
Asbestos	1	2.65	1825	0	4836
Total					6691

Table 7

Burial Charges			340 ($/$ft^3$)	
Surcharges - Per container			0 ($)	
Surcharges - Disposal			0 ($/$ft^3$)	
Waste Type	**Burial Volume (ft^3)**	**Unit Cost of Burial ($/$ft^3$)**	**Surcharge ($)**	**Burial Cost ($)**
Class A - LLW	100	340	0	34000
Asbestos	21	150	0	3150
Total				37150

Table 8

Restoration of Contaminated Areas on Facility Ground						
Task	Work Days					Total Cost ($)
	Supervisor	Foreman	HP	Clerical	Total	
Backfill and restore site	0	0	0	0	0	0

Table 9

Final Radiation Survey						
Task	Work Days					Total Cost ($)
	Supervisor	Foreman	HP	Clerical	Total	
Outdoor release survey	36	40	20	1	87	43040
Building release survey	12	15	6	0.5	33.5	14480
Total	48	55	26	1.5	130.5	57520

Table 10

Site Stabilization, Long-Term Surveillance (if applicable)						
Task	Work Days					Total Cost ($)
	Supervisor	Foreman	HP	Clerical	Total	
On-going building maintenance and surveys (50 yr)	125	600	62.5	125	912.5	312000

R2

March 30, 1995

A

030-16055

Advanced Medical Systems
ATTN: David Cesar
Treasurer
121 North Eagle Street
Geneva, OH 44041

as approved in their renewed application (big blue) of Jan. 95!
34-19089-01

Dear Mr. Cesar:

We have completed our review of your cost estimate for decommissioning the London Road site and are concerned that your estimate of 1,795,612 dollars may not reflect the actual cost to decommission the facility. Overall, our concerns can be summarized as follows: (1) the cost estimate is based on the assumption that the soil under the building is not contaminated, (2) the cost for disposal of solid radioactive waste is based on a cost of $181 per cubic foot, (3) the decommissioning plan does not anticipate demolition of the building, and (4) the decommissioning plan contemplated that the W.H.U.T. Room will not require remote decontamination techniques.

Based on recent water problems at the facility, three additional issues may significantly impact the cost of decommissioning the London Road site. The three issues are: (1) the water may have structurally damaged some parts of the building which would need to be considered in the decommissioning plan, (2) the basement floor slab including the W.H.U.T Room floor, may have to be removed due to further intrusion of contamination into the concrete, and (3) the contaminated water may have migrated causing soil contamination. Based on past experience, the impact of having to remove and dispose of contaminated concrete and soil may cause the cost estimate for the London Road site to be greater than the initial estimate.

Section 4.1 of your submittal entitled "Cost Modifying Factors", states that the cost of radwaste processing, shipping, and disposal account for about 20 percent of the total decommissioning cost. This is based on a disposal cost of $181 per cubic foot. Based on current data from other regional compacts, a more realistic disposal cost would be $400 to $450 per cubic foot, resulting in an increase of 20 to 25 percent over your current estimate. Due to the fact that the Midwest Compact disposal site has not been selected in Ohio, the $400 to $450 cost range per cubic foot may be a reasonable estimate.

In order for the NRC to have a reasonable level of confidence in your cost estimate, please submit a detailed structural evaluation of the existing building, and perform a more detailed characterization of the extent of any concrete and soil contamination. Also, include in your estimate any special remote decontamination techniques that will be utilized to clean the W.H.U.T. room. Finally, please re-evaluate your estimate for the cost of disposal of radioactive waste.

W3

~~9504070098~~ 398507

Please submit your response within 30 days of the date of this letter. If you have any questions or require clarification on any of the information stated above, please do not hesitate to contact Kevin Null of my staff at (708) 829-9854.

Sincerely,

Original Signed By
John A. Grobe
Nuclear Materials Inspection
Section 2

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

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DATE	03/31/95		03/30/95		03/30/95					

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Advanced Medical Systems, Inc.
121 North Eagle Street • Geneva, Ohio 44041
(216) 466-4671 FAX (216) 466-0186

FAXED 10:42a 4-28-95

April 27, 1995

Mr. John A. Grobe, Chief
Nuclear Materials Inspection
Section II
U.S. Nuclear Regulatory Commission
Region III
801 Warrenville Road
Lisle, Illinois 60532-4351

Dear Mr. Grobe:

398507

I am in receipt of your letter dated March 30, 1995, regarding questions concerning the Decommissioning Funding Plan. Your letter requested a response within thirty days of the date of this letter.

I informed you in March that I would be out of the country for several weeks in April. I would be leaving on April 2. As I have just returned, I am not in a position to respond by April 30, 1995, to your questions.

I am requesting an extension of thirty days. We will have a response to you by May 31, 1995.

If you have any questions, please do not hesitate to contact me.

Sincerely,

D l Cesar

DAVID CESAR
Treasurer

DC/cs

cc: Kevin Null (USNRC)

~~9702060283~~

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Advanced Medical Systems, Inc.
121 North Eagle Street • Geneva, Ohio 44041
(216) 466-4671 FAX (216) 466-0186

April 27, 1995

Mr. John A. Grobe, Chief
Nuclear Materials Inspection
Section II
U.S. Nuclear Regulatory Commission
Region III
801 Warrenville Road
Lisle, Illinois 60532-4351

Dear Mr. Grobe:

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If you have any questions, please do not hesitate to contact me.

Sincerely,

D l Cesar

DAVID CESAR
Treasurer

DC/cs

cc: Kevin Null (USNRC)

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UNITED STATES
NUCLEAR REGULATORY COMMISSION
REGION III
801 WARRENVILLE ROAD
LISLE, ILLINOIS 60532-4351

May 4, 1995

Advanced Medical Systems, Inc.
ATTN: David Cesar
Treasurer
121 North Eagle Street
Geneva, OH 44041

Dear Mr. Cesar:

Pursuant to your request in letter dated April 27, 1995, you are hereby granted an additional 30 days in which to respond to our letter of March 30, 1995. We will expect a response no later than May 30, 1995.

If you have any questions, please feel free to contact Kevin Null of my staff at (708) 829-9854.

Sincerely,

John Madera, Chief
Nuclear Materials Licensing Section

License Pending File

9505110116

W/$

Advanced Medical Systems, Inc.
121 North Eagle Street • Geneva, Ohio 44041
(216) 466-4671 FAX (216) 466-0186

Post-it™ Fax Note 7671	Date 4/28/95 # of pages ▶ 1
To John A. Grobe	From David Cesar
Co./Dept. USNRC	Co. AMS, Inc.
Phone # 708/829-9866	Phone # 216/466-4671
Fax # 708/515-1259	Fax # 216/466-0186

April 27, 1995

Mr. John A. Grobe, Chief
Nuclear Materials Inspection
Section II
U.S. Nuclear Regulatory Commission
Region III
801 Warrenville Road
Lisle, Illinois 60532-4351

Dear Mr. Grobe:

I am in receipt of your letter dated March 30, 1995, regarding questions concerning the Decommissioning Funding Plan. Your letter requested a response within thirty days of the date of this letter.

I informed you in March that I would be out of the country for several weeks in April. I would be leaving on April 2. As I have just returned, I am not in a position to respond by April 30, 1995, to your questions.

I am requesting an extension of thirty days. We will have a response to you by May 31, 1995.

If you have any questions, please do not hesitate to contact me.

Sincerely,

D. Cesar

DAVID CESAR
Treasurer

DC/cs

cc: Kevin Null (USNRC)

~~9702060263~~ 18

March 30, 1995

Advanced Medical Systems
ATTN: David Cesar
Treasurer
121 North Eagle Street
Geneva, OH 44041

Dear Mr. Cesar:

We have completed our review of your cost estimate for decommissioning the London Road site and are concerned that your estimate of 1,795,612 dollars may not reflect the actual cost to decommission the facility. Overall, our concerns can be summarized as follows: (1) the cost estimate is based on the assumption that the soil under the building is not contaminated, (2) the cost for disposal of solid radioactive waste is based on a cost of $181 per cubic foot, (3) the decommissioning plan does not anticipate demolition of the building, and (4) the decommissioning plan contemplated that the W.H.U.T. Room will not require remote decontamination techniques.

Based on recent water problems at the facility, three additional issues may significantly impact the cost of decommissioning the London Road site. The three issues are: (1) the water may have structurally damaged some parts of the building which would need to be considered in the decommissioning plan, (2) the basement floor slab including the W.H.U.T Room floor, may have to be removed due to further intrusion of contamination into the concrete, and (3) the contaminated water may have migrated causing soil contamination. Based on past experience, the impact of having to remove and dispose of contaminated concrete and soil may cause the cost estimate for the London Road site to be greater than the initial estimate.

Section 4.1 of your submittal entitled "Cost Modifying Factors", states that the cost of radwaste processing, shipping, and disposal account for about 20 percent of the total decommissioning cost. This is based on a disposal cost of $181 per cubic foot. Based on current data from other regional compacts, a more realistic disposal cost would be $400 to $450 per cubic foot, resulting in an increase of 20 to 25 percent over your current estimate. Due to the fact that the Midwest Compact disposal site has not been selected in Ohio, the $400 to $450 cost range per cubic foot may be a reasonable estimate.

In order for the NRC to have a reasonable level of confidence in your cost estimate, please submit a detailed structural evaluation of the existing building, and perform a more detailed characterization of the extent of any concrete and soil contamination. Also, include in your estimate any special remote decontamination techniques that will be utilized to clean the W.H.U.T. room. Finally, please re-evaluate your estimate for the cost of disposal of radioactive waste.

9504070098 ~~9504070098~~ 20

Please submit your response within 30 days of the date of this letter. If you have any questions or require clarification on any of the information stated above, please do not hesitate to contact Kevin Null of my staff at (708) 829-9854.

Sincerely,

Original Signed By
John A. Grobe
Nuclear Materials Inspection
Section 2

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

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DATE	03/30/95		03/30/95		03/30/95					

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Advanced Medical Systems, Inc.
121 North Eagle Street • Geneva, Ohio 44041
(216) 466-4671 FAX (216) 466-0186

May 30, 1995

Mr. John Madera
U. S. Nuclear Regulatory Commission
Region III
801 Warrenville Road
Lisle, Illinois 60532-4351

RE: Decommissioning Funding Plan

Dear Mr. Madera:

In response to your request for information on our Decommissioning Funding Plan, the following are the answers to the concerns you raised:

(1) The cost estimate is based on the assumption that the soil under the building is not contaminated.

Answer: There is no evidence to indicate the soil is contaminated. In NRC possession is the Waste Hold-up Tank Room evaluation which involved three core samples taken under the building. Based on this sampling which was done by an independent lab and contractor, the soil under the building is not contaminated, and accordingly providing financial assurance for contaminated soil is not necessary.

(2) The cost for disposal of solid radioactive waste is based on a cost of $181.00 per cubic foot.

Answer: We were instructed by the NRC that the cost for waste disposal should be based upon Barnwell, South Carolina's waste disposal cost structure. As I am sure you are aware, South Carolina producers are not charged the additional fees that out of state producers are. This reduces the cost to a South Carolina company to approximately $181.00 per cubic foot. Based on NRC direction and Barnwell's historical cost structure, the cost for disposal of solid radioactive waste is correct.

(3) The Decommissioning Funding Plan does not anticipate demolition of the building.

Answer: There is no evidence to indicate that the building would have to be demolished for decommissioning. The building is approximately an 80,000 square foot, two-story structure. Serious contamination is restricted to the WHUT Room and the Hot Cell. The square footage of which is approximately 800 square feet. Accordingly, this small amount of contaminated square footage does not lend itself to demolition of the building.

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(4) The Decommissioning Funding Plan contemplated that the WHUT Room will not require remote decontamination techniques.

Answer: The WHUT Room evaluation, a copy of which the NRC has, indicates that the exposure limits within the WHUT Room are significantly less than those in the NSS Report issued in 1988. This leads us to believe that remote decontamination techniques when the decommissioning takes place will not be necessary. The primary technique used to decontaminate the WHUT Room are anticipated to consist of a limited access shielded vacuum system, extension tools, and scabbling.

Regarding your questions with recent water problems at the facility:

(1) The water may have structurally damaged some parts of the building which would need to be considered in the Decommissioning Funding Plan.

Answer: Discussions with our engineer do not lead us to believe that the building has been structurally damaged due to the basement flooding. No structural damage has been observed. The water's main entrance way was a standpipe and not through breaches in the structure.

(2) The basement floor slab including the WHUT Room floor may have to be removed due to further intrusion of contamination to the concrete.

Answer: The WHUT Room floor will be scabbled to remove decontamination. This method of decontamination may have to be repeated several times. Surveys of the basement floor slab outside the WHUT Room indicate that contamination is not widespread in the floor slab, and it would not have to be removed.

(3) Contaminated water may have migrated causing soil contamination.

Answer: Recent core borings outside the facility in anticipation of drain tile remediation with the recent flooding of the basement indicate that there is no significant contamination. Outside soil will be tested in the area of the four-inch drainline during the work currently being performed to address the flooded basement. At that time, additional sampling will be performed. Based on past surveys, there is no indication that there is significant contaminated concrete or soil on the exterior of the London Road facility. Therefore, the decommissioning cost is correct.

Furthermore, a DFP is a conceptual cost estimate of the cost to decommission a facility. AMS has no plans to decommission the facility, as the company is still in existence and requires the facility to continue operating. The detailed characterization of decommissioning would be done only in the submittal of the application to decommission which AMS is not submitting. The information enclosed is appropriate in detail for the decommission cost estimate to be compiled.

In addition, you had the question regarding costing for the Midwest Compact. As I am sure the NRC is aware, the Midwest Compact will be located in Ohio. The earliest the Midwest Compact will open is projected to be the year 2005; delays are anticipated. There are currently no regional compacts open. The last low-level waste disposal site which was open to Advanced Medical Systems, Inc. was located in Barnwell, South Carolina. We were instructed by the NRC to use Barnwell's cost structure for our waste disposal. Based upon NRC instructions, the assumption that should the Ohio-based Midwest Compact exist, the waste disposal costs for an Ohio company in the Ohio-based Midwest Compact would be approximately the same as for a South Carolina producer with access to the Barnwell disposal site is correct.

Based upon our response, the Decommissioning Funding Plan and Financial Assurance for our facility at 1020 London Road are reasonable.

If you have any further questions, please contact me.

Sincerely,

D Cesar

DAVID CESAR
Treasurer

DC/cs
cc: D. Miller
H. Billingsley
P. Ely
R. Meschter
C. Berger

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

95-24

June 28, 1995

MEMORANDUM TO: Kevin Null
Materials Licensing Section
Division of Radiation Safety
and Safeguards, Region III

FROM: Louis M. Bykoski
Materials Decommissioning Section
Low-Level Waste and Decommissioning
Projects Branch
Division of Waste Management, NMSS

SUBJECT: REVIEW OF ADVANCED MEDICAL SYSTEMS, INC., COST ESTIMATE RESPONSE NRC LICENSE NO. 34-19089-01

We have reviewed the Advanced Medical Systems, Inc., May 30, 1995, response to NRC's comments on the decommissioning cost estimate for the London Road site. We have provided our comments in the Attachment.

Attachment: As stated

Contact: Larry Pittiglio, NMSS/DWM
415-6702
Louis M. Bykoski, NMSS/DWM
415-6754

W17

SUBJECT: REVIEW OF ADVANCED MEDICAL SYSTEMS, INC., MAY 30, 1995, RESPONSE TO NRC'S COMMENTS ON DECOMMISSIONING COST ESTIMATE FOR THE LONDON ROAD SITE IN CLEVELAND, OHIO, (NRC LICENSE NO. 34-19089-01)

I have completed my review of the Advanced Medical Systems, Inc. (AMS) May 30, 1995, response to the NRC's comments (March 30, 1995,) on the decommissioning cost estimate for the London Road site and again concluded that the estimated cost of $1,795,612 does not realistically reflect the cost to decommission the facility. The basic reasons for my concerns about the cost estimate were the ones identified in my initial review and in the NRC Request for Additional Information of March 30, 1995, to AMS. My initial concerns were: 1) the cost estimate is based the on the assumption that the soil under the building is uncontaminated; and 2) the disposal cost was based on a cost of $181 per cubic foot. AMS' response (May 30, 1995,) did not adequately respond to our initial concerns. In addition, because Region III is familiar with the site, we recommend that Region III needs to evaluate whether AMS has adequately characterized the site to support their position regarding soil contaminations and extent of contamination at the site. Finally, AMS' assumptions that the cobalt source will be shipped to "other" sites, and decommissioning will not take place until the cobalt has decayed to a manageable level are unsupported.

AMS decommissioning cost is based on a disposal cost of $181 per cubic. I recommends using a more realistic cost of approximately $300 per cubic foot (based on July 1, 1995, reopening at Barnwell) base charge plus surcharges associated with curie content, weight, cask, etc. This will result in a significant increase in decommissioning cost.

As previously discussed, recent water problems at the site has resulted in three additional problems that may significantly impact the cost of decommissioning the London Road site. The two problems are: 1) the concrete slab may have to be removed from the Hot Cell as a result of the water causing additional contamination of the concrete; and 2) the contaminated water may have caused extensive soil contamination. Based on past experience, the impact of having to remove and dispose of the contaminated concrete, and to remove and dispose of significant quantities of contaminated soil, the cost estimate for the AMS, London Road site, may be several times greater than the initial estimate.

While AMS' response of May 30, 1995, stated that no structural damage was observed, and that recent core borings indicated no "significant" outside contamination exists, AMS has not performed an adequate site characterization to support their conclusions. In addition, AMS' statement regarding "significant" outside contamination is a clear indicator that outside contamination exists.

With regards to AMS' assumption that the soil under the Waste Hold-up Tank Room is not contaminated, the three core samples taken under the slab may not be sufficient characterization to support this assumption. Based on the current conditions at the AMS, London Road site, the estimated cost of $1,795,612 may be off by several times the actual cost to decommission the site. As we discussed above, significant changes in the quantities will have a significant impact on the total decommissioning cost.

Attachment

In order to have a reasonable level of confidence in the cost estimate, we recommend that NRC require AMS revise the cost estimate to reflect the recent cost for disposal at Barnwell, provide sufficient funds to address the uncertainties in their assumptions, or have Region III (because Region III is familiar with the AMS' site) review the adequacy of the three existing cores and the condition of the building to determine if more characterization is required to assess the extent of the concrete and soil contamination identified above. If Region III determines that AMS needs to perform an additional detailed characterization, we recommend that AMS be required to implement a rigorous schedule for characterizing the site, and that the site characterization plan be reviewed by NRC to assure that the characterization addressed all outstanding issues.

Please contact Larry Pittiglio, if you need additional help.