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GENERAL ATOMIC COMPANY
DECOMMISSIONING PLAN

JUNE 1979

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GENERAL ATOMIC COMPANY

DECOMMISSIONING PLAN

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GENERAL ATOMIC COMPANY

DECOMMISSIONING PLAN

Preface.

General Atomic Company carries out various activities which are licensed by the Nuclear Regulatory Commission and/or the State of California, an agreement state. These activities can generally be described as:

(1) broad nuclear research,

(2) reactor fuel fabrication and

(3) operation of two TRIGA research reactors

The research and fuel fabrication activities involving SNM are licensed under SNM-696; Docket 70-734. The byproduct and source material activities are licensed under California Radioactive Material License 0145-80. The two TRIGA research reactors, the Mark I and Mark F, are NRC licensed respectively under R-38; Docket 50-89 and R-67; Docket 50-163.

This decommissioning plan has been developed in response to an NRC imposed license condition.

The plan gives general information on the methodology, costs and financial arrangements considered relevant to the decommissioning of our licensed facilities. With noted exceptions, our plans are to decontaminate for release for unrestricted use all laboratory buildings and fuel fabrication facilities. The exceptions are the Hot Cells and reactor pool tanks which may or may not be viewed as useful in the future.

1. FACILITY DESCRIPTION

This plan relates to the licensee's facilities in which radioactive material is used or generated. Figure 1.1 is a plan view of the site. The following describes the facilities which are currently involved in routine radioactive material processing. The areas given (in square feet) are those for the various buildings whose walls may provide boundaries for radioactive material. Additional facility descriptions may be found in SNM-696 renewal, Gulf E&ES A12021 documents. Brief descriptions of the significant facilities are given below.

1.1 FLINTKOTE FACILITIES

1.1.1 Component and Fuel Manufacturing Building (SV-A) (106,380 ft^2)

Located at 11220 Flintkote Avenue in Sorrento Valley north of the main complex, the Component and Fuel Manufacturing Building contains offices, shops, and an area used for fuel and component fabrication. The building is 460 ft long and 120 ft wide with about two-thirds of the building of high bay construction. The east section of the building is divided into two floors for offices, a cafeteria, a laboratory and store rooms. Nonrelated activities carried out in the building include a machine shop, a sheet metal shop, and an assembly area for mechanical parts. Approximately one-half of the building area is devoted to fuel fabrication activities. The fuel fabrication area is bounded by two outside walls, a structural steel wall and a masonry wall, which separate it from other areas and activities. Access to the fuel fabrication area is restricted to limit access to authorized personnel, to control SNM, to maintain control and monitoring of personnel, and to prevent the spread of contamination. Separate ventilation systems are maintained for facilities and areas involved in SNM processing.

1.1.2 HTGR Fuel Production Process Development Building (SV-B) (15,200 ft^2)

Process development, pilot scale operations, and specialized fabrication work related to fuel production are conducted in a building adjacent to and north of the Component and Fuel Manufacturing Building. Process development is carried out in the east center portion of the building within an area which has floor to ceiling partitions. The separate cutting, grinding, machining, and polishing operations, on other than SNM, is located in the southwest corner of the building. Figure 1.2 shows a plan view of the facility.

The areas used to work with radioactivity have covered floors, painted walls, etc. to effectuate cleaning of any radioactive contaminants from such surfaces. Current levels of radioactivity are <20 dpm (α)/100 cm^2 of the building's affected portions.

1.2 MAIN SITE

1.2.1 Laboratory Building (119,370 ft^2)

The Laboratory Building contains approximately 400 laboratories, offices, shops, and a few low-level caves for work with low-level radioactivity. Most of the research activities involving metallurgy, chemistry, and experimental physics are conducted in this building. Several of these laboratories may involve rather small quantities of radioactive material. Typically such material will be found in laboratory hoods or special test equipment.

The floors of these laboratories are mostly covered with linoleum. The walls are typically painted masonry or wallboard. The radioactivity found on these surfaces is usually <20 dpm/100 cm^2.

1.2.2 Hot Cell Facility (6950 ft^2)

The Hot Cell Facility is equipped to perform a wide range of investigations of the physical, metallurgical, and chemical properties of irradiated specimens, including examinations of full-size power reactor fuel elements. The facility includes a high-level cell with three operating stations capable of handling activity levels of up to one million Ci of 1 MeV gamma, an adjacent low-level cell that can be used separately or in conjunction with the high-level cell, and a metallography cell equipped to provide complete metallurgical investigations including micro-, macro-, and stereo-photography. Supporting areas include a service gallery, physical test room, machine shop, manipulator repair, decontamination room, and an X-ray room.

The Hot Cell Building consists of office space, three Hot Cells, an operating gallery, and hot and cold auxiliary areas. Figures 1.3 and 1.4 show the plan view of the facility and details of the cells and shielding.

The high-level cell, which is the largest of the cells and which has the most shielding, is 8 ft wide, 18 ft long, and 15 ft high. The cell walls range from 42-in.-thick high-density concrete on the front and end to 60-in.-thick conventional concrete on the rear. A two-section steel door separates this cell from the adjacent low-level cell; the lower section is 21 in. thick and 11 ft. high, and the upper section is 12 in. thick and 3-1/2 ft high. There are three operating stations, two on the front wall and one on the end wall, each with a viewing window and two master-slave manipulators.

The low-level cell is 10 ft long, 8-1/2 ft wide, and 15 ft high. The walls of this cell are formed by the high-level cell door, a 17-inch.-thick solid steel door to the service area, a 36-in. front wall, and a 32-in. back wall of high-density concrete. The front wall has a viewing window with manipulators and various shielded access holes. There are also shielded transfer tubes connecting the low-level cell to the other two cells.

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The metallography cell measures 9 ft long, 5 ft wide, and 11-1/2 ft high. The walls are made of high density concrete and range in thickness from 34 to 36 inches. Personnel access to the cell is through a 15-in.-thick solid steel sliding door to the service area. The front wall of the cell has one operating station equipped with a viewing window, manipulators, and access holes. On the corner of the cell is an operating station equipped with a stereo-microscope and remote operated specimen stage for viewing small specimens. The side wall of the cell contains a metallograph mounted in such a manner that the stage can be retracted into the cell when the instrument is in use. When not in use the instrument is retracted into the cell wall, and a lead-filled shielding door located inside the cell is closed to protect the optical and electronic components.

There are special storage tubes in the cells, one in the low-level cell floor and three in the high-level cell floor. The tubes are 12.25 in. inside diameter and 6 ft 1 in. deep with 18-5/8-in.-thick gasketed plugs. The tubes are located 2 ft from the back wall of the cell and are located on 5 ft 6 in. centers. These tubes may be used to store radioactive and special nuclear materials to reduce radiation levels in the cells and to provide additional nuclear safety.

Auxiliary hot areas within the facility include the hot change room, the hot machine shop, the equipment decontamination room, storage areas for supplies, equipment, and casks, the service gallery and loading dock, and the service corridor.

The operating gallery is a normally clean area encompassing the operating faces of the cells. Work performed in this area includes remote hot cell operations, photography, and other normally clean operations.

1.2.3. TRIGA Reactors Building (6730 ft^2)

Located north of the Laboratory Building, the TRIGA Reactors Building provides an area for diversified experimental and irradiation studies using the inherently-safe TRIGA Mark I and Mark F reactors. Included within the building are associated reactor control consoles, a low-level counting room, a small shop, a neutron beam tube room, and the reactor's administrative offices. In addition, a contiguous "away from reactor" irradiated fuels laboratory exists. This laboratory utilizes the facility previously occupied by the Mark III TRIGA reactor decommissioned in December 1975.

Specific uses of SNM in the reactor portions of the building are generally governed by the terms of Utilization Facility Licenses R-38 and R-67. SNM that is not within the reactor pools may be under our NRC SNM-696 license as is the material in the "away from reactor" laboratory.

Within this building only the reactor pools present any significant decontamination problem in decommissioning. The reactor pools are typically 20 or 25 ft. deep. Their diameter and shape varies as illustrated on Figure 1.5. The Mark I pool holds approximately 4000 gal. of water. The Mark F pool and its storage channel holds approximately 24,000 gal. of water. The Mark III pool holds ≃25,000 gal. of water.

Each of the pools have either an aluminum or steel liner. Surrounding the pool lines at the region nearest the reactor core is a concrete shield to assure that adjacent soil and soil waters will not be activated.

1.2.4 Experimental Area I Facility (5800 ft^2)

This area consists of a building with approximately 10 laboratories, related offices and a bunker for radiochemical analytical and R&D work which requires the close support of the research reactors. There are about 1100 ft^2 of the total area located in a nearby underground bunker which houses a high-level chemistry lab and associated storage. The facility is used mainly for radiochemical analysis work.

1.2.5 TRIGA Fuel Fabrication Building (7500 ft^2)

The TRIGA fuel fabrication building, approximately 60 ft x 125 ft, is constructed of reinforced concrete prefabricated panels of about 7-1/2 in. thick for the walls. The roof is prestressed concrete approximately 4 in. thick. The building contains storage vaults, drum storage area, operations associated offices, locker and restrooms, as well as the fuel fabrication areas. The building has two truck roll-up doors and a personnel door, as well as an appropriate number of emergency exits to meet industrial safety requirements. At one end of the building is a pad providing outside space for a bottled gas farm, liquid nitrogen storage tank, air-conditioning units, high-efficiency air filter plenums and blowers, etc., which require routine servicing by persons not needed in material access areas.

1.2.6 Waste Processing Facility (61,000 ft^2)

This area is located 1000 ft east of the Hot Cell Facility. Included in the area are a service building and various storage areas. Adjacent to this facility are evaporation ponds that occupy approximately 4800 ft^2 and an incinerator for contaminated waste. Located within the service building is a trash compactor used to reduce volume of non-combustible waste.

1.2.7 Experimental Building (45,000 ft^2)

This building houses offices, engineering and metallurgical, as well as chemical pilot plant activities. The major activity involving the use of radioactive material is the chemical pilot plant activity. The metallurgical and chemical pilot plant work areas are subjected to the appropriate controls to minimize the possibility of uncontrolled spread or release of radioactivity to other areas. The support personnel for these activities utilize a fraction of the offices available. The other offices are used by such groups as accounting, fusion engineering, etc.

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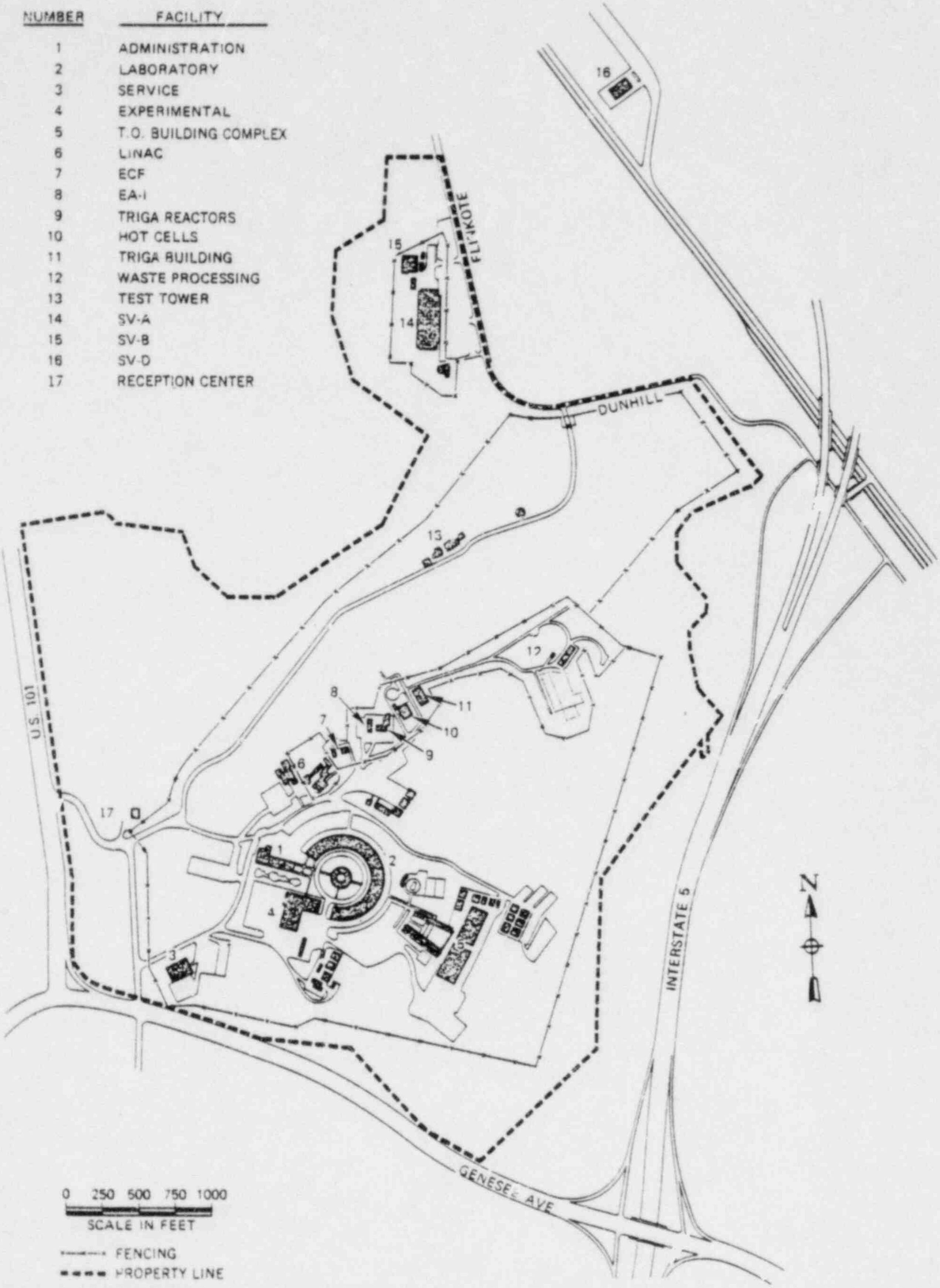

FIG. 1.1 PLAN VIEW OF SITE

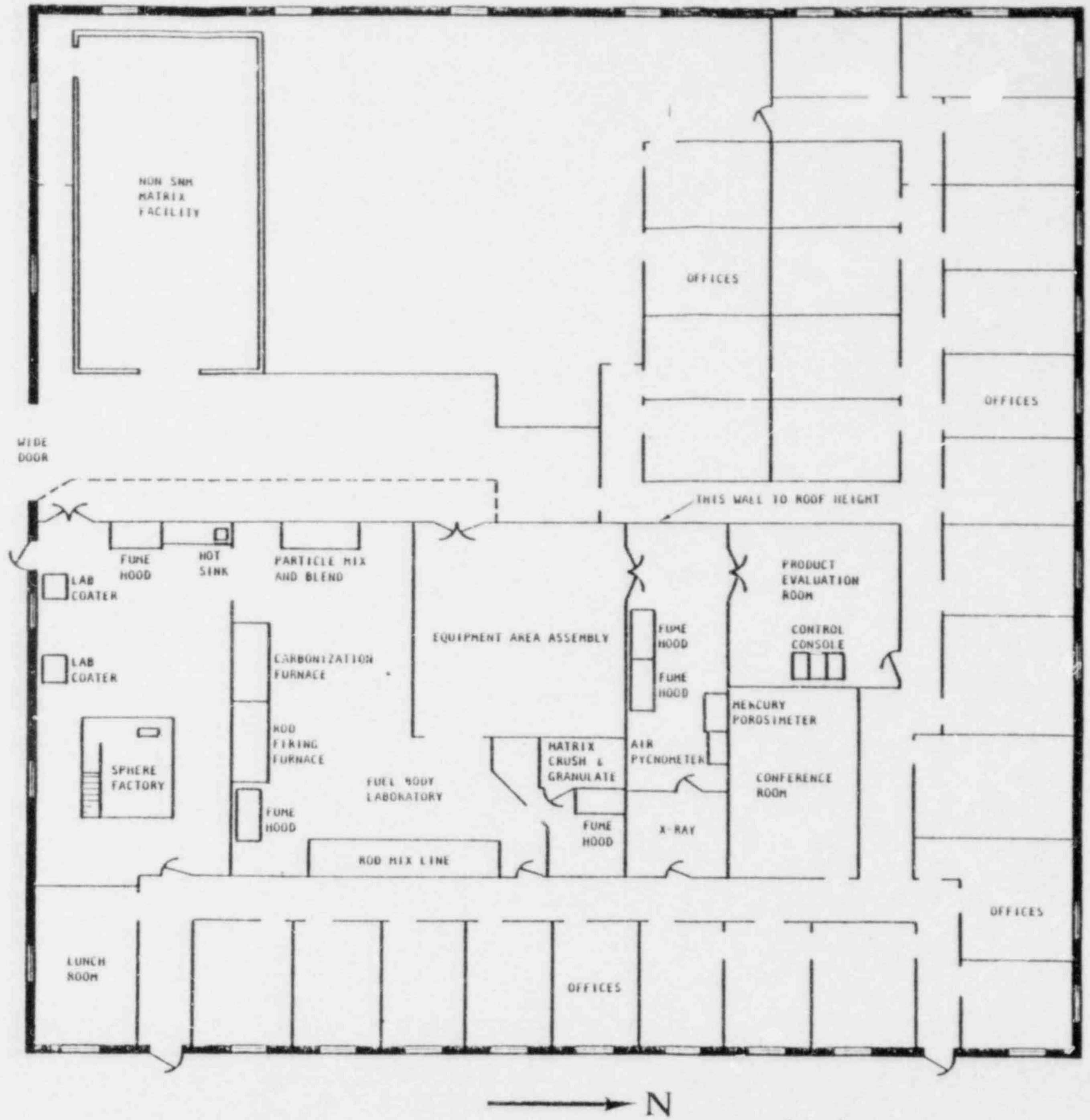

Fig. 1.2 HTGR Fuel Process Development Building

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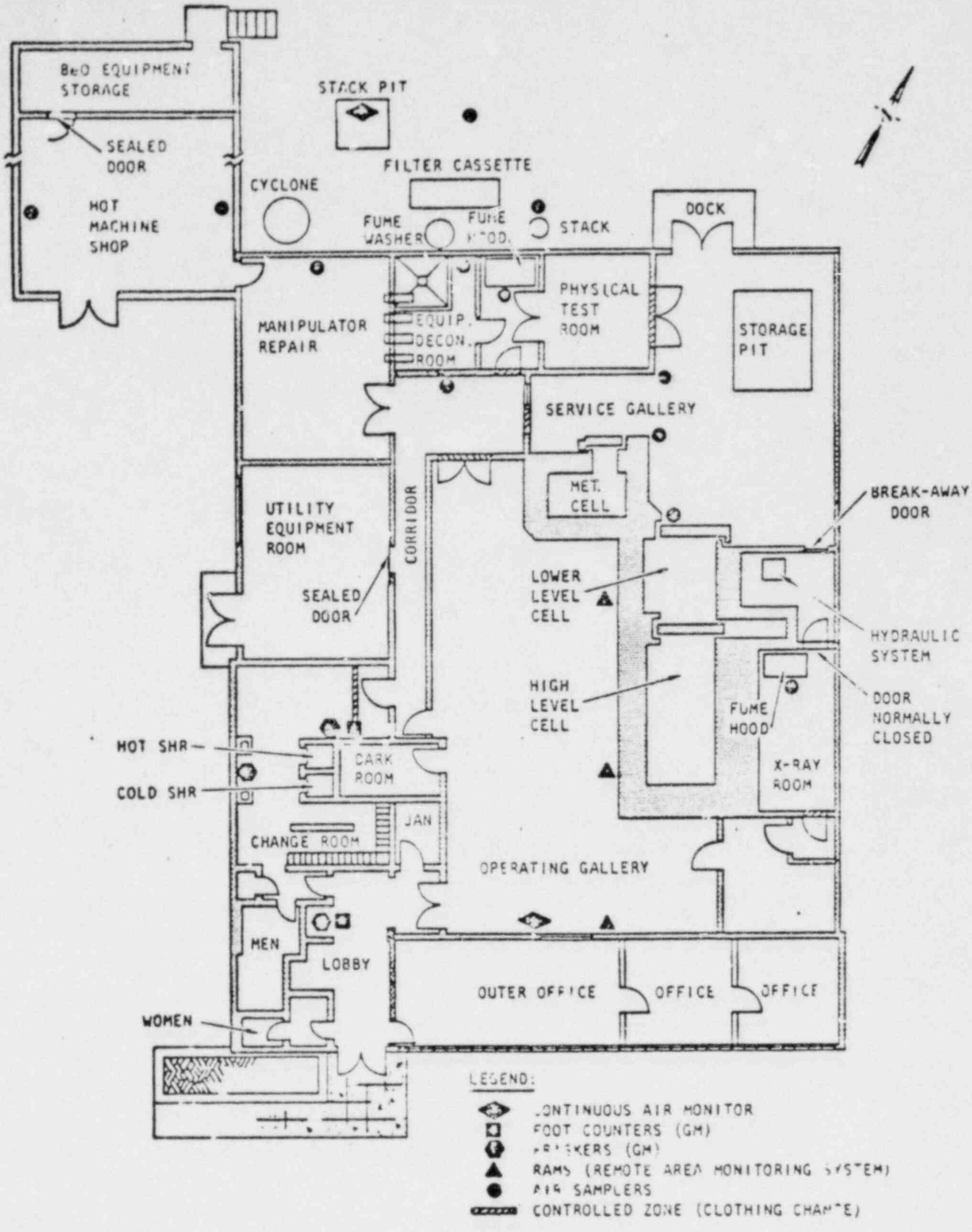

Fig. 1.3 Hot Cell Facility floor plan

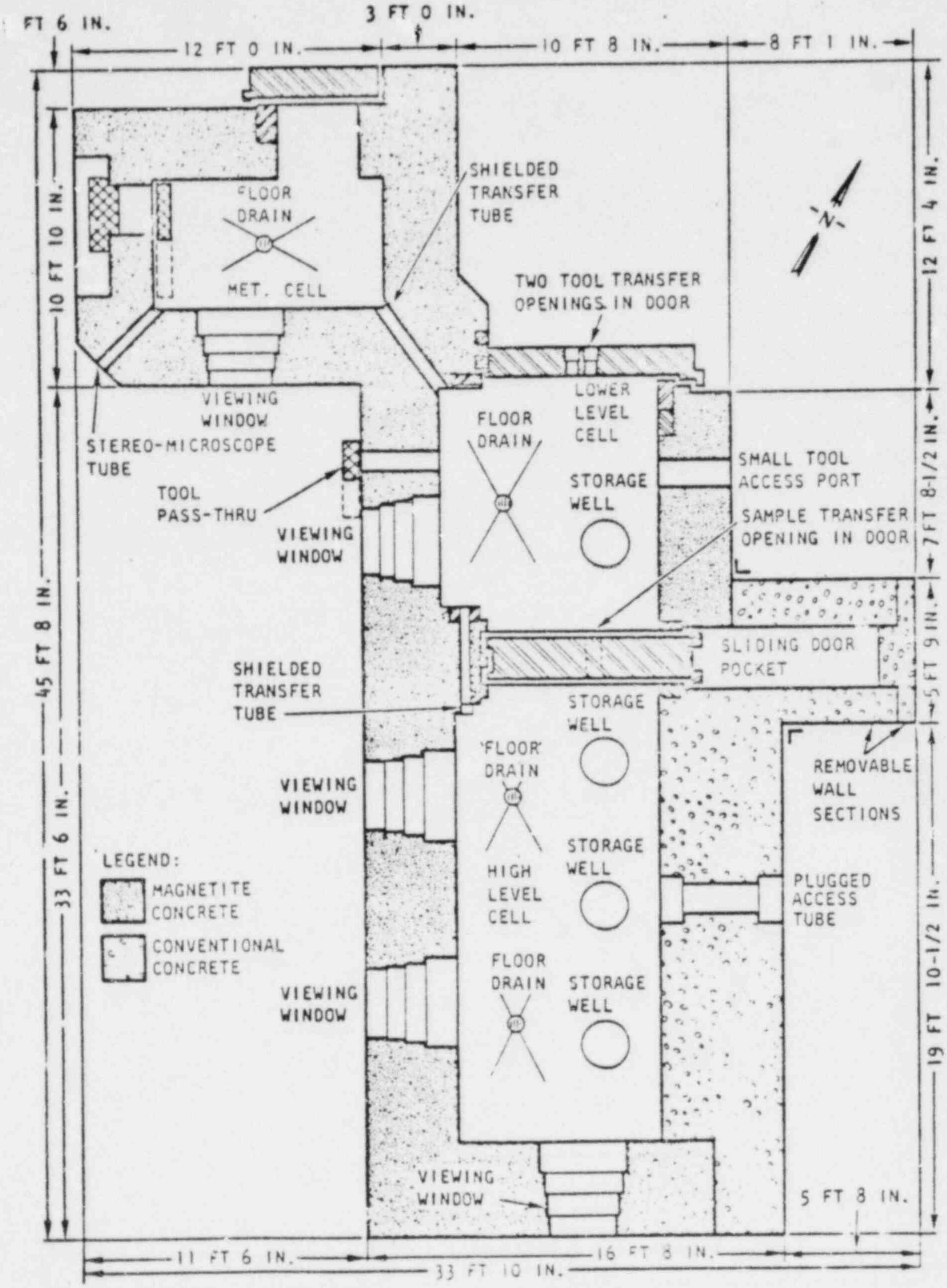

Fig. 1.4 Plan view of the Hot Cells

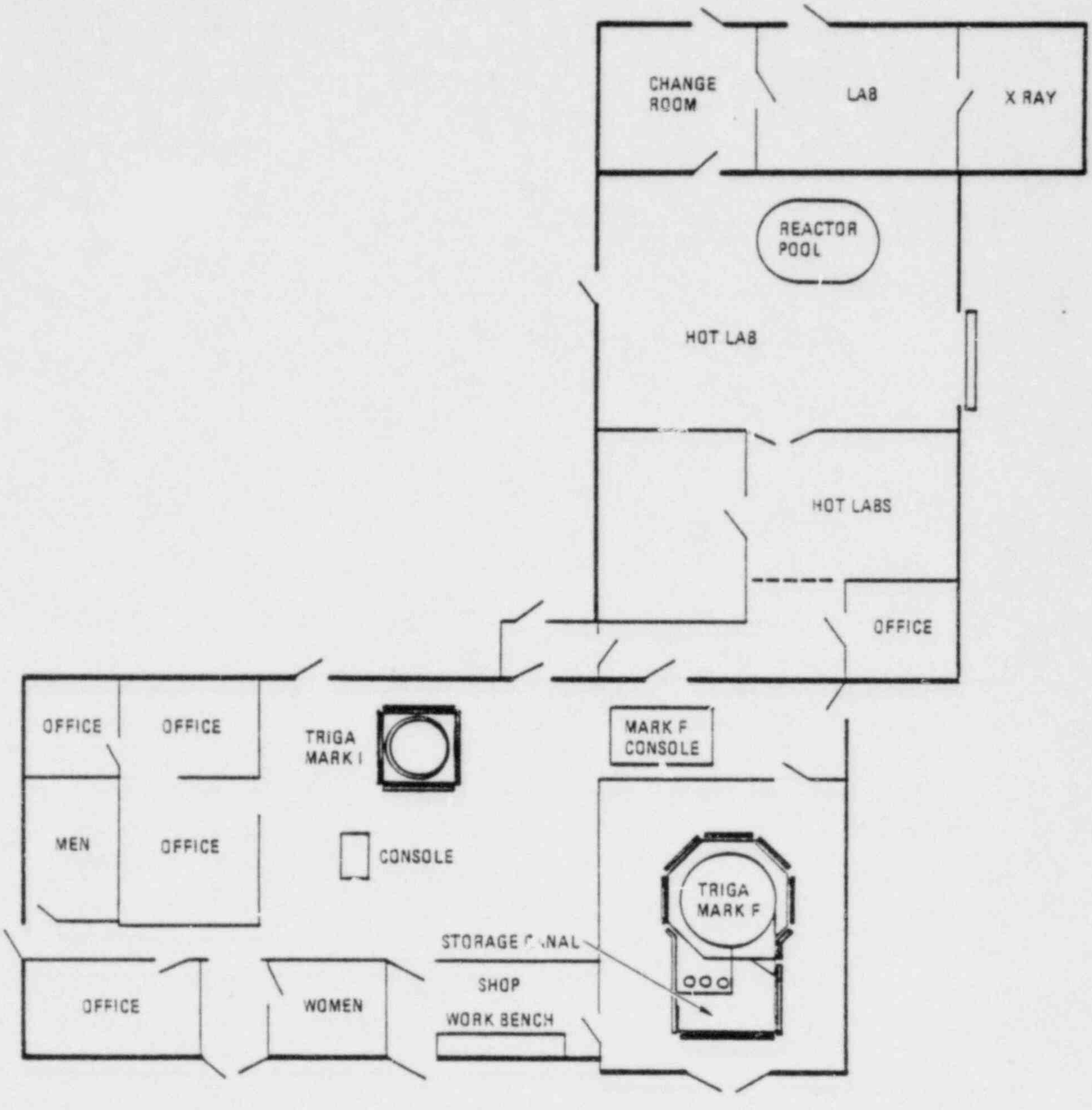

Fig. 1.5 TRIGA reactor building floor plan

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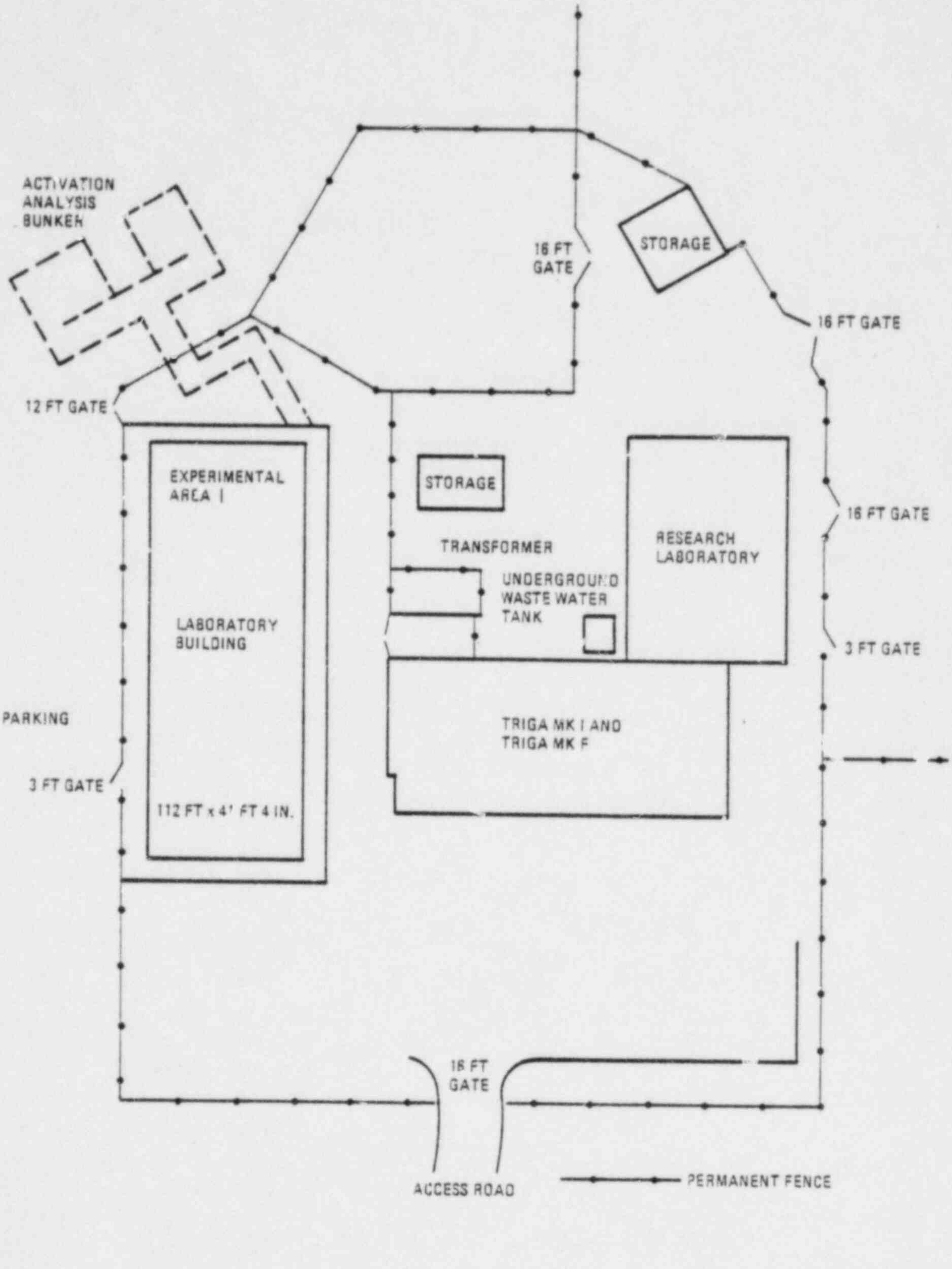

Fig. 1.6 TRIGA reactor facility complex

2. RADIOLOGICAL SAFETY MATERIAL CONTROL ORGANIZATION

General Atomic Company has established an organizational structure which provides for independent management review and approval of all work involving radioactive materials. The facility managers have responsibility to implement work in accordance with approved work plans. The Nuclear Material Control Division (NMCD) establishes policies and criteria applicable to work plans to assure that radiological exposures are "As Low As Reasonably Achievable" (ALARA), material volumes are minimized consistently, and the activities are consistent with applicable licenses and the state and federal regulations. The NMCD also accomplishes various inspections and ongoing surveillances to monitor personnel exposures and assure that work is being accomplished in accordance with the approved work plan. NMCD maintains the liaison with State of California and Federal agencies effecting requirements upon our licensed activities.

Details of the organization structure and respective responsibilities can be found in the SNM-696 license renewal documents. More specifically information can be found in SNM-696, Part II - License specifications (Gulf-E&ES-A12000), sections 3 and 4, as well as in SNM-696, Part I - Demonstration Volume (Gulf E&ES - A12001), sections 1 and 4. The extensive capability of the Health Physics Department is described in section 4 of the Demonstration Volume mentioned above.

The relevant components of this organization would be maintained to review and monitor the decommissioning activities to assure that regulatory and license requirements are met.

3. DISCRETE FACILITY PLANS

3.1 FLINTKOTE FACILITIES

3.1.1 Component & Fuel Manufacturing Bldg. (SVA) (106,380 ft^2)

The SVA Fuel Fabrication Facility has been used to process uranium and thorium into HTGR fuels. Radioactivity in this facility is largely that of materials within process equipment, with some contamination of the walls, floors, etc. Typical wall, floor and structural surfaces have contamination levels of the order of 500 dpm (α)/100 cm^2.

The basic plan would be to remove all radioactive materials from process equipment. All excess material would be transferred to another licensee or disposed of at a licensed burial site. Appropriate closure and surveys would be made to assure that material accountability requirements are met. Process equipment would be cleaned as appropriate, packaged for transfer to another fuel facility or to licensed burial. Once valuable equipment is removed, conventional decontamination using soap and water can begin, removing surface contamination using successive top to bottom clean downs. Limited sand blasting and facility substructure removal will be accomplished as necessary. This may apply to 10% of the facility structures.

When surfaces above floor level have been essentially all decontaminated, the floor surfaces will be decontaminated by a combination of sandblasting, chipping or complete removal as appropriate. Hot drains beneath the floor will be removed to assure that no radioactive materials have leaked into adjacent soil. More specific details follow.

Basic assumptions used in the SVA decommissioning are:

1. The building will continue to be used in other industrial activities not involving radioactive material.

2. All nuclear fuel and their scraps will be accounted for and transferred to another licensee or returned to the government.

3. Equipment of value may be sold and/or transferred to another licensee.

4. NRC Safeguards approvals will be obtained prior to embarking on the facility decommissioning.

5. Building ventilation systems will be operated to control airborne concentrations and dispersal of radioactive material.

Following the removal of process materials and valuable equipment, a contamination survey will be conducted. These data will be used to classify areas according to severity of cleanup required. Specific procedure and coded maps will be developed to guide the decontamination effort. They will be approved by Health Physics.

Logically one of the steps would be to remove equipment used in the processing of the material. Coaters, grinders, blenders, furnaces, screening machines are examples of such equipment. Such equipment would be placed in wooden boxes nominally 4'x4'x8', each box limited to approx. 0.5 ton. Our estimates indicate 170 boxes will be required with a total volume of 21.8×10^3 ft^3.

Next structures not considered part of the base building would be dismantled and similarly packaged. Equipment platforms and support mezzanines are typical of such structures. Estimates indicate 6500 ft^3 of this material. This will require on the order of 50 boxes of up to 1 ton each.

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With equipment and substructures removed, the top to bottom cleandown will begin. Extrapolating our ongoing experience of decontaminating the facility, we estimate that 10,000 gal. of mop water will be generated. Also generated will be approximately 500 ft^3 of wipes, etc. The waste water and wipes will be transferred to the waste processing facility for concentration, compactions and/or solidification.

Removal of residual radioactivity on the basic facility structure may require sandblasting, chipping, etc. The estimated volume of sandblasting materials and residue is 370 ft^3. These materials will be placed in approximately 50 metal drums and transferred to waste burial.

Finally waste drains, ventilation ducts, filter plenums and other collection systems can be removed, packaged and transferred to waste burial.

Radioactive surveys of the facility will be taken. Their results will be documented and made available to the Commission.

Following Commission approval, excavated areas will be backfilled and finished appropriate to intended new use.

3.1.2 HTGR Fuel Production Process Development Building (SV-B) (15,200 ft^2)

Up to one-third of the SV-B Building has been used essentially as a R&D laboratory experimenting with HTGR fuels production processes. Radioactively contaminated areas outside specific equipment are small, well localized and have low level concentrations. Building surface contamination levels of <20 dpm $(\alpha)/100\ cm^2$ are typical for the facility.

Decontamination of this facility is not atypical of any routine decontamination involving moderate spill of particulate material in such a laboratory. Maintaining ALARA dictates that major portions of the facility are routinely kept below the levels established for release to unrestricted access and/or use.

While no specific decontamination plan evaluation of wastes generation has been developed for this facility or other general R&D labs, a general plan for all such labs is as follows.

1. Survey each area and identify sources of radiation by type, quantity and difficulty to clean up.

2. Excess material and equipment will be removed.

3. Areas of highest radiation/contamination will be cleaned and removed.

4. Repeat steps 1 and 3 as required until localized sources are removed.

5. Perform a top to bottom clean down.

6. Survey the laboratory.

7. Reclean as necessary.

8. Resurvey and document results and await inspection prior to NRC release from licensing.

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3.2 MAIN SITE

3.2.1 Laboratory Building (119,370 ft^2)

The plans for decontamination of any laboratory involved with radioactive material would be to either decontaminate the laboratory equipment or remove it as appropriate. Refer to the general plan in Sec. 3.1.2. This would be followed by iterative decontamination of any surrounding areas exhibiting radioactivity until surveys indicate acceptable levels.

GAC routinely decontaminates these laboratories to assure that personnel exposures are at ALARA levels. Radiation levels of the order of <10 dpm $(\alpha)/100\ cm^2$ or 100 dpm $(\beta\gamma)/100\ cm^2$ are routinely achieved after such a decontamination activity.

3.2.2 Hot Cell Facility (6950 ft^2)

The Hot Cells in 1978 and early 1979 were substantially refurbished with new windows, overhauled manipulators and renovated in-cell equipment. During this activity readily removable contamination was remov[illegible] a thorough clean down including the sandblasting of cell surfaces. Radiation levels of 3 mRem fixed ($\beta\alpha$) were achieved with moderate effort involving 1200 manhours.

The plan for decommissioning the Hot Cell would include removal of radioactive materials in-cell and cell support equipment. Such materials would be placed in appropriate packaging, typically Type A and B, or large quantity as authorized by DOT and NRC. A thorough washdown would be accomplished. These residues would be processed in our waste processing facility. Residual radiation levels would be assessed. Sandblasting of the contaminated surfaces would be accomplished to remove the radioactive material lodged on the exposed surfaces. Again a thorough washdown and a radiation survey would be accomplished.

At this point contact decontamination is probably feasible, and an evaluation of the options for final decommissioning can be made. Alternatives such as cell entombment, demolition or practicability for release to unrestricted use would be made. The selected alternative will be pursued with Commission concurrence.

Believing that cell entombment would not be a desirable alternative, we have considered the extreme case of complete demolition and transport to the nearest licensed radioactive burial site. The demolition of the Hot Cell facility will involve the packaging and transport of up to 20,000 ft^3 of concrete as a worst case. To minimize the cost of disposal for such a large volume, engineering solutions such as surface chipping, etc., will be evaluated.

3.2.3. TRIGA Reactors Building (6730 ft^2)

The plan and cost estimates for the currently operated Mark I and Mark F TRIGA reactors is based largely on recent experience gained in the 2 Mw (th) TRIGA Mark III decommissioning (1975) and other decontamination activities accomplished at our Hot Cell as late as September 1978 through February 1979.

Basic assumptions in the plan for decommissioning the TRIGA reactors' facility are:

1. The building will remain as desirable for some future use not necessarily involving radioactive materials or SNM.

2. The decommissioning will occur in two phases separated by time to allow short-lived (≤month) isotopes to decay.

3. All radioactive fuels will be removed from the facility and disposed of via transfer to another licensee or to a government-approved repository pending reprocessing if permitted.

4. Radioactivity levels prior to decommissioning will be at or below levels specified in Table I of Regulatory Guide 1.86 dated June 1974.

These assumptions are consistent with the above-mentioned regulatory guide. Note: In place entombment will not be considered for our research reactors. The reactor pool liners and the concrete shields surrounding them may be left in place and buried if analysis indicates that they contain no significant radioactivity. Such evidence was presented in the Decommissioning of the TRIGA Mark III reactor (Sec. 3.2.3.4). In addition to the above, appropriate approvals or authorizations will be sought of Nuclear Research Regulation (NRR).

3.2.3.1 Mark I Plan

The fuel will be removed from the reactor and shipped to another licensee, burial or repository facility. Any such shipments will be made in NRC licensed packages authorized for such contents.

The non-radioactive components will be removed to interim storage awaiting final disposition, most probably sale to another reactor licensee or as junk. Such components would include the console, reactor bridge, rod drives and connecting rods, etc.

Radioactive components will be separated into two or more groups, e.g., those with relatively short half lives and those with much longer ones. The first group will be allowed to decay and be appropriately disposed of as Low Level or LSA waste. Such items may include: core grid plates, aluminum support structures, underwater storage racks, ion chambers, etc. Other items will likely include: control rods, lazy susan steel support structures, etc.

Pool water (~4000 gal.) from the reactor tank will be sampled and analyzed for radioactivity. The activity level of the pool water when the reactor is operating is between 0.01 to 0.1 μci/cc. μμci/cc levels are achieved shortly after reactor operations have ceased. If radioactivity levels prohibit release to the sewerage system and cannot be removed with the resin bed exchange system, the water will be transferred to the solar evaporative ponds, concentrated and ultimately solidified with other wastes destined for burial.

Having allowed the reactor to cool (≃6 months), one of two courses of action could be followed:

1. Upon determination that radioactivity levels of the tank and biological concrete shield materials are within acceptable limits, we will fill the tank in.

2. If the radioactivity in the materials are excessive and long-lived, the tank and/or shield will be removed and disposed of at an appropriately licensed waste burial site.

3.2.3.2 Mark F Plan

The fuels will be removed from the facility in a manner similar to the Mark I except that burial of HEU fuels is not considered as appropriate in light of current safeguards policy.

The handling of components will be similar to that mentioned in the Mark I plan above.

Radiation levels will be determined for the pool's steel tank and its inside layer of Gunite.

The radioactivity level of the pool water (24,500 gal.) will be determined and disposed of in a fashion similar to that of the Mark I. Activity level in the pool water is roughly that of the Mark I.

Portions of the Gunite layer and steel tank, as required, will be removed, packaged and disposed of as radioactive waste. Previous experience indicates that any induced activity in the concrete biological shield will be below 10 CFR 20 exempt concentrations.

Upon verification of the above the tank will be filled and covered with a layer of concrete.

3.2.3.3 Reactor Facility Waste Water Storage Tank

This tank contains low level waste water typically from decon operations or the drain from an occasional experiment.

This plan provides for removing any waste water to the evaporative ponds for routine processing through the licensed waste yard activity. The tank internals may be decontaminated if practicable. Otherwise the tank will be removed, cut up and packaged for burial.

The concrete caisson which holds the tank will be surveyed for any leaked radioactivity. None is expected.

3.2.3.4 Mark III Pool

The Mark III Pool is a remnant part of the TRIGA Mark III reactor facility which was decommissioned in 12/10/75. Since the reactor's decommissioning the building and reactor pool have been used for certain "away from reactor" irradiated fuel experiments licensed under 10 CFR 70 and our Agreement State license. During the reactor's decommissioning calculations were made and measurements were taken to show that induced actfvity in the concrete biological shield, as well as the soils beyond, were below those specified in 10 CFR 20.304. Refer to Docket 50-227, GAC letter #100-634 dated 10/29/75.

The decommissioning of this facility will involve the removal of any experiment and experimental equipment, the removal and treatment of 25,000 gallons of slightly contaminated pool water, tank liner decontamination, and radiation survey. Upon commission verification of the contamination/radiation levels and approval for release to unrestricted use, the pool cavity can be backfilled and capped appropriate to next user requirement.

3.2.4 Experimental Area I

The experimental Area building contains radio chemistry laboratories primarily associated with activation analysis of materials, fission product analysis, etc. Two of the labs have been equipped to use gram quantities of plutonium in solids, solutions and precipitates within closed enclosures such as gloveboxes.

The decommissioning of this laboratory facility will include special considerations for keeping plutonium contaminated equipment and residues separate from other radioactive wastes.

This building was designed and equipped as a radio chemistry facility, accordingly the floors and work surfaces were sealed. Special cabinets, hoods, sinks, etc., were provided to assure ease of cleaning and minimal contamination spread.

Routine decontamination is accomplished. Removable contamination outside work stations or surfaces is typically found to be <50 dpm ($\beta\gamma$)/100 cm^2 or less. In the plutonium work areas action levels for decontamination are 5 dpm (α)/100 cm^2.

Equipment such as hoods, sinks, cabinets, etc., not a part of building partitions would be removed. Floor coverings would be removed.

The facility would be decontaminated for eventual release to unrestricted use.

The waste volume generated from this facility is anticipated to be less than 2000 ft^3; of this up to 350 ft^3 may have slight plutonium contamination on the surfaces of metal glove boxes and other used laboratory supplies or equipment.

3.2.5 TRIGA Fuel Fabrication Facility

This facility has been used to manufacture uranium metal alloys and assemble them into reactor fuel rods. The alloy operations involve essentially the conversion of enriched uranium metal into a UZr metal alloy and sizing the alloyed pieces with lathes, milling machine, and a centerless grinder.

The plan for decommissioning involves the:

1. disconnect and removal of production equipment;
2. removal of process specific facility equipment such as station ducts, elephant trunks, water cooling lines, etc.;
3. decontamination of facility floor, walls and other surfaces remaining in the building.
4. releasing the facility for unrestricted use.

During step 1, equipment of value to others will be cleaned appropriately and shipped. Such equipment may include the vacuum cooling furnace, several lathes, a milling machine, centerless grinder, portable welder, etc. Residual equipment will be cleaned of surface contamination and packaged for transport to licensed burial, most probably as LSA wastes. An upper limit for the volume of such packaged waste is ~ 500 $ft.^3$

Materials removed in step 2 will be compacted and packed for waste burial. Such material can be placed in 1 or 2 4'x4'x8' wooden boxes.

The remaining facility surfaces will be contact decontaminated for eventual release to unrestricted use. Current contamination levels of the facility floors and walls are the order of 100 dpm $(\alpha)/100\ cm^2$ and are well within established guidelines for release to unrestricted use. Typically the walls and ceilings have contamination levels of <20 dpm $(\alpha)/100\ cm^2$.

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Routine duct surveys indicate the absence of significant radioactivity since the facility is generally free from airborne radioactivity.

Decontamination waste waters, etc., will be removed to the waste processing facility for final treatment and handling prior to transport to licensed burial. Only small quantities are expected.

3.2.6 Waste Processing Facility

The waste processing facility will remain available for handling other facility wastes. Finally this facility will be dismantled. We plan to deactivate the facility sequentially beginning with the dismantling of the combustible material incinerators and trash compactors. Then the evaporation panels would be dismantled. Finally other surfaced work areas and Butler buildings would be dismantled and packaged for transport to burial. This includes removal of asphalt surfaces which are contaminated.

The volume of material resulting from the above will be approximately 65,000 $ft.^3$ Of this 47,000 $ft.^3$ will be slightly contaminated asphalt, concrete and building rubble.

Contamination levels found in the vicinity but outside of actual processing stations and equipment is routinely less than 50 dpm $(\alpha)/100\ cm^2$.

3.2.7 Experimental Building

This building is used for various pilot plant prototype and scale model testing of fuel fabrication and reprocessing plant equipment. This facility typically contains no significant radioactivity except inside the specialized equipment designed to contain high level irradiated material. Such testing involves depleted uranium, natural thorium and a few selected short-lived isotopes to simulate fission products and serve as tracers.

We would plan to remove any contaminated prototype equipment and carry out any required decontamination in preparation for the buildings eventual release for unrestricted use.

Recently taken radiation and wipe surveys found that contamination levels of approximately 20 dpm (α)/100 cm^2. There is no significant ($\beta\gamma$) activity.

4. WASTE PROCESSING & DISPOSAL

GAC has facilities for processing radioactive materials, preparing them for shipment and has long term contracts for the transport and burial of such materials. The waste processing facilities include solar evaporative ponds, combustible waste incinerator, compactors and waste solidification equipment. These facilities have previously been described in detail in the SNM-696 renewal, Demonstration Volume (Gulf E&ES A12001), sections 3.12 and 3.13.

The waste processing facility will be the focal point for those wastes which are to be concentrated or solidified prior to transport to burial. It is expected such materials will be processed and packaged in a manner similar to our normal process waste streams.

Large equipment sub-facility structures, etc., will be packaged at the respective facilities surveyed and appropriately transported in accordance with DOT requirements. Typically such material is placed in 4'x4'x8' wooden boxes to facilitate material handling, to control contamination spread and to meet regulatory requirements.

Our plans for disposal assume the availability of a licensed waste disposal site such as Nuclear Engineering's site at Beatty, Nevada. Disposal at this site is assumed for this costing effort.

We are aware, however, of the provisions of 10 CFR 20 affecting waste disposal and burial. No specific plans have been formulated at this time which include burial at an authorized site locally, i.e., a municipal landfill or other property either government owned or private.

The waste processing facility is not used to process transuranic wastes. Such wastes are packaged at the generating facility. These packaged wastes may or may not be transported to the waste facility while awaiting transport to burial. Most likely such material could not be buried at Beatty, Nev., but at some other authorized facility. The volume of such material and its transport cost are comparatively insignificant.

5. COST ANALYSIS

The task of decommissioning each of the major facilitie has been broken down into work subtasks. The time and materials cost have been developed for the respective subtasks. From the analysis of these costs and knowledge of the materials requiring disposal, overall costs for decommissioning the respective facilities have been tabulated. Contingency factors have been considered and are indicated. Cost associated with property ownership such as taxes, occupancy, depreciation, etc., are not included in this analysis because they do not directly relate to decommissioning activity.

The cost estimates for decommissioning the respective major facilities, as well as the miscellaneous R&D labs (lumped), are shown on Table 5-1. The costs element associated with the transportation and burial charges are given in Table 5-2. All the costs are stated in 1979 dollars and assume continued availability of licensed burial such as the Nuclear Engineering disposal at Beatty, Nev.

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~~PRIVATE DATA~~

TABLF 5-1

TABLE OF COSTS BY FACILITY

($000)

Facility	Equipment Removal	Structure Decontamination Demolition	Waste Packaging	Waste Transport & Disposal	Total
CASE I					
SVA	$531.0	$365.0	$122.0	$389.0	$1,407.0
SVB	--	20.0	--	--	20.0
TFFF	2[illegible].0	17.0	2.7	18.0	59.7
EA-1	20.0	25.0	5.0	6.0	56.0
L Bldg. Labs.	70.0	46.0	15.0	54.8	185.8
Mk. III Pool and Lab.	3.0	5.4	5.0	1.0	14.4
Hot Cell*	154.0	332.0	136.0	140.0	762.0
Waste Yard	--	154.0	71.1	71.0	296.1
TRIGA Facility					
Mk. I	4.5	9.6	5.0	1.0	20.1
Mk. F	8.1	10.0	5.0	1.0	24.1
Sump Tank	2.0	4.0	2.0	--	8.0
Case I Sub-Total	$814.6	$938.0	$368.8	$681.8	$2,853.2
Contingency					1,127.0
TOTAL - Case I	$814.6	$988.0	$368.8	$681.8	$3,980.2
CASE II					
Hot Cell (demolition)**	--	960.0	--	--	960.0
TOTAL - Case I & II	$814.6	$1948.0	$368.8	$681.8	$4,940.2

* Does not include complete demolition of Hot Cell.
**Includes Hot Cell Demolition but not packaging and transport to licensed burial.

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~~PRIVATE DATA~~ Classification removed; see GA ltr 6/19/81

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TABLE 5-2

TRANSPORTATION & BURIAL CHARGES

Transportation	
Assumed sole use vehicle with 40,000 lb. gross wt. limit or 80 55 gallon drums or 18 Typical Boxes	$779/load
Burial Charge (Basic)	$4.75/$ft^3$
55 gallon barrels @ $52.00 each	
4x4x8' boxes @ $608.00 each	

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classification removed; see GA ltr 6/19/87

~~GENERAL ATOMIC~~
~~PRIVATE DATA~~

6. FINANCING

The license condition imposing this plan's submittal requires that it discuss "the financial arrangements that have been made or will be made to insure that adequate funds will be available to cover the costs at the time of decommissioning. We find that posting and maintenance of a bond for such purpose does not appropriately provide such insurance.

General Atomic has operated its facilities since 1957 under government contract or licenses issued by state and federal regulatory agencies. During this period we have decommissioned several principal projects and their facilities. Examples are:

(1) HTGR Critical Reactor Facility (R-104),

(2) Thermionic Critical Reactor Facility (CX-23),

(3) Accelerator Pulsed Fast Assembly (R-105), and

(4) The 2MW TRIGA Mark III Reactor (R-100), used on a government space nuclear program.

Each of these facilities were decommissioned and returned to other unrestricted use. Some of the facilities were decommissioned with company funds charged against accrued reserves while others were decommissioned with government funds.

The costs identified in previous sections are relatively small in relation to the overall operations of GAC and the resources of GAC's owners. It should be noted General Atomic Company is a partnership of Gulf Oil Corporation and Scallop Nuclear, Inc., a Royal Dutch/Shell Company. The relationship of these companies to General Atomic and their financial responsibility have been described in our SNM-696 renewal Demonstration document, Gulf E&ES-A12001, section I. There has been no significant change from the information presented therein.

~~GENERAL ATOMIC~~ Classification removed,
~~PRIVATE DATA~~ per GA ltr 6/19/81 13194

70-734

GENERAL ATOMIC COMPANY
P.O. BOX 81608
SAN DIEGO, CALIFORNIA 92138
(714) 455-3000

June 15, 1979

In Reply
Refer to: 696-1065

Mr. Leland C. Rouse, Chief
Fuel Processing & Fabrication Branch
Division of Fuel Cycle & Material Safety
U.S. Nuclear Regulatory Commission
Washington, D.C. 20555

Subject: SNM-696; Docket 70-734. Submittal of Decommissioning Plan.

Dear Mr. Rouse:

General Atomic Company (GAC) received amendment #2 to its license. Accompanying the amendment were several new license conditions. Submitted herewith is our plan for decommissioning our facilities.

The attached plan generally describes the facilities in which licensed activities are accomplished. General Atomic does not anticipate any near term decommissioning of its facilities. The plans for decommissioning each of the facilities must then be somewhat vague and general. We have however tried to anticipate (1) the level of effort required, (2) specific problems to be faced at each of the major facilities (3) the amount of wastes generated and (4) the costs and destination of waste burial.

The belated submission of this plan is in part due to our mutual interest in utilizing most relevant information available. As you were made aware, GAC was involved in a major renovation of our Hot Cell from early fall 1978 to early spring 1979. This activity included cell decontamination, basic equipment replacement, e.g., cell seals, windows, etc., overhaul of ventilation systems, etc., as well as the packaging and shipment of waste materials. From this experience more accurate extrapolation to our total decommissioning activity could be made. Hot Cell renovation and related activity is now complete.

We believe that information presented in the plan shows that the cost of decommissioning uranium fuel fabrication facilities, research reactors, miscellaneous R&D laboratories, etc., to be sufficiently small that the Commission need not require set aside cash reserves, bonds or other guarantees such as may be appropriate for power reactors, reprocessing facilities or plutonium fuel fabrication facilities.

We look forward to your conclusion of a review of nuclear facility decommissioning policy which is supportive of our belief, namely that decommissioning costs of most Part 70 licensed uranium ~~fuel~~ processing facilities are small compared to resources available to owners.

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Our plan contains private and financial information of the type described in 10CFR2.790. Accordingly we request that it be withheld from public disclosure.

Very truly yours,

William R. Mowry

William R. Mowry
Licensing Administrator
Nuclear Materials Control Division

WRM:hcs
Attachments: 1. 10 CFR 2.790 Affidavit.
2. General Atomic Company Decommissioning Plan, dated June 1979, 4 copies.

696-1065
June 15, 1979
Attachment 1

AFFIDAVIT

Issued pursuant to 10CFR 2.790(b)(1), Request for Withholding Information.

General Atomic Company is required to provide certain detailed information relating to its costs and plans for decommissioning their facilities. This information is required by Condition #18 of NRC license 696; Docket 70-734. The information supplied as attachment 2 to our letter 696-1065, dated June 15, 1979. is considered Private Data of the type within 10CFR 2.790(a)(4). In addition certain facility descriptions and layouts may be within that classification under 10CFR2.790(d).

I certify that I have reviewed the above referenced submittal, Attachment 2 and approve of its withholding under 10CFR2.790(b)(1) and (d).

H. N. Wellhouser

H. N. Wellhouser

June 15, 1979

Date

13194