GE HITACHI NUCLEAR ENERGY AMERICAS, LLC

MORRIS OPERATION

INDEPENDENT SPENT FUEL STORAGE INSTALLATION

DECOMMISSIONING FUNDING PLAN

FEBRUARY 28, 2020

REVISION 4

NRC Material License Number SNM-2500

Docket Number 72-1

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1.0 INTRODUCTION AND SUMMARY

GE Hitachi Nuclear Energy (GEH) operates an Independent Spent Fuel Storage Installation (ISFSI) at its Morris Operation located in Morris, Illinois. This Decommissioning Funding Plan (DFP) has been prepared as required by 10 CFR 72.30 to provide a cost estimate and describe the method of assuring funds to support decommissioning of the GEH Morris ISFSI after all irradiated fuel currently stored on site has been removed. This DFP was prepared in part using the guidance contained in NUREG-1757, Volume 3, *Consolidated NMSS Decommissioning Guidance – Financial Assurance, Recordkeeping, and Timeliness*.

This DFP includes:

- Site location and facility descriptions,
- Operational features relevant to decommissioning
- General decommissioning criteria,
- The technical approach for decontamination, dismantlement, waste management and final release activities
- Key decommissioning and cost estimate assumptions,
- Facility-specific cost estimates for decommissioning, and
- Adjustment of cost estimate and funding level.

The cost estimates were originally prepared in 2012 by an independent third-party engineering firm experienced in preparing DFPs. Methods employed to validate the level of effort required for decommissioning and amounts of wastes expected to be generated included site reconnaissance and measurements, scaling factors from building volumes and footprints, interviews with site personnel, and comparisons to previous other decommissioning projects. The accuracy and appropriateness of the methods used to estimate costs of decommissioning have been demonstrated to be reasonable based on work performed by GEH on similar installations.

The cost estimate was reviewed and updated in 2019 by an independent third-party engineering firm experienced in preparing cost estimates and completing decommissioning-related services for the nuclear industry. The independent review included site reconnaissance and measurements, scaling factors from building volumes and footprints, interviews with site personnel, and comparisons to previous other decommissioning projects. The estimates are based on existing facility conditions and consider interim decontamination and dismantlement activities that have been completed. The major cost contributors to the overall decommissioning cost are labor, equipment and supplies, radioactive waste disposal, laboratory analyses, and miscellaneous expenses (e.g. NRC fees, utilities and insurance). As a result of this

independent third-party review, the cost estimate has been reduced from approximately $104.6 million in the current financial surety bond to approximately to $77.9 million.

NRC regulation 10 CFR 72.30(c) lists four events to be considered to account for potential changes in costs during a DFP update. Since submittal of the last Morris Operation Decommissioning Funding Plan in December 2018:

1) No spills of radioactive material occurred producing additional residual radioactivity in onsite subsurface material.
2) No facility modifications occurred that impacted the decommissioning cost estimate.
3) There were no changes in authorized possession limits.
4) No active decommissioning occurred, thus there were no actual remediation costs that exceed the previous cost estimate.

A summary of the cost estimate is provided in Table 1.1. Details behind the cost estimate are provided in Section 6. A description of how the cost estimate will be adjusted over time is provided in Section 7. Financial assurance for decommissioning costs is provided by General Electric Hitachi (GEH) in the form of a payment surety bond. The current bond with the cost estimate as of December 2018 is included with this document.

It is the intent of GEH to reduce the level of radioactivity remaining in the facility to residual levels that are suitable for unrestricted release in accordance with the criteria for decommissioning in 10 CFR 20.1401 and 20.1402 and allow NRC license termination pursuant to 10 CFR 72.54. Release criteria for building surfaces and soils will be established and approved as part of the development and approval of the Decommissioning Plan.

Table 1.1 Decommissioning Cost Estimate Summary

Category	Estimated Cost ($K)
Planning and Preparation	[[
Decontamination and Dismantlement	
Release Survey	
Waste Packing and Shipping	
Waste Disposal	
Equipment and Supplies	
Laboratory Costs	
Travel and Living Expenses	
Insurance	
Utilities/Shared Services	
NRC Inspection/Interface	
Subtotal	
25% Contingency	]]
Total	**$77,871**

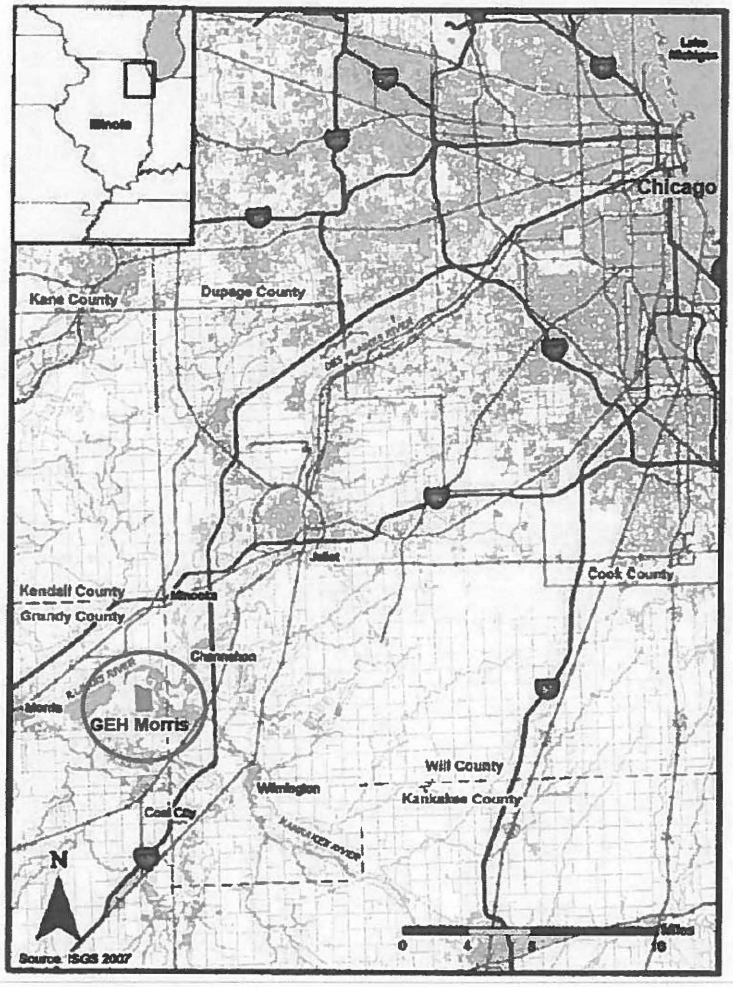
2.0 SITE LOCATION AND FACILITY DESCRIPTION

The GEH Morris facility is located at 7555 East Collins Road in Morris, Illinois, adjacent to the Dresden Nuclear Power Plant (Figure 2.1). It is located approximately 50 miles southwest of Chicago, in Goose Lake Township, Grundy County. Population is sparse throughout Grundy County with concentrations in and around cities such as Morris, Channahon, Minooka, Coal City and Wilmington. Joliet, in adjoining Will County, is the largest city near the GEH Morris site. The Dresden Nuclear Power Station is located adjacent to the GEH Morris facility.

The GEH Morris site is mostly undeveloped except for the north edge of the site where the principal site structures are contained within a 15-acre fenced area adjacent to Collins Road. A second fenced area surrounding the sanitary waste treatment facilities is located immediately south of the principal site structures. Figure 2.2 shows the layout of the principal facilities located within the 15-acre fenced area.

The GEH Morris Operation was originally designed as a fuel reprocessing center. During startup testing in 1971 the site obtained a Special Nuclear Materials (SNM) License, License Number SNM-1265. The first irradiated fuel arrived on site in 1972. In 1974 efforts to operate a reprocessing facility were suspended and the site applied for a spent fuel storage license. In 1974 the Nuclear Regulatory Commission (NRC) reissued SNM-1265 authorizing the storage of irradiated fuel for a period of 5 years. A license renewal request was submitted to the NRC in 1979. While reviewing a license renewal request, the NRC noted that the storage of irradiated fuel at an ISFSI was covered under 10CFR 72 which became effective in 1980. The NRC requested that the license renewal request be revised to conform to the requirements of the new 10 CFR 72. A revised license renewal request was submitted in 1981 and upon review the NRC issued License SNM-2500 in 1982. Amendment 15 to SNM-2500 was approved by the NRC on June 29, 2017. The license is currently set to expire in 2022.

Figure 2.1 Area Map



2.1 Facilities Included in Decommissioning Funding Plan

This section includes general descriptions of the principal buildings and facilities on the Morris Site. Figure 2.3 shows the facilities/buildings subject to decommissioning activities.

The Process Building is a reinforced concrete structure measuring approximately 204 feet by 78 feet and extends approximately 88 feet above grade. The canyon cells supporting planned reprocessing activities were located within this building. However, most of the reprocessing systems/equipment originally located within the canyons has been removed from the site. The western end of the Process Building houses most of

the fuel storage facilities including the Cask Unloading Basin, Fuel Storage Basins, and Fuel Transfer Canal. This area measures approximately 70 feet by 40 feet. The Fuel Basins are approximately 30 feet deep and the Cask Unloading Basin is approximately 49 feet deep. The lower canyon walls and floor as well as the walls of the floors of the Cask Unloading Basin, Fuel Storage Basins, and Fuel Transfer Canal are lined with stainless steel. The Process Building also houses the low level and high-level liquid radwaste systems, and the basin water cleanup and cooling systems. The compressor units associated with the basin water cooling system are located west of the Process Building.

Figure 2.2 GEH Morris Fenced Area Layout

Security-Related Information
Figure Withheld Under 10 CFR 2.390.

The Cask Service Facility is located west of the Process Building. It consists of an insulated steel frame building approximately 52 feet by 82 feet constructed on a concrete slab.

Figure 2.3
GEH Morris Facilities to be Decommissioned

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The Cask Receiving Enclosure Area is attached to the northwest corner of the Process Building. It consists of an insulated steel frame building approximately 45 feet by 75 feet constructed on a concrete slab. At one time rail service was provided to the Cask Receiving Area.

The Air Tunnel is a below grade structure running west to east along the length of the Process Building. It has a cross sectional area of approximately 20 ft^2. The bottom of the air tunnel contains a 3-inch deep stainless steel floor pan for the collection of condensate. Air from the basin area is drawn into the air tunnel via the canyon area as it is routed to the sand filter.

The Sand Filter Building is a 75 foot by 80 foot reinforced concrete structure approximately 15 feet high. The filter bed is approximately 8 feet deep and constructed of graded layers of gravel and sand. An extension of the air tunnel connects the air tunnel to a distribution duct beneath the sand filter. Openings in the distribution duct are designed to disperse air laterally through the gravel layer that forms the bottom of the sand filter. Air is drawn through the sand filters and discharged via the stack by exhaust blowers located in the adjacent Emergency Equipment Building. The Emergency Equipment Building is a 24-foot by 80-foot reinforced concrete building which also houses a diesel generator and associated switchgear.

After passing thru the Sand Filter Building, gaseous effluents pass through a 4-foot diameter reinforced concrete pipe to the main stack located approximately 350 feet south of the Sand Filter and Emergency Equipment Building. The main stack is a welded steel unit approximately 300 feet in height with a stainless steel liner. The Cladding Vault was originally designed to provide interim storage scrap metal resulting from the planed reprocessing of irradiated fuel. It is a below grade structure 45 feet in diameter and 72 feet deep and located directly south of the Process Building and west of the Low Activity Waste (LAW) Vault. It is constructed of reinforced concrete approximately 2 feet thick and lined with stainless steel.

Industrial and sanitary sewage are combined and discharged to onsite sanitary lagoons and a holding basin via liquid waste discharge lines. The sanitary lagoons and holding basin are located within a fenced area south of the 15-acre fenced area.

Rail service was provided to the site by a spur from a siding located approximately 0.5 miles north of the site. As it entered the site, the track divided into three separate spurs. The tracks have been cut and sections removed to prevent any onsite rail movement.

The Low Level Waste Vault provided interim storage of low level radioactive liquid waste. It is located near the southeast corner of the Process Building. Additions to the low Level Waste Vault ceased in 1994 with all liquid wastes being routed to the liquid

radwaste systems. It is a below grade structure 45 feet in diameter and 72 feet deep. It is constructed of reinforced concrete approximately 2 feet thick and lined with stainless steel.

The Dry Chemical Vault was originally designed to provide interim storage of dried process chemical of low activity. It is a below grade structure approximately 35 feet in diameter and 50 feet deep and is located between the Process Building and the Sand Filter Building. It is constructed of reinforced concrete approximately 2 feet thick and lined with stainless steel.

The Cold Warehouse is located in the northeast corner of the 15 acre fenced area. It consists of an insulated steel frame building approximately 50 feet by 100 feet constructed on a concrete slab.

2.2 Other Facilities

There are other facilities and buildings on the site that are not proposed to require decommissioning as described in this section.

The Utility & Service Building is a single-story high bay building located immediately north of the east end of the Process Building. It is approximately 71 feet by 50 feet and constructed using a steel frame and insulated siding and roof on a concrete slab. The building is divided into a utility section which houses a demineralizer water system, primary electrical switchgear, training room, lunchroom, and first aid room; and a service section which houses a change room, lunchroom, and office areas.

The Shop & Warehouse Building is located north of the Process Building. It is approximately 50 feet by 72.5 feet.

The Administrative Building is approximately 60 feet by 70 feet. It is located north of the Shop/Warehouse. Site access is gained via the Administrative Building.

The Fluorine Building (Building F) is approximately 40 feet by 77 feet. The fluorine equipment originally housed in this building have been dismantled and removed from the site.

An onsite well, approximately 790 feet deep, provides water to meet the site's needs. Water is pumped from the well via a 100 gallon per minute submersible pump to a 50,000-gallon elevated water tank located near the well that is situated north of the Utility & Service Building and west of the Cold Warehouse.

3.0 OPERATIONAL FEATURES RELEVANT TO DECOMMISSIONING

The site was originally designed as a fuel reprocessing center; however no fuel was ever reprocessed at the site. Startup testing using natural uranium resulted in the contamination of various systems and the canyon walls located within the Process Building. Startup testing was discontinued in 1974 and the terms of the current site license revised to allow “storage only” of irradiated fuel.

The site’s original design included two water filled storage basins, one for spent fuel and another for storing high level waste. Irradiated fuel was first received at the site and 1972 and continued until 1989. During this time fuel storage capacity was increased twice, once in 1973 by utilizing the high-level waste storage basin and in 1975 by removing the original fuel storage baskets and racks and replacing them with higher density baskets and a grid support system. Currently there are approximately 3,000 fuel bundles stored on site.

Mobile and/or stationary air monitors and samplers are available as necessary to provide information concerning airborne radioactive material concentration and radiation levels. These systems provide data for radiation exposure evaluations of personnel working inside radiation control areas.

During major dismantlement activities, the process building ventilation system is capable of maintaining the direction of airflow into the building through any existing pathways open directly to the environment. While major dismantlement activities are in progress, discharges to the environs will be through an operating particulate filtration system with the effluent continuously monitored or sampled. This system will remain operational during dismantlement until it is necessary to shut it down to permit removal.

Radiation protection equipment similar to those currently used to measure and evaluate radiological samples will be available during decommissioning.

A fire protection system will be available throughout the decommissioning operations. As needed, this consists of fire alarm boxes, sprinkler systems, hoses, extinguishers, pumps, and an onsite water supply. Personnel fire protection equipment such as respiratory protection equipment and rain gear will be maintained and available, as required.

Additionally, fire response capability by outside agencies is available as needed.

The in-plant communication systems consisting of public address, telephone, and radio will be maintained during decommissioning.

4.0 TECHNICAL APPROACH FOR DECOMMISSIONING

Archival records of modifications and/or incidents relative to radioactive or hazardous materials contamination will be reviewed to identify information that may be important to the decommissioning activities.

For areas where radioactive material is currently or previously used, surveys will be performed with instrumentation capable of detecting surface contamination above release limits. In addition, core samples will be taken as necessary at intervals in the areas to monitor for any subsurface contamination. Prior to release of the areas, contamination will be reduced to releasable levels or recovered and shipped for burial.

4.1 General Decommissioning Guidelines

- It is the intent of GEH to decommission the facility so as to reduce the level of radioactivity remaining in the facility to residual levels that are suitable for unrestricted release in accordance with the criteria for decommissioning in 10 CFR 20.1401 and 20.1402, and for NRC license termination pursuant to 10 CFR 72.54. The level of radioactivity remaining will be suitable for unrestricted release in a manner that will not require stabilization and long-term surveillance programs.
- A number of the facility systems and structures will be decontaminated or dismantled to the extent necessary to support NRC license termination allowing the remaining structures at the facility to be available for alternative use.
- Release criteria for building surfaces and soils will be established and approved as part of the development and approval of the Decommissioning Plan.
- Decommissioning activities will include the cleaning and removal of radioactive and hazardous waste contamination that may be present on materials, equipment and structures. Cleaning effectiveness will be assured by verification.
- A reasonable effort will be made to eliminate residual contamination as part of the decommissioning activities in accordance with the provisions of “As Low as Reasonably Achievable” (ALARA).
- Radioactivity on equipment or surfaces shall not be covered by paint, plating, or other covering material unless contamination levels are below the limits specified in Decommissioning Plan prior to applying the covering. Other limits may be applied at the time of decommissioning to assure compliance with dose based limits.

- The radioactivity on the interior surfaces of pipes, drain lines, and ductwork shall be determined by making measurements at traps, and other appropriate access points, provided that contamination at these locations is likely to be representative of contamination on the interior of the pipes, drain lines, or ductwork. Surfaces of premises, equipment, or scrap which are likely to be contaminated but are of such size, construction, or location that the surfaces are inaccessible for purposes of measurement shall be presumed to be contaminated in excess of the limits.
- Special requests may be made to NRC to authorize the release of premises, equipment, or scrap having surfaces contaminated in excess of the limits specified. This may include, but may not be limited to, special circumstances such as razing of buildings or transferring of premises or equipment to another organization continuing work with radioactive materials.
- Radiation exposure limits shall be consistent with allowable limits specified in 10CFR 20.
- Shipments of radioactive materials associated with decommissioning shall conform to the applicable regulations of Title 49 Code of Federal Regulation for transporting hazardous materials.
- Prior to release for unrestricted use, a comprehensive radiation survey will establish that contamination levels and dose rates are within the limits approved in the Decommissioning Plan.
- Independent reviews of the premises will be made to verify that radioactive materials and contamination have been removed to acceptable levels and that the premises meet regulatory release limits.

4.2 General Decontamination and Cleaning Methods

Decommissioning planning activities will include the following; defining the decommissioning organization and staffing key positions, preparation of plans and procedures to support decommissioning activities, initiating communications with key stakeholders, initiating required training, securing packaging and transportation services for the disposal of radioactive and mixed waste, securing offsite laboratory support for sample analyses, verifying the availability of offsite disposal facilities for disposing of radioactive and mixed waste, etc.

A key component if the planning phase will be the performance of a detailed site characterization survey. The characterization survey will assess the extent of radiological contamination and identify any potential mixed waste. A Characterization Survey Plan, Quality Assurance Plan, Radiation Protection Plan, and a Health and

Safety Plan will be prepared to support this effort as will numerous implementing procedures. The characterization survey will attempt to identify all contaminated areas, the magnitude of the contamination present, the extent of the contamination, whether the contamination is surficial or not and if not the depth to which it may extend, and the radionuclides present and their relative fractions.

The characterization survey will address all site facilities and open land areas. The characterization surveys will be based in part on the guidance contained in NUREG-1575 *Multi-agency Radiation Survey and Site Investigation Manual (MARSSIM).* For those areas deemed not to require remedial actions the characterization survey results will be used to justify area classifications for purposes of planning the final status survey.

Once the characterization survey is completed a Characterization Survey Report will be prepared and used to help prepare a detailed Decommissioning Plan. The results of the characterization survey will also be used to aid in the calculation of site-specific derived concentration guideline levels (DCGLs) that will define the criteria for license termination. A Final Status Survey Plan will also be prepared defining how it will be demonstrated that the criteria for license termination have been met at the conclusion of all required decommissioning activities. The Final Status Survey Plan will also be based in part on the guidance contained in NUREG-1757.

Decommissioning will involve a variety of techniques including physical cleaning, chemical decontamination, scabbling, grit/sand blasting, pressure washing, dismantlement, sizing, excavation, water processing, etc. Multiple crews will be used to decontaminate areas in parallel. Where practical, work will progress from areas with a higher potential for contamination to areas with lower potential based in part on the results of the characterization survey. In addition, key support systems, like the ventilation system and rad waste system will be kept in service while needed if possible.

Removal of radioactive material from contaminated surfaces will be accomplished in three ways: (1) physical cleaning of the surface, (2) using chemicals to dissolve surface films containing radioactive materials or (3) removing the surface of the structure itself. Typical tools and equipment used for dismantlement and decontamination may be as follows:

Typical Dismantlement Tools and Equipment

Oxyacetylene Torch
Guillotine Pipe Saw
Tube Cutter
Ratcheting Pipe Cutter
Reciprocating Saw
Nibbler

Assorted Tools (Impact Wrenches, Bolt Cutters, etc.)
High-Velocity Liquid Jet
Low-Velocity Liquid Jet
Hydraulic Concrete Surface Spalling Device
Concrete Drills
Electric/Pneumatic Hammers
Portable A Frames
Portable Wash Tanks
Portable Greenhouse Erection Kit
Portable Spray Cleaning Booth
Portable Power Brushes
Portable Abrasive Blasting Unit
Plasma Cutting Equipment

Physical cleaning methods include sweeping, vacuuming, hand wiping, sandblasting, and washing with various cleansing agents. Chemical decontamination methods use acid or basic solutions to dissolve residual contamination from surfaces. If physical cleaning and chemical decontamination techniques do not reduce contamination levels on equipment and/or building surfaces to acceptable radioactivity release levels, or are unfeasible, it will be necessary to either use more extensive methods, such as sandblasting or scraping that physically removes surface layers, or to remove the item for burial.

Removal of contamination from sealed porous surfaces, such as painted walls and floors, asphalt, tank exteriors, and other surfaces, will be accomplished using a variety of techniques. For removable contamination, vacuuming or simple sweeping compounds are often effective. For more fixed contamination, various cleansing compounds combined with hand wiping, hand scrubbing, and/or power scrubbing techniques will be utilized. Degreasing agents may be used in removing contamination films from surfaces. Organic solvents have an advantage of not being corrosive to equipment and electrical connections. Variable pressure, high or low-velocity liquid jets can be effective for some types of decontamination work. Chemical solutions identified as decontamination agents and compatible with the available waste treatment processes and with materials used in the system may be used during decontamination. Consideration will be given to cost and environmental impact.

Concrete surfaces in the plant which are contaminated to a depth of a few centimeters and that cannot be cleaned to an acceptable release level by surface wiping or washing techniques will be physically removed and packaged for disposal. Several criteria will be considered in selecting a concrete removal method. The selected method will facilitate control of airborne contamination and minimize the potential for personnel exposure to radioactivity. The size and weight of removed materials will be controlled to facilitate packaging and shipping for disposal.

4.3 Facility Specific Decommissioning Considerations

In preparing this DFP the following decommissioning activities were considered. However the need for performing some of the activities or the effort involved will likely be revised once the characterization survey has been completed and the decommissioning plan approved.

Significant decommissioning activities may include:

- Drain the Cask Unloading Basin, Fuel Storage Basins, and Fuel Transfer Canal and process the water for release and/or store for reuse during the decommissioning.
- Remove tools and equipment stored within the Cask Unloading Basin, Fuel Storage Basins, and Fuel Transfer Canal.
- Remove and size the fuel storage racks and grid assemblies in the Fuel Storage Basins.
- Remove any debris from the bottom of the Cask Unloading Basin, Fuel Storage Basins, and Fuel Transfer Canal.
- Remove and size the stainless-steel liner from the walls and floor of the Cask Unloading Basin, Fuel Storage Basins, and Fuel Transfer Canal.
- Removal/decontamination of basin water support systems and structures such as the basin water leakage control system, basin water cleanup system, basin water filtration system, basin water cooling system, etc.
- Remove miscellaneous piping and decontaminate surfaces within the Process Building.
- Decontamination of exposed concrete surface associated with the Cask Unloading Basin, Fuel Storage Basins, and Fuel Transfer Canal.
- Removal of the floor pan from within the bottom of the air tunnel.
- Decontamination of the air tunnel.
- Clean out of the Cladding Vault, Dry Chemical Vault, LAW Vault.
- Remove and size the stainless-steel liner from the walls and floor of the Cladding Vault, Dry Chemical Vault, LAW Vault.
- Decontamination of exposed concrete surfaces associated with the Cladding Vault, Dry Chemical Vault, LAW Vault.

- Decontaminate the waste disposal cart tunnel and equipment pit.
- Clean out of the canyon cells. Much of the work has been completed over the past several years, but additional work remains to be done.
- Remove and size the stainless-steel liner from the lower walls and floor of the canyon cells.
- Decontamination of exposed concrete surfaces associated with the canyon cells.
- Dismantle building cranes and decontaminate or size for disposal.
- Remove and size canyon cell covers.
- Decontaminate or remove embedded piping.
- Decontaminate or remove buried piping and equipment tunnels.
- Remove and size support systems such as the rad waste system, basin water cleanup system, basin water filtration system, basin water cooling system, etc.
- Decontaminate the rooms/cubical used to house support systems.
- Remove the filter media (gravel and sand) from within the sand filter building.
- Decontaminated the walls of the sand filter building.
- Remove the blowers from the Emergency Equipment Building.
- Remove the distribution duct work beneath the sand filter.
- Decontaminate or remove the duct work between the sand filter and the stack.
- Dismantle, decontaminated, or package for disposal the stack.
- Remediate the soil beneath and adjacent to the location of the old basin coolers.
- Remediate the soil beneath and adjacent to the north spur which was used for cask storage.
- Remediate the floor of the Cask Service Facility.
- Remediate the floor of the cold warehouse.

- Evaluate the sanitary and overflow basins and excavate contaminated soil to DCGLs, as required.

Removed materials and equipment from the decontamination and dismantling of the facility may be routed to an on-site processing area. Material and equipment that can be certified to be free of contamination may be released for unrestricted disposition (e.g. scrap, recycle or general disposal). Contaminated material and equipment will be characterized and segregated for additional processing. This may include disassembly, chemical cleaning, volume reduction, or packaging for disposal to a low-level radioactive waste disposal facility.

In some cases, it may be difficult to remove and or decontaminate buried and embedded piping. If necessary, dose calculations may be performed and with the approval of the NRC the pipes grouted and left in place.

At the completion of decommissioning, a final status survey will be performed to demonstrate that the site meets the criteria for license termination. The results of the final status survey will be documented in a Final Status Survey Report and forwarded to the NRC for review. If required, arrangements will be made to facilitate confirmatory surveys by an NRC contractor. Upon acceptance of the Final Status Survey Report, it is anticipated that, the NRC will terminate License Number SNM-2500.

4.4 Radiological and Industrial Safety

During decommissioning activities, worker exposures and potential release pathways will be controlled and monitored in accordance with internal procedures, license conditions and regulatory requirements. Many aspects of programs currently in use will be maintained.

The criticality accident alarm system (CAAS), which provides real-time monitoring wherever SNM is handled or stored on the plant site, will continue to be operationally maintained until removal of spent fuel bundles.

Another safety system that will be essential during decontamination is the fire alarm system with fire alarm boxes strategically placed throughout the site. After being triggered, the system currently sends out a coded alarm that identifies the area of the fire. Activities during decommissioning such as cutting, dismantling and non-routine trash accumulation will make this safety system essential.

Necessary environmental monitoring programs established during the operation of the plant will continue during the decommissioning activities to assure that contaminants are being contained. Samples currently are taken at the stack release points, from soil around the site, at the dam or discharge point, and from wells around the site. These samples will be analyzed for specific contaminants. A history of data has been

generated to provide a reference point for the evaluation of the effectiveness of the environmental monitoring program during decommissioning.

Radiation exposure to employees will be monitored through existing programs, such as issuance of personnel monitoring devices, air sampling of airborne contamination, and routine bioassays. These programs will continue to be maintained to meet the regulatory requirements specified in 10 CFR 20.

Workers who are trained in radiation protection practices and contamination control techniques will perform decontamination activities. Protective clothing will be available in sufficient quantities to allow for personnel contamination control. Various types of respirators will be available to provide the degree of protection necessary for the decontamination job being performed, ranging from half-mask respirators to supplied air hoods or masks.

For jobs requiring dismantlement of heavily contaminated items, isolation tents with portable blowers and high-efficiency particulate air (HEPA) filters may be utilized. Tenting techniques may also be employed for decontamination activities where significant dusting potential exists.

4.5 Waste Management

Contaminated material will have to be removed during decommissioning. If these materials cannot be treated or decontaminated to acceptable levels, they will be properly packaged and shipped to an authorized disposal site or disposed of in a manner authorized by the NRC.

Contaminated waste materials that will be generated during decommissioning include:

- Process equipment, tanks, and hoods, piping, ducts, and fixtures
- HEPA and roughing filters
- Concrete rubble
- Soil-like material
- Sludge and liquids
- Miscellaneous noncombustible materials (pumps, motors, and other equipment)

All shipments of radioactive material will be made in compliance with federal, state, and local regulations. DOT and NRC transportation regulations establish container requirements, dose rate limits and handling procedures to ensure the safety of the public and transportation workers during shipment of radioactive materials. Current federal regulations applicable to the transport of radioactive materials are:

- 49 CFR Parts 171-177 – DOT regulations governing the transport of hazardous materials.
- 10 CFR 71 – NRC regulations governing the packaging and shipping of radioactive materials.
- 10 CFR 61 – Licensing Requirements for Land Disposal of Radioactive Waste.

In addition, for highway transport, state agencies regulate vehicle sizes and weights and, in some cases, transportation routes and times of travel.

All hazardous waste will be packaged in safe containers commensurate with the hazard involved in order to meet regulatory packaging, shipping, and burial requirements.

4.6 Final Release

As areas/buildings are being decontaminated, contamination surveys will be made to determine the degree to which decontamination has been effective. Upon completion of all decommissioning activities a final site survey will be performed to determine the level of residual material. It is intended to demonstrate that applicable limits have been achieved, and that the premises may be released for unrestricted use.

A detailed survey report will be prepared which identifies the premises, describes the scope of the survey, and reports the findings of the survey in specified units. A copy of this survey report will be submitted to the NRC requesting release of the site for unrestricted use.

5.0 KEY DECOMMISSIONING AND COST ESTIMATE ASSUMPTIONS

This DFP is based on the following key assumptions:

1. An independent third-party contractor will perform decommissioning activities. Representative labor rates for each designated craft and salaried worker, as well as well as carrying costs for site management worker supervision and essential support services (e.g. health physics and security).
2. Dismantling will be programmed, and time phased to maintain waste segregation, and staffing for decontamination and monitoring capabilities for as long as required.
3. The plant will have had normal operations in the interim prior to decommissioning, i.e., no unplanned events have occurred to substantially disrupt the condition of the facility at the time of decommissioning.
4. Decommissioning activities will take place promptly on cessation of operations without additional multiyear storage-for-decay periods.
5. All spent fuel and high-level waste currently stored on site will have been removed and possession taken by DOE prior to initiating decommissioning activities.
6. This DCE covers only those costs associated terminating NRC License Number SNM-2500. It does not address any non-radiologically contaminated hazardous materials including asbestos that may be on site, or the removal of non-radiologically contaminated buildings, systems, or components, or preparing the site for beneficial reuse.
7. Decommissioning activities will include consideration of the latest technology for decontamination techniques and equipment in order to utilize those features that are the most cost effective and efficient.
8. Decommissioning costs are calculated as of December 2019.
9. Decommissioning activities will take place over a 4-year period, broken down as follows:
    a. One year of pre-planning activities during which the Decommissioning Plan is prepared and submitted to the NRC for review and approval[1];
    b. Two years to conduct the decommissioning activities, and

[1] This pre-planning period is assumed to initiate within an approximately 6-year period when spent fuel stored in the facility will be removed.

c. One year to perform the Final Status Survey and prepare the final report, and review and approval by the NRC followed termination of the license.

10. Planning and preparation costs include preparation of documentation for regulatory agencies, submittal of decommissioning plan to NRC, development of work plans, procurement of special equipment, staff training, and characterization of radiological condition of the facility. In addition, labor costs for removal of applicable spent fuel bundles and associated security personnel are included in planning and preparation costs.
11. A contingency factor of 25% is applied.
12. Insurance for the facility is based on actual insurance premiums.
13. All Class A waste including mixed waste will be trucked to the Energy Solutions disposal site in Clive, Utah in top loading intermodals.
14. Class B waste will be disposed at an approved facility.
15. No Class C or other orphan waste will be generated.
16. Assumed mode of transportation for waste is by truck.
17. The estimate does not include credit for material scrap value.
18. Laboratory fees include sample transport, testing and analysis at an offsite third-party laboratory.
19. The cost of regulatory licensing and inspection services includes reviews, approvals, ongoing inspections, and final license termination. The fees also include costs to review the final site survey.
20. Restoration of contaminated areas on facility grounds and site stabilization are assumed to not be required.

6.0 DECOMMISSIONING COST ESTIMATE

The estimated total cost for decommissioning the facilities licensed under SNM-2500 is approximately $77.9 million (as of December 2019). The bases for this decommissioning cost estimate are provided in Tables 6.1 thru 6.8. The estimated total cost is based on the assumptions stated in Section 5 of this plan and assumes an efficient decommissioning activity, but a conservative 25% contingency is added to allow for unforeseen problems that might arise during the activity.

The current decommissioning cost estimate presents each of the major decommissioning components as similar as practicable to those in NUREG – 1757.

The cost estimate was originally prepared in 2012 by an independent third-party engineering firm experienced in preparing DFPs and completing decommissioning-related services for the nuclear industry. Methods employed to validate the level of effort required for decommissioning and amounts of wastes expected to be generated included site reconnaissance and measurements, scaling factors from building volumes and footprints, interviews with site personnel, and comparisons to previous other decommissioning projects. The accuracy and appropriateness of the methods used to estimate costs of decommissioning have been demonstrated to be reasonable based on work performed by GEH on similar installations. The estimates are based on existing facility conditions and consider interim decontamination and dismantlement activities that have been completed.

The accuracy and appropriateness of the methods used to estimate costs of decommissioning have been demonstrated to be reasonable based on work performed by GEH on similar installations.

The decommissioning activities have been divided into three phases. The first of these is the Planning and Preparation Phase. This phase consists of preparing a characterization survey plan for the areas included in the license. Once this plan is approved, the characterization survey will be performed. A characterization report will be prepared based on the results of the survey and will be used for further planning and document preparation. All documents associated with the decontamination and dismantling activities will be prepared as part of this phase. This includes the decommissioning plan, work plans, operating procedures and other operational documents. This phase will also include the procurement of long lead-time equipment and operational supplies. In addition, labor costs for the removal of spent fuel bundles that GEH has title to, and oversight and security during removal of remaining spent fuel bundles are included in planning and preparation costs.

The second phase is the Decontamination and Dismantling Phase that consists mainly of the actual operations necessary to render the facilities to a state where they can be released from regulatory control. This will include the remedial radiation surveys to ensure that all release criteria have been met. This phase includes the activities associated with

the mobilization of workers to the site to perform the decontamination and dismantling activities. This will include training and establishing work areas, safety controls and appropriate administrative areas.

The third phase is the Final Survey Phase. This will be the formal survey to ensure that all regulatory requirements have been met. It will involve a radiological survey of all areas associated with the decommissioning activities. It will also include the demobilization of workers and equipment from the site. During this phase, all associated documents involved with the termination of the license will be prepared and submitted to the regulatory authority.

Pursuant to 10 CFR 72.30(d), GEH maintains records of information that could have a material effect on the ultimate costs of decommissioning until termination of the license. Information maintained in these records includes:

- Records of spills or other unusual occurrences involving the spread of contamination in and around the facility, equipment, or site. Records of spills or other unusual occurrences may be limited only to instances when contamination remains after any cleanup procedures or when there is reasonable likelihood that contaminants may have spread to inaccessible areas as in the case of possible seepage into porous materials such as concrete. These records will include any known information on identification of involved radionuclides, quantities, forms, and concentrations;

- As-built drawings and modifications of structures and equipment in areas where radioactive materials are used and/or stored, including locations that possibly could be inaccessible (for example, buried pipes which may be subject to contamination); and

- A list contained in a single document that is updated, at a minimum, every two years and includes the following:

    1) Areas designated and formerly designated as Restricted Areas as defined under 10 CFR 20.1003, Definitions,

    2) Areas outside of Restricted Areas that require documentation under 10 CFR 72.30(d)(1),

- Records of the cost estimate performed for the DFP, and records of the funding method used for assuring funds, including a copy of the financial assurance mechanism and any supporting documentation.

Table 6.1 Estimated Waste Volumes

Waste Category	Volume (ft^3)
Soil and Soil-Like Debris	[[
Debris	
Greater Than Class A	
Mixed	
Total	]]

Table 6.2
Planning and Preparation (Work Days)

Activity	Project Leader	Labor Superintendent	RSO/CHP	Waste Broker	Rad. Engineer	Licensing/MCA	Ind. Safety Engineer	RP Tech	Crew Leader	Clerical	Security	Craft Labor
Preparation of Documentation for Regulatory Agencies	[[											
Submission of Decommissioning Plan												
Development of Work Plans												
Procurement of Special Equipment												
Staff Training												
Characterization of Radiological Condition of the Facility												
Totals												]]

Table 6.3
Decontamination and Dismantlement of Facility Components (Work Days)

Activity	Project Leader	Labor Superin-tendent	RSO/CHP	Waste Broker	Rad. Engineer	Licensing/MCA	Ind. Safety Engineer	RP Tech	Crew Leader	Clerical	Security	Craft Labor
Preparation/Mobilization	[											
Equipment/Component Removal												
Remedial Radiation Surveys												
Totals												]]

Table 6.4
Final Radiation Survey (Work Days)

Activity	Project Leader	Labor Superin-tendent	RSO/CHP	Waste Broker	Rad. Engineer	Licensing/MCA	Ind. Safety Engineer	RP Tech	Crew Leader	Clerical	Security	Craft Labor
Final Radiation Surveys	[											
Totals												]]

Table 6.5
Total Decommissioning Project Work Days by Labor Category

Activity	Project Leader	Labor Superin-tendent	RSO/CHP	Waste Broker	Rad. Engineer	Licensing/MCA	Ind. Safety Engineer	RP Tech	Crew Leader	Clerical	Security	Craft Labor
Planning and Preparation Totals	[											
Decon/Dismantlement Totals												
Final Radiation Survey Totals												
Totals												]]

Table 6.6
Worker Unit Cost Schedule

Title	Rate	Daily Rates
Project Leader	[[	
Crew Leader*		
RSO / CHP		
Labor Superintendent*		
Waste broker		
Security*		
Radiological Engineer		
Licensing / MC&A		
Clerical*		
Ind Safety Engineer		
Craft Labor*		
Radiological Technicians		]

* Assumed to be locally hired personnel with no associated travel and per diem costs.

Table 6.7
Total Labor Costs by Major Decommissioning Task

Activity	Project Leader	Labor Superintendent	RSO / CHP	Waste Broker	Rad. Engineer	Licensing/ MC&A	Ind. Safety Engineer	RP Tech	Crew Leader	Clerical	Security	Craft Labor	Totals
Planning and Preparation Totals	[												
Decon/ Dismantlement Totals													
Final Radiation Survey Totals													]]
Totals												]]	

Grand Total: [[ ]]

Table 6.8
Packaging, Shipping, and Disposal of Radioactive Wastes

Waste Type	Waste Volume (ft^3)	Number Containers	Container Type	Container Cost[1]	Container Loading Cost[2]	Transporta-tion Cost[3]	Burial Cost ($/$ft^3$)	Total Burial Cost	Total Disposal Cost
Debris	[								
Soil and Soil-Like Debris									
Mixed Waste									
Class B									
Totals									]]

1. Container cost: Intermodal – [[.]]
2. Container loading cost based on .]]
3. Transportation cost based on [[.]]

7.0 ADJUSTMENTS TO DECOMMISSIONING COST ESTIMATE

The cost estimate included in this DFP is reviewed, and if necessary, adjusted annually. This review considers events such as spills of radioactive material that produced additional residual radioactivity, facility modifications, changes in authorized possession limits, and completed or active decommissioning projects.

Every three years a more detailed review is performed and the DFP updated in accordance with the requirements of 10 CFR 72.30(c). This review validates assumptions used to prepare the plan including labor rates, labor categories, waste volumes, waste categories, analytical costs, waste disposal options, waste disposal rates, transportation and packaging costs, utility costs, taxes, insurance costs, etc.

The cost estimate was reviewed and updated in 2019 by an independent third-party engineering firm experienced in preparing cost estimates and completing decommissioning-related services for the nuclear industry. The independent review included site reconnaissance and measurements, scaling factors from building volumes and footprints, interviews with site personnel, and comparisons to previous other decommissioning projects. The estimates are based on existing facility conditions and consider interim decontamination and dismantlement activities that have been completed. As a result of this independent third-party review, the cost estimate has been reduced from approximately $104.6 million in the current financial surety bond to approximately $77.9 million.

8.0 CERTIFICATION OF FINANCIAL ASSURANCE

The NRC approved decommissioning cost estimate has been reduced from approximately $104.6 million in the current financial surety bond to $77.9 million.

A payment surety bond was established to provide decommissioning financial assurance that was submitted to the NRC by letter dated March 27, 2018, Subject: GEH/GNF-A Financial Assurance of Decommissioning Funds – Surety Bonds. (ADAMS Accession Number ML18087A172). Supplemental Riders to increase the bond amounts were submitted to the NRC by letter dated March 19, 2019 Subject: GEH/GNF-A Financial Assurance of Decommissioning Funds – Surety Bond Riders (ADAMS Accession Number ML19080A060). A Copy of the current surety bond is provided as Figure 8.1 in this section.

In addition, GEH has established a Master Standby Trust Agreement with the Bank of New York Mellon for the benefit of the NRC in the case of default or inability to direct decommissioning activities by GEH. An amended standby trust agreement was submitted to the NRC by letter dated April 5, 2018, Subject: GEH/GNF-A Financial Assurance of Decommissioning Funds – Standby Trust Agreement Amendments". (ADAMS Accession Number ML18096A036).

Figure 8.1 Payment Surety Bond

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