DOE/EA-1322

ENVIRONMENTAL ASSESSMENT FOR THE CONSTRUCTION AND OPERATION OF THE HIGHLY ENRICHED URANIUM BLEND-DOWN FACILITIES AT THE SAVANNAH RIVER SITE

NOVEMBER 2000

U. S. DEPARTMENT OF ENERGY
SAVANNAH RIVER OPERATIONS OFFICE
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LIST OF ABBREVIATIONS/ACRONYMS

The following is an alphabetized list of the abbreviations and acronyms found within the text of this document:

C	-	Centigrade
CFR	-	Code of Federal Regulations
CLAB	-	SRS Central Analytical Laboratory
DOE	-	U. S. Department of Energy
DOT	-	U. S. Department of Transportation
EA	-	environmental assessment
EIS	-	environmental impact statement
ERPG	-	Emergency Response Planning Guidelines
ETF	-	Effluent Treatment Facility
F	-	Fahrenheit
FONSI	-	Finding of No Significant Impact
ft	-	feet
g	-	gram
gpm	-	gallons per minute
HEU	-	highly enriched uranium
HNUS	-	Halliburton NUS Corporation
hr	-	hour
km	-	kilometers
kVA	-	kilovolt-ampere
L	-	liter
LEU	-	low enriched uranium
LCFs	-	latent cancer fatalities
m	-	meter
mi	-	miles
mrem	-	1/1000 roentgen equivalent man
MVA	-	megavolt-ampere
NCRP	-	National Council on Radiation Protection and Measurements
NEPA	-	National Environmental Policy Act
NRC	-	U. S. Nuclear Regulatory Commission
NU	-	natural uranium
OSHA	-	Occupational Safety and Health Act
ppm	-	parts per million
rem	-	unit of dose equivalent of radiation
ROD	-	Record of Decision
SCDHEC	-	South Carolina Department of Health and Environmental Control
SRS	-	Savannah River Site
TEDE	-	total effective dose equivalent
TVA	-	Tennessee Valley Authority
U	-	uranium

LIST OF ABBREVIATIONS/ACRONYMS (continued)

U^{235}	-	uranium-235
U-Al	-	uranium-aluminum
WSMS	-	Westinghouse Safety Management Solutions
WSRC	-	Westinghouse Savannah River Company
Y-12	-	Oak Ridge Y-12 Plant

1.0 INTRODUCTION

The U. S. Department of Energy (DOE) prepared this environmental assessment (EA) to analyze the potential environmental impacts associated with the proposed construction and operation of the highly enriched uranium (HEU) blend-down facilities at the Savannah River Site (SRS), located near Aiken, South Carolina (Figure 1-1). Specifically, this proposed action would include the construction and operation of a low enriched uranium (LEU) loading station and modifications to the existing highly enriched uranium (HEU) blend-down facilities, SRS Central Analytical Laboratory (CLAB), and K-Area facilities at SRS. DOE needs to take action to support the ongoing disposition of surplus HEU, a weapons-usable fissile material, within the DOE complex. Blending the HEU down to LEU with materials low in U^{235} eliminates the risk of diversion for nuclear proliferation purposes and enhances the beneficial recovery of the commercial fuel value of the resulting LEU. This isotopic blending process can be performed by blending HEU with natural uranium (NU). Once HEU is blended down to LEU, it is no more weapons-usable than existing, abundant supplies of LEU (DOE 1996a). DOE proposes to construct and operate the LEU loading station and implement the changes to the existing HEU blend-down facilities, CLAB, and K-Area facilities necessary to support the operation of the proposed station. This action would enable SRS to ship the blended-down LEU offsite for further processing, thereby eliminating the onsite inventory and the weapons-usability of this material.

This document was prepared in compliance with the National Environmental Policy Act (NEPA) of 1969, as amended; the requirements of the Council on Environmental Quality Regulations for Implementing NEPA (40 CFR 1500-1508); and the DOE Regulations for Implementing NEPA (10 CFR 1021). NEPA requires the assessment of environmental consequences of Federal actions that may affect the quality of the human environment. Based on the potential for impacts described herein, DOE will either publish a Finding of No Significant Impact (FONSI) or prepare an environmental impact statement (EIS).

1.1 Background

DOE and the Tennessee Valley Authority (TVA) have determined that it is technically feasible to convert off-specification HEU (approximately 60-percent U^{235}) to less than 20 percent U^{235} LEU product for use as commercial fuel in the TVA reactors. This would ensure a non-military use for this material and would be consistent with DOE's decision for surplus HEU disposition within the DOE complex. SRS currently has 21 metric tons (23 tons) and Oak Ridge Y-12 Plant (Y-12), Tennessee, has 12 metric tons (13.2 tons) of HEU (DOE 1996a). Currently, some of the HEU is stored in tanks situated in the H-Canyon Outside Facilities at SRS, and as metal and unirradiated uranium-aluminum (U-Al) alloy ingots at Y-12. The remainder is stored in K Area at SRS in the form of fuel elements and unirradiated U-Al alloy ingots. In addition, once modifications to existing facilities are complete, SRS will have the capability to blend HEU with NU solution to produce an LEU product in the form of uranyl nitrate solution. The liquid uranyl nitrate

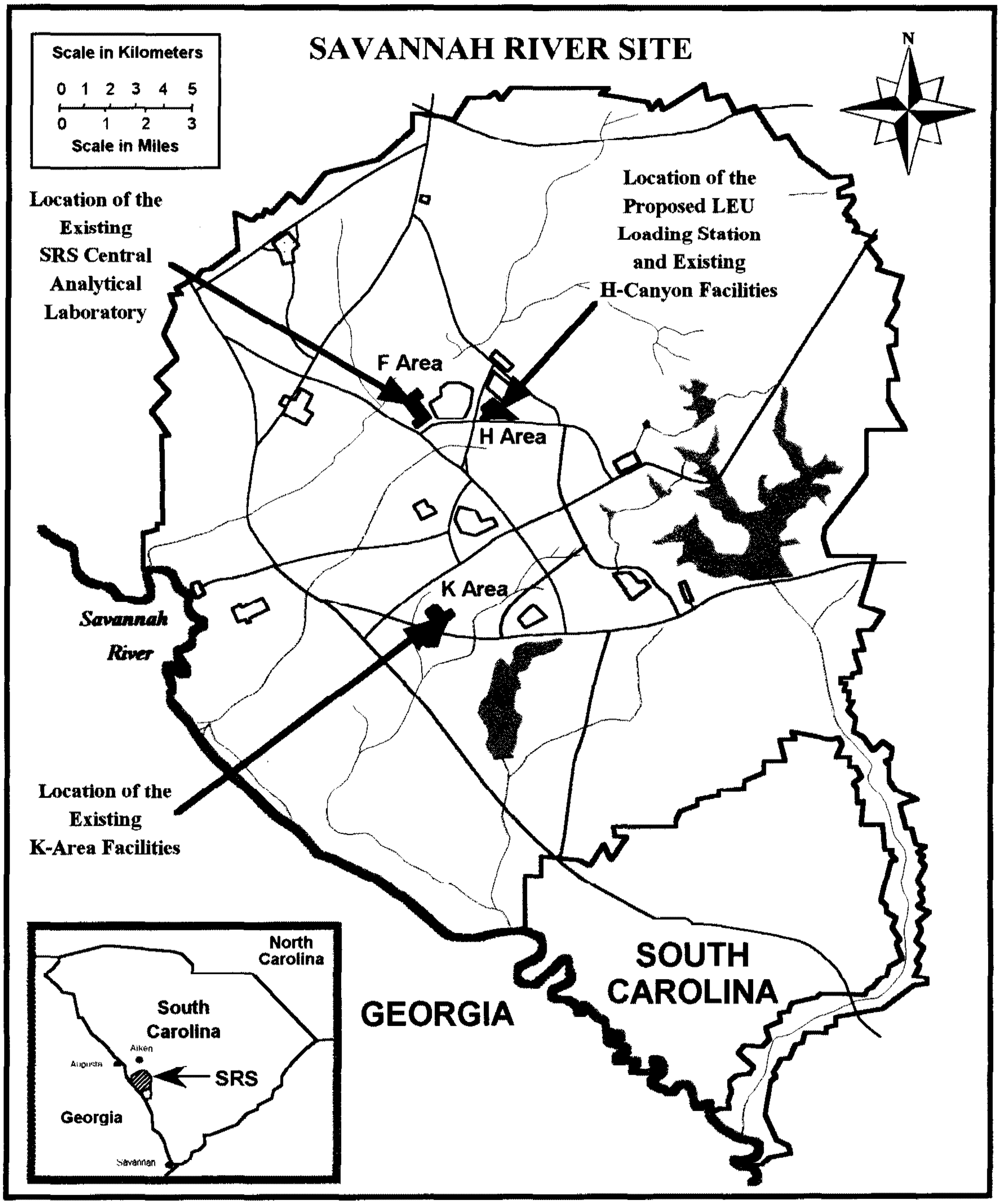

Figure 1-1. Locations of the proposed low enriched uranium (LEU) loading station and the various project components of the modifications to the existing highly enriched uranium (HEU) blend-down facilities at the Savannah River Site, South Carolina.

from dissolution of the fuel elements would then be shipped offsite to a TVA vendor facility for solidification (powdered form) to commercial enrichment levels. The powdered LEU would then be shipped on to other TVA vendors for fabrication into fuel pellets and subsequently into fuel elements for use in the TVA reactors. The HEU in the form of unirradiated U-Al alloy ingots would either be shipped directly to Y-12 for interim storage, shipped to a designated TVA vendor facility for fabrication into fuel pellets for use in the TVA reactors, or processed (like the fuel elements) at SRS and shipped as uranyl nitrate to the TVA vendor.

The conversion and transportation of the LEU solution were already addressed in broad terms in the final EIS on the disposition of surplus HEU (DOE/EIS-0240) (DOE 1996a). However, the associated Record of Decision (ROD) (DOE 1996b) for that EIS stated that DOE had decided to keep the LEU solution in interim storage at SRS until a future decision regarding the disposition of this material was made. At this time, a new ROD stating that the decision has now been reached to ship the LEU solution would have to be issued by DOE before such shipments could be initiated. The transportation of the U-Al ingots was addressed in the Y-12 EA (DOE 1994a). Further, the previously mentioned EIS and ROD indicated that only existing facilities at SRS (with no modification required) would be used for the blend-down operations, and hence, there was no evaluation of any impacts associated with facility modifications. Subsequent to the completion of this EIS and ROD, the U. S. Nuclear Regulatory Commission (NRC) notified DOE that tanker trucks could not be used to transport the LEU solution. Special U.S. Department of Transportation (DOT) Type B containers would be designed and employed for these shipments. Such containers are capable of sustaining substantial impacts during accident scenarios and maintaining high leak-tightness integrity.

To enable the proposed fuel conversion program to take place, SRS would need to have the onsite capability to purify, analyze, blend and load the liquid LEU into the specially-designed and NRC licensed containers for shipment. In addition, to enable the U-Al alloy ingots to be shipped directly to Y-12 or a TVA vendor facility, or to be processed at SRS, additional upgrades to the K-Area fuel handling and shipping facilities would be required. Therefore, DOE has decided to propose the construction and operation of a loading facility at SRS and to modify/upgrade existing facilities in H Area, K Area and CLAB to provide this onsite capability and further the disposition of surplus HEU.

1.2 Purpose and Need for Action

The purpose of the proposed action is to provide SRS with the onsite capability to purify, analyze, blend and load the liquid uranyl nitrate into shipping containers for transport to an offsite commercial facility for solidification. Further, to enable the U-Al alloy ingots to be shipped directly to Y-12 or a TVA vendor facility, or to be processed at SRS, additional upgrades to the K-Area fuel handling and shipping facilities would be required. To support DOE's nonproliferation objective, DOE needs to implement this action to eliminate the onsite inventories of surplus HEU and ultimately enable the use of a blended-down form of this material as reactor fuel.

2.0 PROPOSED ACTION AND ALTERNATIVES

2.1 Proposed Action

The proposed action entails the following: (1) construction of the LEU loading station; (2) upgrade the CLAB modules located in Buildings 772-F and 772-1F that would support the LEU loading station and the various HEU blend-down facilities; (3) upgrade and add supplementary equipment to HA-Line/H Canyon; (4) upgrade the railroad tunnel airlock material transfer station; and (5) upgrade the fuel handling and shipping facilities in Building 105-K to enable shipment to H Canyon (for processing at SRS) and/or Y-12/TVA vendor facility. The supplementary equipment additions and upgrades are necessary to HA-Line/H Canyon and CLAB to increase the product throughput and analysis turn-around time, respectively. The upgrades to the railroad tunnel airlock material transfer station and K-Area fuel transfer facilities are necessary to enable the transfer of HEU feed stock material from K Area to H Canyon and/or to Y-12/TVA vendor facility. This project is integral with existing H-Area, K-Area, and CLAB process systems and infrastructure (Figure 2-1) that were evaluated in the Disposition of Surplus Highly Enriched Uranium Final EIS (DOE 1996a).

The construction activities associated with the proposed action would start in December 2000 and be completed by April 2004. The earliest operations start date for the shipments would be April 2003. The facility would be operational for about 5 years. The program would be considered complete when all of the U-Al alloy ingots have been shipped offsite and/or the converted LEU solution is loaded in the shipping containers pending transport to the vendor. The project construction costs would be in the range of about $10-40 million per year (for 2½ years), and the annual operating costs would be up to approximately $30 million.

The LEU loading station would be located outside and immediately adjoining the HA-Line facilities, which are located adjacent to the southeast end of H Canyon (Building 221-H) (Figure 2-2). The preferred location for the facility would require minimal grading and use of fill material. Conceptually, the facility would be a pre-engineered metal building (i.e., Butler Building) on a reinforced concrete slab (Figure 2-3). The foundation design may involve the use of footings or pilings. The sides of this large carport-type structure would be enclosed from the ground level up to the base of the roof. The size of the LEU loading station would be approximately 20.8 meters (68 feet) long, 6.7 meters (22 feet) wide, and 7.3 meters (24 feet) in height. The total square footage would be approximately 139 m^2 (1,496 ft^2). Exterior doors would be located to allow personnel to enter both the ground and elevated walkway levels of the facility. External and interior stairways would be provided to access the walkways.

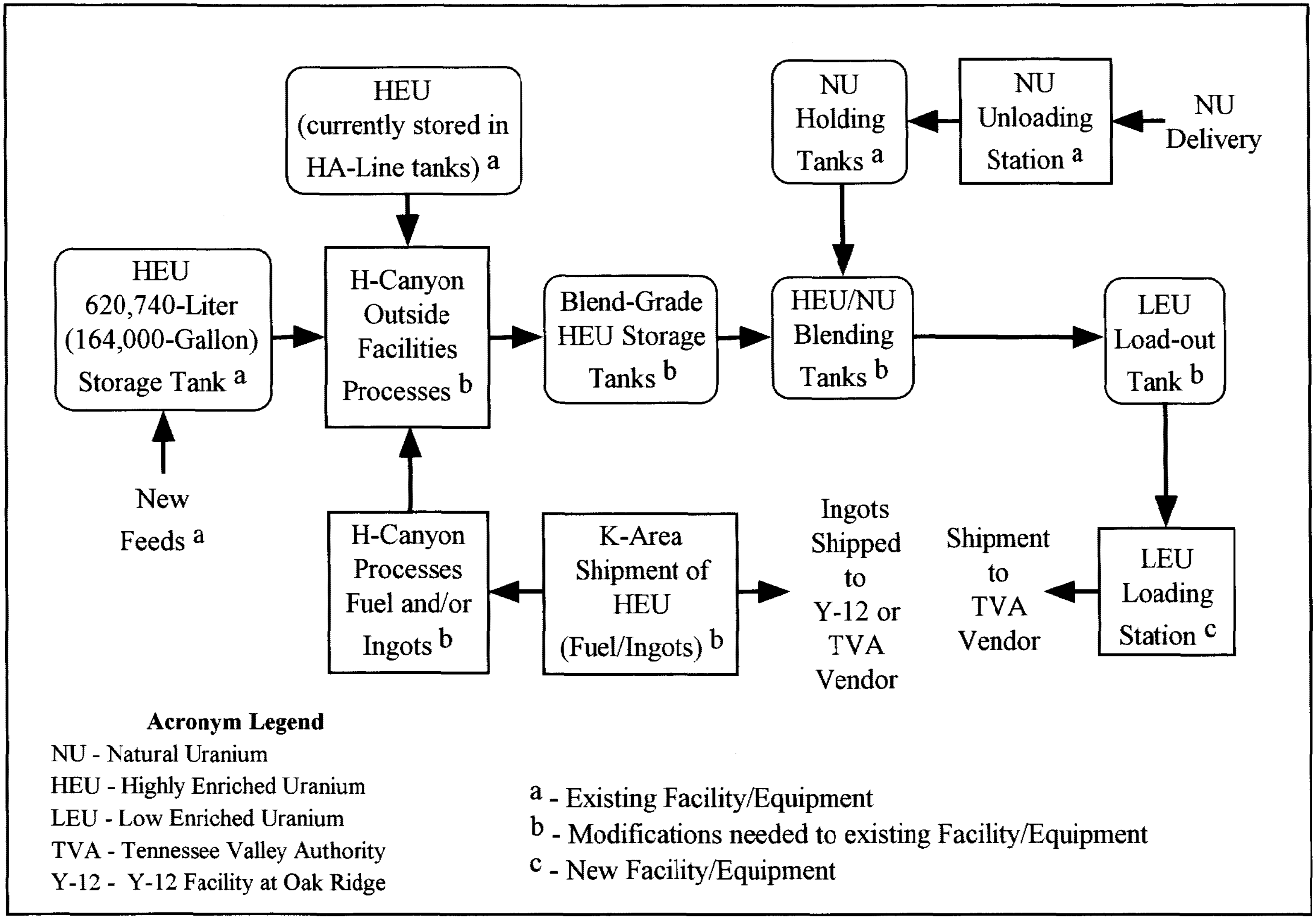

Figure 2-1. Schematic of HEU to LEU blend-down process at the Savannah River Site, South Carolina.

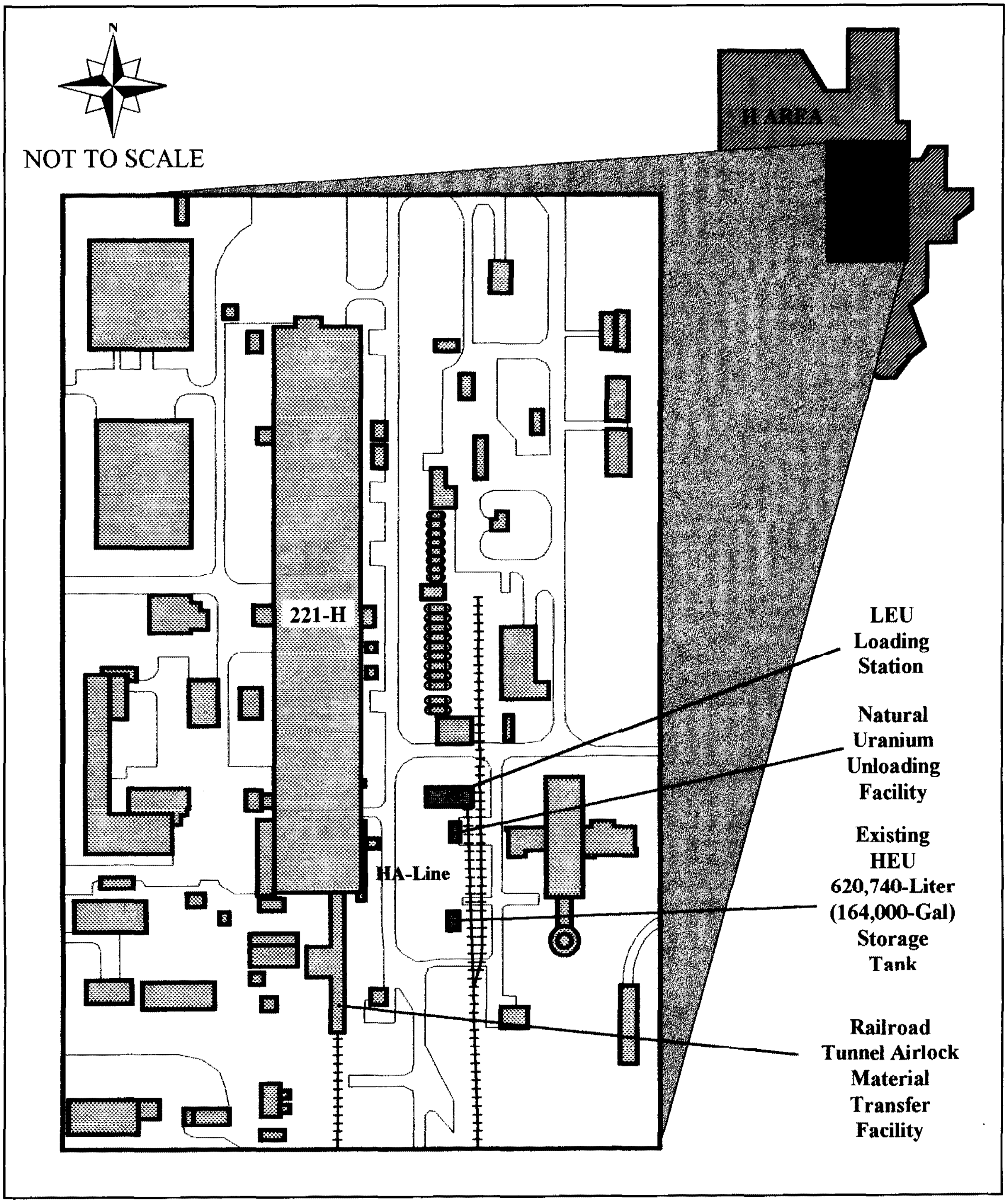

Figure 2-2. Locations of the proposed low enriched uranium (LEU) loading station and the existing highly enriched uranium (HEU) blend-down facilties in H Area at the Savannah River Site, South Carolina.

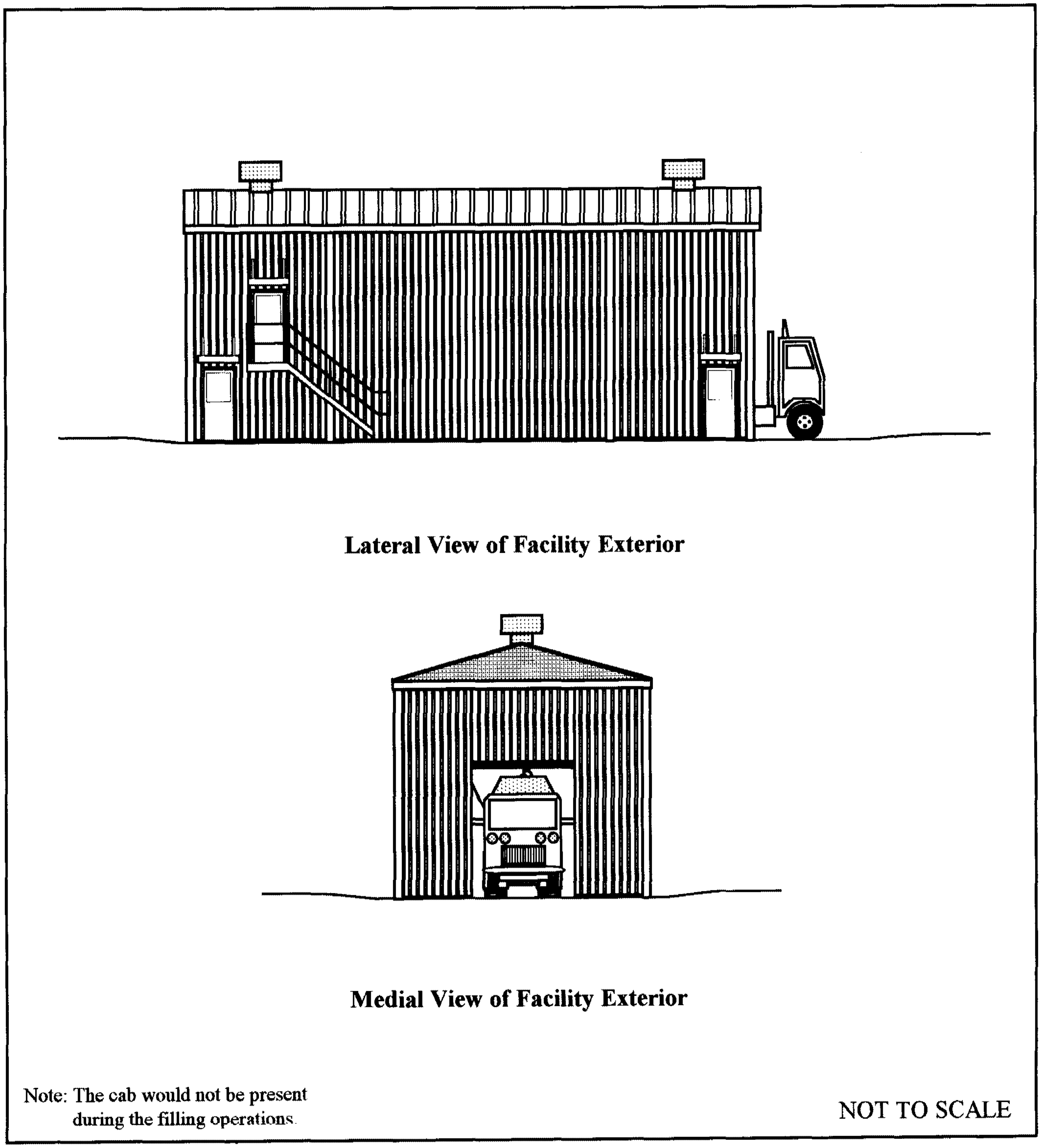

Figure 2-3. Conceptual schematic of the exterior of the proposed LEU loading station at the Savannah River Site, South Carolina.

The LEU loading station design would also include infrastructure specific to this proposed building. A paved roadway or drive would be provided for vehicular access to the facility. Sidewalks would be provided for pedestrian access. External lights would be installed around the perimeter of the building. The facility would be enclosed by a perimeter fence. Access to the loading station would be through a change room and distributed control system equipment modular building. Telephone and power tie-ins would be brought into the proposed facility, with the existing lines used to the maximum extent possible. Additional infrastructure tie-ins would include domestic water, instrument air, breathing air, and a public address system. Spill containment features of the LEU loading station would include curbs, a sloped concrete floor, trenches, and a sump. In the event of a spill, the contents of the sump would be pumped to the existing Effluent Treatment Facility (ETF) in H Area.

Shipping campaigns for uranyl nitrate would take place at 2 to 3 week intervals. The TVA vendor trailer trucks carrying the shipping containers would be backed into the proposed facility. Each trailer would nominally contain nine shipping containers (DOT Type B, NRC licensed). The loading area of the facility would be accessed by elevated walkways on both sides of the vehicle bay. The line from the blended LEU storage tank would lead into a header tank that would be sized to fill only one shipping container (i.e., approximately 946 liters or 250 gallons). That would eliminate the potential for either spills or overflows during the filling operations. Overhead lines would lead from the header tank to the filling appliances (Figure 2-4). To eliminate solids in the uranyl nitrate solution, the LEU would be directed through a 50-micron filter as it is loaded into the shipping container. The loading system would have the capability to either fill, or, in the event of a problem, drain the shipping containers. During filling operations, the shipping containers would be vented through a tank that is tied into the existing Recycle Vessel Vent System. In addition, the truck cab would be separated from the trailer during the filling operations to minimize fire hazards.

The proposed LEU loading station would be operated continuously with four 12-hour rotating shifts plus a day shift. The facility workforce would include 0.5 shift operations manager, 1 first line supervisor, 2 operators, 1 maintenance person, and 1 radiological controls officer on each shift. Shipments of ingots (depending on destination – Y-12/TVA vendor or H Canyon) would begin as early as Fiscal Year 2003 and end as late as Fiscal Year 2008. Existing facilities (i.e., CLAB, H Canyon, HA-Line, and Building 105-K) would be supplemented with personnel as needed to support the program.

Prior to shipment, CLAB personnel would verify through analyses that the uranium enrichment and total uranium concentration of the uranyl nitrate solutions as well as any impurities were within the limits allowable for transportation to and acceptance at the TVA vendor facility in Tennessee. The CLAB upgrades would be implemented to ensure that the sample analysis process would be capable of supporting these chemical analyses. The CLAB upgrades would consist of renovation of several laboratory modules, procurement and installation of new analytical equipment, and service upgrades to supporting instrument operation. For example, the CLAB upgrades could include

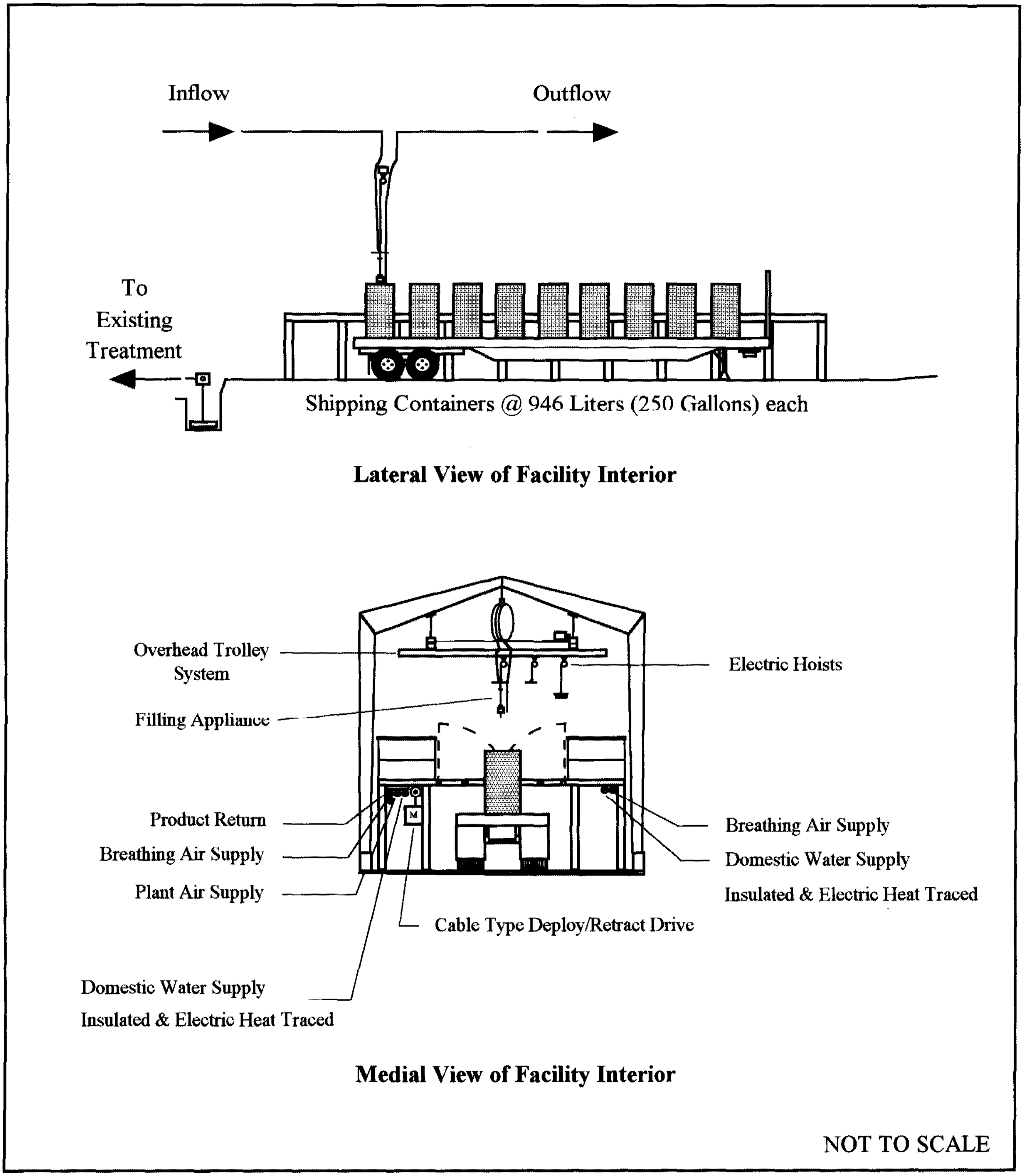

Figure 2-4. Conceptual schematic of the interior of the proposed LEU loading station at the Savannah River Site, South Carolina.

installation of the following new equipment: hoods, bench/storage cabinets, sinks, doors, flooring, gas chromatographs, free acid analyzer, and a two-cylinder helium manifold. The existing laboratory equipment (e.g., sinks, cabinets, flooring, appliances, etc.) would be decontaminated to acceptable radiological levels and removed from the labs for either onsite disposal or reuse. Existing utility infrastructure (e.g., light fixtures, electrical outlets and receptacles, fire protection sprinkler systems, data/phone outlets) would be upgraded, repaired, or replaced as appropriate.

The upgrades and additions of equipment at HA-Line would involve changes in the existing process lines designed to downblend HEU to less than 20 percent U^{235} LEU. These changes would be implemented at various points in the process from the existing 620,740-liter (164,000-gallon) HEU storage tank and NU unloading station to the proposed LEU loading station. Based on conceptual design, these supplementary equipment additions would include installation of: (1) five primary and eight secondary pumps to existing or proposed interim process line blending or storage tanks; (2) an NU volume fine adjustment and batch controller; (3) a 15,140-liter (4,000-gallon) blend-grade HEU tank (and associated in-line sample unit); (4) an HEU isotopics fine adjustment and batch controller; and (5) in-line piping between the previously mentioned process components and the existing process equipment. All of these upgrades and additions would be implemented within existing facilities or developed locations within H Area.

To support the fuel transfer from K Area to the blend-down facilities, the H-Canyon railroad tunnel airlock material transfer station (i.e., located at the south end of Building 221-H) would have to be upgraded. These upgrades would include for example: the installation of a modular personnel cool down unit, replacement of the material transfer shuttle railcar (with a smaller self-powered railcar that is easily decontaminated), installation of a transfer unloading jib crane, and construction of a truck road ramp. The truck road ramp would be built south of the existing railroad tunnel airlock to provide access for a low flatbed type trailer from the existing roadway down to the entry door to the tunnel. Installation of the new road/ramp would also require new reinforced concrete retaining walls, storm sewer pipe, security fencing, vehicular gates, and appropriate re-grading.

Several modifications and upgrades of the fuel transfer facilities in the existing Building 105-K would have to be made for the purpose of handling contamination from the fuel that has been in moderator. Only a limited number of these fuel tubes would have to be processed. The changes necessary to enable this transfer operation would possibly include for example: installation of a decontamination oven and enclosure (including the exhaust system), installation of a fuel tube scale, installation of fuel tube storage racks, construction of a decontamination/weighing station, installation of a modular change room facility, and installation of radiation detection and monitoring equipment. Modifications and upgrades would also have to be made to accommodate shipping the U-Al alloy ingots to H Canyon, Y-12 or a TVA vendor facility.

The facilities involved in the proposed action are located entirely within the limited access portions of F, H, or K Areas. All existing security systems and programs for this area of SRS would be extended to the facilities involved in the proposed action.

2.2 Alternatives to the Proposed Action

In accordance with NEPA regulations, DOE examined the following alternatives to the proposed action:

- No action, continue to store the surplus HEU at SRS
- Build the proposed LEU loading station at another onsite location

2.2.1 No Action, Continue to Store the Surplus HEU at SRS

One alternative to the proposed action is to take no action. This would consist of SRS continuing to store the surplus HEU onsite, and not implementing any action to construct or operate the loading facility. The liquid uranyl nitrate would remain stored until a future decision regarding its disposition is made. This alternative would not satisfy the nonproliferation objective of eliminating the weapons-usability of the surplus HEU.

2.2.2 Build the Proposed LEU Loading Station at Another Onsite Location

One potential reasonable alternative to the proposed action would be to build the LEU loading station at another location onsite. The loading facility would not be in close proximity to the blending operation in HA-Line. Although this alternative would satisfy the same objectives as the proposed action, the added distance from HA-Line would result in increased cost for the piping system.

3.0 ENVIRONMENTAL CONSEQUENCES OF THE PROPOSED ACTION AND ALTERNATIVES

SRS occupies an area of approximately 800 square kilometers (300 square miles) in southwestern South Carolina (Figure 1-1). The site borders the Savannah River for about 27 kilometers (17 miles) near Augusta, Georgia, and Aiken and Barnwell, South Carolina. SRS contains five non-operational nuclear production reactor areas, two chemical separations facilities, waste treatment, storage and disposal facilities, and various supporting facilities. The Final EIS for the Construction and Operation of a Tritium Extraction Facility at SRS (DOE 1999) and the most recent socioeconomic survey of the six-county SRS area of influence (HNUS 1997) contain additional information on SRS facilities and the areas surrounding the site.

3.1 Construction Activities

All activities related to the construction portion of the proposed action would take place within previously developed areas. The LEU loading station would be built at a location in H Area that is already cleared but is currently unoccupied. The other portions of the proposed action (i.e., modifications and upgrades to CLAB, H-Area facilities, and K-Area facilities) would take place in the interiors of existing buildings. Some small areas may be used as temporary lay-down yards or equipment storage. Therefore, land use impacts due to these construction activities would be negligible.

The direct and indirect socioeconomic impacts of the peak project construction work force of 50 people would be negligible when compared to the present total SRS employment of approximately 14,000 people. These workers (including both non-manual and manual employees) would be drawn from both local and non-local sources as determined by skilled worker availability. No measurable impact on the local economy would be expected from the proposed action.

The proposed action would not require the development of any new groundwater or surface water resources. The only groundwater resources which would be utilized in association with the construction portion of the proposed action would be domestic water supplies for use as drinking water, sanitary sewer supplies, and fire water for use in the existing H-Area and K-Area fire suppression systems. The domestic water usage will not be expected to increase significantly as a result of the project's construction activities. This existing usage is already permitted through South Carolina Department of Health and Environmental Control (SCDHEC).

The proposed project would generate minor amounts of some construction-related debris or rubble. These wastes would include suspect or low-level radioactively contaminated soil (e.g., in the area of the H-Canyon Outside Facilities), demolition and renovation waste (including minimal amounts of asbestos pipe insulation), general construction waste (including steel), and old broken concrete. Depending upon the composition and presence of detectable contamination, these waste streams would be placed in appropriate waste receptacles, and then transported to and disposed of at either the municipal solid waste disposal site in use at that time (e.g., Three Rivers Solid Waste Authority Regional Landfill), the SRS erosion control pit, or the SRS Solid Waste Management Area (i.e., E Area), as appropriate. The management, transportation, and disposal of such wastes has already been addressed in DOE (1994b), DOE (1995a), and DOE (1995b). Small amounts of liquid waste would be generated when the line breaks in the HA-Line basin are conducted. These materials would be flushed to existing treatment facilities. No new waste streams or types of waste would be generated during implementation of the proposed action. These project activities would be expected to have only a minimal impact on site waste management operations.

Construction-related air quality effects would primarily be due to temporary equipment use. Diesel operated equipment (e.g., trucks and forklifts) would be used to load and haul solid wastes away for disposal on site, and for delivery and off-loading of equipment in support of the proposed action. The operation of this class of equipment does not currently fall within the SCDHEC requirements for air permitting activities.

Implementation of the project construction activities would result in a less than 1-percent increase in the site traffic volumes on SRS Roads C, 4, E, and roads to K Area. This would primarily entail the transportation of equipment, construction materials, and the waste generated by this portion of the proposed action. Since the current traffic volume on these site roads is below the design capacity, traffic and transportation impacts associated with the construction activities of this project would be negligible.

Because of the project locations in existing industrial onsite areas, no impacts on any SRS ecological or environmental resources would be expected as a result of the facility construction and process modification portion of the proposed action. The project locations consist entirely of borrow or fill material that was placed during construction of the existing facilities (Rogers 1990). There would be no excavation of previously undisturbed soils during the proposed action; consequently, no impacts to site cultural resources would be expected as a result of the proposed action.

The Occupational Safety and Health Act (OSHA) requires that employers comply with the safety and health standards set by the act (29 CFR 1910) to provide each employee with a work site that is free from recognized hazards that are likely to cause death or serious injury. Temporary barricades and signs would be installed during construction to prevent entry of unauthorized personnel at the various specific project sites. Aside from unexpected construction accidents, there should be no potential for impacts to human health and worker safety associated with the construction portion of the proposed action at SRS.

3.2 Operational Activities

The operation of the LEU loading station, CLAB, H-Area facilities, and K-Area fuel handling and shipping facilities would take place entirely within existing developed site areas. Therefore, land use impacts associated with operational activities would be negligible.

Once operational, the proposed facilities would employ a peak total of approximately 270 people. These employees would either be reassigned from the existing site workforce or would be new hires.

All utilities (i.e., domestic/fire water, steam, electrical) would be obtained through connections with existing distribution systems in H Area. The domestic water needs of the subject facilities would not be expected to exceed 1 percent of the current usage volume or rate of the H-Area Outside Facilities, and thus should not affect the water level of the supply aquifer. The fire water usage for these facilities is normally expected to be zero cubic meters/second (zero gpm). The increase in steam usage for the H-Area

Outside Facilities would be negligible as a result of the proposed facility operations and process modifications. The total additional power needs for the proposed action are projected to be 160 kVA. This would result in a minor increase to the recent H-Area electrical demand of 22.4 MVA (i.e., out of a design capacity of 64 MVA). The change in the utility usage in CLAB and K Area would be negligible as a result of implementing the proposed action.

The only source of air emissions from the proposed facility would be from the vent on the shipping containers. These containers would be vented through a tank (i.e., most likely Tank E1-1) which is tied into the existing Recycle Vessel Vent System. The Recycle Vessel Vent System vacuum on the shipping containers would also collect minute amounts of off-gas (i.e., hydrogen) and possibly some uranyl nitrate solution vapors. The impacts of these air emissions associated with the proposed action would be negligible as they would be discharged through the 291-H sand filters. No significant change in air emissions in CLAB and K Area would result from the proposed action.

There would be no liquid effluents from the proposed process since two solutions are being blended together. Spills would be minimized. Any spills from the blending operations would be captured in an existing basin or sump, and transferred to the General Purpose Evaporator for processing. The overheads of the evaporator are sent to ETF, and the bottoms to the H-Area Tank Farm. Spills from the loading operations would be captured in the integral basin or sump system of the new loading station. The liquid effluents from CLAB operations would continue to be sent to the 221-F Lab Waste Evaporator, with overheads going to ETF and bottoms to the F-Area Tank Farm. No impacts to either surface or ground water resources would be expected to result from the proposed action.

The only waste generated during operation of the proposed loading facility would include small amounts of domestic sanitary solid and low-level job control (e.g., plastic suits and associated wipes) waste. All of this sanitary solid waste would be disposed of at the municipal solid waste disposal site in use at that time. The low-level job control waste would be disposed of at the SRS Solid Waste Management Area. Operations of the proposed facility would be expected to have only a negligible impact on the site waste management operations.

The increases in traffic volume associated with the operational portion of the proposed action would be minor. The increased truck traffic within H and K areas would be present only at intervals of once every 2-8 weeks. Again, the vehicle traffic in these areas of the site is below the design capacity for the affected roadways. These increases in traffic volume would be expected to have a negligible impact on the site.

Workers at the LEU loading station would have to dress in protective clothing during filling operations. The anticipated maximum protective clothing that workers would have to wear would be two pairs of coveralls and a full respirator (or fresh air hood). The minimum would be one pair of coveralls. The full-face respirator may be waived pending further investigation. The CLAB technicians typically wear coveralls, laboratory coats, two pairs of gloves, shoe covers, and safety glasses as protective clothing. Because of the use of protective clothing and administrative controls, there would be little or no potential for impacts to human health and worker safety associated with the normal operation of the proposed or existing facilities.

Worker exposures to radiation under normal operations are required to be kept as low as reasonably achievable. SRS has an administratively controlled exposure level of 500 mrem per year. Within the DOE complex, the worker exposure limit is a dose of less than 2 rem per year, while the Federal regulatory limit for workers is less than 5 rem per year. Appropriate procedures and administrative controls (e.g., personnel training and work area barriers) would be in place prior to any proposed activities. Also, radiation worker exposure levels would be monitored (i.e., with personal dosimeters) during the proposed operational activities. The dose to workers would not be expected to increase above current exposure levels. The enriched uranium is stored in H-Area tanks. The average worker in H-Area Outside Facilities receives ≤ 10 mrem/quarter, with maximum exposure rates estimated to be equal to or less than 5 mrem/hr. Based on an occupational risk factor of 4×10^{-4} fatal cancers per person-rem, workers engaged in the processes associated with the proposed action would not be expected to incur any harmful health effects from radiation exposures which they receive during normal operations.

3.3 Accident Analysis

3.3.1 Analyzed Scenario

A fire in the LEU loading station would constitute the single, most bounding, credible accident for project analysis. This determination is based on the fact that all tanks and processes associated with the off-specification HEU blend-down project, except for the LEU loading station, currently exist onsite and have been addressed in previous NEPA documentation (DOE 1996a).

Under the proposed action in this EA, an LEU loading station would be built in H Area to handle the transfer of the LEU product solution into DOT-certified containers for shipment. The trailer truck would be assumed to hold nine 946-liter (250-gallon) containers. These containers will be NRC licensed, Type B containers, which will meet applicable 10 CFR 71 criteria.

3.3.2 Assumptions

The scenario envisions a fire starting in the LEU loading station. The fire is assumed to begin after the nine shipping containers on the trailer truck have been filled with LEU solution. The loading station is essentially an outdoor facility that would be similar in design to a carport-type structure. Any fire detection/suppression system located within the facility is assumed to fail. It is also assumed that the fire at the trailer loading dock will not spread to the H Canyon affecting the LEU and HEU storage tanks. The LEU solution is assumed to contain uranium with an enrichment of up to 20 percent U^{235} in solution with a concentration of less than 100 gU/L. The fire would consume the inventory in the nine shipping containers on the trailer bed (i.e., a total of 8,516 liters or 2,250 gallons). The fire is also postulated to damage the piping from the LEU storage tank to the LEU loading station in a manner consistent with release. It is assumed that valving is in place on this transfer line to terminate flow to the loading station. It is also assumed that the valve between the storage tank and the loading dock area is not closed by the operator until an additional 946 liters (250 gallons) of LEU solution is leaked to the loading area. It is assumed that the fire will consume a total of 9,463 liters or 2,500 gallons of the LEU solution. Because the facility is outside, the release will be a direct airborne release. No chemical inventories, other than the LEU solution, are assumed to be located on the loading station. The release would involve radiological material and nitric acid. The nitric acid release was modeled assuming a 50 percent nitric acid solution with a puddle area of 167 m^2 (1,800 ft^2) and a volume of 8,516 liters (2,250 gallons). Input parameters include meteorological data such as Stability Class E with a wind speed of 1.7 meters/second (5.6 feet/second) and an air temperature of 29°C (84°F). This bounding fire is assumed to be in the "unlikely" frequency range, with a probability of occurrence of less than once in 100 years but greater than once in 10,000 years. Facility personnel must fail to detect and control the fire before it has progressed beyond the incipient stage and the automatic fire suppression systems, if there are any, must fail to control the fire to the place of origin.

3.3.3 Consequences

The consequences resulting from a fire in the LEU loading station would be quite low. The accident is expected to result in the onsite worker being exposed to 1.2 rem and the offsite individual being exposed to 0.0015 mrem (WSMS 1999).

As a point of reference, the average individual dose in the United States, including persons residing in the Central Savannah River Area, from natural and manmade sources of radiation is about 360 mrem. The natural radiation sources contributing to this total include: radon – 200 mrem; cosmic – 27 mrem; rocks and soil – 28 mrem; and sources internal to the body – 40 mrem. Manmade radiation sources include: medical exposures - 53 mrem; consumer products - 10 mrem; and other sources (e.g., occupational exposures and fallout) – 0.6 mrem (NCRP 1987). The recent maximum calculated dose from all SRS releases to the population residing within 80 km (50 mi) of SRS was 0.19 mrem (Arnett and Mamatey 1999).

The onsite population total effective dose equivalent (TEDE) is 25 person-rem (WSMS 1999). Based on a dose-to-risk conversion factor of 4.0×10^{-4} (onsite) latent cancer fatalities (LCFs) per person-rem, 0.01 LCFs per year would be expected to result from the postulated scenario. The general public TEDE is 2.4 person-rem (WSMS 1999). Based on a dose-to-risk conversion factor of 5×10^{-4} (offsite) LCFs per person-rem, 0.0012 LCFs per year would be expected to result from the postulated accident scenario.

In general, the symptoms of exposure to the aqueous nitric acid and uranium (in nitric acid) may include burning sensation, coughing, wheezing, laryngitis, shortness of breath, headache, nausea and vomiting. Aqueous nitric acid may be fatal if inhaled, swallowed, or absorbed through the skin. Nitric acid causes burns. Nitric acid and uranium (in nitric acid) are extremely destructive to tissue of the mucous membranes and upper respiratory tract, eyes, and skin.

Based on the exposure symptoms discussed in the previous paragraph, there would be potential toxicological effects associated with such an event. The severity of consequences depends on the extent of exposure, and the specific location of the affected individual(s). Toxicological consequences are based on concentrations of a specific material in parts per million (ppm) of the material in air. Emergency Response Planning Guidelines 1 (ERPG-1) is the maximum airborne concentration below which it is believed that nearly all individuals could be exposed for up to 1 hour without experiencing other than mild transient adverse health effects or perceiving a clearly defined objectionable odor. Similarly, ERPG-2 is the maximum airborne concentration below which it is believed that nearly all individuals could be exposed for up to 1 hour without experiencing or developing irreversible or other serious health effects or symptoms, which could impair an individual's ability to take protective action. Finally, ERPG-3 is the maximum airborne concentration below which it is believed that nearly all individuals could be exposed for up to 1 hour without experiencing or developing life-threatening health effects.

Toxicological consequences to the onsite worker would be approximately 1.97 ppm (Brown 1999), which is below the ERPG-1 threshold of 2 ppm. Toxicological consequences to the offsite individual would be 0.089 ppm (Brown 1999), which is also below the ERPG-1 threshold. Therefore, the analyzed accident would not result in any fatalities, the development of any irreversible or serious health effects, or even the development of any mild transient adverse effects.

3.4 Environmental Consequences of the Alternatives

The no-action alternative would result in SRS continuing to store the surplus off-specification HEU in existing tanks within H Area. None of the impacts associated with the construction and operation of the proposed LEU loading station would be realized. The consequences of continued storage of HEU at SRS were specifically discussed in DOE (1996a). In general, under current normal operations, radiological releases to the environment as well as direct exposures would be expected to occur. However, these resulting impacts would remain within regulatory limits. The total worker dose would be 216 person-rem/year. After 20 years of operation, the corresponding number of fatal cancers among these workers would be 1.7. The total population dose would 21.5 person-rem/year, with 0.22 fatal cancers after 20 years of operation.

The alternative to build the proposed LEU loading station at another location in H Area would include the same general impacts as the proposed action. In addition, there would be minor impacts associated with the increased piping needed to support building the proposed loading station at a location not in close proximity to HA-Line. However, because of this increased distance from the HA-Line area of H Canyon, this alternative would neither be either cost effective nor operationally efficient.

3.5 Cumulative Impacts

The principal cumulative impact from the proposed action would be the elimination of the surplus HEU currently being stored in tanks and facilities at SRS. There would be minor changes in land use in an already developed area of SRS as a result of the proposed action. There would be no measurable impact on the local economy as a result of the proposed action and no environmental justice concerns. Cumulative ambient air quality impacts would be negligible. Groundwater impacts would be negligible. Little to no traffic and transportation impacts would result from implementation of the proposed action. There would be no impacts to sensitive environmental resources (e.g., threatened and endangered species and their habitats, floodplains and wetlands, and archaeological sites). Assuming that both protective clothing and adequate safety measures are utilized, the proposed action should not pose any potential problems for either human health or worker safety. There would be no measurable impact to either public health and safety as a consequence of the proposed action. No excess LCFs would occur as a result of the proposed action.

4.0 REGULATORY AND PERMITTING PROVISIONS CONSIDERED

DOE policy is to carry out its operations in compliance with all applicable Federal, State and local laws and regulations, as well as all DOE Orders. This section provides a discussion of the major regulatory permit programs that might be applicable to the proposed action.

4.1 National Environmental Policy Act of 1969, as amended (42 USC 4321 *et seq.*)

This EA has been prepared in accordance with NEPA of 1969, as amended, and with the requirements of the Council of Environmental Quality Regulations for Implementing NEPA (40 CFR 1500-1508), DOE Regulations (10 CFR 1021), and DOE Order 451.1B. NEPA, as amended, requires "all agencies of the Federal Government" to prepare a detailed statement on the environmental effects of proposed "major Federal actions significantly affecting the quality of the human environment." This EA has been written to comply with NEPA and assess the environmental effects of the LEU loading station and modifications to the HEU blending facilities at SRS.

4.2 Solid Waste Regulations

Small amounts of solid waste materials (e.g., construction rubble and debris) would be deposited in the municipal solid waste facility being used by SRS at that time, in the SRS Solid Waste Management Area, or in the SRS erosion control pit, as appropriate. These activities would be part of already permitted waste management activities that are ongoing at SRS.

4.3 Air Emission Regulations

Operation of the class of construction equipment to be used in implementing the proposed action does not currently fall within the SCDHEC requirements for air permitting activities. The use of any diesel generators during construction activities would be prescreened for permitting requirements under Title V. The operations of CLAB and the proposed LEU loading station would be under an existing permit.

4.4 Domestic Water Regulations

Any modifications of the domestic water tie-ins within the existing H-Area infrastructure would require a SCDHEC domestic water construction permit (SCDHEC Regulation R61-58). The SCDHEC domestic water operating permits for the H-Canyon Outside Facilities are already in place, and would be modified as necessary.

4.5 Liquid Discharge Regulations

The discharge of stormwater from the area encompassing the proposed facility is an already permitted NPDES activity.

5.0 AGENCIES AND PERSONS CONSULTED

Westinghouse Safety Management Services, Inc. were consulted during the preparation of this EA.

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