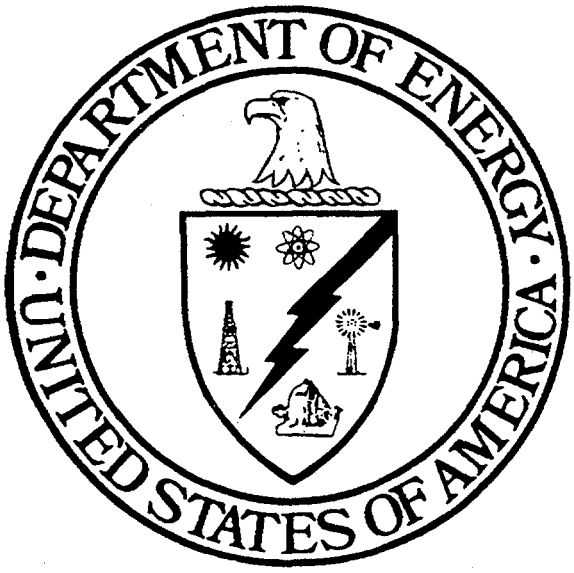
DOE/EA-1222

ENVIRONMENTAL ASSESSMENT FOR THE TRITIUM FACILITY MODERNIZATION AND CONSOLIDATION PROJECT AT THE SAVANNAH RIVER SITE



JANUARY 1998

U. S. DEPARTMENT OF ENERGY
SAVANNAH RIVER OPERATIONS OFFICE
SAVANNAH RIVER SITE

DISCLAIMER

DOE/EA-1222

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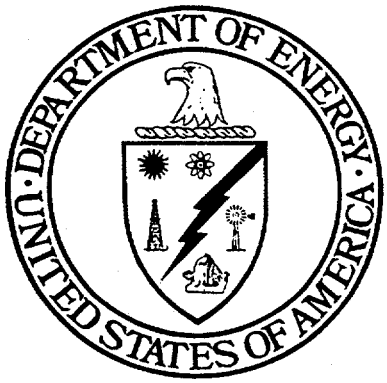

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LIST OF ABBREVIATIONS/ACRONYMS

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

Al	-	aluminum
ALARA	-	As Low As Reasonably Achievable
APT	-	Accelerator Production of Tritium
ARMS	-	Automated Reservoir Management System
CFR	-	Code of Federal Regulations
CIF	-	Consolidated Incineration Facility
CLWR	-	Commercial Light Water Reactor
DOE	-	U. S. Department of Energy
DP	-	Defense Programs
EA	-	Environmental Assessment
EIS	-	Environmental Impact Statement
Fe	-	iron
ft	-	feet
FY	-	Fiscal Year
HNUS	-	Halliburton NUS Corporation
HSV	-	Hydride Storage Vessel
HT	-	tritiated hydrogen
HTV	-	Hydride Transport Vessel
HVAC	-	Heating, Ventilation, and Air Conditioning
kVA	-	kilovolt-ampere
kW	-	kilowatt
LAW	-	low activity waste
LCF	-	latent cancer fatality
LLW	-	low-level radioactive waste
m	-	meter
Mn	-	manganese
mrem	-	1/1000 rem
msl	-	mean sea level
MTF	-	Material Test Facility
NEPA	-	National Environmental Policy Act
NERP	-	National Environmental Research Park
NPDES	-	National Pollutant Discharge Elimination System
NUS	-	NUS Corporation
PV	-	Product Vessel
rem	-	roentgen equivalent man
Rev	-	Revision
SAM	-	Scanning Auger Microprobe
SCDHEC	-	South Carolina Department of Health and Environmental Control
SEM	-	Scanning Electron Microscope
SR	-	Savannah River Operations Office
SRARP	-	Savannah River Archaeological Research Program
SRI	-	Savannah River Natural Resource Management and Research Institute
SRS	-	Savannah River Site
TEF	-	Tritium Extraction Facility
USGS	-	U. S. Geological Survey
VIM	-	Video Intensified Microscope
WSRC	-	Westinghouse Savannah River Company
Z-Bed	-	Vessel filled with zeolite
Zn	-	zinc

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1.0 INTRODUCTION

The Department of Energy (DOE) prepared this Environmental Assessment (EA) to assess the potential environmental impacts associated with the proposed modernization and consolidation of the existing tritium facilities at the Savannah River Site (SRS), located near Aiken, South Carolina (Figure 1-1). The proposed action would include the relocation and modification of the existing process systems, equipment, and functions within the SRS tritium facility complex. The proposed action would improve operational safety, reduce environmental releases, improve productivity, and significantly reduce future operating costs.

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 Parts 1500-1508); and the DOE Regulations for implementing NEPA (10 CFR Part 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 or prepare an Environmental Impact Statement (EIS).

1.1 Background

In the 1950s, DOE began the production of tritium in nuclear reactors at SRS. The existing tritium extraction and processing facilities on site (i.e., Buildings 232-H and 234-H) date from that time. The design of these facilities entailed locating the tritium process equipment in high-velocity air hoods or within specific rooms in the building. Such designs limited the mitigation capabilities in the event of an accident. In the early 1990s, Building 233-H was constructed to replace all of the tritium loading and unloading functions previously located in 234-H. All of the tritium process equipment in 233-H was confined in gloveboxes to better control any emissions.

As part of the SRS Activity Implementation Plan, DOE is pursuing programs to downsize and modernize the existing production and engineering activities at the site. These programs are being proposed for implementation from the present fiscal year through Fiscal Year 2004. This baselining of site production and engineering capability is consistent with DOE's Stockpile Stewardship Program and the Process Development Surveillance Implementation Plan. The scope of this program includes the Engineering, Consolidated Process Development Programs, as well as the proposed action described in the present EA. Support of these programs is essential to further cost reductions to operating budgets while still meeting the expected missions assigned to SRS.

This site program would necessitate consolidating the existing tritium processing activities into fewer buildings within H-Area. Most of these proposed modifications would be accomplished in Building 233-H and other existing buildings located within the tritium facility complex (Figure 1-2). The movement of these processes would reduce the use of second generation tritium facilities in favor of the more modern third generation structures.

1.2 Purpose and Need for Agency Action

DOE needs to take action to reduce SRS tritium facility operating costs and ensure the continuing capability to support the nuclear weapons stockpile of the United States. While the need for tritium has declined since the end of the Cold War, SRS facilities will be required to continue to recycle tritium to support the continuing nuclear weapons stockpile. Because of advances in tritium handling technology since the tritium facilities were

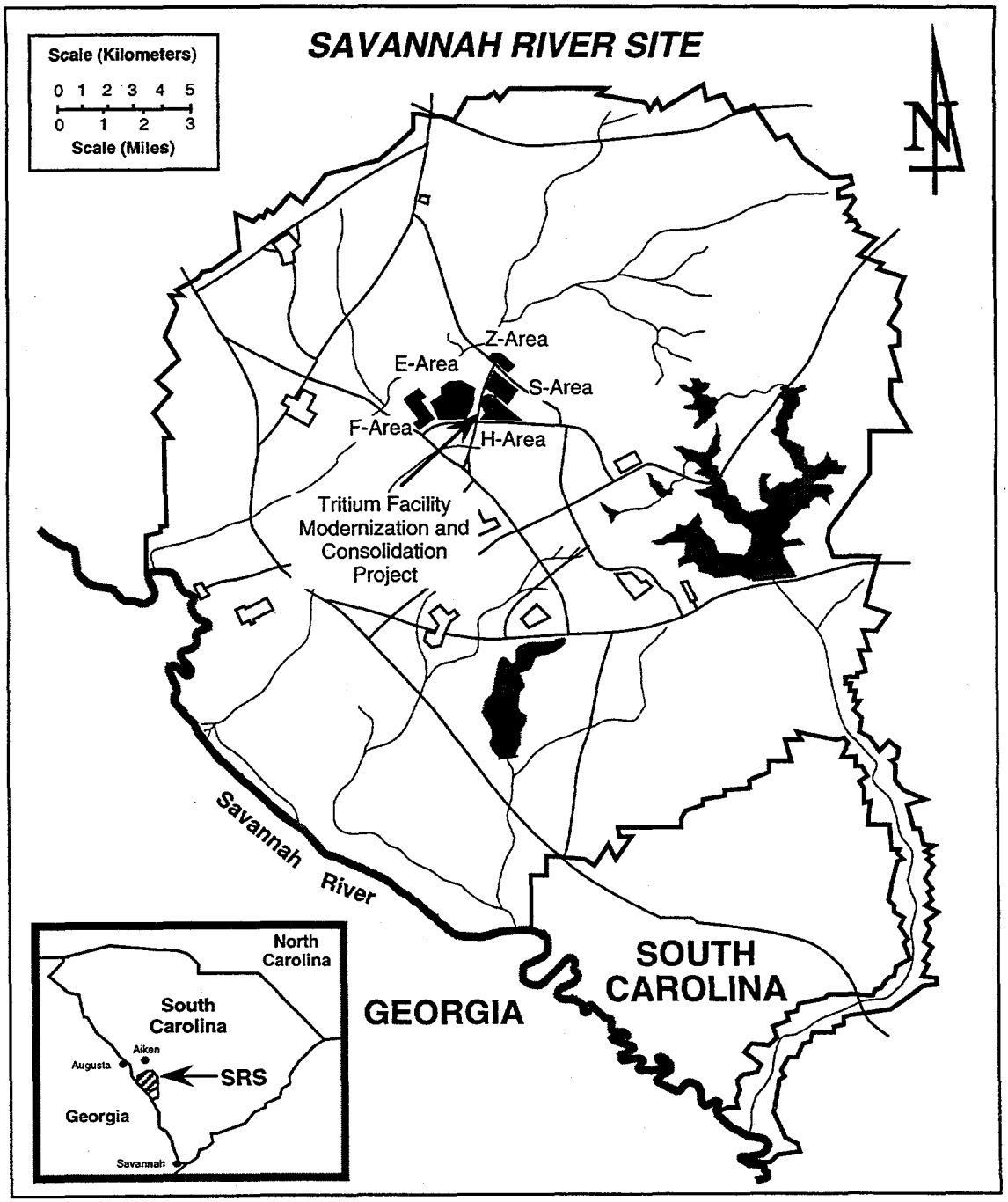

Figure 1-1. Location of the Tritium Facility Modernization and Consolidation Project at the Savannah River Site, South Carolina.

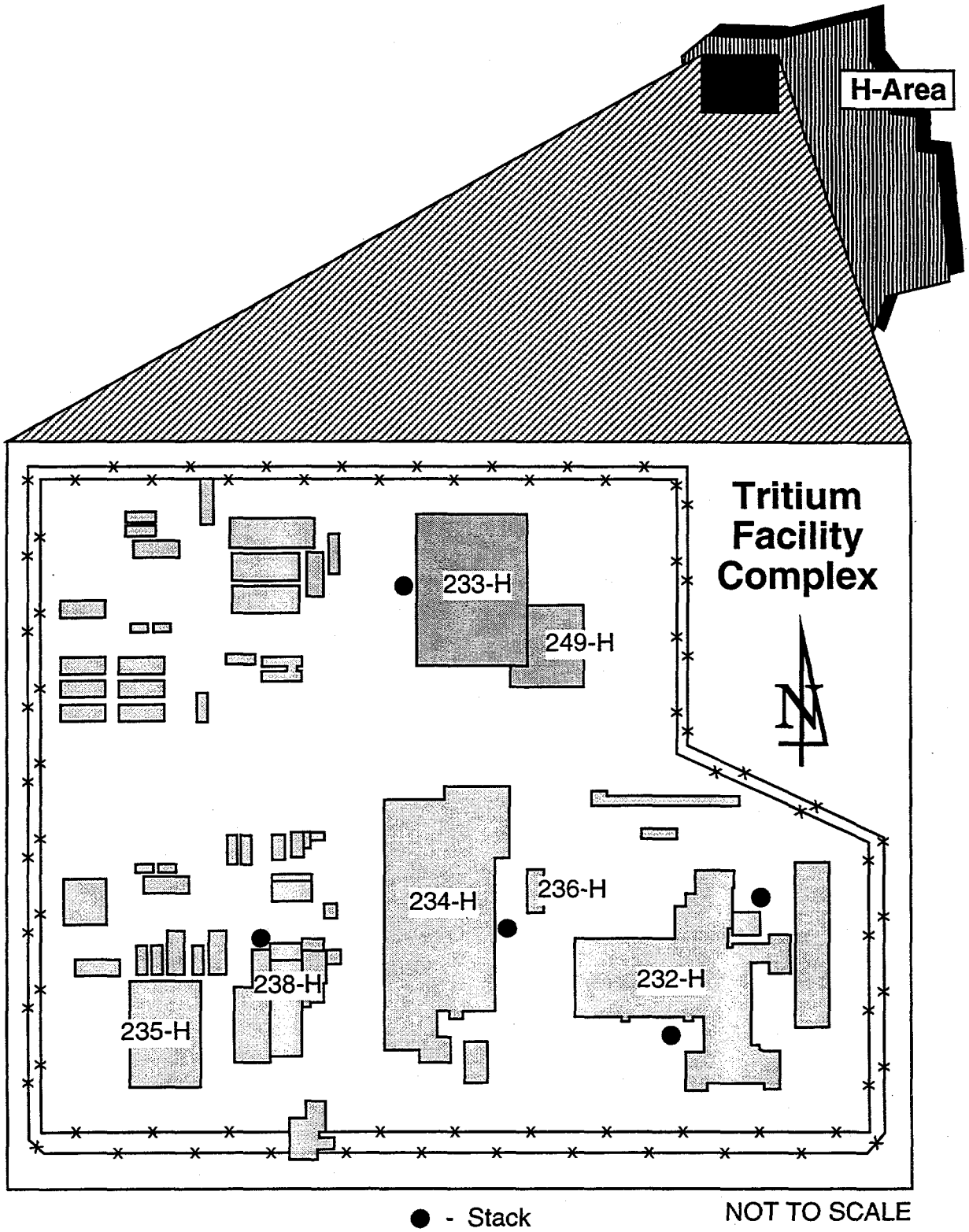

Figure 1-2. Location of the Tritium Facility Complex within H-Area.

constructed, actions required to reduce operating costs can also improve operational safety and reduce impacts of tritium operations on the environment.

2.0 PROPOSED ACTION AND ALTERNATIVES

2.1 Proposed Action

The proposed action is to consolidate the tritium activities currently performed in Building 232-H (Figure 2-1) into Buildings 233-H and 234-H (Figure 2-2). All tritium processing operations currently being conducted in Building 232-H (with the exception of extraction and obsolete or abandoned systems) would be relocated to 233-H. The systems remaining in 232-H would be shut down and left in place. New tritium processing equipment in Building 233-H would be sized to accommodate the production capacity of DOE's new tritium source. DOE is currently pursuing a dual track strategy for production of tritium (DOE, 1995d). By late 1998, DOE will decide to produce tritium using an Accelerator for the Production of Tritium (APT), which would be located at SRS, or by purchasing an existing commercial light-water reactor (CLWR) or purchasing irradiation services at an existing CLWR. A Tritium Extraction Facility (TEF) to support the CLWR would be constructed at SRS. The construction portion of the proposed action would begin in Fiscal Year 1998 and be completed in Fiscal Year 2004.

Building 234-H would be used to house the non-gas processing equipment that would be moved out of Building 232-H, including certain Material Test Facility (MTF) functions. Building support services (e.g., HVAC and electrical distribution) for 234-H would be modernized to provide dependable service for the future and to support the processes that would be moved from 232-H. Personnel offices, control room, document control, Automated Reservoir Management System (ARMS) computer systems, change rooms, and radiological control operations would be maintained in the existing locations. Support services for the "abandoned" process rooms in 232-H would be maintained as required. The relocation activities to 234-H (Figure 2-2) would include specific functions from both MTF and Reservoir Surveillance Operations currently located in 232-H as follows:

- Environmental chambers and associated functions
- Life storage and shelf storage
- Thermal shock
- Clean metallography
- Contaminated metallography
- Scanning electron microscope
- Scanning auger microscope
- Video intensified microscope
- Tritium test manifold
- Flow tester

All processes with an appreciable potential to generate a tritium release would be relocated to 233-H and be installed in gloveboxes connected to either the existing or a new 233-H glovebox stripper system. Building support services, for 233-H, such as HVAC, breathing air and electrical distribution would also be altered in support of this project.

The proposed relocation of the process systems from 232-H to 233-H would provide improved support of the reservoir loading mission of the new host facility. This would minimize scheduling problems between buildings and replace older, less efficient equipment with new units based on current technology. It would also include the placement of both a process stripper (for recovery of tritium from waste process gases prior

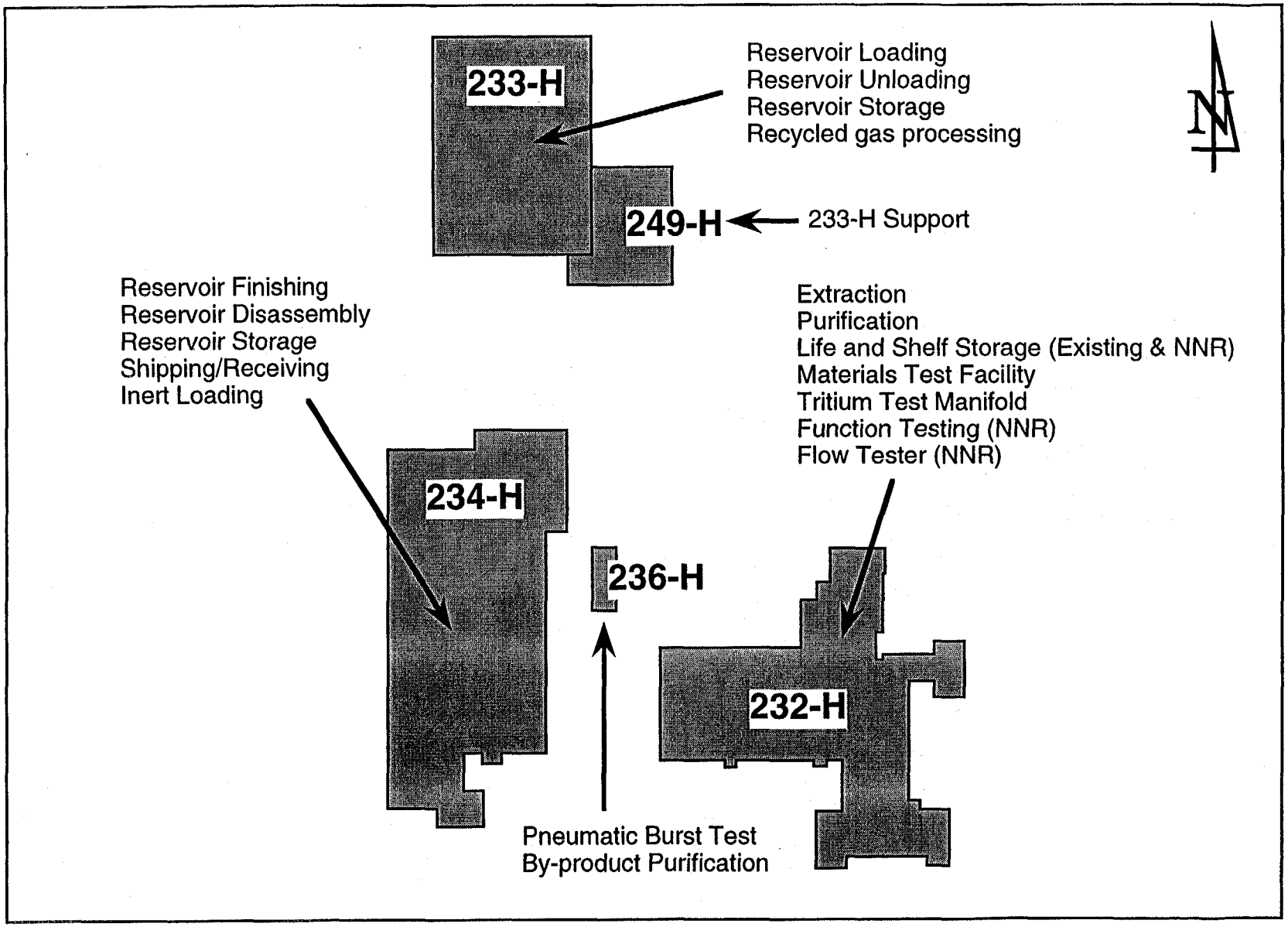

Figure 2-1. Schematic of the existing process/system layout within the Tritium Facility Complex.

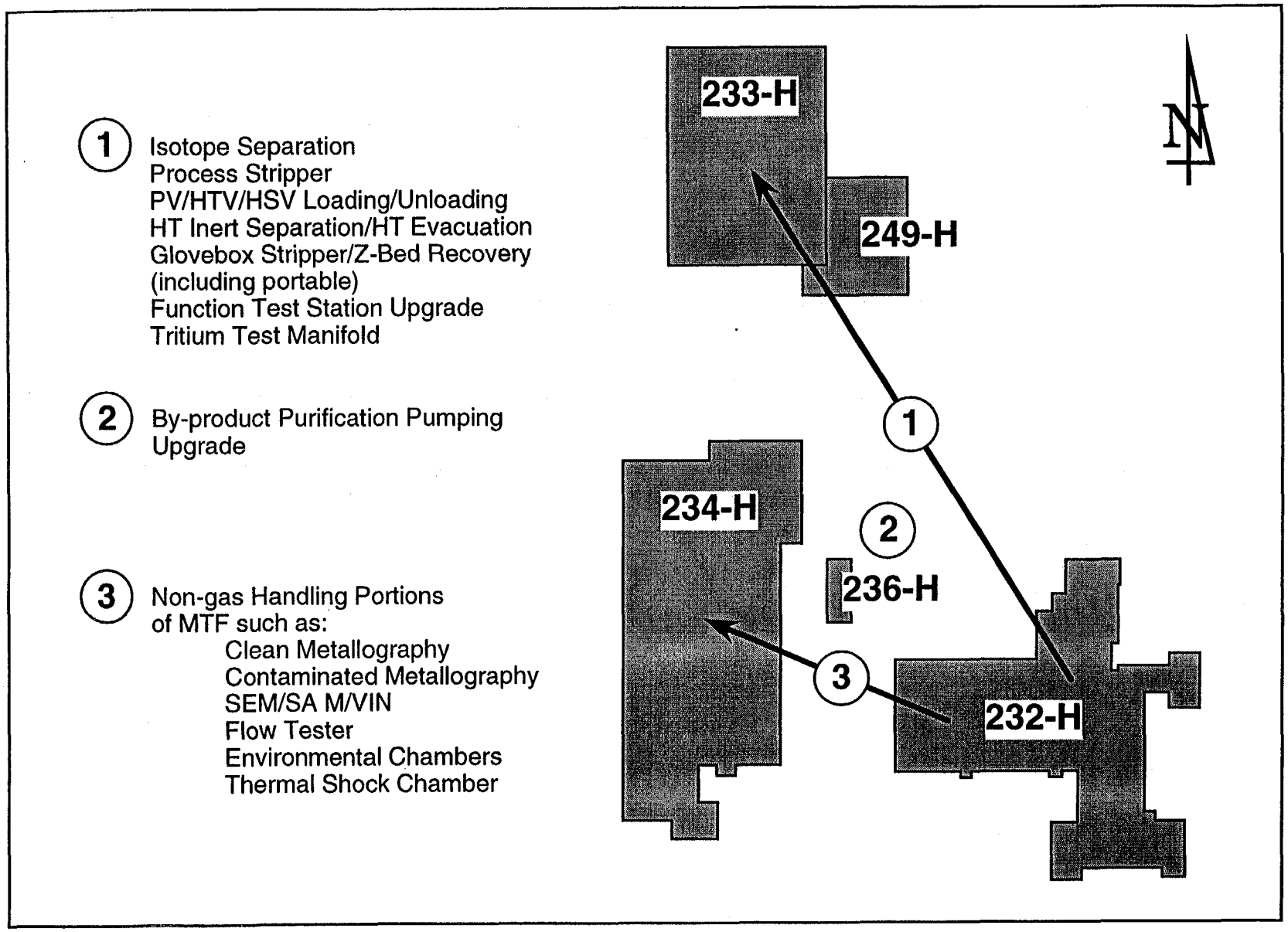

Figure 2-2. Schematic of the proposed process/system relocation in the Tritium Facility Complex.

to release to the atmosphere) and special container loading and unloading capabilities in Building 233-H. A hydrogen isotope separation system would be installed in 233-H to recover tritium from the 233-H Zeolite Bed Recovery system. These systems would include the capability to process gases delivered from the CLWR-TEF and the APT. These systems would replace those currently in use in 232-H allowing those systems in 232-H to be shut down. A function test station would be modified in 233-H to duplicate capability of the one currently in 232-H. Gas transfer capability from Building 236-H and the 234-H analytical laboratory to 233-H would be upgraded during modernization activities.

The functions in 232-H that currently support operations in 233-H, and which would be relocated from 232-H to 233-H include the following:

- Recovery of tritium from protium containing streams
- Recovery of tritium from inert rich streams
- Purging of protium, nitrogen, and excess deuterium from the current 233-H recycled gas processing operations
- Loading and unloading of bulk quantities of tritium from shipping or storage containers

The proposed action would alter the stack-specific emissions of radionuclides, primarily tritium, within the tritium facility complex. The relocation of the various process capacities from 232-H would be expected to increase the 233-H tritium releases to the atmosphere from the current level of less than 1,000 curies per year to approximately 11,700 curies per year in the maximum case (Gearman, 1997). However, with the exception of minimal emissions due to offgassing of equipment and the extraction area, the tritium releases from 232-H, which are currently approximately 19,000 curies per year, would be virtually eliminated as a result of implementing the proposed action (Gearman, 1997). Therefore, the overall result would be a significant net reduction, almost 50 percent, in the tritium emissions from the tritium facility complex (Table 2-1).

In addition to the aforementioned operational emissions, the proposed action would also add a new 600 kW (750 kVA) standby diesel generator to the project location. This unit would be used to replace the existing smaller standby diesel generator for Building 234-H.

The installation of the new systems would result in the elimination of the generation of tritium-contaminated mercury mixed waste from the tritium facility complex. In addition, generation of the tritium-contaminated pump lubricating oil would be greatly reduced.

The existing facilities and processes would remain on line and operational until the replacement facilities have been made operational. With the exception of extraction operations, all of the remaining process located in 232-H would be relocated within the tritium facility complex as part of this project. The existing extraction furnaces and process in 232-H would be shut down as part of 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 use the existing tritium facilities
- Construct a new Replacement Extraction and Purification Facility

Table 2-1. Comparison of tritium emissions[a] by building within the SRS tritium facility complex under existing operations and following implementation of the proposed action.

Building	Existing Operations		Proposed Action	
	Process	Emissions[a]	Process	Emissions[a]
233-H	Reservoir Loading and Unloading	1,000	Reservoir Loading and Unloading	1,000
	-	-	Process Stripper Effluent	2,600
	-	-	Hydrogen Isotope Separator System	6,500
	-	-	Purge Stripper System	1,600
232-H	Extraction Operations	19,000	-	-
Total		20,000		11,700

[a] in curies per year

2.2.1 No Action, Continue to Use the Existing Tritium Facilities

One alternative to the proposed action is to take no action. This would consist of SRS continuing to use the existing less effective tritium processing facilities in Building 232-H. The impacts associated with the proposed action (for example, operating cost reductions and enhanced emission controls) would not occur. The existing levels of emissions associated with the current process equipment would continue at the current rate. There would be no cost savings as would occur under the proposed action.

2.2.2 Construct a New Replacement Extraction and Purification Facility

This alternative would involve the replacement of Building 232-H with a new structure and modernized equipment. This proposed building, entitled Replacement Extraction and Purification Facility, Building 231-H, would necessitate the siting, construction, and equipping of a new building within the tritium facility complex. Due to limited space within the facility complex and the high costs associated with a new facility, it was determined that the goals of the tritium mission could be accomplished through the use of the expansion area within Building 233-H and reducing the capacities, consistent with project needs, of the processes being relocated.

3.0 AFFECTED ENVIRONMENT

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 Shutdown of the River Water System at SRS (DOE, 1997) and the most recent socio-economic 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 Land Use

The existing SRS tritium facility complex, built between the 1950s and the present, is located on Federal lands within the H-Area boundaries (Figure 1-2). Since that time, this property has remained highly-developed and industrialized. This location has only been used for activities supporting the site's tritium missions.

3.2 Geology and Seismology

SRS is located in the Aiken Plateau physiographic region of the upper Atlantic Coastal Plain approximately 40-kilometers (25-miles) southeast of the Fall Line which separates the Piedmont Plateau from the Atlantic Coastal Plain. The topographic surface of the coastal plain slopes gently seaward and is underlain by a wedge of seaward-dipping unconsolidated and semiconsolidated sediments from the Fall Line to the coast of South Carolina. The Atlantic Coastal Plain tectonic province in which SRS is located is characterized by generally low seismic activity that is expected to remain subdued (Haselow et al., 1989).

The location of the proposed action has been modified historically from the surrounding environs. The area encompassed by the tritium facility complex is comprised of

Udorthents, well drained soils formed in heterogeneous materials placed during construction of the existing facilities. The overall area is generally flat, with a slight down-sloping aspect in a west-northwesterly direction (Rogers, 1990).

No geologic faults are located within the proposed project area. The most active seismic zones in the southeastern United States are all located over 160 kilometers (100 miles) away from the site. A recent EIS (DOE, 1997) contains information on SRS fault location and earthquake occurrences.

3.3 Hydrology

The Savannah River forms the western boundary of SRS and receives drainage from five major tributaries on the site: Upper Three Runs, Fourmile Branch, Pen Branch, Steel Creek, and Lower Three Runs. These tributaries receive varying types of wastewater discharges from plant processes and sanitary treatment systems, all of which are permitted through the National Pollutant Discharge Elimination System (NPDES). On SRS, various plant processes also require the pumping of Savannah River water and/or on-site groundwater. A recent EIS (DOE, 1997) contains information on groundwater systems on SRS and in the surrounding region.

The tritium facility complex is located on an elevated filled site which drains to the west-northwest (USGS, 1988). The nearest 100-year floodplain and jurisdictional waters/wetlands are located approximately 1890 meters (2067 yards) to the west and approximately 302 meters (330 yards) to the west-northwest, respectively (NUS Corporation, 1984). A small storm water retention basin is located approximately 69 meters (75 yards) to the west of the tritium facility complex boundary.

The depth to uppermost groundwater is less than 11 meters (35 feet) below grade at the tritium facility complex. The direction of flow of the uppermost groundwater is upward and to the west-northwest. The current level of water use within the tritium facilities in question is 0.0016 cubic meters/second (25 gpm).

3.4 Ecological and Cultural Resources

Since 1951, when the U.S. Government acquired SRS, natural resource management practices and natural succession outside of the construction and operation areas at SRS have resulted in increased ecological complexity and diversity of the site. Forested areas support a diversity of wildlife habitats that are restricted from public use. Forest management practices include controlled burning, harvesting of mature trees, and reforesting. Wildlife management includes control of white-tailed deer (*Odocoileus virginianus*) and wild swine (*Sus scrofa*) populations through supervised hunts. SRS, which was designated as the first National Environmental Research Park (NERP) in 1972, is one of the most extensively-studied environments in this country. Wike et al. (1994) contains additional information on the biotic characteristics of SRS.

Six species on SRS are afforded protection by the Federal government under the Endangered Species Act of 1973. These are the bald eagle (*Haliaeetus leucocephalus*), wood stork (*Mycteria americana*), red-cockaded woodpecker (*Picoides borealis*), American alligator (*Alligator mississippiensis*), shortnose sturgeon (*Acipenser brevirostrum*), and smooth purple coneflower (*Echinacea laevigata*). None of these species have been documented as either occurring or using the lands either within or adjacent to the proposed project location (Wike et al., 1994).

Several wildlife species have been observed in and around the general area of the proposed project location. This limited wildlife species composition is comparable to similar urban or developed habitat types elsewhere on SRS. Comprehensive listings of wildlife species can be found in Wike et al. (1994) and Mayer and Wike (1997).

The management and utilization of forests, soils, watersheds, and wildlife at SRS are described in the SRS Natural Resources Management Plan (DOE, 1991) and defined under the terms of a Memorandum of Agreement between DOE Savannah River Operations Office (SR), U.S. Forest Service Savannah River Natural Resource Management and Research Institute (SRI), the Natural Resources Conservation Service, and Westinghouse Savannah River Company. DOE-SR uses this Memorandum of Agreement to define the roles and responsibilities of the various agencies and organizations in the management of natural resources on SRS.

The proposed project location is situated within the medium or Type II archaeological sensitivity zone for SRS (SRARP, 1989). This location had been previously surveyed prior to the siting and construction of the tritium facilities complex (DOE, 1986). To date, no complex archaeological or potential National Register of Historic Places eligible sites have been identified within the proposed project location. Cultural resources at SRS are managed under the terms of a Programmatic Memorandum of Agreement among DOE-SR, the South Carolina State Historic Preservation Officer, and the Advisory Council on Historic Preservation. DOE-SR uses this Programmatic Memorandum of Agreement to identify cultural resources, assess these in terms of National Register eligibility, and develop mitigation plans for affected resources in consultation with the South Carolina State Historic Preservation Officer. DOE-SR would comply with the stipulations of the Programmatic Memorandum of Agreement for all activities related to this project.

3.5 Radiation Environment

A person residing in the Central Savannah River Area (within 80 kilometers or 50 miles of SRS) receives an average annual radiation dose of about 360 mrem; SRS contributes less than 0.1 percent of that total. Natural radiation sources contribute about 300 mrem, medical exposures contribute about 53 mrem, and consumer products contribute about 10 mrem. The most recent SRS annual environmental report (Arnett and Mamatey, 1997) contains more information on the radiation environment.

4.0 ENVIRONMENTAL CONSEQUENCES OF THE PROPOSED ACTION AND ALTERNATIVES

4.1 Facility Construction/Process Modification

All activities related to the proposed action would take place within a previously developed area. In addition to the interior construction within existing buildings within the tritium facility complex, a 186 square-meter (2,000 square-foot) extension to Building 234-H, two small support buildings, and several exterior equipment pads (e.g., for small-scale chillers and electrical substations) would be constructed as part of the proposed project. Some small areas may also be used a temporary lay-down yards or equipment storage. Therefore, land use impacts due to construction activities associated with the facility modernization and consolidation project would be negligible.

The direct and indirect socioeconomic impacts of the peak project construction work force of 102 would be negligible when compared to the present total SRS employment of approximately 15,000 people (HNUS, 1997). These workers (including both non-manual

and manual employees) would annually comprise an average of approximately 58 people, who would be badged onto SRS for this project. This work force 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 proposed action would be domestic water supplies for use as process water, drinking water, sanitary sewer supplies, and fire water for use in the existing buildings 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).

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.

The modernization/consolidation portion of the proposed action would result in the generation of some construction-related debris or rubble. These wastes would include scrap cable, piping, steel, insulation, aluminum jacketing, sheet metal, steel rebar, concrete, sheet rock, and other miscellaneous construction rubble. 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., Hickory Hill Landfill or 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 (1994), DOE (1995a), and DOE (1995b). Any serviceable equipment which is removed but not needed for the proposed project would be re-used wherever possible. No new waste streams or types of waste would be generated during the construction phase of the proposed action. These project activities would be expected to have only a minimal impact on site waste management operations.

Implementation of the project construction activities would result in a less than 1 percent increase in the site traffic volumes on SRS Roads 4 and E. 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/transportation impacts associated with the construction activities of this project would be negligible.

As discussed in Section 3.4, there are no significant wildlife habitats, wetlands, floodplains, or protected species found within the developed site lands to be affected by the proposed action. In addition, none of the construction-related activities would be expected to have any appreciable impact beyond the tritium facility complex boundaries. Therefore, no impacts on any SRS ecological/environmental resources would be expected as a result of the facility construction/process modification portion of the proposed action.

As part of the routine SRS Site Use Permit system, each prospective project site is also reviewed for potential archaeological impacts. Since the project location consists entirely of Udorthents placed during construction of the existing facilities, and there would be no

excavation of previously undisturbed soils during the proposed action, no impacts to site cultural resources would be expected as a result of the proposed action.

Limited decontamination and removal of unused equipment would be required in portions of Building 234-H as part of this project. However, decontamination and subsequent decommissioning of equipment or facilities presently in operation at SRS is not part of the proposed action. At the end of the tritium facilities' operational lifetimes, these buildings would be decontaminated and decommissioned in accordance with decontamination methods and expertise in existence at that time. Equipment would be removed and either re-used or disposed of as required.

4.2 Normal Operation

The operation of the modernized and consolidated tritium facilities associated with the proposed action would take place entirely within an existing developed site area. Therefore, land use impacts associated with operational activities would be negligible.

Once operational, the modified tritium facilities would employ approximately 40 people. The subject facilities and associated processes currently employ a total of 137 site workers, mostly in 232-H (i.e., 123 employees). The balance of facility personnel would either be reassigned to other activities within the SRS tritium projects where possible or removed from the employee rolls.

No surface water would be used during operation of the modified tritium facilities. All domestic and fire water would be obtained from existing distribution systems within H-Area. The domestic water needs of the subject facilities would not be expected to exceed 0.0002 cubic meters/second (3.0 gpm). This is slightly more than one-tenth of the current usage volume or rate, and thus should not affect the water level of the supply aquifer. The fire usage for these facilities is normally expected to be zero cubic meters/second (zero gpm).

The stormwater, sanitary wastewater, process wastewater, and non-contact cooling water effluent from the tritium facility complex would not be expected to change significantly from those of the current operations. As such, the implementation of the proposed action would have a negligible impact either to the NPDES discharges at the existing permitted outfalls, or the site facility (e.g., H-Area Effluent Treatment Facility) treating specific effluents. If the numbers of employees were to be reduced as a result of the implementation of the proposed action, then the volume of sanitary wastewater would be reduced by approximately two-thirds of the present discharges.

Routine air emissions of process and exhaust gases from the operation of the tritium facility complex contain tritium and trace quantities of other radioactive fission products. The new missions would potentially add the non-radioactive hydrogen isotopes protium and deuterium to these emissions. The process stripper effluent would be expected to contribute approximately 2,600 curies per year to the complex's air emissions in a maximum case scenario. The emissions associated with a comparable maximum scenario for the hydrogen isotope separation system would be approximately 6,500 curies per year. Nitrogen flow from the 233-H purge stripper system, which discharges to the atmosphere, would be tripled. It is conservatively estimated that the increased purge would result in an emission increase of approximately 1,600 curies per year (Gearman, 1997). With the virtual elimination of the 232-H tritium emissions due to the suspension of operations in that facility, the resulting air emissions would not exceed the current estimated average dose of 1.3×10^{-3} rem to the maximally exposed off-site individual. The collective dose to the

off-site population within a 80-kilometer (50-mile) radius would be 112 person-rem. This would result in 0.056 latent cancer fatalities (LCF) (DOE, 1995c).

Within the recent past, atmospheric tritium releases from the SRS tritium facility complex have been decreasing (Figure 4-1). The emissions associated with the proposed action would result in a further decrease in this historical trend. In general, however, none of these emission levels have been sufficient to result in an impact at the site boundary. Under the Clean Air Act (40 CFR Part 61), in order to exceed the U. S. Environmental Protection Agency standard for hazardous air pollutants (i.e., 10 mrem effective dose equivalence at the site boundary), the annual amount of tritium released from the site would have to exceed 7,600,000 curies (Rowan, 1997). Neither historical nor projected levels of SRS tritium releases are expected to even approach this threshold emission amount.

The radiation dose at the modified tritium facilities would not be above that which is currently realized by employees associated with the subject processes. Radiation dose rates at these facilities shall be ALARA (i.e., As Low As Reasonably Achievable) and shall not exceed 0.25 mrem/hr to personnel in continuously occupied areas. The current average annual exposure for the tritium facility complex is 0.24 mrem. 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.

Aside from the current small amounts of domestic sanitary solid waste, no new non-radioactive waste streams would be generated during operations of the modified facilities. All of this sanitary solid waste would be disposed of at either the municipal solid waste disposal site in use at that time or the SRS erosion control pit, as appropriate.

The operational low-level radioactive waste (LLW) streams associated with the proposed action are provided in Table 4-1. As with the non-radioactive waste, none of these LLW types would constitute new waste streams for the site. In addition to these LLW streams, smaller volumes of hazardous (1.3 cubic meters or 46 cubic feet per year) and mixed low-level (5.0 cubic meters or 177 cubic feet per year) waste would be generated during normal operations. All of the projected annual waste volume would be encompassed within the 30-year waste forecast for these waste types (WSRC, 1994a, 1994b). In addition, the current generation of contaminated mercury and oils would cease and be greatly reduced, respectively, as a result of implementing the proposed action. With the termination of operations in 232-H, the LLW streams (approximately 425 cubic meters or 15,000 cubic feet per year) associated with those operations would also cease to be generated. This would result in a net reduction in the LLW being generated within the tritium facility complex.

Increases in traffic volume associated with the operational portion of the proposed action would be negligible. Nearly all of the transportation associated with current operation of the tritium facility complex would remain unchanged as a result of modernizing and consolidating these facilities.

The facilities involved in the proposed action are located entirely within the limited-access, fenced tritium facility complex. All existing security systems and programs for the existing tritium facilities complex, including physical security, would be extended to the buildings involved in the proposed action. Successful access to these facilities requires passing through an explosive detection system, a metal detector system, a proximity card system, and guard stations. Some rooms in these buildings are also controlled by cipher and

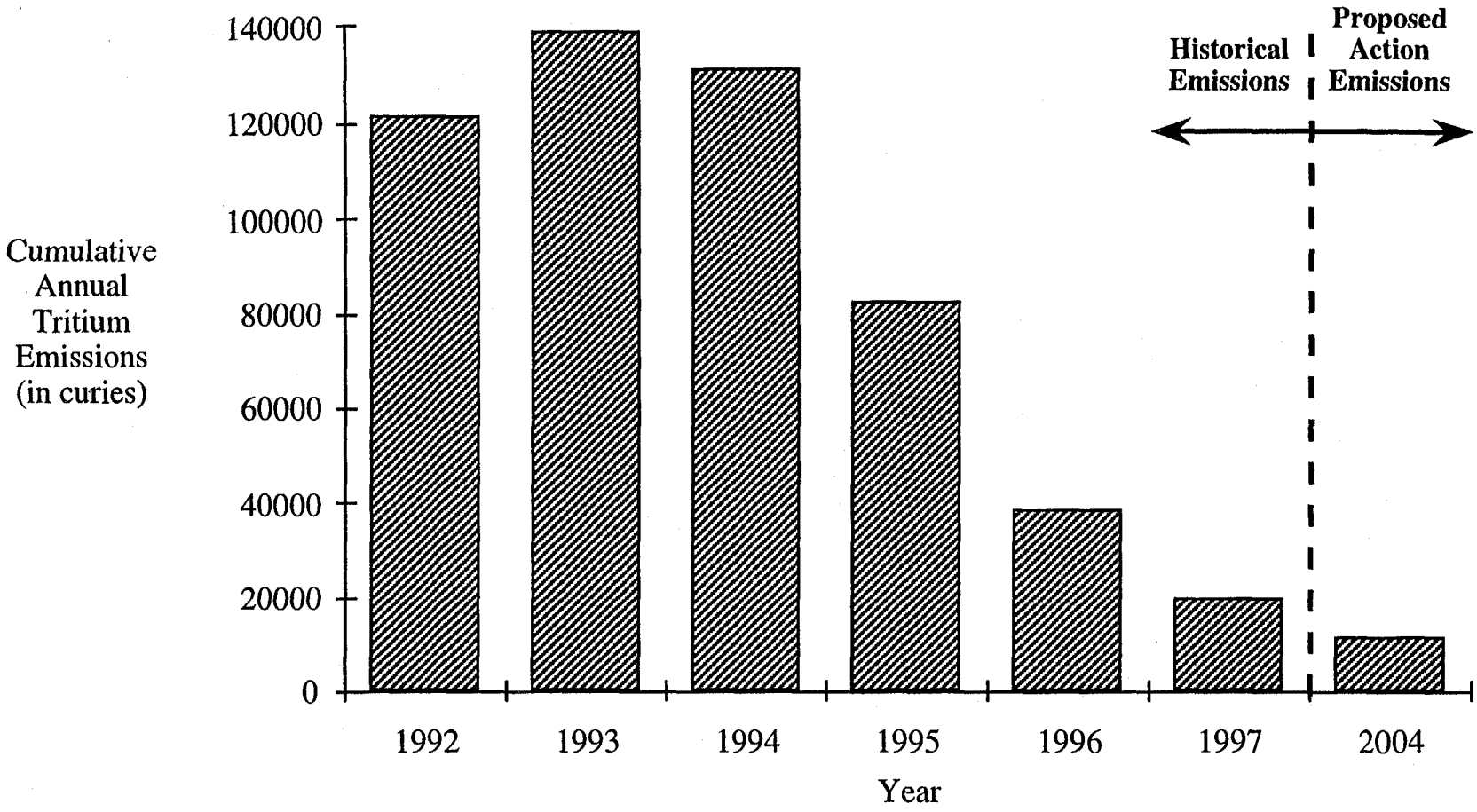

Figure 4-1. Historical and projected cumulative annual tritium emissions within the Tritium Facility Complex.

Table 4-1. Operational solid waste generation forecast from systems installed or modified as part of the proposed action.

Solid Waste Type	Forecast Basis	Annual Volume in m^3 (ft^3)	Percent of Estimated SRS Annual Waste Forcast[a]
	Building 233-H		
LLW to LAW Vault	Project adds 4 process hoods and modifies systems in 2 hoods in 233-H; use 20 percent of FY98 233-H waste generation	7.1 (250)	0.1164
LLW to CIF	Project adds 4 process hoods and modifies systems in 2 hoods in 233-H; use 20 percent of FY98 233-H waste generation	8.5 (300)	0.0039
Spent Vessels containing magnesium oxide as LLW to LAW Vault	6 vessels per year at 0.14 m^3 (5 ft^3) per vessel	0.9 (32)	0.0148
Spent Vessels containing Zn/Mn/Al as LLW to LAW Vault	12 vessels per year at 0.09 m^3 (3 ft^3) per vessel	1.0 (35)	0.0164
Spent Vessels containing Zn/Fe as LLW to LAW Vault	4 vessels per year at 0.09 m^3 (3 ft^3) per vessel	0.3 (11)	0.0049
	Building 234-H		
LLW to LAW Vault	Small amount of non-incinernable waste generated by metallographic activities	0.3 (11)	0.0049
LLW to CIF	Project impacts approx. 20 percent of the radiological areas in 234-H; use 20 percent of FY98 waste generation	8.5 (300)	0.0039
	Total	26.6 (939)	0.1652

[a] Annual LLW volume to be treated at either CIF or LAW Vault. Based on data provided in DOE (1995a)

combination locks. No additional safeguard and security measures would be required for these buildings.

4.3 Human Health Effects

The proposed action would not reduce the scope of tritium operations at SRS. This project would, however, transfer operations of tritium from a facility that entered service in the late 1950's (232-H) to a facility that entered service in 1993 (233-H). Because SRS operations would still involve tritium processing, the potential for release of radioactive tritium at the tritium facility complex would also continue to exist. However, appropriate controls would be in place in order to maintain radioactive personnel exposure well below the current DOE guidelines of 5.0 rem per year, in keeping with ALARA principles. Additionally, appropriate procedures and administrative controls (e.g., personnel training and a Radiation Work Permit) would be in place prior to any proposed activities. Also, radiation and hazardous chemical worker exposure levels would be monitored during the proposed actions (i.e., personal dosimeters and constant air monitors). Furthermore, consolidating tritium operations should reduce the potential for worker and off-site public exposure by moving existing operations into a more modern, more robust facility (Shogren, 1997).

The projected average occupational external whole-body exposure to tritium facility personnel in the H-Area due to routine operations in 1996 was approximately 0.001 rem. This is substantially less than the maximum allowable exposure of 5.0 rem per year. Therefore, operations, based on a dose-to-risk conversion factors of 4.0×10^{-4} (onsite) LCFs per person-rem (roentgen equivalent man) (56 FR 23363), no worker LCFs per year would be expected to result from the proposed packaging and storage. It is anticipated that routine operations would not provide additional exposure of toxic or noxious vapors to workers (Shogren, 1997).

Also, no public exposure to radiation above that currently experienced from SRS operations is anticipated as a result of these actions. That is, as reported in Arnett and Mamatey (1997), the potential dose to the hypothetical off-site maximally exposed individual during 1996 from site operations was 1.9×10^{-4} rem. The potential dose to the local population of 620,100 persons from 1996 operations was 2.8 person-rem. The 1996 average dose to the population was 5.0×10^{-6} rem per person. The current DOE radiation limit for an individual member of the public is 0.1 rem per year, and the national average dose from natural sources is 0.3 rem per year. Because the proposed activity only consolidates current operations, it is anticipated that there will be a significant net reduction in the release of radioactive material due to tritium operations. Therefore, with no additional off-site exposure involved with the tritium consolidation activities at H-Area, no adverse health effects to the public are expected (Shogren, 1997).

No toxicological exposure to workers or the general public is expected to occur as a result of tritium processing activities. Tritium facility personnel routinely handle hazardous chemicals. A comprehensive training program specifically designed to address the sorting and repackaging will be instituted. The program will include procedures (e.g., use of personnel protective clothing), specific hazardous materials training, and equipment safeguards (Shogren, 1997).

4.4 Accident Analysis

The proposed action involves moving all tritium processing operations from 232-H to 233-H. This would result in moving tritium from a facility built in the late 1950's to a building that entered service in 1993. As previously noted, the proposed action does not

represent a change in the overall scope of tritium processing operations at SRS. However, the proposed action does represent a consolidation of activities into newer, more robust facilities. This can reasonably be anticipated to reduce the potential for accidents involving tritium. The reduction in the potential or frequency of occurrence would result from consolidating operations in a facility that was designed to the latest requirements for safe operation and hazardous material confinement. When considering accident analysis, a "worst case" event would involve the release of the entire tritium inventory. Because the proposed activity does not change scope of tritium operations at SRS, the consequences of the worst case event would be the same after consolidation as they are currently. In other words, the total inventory of tritium processed at SRS will not be changed by the proposed activity, and thus, the consequences resulting from the release of the entire inventory will not change. Considering that the proposed action should reduce the expected frequency of occurrence for any accident and the consequences, at worst, will be the same, it can be concluded that the proposed activity will not increase the risk of tritium operations and should decrease the risk. Therefore, accidents associated with the proposed activity will not constitute a significant impact (Shogren, 1997).

4.5 Environmental Consequences of the Alternatives

The no-action alternative would result in a continuation of the various impacts associated with the existing operations within the tritium facility complex. None of the cumulative reductions in the air emissions or waste generation rates would be realized. The construction of a replacement extraction and purification facility would have basically the same operation impacts to the environment as that of the proposed action. However, building such a facility in an already developed area would generate substantially more rubble and debris as a result of having to clear sufficient lands within that area for the new structure to occupy. In addition, taking up the limited space within the complex with a new building would severely restrict the potential to locate other future SRS tritium missions (e.g., CLWR-TEF) within the security fence of the existing tritium facility complex. The costs associated with this alternative would be also be on the order of two times higher than that of the proposed action; however, the resultant operational advantages and environmental impacts would still be similar to that of the proposed action. Based on the analyses conducted on the existing tritium facilities, no additional LCFs would be expected as a result of either normal operational of or accidental releases from the Replacement Extraction and Purification Facility.

4.6 Cumulative Impacts

The principal cumulative impacts would be from the reduction in aggregate emissions of radionuclides from the tritium facility complex. If the addition of tritium gases from the new SRS tritium missions were sent to the 233-H stack for release, the aggregate emissions would be comparable to those occurring at present. The operational waste generation of the upgraded facilities would result in an overall reduction or elimination of waste streams currently being produced by the existing processes. There would be no changes in land use at SRS as a result of the proposed action. Assuming that the 97 tritium workers (that were not needed in the proposed upgraded facilities) would be reassigned, there would be no net change in SRS employment. If the excess employees were not reassigned, the site workforce would decrease by less than 1 percent. The site usage of domestic and potable water would not change. The stormwater and process wastewater discharges would not change appreciably at the H-02 outfall. There would be no impacts to sensitive environmental resources (e.g., threatened and endangered species and their habitats, floodplains and wetlands, and archaeological sites). No excess LCFs would occur as a result of the proposed action.

5.0 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.

5.1 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 Parts 1500-1508), and DOE Regulations (10 CFR Part 1021), and DOE Order 451.1A. 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 modernization and consolidation of the tritium facilities at SRS.

5.2 Solid Waste Regulations

Small amounts of nonradioactive, nonhazardous waste materials (e.g., construction rubble and debris, office paper waste) would be deposited in the municipal solid waste facility being used by SRS at that time. In addition, small amounts [i.e., 26.6 cubic meters/year (939 cubic feet/year) of low-level contaminated operational waste would be disposed of on site on an annual basis. This would be part of an ongoing already permitted SRS activity.

5.3 Air Emission Regulations

The use of diesel generators during construction activities would be permitted under a Title V construction permit. Air releases through existing systems located within the tritium facilities complex are already covered by Title V operating permits. These permits would be modified as necessary (e.g., to include the replacement 600 kW diesel generator).

5.3 Domestic Water Regulations

Any modifications of the domestic water tie-ins within the existing buildings would require a SCDHEC domestic water construction permit (SCDHEC Regulation R61-58). The SCDHEC domestic water operating permits for the tritium facility complex are already in place, and would be modified as necessary.

5.3 Liquid Discharge Regulations

The discharge of both stormwater and process cooling water discharges from the tritium facility complex is an already permitted NPDES activity. These permits would be modified as necessary.

6.0 AGENCIES AND PERSONS CONSULTED

Staff professionals from the U.S. Forest Service SRI and Westinghouse Safety Management Solutions, Inc., were consulted during the preparation of this EA.

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