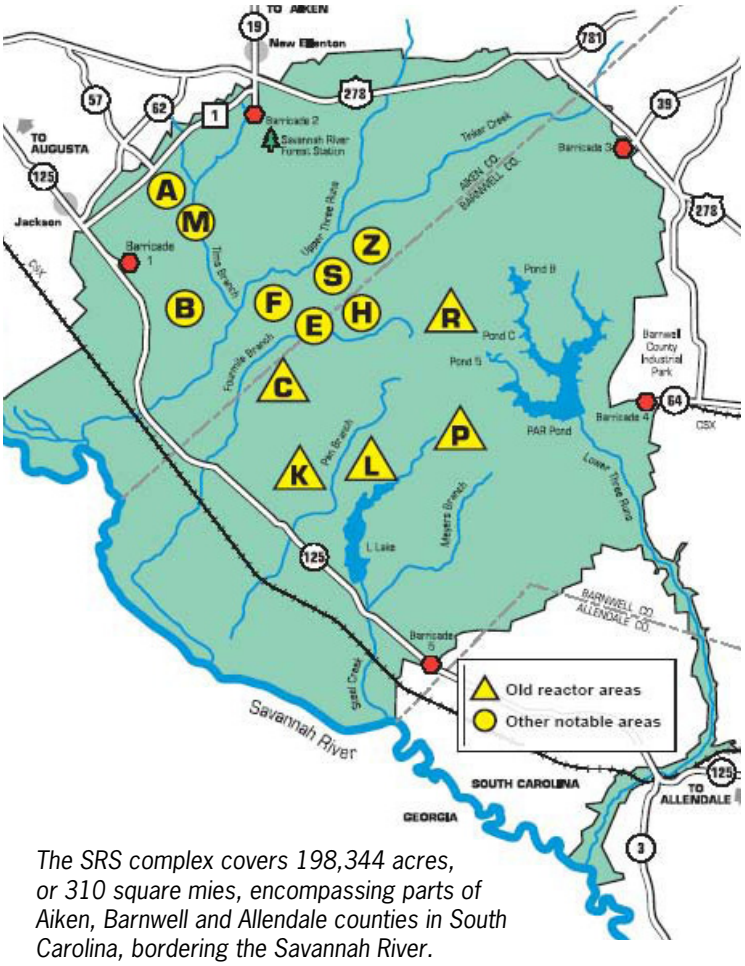
SAVANNAH RIVER SITE

Facts enterprise·srs

Savannah River Site

198,344 acres, or 310 square miles

- DOE: Savannah River Operations Office
- NNSA: Savannah River Site Office
  - — *Office of Site Engineering and Construction Management*
- USDA Forest Service-Savannah River
- U.S. Nuclear Regulatory Commission
- U.S. Army Corps of Engineers
- Contractors
  - — *Savannah River Nuclear Solutions, LLC (Site Management and Operations, and Savannah River National Laboratory)*
  - — *Savannah River Remediation LLC (Liquid Waste Operations)*
  - — *WSI SRS Team (SRS security)*
  - — *Shaw AREVA MOX Services (Mixed Oxide [MOX] Fuel Fabrication Facility construction)*
  - — *Parsons (Salt Waste Processing Facility construction)*
  - — *University of Georgia (Savannah River Ecology Laboratory)*
- SRS workforce: 12,000
- Annual budget ~$2.5 billion



The SRS complex covers 198,344 acres, or 310 square mies, encompassing parts of Aiken, Barnwell and Allendale counties in South Carolina, bordering the Savannah River.

The Savannah River Site is owned by the U.S. Department of Energy, and is managed and operated by Savannah River Nuclear Solutions.

Savannah River NUCLEAR SOLUTIONS℠
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Dedicated to maintaining the highest possible safety and security standards, the Savannah River Site (SRS) is a key Department of Energy (DOE) industrial complex responsible for environmental stewardship, environmental cleanup, waste management and disposition of nuclear materials. More specifically, SRS processes and stores nuclear materials in support of national defense and U.S. nuclear nonproliferation efforts. The Site also develops and deploys technologies to improve the environment and treat nuclear and hazardous wastes left from the Cold War.

While current missions remain the highest priority, SRS leadership place great importance on developing broader missions for SRS that use its unique capabilities in order to address critical national missions in environmental stewardship, clean energy and national security.

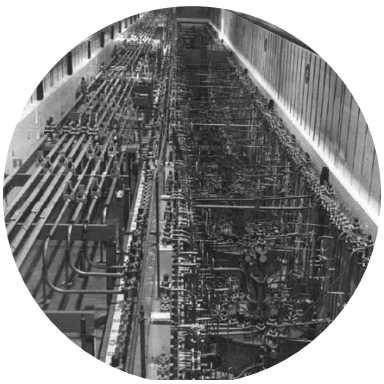
Savannah River Site Focus The Savannah River Site is committed to its people, missions and the future. SRS has a long track record of being the safest site in the DOE Complex and one of the safest major industrial sites in the world. Protecting workers, the public, the environment, and national security interests is its highest goal.

Enterprise SRS is a new strategic vision that will refocus SRS talents and efforts on developing future missions by leveraging the Site's unique nuclear materials knowledge and assets in Environmental Stewardship, Clean Energy and National Security.

SRS waste tanks under construction

History During the early 1950s, SRS began to produce materials used in nuclear weapons, primarily tritium and plutonium-239. Five reactors were built to produce nuclear materials. Support facilities, including two chemical separations plants, a heavy water extraction plant, a nuclear fuel and target fabrication facility, a tritium extraction facility and waste management facilities were also built.

Irradiated materials were moved from the reactors to one of the two chemical separations plants. In these facilities, known as "canyons," the irradiated fuel and target assemblies were chemically processed to separate useful products from waste. After refinement, nuclear materials were shipped to other DOE sites for final application. SRS produced about 36 metric tons of plutonium from 1953 to 1988.



The interior of one of SRS's chemical separations facilities before operations began

Savannah River National Laboratory SRNL puts science to work to create, test and deploy solutions to the technological challenges facing the Site and the nation in three key areas: national and homeland security, energy security, and environmental management. SRNL researchers have made significant advances in glass technology, hydrogen technology, nonproliferation technology, environmental characterization and cleanup, radioactive waste treatment, sensors and probes, and other fields.

In 2006, the Department of Energy Office of Environmental Management (EM) designated SRNL as EM's "corporate laboratory." In this capacity, SRNL applies its unique expertise and applied technology capabilities to reduce technical uncertainties in order to assist sites across the DOE Complex in meeting cleanup requirements.

The laboratory's approximately 900-person research staff includes several internationally recognized experts; about one-fourth of the research staff members have doctorates.

SRNL's unique facilities include biotechnology laboratories, for the safe study and handling of radioactive materials, a field demonstration site for testing and evaluating environmental cleanup technologies, and laboratories for ultra-sensitive measurement and analysis of radioactive materials.

Waste vitirification technologies

Applied research and development for meeting the nation's future energy needs

While the laboratory continues to solve the Site's technological challenges, about half of its work comes from non-SRS customers, including DOE, NNSA, other DOE sites and federal agencies, such as the Department of Homeland Security and the Federal Bureau of Investigation.

To maximize the nation's return for its investment in the laboratory, SRNL forms strategic partnerships with private industry, academia and other government agencies to apply the laboratory's unique expertise to challenges of mutual interest.

Sensitive analysis in an ultra-clean room

The laboratory also shares its expertise by licensing private companies to manufacture and market technologies created at SRNL, a move that helps American businesses sharpen their competitive edge and provides taxpayers a second return on their investment.

As the vision for SRS evolves to an enterprise, SRNL has become a center of focus, a growth engine for the Site. SRNL will be instrumental in developing solutions for some of the most difficult challenges facing our nation. SRS will expand into business segments that capitalize on historic competencies, including Environmental Stewardship, Clean Energy and National Security.

Tritium Tritium, with a half-life of 12.3 years, must be replenished, and SRS is the nation's only facility for extracting, recycling, purifying and reloading tritium. Tritium is replenished by recycling tritium from existing warheads and by extracting tritium from target rods irradiated in nuclear reactors. Recycled and extracted gases are purified to produce tritium suitable for use.

SRS Tritium Extraction Facility

SRS helps maintain the U.S. nuclear stockpile by replenishing gas transfer systems, which ensure performance of nuclear weapons. War Reserve reservoirs (stainless steel containers that meet rigorous quality specifications) are loaded with a mixture of tritium and deuterium gases, finished, assembled, inspected, packaged and shipped.

In the absence of nuclear weapons testing, designers must rely on surveillance data to certify the reliability of U.S. nuclear weapons. Samples of nuclear weapons are removed from the active stockpile, and their gas transfer systems are sent to SRS Tritium facilities for function testing. Metallographic evaluation and/or burst testing are performed following the function test to obtain valuable information about reservoir integrity, leading to safer designs.

As tritium radioactively decays, it produces a precious commodity, Helium-3, which is used in neutron detection equipment being installed throughout the world to protect our nation and its allies from terrorism. Tritium programs recover, purify and bottle this valuable by product of tritium. SRS is the sole producer of Helium-3 gas in the U.S.

Mixed Oxide Fuel Fabrication SRS is one of the primary DOE sites with missions to address issues of national security and nonproliferation, including legacy material disposition.

Plutonium (Pu) and nuclear material management missions now being conducted at SRS will be expanded to include materials from dismantled weapons and surpluses from other DOE sites. This new mission will be focused on the disposition of excess weapons-grade material consistent with the U.S.-Russian agreement on nonproliferation. The Mixed Oxide (MOX) Fuel Fabrication Facility (MFFF) will convert excess weapons-usable Pu to a form that can be used in commercial power reactors.


The Mixed Oxide Fuel Fabrication Facility began construction in 2007.

On Aug. 1, 2007, construction began for the MFFF, which will be operated by Shaw AREVA MOX Services. In 2009, construction started on the Waste Solidification Building, which will handle the waste generated by the MFFF. Pit Disassembly and Conversion, which will disassemble pits from nuclear weapons and convert the Pu for use in MFFF, is still in the design phase.

Canyon Operations SRS's two primary separations facilities, called "canyons," are located in F and H Areas. F Canyon and H Canyon—together with FB Line and HB Line, which are located atop the canyons—are where nuclear materials historically have been chemically recovered and purified.

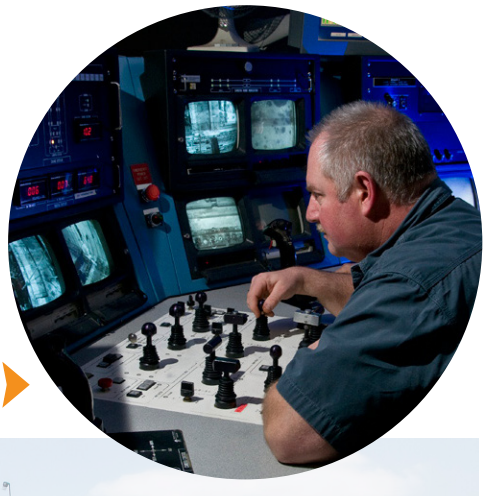
F Canyon and FB Line have completed their production mission and have been deactivated, with both facilities awaiting future disposition decisions.

H Canyon and HB Line support the DOE Enriched Uranium and Plutonium Disposition Programs by reducing the quantity of fissile materials in storage throughout the U.S. This supports both environmental cleanup and nuclear nonproliferation efforts and a smaller, safer, more secure and less expensive nuclear weapons complex. The canyon has also been used to support the disposition of highly enriched uranium (HEU) and plutonium (Pu) from across the DOE Complex.

The interior of the building resembles a canyon because the processing areas resemble a gorge in a deep valley between steeply vertical cliffs.

SRS has "blended down" weapons-usable HEU to make low enriched uranium (LEU), which has been converted to commercial reactor fuel for use by the Tennessee Valley Authority (TVA). Since March 2003, approximately 21 metric tons of highly enriched uranium has been blended down at SRS producing approximately 301 metric tons of low enriched uranium solution that has been shipped to TVA for use in its commercial reactors at Browns Ferry in Alabama and Sequoyah in Tennessee. This material is now providing electricity for homes throughout the Southeast.

HB Line has also produced Pu-238 for National Aeronautics and Space Administration. In 1995, SRS completed a five-year campaign to supply Pu-238 for NASA's Cassini mission. The unmanned expedition to the planet Saturn was launched October 13, 1997, and arrived at the ringed planet July 1, 2004, after a flawless flight.



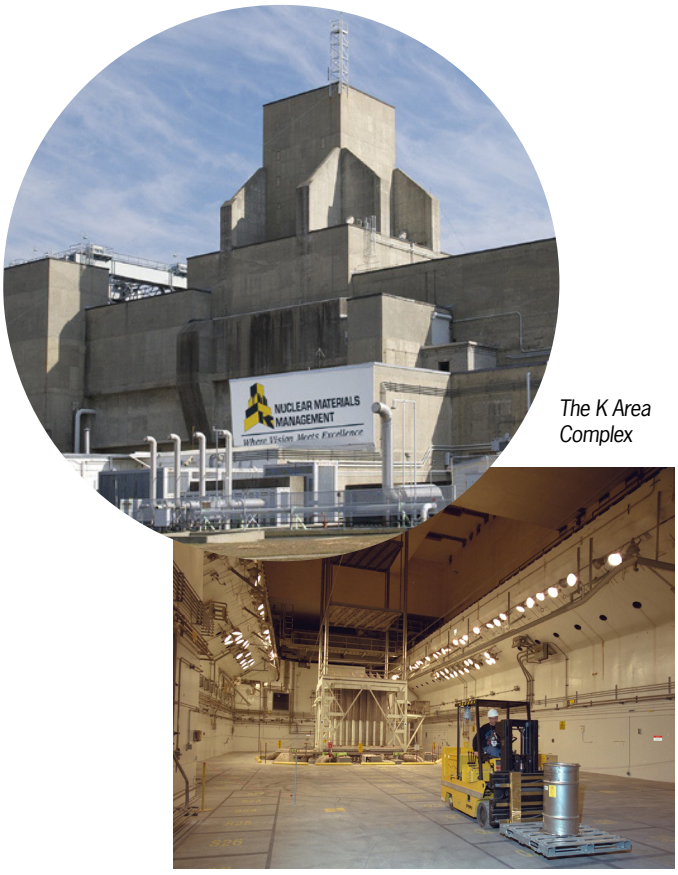
Operators in H Canyon's crane control room.

Nuclear Materials Management Operations at SRS's K Area Complex (KAC) provide an interim safe storage location for much of DOE's excess Pu. New Pu facilities were built at SRS, under a Record of Decision issued by DOE in 2000. This makes SRS the nation's cornerstone of excess Pu management and disposition.

SRS assisted DOE in saving millions of taxpayer dollars through the safe receipt and storage of the excess Pu from the Rocky Flats Environmental Technology Site, SRS's FB Line, the Hanford Site, Lawrence Livermore National Laboratory (LLNL) and Los Alamos National Laboratory (LANL).

The KAC is DOE's only Special Nuclear Materials (SNM) storage facility designated for interim safe storage of Pu and HEU at SRS. The principal operations building formerly housed K Reactor, which produced nuclear materials to support the United States during the Cold War for nearly four decades. It was DOE's last operating production reactor, shutting down in 1992.

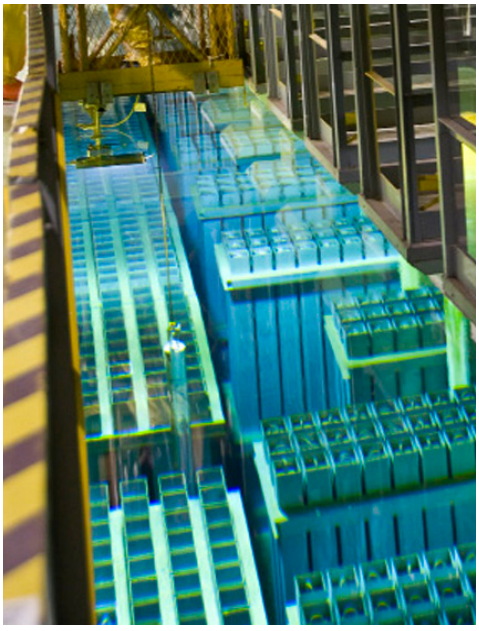
Significant security upgrades have been implemented in the KAC to ensure the continued safe storage of SNM until it can be dispositioned. A stabilization and repackaging capability can be added to the KAC in addition to the existing surveillance and storage capacity in order, to further enhance DOE's ability to manage excess Pu and other SNM until a final disposition path is achieved.



The K Area Complex

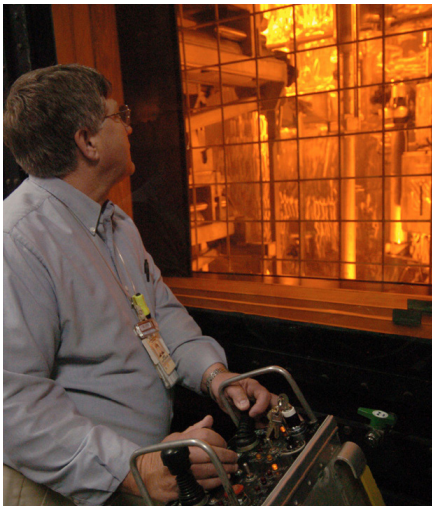
Used Nuclear Fuel Used nuclear fuel (UNF) from the Site's production reactors, and from domestic and foreign research reactor programs, is currently stored at the L Area Complex (LAC), awaiting final disposition.

Since 1996, LAC has received over 10,000 UNF assemblies in approximately 500 casks from off-site sources. Fuel types include uranium-aluminum alloys, uranium oxides and silicides, and others that vary in uranium enrichment between 19 and 93.5 percent uranium 235.



Used fuel in the L Area Complex.

Waste Management Nuclear material production produced unusable by-products, such as radioactive waste. About 36 million gallons of radioactive liquid waste are stored in 49 underground tanks.



Liquid waste stablization at DWPF

Defense Waste Processing Facility (DWPF) is processing the high-activity waste, encapsulating radioactive elements in borosilicate glass, a stable storage form. Since DWPF began operations in March 1996, more than 10 million pounds of radioactive glass has been produced.

Much of the liquid waste in the tanks is being separated as relatively low-level radioactive salt solution through a new, innovative approach to waste removal, called the Actinide Removal Process and Modular Caustic Side Solvent Exaction Unit. These facilities treat, decontaminate and disposition radioactive salt waste removed from SRS storage tanks, sending the higher activity waste to DWPF. The facilities use the same unit processes as those in the SRS Salt Waste Processing Facility, which is now under construction and is targeted for operations by 2015. The SWPF will provide high volume, highly efficient treatment capacity for longer term salt processing at SRS.

Low-level salt waste from salt treatment processing is sent to the Saltstone Production Facility, where it is mixed with cement, ash and furnace slag and poured into permanent concrete vaults for safe disposal at the Saltstone Disposal Facility. SRS is the first site in the DOE Complex to disposition salt waste.

The Saltstone Disposal Facilities

SRS waste tanks have provided nearly 50 years of safe storage for nuclear waste. Removing waste from the tanks will allow for permanent closure of the Site's high-level waste tanks, a high priority for DOE. Four waste tanks presently are being prepared for closure.

In addition to radioactive liquid waste, other radioactive wastes at the Site are: low-level solid waste (which includes items such as protective clothing, tools and equipment that have become contaminated with small amounts of radioactive material); and transuranic (TRU) waste, which contains alpha-emitting isotopes with an atomic number greater than uranium. Other wastes include hazardous waste, which is any toxic, corrosive, reactive or ignitable material that could affect human health or the environment; mixed waste, which contains both hazardous and radioactive components; and sanitary waste, which, like ordinary municipal waste, is neither radioactive nor hazardous.

SRS disposes of low-level radioactive waste on site in specially engineered facilities. However, some types of low-level waste are technically unsuitable for disposal at SRS waste management facilities. In July 2001, SRS began shipping some of these wastes to off site treatment and disposal facilities.

TRU waste had been stored temporarily at SRS. The opening of the Waste Isolation Pilot Plant (WIPP) in New Mexico, a DOE deep geological disposal facility specifically designed for TRU waste has provided a disposal site. In 2001, SRS began shipping its TRU waste, about 30,000 legacy drums or about 6,000 cubic meters to WIPP. At the end of 2011, over 29,500 55-gallon drums, of the original TRU waste inventory was shipped. SRS's current projections have the Site scheduled to ship all of the SRS TRU legacy waste to WIPP by 2013, 22 years ahead of the original baseline.

Hazardous waste is routinely shipped off site to commercial facilities for treatment and disposal. In 2001, SRS made its first-ever shipments of mixed waste for treatment off site, and continues to decrease the inventory of mixed waste using available Resource Conservation and Recovery Act (RCRA)-regulated treatment and disposal vendors.

A TRU waste shipment leaving SRS's waste management facilities

Cleanup Since approximately 2003, extensive cleanup and closure work has been completed at SRS under a concept known as Area Completion, which streamlines and accelerates the cleanup process. The SRS Area Completion Project (ACP) has removed excess facilities and remediated soil and groundwater in an integrated fashion, with the full support of DOE, the United States Environmental Protection Agency and the South Carolina Department of Health and Environmental Control.

ACP focuses on cleaning up contamination in the environment by treating or immobilizing the source of the contamination to mitigate transport through soil and groundwater and clean up or slow the movement of contamination that has already migrated from the source. From capping waste sites to installing efficient groundwater treatment units, field work is a top priority. Field work includes closure of inactive seepage basins, rubble pits, rubble piles and disposal facilities. Major groundwater cleanup systems operate extensively in nearly every Site area.

More than 375 of SRS' 515 waste units have been completed, with more than 2,000 regulatory milestones safely met. Deployment of numerous cost-effective technologies expedites the cleanup process.

Remediation is being executed in a fashion that completes environmental cleanup and facility decommissioning area by area until all areas at SRS are completed by 2031. Units at which waste is left in place will be under institutional controls that feature access restrictions, inspection, maintenance and long-term stewardship monitoring. Typically, soils will be remediated to an acceptable residual risk for industrial workers. Groundwater will be addressed in a manner such that required cleanup levels, approved by regulators, will be achieved over time. Much ACP work was accelerated through a significant investment of $1.6 billion at SRS in 2009 from the American Recovery and Reinvestment Act, including a 75 percent reduction in footprint and final decommissioning of numerous facilities, notably three production reactors which are expected to remain in their present state for over 1,400 years.

T Area was SRS's first area completion. The photo to the left is of T Area in 2002, before demolition of buildings began; the photo to the right, in 2006 after closure.

22 underground tanks were filled with grout as part of closure work at the General Separations Area Consolidated Unit.

Analytical Laboratories The SRS Analytical Laboratories include seven different facilities across the Site, which provide high quality analytical, radiometric and environmental monitoring data to a range of customers. Analysis results are used for process control, nuclear safety, nuclear criticality prevention, nuclear material accountability, product quality, radiological waste characterization, regulatory compliance and personnel safety.

The Labs maintain certification through the Department of Energy's Laboratory Accreditation Program, South Carolina Department of Health and Environmental Control, American Industrial Hygiene Program Association and the Mixed Analyte Performance Evaluation Program.

Analytical Laboratories provide a diverse array of scientific and technical services supporting Site missions.

Environment

Originally farmland and swamp land, SRS now encompasses a timber and forestry research center managed by the U.S. Forest Service-Savannah River, part of the U.S. Department of Agriculture. In 1972, DOE's predecessor agency, the Atomic Energy Commission, designated SRS as the first National Environmental Research Park. Endangered species, including the short-nose sturgeon and wood stork, visit the Site from time to time. SRS is also home to the bald eagle and the red-cockaded woodpecker. Other wildlife commonly found on the Site includes alligators, white-tailed deer, wild turkeys and otters.

SRS's ponds, lakes, and streams are home to hundreds of land and water animals.

Employment

Today, nearly 12,000 people are employed at SRS, making it one of the largest employers in South Carolina. About 50 percent are employees of SRNS and its major subcontractors. DOE employees represent about three percent of the SRS population. SRNS is responsible for the Site's nuclear facility operations, with the exception of the liquid waste facilities; SRNL; environment, safety, health and quality assurance; and all administrative functions. The SRNS team includes Fluor Daniel, Newport News Nuclear and Honeywell. Savannah River Remediation LLC, is responsible for liquid waste operations under a contract in place for six years beginning July 1, 2009. The SRR team includes URS, Babcock & Wilcox, Bechtel and CH2MHill. The rest are SRNS subcontractors, the U.S. Forest Service-Savannah River, and other DOE contractors; the security contractor, Wackenhut Services Inc.; Shaw AREVA MOX Services; Parsons; and the Savannah River Ecology Laboratory, operated by the University of Georgia.

All SRS employees must pass General Employee Training before accessing the Site.

Economic Impact

The Site's economic impact ripples across a two-state area at a rate of about $2.6 billion each year. Currently, the overall budget is about $2.5 billion. Of that, roughly 70 percent is payroll and employee benefits. The Site spends about $200 million each year in procurements in the two state area. Site employees pay over $150 million in federal and state taxes, and $100 million in medical claims annually.