DOE Paducah Site Tour

Paducah Gaseous Diffusion Plant (PGDP)

Industry Workshop

July 31, 2012

EM Environmental Management

safety ❖ performance ❖ cleanup ❖ closure

Site History/Key Facts

The Paducah Sun-Democrat

Paducah, Ky., Friday Evening, December 15, 1950 ••• 4 Editions Daily—2 Sunday

AEC To Build A-Plant At KOW Site

Chinese Reds Drive Into UN Beachhead

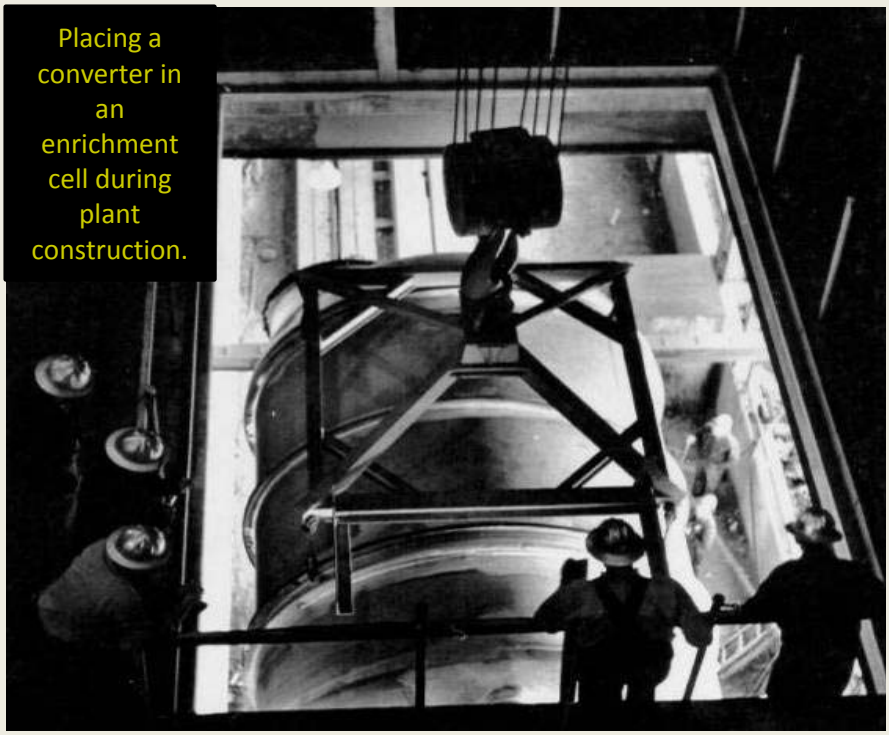
Activity Expected On Northwest Front

Building Force Of 10,000 May Be Required

Cost Set At $500,000,000; 1,600 Permanent Jobs Expected

In 1950, the Atomic Energy Commission selected the former Kentucky Ordnance Works site for the second of three planned uranium enrichment plants.

Construction began in 1951. The first product was shipped in 1952.



Placing a converter in an enrichment cell during plant construction.

Site History/Key Facts

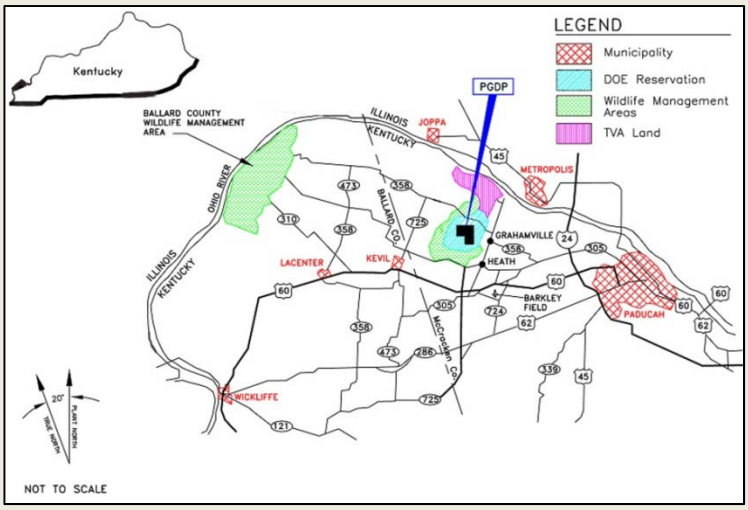
- Uranium was enriched for nuclear weapons until the mid-1960s when the plant began enriching uranium for use as commercial nuclear power reactor fuel.
- Today, the plant is the nation's only gaseous diffusion uranium enrichment facility.
- The U.S. Department of Energy (DOE) is the property owner and leases enrichment facilities to the United States Enrichment Corporation (USEC).

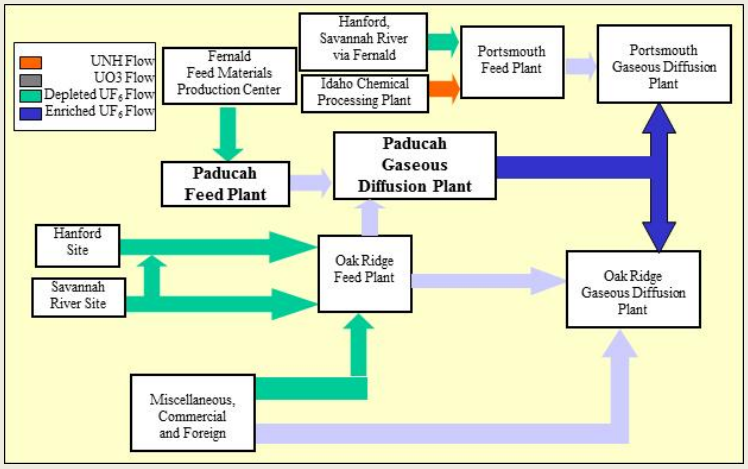
This painting shows early plant workers leaving the site.

- USEC has ~1,200 employees and is western Kentucky's largest industrial employer.
- DOE and its contractors employ ~800.
- The enrichment plant buys about $500 million in power per year, almost all from the Tennessee Valley Authority (TVA).
- In its nearly 60 years of operation, the plant has pumped more than $5 billion into the regional economy.

Site History/Location

- Plant operations require various support facilities such as electrical switchyards and a chemical cleaning/ decontamination building (C-400), waste water treatment facilities, etc.
- Initial feed stock came from reprocessed material acquired from a variety of sources .
- C-410 Feed Plant built to convert returns (recycled uranium from nuclear reactors) to uranium hexafluoride (UF_6).



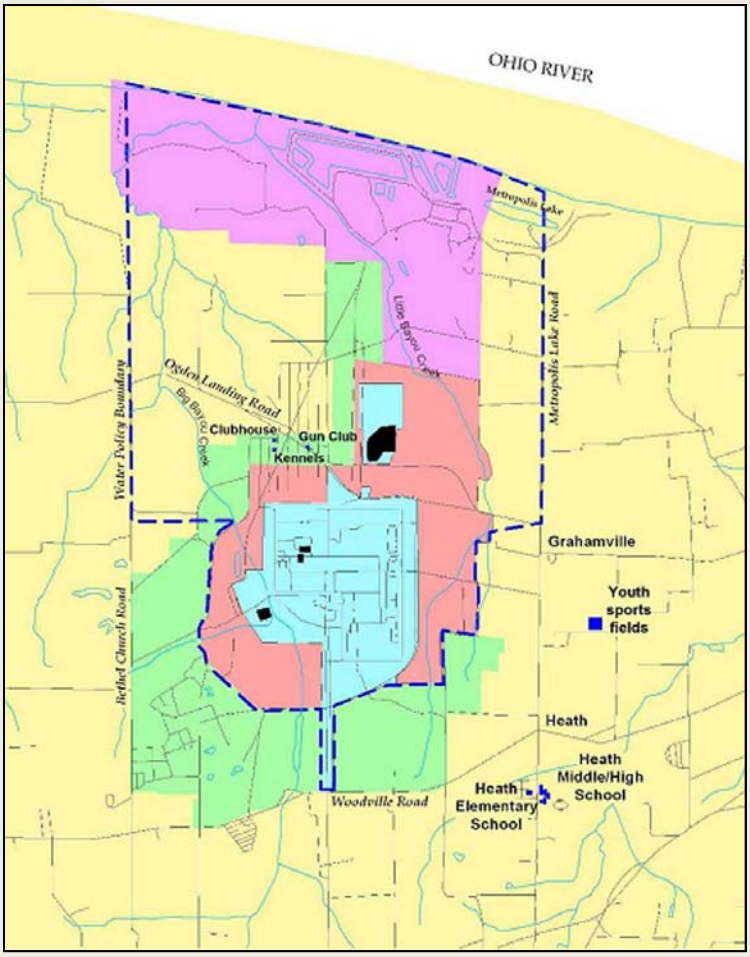


- Returns decline over time as reprocessing operations end at Hanford and Savannah River and more UF_6 is purchased from commercial plants; program ends in 1985; returns contained Plutonium, Neptunium, and Technetium-99.
- Honeywell plant in Metropolis, Illinois, built in 1958 to supply more UF_6 .

Land Use

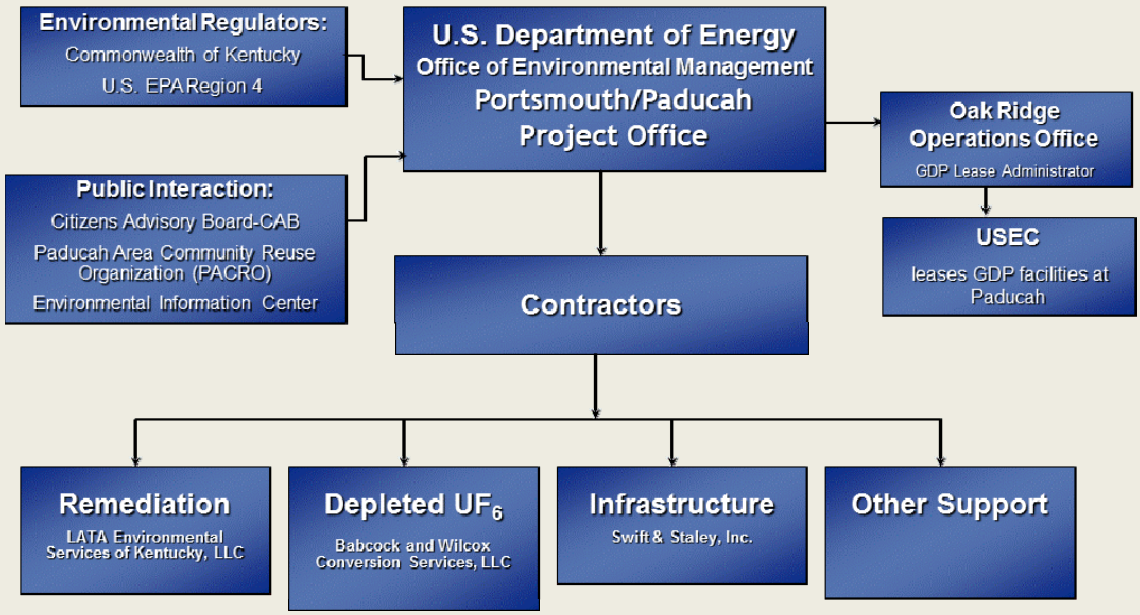
Most of the DOE-owned land is licensed to the Commonwealth of Kentucky as part of the West Kentucky Wildlife Management Area (WKWMA).

- Blue area includes DOE facilities, operating enrichment plant facilities, and the depleted uranium conversion facility.
- TVA owns a large tract of land north of the enrichment plant where they built a power plant.



Pink – TVA Shawnee Fossil Plant
Peach – DOE Land Licensed to WKWMA
Green – WKWMA Owned Land
Blue – DOE Owned Property

Paducah Site Interfaces



DOE and USEC share use of the enrichment plant and many of its facilities.

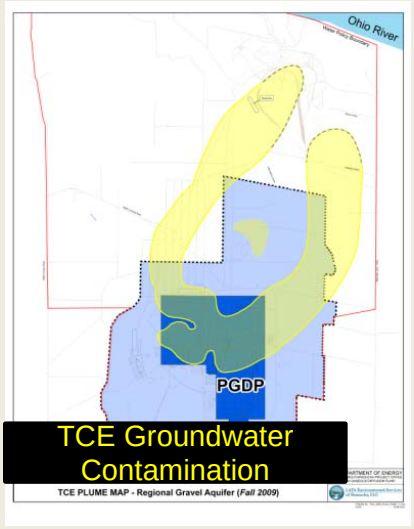
- USEC created in 1993, privatized in 1998.
- USEC leases all process-related buildings, key facilities, such as the Administration Building, the Guard and Fire Headquarters, the Equipment Cleaning Building, Technical Services Building, Maintenance and Stores Building.
- USEC may choose to cease enrichment activities within the next two years and return the facilities to DOE.

Paducah Site DOE Missions

Depleted Uranium Hexafluoride Plant

- ✓Owner/landlord
- ✓Environmental cleanup
- ✓Disposal of legacy waste
- ✓Decontamination and Decommissioning of surplus facilities
- ✓Storage and conversion of DUF_6

Environmental Cleanup



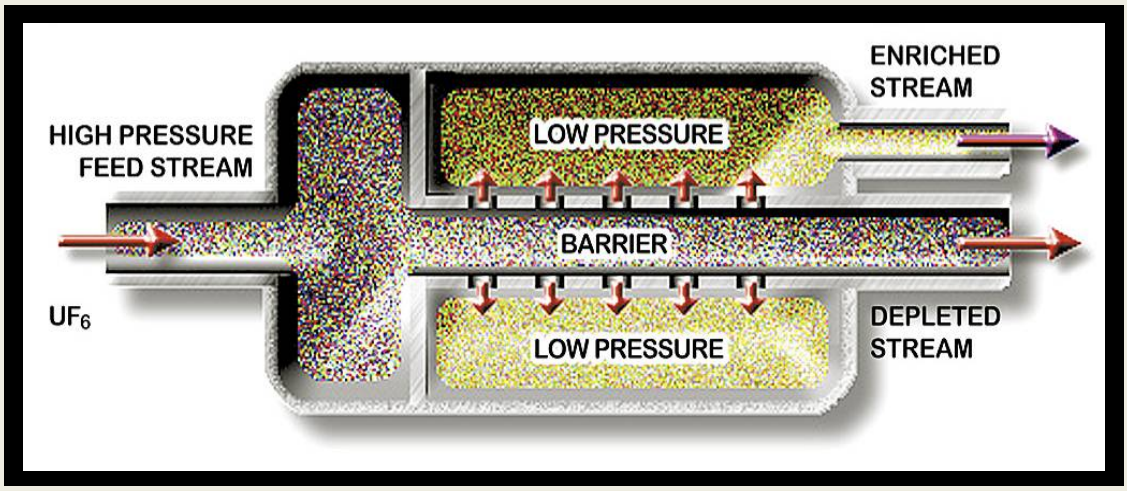
TCE Groundwater Contamination

Firing Range Removal Action

Offsite Waste Shipment

D&D of an Inactive Facility

Gaseous Diffusion



- Enrichment process separates lighter uranium-235 isotopes from heavier uranium-238. Gas is forced through a series of porous membranes (barriers) with microscopic openings. Uranium-235 moves through the membranes more easily, increasing the concentration of uranium-235 as it moves through the process.
- A set of enrichment equipment, known as a “stage,” includes an electric motor powering a compressor that forces the gas through the barriers located in the converter.
- There are 1,760 stages in the four process buildings and 60 stages in the purge and product facility and about 400 miles of process lines. Stages are arranged in groups called cells.
- There are four process buildings with 74 acres under roof.

Key Facts

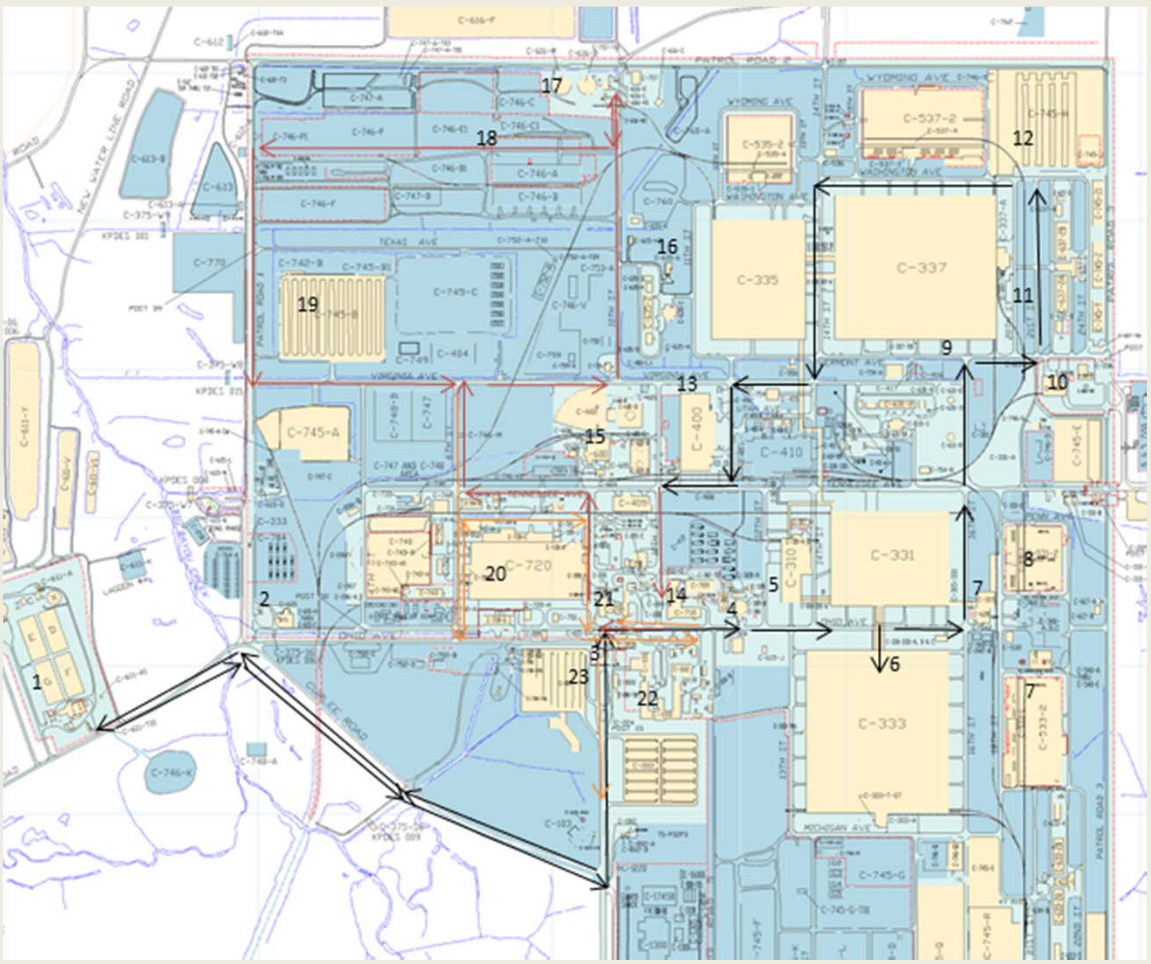
Peak Design Power Capacity	3,040 megawatts (MW) Summer - 900 MW Normal - 1600-1700 MW
Power Suppliers	Shawnee Steam Plant, Electric Energy Inc.
Largest Process Motor	3,300 horsepower
Water Utilization	26 million gal per day
R-114	Approx. 8,000,000 lbs
Lube Oil	600,000 gallons
Steam Plant Currently	Average 83,000 lbs per hour Capacity 200,000 lbs per hour
High Pressure Fire Water Tank	325 feet/320,000 gallons
Sanitary Water Tank	185 feet/250,000 gallons
Number of Enrichment Stages	1860 (1760 in process buildings)
Number of Control Instruments	85,000
Miles of Process Piping	400 (approximately)
Miles of Roadway	19
Miles of Rail	9

Tour Route

1 C-611 Water Treatment Plant (S)
2 C-615 Sewage Treatment Plant(D)
3 Enter Post 15
4 C-300 Central Control Building (S)
5 C-310 Product Withdrawal(D)
6 C-333 Process Building (S)
7 C-315 Tails Withdrawal (D)
8 Switchyards (D)
9 Fire Water Tank (D)
10 C-360 Toll Transfer and Sampling Building (D)
11 Cooling Towers (D)
12 Cylinder Yards (D)
13 C-400 Cleaning Building (S)
14 C-710 Laboratory (S)
15 C-600 Steam Plant (S)
16 C-635-6 Waste Heat Building (D)
17 C-616 Liquid Pollution Abatement Facility (D)
18 Nickel Ingots (D)
19 Cylinder Yards (D)
20 C-720 Machine Shop(S)
21 C-200 Guard and Fire Headquarters (D)
22 C-100 Administrative (D)
23 Exit Post 15

(S) – Stop
(D) – Drive-By

Tour Route


C-335
C-337
C-331
C-333
C-720
C-400
C-410
C-745-A
C-745-B
C-745-C
C-537-2
C-535-2
C-745-G
C-746-K
C-770
C-310
C-533-2
WYOMING AVE
WASHINGTON AVE
TEXAS AVE
VIRGINIA AVE
OHIO AVE
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C-611 Water Treatment Plant

The C-611 Water Treatment System provides the water supply to the Paducah Site. The C-611 water treatment plant has 15 acres of fenced area. The filter building and pump station is of wood frame construction with 13,067 square feet of floor space.

An average 26 million gallons per day (mgd) is required at the present with a peak of 30 to 32 mgd usage. The water treatment process is based on conventional water treatment techniques which include softening, coagulation, flocculation, sedimentation, and chlorination. Raw water is obtained from the Ohio River through an intake station and pumped through water-softening units at the facility.

The water is chlorinated and flocculated in the mixing basin. Approximately 99% of the suspended solids are settled out in the four reinforced, concrete-lined settling basins with a total capacity of 12 million gallons. After the sedimentation process, approximately 15% of the water is filtered, post chlorinated, and pumped to the sanitary water distribution system. The remaining water is pumped into the plant water distribution system for use as once-through cooling water or for use in the recirculating cooling water system.

C-615 Sewage Treatment Plant

The C-615 Sewage Disposal Plant provides the sewage handling and treatment for the Paducah Site. C-615 is constructed of reinforced concrete with 806 feet of floor space. The sewage collection system services all the occupied plant buildings with the exception of some remote facilities. The C-615 waste treatment plant consists of chemical, mechanical, and biological treatment prior to discharge.

The C-615 Sewage Treatment Plant provides secondary treatment. It consists of a comminutor, primary and secondary settling basins, trickling filter, sludge digester and settling beds, chlorinator, and contact chamber.

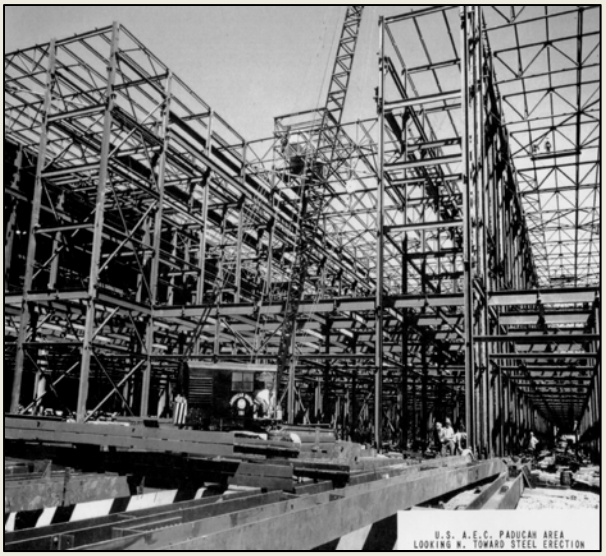
Sewage is handled by four 400 gallons per minutes (gpm) basin pumps and 75 gpm sludge pumps which provide a basic plant capacity of 350 gpm. Normal flow is between 200 and 300 gpm.

C-300 Central Control

The Central Control Facility monitors, coordinates, and/or controls critical plant processes, power distribution, utilities, communications, plant alarm systems, and emergency operations. More than 10,000 miles of cable supply electronic information about the plant's process systems to this building. The Central Control Facility houses four main functions: the plant shift superintendent, the cascade coordinator, the power supervisor, and the emergency operations center.

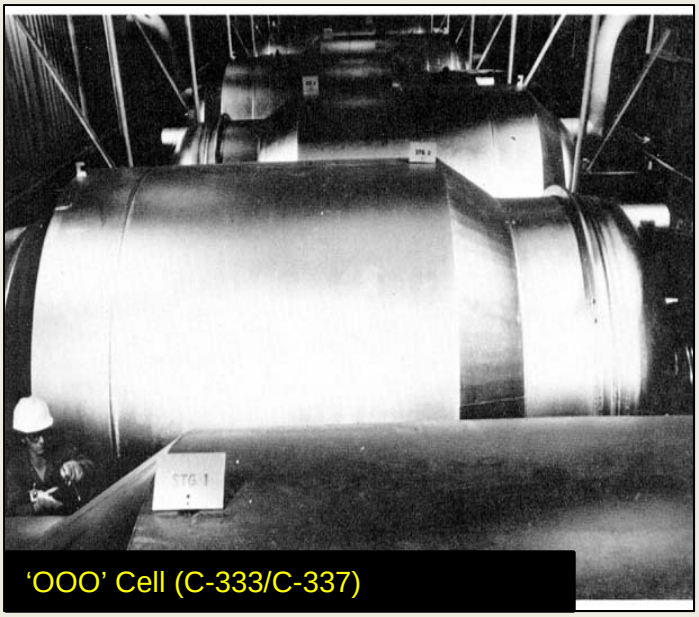
The Central Control Facility was constructed in 1953 to serve as the main control center for the gaseous diffusion operation. The Central Control Building is circular in design of reinforced concrete construction. The foundation, walls, and elliptical roof are all of reinforced concrete. An elliptical, one-story wing is located on the south facade.

Process Buildings



- ✓ The enrichment process at PGDP occurs primarily in four large cascade process buildings that enrich uranium by the gaseous diffusion process.
- ✓ The PGDP enrichment process consists of approximately 1,760 stages arranged in two parallel cascades for products up to 2.75 weight % ^{235}U.
- ✓ Through different valving configurations, the plant is able to enrich uranium at higher assays up to 5.5 wt. % ^{235}U.

- ✓ The larger process buildings are approximately 1100 feet long by 970 feet wide, and 83 feet high. Each large process building contains approximately 26 acres under roof.
- ✓ The smaller process buildings are approximately 804 feet long by 640 feet wide, and 68 feet high. Each smaller process building contains approximately 13 acres under roof.
- ✓ Each process building has a dedicated switchyard and set of cooling towers


'OOO' Cell (C-333/C-337)

C-333 Process Building

This building is a large processing facility and contains the cascade machinery used in the gaseous diffusion extraction process. The building has a poured concrete foundation, a built-up flat roof, and exterior walls of transite panels. There are two levels, with approximately a 26 acre footprint. The main (north) facade has a recessed or incised first-floor level. This level has a series of steel posts, which support the upper facade.

This first-floor level has five pedestrian entrances. Each entrance is set within a concrete-block surround and has original three-panel sliding-track steel doors. The south facade of the building has a recessed or incised first-floor level. This recessed area contains a railroad spur line, and opening onto this spur line are five entrances.

With the exception of these doors, the first floor level lacks openings and the exterior-wall material is of transite panels. There are three elevated bridges, or tie lines, that connect buildings C-333 and C-331 on the north facade. Designated C-331-333-A, -B, and -C, these are enclosed walkways of structural steel. They have elliptical roofs and walls of steel panels and rest on a steel post foundation. With the exception of three exhaust fans and the tie line, the upper facade lacks additional openings.

Switchyards

C-531, C-533, C-535, and C-537 switchyards contain the 161kilovolt (kV) electrical system components necessary for operation of the PGDP. The plant typically uses between 700 megawatts and 2000 megawatts of electrical power per hour, depending on the plant's production targets and availability of reasonably priced power. The plant was built with the capacity to use up to 3000 megawatts

Electrical power comes into the plant at 161,000 volts through the overhead transmission lines from TVA's Shawnee Steam Plant and Electric Energy, Inc. (EEI) at Joppa, Illinois. The power flows through more than 80 circuit breakers to large transformers (35) located throughout the plant. While all the power enters the plant through the TVA and EEI power lines, the plant purchases power from various utilities throughout the Midwest.

Of the eighteen transmission lines entering the PGDP, twelve are owned by the TVA and six are owned by EEI. Kentucky Utilities owns one line that comes to the plant and goes out but does not provide feed to the plant. In addition the four PGDP switchyards are connected by five 161kV tie lines owned by DOE and leased by USEC.

C-310 Product Withdrawal

Enriched uranium is withdrawn from the cascade at the Product Withdrawal Facility. This building is equipped with withdrawal positions to accommodate either 2 ½- (30B) or 10-ton (48X) product cylinders. The large tower next to the west side of the building is a 200-foot stack used to vent gases from the enrichment process.

Building C-310 is a two-story building that extracts “lite gases” and enriched uranium produced by the plant. The building has a poured-concrete foundation, a builtup flat roof, and an exterior of transite panels. The building has an approximate 13-acre footprint with a rail connector.

On the east facade is a large, metal canopy that extends across approximately one-third of the building. This canopy is supported by steel posts and encloses a 20-ton crane used to transport steel cylinders. On this section of the facade is a garage bay with an overhead-track door. Also on this section are three original two-light steel and glass pedestrian doors. The upper facade lacks openings except for a two-light steel and glass door on the second story, accessed by a steel staircase. Attached to this section of the facade is a second 20-ton crane for cylinder loading.

The south facade has a wall of transite panels and the only opening is an overhead-track steel door in the central bay of the first floor. At the southwest corner of the building is an attached steel tower that rests on a concrete foundation. This tower supports an exhaust pipe that vents “lite gases” from the building.

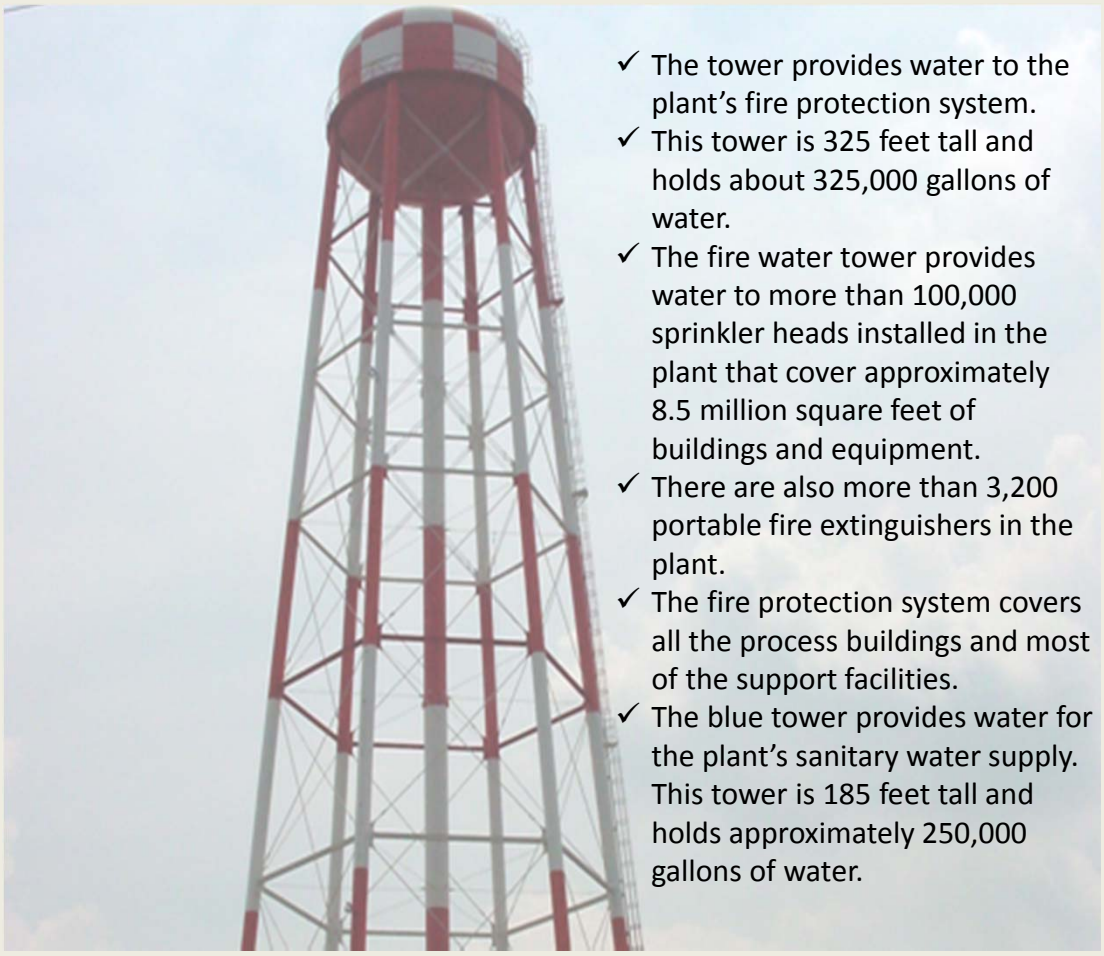
C-315 Tails Withdrawal

At the Depleted Uranium (Tails) Withdrawal Facility, the uranium that is depleted of most of its ^{235}U atoms is pulled from the cascade process and drained into 14-ton cylinders for storage. This facility may fill between one to four cylinders per day. Once filled, the cylinders are moved with cylinder haulers to storage yards.

This is a two-story building that shares a common party wall on the south facade with building C-620. The Surge and Tails Building is the site of depleted UF_6 extraction from the gaseous diffusion process and its placement into steel cylinders. Building C-315 has a poured-concrete foundation, a built-up flat roof, and an exterior of transite panels. The facility has a rail connector. The upper facade and rest of the first story has an exterior of transite panels. Extending from the upper facade of this building is an enclosed steel tie line that rests on steel piers. The north facade of the building lacks openings except for two louvered vents.

The east facade of the building also has a partial-width wall of poured-concrete. Within this wall is a pedestrian entrance with an original steel and glass door and four garage bays with steel overhead track doors. Across the width of the building is a large metal canopy. The canopy protects the loading dock area and beneath the canopy is a 20-ton crane for handling the uranium cylinders.

High-Pressure Fire Water System



- ✓ The tower provides water to the plant's fire protection system.
- ✓ This tower is 325 feet tall and holds about 325,000 gallons of water.
- ✓ The fire water tower provides water to more than 100,000 sprinkler heads installed in the plant that cover approximately 8.5 million square feet of buildings and equipment.
- ✓ There are also more than 3,200 portable fire extinguishers in the plant.
- ✓ The fire protection system covers all the process buildings and most of the support facilities.
- ✓ The blue tower provides water for the plant's sanitary water supply. This tower is 185 feet tall and holds approximately 250,000 gallons of water.

Cooling Towers

The cooling towers and pump houses serve to remove the heat produced in the gaseous diffusion process and to pump cooled water back into the process buildings to cool the diffusion machinery. There are four sets of cooling towers used to remove heat from the enrichment process—one set of cooling towers dedicated to each process building. About 500 million gallons of water are recirculated in the plant every 24 hours. Nearly 12-25 million gallons of water evaporate each day depending on the plant load or power level. Currently at 900 megawatts, approximately 12 million gallons per day are replaced with water from the Ohio River.

C-633-2B Cooling Tower

The gaseous diffusion process results in enormous amounts of excess heat when the gas is compressed. This heat is then transferred through underground pipes to the cooling towers. Here the heated water is cooled by airflow, releasing the heat as steam. Water is then recirculated by pumping back into the process buildings where the process heat is removed by an intermediate freon system which then transfers the heat to the water.

Pump inside of Pump House

These towers include C-631, which supports Building C-331; C-633, which supports Building C-333; C-635, which supports Building C-335, and C-637, which supports Building C-337. Each complex contains a pump house, cooling tower, blending cooling towers, and other support buildings.

C-360 Toll Transfer and Sampling

The C-360 Toll Transfer and Sampling Facility provides systems for receiving, sampling, transferring and shipping cylinders containing UF_6. This facility provides all operations necessary for fulfilling enrichment service contracts for private industry. Feed material, as well as the plant's enriched product, is weighed and tested at this facility to ensure it meets industry standards. Four autoclaves, similar to the ones housed in the vaporizer facilities, are used to sample and/or transfer UF_6. A new annex facility is used to prepare customer orders for shipment.

The building is constructed of structural steel with build-up roof, cement-asbestos and metal siding with concrete floor slabs and foundations. The Toll Transfer and Sampling Building is divided into a high-bay work area of about 18,000 square feet and a low-bay service area of 3,593 square feet. The service (basement) area houses the transfer station and scales, cold traps, evacuation drums, and associated piping. The laboratory area is located north of the work area on the same level and contains four sampling stations, laboratory bench, and control panels to monitor and control building operations. The east side of the building has crane doors that allow the movement of overhead cranes in and out of the building if required. Roll-up doors are provided at truck entrances, rail entrance, and entrances to maintenance areas.

Office, lounge, and kitchen areas are adjacent to the laboratory. An annunciator panel is provided in the laboratory and supervisor's office to provide alarms for critical parameters of building operation. The building also contains a rail siding on the south side that utilizes the work area as an interior loading dock with space for cylinder staging. Maintenance areas, a truck entrance, electrical equipment room, and shower and rest room facilities are also provided.

C-400 Cleaning Facility

The C-400 Chemical Operations Facility, built in 1953, provides cleaning and decontamination services for the plant. It has a floor area of 116,140 square feet. Equipment removed from the process buildings for repair is cleaned here prior to being moved to the maintenance facility. Cylinders are also cleaned and tested at this facility. The Chemical Operations Facility also houses the plant's laundry which cleans and mends more than 3,000 pairs of coverall each week.

The floor drains in the C-400 building that are near fissile operations without secondary containment have been sealed or have engineered controls in place as a control to help prevent a criticality from occurring in the drain systems and associated sumps in the event that fissile solutions are spilled onto the floor.

C-709/C-710 Laboratory

The C-709 Plant Laboratory Annex and the C-710 Technical Services Building house laboratories with an array of modern analyzers and test equipment, offices, a conference room, and vault for records retention and storage. C-709 is constructed of structural steel and cement coated siding and has 13,500 feet of floor space. C-710 is constructed of reinforced concrete with 84,333 square feet of floor space.

The laboratory facilities analyze over 100,000 various types of analytical tests per year, such as analyzing for metals, radiological, organics, inorganics, volatiles, and semivolatiles. Media types such as groundwater, concrete, soil, air, waste waters are processed through the laboratory, also supporting the environmental cleanup programs.

C-600 Steam Plant

The C-600 Steam Plant provides steam, a portion of the compressed air, nitrogen, and chilled water utilized at the Paducah Site. Some of the site facilities such as C-100, C-300, and C-710 currently utilize the chilled water system for building air conditioning and the steam for heating. C-600 is constructed of structural steel with corrugated siding with 47,424 square feet of floor space.

The plant produces steam used to heat, vaporize UF_6, obtain UF_6 samples, maintain process temperatures, clean equipment, and provide heat for other miscellaneous buildings and process operations. It consists of three water wall tube boilers (two coal-fired and one oil-and gas-fired) each capable of producing 100,000 pounds of steam per hour at 250 pounds per square inch plus associated equipment. The use of electrostatic precipitators and low-sulpher coal helps the plant keep atmospheric emissions below environmental limits. The steam plant uses approximately 35,000 tons of coal per year.

C-635-6 Waste Heat Pumps

The gaseous diffusion process uses large amounts of power to enrich uranium. More than 90% of the power consumed is rejected as the waste heat of compression. PGDP facilities have taken advantage of the large amount of waste heat by using that heat to maintain process building temperatures. The primary source of heat that is required to keep the UF_6 gas in the gaseous state in site process buildings is the waste heat of compression. Supplemental steam heaters are installed in certain areas of PGDP process buildings to provide heat when portions of the process are off-line.

As improvements and additions were made to the PGDP facilities, the use of waste heat to provide non-process building heating was expanded. Systems were designed and built to pump heated recirculating cooling water (RCW) from the process buildings to the buildings requiring space heating. The pumped water is known a recirculating heating water (RHW). Currently there are nine buildings at PGDP heated with RHW. Shutdown of the gaseous diffusion process will result in loss of waste heat source, RCW and RHW, and the internal radiant heat from the process within each buildings. Steps must be taken to provide alternate sources of heat or to winterize the buildings if the uranium enrichment process is shutdown.

The buildings heated with RHW are:

C-100 Administration
C-101 Cafeteria
C-102 Medical
C-200 Guard and Fire Headquarters
C-400 Cleaning Facility
C-710 Laboratory
C-720 Maintenance Shops
C-750 Garage
C-360 Toll Transfer and Sampling

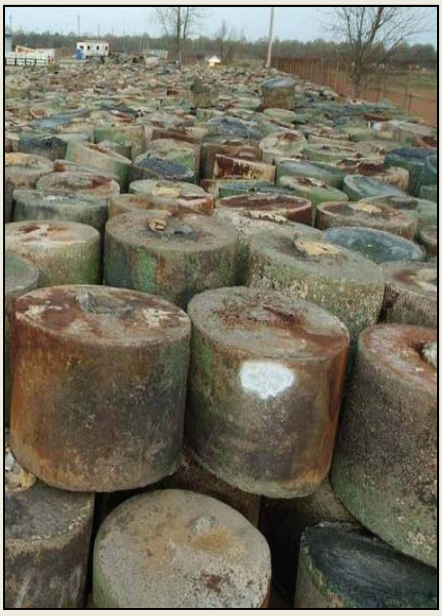
C-616 Liquid Pollution Abatement

The PGDP Recirculating Cooling Water (RCW) systems are treated for corrosion control with a phosphate-based inhibitor for steel, a copper corrosion inhibitor, and a dispersant. Because a large quantity of RCW is lost through evaporation in the cooling towers, the concentration of soluble salts and nondissolved impurities will increase unless some means is used to control it. To control this at PGDP, a blowdown is used. The corrosion inhibitors and other contaminants in the blowdown prohibit direct discharge of this water to the receiving stream. The purpose of the C-616 waste water treatment plant is to treat this waste water to lower the contaminant concentrations below the discharge limits.

Blowdown from the four cascade cooling tower systems is pumped into a collection system that routes the blowdown to C-616. The blowdown flow is measured at the-C-616 influent valve vault. The C-616 Waste Water Treatment Plant uses both chemical and mechanical processes. Ferrous sulfate, calcium oxide, and a cationic polymer are used to precipitate contaminants in the blowdown water for removal. Clarifiers provide for the flash mixing of the chemicals with the incoming blowdown water and recirculating sludge, coagulation, and clarification within a single tank.

Nickel Ingots/Cylinder Yards

9,700 tons of volumetrically contaminated nickel are stored on the Paducah Site.



Large cylinder storage yards are located throughout the plant. These yards are used to store cylinders containing uranium used as feed material for the enrichment process, uranium that has been enriched and is awaiting shipment to a customer, or uranium that is depleted in the ^{235}U atom and is in long-term storage. There are currently about 30,000 cylinders that belong to DOE and about 11,000 cylinders that belong to USEC on site.

C-720 Machine Shops

C-720 Maintenance and Stores Building is primarily a maintenance area containing both high bay and low bay areas. The facility also contains numerous offices, conference rooms, large storage areas, maintenance shops and loading docks. C-720 is constructed of structural steel with corrugated siding and has 336,498 square feet of floor space. Almost every industrial craft is represented here, including machining, forming, welding, heat treating, electronics, painting, carpentry, and plumbing. The crafts housed in this building have the capability to fabricate, repair, maintain, and calibrate almost every piece of equipment essential to the operation of the plant.

The high bay portion of the facility contains metal fabrication and machining equipment; overhead crane bays; electrical motor facilities which include support equipment necessary to completely rebuild and test electrical motors and electrical protective equipment and electrical insulating gloves; climate controlled shop areas for precision work; electronic repair facilities; and paint spraying facilities.

C-720 Machine Shops

There are 72 milling machines, both horizontal and vertical ranging in size from a Bridgeport with a 9 inch by 36 inch table to a Gray 20 foot table with a 72 inch vertical head travel. They are also equipped with nine tape controlled and computerized numerical controlled milling machines, dive tape controlled drilling machines, 14 radial drills ranging from the small table and floor models up to the Cincinnati Bickford which has a 24-inch diameter column and a 10-foot arm.

Various equipment is available for all types of grinding, shaping, forming and welding.

This facility could support anything from heavy equipment fabrication and assembly to intricate parts manufacturing.

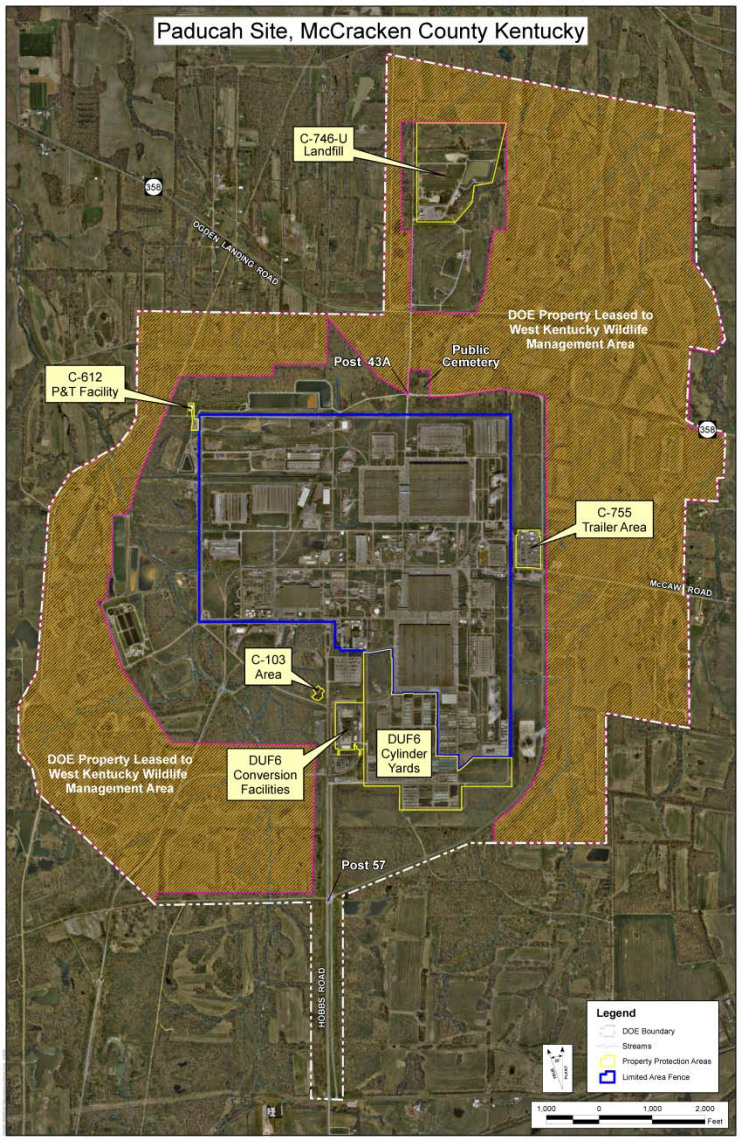
C-200 Guard and Fire Headquarters

- ✓ The C-200 Guard and Fire Headquarters currently houses the sites security forces and fire services personnel.
- ✓ Emergency response equipment includes a 100-foot snorkel truck, two ambulances, an emergency truck, and a pump truck with foam-making capability.
- ✓ DOE has mutual-aid agreements with surrounding communities so we can help one another if needed during an emergency.
- ✓ C-200 is constructed of reinforced concrete with 19,490 square feet of floor space. It contains offices, two conference rooms, a firing range and bays for emergency response vehicles.

C-100 Administrative Complex

The C-100/101/102 Administrative Complex consists of numerous offices and conference rooms, two fireproof vaults, cafeteria facilities and medical facilities. The buildings are constructed of reinforced concrete and have a total of 97,508 square feet of floor space. The facility is equipped with an elevator. Additionally, the Administration Building contains the plant's cafeteria with seating capacity for approximately 250 people, and also the plant's Credit Union and Medical Facility.

Site Security



- ✓ USEC currently provides the Protective Force .
- ✓ Approximately 644 acres lie within the Limited Area (LA) perimeter fence (blue).
- ✓ Most facilities necessary for PGDP operation are contained within this LA.
- ✓ Property Protection Areas (yellow) totaling approximately 194 acres are outside of the LA , including the water treatment plant, some lagoons, landfills, and various smaller facilities, but are within the DOE reservation.

Site Landfills

The C-746-U Solid Waste Contained Landfill is the only operating disposal site at the Paducah plant. It opened in 1997 and has helped DOE reduce disposal costs by accepting certain types of waste: sanitary waste, soil and debris and industrial waste. No hazardous is accepted; however, waste with small amounts of radioactivity within the landfill's Authorized Limits is acceptable. No radioactive waste above Authorized Limits is accepted.

Landfill Operations

C-746-U Solid Waste Contained Landfill

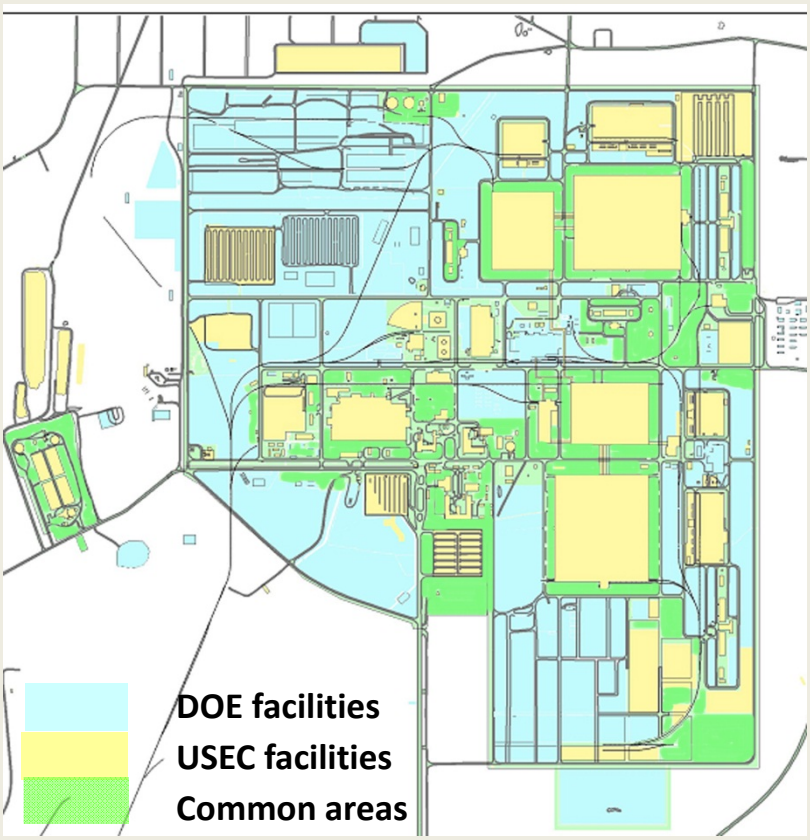
In the plant's early years of operation, material and equipment removed from the facility were buried in a series of on-site disposal areas. These burial grounds include both classified and non-classified material. The Burial Grounds Operable Unit (ten Solid Waste Management Units) was established to conduct the remediation activities for these areas. Alternatives are being evaluated through the CERCLA process.

C-404 Closed Hazardous Waste Landfill

Site Authority

DOE and USEC use the enrichment plant and many of its facilities.

- ✓ DOE activities are conducted under DOE Authority governed by DOE Orders.
- ✓ USEC uranium enrichment activities are conducted under license issued by the Nuclear Regulatory Commission.
- ✓ Authority for activities conducted in common areas are dependent on the agency performing the work.



- ✓ DOE Material Storage Areas (DMSAs) are locations set aside for DOE material and activities - usually within common or USEC leased areas. These areas require coordination when work activities are conducted.

Environmental Agreements/Permits

DOE Facility/Operations Agreements/Permits

Permits/Agreements	Issuing Agency
Kentucky Pollutant Discharge Elimination System	Kentucky Division of Water
Solid Waste – Residential Landfill (Closed)	Kentucky Division of Waste Management
Solid Waste – Inert Landfill (Closed)	Kentucky Division of Waste Management
Solid Waste Contained Landfill (Construction and Operation)	Kentucky Division of Waste Management
Hazardous Waste Facility Permit	Kentucky Division of Waste Management
Clean Air Act Permit	Kentucky Division for Air Quality
Federal Facilities Agreement	Kentucky Department for Environmental Protection, U.S. Environmental Protection Agency, and DOE
Toxic Substances Control Act Federal Facility Compliance Agreement and Modifications	U.S. Environmental Protection Agency and DOE
Site Treatment Plan Agreed Order	Natural Resources and Environmental Protection Cabinet and DOE
DUF_6 Agreed Order	Natural Resources and Environmental Protection Cabinet and DOE
DMSA, Water, Landfill Agreed Order	Natural Resources and Environmental Protection Cabinet and DOE

Gaseous Diffusion Facility/Operations Permits

Permits/Agreements	Issuing Agency
Utah Generator Site Access	Utah Department of Environmental Quality
Hazardous Waste	Kentucky Division of Waste Management
Tennessee Radioactive-Waste-License-for-Delivery	Tennessee Department of Environment and Conservation
Kentucky Pollutant Discharge Elimination System	Kentucky Division of Water
Ohio River Water Withdrawal Permit	Kentucky Division of Water
Water Treatment Registration (Public Water System)	Kentucky Division of Water
Clean Air Act Title V Permit	Kentucky Division for Air Quality
Underground Storage Tank Registration (2 fuel tanks)	Kentucky Division of Waste Management
Toxic Release Inventories	U.S. Environmental Protection Agency

Outfalls

Location[a]	Discharge Sources
001	The treated wastestreams of the C-752-A Waste Storage and Treatment Facility, C-752-C Decontamination Pad, C-753 Waste Treatment and Storage, C-616 Wastewater Treatment Facility currently leased to USEC, C-612 Northwest Plume Groundwater System, C-614 Northeast Plume Containment System, and C-613 Northwest Corner Storm Water Collection Basin and contributing sources of these units.
002	Cooling water, roof and floor drains, sink drains, and extended aeration sewage treatment system.
004	Domestic sewage, laboratory sink drains, motor cleaning, garage drains, laundry, machine coolant treatment filtrate, condensate blowdown, and cooling water.
006	Water treatment plant sludge, sand filter backwash, and laboratory sink drains from Outfall 005.
008	Surface drainage, roof and floor drains, cooling water, paint shop discharge, condensate, instrument shop cleaning area, metal cleaning rinse water, and sink drains.
009	Surface drainage, roof and floor drains, condensate, cooling water, and sink drains.
010	Switchyard runoff, roof and floor drains, and condensate sink drains.
011	Cooling water, roof and floor drains, switchyard runoff, condensate, and sink drain; currently rainfall runoff.
012	Roof, floor, and sink drains, condensate, surface runoff, and extended aeration sewage treatment system.
013	Storm water runoff from southeast corner of the plant.
015	Untreated storm water runoff from the C-749 Uranium Scrap Burial Yard, C-404 Low-Level Radioactive Waste Burial Ground, and the C-747 Burial Area.
016	Storm water runoff from the southwest corner of the plant.
017*	Untreated storm water runoff from the DUF6 conversion facility site and cylinder yards, and distilled water treatment reject stream and cooling tower blowdown from the conversion facility.
019	Storm water runoff from the covered and support areas of the C-746-U Landfill.
020	Treated leachate from the C-746-U contained landfill and the C-746-S closed residential landfill.

*Outfall 017 is controlled by the DUF_6 facility. The discharge source description for Outfall 017 is a revised statement, as stated in the KPDES permit application, that was submitted to the Kentucky Division of Water in July 2011.

Outfalls in large bold print indicate outfalls regulated by the Kentucky Pollutant Discharge Elimination System permit issued to DOE and its contractors. Other outfalls are regulated by the permit issued to the United States Enrichment Corporation.