



**Portsmouth Gaseous Diffusion Plant Site Tour Script
Environmental Technical Support (ETS) Contract Re-compete
June 26, 2012**

**10 MINUTE DRIVE FROM OSU ENDEAVOR CENTER ON SHYVILLE ROAD TO PLANT
(Protective Force leads bus to Main Drive Gate at slow speed)**

This document provides a general description of the regional area and history of plant as bus leaves Endeavor Center, travels down Shyville Road and Fog Road to enter plant via Main Drive Gate.

Welcome to southern Ohio! My name is Tony Takacs with the Portsmouth/Paducah Project Office and I will serve as your tour guide today. On our short drive to the plant, I'll give you a brief description of the area and history of the plant. The majority of this information is also provided in your tour booklet.

The building we just left is owned by the Ohio State University. The Department of Energy provided \$700,000 funding support for this business incubator through a grant from its designated community reuse organization, the Southern Ohio Diversification Initiative. The OSU business incubator grows small businesses to allow them to "hatch" onto their own by providing office support and equipment resources. This has been very successful, including a dentist and a retail cabinet supplier that have grown from the incubator to set up their independent businesses in the region.

The building we are now approaching to the right of the bus is the corporate headquarters for WAI, Wastren Advantage, Inc., built in 2011. This small business, originally located in Colorado, was purchased by a local individual who moved the firm's headquarters to Piketon, Ohio. WAI is one of the two mentor protégé small business teaming partners with the Decontamination & Decommissioning contractor, Fluor-B&W Portsmouth.

Plant History

The Portsmouth Gaseous Diffusion Plant is the largest employer in Pike County, a county that claims the unfortunate distinction of having the highest unemployment rate in the state of Ohio. Its 2,500 employees are crucial to the economic livelihood of the southern Ohio region. Of the 2,500 plant workers, about 1,900 are employed by Fluor-B&W on the DOE's D&D Project.

The plant was built between 1952 and 1956 as the last of three gaseous diffusion plants constructed to enrich uranium in support of the nation's Defense Program. The other two facilities were in Oak Ridge, Tennessee (that is currently undergoing D&D) and Paducah, Kentucky, the only domestic uranium enrichment production facility operating in the U.S. today.

During the early years of the plant, highly enriched uranium was produced for use in the nuclear weapons and nuclear submarine programs. The production of highly enriched uranium was suspended in 1991. The plant enriched uranium for use in commercial nuclear power plants until production was terminated in May 2001. The Portsmouth Gaseous Diffusion Plant was maintained in cold standby status until the end of FY 2005, when it transitioned to cold shutdown in preparation for

decommissioning of the facilities. DOE awarded the D&D contract to Fluor-B&W Portsmouth (FBP) in August 2010 and FBP assumed the work scope in late March 2011.

Just before bus turns left onto Fog Road:

I'd like to point out the mounded area to the right of the bus is one of five landfills on-site that have all been closed and capped in accordance with the regulatory requirements. This is the former sanitary waste landfill and is the only one of the five that was built after the requirements to install a bottom liner before disposal of waste. This landfill was closed in two sections: the northern section was completed in 1995 and the southern portion in 1998. There is no operating landfill on the plant site at this time. The small garage structure is used to house the roads and grounds maintenance equipment and staff for the Department's Facility Support Services contractor.

As we turn onto the Northeast Bypass Road, commonly referred to as Fog Road, the area to the far left of the bus is being evaluated as a preferred location for a potential onsite disposal cell for the D&D Project, if onsite waste disposition is the selected alternative. Numerous soil and groundwater studies have been conducted to better understand the geology of this site. DOE and its D&D contractor are working closely with Ohio EPA and the public before a waste disposition decision is made which is expected later this year.

Bus continues south on Fog Road.

To the left of the bus at the top of the hill is the X-611B Lime Sludge Lagoon, used to settle out lime waste waters from the plant's water treatment plant. And as we cross the bridge, you can see the pipeline to the right of the bus that transports the waste waters from the Water Treatment Plant to the lagoon.

Once we make the curve, you can see a wetland area on the left side of the bus. This is the northern section of the X-611A Prairie which has wetlands on both the northern and southern ends. The X-611A Prairie was the first Corrective Measures Implementation cleanup project approved by Ohio and U.S. EPA under the Resource Conservation and Recovery Act. It was constructed in 1996-1997. The X-611A was the former lime sludge lagoons for the Water Treatment Plant. Due to a short time use of a chromium-based corrosion inhibitor in the cooling water piping, chromium contamination was identified in the lagoons' sludge.

The approved cleanup remedy to transform the area to a prairie ecosystem required dewatering of the 18-acre lagoon area, placement of a thick geotextile fabric liner to stabilize the sludge, and then covering the entire area with clean fill dirt – at least two feet thick with some areas to the back of the prairie as much as 10 feet thick. More than 38 different varieties of prairie grasses and plants were seeded to complete the project. As part of the surveillance and maintenance plan, the prairie undergoes a controlled burn every five years to keep the prairie plants germinated and eliminate woody plant growth.

On the right of the bus is one of four operating groundwater treatment facilities under the DOE environmental remediation program to treat groundwater containing trichloroethylene or TCE, an industrial solvent that was formerly used at the plant to degrease equipment. The X-624 Treatment Facility was constructed in 1991, along with an interceptor trench, to collect and treat the groundwater on the eastern end of the X-701B groundwater plume area and prevent it from migrating into Little Beaver Creek that is located parallel to Fog Road to the left of the bus.

You will also notice on both sides of the bus some of the more than 1,000 groundwater monitoring wells that have been installed all over the federal property. About 600 of these wells are sampled on a regular basis.

Bus turns right onto East Access Road, travels to stop sign and then turns left onto Perimeter Road.

The plant's Perimeter Road encircles the facility and is about seven miles in length. The DOE Reservation is nearly 3,800 acres of which 1,200 acres are inside the Perimeter Road. After the terrorist attacks of September 11, 2001, public access was closed to the plant. As a result of requests from the public to provide quicker access for emergency vehicles to residences east of the plant, the southern half of the Perimeter Road was reopened in 2005. Just recently, the guard stations on the Perimeter Road have been opened up for official-use-only traffic.

Straight ahead and to the right as we turn onto the Perimeter Road is the tan-colored building called the Uranium Management Center, where DOE consolidated surplus uranium materials from the Fernald and Hanford sites, as well as several universities from across the country in the late 1990s. Some of this material was repackaged and removed under the American Recovery and Reinvestment Act funding in 2010.

As we crest the hill, you get a full view of the entire gaseous diffusion plant site to the right. The three large process buildings are obvious due to their enormous size. They were built in just two years between 1954 and 1956 by more than 22,000 construction workers. Each of these buildings is about a half-mile long, two stories high, and covers more than 30 acres under roof. These three buildings alone could hold over 200 football fields. The gaseous diffusion plant buildings encompass more than 10 million square feet total.

The process building to the far right is the X-333 building, the middle process building is the X-330, and the building to the far left is the X-326 process building. During the gaseous diffusion process, the uranium hexafluoride (UF₆) gas goes through more than 4,000 stages to enrich uranium. The U-235 isotopes are lighter and travel faster than the U-238 isotopes through the porous barriers in the gaseous diffusion converters. As the gas travels up the cascade through each of the buildings, the U-235 becomes further enriched. Therefore, the highly enriched uranium was produced in the final, X-326 Process Building and the equipment became smaller and smaller through the enrichment process due to nuclear criticality safety concerns. A converter in the X-333 building is about 33 tons whereas a converter in the X-326 building is only about 2 tons. The by-product of the process was the depleted uranium hexafluoride, which is predominantly U-238.

You can also see on the right some of the new office trailer complexes that have been installed for the relocation of D&D personnel from the X-100 Administration Building and other facilities onsite.

Bus enters Main Drive Gate – Protective Force provides sign-in sheet and notifies on-duty officer that bus has been in constant view since badging at Endeavor Center so de-boarding of bus is not required. Bus will travel west on 10th Street to stop sign.

We are now entering the Gaseous Diffusion Plant and the buildings are all reminiscent of government facilities built in the early 1950s. The X-100 Administration Building is on the left. It was built in 1954 as a "temporary facility". It has been an administrative building ever since and is now being emptied and prepared for demolition. The exterior is asbestos transite siding. The markings on the exterior of the building indicate the radiological surveying that has taken place as part of the characterization prior to tear-down. Fencing is being completed to isolate the building as a construction area for demolition work expected to start later this year.

The X-100 complex consists of the Administrative Building, the X-102 Cafeteria and the X-101 Medical Building. All are projected to be the first facilities torn down under the D&D Project.

To the right of the bus are the X-104 Police Headquarters and then the X-750 Garage, complete with gas pumps and vehicle maintenance bays.

Like many government installations of the early 1950s, this plant was built during the height of the Cold War to be totally self-sufficient. It has its own water treatment and sewage treatment plants, police and fire departments, electrical switchyards, and a machine shop that could pretty much build or repair anything that was needed at the site.

You will hear a lot of building numbers today as we drive by facilities. Building numbers at DOE's Piketon Site start with an X (similarly, building numbers at the Paducah plant start with a C and at Oak Ridge, a K). Something to keep in mind that will help you:

- X-100 series mean administrative type structures
- X-300 series refer to process operations/support facilities
- X-500 series refer to electrical facilities
- X-600 series refer to water facilities and
- X-700 series refer to maintenance facilities

The gaseous diffusion plant facilities generally are 3 digits and the centrifuge facilities use 4 digits.

At stop sign, bus turns left onto Mahoning Avenue, traveling south to 6th Street.

As the bus turns left, note the domed roofed concrete building straight ahead and to the right. This is the X-300 Plant Control Facility, the "hub" of the gaseous diffusion plant. It was built in the early 1950s and has operated non-stop, 24 hours a day. The plant's shift superintendents are located in this building. They could monitor all three process buildings and communicate with the off-site electrical power plants supporting the site. If there is any type of incident on plant site, the first call goes to the X-300 Building. From here, the shift superintendents notify emergency responders if needed. The building was constructed to be both earthquake-proof and bomb-proof when it was built.

The building on the left of the bus is the plant's former cafeteria that was recently shut down to prepare for D&D. Some of the plant records have been temporarily relocated from the X-100 Building to here until a new records vault is completed in the X-720 Maintenance Building.

The building on the right is the X-710 Technical Services Building, which contains a laboratory licensed to perform both radiological and chemical analytical work.

The smaller building to the left is the X-101 Medical Facility that has also been vacated and is being prepared for future teardown. The current medical facility is located in the white trailer on the right.

Bus will turn right onto 6th Street.

The Piketon Site received more than \$118 million under the American Recovery and Reinvestment Act (ARRA) in 2009 to help put Americans back to work. Approximately 400 people were hired to complete five ARRA projects. One of those projects was located to the right of the bus. The X-760 Chemical Engineering Building was taken down in June 2010 and the site is now a grassy field. The 5-Unit Groundwater Plume is beneath the surface and is being treated through a number of extraction wells and the X-622 Groundwater Treatment Facility.

On the left of the bus is the X-600 Steam Plant used to heat the buildings and autoclaves on this side of the plant. Now that the plant is no longer in production, the coal-fired Steam Plant is entirely too large and inefficient. It is proposed to be replaced by a smaller, more energy-efficient modular unit.

Bus will stop at stop sign and turn left onto Pike Avenue and travel south to 5th Street. Then bus will turn right (west) on 5th Street to Scioto Avenue.

As the bus stops at the stop sign, take a look to your right and you are seeing one mile of process buildings with both the X-326 and X-330 Buildings. *(After bus turns left onto Pike Avenue)* Directly to the right of the bus is the X-326 building where the highly-enriched uranium or HEU was produced.

The X-326 Process Building is 2.5 million square feet. Its two floors have a combined floor space of approximately 58 acres. At one time, this plant could produce enriched uranium greater than 97% assay for weapons grade material. The X-326 Building has the smallest sized equipment to stay within nuclear criticality safety requirements. Currently, the D&D contractor is removing converters from the second story cell floor to prepare the equipment for future off-site shipment for disposal.

This is called “cut and cap” as they cut out the equipment from the process system and cap the ends of the converters.

Bus turns right at stop sign onto 5th Street.

You can observe some of the security remnants associated with the X-326 high-enrichment process to the right – the razor wire, motion detectors and security cameras. The building had armed protective force officers at each entry point to the building due to security requirements at the time the HEU was being produced until it was terminated in 1991.

On the left of the bus is one of the completed environmental remediation projects, the X-231B Oil Biodegradation Plot. This involved in situ soil mixing and placing a liner and soil cap over the area with continued monitoring. The Environmental Program has been ongoing since 1989 when consent agreements were signed between DOE and the state of Ohio and US EPA. Ohio EPA has day-to-day oversight of the plant site. A number of projects have been completed under the environmental requirements.

The building on the left is the last remaining Cooling Tower Complex as the other two have been demolished. This cooling tower and pump house was used to cool the process operations in the X-326 Building on the right.

Further down the street to the left, past the Portal, is the Emergency Operations Center and Fire Department for the entire plant site.

At stop sign, bus will turn right (north) onto Scioto Avenue traveling along the west side of the X-326 and X-330 Process Buildings.

To the left of the bus, you will note the centrifuge facilities seen in the distance. These buildings were built by the Department of Energy in the late 1970s and early 1980s as part of the Gas Centrifuge Enrichment Plant (GCEP) project that was canceled in 1985 before being placed into operations. Each of the two process buildings is 303,000 square feet. DOE leased the facilities to USEC in 2006 for its commercial American Centrifuge Plant. You can see the two large centrifuge process buildings to the left and to their right is the 5-story recycle and assembly maintenance building for the centrifuge program. Immediately to the left of the bus is the X-7721 Maintenance, Stores and Training Building, that is also leased for USEC’s centrifuge program.

As many of you may know, the American Centrifuge Plant is a separate, commercial venture by USEC and is not associated with the DOE D&D program. USEC has submitted a \$2 billion loan guarantee application to DOE Headquarters and is awaiting a decision. In the interim, DOE and Congress recently approved a Research, Development and Demonstration grant to allow USEC’s centrifuge project to continue.

Bus continues north on Scioto Avenue, driving by the DUF6 plant, X-740 plume area and X-530 Switchyard on left side of the bus. On right of bus are the X-326 and X-330 Process Buildings. The Bus will turn right onto 20th Street at end of Scioto Avenue.

To the left of the bus is the Depleted Uranium Hexafluoride (DUF6) Conversion Plant. BWCS was contracted by DOE in December 2010 to operate conversion facilities both here and at Paducah, KY. These plants will convert DOE’s large inventory of DUF6 to a more stable chemical form, uranium oxide, for reuse or disposal. During the process, hydrofluoric acid is collected and sold as a product to be used in the glass etching and metal engraving industry. Conversion of the more than 24,000 cylinders at the Piketon Site will take about 18 to 20 years. The conversion plant employs approximately 180 workers.

Immediately north of the X-326 building to the right is the X-330 Process Building. It is about 2,176 feet long, 640 feet wide and 66 feet high. The depleted uranium or “tails” were withdrawn at the northeastern corner of the X-330 Building, called the Tails Withdrawal Facility.

All Greater-than-Safe-Mass uranium deposits were removed from the process buildings in 2007.

Bus will follow Scioto Avenue north after crossing the intersection of Scioto and 15th Street.

The small grove of trees to the left side of the bus is part of the X-740 phytoremediation project. A total of 765 hybrid poplar trees with long root structures were planted in 1998-99 over a 2.6-acre area to treat a low-concentration TCE-contaminated groundwater plume. The intent was the roots would reach the contaminated groundwater, suck up the TCE through the trees and biodegrade the contaminants through photosynthesis. However, southern Ohio has had enough rain that the trees did not need to reach the groundwater for growth. The phytoremediation has not met the remediation goals established by the regulatory agencies so a supplemental bioremediation remedy has also been used at this plume.

The X-530 Electrical Switchyard and associated switch houses are located on the left. The switchyard receives power from the Ohio Valley Electric Corporation's system at 345kV, nominal, and delivers power at 13.8kV to the switch houses for distribution to both the X-330 and X-326 Process Buildings and area auxiliaries. There were two major switchyards on site needed to supply power for the uranium enrichment process. The other switchyard was demolished in 2010 under the Recovery Act funds. When this plant was in full operations, it used approximately 2,200 megawatts of power each day, enough to power New York City at the time the plant was built in the early 1950s.

The enormous amount of electrical power is the major cost drawback with the gaseous diffusion technology. The centrifuge technology uses only 5% of the electrical power that the diffusion plant used.

Power is brought to the plant site through the Don Marquis Substation, located on the hill to the left of the bus. Power comes into the Don Marquis Substation from two off-site generating stations that were initially built in the early 1950s to serve the plant: Kyger Creek on the Ohio River near Gallipolis, Ohio and Clifty Creek in Madison, Indiana. Since the plant is no longer in production, the Ohio Valley Electric Corporation has placed the excess power on the national grid system for use by other electrical utilities.

Bus continues north on Scioto Avenue, passing the large DUF6 cylinder yard on left.

DOE is responsible for about 24,000 cylinders of depleted uranium hexafluoride (DUF6), stored in three storage yards onsite. You can see the largest X-745C cylinder storage yard to the left. A separate cylinder storage yard is located across the Perimeter Road on the northwest end of the plant for storage of depleted uranium cylinders shipped to Portsmouth from Oak Ridge. These 14-ton cylinders of solid depleted uranium material will be processed through the DUF6 Conversion Plant.

Bus stops at stop sign and then turns right onto 20th Street, traveling east toward X-333 Process Building.

The X-344 Building Complex is to the left of the bus. This was previously the sampling and transfer facility, where the UF6 was heated in an autoclave (like a large pressure cooker) to a gas so the product could be sampled to ensure it was enriched to the proper specifications required by the customers. The UF6 would then be transferred to a 2.5-ton product cylinder that would be placed into an overpack for transport by truck to the fabricators, who would then convert the material to metal rods used in nuclear power plants. The facility is currently being used to transfer thin walled tails cylinders to thick walled cylinders for transport to the Paducah plant for re-enrichment. Clean UF6 material stored in cylinders on the outside storage pad is being sold by DOE under its barter program with the ensuing funds used to help pay for cleanup.

Bus continues east on 20th Street.

The X-333 Process Building is on the right of the bus. The X-333 is the first of the three process buildings where the gaseous diffusion operations began. It houses the largest pieces of equipment

and required the most electrical power consumption. The X-333 building is about 1456 feet long, 970 feet wide and 82 feet high. The two floors have a combined floor space of approximately 65 acres. The building is a little more than 1/4 mile long. There are 640 stages in this building and a total of 4,020 stages in all three process buildings. Each cell in the building consists of three major components: a motor, compressor and converter. The other two process buildings have a similar concept but with much smaller equipment.

On the left of the bus is the 20-acre site of the former X-533 Electrical Switchyard. The switchyard demolition started in February 2010 under the Recovery Act funds and was completed in December 2010. More than 160 electrical towers were removed, as well as two switch houses and a control house. Some of the towers were 120 feet tall. About 18,000 lbs of metals were recycled by the Southern Ohio Diversification Initiative (SODI) with half the proceeds being retained within the community for economic development efforts and half being returned to the U.S. Treasury. To date, more than \$2.1 million has been provided to SODI from the metals recycling.

Bus continues east, traveling through the former X-633 Cooling Tower Complex area.

The light blue building on the hill to the left is the site's water treatment plant. Well fields were installed along the Scioto River near the village of Piketon and pipelines were built all the way to the plant to transport water from the Teays Valley aquifer to the site's Water Treatment Plant. The plant used more than 20 million gallons of water a day during production.

We are traveling through the former site of the X-633 Cooling Tower Complex, the largest cooling towers that were used to cool the heat of compression from the uranium enrichment process in the X-333 Process Building. There were four separate cooling towers and a pump house. All that remains are the below-grade basins and piping that will be removed during the D&D project. The X-633 Cooling Tower Complex was demolished in June 2010 as another Recovery Act funded project.

Bus travels south on Patrol Road toward the X-701B Groundwater Treatment Area.

The fourth Recovery Act project site was located to the right of the bus. This was the location of the X-701B Groundwater Treatment Project. The X-701B Holding Pond was previously located on this side of the small teal colored building. It was used until the late 1980s to settle out waste waters from the X-700 Cleaning Facility. Because of the extensive use of TCE to degrease equipment in the X-700 Building, the TCE in the waste waters settled to the bottom of the holding pond and over time, settled along the bedrock layer about 30 feet beneath the surface making it extremely difficult to remove.

With the Recovery Act funds, about a 70,000 square foot area was excavated all the way down to the bedrock layer and a chemical oxidant, sodium persulfate, was mixed into the soils to react and break down the TCE contaminants. This area had the highest concentrations of TCE contamination onsite. The treated soils were then backfilled and the area has since been seeded to a grassy field. Post-sampling results have shown more than 85% reduction in the TCE levels.

Bus follows Patrol Road around east and south side of Uranium Management Center.

We are approaching the large tan warehouse on the right, called the X-744G Uranium Management Center. For your bearings, if you look to the left of the bus you will see where we came onto the plant Perimeter Road from Fog Road. As mentioned previously, the Uranium Management Center has been used to provide storage of surplus uranium material consolidated from Fernald, Hanford, and several universities from across the country.

DOE issued a Request for Proposals a few years back hoping to sell some of this material to the nuclear industry but due to the materials being out of specification with current requirements, very little was actually sold. DOE declared the remaining material waste and under the Recovery Act, a large portion of the inventory was repackaged and shipped to DOE's Nevada National Security Site for disposal.

Bus will travel west on 16th Street between the X-720 Maintenance Building and the X-700/X-705 Buildings.

We are passing by the large X-720 Maintenance and Stores Building on the left of the bus. This building was used to repair the large pieces of equipment from the process buildings. There is also a paint shop, carpentry shop, sheet metal shop and other maintenance facilities in this building.

The two large buildings on the right are the X-700 Cleaning Facility, followed by the X-705 Decontamination Facility. Use of two vapor degreasers in the X-700 Building, using heated TCE for many years until the late 1980s, resulted in contamination of the groundwater, identified as the 7-Unit Groundwater Plume. Waste waters were sent to the X-701B Holding Pond area, which resulted in the high TCE-concentration groundwater plume in that area.

The blue-sided building to your right just past the X-705 Decontamination Facility is the X-627 Groundwater Treatment Facility. This treats groundwater collected from sumps in the basements of the X-700 Cleaning Facility and X-705 Decontamination Building.

The bus will continue to follow 16th Street to stop sign at Pike Avenue.

The X-345 Building is the white warehouse on your right. This building was previously used to store highly enriched uranium, or HEU, when it was produced at the site. You can see the extensive razor wire, motion detectors and cameras that were protective measures for this building. HEU is no longer stored onsite.

Bus turns left onto Pike Avenue and follows it to 11th Street, turning left onto 11th Street.

The grassy field area to the right is the location of another smaller, inactive facility that has been removed over the past couple years. The X-103 Auxiliary Office Building was demolished and the area was reseeded.

Bus turns right onto Mahoning Avenue, then left onto 10th Avenue to exit the Gaseous Diffusion Plant.

As we turn right onto Mahoning Avenue, you get a closer look at the domed-roofed Plant Control Facility on the right and the X-750 garage on the left.

We will stop briefly at the Main Drive Gate to drop off your visitor badges. The Protective Force Officer will board the bus to collect them so please have your brown visitor badge with the small green PNAD badge available.

The bus returns the visitors to the Ohio State University Endeavor Center via Fog Road.

If you have any questions following the tour, please provide them to the EMCBC website so they can be answered for everyone.

Thank you for participating on today's tour!

Respectfully,

Tony Takacs