

DUF6 Conversion Facility Portsmouth Tour Verbatim Script 2015

NOTE: Read **non italicized** portion verbatim.

Guide visitors to enter door S-1 at DUF6 Administration Building, sign in and step into Admin Building, gathering in training room 105. Visitors will receive PERSONAL PROTECTION EQUIPMENT (safety glasses, verify shoes adequate), and a welcome/ safety briefing.

Formally start tour by introducing self. “ My name is _____, and my position is _____”.

“The tour is scripted for consistency, and no questions will be answered during the tour by me or any escorts or any persons you may encounter. Exceptions are only for an emergency. In all emergency situations follow the escorts. If you need to use the bathroom facility, contact one of the escorts so the group can pause for you.

Visitors need to use 3x5 cards to jot down questions. I have extra cards available upon request. The cards will be collected at the end of the tour by DOE tour escorts and responses will be placed on the DUF6 Operations Procurement website shortly. Please provide your name/contact info on the first card and name on all subsequent cards you turn in so we can contact you if we have any questions regarding your handwriting. At this time, if anyone needs to use the bathroom facilities, please do so. They are located...”

Pass out cards to anyone who needs them. Monitor any persons using the bathrooms. Conduct headcount using sign in sheet as a basis. Jot down number of visitors.

Before exiting Administration Bldg (AB), indicate

“We are in a 2 Story Administration Office Building that accommodates management and support staff. This building contains a second floor meeting room with video teleconference capabilities. On this tour one escort will trail behind the last person. We will walk through the building once, exit and proceed to the SW Corner of full cylinder storage pad. Please follow me.” *Canned response if needed:* Please jot down your questions

Upon exiting the AB, meet at the crossroad point between the full cylinder staging area and KOH building entrance N-1:

From this vantage note some of the buildings that we will tour through: the Conversion Building (CB), Warehouse/Maintenance Building, and KOH or Potassium Hydroxide Building. Throughout this facility, there are detectors tied to alarm systems that will warn us for abnormal conditions. Please follow your escorts in the event you hear any alarms. The full cylinder pad adjacent to the Conversion Building CB (*point*) is used for temporary DUF6 cylinder storage prior to processing.

Note that full cylinders travel on this concrete driveway (*point*) from the Cylinder Yards arriving on cylinder haulers that you will see later in the tour.

The cylinder haulers enter through Gate DUF6-1, and place/stage full DUF6 cylinders in the full cylinder pad zone.

From the Full Cylinder Staging Area, the cylinders are loaded onto a cart and moved into the Conversion Building air-locks. From there the cylinders are moved into the Vaporization Room via airlock doors (W-1) or Cylinder Evacuation Room via (door W-2) using an overhead monorail and/or rail cart.

Canned response: Please jot down your questions

We will follow the conversion process in the conversion building but first we will tour the KOH building through door N-1. We will enter into the KOH Potassium Hydroxide building and congregate next to me in one area.

Pause and perform headcount.

I will first read to you the posted safety signs. *Read signs*

Proceed to KOH building and enter through N-1 side door:

Pause inside building:

This building houses Potassium Hydroxide KOH regeneration process equipment. Aqueous Potassium Hydroxide KOH is utilized in one of two aqueous HF scrubber systems in the conversion building. Saturated Potassium Hydroxide KOH solution is regenerated in this building using lime, producing a CaF₂ byproduct. This building also houses the Deionized Water System and associated tanks.

Panning from the right we have:

The KOH system regenerates spent KOH. This system is periodically operated using an Operator Work Station (OWS). The KOH system includes hydrated lime addition and mixing tanks, storage tanks and a filter press. Turning (*point*) to the Deionized Water System (DIW), this system supplies clean water to boilers located in the neighboring conversion building. This steam is fed to the conversion units. The Deionized Water System generation system is a multi-bed adsorption system that requires periodic regeneration.

Canned response: Please jot down your questions

Please follow me and we exit the same door we entered; we will exit to the right, walk parallel to the Conversion Building CB on our left and enter the Conversion Building CB. I will wait for all to arrive and then read the posted safety signs. *Read signs*

Prior to entering, the yard with cylinders single stacked is called the Heel Cylinder Staging Area. I will refer to this yard during the Conversion Building CB tour.

As you follow me we will enter through door marked 'Monitoring Area' and congregate in the first open space beyond. We will pass locker rooms and small storage areas on ground level. Be sure you are wearing your safety glasses.

Our first stop is the Vaporization area. We will proceed through this door (148).

The Vaporization area houses eight autoclaves that can accommodate both 30" and 48" diameter cylinders. To date, only 48" cylinders have been processed. The rail tracks and the crane monorail (*point*) along the whole length of the room are used to move cylinders for processing. A brief summary of the autoclave operation is as follows: configuration is established and the AC door is opened, a cradle system is positioned, the cylinder is set on the cradle and positioned into the AC and connected to the feed system. Once the autoclave door is closed, interlocks are activated and the Control Room (CR) assumes control. The Control room manages Cylinder heat up, Cylinder feed, Cylinder final evacuation using vacuum pumps and final cool down of the empty cylinder. The entire cycle takes approximately 24 hours.

Canned response: Please jot down your questions

Please follow me to the end of this area to see the Cylinder Transfer System (CTS).

Pause

Cylinders that cannot be processed through the Vaporization System will be processed through the Cylinder Transfer System in the Conversion Building. The Cylinder Transfer System will be used to transfer the DUF6 from unacceptable cylinders to line one conversion unit. Vacuum pumps are provided to assist in these transfers.

Please follow me into the next room, the Cylinder Evacuation Room CER.

I will wait for all to arrive and then read the posted safety signs. *Read signs*

Oversized cylinders, such as the CV-19 type, will be processed in the Cylinder Evacuation Room CER and the contents of the cylinder transferred gradually to line one conversion unit. Vacuum pumps are provided to assist in these transfers. Heat blankets may also be utilized to aid in the transfer operation. Both the Cylinder Transfer System CTS and Cylinder Evacuation Room CER have not been operated to date.

We will now proceed to view the Cylinder Stabilization System (CSS) area which is located at the far end of this room where we entered. I will wait for all to arrive at the Cylinder Stabilization System CSS.

Pause and silent headcount check.

The Cylinder Stabilization System CSS is used to perform stabilization of all cylinders (48" diameter and below) in one or both of the two identical stations (*point*). A special KOH stabilization media is used to neutralize any residual acidic materials remaining in DUF6 cylinders that have been processed. Prior to processing at Cylinder Stabilization System CSS, empty cylinders containing non-volatile heels are moved out to the Heel

Cylinder Staging Area for an aging period of sufficient time to allow background radiation to decay.

Canned response: Please jot down your questions

We will now exit this room and enter the next room over to see the oxide powder transfer area. Follow me through the doors ahead and I will wait for everyone to congregate.

Pause and silent headcount check.

The conversion process is a continuous process in which almost all of the operations are automated for efficiency, high quality, and safe operation. Operators primarily provide surveillance. Cylinder transfer and cylinder handling require more manual operations, but most of the actions (outside of actual cylinder movement) are automated through the Integrated Control System (ICS) that incorporates the operation of the process systems and balance of plant (BOP) systems. Above us is the control room which contains the Integrated Control System ICS and other control systems. We will enter that room later in the tour.

Mirroring the three Conversion Lines in the Vaporization room we just departed is a series of six oxide transfer stations in this room. Each transfer station can collect product oxide in drums for sampling or collecting seed material to fill the conversion units upon start up. These transfer stations are fitted with a special drum bypass for normal continuous operation when oxide is pneumatically transferred and collected in large hoppers which we will see later in the tour. We will now proceed to the second floor via the elevator. As we proceed to the upper levels, be careful of trip hazards as some of the floor surfaces will change to a grating.

Pause and silent headcount check.

You are viewing one of two conversions units for Line 3. Each Line has two conversion units. The bottom section of the conversion units are all on the second floor. Note that you are viewing the external surface of the conversion unit heating jackets. In the DUF6 dry conversion method, feed gases steam, hydrogen and nitrogen are mixed and fed upward through a flat circular porous distributor plate to each of these fluidized bed conversion units. At a higher section in the conversion unit, vaporized DUF6 is fed, mixes, reacts and is converted to uranium oxide powder. The resulting uranium oxide powder flows down by gravity through a center hole in the distributor plate and is pneumatically transferred and collected and packaged for disposition.

Overall, the process equipment is arranged in parallel lines, each line consisting of two autoclaves and two conversion units. Two product streams are produced, a gas mixture and oxide solid. Later in the tour we will see parts of the product gas stream where it exits the top of each conversion unit, enters a hydrogen fluoride (HF) recovery system and then through process off-gas scrubbers prior to being vented to the facility stack. The

Conversion Building CB is maintained at slight negative pressure as are all air/scrubbed off-gas exhausts through the stack.

Canned response: Please jot down your questions

We will now proceed to view the oxide hopper and roll compactor systems.

Pause and silent headcount check. I will wait for all to arrive and then read the posted safety signs. *Read signs*

Before going up the steps be aware of low clearance (*point*) – a foam rubber is covering a bracket.

In this room we can see two oxide hoppers and two set of roll compactors that compress the oxide powder into pellets to reduce its volume prior to refilling modified empty cylinders. Viewing above is the hoppers that we will enter to see on the next floor. Looking down we see the oxide cylinder upenders and the another room that we will visit. Also in view are airlocks used to moves cylinders into and out of the building. Once oxide filled cylinders have exited the building, they will be transferred back into the cylinder yards. We will view the alternate path later in the tour, where oxides can be loaded into gondola railcars; that method is not being used at this date.

We will now proceed to the third floor via the elevator. As we proceed to the upper levels, be careful of trip hazards as some of the floor surfaces will change to a grating.

Canned response: Please jot down your questions

Pause and silent headcount check in the elevator.

In front of us is the third floor which requires hard hats to enter. We will not enter the area. This floor is the level where DUF6 is fed into the conversion units. In addition, seeding oxide powder in the conversion units is performed at this level. We will now proceed up the stairs to the Mezzanine area to view the top of the conversion units and the oxide hoppers.

Pause and silent headcount check next to oxide hopper door.

On this floor the top of each of the conversion units can be seen. The product gas stream is filtered and nitrogen is used to back pulse the filter to separate fine oxide from the gas stream exiting the filter. The oxide falls back by gravity into the conversion unit and, as the oxide particle size grows, fluidization is overcome and oxide powder exits the bottom of the conversion unit into the powder transfer system.

Also located on this level are the oxide hoppers. Before we enter the room, I will wait for all to arrive and then read the posted safety signs. *Read signs*

Be careful not to touch or bump into any equipment, as there are some sensitive, fragile components in this room.

Enter

In this room are the two oxide hoppers that we saw earlier in the tour. The oxide from Lines one and two enter one hopper and the other hopper receives oxide from Line three (and four in Paducah). Each hopper has a unique filter system that separates the oxide and discharges the oxide to fall down into the hopper. The air transporting the oxide is vented into the facility stack, via High Efficiency Particle Air filters.

From this level one can again view the room below which contains a maintenance shop, the Cylinder Modification System and the Oxide Handling Filling System. We will be proceeding to that room next. Follow me back to the elevators as we proceed to the first floor.

Pause and silent headcount check upon exiting the elevator.

We will proceed through these doors (*point*).

From this vantage we can see the maintenance 'hot shop' area, Cylinder Modification System (CMS) area, and distributor plate and filter cleaning areas.

Special equipment is used including a ultrasonic cleaning tank for maintenance and reuse of oxide filters. The Cylinder modification system is used to retrofit an empty cylinder with a flange. This new cylinder is filled with product oxide powder pellets at the Cylinder Upender filling station which we will walk now to see. I will point out the Operator Work Station that is an example of one of several distributed throughout the facility for remote operations by field operators. The Operator Work Stations OWSs are in direct communication with the Control Room. A crane is used to move cylinders in this room.

Canned response: Please jot down your questions

We will now tour the HF recovery room which contains a series of unit operations that remove HF from the product gas stream, collect condensed aqueous HF product by gravity and transfer the product to the Hydrogen Fluoride Storage (HFS) area. Non-condensed offgas is routed through the scrubbers to the facility stack.

Follow me to the Hydrogen Fluoride Recovery HFR room.

Pause and silent headcount upon entering HFR

In this room there are two sets of scrubbers, Deionized Water scrubbers and KOH scrubbers. (*point to banks*). The KOH bank includes a Backup scrubber. Next to the

Deionized Water scrubbers are set of HF receiver tanks, pumps/piping for temporary accumulation of aqueous HF and transfer to HFS tanks.

Support equipment in this room also includes various chiller systems for various heat transfer operations throughout the facility.

Canned response: Please jot down your questions

We will now proceed to the monitoring area when the contractor will perform a radiation scan for each person prior to exiting this facility. Upon exiting the controlled area we will tour the control room and then other unit operations outside. We will congregate here once everyone is scanned and then proceed.

Pause and silent headcount before entering CR.

We will now proceed up stairs to upper Conversion Building Admin level. You will see office spaces and a break room. We will stop in front of the control room. The CR contains the Integrated Control System (ICS) with dedicated computers that manage each of the three Conversion Lines. The Integrated Control System consists of the basic process control system (BPCS) and independent safety system (ISS). As I noted earlier, the Operator Work Station OWS provides the operator interface required for start-up, shutdown and for general plant control and monitoring. These Operator Work Stations OWSs have a communication link to the Integrated Control System ICS.

You will also see two white boards which provide facility status information.

The Control Room is backup up with a dedicated Uninterruptible Power Supply UPS system.

I will enter the Control Room (CR) first myself and then invite you all. We will not speak in the Control Room.

Enter

Exit

We will now proceed to the HF condenser room. We will not enter into the areas requiring hard hats. I will open the first of two doors and read the posted safety signs and then we will all enter. *Read signs*

Conversion offgas piping enters from conversion room. The HF condensers located near the ceiling condense HF vapor into liquid. A separator is used to split these two streams. A small fraction of HF vapor does not condense and is sent to the Deionized Water scrubber system. The final HF is recovered as product. This room contains the steam supply system boilers and H₂ piping.

Pause and silent headcount before exiting CB.

We will now exit the Conversion Building and tour other parts of the plant. Follow me outside and we will congregate just outside the Conversion Building .

We will tour the rail area next – follow me.

The crane area and rail spur is designed for transportation of oxide cylinders.

We will tour the Hydrogen Fluoride Storage HFS area next – follow me.

Proceed to HF storage rail/truck access point, Stop at rope:

The Hydrogen Fluoride Storage HFS area contains two platforms for either rail or tractor trailer loadout of product HF. This facility has 5-10,000 gallon HF storage tanks. The piping manifold system has an HF scrubber to capture HF vapor during loadout. The rail spur for HF product shipments and truck access pass through slide gates/guardhouses,

Please follow me the next stop.

In front of you are four Hydrogen H₂ generation/supply systems. This technology is based on natural gas/steam reformation process. A new system is being procured to replace this system.

Please follow me to the next stop.

Proceed to N₂ pad:

Nitrogen N₂ supply system is leased equipment from Air Liquide. Cryogenic Nitrogen N₂ is periodically delivered to our site.

Please follow me to the Full Cylinder Staging area we began our tour.

Pause and silent headcount.

Please follow me to the next stop.

The equipment (point) in front of you is the Heating/Ventilation/AirConditioning chiller cooling water mechanical draft cooling tower. Another cooling tower stands next to the Nitrogen N₂ supply system.

Please follow me to the next stop.

This standby diesel generator provides backup power to select systems on this site. We will now tour two areas, the Electrical and Mechanical Rooms in the Conversion Building.

Please follow me – *Walk toward mechanical room; read signs*

Please don hearing protection using the foam PERSONAL PROTECTION EQUIPMENT,

Pause / check PERSONAL PROTECTION EQUIPMENT

We will now enter door N-4 ; Since the noise level is too high, what you will see are:

Instrument air compressors and dryers, chillers, Chilled water pumps and Cylinder upender hydraulic pumps and reservoir.

I will motion for everyone to exit by raising/waving my hands. Congregate outside the same door we entered.

Enter

Exit mechanical room:

Follow me to the outside of the Electrical room.

Two redundant 13.8 kV electrical feeds that come into the plant underground from the switchyard. The facility stack can be viewed from this vantage point.

Since the noise level is too high, what you will see includes:

The Uninterruptible Power Supply, Automatic bus transfer switch tied to Stand-by Diesel Generator, Various motor control stations, 480V switchgear, BPCS basic process control system and independent safety system ISS cabinets.

I will motion for everyone to exit by raising/waving my hands to exit and congregate outside the same door we entered.

We will now enter electrical room Door N-1:

Proceed out of electrical room

We will now walk through the Warehouse which also contains Maintenance work and storage areas. This will be a one pass without any stops or script. Warehouse is staging area for cylinder yard and support operators, maintenance personnel, and supervision. Also includes material storage area, break area, locker rooms and showers.

Enter warehouse through rollup door or E-2:

Proceed South through warehouse: Exit through South door.

Pause and silent headcount.

We will now return to the AB foyer and exit onto the bus for a tour of the Cylinder Yards.

If weather permits, upon escort, drive into CY C yard and have visitors stand at entrance to yard.

The Cylinder Yard contains various assay cylinders. What you see are the typical 48” cylinders. Cylinder movements are needed as only assay level $<0.25\%$ can currently be processed in the conversion facility.

Follow me as we walk through part of Cylinder Yard C – do not walk close to any cylinder but stay in the aisles. Cylinders are stacked two high. The work activities in the Cylinder Yards includes visual inspections, pressure checks prior to movement and processing, and cylinder rearrangements in order to supply cylinder operations, which process on average 3 cylinders a day/7 days a week during normal operations.

Portsmouth DUF6 Operations manages three Yards, C, E and part of G.

We will now exit this yard and drive by E and G for your viewing.

Notice the oxide cylinders stored – they have flanges. Notice the cylinder haulers parked in the yards.

Exit

Enter van

Drive by other CYs

Return, enter AB

Collect PERSONAL PROTECTION EQUIPMENT, sign out visitors, collect 3x5 cards, and release tour.