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| TITLE: Transporting Uranium Oxide Cylinders | DUF6-X-CYP-2505 | Rev. 1 |
| DOCUMENT TYPE: Technical Procedure | PREPARER: J. Anglemyer | Page 1 of 17 |
| SUBJECT MATTER AREA: Cylinder Yards | CONCURRENCE / DATE: See Form 4320. | |
| OWNER: Operations Support Manager | APPROVED BY / DATE: T. Marshall / Refer to 4320. | |
| X USQ Required \_\_ Categorically Excluded | EFFECTIVE DATE: 11/14/2018 | |
| FORC REVIEW REQUIRED? \_X\_ Yes \_\_ No | PERIODIC REVIEW: 3 years | |

Usage Requirements

Reference  Level 2 UET for: DUF6-X-CYP-2505-F01 and F02  Level 1 UET for: \_\_\_

**Note:** This procedure shall be available to workers, though not necessarily at the work location. Refer to the procedure, as needed, to ensure the task is completed properly.

**Note:** DUF6-X-CYP-2505-F01 and F02 must be under the control of the procedure user at the task location during periods of active performance. Each step or group of related steps of the procedure shall be read by the user or designated reader before performance of that step or activity. If procedure step sign-offs or data taking is required, it shall be accomplished at the completion of the step.

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# 

# Purpose

This procedure provides instructions for transporting Department of Energy (DOE) cylinders containing uranium oxide between the DUF6 Conversion Facility and the X-745 Cylinder Storage Yards (CSY). This includes pre-movement inspections and the placement of cylinders.

# Scope

This procedure applies to the on-site transport of cylinders that have been filled with uranium oxide.

Transport of cylinders containing DUF6 is performed in accordance with applicable transportation requirements found in DUF6-U-CYP-2501, *Handling, Transportation, and Inspection of DOE 48-Inch UF6 Cylinders.*

# Other Documents Needed

* DUF6-X-CYP-2505-F01, *DOE Oxide Cylinder Relocation Authorization Form* (CID or manually generated)
* DUF6-X-CYP-2505-F02, *Inspection Criteria for Oxide Cylinders*
* DUF6-X-CYP-2501, *Handling, Transportation, and Inspection of DOE 48-Inch UF6 Cylinders*
* DUF6-X-CYP-2513, *Inspection and Operation of UF6 Cylinder Handler or Straddle Carrier*
* DUF6-X-CYP-2519, *Portsmouth Preventive Maintenance and Inspection Program for UF6 Cylinder Handling Forklifts*

# Responsibilities

Personnel responsible for performance of this procedure:

* CSY Supervisor
* CSY Operator / Technician
* Cylinder Data Management Clerk

# Initial Conditions

Prior to initial use, cylinder-handling equipment used to lift, relocate, **and** transport cylinders **shall** be approved by Engineering **and** the site Cylinder Yard Facility Manager.

# Tools and Equipment

The following equipment may be needed during oxide cylinder handling activities. This list is not comprehensive **and** there is no requirement to have all of this equipment in the cylinder yard during handling **and** inspection activities.

* Cylinder wedges
* Forklift
* Cylinder Handler
* Tools to set cylinder cradles

# Precautions and Limitations

## Precautions

* Leather gloves **shall** be worn when in physical contact with cylinders.
* Standoff distances **shall** be maintained between UF6 cylinders **and** vehicles left unattended (i.e., when personnel are not within the CYLINDER STORAGE YARD). (See Attachment C, *Safe Standoff Distances*.)

DUF6-X-TSR-004, 5.5.3.4 D

* Standoff distances **shall** be maintained between UF6 cylinders **and** vehicles left unattended (i.e., when personnel are not within the FULL CYLINDER STAGING AREA) per DUF6-X-OPS-0100, *Cylinder* *Vaporization Production Order*.
* Cylinder lift capacity **shall** be restricted to 31,654 lbs. maximum for the NCH-35 Stacker.
* If visible signs of PCB paint is observed on the ground then the Cylinder Yard Supervisor **shall** be notified **and** a work request initiated for cleanup.

## Limitations

* Daily operating inspections on cylinder handler **or** straddle carrier **shall** be performed in accordance with DUF6-X-CYP-2513, *Inspection and Operation of UF6 Cylinder Handler or Straddle Carrier*.
* Oxide cylinders being moved to the Conversion Facility **shall only** be located in the Oxide Cylinder Staging Area (X-1745C).
* On-site speed limits shall not be exceeded.

## Hazard Controls

* General hazards are captured in HCIC-X-16-0642, *Hazard Controls Identification Checklist (HCIC)* for DUF6-X-CYP-2505, *Transporting Uranium Oxide Cylinders*.

# Process

## Cylinder Movement Preparations

CSY Supervisor

1. **Prepare** DOE Oxide Cylinder Relocation Authorization Form   
   (DUF6-X-CYP-2505-F01) either manually **or** automatically using the DOE   
   UF6 Cylinder Information Database (CID) Database.

CSY Supervisor or Designee

1. **Enter** cylinder ID into the CID for each oxide cylinder to be moved to **or** from CSY.

CSY Supervisor

1. **Notify** Health and Safety Technician (HST) when oxide cylinder movements will be conducted.
2. **Ensure** radiological survey has been performed of cylinder within past 72 hours.

**Note**: A pre-use inspection **shall** be performed each day the equipment is used.

WARNING

The cylinder handler operator shall be in the immediate vicinity of the equipment while it is running.

Cylinder Handler Operator

1. **Perform** pre-use inspection of assigned cylinder-handling equipment in accordance with DUF6-X-CYP-2513, *Inspection and Operation of UF6 Cylinder Handler or Straddle Carrier* **or** DUF6-X-CYP-2519, *Portsmouth Preventive Maintenance and Inspection Program for UF6 Cylinder Handling Forklifts*, as applicable.

Operator Technician

1. **Verify** handling equipment does not limit safe egress from work area.

***8.1 Cylinder Movement Preparations*** (continued)

CSY Supervisor

1. **Ensure** oxide cylinders are physically present on staging PAD.

Operator Technician

1. **Inspect** cylinder to be transported using DUF6-X-CYP-2505-F02, *Inspection Criteria for Oxide Cylinders.*
2. **Immediately Notify** Cylinder Yard Supervisor if any inspection criteria are ‘UNSAT’.

CSY Supervisor

1. **IF** contamination is suspected,

**THEN Perform** the following:

* 1. **Instruct** Cylinder Handler Operator not to lift cylinder.
  2. **Initiate** response actions in accordance with HST direction.

## Initial Lifting of the Cylinder

Operator Technician

1. **Ensure** there is safe egress from around cylinder.
2. **IF** egress is not blocked by equipment **or** cylinders,

**THEN** **Signal** Cylinder Handler Operator to lift cylinder.

WARNING

Cylinder lift capacity shall be restricted to 31,654 lbs maximum for the NCH-35 Stacker.

1. **Lift** cylinder using a straddle carrier **or** cylinder handler, as appropriate.

## Transporting the Cylinder

Operator Technician

1. **Transport** cylinder per the following:

**Comply** with requirements of DUF6-X-CYP-2501, *Handling, Transportation, and Inspection of DOE 48-Inch UF6 Cylinders.*

**Use** **only** approved transport routes shown in Attachment B, *Uranium Oxide Cylinder Transportation Routes*.

1. **Direct** Cylinder Handler Operator to designated **or** assigned storage location for cylinder.

Cylinder Handler Operator

1. **Relocate** cylinder, as directed by the Operator Technician.

Operator Technician

1. **Perform** one of the following steps:

**IF** placing on saddle,

**THEN** **Go To** Section 8.4.

**IF** placing on top shelf of existing row,

**THEN** **Go To** Section 8.5.

**IF** placing on ground,

**THEN** **Go To** Step 8.3 [5].

1. **Perform** the following to place cylinder directly onto ground:
   1. Slowly **Lower** cylinder to surface, allowing cylinder to rest on its stiffening rings,

**AND** **Wedge** cylinder, if necessary.

* 1. **Open** grappler tines fully.
  2. **Raise** and **Move** grappler from cylinder.
  3. **Apply** wooden wedges to middle stiffing ring on both sides of cylinder.

## Placing a Cylinder in the Bottom Storage Position

Cylinder Handler Operator

1. **Lower** cylinder to horizontal position about six inches above saddles **and** centered on saddles.

Operator Technician

WARNING

Positioning any part of the body under a suspended cylinder is prohibited and could result in severe personal injury or death.

1. **Verify** cylinder is aligned with saddles, being careful not to place any part of the body under the suspended cylinder.
2. **IF** cylinder is not aligned,

**THEN** **Signal** Cylinder Handler Operator to reposition cylinder, being careful not to place any part of the body under the suspended cylinder.

1. **IF** cylinder is in correct position,

**THEN** **Signal** Cylinder Handler Operator to lower cylinder onto saddles.

1. **IF** any of the following do not exist,

**THEN** **Reposition** cylinder:

Cylinder body is centered **and** in contact with saddles.

Stiffening rings are **not** setting on a saddle.

Lifting lugs are approximately level **or** if the row is on a slope, parallel to slope of yard.

Flange ends are facing same direction in each row.

Lifting lugs are **not** touching neighboring cylinder.

Lifting lugs are similar in design **and** location to those of neighboring cylinder.

Cylinder Handler Operator

1. **IF** cylinder handler is used,

**THEN Perform** the following:

* 1. **Open** grappler tines fully.
  2. **Raise** and **Move** grappler from cylinder.

## Placing a Cylinder in the Top Storage Position

WARNING

A struck-by/crushing hazard may exist if full 10-ton and 14-ton oxide cylinders are stacked more than three cylinders high.

Operator Technician

1. **Plan** stacking to ensure stacked cylinder meets the following requirements:

Full 10-ton **and** 14-ton cylinders are not stacked more than three cylinders high.

Cylinder has same diameter **and** similar stiffening rings as bottom cylinders.

Cylinder type is compatible with cylinders it is to be stacked with.

Cylinder Handler Operator

1. **Lower** cylinder to a position about six inches above bottom cylinders **and** centered above space between lower support cylinders.

Operator Technician

1. **Verify** cylinder is aligned correctly with stiffening rings of lower-tier cylinders.

Cylinder Handler Operator

1. **Adjust** position, as directed by the Operator Technician.

Operator Technician

1. **Signal** Cylinder Handler Operator to lower cylinder onto lower cylinders.
2. **Position** cylinder by ensuring the following:
   1. Centerline of narrow/plate stiffening rings of upper cylinder are within approximately three inches of stiffening rings of lower cylinders.
   2. Wide-channel stiffening rings of upper cylinder are supported by wide-channel stiffening rings of lower cylinders for at least half of their width.
   3. Lifting lugs are not touching body of neighboring cylinders.
   4. Bottom of top cylinder is not touching lifting lugs of bottom row cylinders.
   5. Cylinder has a minimum of two contact points with each lower cylinder.

***8.5 Placing a Cylinder in the Top Storage Position*** (continued)

Cylinder Handler Operator

1. Slowly **Lower** cylinder onto lower cylinders.
2. **IF** cylinder handler is used,

**THEN Perform** the following:

* 1. **Open** grappler tines fully.
  2. **Raise** and **Move** grappler from cylinder.

## Discovery of a Fluid Leak in Cylinder Handling Equipment

Cylinder Handler Operator

1. **IF** cylinder-handling equipment is found to have a fluid leak during cylinder handling,

**THEN Perform** the following:

* 1. **Lower** cylinder to ground.
  2. **Back** cylinder-handling equipment away from cylinder.
  3. **Shut Down** engine.
  4. **Notify** Cylinder Yard Supervisor **and** Facility Manager.

Cylinder Yard Supervisor

1. **IF** event occurs outside cylinder yard **or** Oxide Staging Area,

**THEN** **Perform** necessary actions needed to protect cylinder from damage.

1. **Notify** PSS of fluid leak, if applicable.
2. **Initiate** clean up in accordance with site requirements.

## Response to a Dropped Cylinder

Cylinder Handler Operator

1. **IF** cylinder is damaged **or** dropped during handling **or** relocation,

**THEN** **Stop** and **Notify** Facility Manager **and** Cylinder Yard Supervisor.

## Post Relocation Activities

Operator Technician

1. **IF** oxide cylinder was relocated to a CSY,

**THEN** **Record** new cylinder storage location (Yard, Section, Row, Position, Top/Bottom) on DOE Oxide Cylinder Relocation Authorization Form.

1. **IF** cylinder was relocated to the Conversion Facility,

**THEN** **Record** “X-1745C” under “Yard” on DOE UF6 Cylinder Relocation Authorization form.

1. **Complete** “Relocation Date” space for cylinder relocation on DOE Oxide Cylinder Relocation Authorization Form.

## Closing Out Work Documentation

Operator Technician

1. **Return** DOE Oxide Cylinder Relocation Authorization Form to supervision.

Supervisor

1. Visually **Verify** locations of cylinders are correct.
2. **Sign** DOE UF6 Cylinder Relocation Authorization form.

Data Entry Clerk/Supervisor

1. **Update** CID to reflect final location of cylinder(s).

# Records

Records generated or received as a result of performing this procedure must be submitted to Records Management and Document Control for retention **and** disposition in accordance with DUF6-U-DMP-0001, *Controlled Document Procedure*, **and** DUF6-U-DMP-0002, *Document Control and Records Management*.

* DOE Oxide Cylinder Relocation Authorization Form, **or** equivalent
* Inspection Criteria for Oxide Cylinders

# References

* *Material Handling Equipment*, 29 CFR 1926.602
* DUF6-X-TSR-004, *Technical Safety Requirement for the DUF6 Conversion Project Cylinder Storage Yards, Piketon, Ohio*
* DUF6-X-DSA-003, *Documented Safety Analysis for the DUF6 Conversion Project Cylinder Storage Yards, Piketon, Ohio*
* DUF6-X-OPS-0100, *Cylinder* *Vaporization Production Order*

# Definitions

**CID** Cylinder Information Data Base

**CSY** DOE DUF6 Cylinder Storage Yards

**DOE** Department of Energy

**HST** Health & Safety Technician

**MCS** Mid-America Conversion Services, LLC

**NRTL** Nationally Registered Testing Laboratory

**PCB** polychlorinated biphenyls

**PORTS** Portsmouth Gaseous Diffusion Plant

**PPA** Plant Protection Area

**PSS** Plant Shift Superintendent

**TSR** Technical Safety Requirement

**U308** Uranium Oxide

**ATTENDED** -An object or activity is ATTENDED when a FIRE QUALIFIED INDIVIDUAL remains in visual contact with the object or activity, watches for abnormal conditions, is able to perform notification of emergency conditions per plant procedure, and is equipped with a communication device.

DUF6-X-TSR-004, 1.2 & 5.5.3.4 D

**Empty** –a cylinder with a net weight of zero.

**11 DEFINITIONS** (continued)

**FIRE QUALIFIED INDIVIDUAL** –An individual who is trained as a FIRE WATCH, but is not required to be independent from the work activity of concern and may concurrently monitor for fires and perform other duties.

DUF6-X-TSR-004, 1.2

# Revision History

|  |  |  |
| --- | --- | --- |
| **Revision Number** | **Effective Date** | **Summary of Changes** |
| 0 | 02/28/17 | Incorporated global changes approved by MCS. |
| 1 | 11/14/18 | Formatting changes throughout procedure. Removed disclaimer on cover page. Added action step in section 8.1 for CSY Supervisor to ensure cylinder is present on staging PAD. |

# Attachments

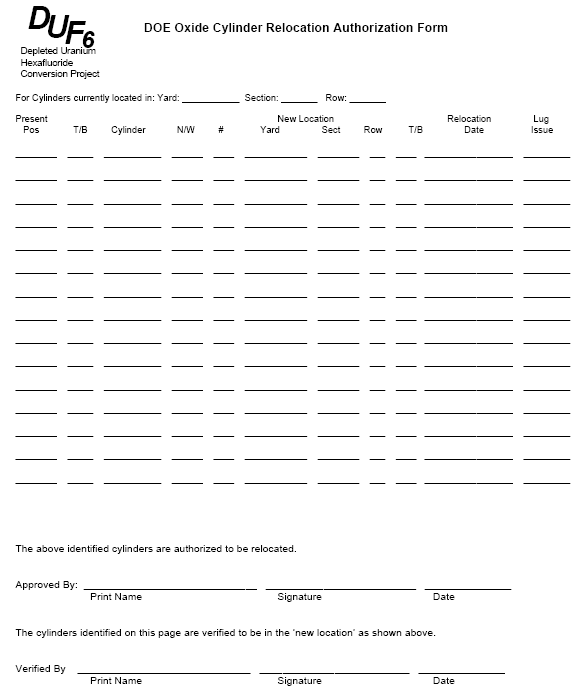
Attachment A, *DOE Oxide Cylinder Relocation Authorization Form* (Sample)

Attachment B, *Uranium Oxide Cylinder Transportation Routes*

Attachment C, *Safe Standoff Distances*

## Attachment A, DOE Oxide Cylinder Relocation Authorization Form

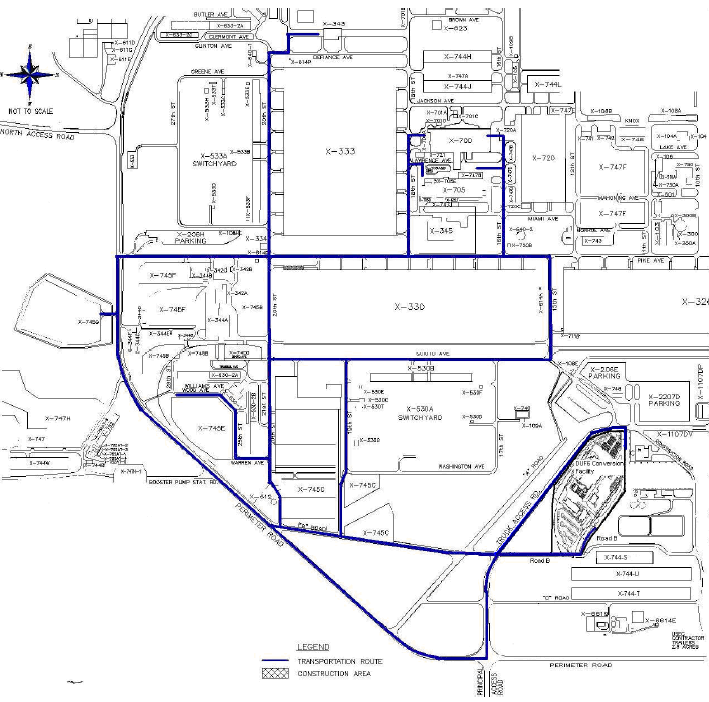
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SAMPLE

## Attachment B, Uranium Oxide Cylinder Transportation Routes

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## Attachment C, Safe Standoff Distances

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Safe Standoff Distances Between UF6 Cylinders and Various Types of Unattended Vehicles/Equipment in the Cylinder Storage Yards

|  |  |
| --- | --- |
| **Vehicle/Equipment** | **Distance** **(ft)** |
| Vehicles with greater than 250 and less than or equal to 450 gallons of fuel capacity | 40\* |
| Vehicles with greater than 50 and less than or equal to 250 gallons of fuel capacity | 25\* |
| Vehicles/equipment with less than or equal to 50 gallons of fuel capacity | 10\* |

\* Applicable when personnel are not present in the Cylinder Storage Yard

DUF6-X-DSA-003, Table 4-3

**END OF DOCUMENT**