

Second Target Station Project: Interface Sheet Target Assembly & Remote Handling



Aaron Jacques
Steve Schrick
Jesse Hawkins
Lukas Bearden

April 29, 2026



ORNL IS MANAGED BY UT-BATTELLE LLC FOR THE US DEPARTMENT OF ENERGY

**The only OFFICIAL COPY of this document is the on-line electronic version in EDRM.
Before using a printed copy, verify that it is the most current version.**

This report was prepared as an account of work sponsored by an agency of the United States Government. Neither the United States Government nor any agency thereof, nor any of their employees, makes any warranty, express or implied, or assumes any legal liability or responsibility for the accuracy, completeness, or usefulness of any information, apparatus, product, or process disclosed, or represents that its use would not infringe privately owned rights. Reference herein to any specific commercial product, process, or service by trade name, trademark, manufacturer, or otherwise, does not necessarily constitute or imply its endorsement, recommendation, or favoring by the United States Government or any agency thereof. The views and opinions of authors expressed herein do not necessarily state or reflect those of the United States Government or any agency thereof.

Second Target Station Project

INTERFACE SHEET TARGET ASSEMBLY & REMOTE HANDLING

Aaron Jacques
Steve Schrick
Jesse Hawkins
Lukas Bearden

April 29, 2026

Prepared by
OAK RIDGE NATIONAL LABORATORY
Oak Ridge, TN 37831
managed by
UT-BATTELLE LLC
for the
US DEPARTMENT OF ENERGY
under contract DE-AC05-00OR22725

CONTENTS

CONTENTS.....	iii
1. INTRODUCTION	1
2. SEGMENT HANDLING AND DISPOSAL.....	2
2.1 TARGET SEGMENT HANDLING	2
2.2 Target Segment Nose Coating Protector and Installation Tool.....	3
2.3 TARGET SEGMENT REPLACEMENT RATE.....	4
2.4 SEGMENT DOWN-SIZING SHEAR CROSS-SECTION	5
2.5 OFF-NORMAL TARGET SEIZE	6
APPENDIX.....	7
A.1 DRIVE AND SHAFT INSTALLATION INTO MUTS	7
A.2 DRIVE AND SHAFT REMOVAL FROM MUTS AND INSTALLATION INTO CORE VESSEL	7

1. INTRODUCTION

Remote Handling [S.03.10] is responsible for process planning and necessary tools related to handling any components that require remote operation to install or remove. This includes removal and installation of post-beam operation Target Assembly components that cannot be handled hands-on. Specifically, these items are:

- Target Segment

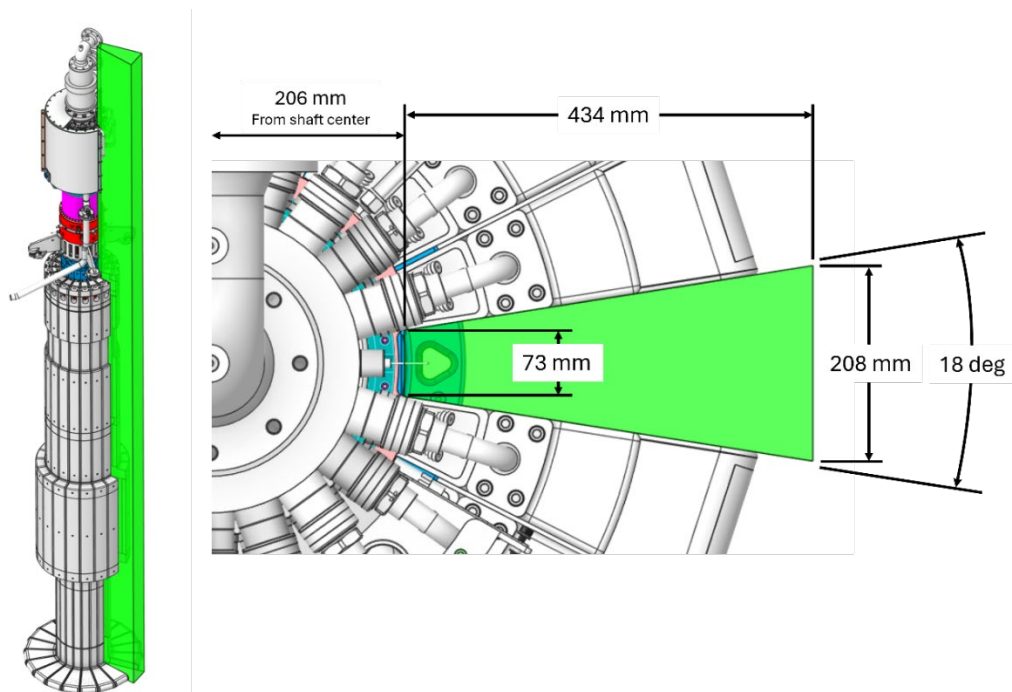
Target Assembly [S.03.02] is responsible for any maintenance activities that relate to hands-on components (e.g. motor, bearing, seal, water valve, water union).

Remote Handling [S.03.10] is responsible for the following:

- Preparation for transport to the disposal site.
- Providing Target Assembly with confirmation that final Target Segment design is valid for handoff to Remote Handling in post-operation condition.
- Utilize the identified Removal & Installation Zone and lifting features to attached, remove, and process post-operation Target Segments.
- Utilize the identified Removal & Installation Zone and lifting features to install new Target Segments.

Target Assembly segment removal and installation must fall within the Removal & Installation Zone as defined in Figure 1.

Figure 1. Target Segment Removal & Installation Zone



2. SEGMENT HANDLING AND DISPOSAL

2.1 TARGET SEGMENT HANDLING

Removal and insertion of a Target Segment will require the removal of a shield block to uncover access space. This shield block is contained within the scope of Remote Handling [S.03.10] and Vessel Systems [S.03.06] interface.

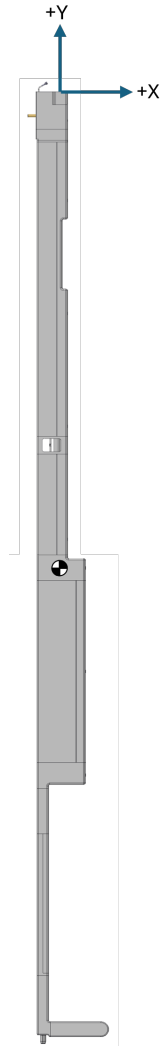
The physical size of the Target Segment (with and without the Nose Protector) and the Segment CG are listed in Table 1. A visual reference is provided by Figure 2.

Table 1. Target Segment Physical Specs

Segment Size (L, W, H)	L: 381.349 mm W: 178.099 mm H: 5055 mm
Lift Point Relative to Global Coordinate System (X, Y, Z)	X: 804.5 mm Y: 4978 mm Z: 0 mm
CG Relative to Lift Point (X, Y, Z)^a	X: -2.865 mm Y: -2541.503 mm Z: 0 mm
Mass	542.899 kg
Pin Location Relative to Lift Point (X, Y, Z) (Referencing lower surface and central axis of pin.)	X: -89 mm Y: -5055 mm Z: 0 mm
Segment Size with Nose Protection (L, W, H)	L: 399.849 mm W: 178.099 mm H: 5055 mm
Segment Lift Interface Specs	1 1/2"-8 UN tapped hole x 2" depth

^a See Figure 8 for CG reference point.

Figure 2. Target Segment Coordinate Location



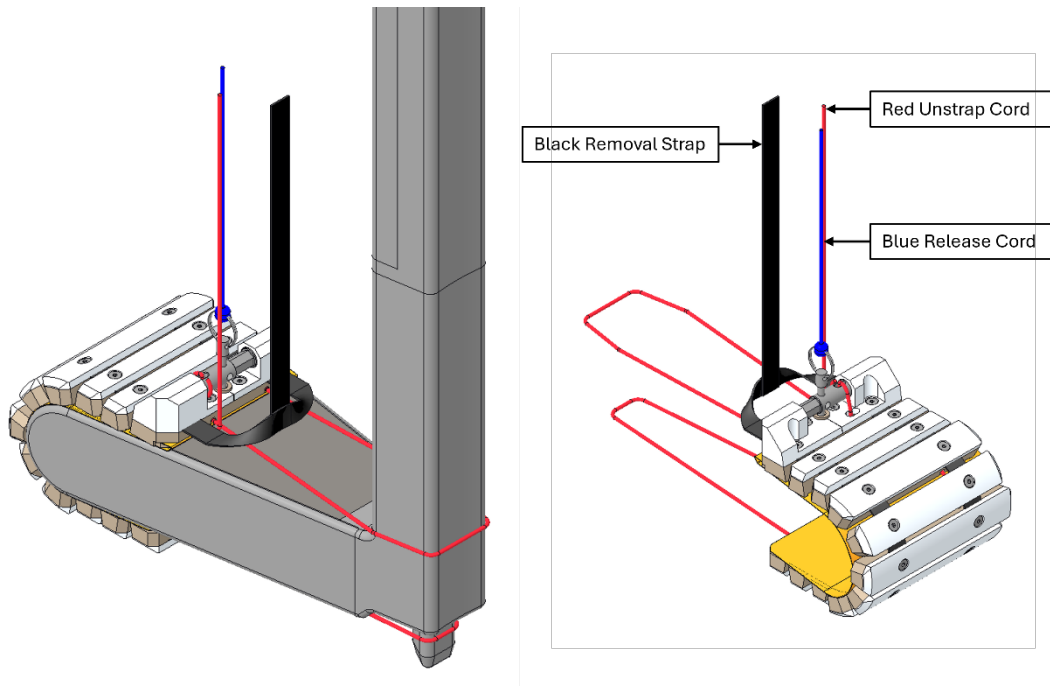
*Coordinate system defined as intersection of Remote Handling interface hole axis and top of segment.

2.2 TARGET SEGMENT NOSE COATING PROTECTOR AND INSTALLATION TOOL

The nose of a Target Segment is protected during transport via a cover assembly as shown in Figure 3. This is an integral part of the Target Segment installation into the Core Vessel, and is removed after final positioning of the segment relative to the shaft.

The Segment installation sequence and procedure is the scope of Remote Handling [S.03.10], including removal of the nose protector. Design, procurement, and installation of the nose protector falls within Target Assembly [S.03.02] scope.

Figure 3. Target Segment Removable Nose Protector



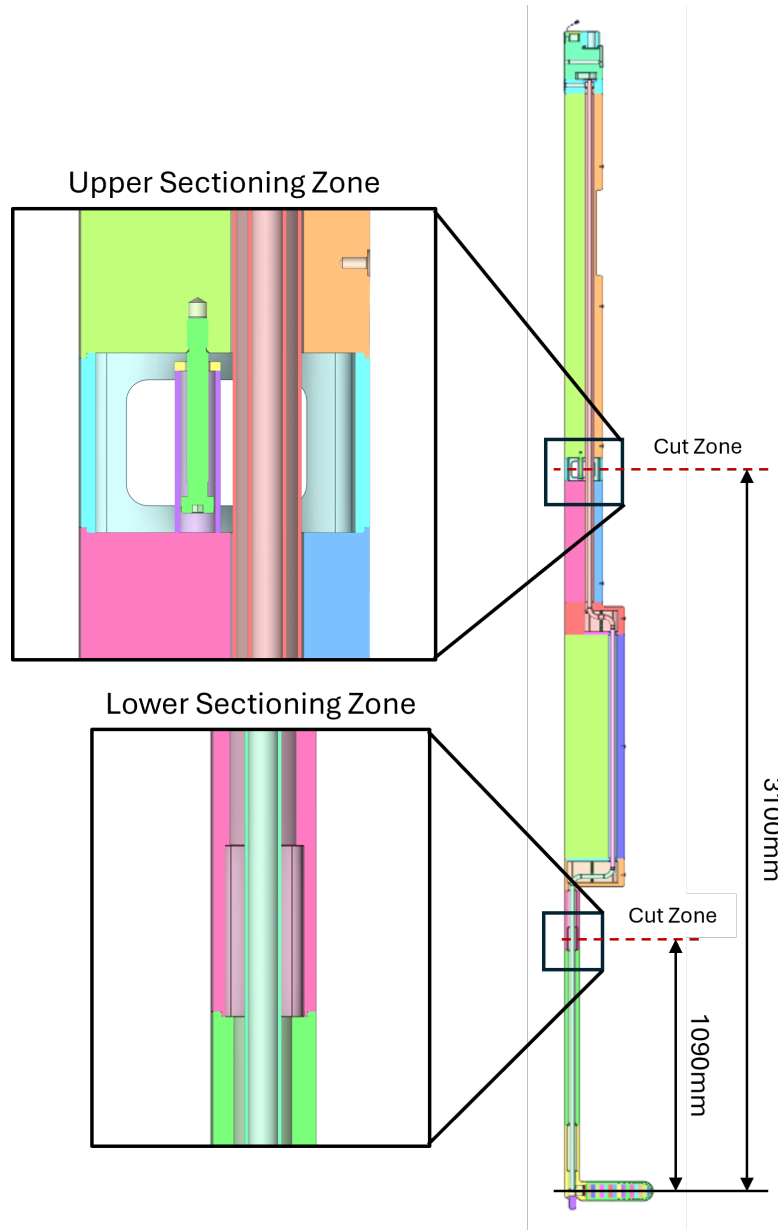
2.3 TARGET SEGMENT REPLACEMENT RATE

- Worst Case: 20 Target Segments within a single year, for 1 year only
- Facility Design basis: 6 Targets Segments/year for up to 5 years
- Planned Disposal: 3 Target Segments/year

2.4 SEGMENT DOWN-SIZING SHEAR CROSS-SECTION

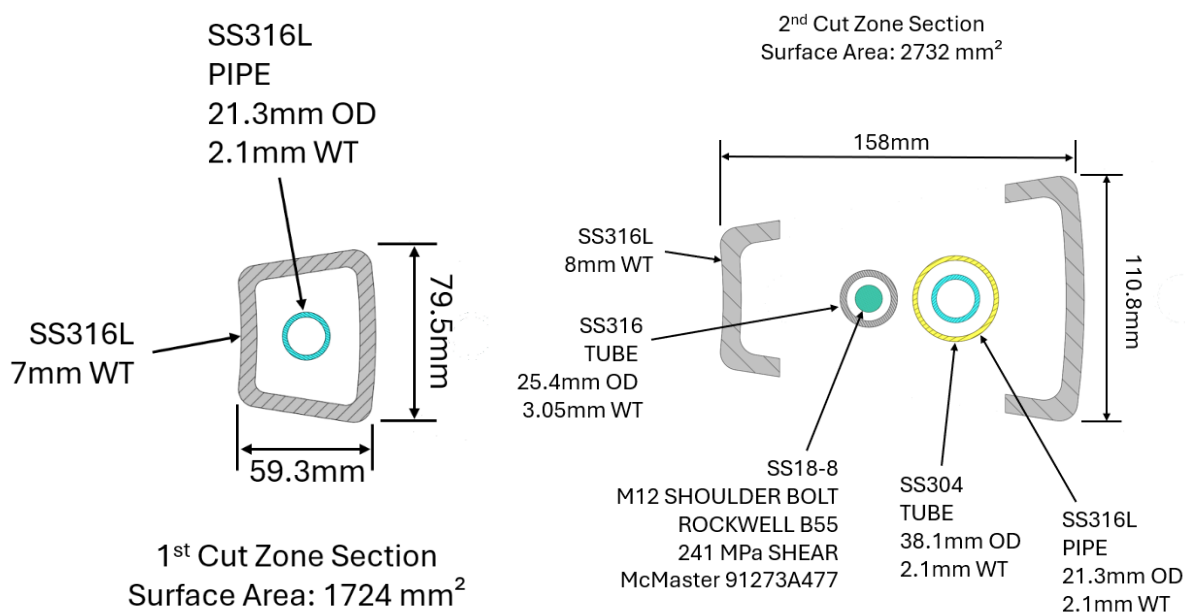
Refer to Figure 4 for cut zone elevations for segment down-sizing. Each zone is 100mm tall, centered on the zone elevation. Cross sections of zones with materials and bounding dimensions are shown in Figure 5.

Figure 4. Segment Down-Sizing Zones



Target Assembly [S.03.02] to provide visual indication of cut elevations on external geometry of Target Segment.

Figure 5. Segment Down-Sizing Zone Details



2.5 OFF-NORMAL TARGET SEIZE

It is conceivable that the Target Assembly could become seized in the Core Vessel shielding in an off-normal failure scenario. In this case, rotation would not be possible, making segment removal impossible, and causing the Target Assembly and MRA to become entrapped in the shielding. In this scenario it would be necessary to unstack the Core Vessel shielding to extract the Target Assembly. Vessel System designed [S.03.06] shield blocks would require removal, with Remote Handling [S.03.10] responsible for removal and storage. This is outside of the current scope of the project.

In the event that the Target Assembly shaft needs replacement (shaft intended to be a life-of-facility component), Remote Handling [S.03.10] would be responsible for removal and transport in a cask. This is outside of the current scope of the project.

APPENDIX

The following information is provided for reference only. The information is primarily covered in the interface between Target Assembly [S.03.02] and Conventional Facilities [S.05.01].

APPENDIX A. INSTALLATION

A.1 DRIVE AND SHAFT INSTALLATION INTO MUTS

Installation of the Target Drive and Shaft into MUTS for initial assembly and testing is handled within the Target Assembly [S.03.02] scope.

A.2 DRIVE AND SHAFT REMOVAL FROM MUTS AND INSTALLATION INTO CORE VESSEL

The task of moving the Target Assembly from MUTS to the Core Vessel will be handled by Installation of Target Monolith Systems [S.03.08] scope.