

SECOND TARGET STATION (STS) PROJECT

Interface Sheet for Moderator Reflector Assembly and Target Process Systems



Jim Janney
Don Montierth

3/6/2024

DOCUMENT AVAILABILITY

Reports produced after January 1, 1996, are generally available free via US Department of Energy (DOE) SciTech Connect.

Website www.osti.gov

Reports produced before January 1, 1996, may be purchased by members of the public from the following source:

National Technical Information Service
5285 Port Royal Road
Springfield, VA 22161
Telephone 703-605-6000 (1-800-553-6847)
TDD 703-487-4639
Fax 703-605-6900
E-mail info@ntis.gov
Website <http://classic.ntis.gov/>

Reports are available to DOE employees, DOE contractors, Energy Technology Data Exchange representatives, and International Nuclear Information System representatives from the following source:

Office of Scientific and Technical Information
PO Box 62
Oak Ridge, TN 37831
Telephone 865-576-8401
Fax 865-576-5728
E-mail reports@osti.gov
Website <http://www.osti.gov/contact.html>

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.

S01020500-IST10186-R00

SECOND TARGET STATION (STS) PROJECT

Interface Sheet for Moderator Reflector Assembly and Target Process Systems

Date Published: 3/6/2024

Prepared by
OAK RIDGE NATIONAL LABORATORY
Oak Ridge, TN 37831-6283
managed by
UT-BATTELLE, LLC
for the
US DEPARTMENT OF ENERGY
under contract DE-AC05-00OR22725

Approvals

Interface Sheet for Moderator Reflector Assembly and Target Process Systems

ISSUE DATE:
3/6/2024

PREPARED BY
Jim Janney

PROJECT
Second Target Station

DOCUMENT NUMBER:
S01020500-IST10186

	Signature / Date					
	Rev. 00	Date	Rev. 01	Date	Rev. 02	Date
Moderator Reflector Assembly Task Leader	Jim Janney					
Target Process Systems Task Leader	Don Montierth					
Target Systems Level 2 Manager	Peter Rosenblad					
Neutron Production Systems Group Leader	Daniel Lyngh					
Interface Systems Group Leader	Mike Strong					

Revision	Description
00	Initial Release

TABLE OF CONTENTS

TABLE OF CONTENTS v

1. Purpose 6

2. Scope..... 6

 2.1 Interfacing Parts or Components..... 6

3. Acronyms and Definitions 6

4. References..... 6

 4.1 Documents Applicable to the Interfacing SSCs..... 6

5. Interface Definition..... 6

 5.1 Technical Description of the Interface..... 6

 5.2 Interface Data..... 7

1. PURPOSE

This document defines the interfaces between Moderator Reflector Assembly and Target Process Systems. The interface ensures coordination of cooling water supply parameters, component heat loads, and other component parameters for the water supplies to the Moderator Reflector Assembly. These parameters define boundary conditions that are critical for component analyses and heat loads and gas production rates that are required for process system sizing. The interface described in this document will provide guidance to the design of the Moderator Reflector Assembly and Target Process Systems.

2. SCOPE

The scope of this document is the interface between Moderator Reflector Assembly and Target Process Systems. No parent Interface Control Document exists since both systems are within Target Systems. This document describes cooling water supply parameters, component heat loads, and other component parameters for the water supplies to the Moderator Reflector Assembly.

2.1 INTERFACING PARTS OR COMPONENTS

No physical interface exists between the Moderator Reflector Assembly and Target Process Systems, as Vessel Systems controls the penetrations through the Core Vessel.

3. ACRONYMS AND DEFINITIONS

IS Interface Sheet
MRA Moderator Reflector Assembly
SSC Structure, System or Component
STS Second Target Station

4. REFERENCES

4.1 DOCUMENTS APPLICABLE TO THE INTERFACING SSCS

Ref	Document Titles	Document Control System Location
[1]	S03040000-SR0001-R00 System Requirements Document for MRA	/Neutron Sciences/Second Target Station (STS)/S03 – Target Systems/S0304 – Moderator Reflector Assembly
[2]	S03090000-SR0001-R00 System Requirements Document for Target Process Systems	/Neutron Sciences/Second Target Station (STS)/S03 – Target Systems/S0309 – Target Process Systems

5. INTERFACE DEFINITION

5.1 TECHNICAL DESCRIPTION OF THE INTERFACE

The MRA-Target Process Systems Design Basis Table (Table 1) documents the neutronic heat load required to be removed from the component by each water supply, as well as the expected portion of that heat load deposited in the water, based on neutronic analysis, for each of the 5 MRA water supplies. The expected flow rate and inlet temperature for each supply is documented, as well as the resulting pressure drop for each leg based on CFD analysis of the MRA. Finally, the table notes that the 5 water supplies are combined into 2 returns, 1 each for the upper and lower portions of the MRA.

5.2 INTERFACE DATA

Table 1. MRA-Target Process Systems Design Basis Table

STS Process Systems Design Basis 2.8 MW Beam/700 KW to STS													
Target Systems Energy Deposition	Technical Component Design Values							Primary Cooling Loop					
	STS Design Baseline Heat Load, Watts	Energy Deposited In Water Watts	Component Water Volume, cm ³	Component Pressure Drop, PSI	Component MAWP, PSIA	Component Material of Construction	Corrosion Rate Mil/year	Design Basis Flow GPM	Design Basis ΔT °F	Primary T Inlet °F	Supply Pipe Size, Inches	Return Pipe Size, Inches	
Upper Premoderator	11,198	3,001	2,411	5.67	75.0	Al, Be, SS	0.1/1	7.5	12.8	90	1	1.5	Combined upper return 1.5"
Upper Reflector	12,681	415	1,578	11.37	75.0	Al, Be, SS	0.1/1	7.5	14.5	90	1		
Lower Premoderator	10,770	4,190	3,187	3.48	75.0	Al, Be, SS	0.1/1	7.5	12.3	90	1	2	Combined lower return 2"
Lower Reflector	10,981	383	1,413	9.22	75.0	Al, Be, SS	0.1/1	7.5	12.6	90	1		
MRA Backbone	12,547	135	2,850	1.64	75.0	316L SS	0.1	15.0	7.2	90	1.5		