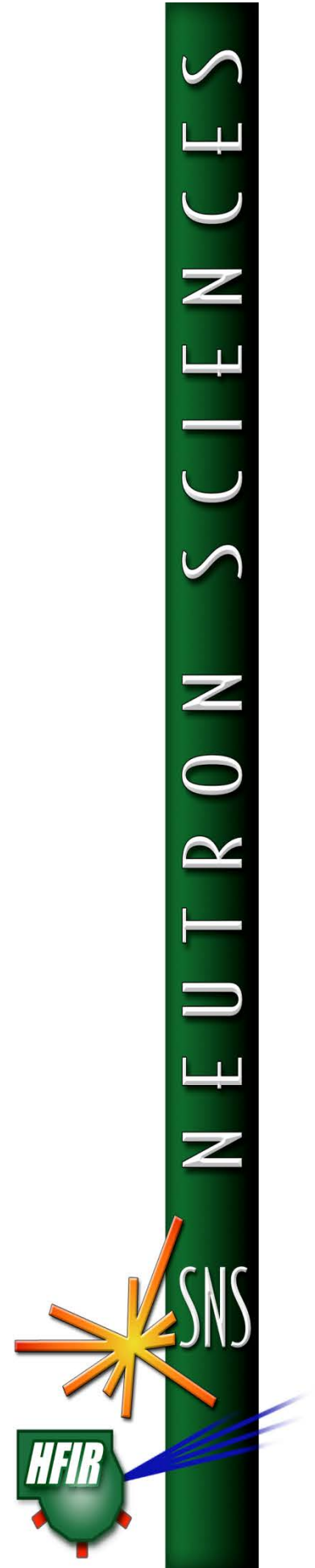


PPU-P02-SW0001-R00

SPALLATION NEUTRON SOURCE

STATEMENT OF WORK PPU CRYOMODULE DESIGN

April 27, 2018



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Introduction

The Proton Power Upgrade (PPU) requires that 7 High Beta Cryomodules are to be assembled and installed in the Spallation Neutron Source (SNS) linear accelerator (LINAC).

Within this document references and engineering drawings with labels of “SNS” or the Company – UT-Battelle / Oak Ridge National Laboratory, “The Seller” shall refer to the manufacturer / vendor doing the work. This document shall be referred to as “the Agreement.”

1.0 Scope

This statement of work (SOW) describes the Seller’s roles and responsibilities of completing the final design of the PPU cryomodule until CD-2/3b. The final design shall meet the requirements set forth in 104110000-SW0008-R01. This shall include at a minimum the following:

- 3D model of PPU cryomodule
- Detail drawings of PPU cryomodule
- Assembly methodology
- Cryogenic testing methodology
- Shipping procedure

2.0 Reference Documents

2.1 *104110000-SW0008-R01*

3.0 Responsibilities

3.1 Seller Responsibilities

- 3.1.1 All labor for final design of 7 PPU cryomodules including detail mechanical design (models and drawings), assembly methodology, cryogenic testing methodology, and shipping procedure.
- 3.1.2 Participate in reviews up to and including CD-2/3b.
- 3.1.3 Engineering calculations and drawing packages.
- 3.1.4 Assembly procedures.
- 3.1.5 Progress reports and other submittals.
- 3.1.6 Design all manufacturing jigs, tooling and assembly fixtures.
- 3.1.7 Design and analyze all lifting and handling fixtures.
- 3.1.8 Packaging and delivery plans.

3.2 Company Responsibilities

- 3.2.1 PPU High Beta Cryomodule reference drawing package.
- 3.2.2 Cryomodule assembly reference procedure manual.

4.0 Reporting

- 4.1 *The Seller shall provide monthly written progress reports to the Company during the design phase of the project.*
- 4.2 *Meetings may be conducted by video or teleconference at regular intervals with mutual agreement.*

5.0 Exceptions

Any exceptions to this specification shall be clearly noted in the Seller's quotation. Any items not specified in this document but considered important for performance of this project must be brought to the attention of the Company procurement representative prior to any work being done or cost being incurred by the Company.

6.0 Design Package Preparation

The Seller shall perform all design activities necessary for the fabrication, cryogenic testing, and delivery of the cryomodules in accordance with the requirements of this section.

6.1 *Intellectual Property*

Rights to all intellectual property contained within the deliverables provided by the Seller shall be transferred to the Company. The Company reserves the right to re-use, alter or transfer information gained from this project at any time in the future for further development or procurement.

6.2 *CAD Modeling*

Design modeling of the PPU Cryomodule shall be performed using a 3D CAD system. The Company uses and prefers CREO software. Any alternate CAD system used by the Seller shall be compatible with CREO to the extent that the Company can open solid model files created by the Seller.

6.3 *Engineering Drawings*

The Seller shall produce a complete set of 2D engineering drawings for the cryomodule. The engineering drawing package shall include as a minimum:

- Installation drawings for interface with the SNS LINAC
- Weldment drawings
- Assembly drawings of all separable systems
- Individual part drawings of all fabricated components
- Drawings of all tooling, lifting, handling, alignment, and installation fixtures
- Piping and instrumentation drawings

6.3.1 All engineering drawings shall be prepared in accordance with ASME Y14.100, Engineering Drawing Practices, latest revision.

6.3.2 Dimension and tolerancing shall be performed in accordance with ASME Y14.5 2009, Dimensioning and Tolerancing

6.3.3 The Seller shall provide a complete set of all native CAD files both models and drawings to the Company upon delivery.

6.3.4 The Seller shall provide available native CAD files to the Company for purposes of review at any time during the project upon request.

6.3.5 Each Drawing shall be assigned a SNS drawing number according to the following scheme:

104210100-M8U-8200-A00X	Installation Assembly
104210200-M8U-8200-A00X	Top Level Assembly
104210300-M8U-8200-A00X	Cryomodule Stand
104210400-M8U-8200-A00X	Air Side Assembly
104210500-M8U-8200-A00X	Supply End-Can
104210600-M8U-8200-A00X	Return End-Can
104210700-M8U-8200-A00X	Vacuum Vessel
104210800-M8U-8200-A00X	Spaceframe
104210900-M8U-8200-A00X	Outer Magnetic Shield
104211000-M8U-8200-A00X	Thermal Shield
104211100-M8U-8200-A00X	Inner Magnetic Shield
104211200-M8U-8200-A00X	Insulation
104211300-M8U-8200-A00X	Tuner
104211400-M8U-8200-A00X	Cavity String Assembly
104211500-M8U-8200-A00X	Fundamental Power Coupler
104211600-M8U-8200-A00X	Helium Vessel
104211700-M8U-8200-A00X	Cavity
104211800-M8U-8200-A00X	Tooling
104211900-M8U-8200-A00X	Instrumentation

6.3.6 The Seller shall utilize a formal drawing and document change control process to track revisions resulting from design changes, manufacturing exceptions and non-conformances. Revision levels shall be noted on all drawings and documents used for fabrication, procurement or supplied to the Company.

6.4 *Engineering Calculations*

6.4.1 Engineering calculations and analyses shall be performed using mathematical and finite element software. The Seller shall provide native, electronic files of all calculations and analyses upon request.

6.4.2 All engineering analyses shall be published in Adobe pdf electronic format. The Seller shall assign each published engineering document a SNS document number according to the following scheme:

104210100-DA000X