NCSX

Statement of Work

Trim Coil

[TR-A, TR-B]

NCSX-SOW-133-01-00

May 14, 2008

Prepared by: Michael Kalish Digitally signed by Michael Kalish DN: cn=Michael Kalish, o=PPPL, ou=Engineering, email=mkalish@pppl.gov, c=US Date: 2008.05.14 16:38:03 -04'00'

M. Kalish, Responsible NCSX Engineer for Trim Coils

Concur: Jim Chrzanowski Digitally signed by Jim Chrzanowski DN: cn=Jim Chrzanowski, o=PPPL, ou=Enginering, email=jchrzano@pppl.gov, c=US Date: 2008.05.15 08:17:09 -04'00'

J Chrzanowski, Technical Coil Expert

Concur: F. Malinowski Digitally signed by F. Malinowski DN: cn=F. Malinowski, o=PPPL, ou=QA, email=fmalinow@pppl.gov, c=US Date: 2008.05.15 09:22:23 -04'00'

Frank Malinowski, Procurement Quality Assurance Representative

Approved by: Phil Heitzenroeder Digitally signed by Phil Heitzenroeder DN: cn=Phil Heitzenroeder, o=MED, ou=Engineering, email=pheitzen@pppl.gov, c=US Date: 2008.05.15 09:45:23 -04'00'

Phil Heitzenroeder, RLM for Stellarator Core Systems (WBS 1) Design and Procurement

REVISIONS

Revision No.	Description of Change	Date
0	Initial Issue	5/14/2008

Table of Contents

1 GENERAL INFORMATION

1.1 Introduction

This Statement of Work is for the manufacture of the Trim Coils [TR-A, and TR-B] for the National Compact Stellarator Experiment (NCSX).

The Trim Coil Assemblies are defined in Specification NCSX-CSPEC-133-01

The National Compact Stellarator Experiment (NCSX) is an experimental research facility that is to be constructed at the Department of Energy's Princeton Plasma Physics Laboratory (PPPL). Its mission is to acquire the physics knowledge needed to evaluate compact stellarators as a fusion concept, and to advance the understanding of three-dimensional plasma physics for fusion and basic science. The Trim Coils are a Primary component of the NCSX Device. The Trim Coils are symmetrically positioned above and below the core of the machine.

The NCSX project is managed by PPPL in partnership with the Oak Ridge National Laboratory. This Subcontract will be administered by PPPL. Further description of the NCSX can be found at http://www.pppl.gov/ncsx/.

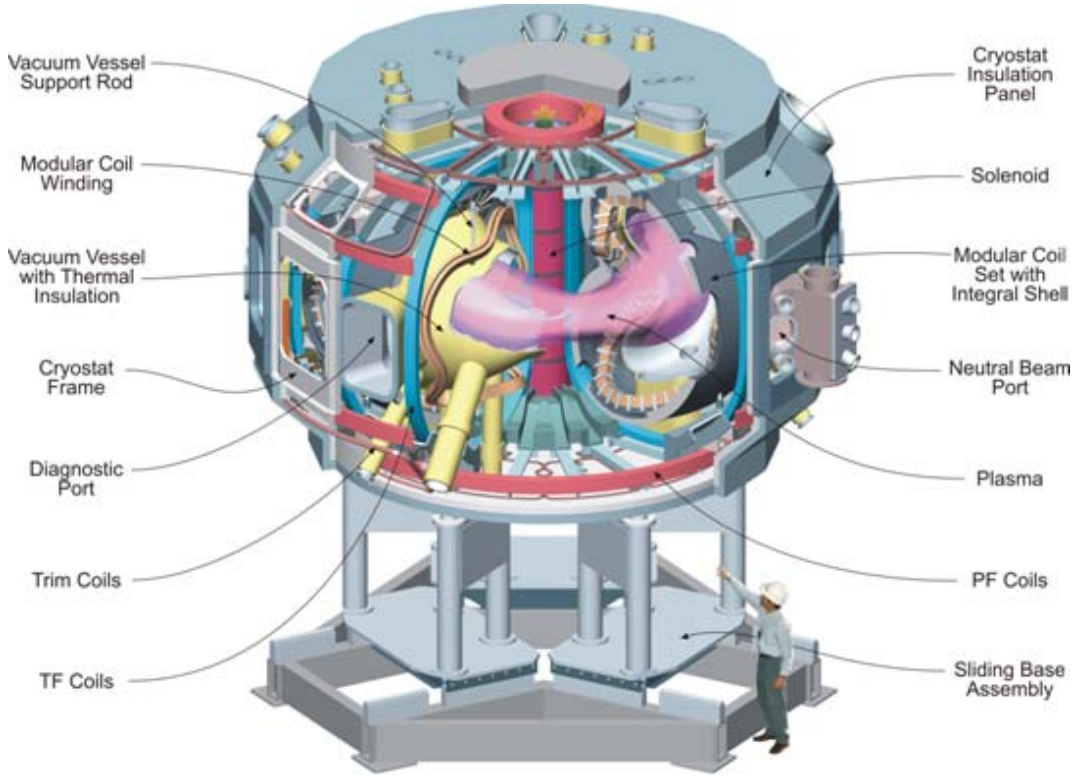

Figure 1 - The NCSX Device and Identification of Major Components

Note: This Figure is only for illustration and should not be used in the performance of this Scope of Work

2 APPLICABLE DOCUMENTS

NCSX-CSPEC-133-01, Product Specification for Trim Coils

3 WORK REQUIREMENTS

The supplier shall manufacture, inspect, test and deliver to PPPL Trim Coil Assemblies that shall conform to the requirements of NCSX-CSPEC-133-01. Processing shall be in accordance with the supplier's PPPL-approved Manufacturing, Inspection, Test and Quality Assurance Plan, and associated procedures. Supplier shall provide all process documentation identified in Section 6.

3.1 MIT / QA Plan

The Subcontractor shall provide PPPL with manufacturing, inspection and test information sufficient to convey an overview of the processing and the adequacy of the controls, inspections, and tests that are part of the manufacturing process. The submittal, of the Manufacturing, Inspection, Test, and Quality Assurance Plan (MIT/QA Plan), may consist of the Subcontractor's standard documents such as Travelers/Routers/Process Sheets and procedures or may require development of a new document, as long as the submittal accomplishes the following:

- outlines the sequence of operations,
- identifies critical manufacturing operations,
- identifies inspections, examinations, and tests, and
- include procedures for special processes, inspections, and tests.

The MIT/QA Plan is required for PPPL review and approval prior to start of fabrication. All inspections and tests referenced in the Specifications listed in Section 2 must be addressed in the MIT/QA Plan.

From the plan, PPPL may designate selected operations as mandatory "witness" points. Subcontractor shall provide PPPL with a minimum of five (5) working days notice in advance of these witness points. Such witness points shall be mutually planned to minimize delays. The MIT / QA Plan shall include steps to address the topics listed in this section.

3.1.1 Fabrication

3.1.1.1 All winding operations shall be performed in clean room to minimize risk of foreign particles or dirt from entering coil insulation.

3.1.1.2 Adequate cleaning and preparation steps shall be included in the work control documents.

3.1.1.3 Oversight of the winding operation is required to ensure the even distribution of the half lap layers and guarantee the proper insulation coverage for ground wrap insulation. Hold points for measurements of the overall ground insulation thickness are to be incorporated into the winding procedure identified in the MIT plan.

4 QUALITY ASSURANCE

4.1 Inspection/ Surveillance/Audit by PPPL

Authorized representatives of PPPL and the U. S. Government shall have the right at all reasonable times to visit the Subcontractor's premises and those of Subcontractor's suppliers during the performance of the Subcontract for the purposes of inspection, surveillance, audit and/or obtaining any required information as may be necessary to assure that items or services are being furnished in accordance with specified requirements. Such visits shall be coordinated with the Subcontractor's personnel to minimize interference with the normal operations of said premises. The Subcontractor shall make available records and documentation necessary for this function and shall provide all reasonable facilities and assistance for the safety and convenience of PPPL and/or U. S. Government representatives in the performance of their duties. PPPL and the U. S. Government recognize the Subcontractor's right to withhold information concerning proprietary processes. The Subcontractor agrees to insert the paragraph above in each lower-tier-procurement issued hereunder.

4.2 Subcontractor's Responsibility for Conformance

Neither PPPL review and/or approval of Subcontractor's documents nor PPPL inspection of Subcontractor's items or services shall relieve the Subcontractor of responsibility for full compliance with requirements of the purchase order/contract. The Subcontractor is responsible for assuring that all requirements and restrictions are imposed on any sub-tier suppliers.

4.3 Non-conforming Items

Non-conforming items shall be positively identified, and, where possible, segregated to prevent use. PPPL must be notified of non-conformances within one (1) business day. The Subcontractor shall document each nonconformance, identifying the extent and location of the non-conformance and

proposing a disposition. The written concurrence of PPPL is required prior to implementing the disposition. The Subcontractor's system shall provide not only for timely resolution of non-conformances but also for analysis of non-conformances to determine root causes and to implement appropriate and effective corrective actions.

4.4 Subcontractor's Quality Assurance Program

The Subcontractor shall maintain an effective Quality Assurance Program to assure that the Subcontractor's work meets the standards in NCSX-CSPEC-133-01 and is performed in accordance with contractual requirements. Subcontractor's quality assurance function shall be actively involved in the planning, processing oversight, problem resolution, and determination of acceptability of all work under this SOW. The function shall be organized to have sufficient authority and independence to identify quality problems, verify conformance of supplied items or services to specified requirements and obtain satisfactory resolution of conflicts involving quality.

4.5 Inspection and Testing

Inspections and tests shall be performed in accordance with written procedures referencing criteria for acceptance or rejection. Except where specifically stated otherwise, actual data and accept/reject status for each inspection and test shall be documented. Reports shall clearly identify the item inspected, the locations or areas covered by the report, the performing individual, the date performed, equipment used (with calibration status), and the signature of the authorized individual. A test plan (may be part of the MIT/QA Plan) shall be submitted for approval prior to testing. The Test Plan shall include steps to address the topics listed in this section. Specifically vendor shall identify procedure for performing the required turn to turn voltage tests.

4.6 Deviations to the Approved MIT / QA Plan or Procedures

Deviations to the approved documents shall be included in the weekly report. The Subcontractor is required to obtain PPPL's written approval for deviations which may adversely affect conformance to the contracted delivery schedule or product specification. Deviations requiring written approval shall be submitted on the PPPL Request for Deviation form (Attachment II).

4.7 Document Traceability and Records

The Subcontractor shall maintain a system of documentation whereby objective evidence of required operations, inspections, examinations, and tests is systematically compiled, indexed, stored and ultimately provided to PPPL per paragraph 5.4.3, Process History. Such objective evidence may include "travelers" and material test, certification, inspection, examination, test and nonconformance reports. All documents

which shall be complete, legible, and validated by responsible personnel and shall be traceable to subject items.

4.8 Material Certifications

Material certifications shall be provided for conductor, insulation, and epoxy procured by the vendor. Material certifications shall be provided to PPPL once the vendor has accepted them for use.

4.9 Equipment/Material Identification and Status

Material and equipment identification shall be maintained throughout the program and be traceable to records. Status of acceptability shall be readily discernible through the Subcontractor's use of tags, stamps, serial numbers or other positive means.

4.10 Calibration of Test and Measuring Equipment

Inspections and tests shall be performed using properly calibrated measuring and test equipment. Subcontractor shall have in its possession the necessary equipment to perform the required inspections and tests. Calibration standards shall be traceable to the National Institute for Standards and Technology (NIST) or equivalent acceptable to PPPL and shall not be used for shop inspections, but instead be protected against damage or degradation.

4.11 Shipping

The subcontractor shall provide a shipping container adequate to maintain the Trim Coil geometry and to guarantee that the Trim Coils are not damaged in transit.

4.12 PPPL Receiving and Inspection

PPPL will perform Receiving Inspection on items supplied by Subcontractor.

5 DELIVERABLES

5.1 Prior to Fabrication Release

5.1.1 MIT/QA Plan, and Associated Procedures

The Supplier shall provide their MIT/QA plan and all associated procedures to PPPL for approval prior to beginning fabrication.

5.2 Weekly Reports

Brief weekly status reports covering technical, administrative, and quality activities and notable problems/issues and progress photographs. This report shall be submitted to PPPL on each Friday following subcontract award. The report may be submitted as email.

5.3 Monthly Reports

Subcontractor shall submit via e-mail, to be received by PPPL by the last working day of each month, a report that includes a schedule of major tasks to be performed under the Subcontract, and actual/projected completion dates. Include a narrative explanation of significant schedule delays.

5.4 Trim Coil Deliverable

5.4.1 Final Product

The supplier shall deliver Trim Coils A and B which conform to the applicable specification NCSX-CSPEC-133-01

5.4.2 Shipping Release Form

Prior to each shipment, the Subcontractor shall submit to PPPL a completed and signed “Product Quality Certification and Shipping Release” form (Attachment 1 of this SOW), along with a copy of the Process History (ref. Paragraph 6.4.3), and received from PPPL written acceptance to ship. Shipping shall not commence until subcontractor receives PPPL’s written acceptance to ship.

5.4.3 Process History

Subcontractor shall provide to PPPL one (1) "paper" copy or one (1) "electronic" copy of the Process History, which includes a compilation of documents, detailing the objective evidence of the acceptability of the work performed. The Process History shall be complete and available at the time the Subcontractor requests Release for Shipment. The Process History shall include as a minimum, but not be limited to:

- Material certifications
- Electrical Testing Data
- VPI temperature history.
- Completed nonconformance reports
- Validated inspection and test reports, including inspection measurements and any digital photographs.
- Completed shop travelers or process sheets with digital photographs.
- Signed Shipping Release

5.5 Tooling and Software

All tooling and software specially fabricated /generated for the performance of this SOW shall become the property of the United States Government. Disposition will be per direction of PPPL.

The supplier shall maintain any CAD/CAM files generated in the performance of this SOW for a period of at least three years from the end of the subcontract.

ATTACHMENT 1 –SHIPPING RELEASE FORM

PLASMA PHYSIC LABORATORY—PPPL

<table>
<tr><td colspan="6">PRODUCT QUALITY CERTIFICATION AND SHIPPING RELEASE</td></tr>
<tr><td>PROJECT</td><td colspan="3">ITEM DESCRIPTION</td><td colspan="2">SHIPMENT NUMBER</td></tr>
<tr><td>PPPL SUBCONTRACT/ ORDER NO.</td><td>REV.</td><td>ITEM NO.</td><td>SUPPLIER REFERENCE NO.</td><td>REV.</td><td>QUANTITY SHIPPED</td></tr>
<tr><td colspan="6">SUPPLIER'S CERTIFICATION

This is to certify that the products and services identified herein have been produced under a controlled quality assurance program and are in conformance with the procurement requirements including applicable codes, standards and specifications as identified in the above-referenced documents unless noted below. Any supporting documentation will be retained in accordance with the procurement requirements.

SIGNED: _____ DATE: _____

TITLE: _____ COMPANY: _____</td></tr>
<tr><td colspan="6">PPPL (AUTHORIZED REPRESENTATIVE) SHIPPING RELEASE

This is to certify that evidence supporting the above Supplier's Certification statement has been audited and no product/service nonconformances from procurement requirements have been found unless noted below. This product/service is hereby released for shipment.

This section serves as the Quality Assurance release for the above described product for shipment. It does not constitute an acceptance thereof and does not relieve the Vendor, Manufacturer or Contractor of any and all responsibility or obligation imposed by the purchase contract. It does not waive any rights the Purchaser may have under the purchase contract, including the Purchaser's right to reject the above described material upon discovery of any deviations from requirements of the purchase contract, drawings and specifications.</td></tr>
<tr><td colspan="6">NONCONFORMANCES FROM PROCUREMENT QUALITY REQUIREMENTS:</td></tr>
<tr><td colspan="6">REMARKS/PRODUCT SERIAL NUMBERS:</td></tr>
<tr><td colspan="4">BY PPPL QA REPRESENTATIVE (OR DESIGNEE)</td><td colspan="2">DATE</td></tr>
</table>

ATTACHMENT II. PPPL REQUEST FOR DEVIATION (RFD) FORM

NCSX RFD Part I	**Number:**	**RFD Description:**
Initiator:	**Organization:**	
List of Impacted Documents: ***(Specification, MIT/QA Plan, SOW, drawing, etc.)***		
Cost Impact: ***(If none, so state)***		
Schedule Impact: ***(If none, so state)***		
Quality Impact: ***(If none, so state)***		
State Requirement Deviation is Requested For***: (Specification, MIT/QA Plan, SOW, drawing, etc.)***		
Full Description of the Deviation Requested: ***(Use continuation pages, e-mails, letter, sketches, etc. as needed and include amplifying information as appropriate to support deviation request.)***		
Attachments:		
Initiator Signature: _____ Date: _____		