

National Compact Stellarator Experiment (NCSX)

Modular Coil Conductor

Statement of Work

NCSX-SOW-142-03-00

August 6, 2004

Prepared by:

J. Chrzanowski, Winding Facility Manager

Concurrences:

D. Williamson, Modular Coils (WBS 14) Manager

B. Nelson, Project Engineer for Stellarator Core Systems (WBS 1)

F. Malinowski, PPPL Procurement QA Representative

Approved by:

W. Reiersen, Engineering Manager

Controlled Document

THIS IS AN UNCONTROLLED DOCUMENT ONCE PRINTED

Check the NCSX Engineering Web prior to use to assure that this document is current.

Revisions

Revision No.	Description of Change	Date
0	Initial Issue	8/6/2004

Table of Contents

1	SCOPE	1
1.1	SCOPE	1
1.2	BACKGROUND	1
2	APPLICABLE DOCUMENTS.....	1
2.1	PRODUCT SPECIFICATION	1
2.2	SUBCONTRACTOR DOCUMENTS	2
3	WORK REQUIREMENTS.....	2
4	QUALITY ASSURANCE	2
4.1	SUBCONTRACTOR’S QUALITY ASSURANCE PROGRAM	2
4.2	INSPECTION/ SURVEILLANCE/AUDIT BY PPPL.....	2
4.3	SUBCONTRACTOR'S RESPONSIBILITY FOR CONFORMANCE	3
4.4	NONCONFORMING ITEMS	3
4.5	SUBCONTRACTOR INSPECTION AND TESTS	3
4.6	EQUIPMENT/MATERIAL IDENTIFICATION AND STATUS	3
4.7	CALIBRATION OF TEST AND MEASURING EQUIPMENT	4
4.8	CONTROL OF SPECIAL PROCESSES	4
4.9	SHIPPING RELEASE	4
4.10	PPPL RECEIVING AND INSPECTION.....	4
5	DOCUMENTATION.....	4
5.1	PROCESS HISTORY	4
•	Original Reports.....	5
•	Material Test Reports.....	5
5.2	WEEKLY REPORTS	5
5.3	MONTHLY REPORTS	5

Attachment

Attachment 1 - Shipping Release Form

1 SCOPE

1.1 Scope

This Statement of Work is for the production and delivery of all of the insulated cable conductor for a complete set of modular coil production coils (18 coils) and two spares for the National Compact Stellarator Experiment (NCSX). The insulated cable conductor is defined in product specification NCSX-CSPEC-142-04 and shall be provided on 160 spools. The due dates for all deliverables are defined in the Subcontract.

1.2 Background

NCSX is the first of a new class of stellarators known as “compact stellarators.” Stellarators are a class of magnetic fusion confinement devices characterized by three-dimensional magnetic fields and plasma shapes and are the best-developed class of magnetic fusion devices after the tokamak. The stellarator concept has greatly advanced since its invention by Dr. Lyman Spitzer, the founding director of the Princeton Plasma Physics Laboratory (PPPL), during the 1950’s. Improved fundamental understanding coupled with advanced parallel computers has enabled the design of practical stellarators, optimized for plasma confinement and stability but with an aspect ratio similar to tokamaks. The NCSX design used this capability to combine the best features of both stellarators and tokamaks, providing solutions to the challenges of fusion plasma confinement.

The NCSX project is managed by PPPL in partnership with the Oak Ridge National Laboratory. This Subcontract will be administered by PPPL. Operation of NCSX is scheduled to begin in May 2008. Further description of the NCSX can be found at:

<http://ncsx.pppl.gov/>

2 APPLICABLE DOCUMENTS

2.1 Product Specification

The product specification NCSX-CSPEC-142-04-00 can be found at:

ftp://ftp.pppl.gov/pub/ncsx/manuf/MC_Conductor/

2.2 Subcontractor Documents

The Subcontractor-provided documents shall include the test and inspection plan that outlines the processes to be used to verify that the conductor meets the requirements specified in the product specification..

3 WORK REQUIREMENTS

The Subcontractor shall manufacture, inspect, test and deliver to PPPL all the modular coil insulated cable conductor that conforms to the applicable version of the product specification and the test and inspection planned used to verify compliance with the requirements specified in the product specification. The Subcontractor shall also provide all process documentation identified in Section 5 of this SOW.

4 QUALITY ASSURANCE

4.1 Subcontractor's Quality Assurance Program

The Subcontractor shall maintain an effective Quality Assurance Program to assure that the Subcontractor's work meets the required quality 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.

4.2 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.

4.3 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 Subcontract. The Subcontractor is responsible for assuring that all requirements and restrictions are imposed on any sub-tier suppliers.

4.4 Nonconforming Items

Nonconforming items shall be positively identified, and, where possible, segregated to prevent use. PPPL must be notified of nonconformances as part of the status reporting. The Subcontractor shall document each nonconformance, identifying the extent and location of the nonconformance and proposing a disposition. The written concurrence of PPPL is required prior to implementing of any disposition to use the item (Use-as-is, Rework, Repair, or similar). The Subcontractor's system shall provide not only for timely resolution of nonconformances but also for analysis of nonconformances to determine root causes and to implement appropriate and effective corrective actions.

4.5 Subcontractor Inspection and Tests

Subcontractor 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.

4.6 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.

4.7 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.

4.8 Control of Special Processes

Subcontractor shall use trained and qualified personnel and qualified written procedures in accordance with specified requirements for the performance of certain special processes, including but not limited to, welding, dimensional inspection, heat treatment, nondestructive examination, etc. Copies of special process procedures and personnel qualifications shall be submitted to PPPL for review and approval a minimum of five working days prior to performance of the work.

4.9 Shipping Release

Subcontractor shall have a signed "Product Quality Certification and Shipping Release" Form (Attachment 1 to this SOW) prior to NCSX Project acceptance of procured items or services for full or partial shipment. NCSX Project reserves the right to refuse to accept shipments unless accompanied by a signed "Shipping Release Form"

4.10 PPPL Receiving and Inspection

PPPL will perform Receiving Inspection on items supplied by Subcontractor. Discrepant items or services will be rejected and returned to the Subcontractor.

5 DOCUMENTATION

5.1 Process History

Subcontractor shall provide one copy of a Process History with the shipping release request (Section 4.9) and two copies with the completed assembly. The Process History shall include the following:

- **Original Reports**

Copies of the original reports of all required inspections, tests and examinations, which have been properly validated by authorized personnel.

- **Material Test Reports**

Material Test Reports traceable to the actual material and showing actual relevant chemical, and mechanical properties of Subcontractor-provided materials used. One copy is to be submitted upon Subcontractor acceptance for use.

5.2 Weekly Reports

The Subcontractor shall provide brief weekly status reports (e-mail acceptable) covering any notable technical, administrative, or quality problems/issues and progress status (including pertinent photographs). Periodically, when requested by the Princeton Technical Representative, the report will include the percent completion of the work for the next milestone deliverable.

5.3 Monthly Reports

The Subcontractor shall prepare and submit monthly e-mail reports indicating schedule progress for each task/deliverable planned.

- The Subcontractor shall submit a milestone schedule that clearly indicates the tasks to be accomplished, the time frame over which each task will be accomplished, and the cost assigned to that task.
- The Subcontractor shall report (e-mail report satisfactory) schedule progress against each milestone by indicating actual and forecast finish dates. A narrative explanation of schedule delays shall also be provided.

Attachment 1

PRINCETON UNIVERSITY PLASMA PHYSIC LABORATORY—PPPL

PRODUCT QUALITY CERTIFICATION AND SHIPPING RELEASE					
PROJECT	ITEM DESCRIPTION			SHIPMENT NUMBER	
PPPL Subcontract / Order No.	REV.	ITEM NO.	SUBCONTRACTOR REFERENCE NO.	REV.	QUANTITY SHIPPED
<p>SUBCONTRACTOR'S CERTIFICATION</p> <p>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.</p> <p>SIGNED: _____ DATE: _____</p> <p>TITLE: _____ COMPANY: _____</p>					
<p>PPPL (AUTHORIZED REPRESENTATIVE) SHIPPING RELEASE</p> <p>This is to certify that evidence supporting the above Subcontractor'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.</p> <p>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 Subcontractor 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.</p>					
<p>NONCONFORMANCES FROM PROCUREMENT QUALITY REQUIREMENTS:</p> 					
<p>REMARKS/PRODUCT SERIAL NUMBERS:</p> 					
<p>BY PPPL QA REPRESENTATIVE (OR DESIGNEE)</p>				<p>DATE</p>	