PPPL NONCONFORMANCE REPORT NO: 3634 Open Date 03/13/06 Rev #: 3 , 10/4/2007

Status 2 - Disposition Needed **Trend** 01-Deviation From Doc/Proc

Department NCSX **Division** WBS 141

Source/Org FABRICATION, OPERATIONS & MAINTENANCE

Item Dwg/Part# SE142C-270 Rev. 0 **Procurement #** _____ **Cost Center** _____

RAP# 3234 **Job Doc #** D-NCSX-MCF-004 **Vendor** VARIOUS

RAP Title Modular Coil Fabrication - Post VPI Activities

☐ HoldTag Applied

Nonconforming Condition (include requirement(s) violated):

The first shipment of NCSX modular coil final winding clamp assemblies, and related purchased hardware exhibits a magnetic permeability higher than the maximum allowed per NCSX-ASPEC-GRD-03 paragraph 3.3.1.1 (permeability shall not exceed 1.02). Unless otherwise noted all material is type 316 stainless steel See attached list for details.
REV 1: Parts 3 and 6 are silverplated and were verbally reported as not being able to be annealed without damage.
SEE PAGE 2 FOR ADDITIONAL REVISIONS.
REV 2: Final winding clamp assembly redsigned, see attachment for revision details. Also see NCR 3639 as it deals with this same issue.
REV 3: Further investigation (part 6 only) with greater details per NCSX Engineering request, see page 2 of attachment for specifics.

Lot Size Recd 0 **Sample Size Insp** 0 ☐ Lot Rejected **# Rejected** 0

Reported By Phelps C **Validated By** Boscoe J John E. Boscoe Digitally signed by John E. Boscoe DN: cn=John E. Boscoe, o=US, o=PPPL Date: 2007.10.04 11:58:45 -04'00' **Validated Date** 10/04/07

~~**Disposition: Rework*__ Repair*__ Use As Is*__ Return To Vendor*__ Scrap*___**~~

(Rev 0) Rework by removing permeability using vacuum oven cycle 800-1000 deg. C @ 1 hour. (Labor = 40 hours)
(Rev 1) Awaiting test results from outside laboratory to determine whether the permeability of the 316ss parts can be used "as is " without further work.
Note: C. Phelps, 4/3/07 - Larry said Phil will address this when he returns.

Please use p. 2 for disposition and approvals .

For rework or repair of vendor supplied equipments, fill in information below:

#Hours _____ **$Est Labor** _____ **$G&A** _____

$Material _____ **$Burden** _____ **$Total** _____

Disposition By _____ **Date** _____

Supervisor's Concur _____ **Date** _____

Eng. Dept. Head Concur _____ **Date** _____

WCO/Other _____ **Date** _____

PQA/QC Mgr Dispos Concur _____ **Date** _____

QC Field Verification By _____ **Date** _____

Distribution

Cog J. Chrzanowski
Insp C. Phelps
Proj. Doc Control (when closed)
QC Files
Malsbury J
Boscoe J
T. Meighan
Williams M
Dudek L
Tyrrell M
Simmons B

Disposition: **Rework___** **Repair ___** **Use As Is___** **Return to Vendor___** **Scrap___**

For rework or repair of vendor supplied equipment, fill in information below:

 # Hours _____ **$ Est Labor_____** **$ G&A_____**

$ Material _____ **$ Burden _____** **$ Total _____**

Disposition by _____

~~**Supervisor's Concurrence**~~ RLM _____

Eng. Dept. Head Concurrence _____

Other (i.e., WCO/FPE) Concurrence N/A _____

Digitally signed by N/A
DN: cn=N/A, c=US, o=PPPL, ou=QA
Date: 2007.10.04 10:08:35 -04'00'

PQA/QC Mgr Disposition Concurrence _____

QA Field Verification by _____

NCR 3634, Attachment, R3 (p. 1 of 2)

Part #	Part Type	Quantity	Sample Size	Results
2	Bar, Clamp	175	21	(12) >1.10, <1.15 (4) >1.15, <1.2 (5) >1.2, <1.8
3	Bushing Spacer (Silver Plated 316)	1	1	(1) >1.06, <1.08
4	Washer, Convex	1610	100	(40) <1.02 (60) >1.02, <1.03
5	Washer, Concave	1610	100	(6) >1.02, <1.03 (9) >1.03, <1.04 (30) >1.04, <1.05 (30) >1.05, <1.06 (25) >1.06, <1.08
6	Keeper Screw (Silver Plated)	4	4	(1) >1.02, <1.03 (1) >1.03, <1.04 (2) >1.04, <1.05
7	Clamp Swivel	1	1	(1) >1.03, <1.04
10	3/8-16 x 1 ¼ SH	882	44	(41) >1.02, <1.03 (3) <1.02
11	3/8 x 3/8 shoulder	188	20	(1) >1.02, <1.03 (1) >1.03, <1.04 (3) >1.04, <1.05 (6) >1.05, <1.06 (6) >1.06, <1.08 (3) >1.08, <1.09

The following parts were found to be acceptable.

Part #	Part Type	Quantity	Sample Size	Results
8	Belleville Washers	~10,000	~200	(~200) <1.02 (Inconel)
12	¼-20 x ½ BH	1850	100	(100) <1.02

REV 2: The final winding clamp has been redesigned eliminating parts 4, 5, and 11. Parts 3 and 7 have been redesigned, the new shipments of parts 3 and 11 are below 1.02 Mu (see sampling results below). Parts 2 and 10 have been annealed in accordance with Rev 0 disposition and are all below 1.02 Mu. Part 6 remains unchanged and cannot be annealed due to the silver plating. See results above and NCR 3639 for additional permeability readings on the balance of Part 6.

Part #	Part Type	Quantity	Sample Size	Results
New - 3	Bushing Spacer	910	72	(72) <1.02 Mu
New - 7	Clamp Swivel	920	80	(80) <1.02 Mu

REV 3: 10/4/07 – Upon further discussion and investigation with NCSX Engineering an additional sample of remaining "keeper screws" (pt. #6) was conducted with the intention of better defining specifically which areas of these parts are exhibiting high magnetic permeability. See details of sampling and drawing below.

A quantity of 100 pieces of pt. #6 remain in their original packaging from vacuum prep., a sample of 12 pieces was inspected with the following results.

Sample #	Number of spots >1.02 Mu	Permeability of spots
1	2	Both spots >1.02, <1.03 Mu
2	Entire top face	Entire top surface >1.02, <1.03 Mu
3	2	1 spot >1.02, <1.03 Mu; 1 spot >1.03, <1.04 Mu
4	2	Both spots >1.02, <1.03 Mu
5	3	All spots >1.02, <1.03 Mu
6	0	Entire part <1.02 Mu
7	4	3 spots >1.02, <1.03 Mu; 1 spot >1.04, <1.05 Mu
8	3	All spots >1.02, <1.03 Mu
9	3	2 spots >1/02, <1.03 Mu; 1 spot >1.03, <1.04Mu
10	5	4 spots >1.02, <1.03 Mu; 1 spot >1.03 , <1.04 Mu
11	6	5 spots >1.02, <1.03 Mu; 1 spot >1.03, <1.04 Mu
12	6	4 spots >1.02, <1.03 Mu; 1 spot >1.03, <1.04 Mu; 1 spot >1.04, <1.06

The worst case possible from the data above appears to be the entire top surface of the part at just under 1.06 Mu. Only the outer surfaces of the part was able to be measured due to the configuration of the gauge and part, none of the threads exhibited any permeability and most of the pieces sampled only had a few spots on the top surface around the spanner wrench holes, see drawing below.