PPPL DESIGN REVIEW CHIT

WP # _____ (ENG-032)

CHIT # 1

COMPONENT/SUBSYSTEM/SYSTEM **NCSX Winding Form, Cladding & Tolerances Peer Review**

☒ PEER
☐ CDR
☐ PDR
☐ FDR

COGNIZANT DESIGN ENGINEER B. Nelson DATE OF REVIEW 1-23-03

SUBJECT: (CHECK AS APPLICABLE)

☐ REQUIREMENTS	☐ HARDWARE	☐ SAFETY
☐ ANALYSIS	☐ CONFIGURATION	☐ COST/SCHEDULE
☐ PERFORMANCE	☐ RELIABILITY/MAINTAINABILITY	☒ QUALITY

COMMENT/CONCERN/RECOMMENDATION

The peer review should review the drawings going to the vendor. There should be a subgroup of the participants at this meeting focused on the outstanding issues that were not (and were not organized to be) comprehensive.

ORIGINATOR R. J. Hawryluk

NAME/ORGANIZATION

REVIEW BOARD COMMENT/RECOMMENDATION
(Address technical, cost, and schedule impacts as appropriate. If CHIT is not adopted, provide technical reason do not simply state "out-of-scope or N/A" without explaining.)

ACTION: B. Nelson to announce when the drawing package is ready, and a subgroup will be reconvened.

X CONCUR
0 DISAGREE
0 OTHER

CHAIRPERSON L.E. Dudek DATE: 1-23-03

COGNIZANT DESIGN ENGINEER'S RESPONSE/DISPOSITION:

A formal FDR will be conducted to review the procurement package (including the specification and drawings) for the prototype MCWF. A subgroup of participants form the MCWF Peer Review will be invited to participate.

SIGNATURE _____ DATE: _____

RESPONSIBLE RLM REVIEW

0 APPROVE COG DISPOSITION
0 DISAPPROVE COG DISPOSITION

SIGNATURE _____ DATE: _____

COGNIZANT DESIGN ENGINEER CLOSE-OUT
Sign when action required by disposition is complete.

SIGNATURE _____ DATE: _____

PPPL DESIGN REVIEW CHIT

WP # _____ (ENG-032)

CHIT # 2

COMPONENT/SUBSYSTEM/SYSTEM **NCSX Winding Form, Cladding & Tolerances Peer Review**

COGNIZANT DESIGN ENGINEER B. Nelson DATE OF REVIEW 1-23-03

☒ PEER
☐ CDR
☐ PDR
☐ FDR

SUBJECT: (CHECK AS APPLICABLE)

☐ REQUIREMENTS	☐ HARDWARE	☐ SAFETY
☐ ANALYSIS	☐ CONFIGURATION	☐ COST/SCHEDULE
☐ PERFORMANCE	☐ RELIABILITY/MAINTAINABILITY	☒ QUALITY

COMMENT/CONCERN/RECOMMENDATION

QA should participate in these reviews.

ORIGINATOR R. J. Hawryluk

NAME/ORGANIZATION

REVIEW BOARD COMMENT/RECOMMENDATION
(Address technical, cost, and schedule impacts as appropriate. If CHIT is not adopted, provide technical reason do not simply state "out-of-scope or N/A" without explaining.)

QA to be included in the next review.

X CONCUR
0 DISAGREE
0 OTHER

CHAIRPERSON L.E. Dudek DATE: 1-23-03

COGNIZANT DESIGN ENGINEER'S RESPONSE/DISPOSITION:

QA will be included in the FDR for the prototype MCWF.

SIGNATURE _____ DATE: _____

RESPONSIBLE RLM REVIEW

0 APPROVE COG DISPOSITION
0 DISAPPROVE COG DISPOSITION

SIGNATURE _____ DATE: _____

COGNIZANT DESIGN ENGINEER CLOSE-OUT
Sign when action required by disposition is complete.

SIGNATURE _____ DATE: _____

PPPL DESIGN REVIEW CHIT

WP # _____ (ENG-032)

CHIT # 3

COMPONENT/SUBSYSTEM/SYSTEM **NCSX Winding Form, Cladding & Tolerances Peer Review**

COGNIZANT DESIGN ENGINEER B. Nelson DATE OF REVIEW 1-23-03

☒ PEER
☐ CDR
☐ PDR
☐ FDR

SUBJECT: (CHECK AS APPLICABLE)

☐ REQUIREMENTS	☐ HARDWARE	☐ SAFETY
☐ ANALYSIS	☐ CONFIGURATION	☐ COST/SCHEDULE
☒ PERFORMANCE	☐ RELIABILITY/MAINTAINABILITY	☐ QUALITY

COMMENT/CONCERN/RECOMMENDATION

Need to define a way to test the integrity of the poloidal break prior to winding the coil.

ORIGINATOR R. J. Hawryluk

NAME/ORGANIZATION

REVIEW BOARD COMMENT/RECOMMENDATION
(Address technical, cost, and schedule impacts as appropriate. If CHIT is not adopted, provide technical reason do not simply state "out-of-scope or N/A" without explaining.)

Action: Jim Chrzanowski to develop test plan.

X CONCUR
0 DISAGREE
0 OTHER

CHAIRPERSON L.E. Dudek DATE: 1-23-03

COGNIZANT DESIGN ENGINEER'S RESPONSE/DISPOSITION:

Agreed. Verification of the integrity of the poloidal break is essential prior to winding coil. Chrzanowski to incorporate in coil winding and test plan.

SIGNATURE _____ DATE: _____

RESPONSIBLE RLM REVIEW

0 APPROVE COG DISPOSITION
0 DISAPPROVE COG DISPOSITION

SIGNATURE _____ DATE: _____

COGNIZANT DESIGN ENGINEER CLOSE-OUT
Sign when action required by disposition is complete.

SIGNATURE _____ DATE: _____

PPPL DESIGN REVIEW CHIT

WP # _____ (ENG-032)

CHIT # 4

COMPONENT/SUBSYSTEM/SYSTEM **NCSX Winding Form, Cladding & Tolerances Peer Review**

COGNIZANT DESIGN ENGINEER B. Nelson DATE OF REVIEW 1-23-03

☒ PEER
☐ CDR
☐ PDR
☐ FDR

SUBJECT: (CHECK AS APPLICABLE)

☐ REQUIREMENTS	☐ HARDWARE	☐ SAFETY
☐ ANALYSIS	☐ CONFIGURATION	☒ COST/SCHEDULE
☐ PERFORMANCE	☐ RELIABILITY/MAINTAINABILITY	☐ QUALITY

COMMENT/CONCERN/RECOMMENDATION

The copper cladding concept needs further development to assess cost & schedule impact.

ORIGINATOR R. J. Hawryluk

NAME/ORGANIZATION

REVIEW BOARD COMMENT/RECOMMENDATION

(Address technical, cost, and schedule impacts as appropriate. If CHIT is not adopted, provide technical reason do not simply state "out-of-scope or N/A" without explaining.)

Action: B. Nelson
Bob Parsells has been assigned to evaluate concept design.

X CONCUR
0 DISAGREE
0 OTHER

CHAIRPERSON L.E. Dudek DATE: 1-23-03

COGNIZANT DESIGN ENGINEER'S RESPONSE/DISPOSITION:

Removing the copper cladding from the vendor's scope requires that the Project develop an internal R&D plan to establish process for applying copper cladding and assess cost and schedule impacts. Bob Parsells has been tasked with developing a SOW for the internal R&D. A kick-off meeting was held on 1/29. Initial draft of the SOW is due 2/12.

SIGNATURE _____ DATE: _____

RESPONSIBLE RLM REVIEW

0 APPROVE COG DISPOSITION
0 DISAPPROVE COG DISPOSITION

SIGNATURE _____ DATE: _____

COGNIZANT DESIGN ENGINEER CLOSE-OUT

Sign when action required by disposition is complete.

SIGNATURE _____ DATE: _____

PPPL DESIGN REVIEW CHIT

WP # _____ (ENG-032)

CHIT # 5

COMPONENT/SUBSYSTEM/SYSTEM **NCSX Winding Form, Cladding & Tolerances Peer Review**

☒ PEER
☐ CDR
☐ PDR
☐ FDR

COGNIZANT DESIGN ENGINEER B. Nelson DATE OF REVIEW 1-23-03

SUBJECT: (CHECK AS APPLICABLE)

☐ REQUIREMENTS	☐ HARDWARE	☐ SAFETY
☒ ANALYSIS	☐ CONFIGURATION	☐ COST/SCHEDULE
☐ PERFORMANCE	☐ RELIABILITY/MAINTAINABILITY	☐ QUALITY

COMMENT/CONCERN/RECOMMENDATION

Document the field errors from the case with no break as well as one poloidal break. Physics to define the driving factors for the eddy currents.

ORIGINATOR R. J. Hawryluk

NAME/ORGANIZATION

REVIEW BOARD COMMENT/RECOMMENDATION

(Address technical, cost, and schedule impacts as appropriate. If CHIT is not adopted, provide technical reason do not simply state "out-of-scope or N/A" without explaining.)

ACTION: W. Reiersen to evaluate / assign

X CONCUR
0 DISAGREE
0 OTHER

CHAIRPERSON L.E. Dudek DATE: 1-23-03

COGNIZANT DESIGN ENGINEER'S RESPONSE/DISPOSITION:

Hutch Neilson charged Mike Zarnstorff with laying out an analysis plan for establishing the requirements for and the sufficiency of a single poloidal break. The plan will include assessing no poloidal break and single poloidal break configurations. It will also assess various toroidal break configurations in combination with the no/single poloidal break. Art Brooks will perform the eddy current analysis using current waveforms supplied by Zarnstorff. The study will be completed prior to initiating work on the prototype winding form.

SIGNATURE _____ DATE: _____

RESPONSIBLE RLM REVIEW

0 APPROVE COG DISPOSITION
0 DISAPPROVE COG DISPOSITION

SIGNATURE _____ DATE: _____

COGNIZANT DESIGN ENGINEER CLOSE-OUT

Sign when action required by disposition is complete.

SIGNATURE _____ DATE: _____

PPPL DESIGN REVIEW CHIT

WP # _____ (ENG-032)

CHIT # 6

COMPONENT/SUBSYSTEM/SYSTEM **NCSX Winding Form, Cladding & Tolerances Peer Review**

COGNIZANT DESIGN ENGINEER B. Nelson DATE OF REVIEW 1-23-03

☒ PEER
☐ CDR
☐ PDR
☐ FDR

SUBJECT: (CHECK AS APPLICABLE)

☐ REQUIREMENTS	☐ HARDWARE	☐ SAFETY
☒ ANALYSIS	☐ CONFIGURATION	☐ COST/SCHEDULE
☐ PERFORMANCE	☐ RELIABILITY/MAINTAINABILITY	☐ QUALITY

COMMENT/CONCERN/RECOMMENDATION

What is the impact of not including a toroidal break on the 3 sections which are joined? Is the eddy current time constant & hence the eddy currents significantly larger?

ORIGINATOR R. J. Hawryluk

NAME/ORGANIZATION

REVIEW BOARD COMMENT/RECOMMENDATION

(Address technical, cost, and schedule impacts as appropriate. If CHIT is not adopted, provide technical reason do not simply state "out-of-scope or N/A" without explaining.)

ACTION: Wayne Reiersen to evaluate / assign.

0 CONCUR
0 DISAGREE
X OTHER

CHAIRPERSON L.E. Dudek DATE: 1-23-03

COGNIZANT DESIGN ENGINEER'S RESPONSE/DISPOSITION:

(Included in response to chit #5)

SIGNATURE _____ DATE: _____

RESPONSIBLE RLM REVIEW

0 APPROVE COG DISPOSITION
0 DISAPPROVE COG DISPOSITION

SIGNATURE _____ DATE: _____

COGNIZANT DESIGN ENGINEER CLOSE-OUT

Sign when action required by disposition is complete.

SIGNATURE _____ DATE: _____

PPPL DESIGN REVIEW CHIT

WP # _____ (ENG-032)

CHIT # 7

COMPONENT/SUBSYSTEM/SYSTEM **NCSX Winding Form, Cladding & Tolerances Peer Review**

COGNIZANT DESIGN ENGINEER B. Nelson DATE OF REVIEW 1-23-03

☒ PEER
☐ CDR
☐ PDR
☐ FDR

SUBJECT: (CHECK AS APPLICABLE)

☒ REQUIREMENTS	☐ HARDWARE	☐ SAFETY
☒ ANALYSIS	☐ CONFIGURATION	☐ COST/SCHEDULE
☒ PERFORMANCE	☐ RELIABILITY/MAINTAINABILITY	☐ QUALITY

COMMENT/CONCERN/RECOMMENDATION

Is 20 msec flux penetration sufficient? Is it too expensive for the benefit? Does it eliminate the need for extensive analysis?

ORIGINATOR R. J. Hawryluk

NAME/ORGANIZATION

REVIEW BOARD COMMENT/RECOMMENDATION

(Address technical, cost, and schedule impacts as appropriate. If CHIT is not adopted, provide technical reason do not simply state "out-of-scope or N/A" without explaining.)

ACTION: W. Reiersen to evaluate

X CONCUR
0 DISAGREE
0 OTHER

CHAIRPERSON L.E. Dudek DATE: 1-23-03

COGNIZANT DESIGN ENGINEER'S RESPONSE/DISPOSITION:

Eddy current analysis will be performed to confirm that field errors arising from the eddy currents are acceptable (response to Chit #5). The cost of a single break was estimated to be on the order of $0.5M, bringing the time constant dov from 70msec to 18 msec. Physics (Zarnstorff) to assess benefit of adding the poloidal break to the mission goals and the need for extensive analysis.

SIGNATURE _____ DATE: _____

RESPONSIBLE RLM REVIEW

0 APPROVE COG DISPOSITION
0 DISAPPROVE COG DISPOSITION

SIGNATURE _____ DATE: _____

COGNIZANT DESIGN ENGINEER CLOSE-OUT

Sign when action required by disposition is complete.

SIGNATURE _____ DATE: _____

PPPL DESIGN REVIEW CHIT

WP # _____ (ENG-032)

CHIT # 8

COMPONENT/SUBSYSTEM/SYSTEM **NCSX Winding Form, Cladding & Tolerances Peer Review**

☒ PEER
☐ CDR
☐ PDR
☐ FDR

COGNIZANT DESIGN ENGINEER B. Nelson DATE OF REVIEW 1-23-03

SUBJECT: (CHECK AS APPLICABLE)

☐ REQUIREMENTS	☐ HARDWARE	☐ SAFETY
☒ ANALYSIS	☐ CONFIGURATION	☐ COST/SCHEDULE
☐ PERFORMANCE	☐ RELIABILITY/MAINTAINABILITY	☐ QUALITY

COMMENT/CONCERN/RECOMMENDATION

Does the spatial distribution of lateral load change for different modular coil current distributions? E.g., the flexibility scenarious.

ORIGINATOR M. Zarnstorff

NAME/ORGANIZATION PHYSICS

REVIEW BOARD COMMENT/RECOMMENDATION

(Address technical, cost, and schedule impacts as appropriate. If CHIT is not adopted, provide technical reason do not simply state "out-of-scope or N/A" without explaining.)

ACTION: D. Williamson to have analysis performed and incorporate results into the design if needed.

X CONCUR
0 DISAGREE
0 OTHER

CHAIRPERSON L.E. Dudek DATE: 1-23-03

COGNIZANT DESIGN ENGINEER'S RESPONSE/DISPOSITION:

Williamson to evaluate for M50 flexibility scenarios.

SIGNATURE _____ DATE: _____

RESPONSIBLE RLM REVIEW

0 APPROVE COG DISPOSITION
0 DISAPPROVE COG DISPOSITION

SIGNATURE _____ DATE: _____

COGNIZANT DESIGN ENGINEER CLOSE-OUT

Sign when action required by disposition is complete.

SIGNATURE _____ DATE: _____

PPPL DESIGN REVIEW CHIT

WP # _____ (ENG-032)

CHIT # 9

COMPONENT/SUBSYSTEM/SYSTEM **NCSX Winding Form, Cladding & Tolerances Peer Review**

☒ PEER
☐ CDR
☐ PDR
☐ FDR

COGNIZANT DESIGN ENGINEER B. Nelson DATE OF REVIEW 1-23-03

SUBJECT: (CHECK AS APPLICABLE)

☐ REQUIREMENTS	☒ HARDWARE	☐ SAFETY
☐ ANALYSIS	☐ CONFIGURATION	☐ COST/SCHEDULE
☐ PERFORMANCE	☐ RELIABILITY/MAINTAINABILITY	☐ QUALITY

COMMENT/CONCERN/RECOMMENDATION

Have casting vendor install monuments onto the castings. Ideally the monuments would be in identical locations among the similar coil forms. [Monuments could be 1/8" via holes, machined 1/8" deep.]

ORIGINATOR S. Raftopoulos

NAME/ORGANIZATION PPPL/ENGINEERING

REVIEW BOARD COMMENT/RECOMMENDATION

(Address technical, cost, and schedule impacts as appropriate. If CHIT is not adopted, provide technical reason do not simply state "out-of-scope or N/A" without explaining.)

ACTION: ORNL to add this feature to the drawings. Jim Chrzanwoski to provide the information to ORNL.

X CONCUR
0 DISAGREE
0 OTHER

CHAIRPERSON L.E. Dudek DATE: 1-23-03

COGNIZANT DESIGN ENGINEER'S RESPONSE/DISPOSITION:

Location and geometry of monuments will be coordinated with prototype vendors and Chrzanowski (who is responsible for winding).

SIGNATURE _____ DATE: _____

RESPONSIBLE RLM REVIEW

0 APPROVE COG DISPOSITION
0 DISAPPROVE COG DISPOSITION

SIGNATURE _____ DATE: _____

COGNIZANT DESIGN ENGINEER CLOSE-OUT

Sign when action required by disposition is complete.

SIGNATURE _____ DATE: _____

PPPL DESIGN REVIEW CHIT

WP # _____ (ENG-032)

CHIT # 10

COMPONENT/SUBSYSTEM/SYSTEM **NCSX Winding Form, Cladding & Tolerances Peer Review**

COGNIZANT DESIGN ENGINEER B. Nelson DATE OF REVIEW 1-23-03

☒ PEER
☐ CDR
☐ PDR
☐ FDR

SUBJECT: (CHECK AS APPLICABLE)

☐ REQUIREMENTS	☐ HARDWARE	☐ SAFETY
☐ ANALYSIS	☐ CONFIGURATION	☐ COST/SCHEDULE
☐ PERFORMANCE	☐ RELIABILITY/MAINTAINABILITY	☐ QUALITY

COMMENT/CONCERN/RECOMMENDATION

Is there another way to "chill" coil without adding copper plates. For example, pot coil with thermal conductive epoxy.

ORIGINATOR L. Dudek

NAME/ORGANIZATION PPPL/ENGINEERING

REVIEW BOARD COMMENT/RECOMMENDATION

(Address technical, cost, and schedule impacts as appropriate. If CHIT is not adopted, provide technical reason do not simply state "out-of-scope or N/A" without explaining.)

ACTION: Jim Crhzanowski to investigate the possible use of thermally conductive epoxy.

X CONCUR
0 DISAGREE
0 OTHER

CHAIRPERSON L.E. Dudek DATE: 1-23-03

COGNIZANT DESIGN ENGINEER'S RESPONSE/DISPOSITION:

Chrzanowski to investigate. Thermally conductive epoxies identified so far have been pastes suitable as adhesives, but not for VPI.

SIGNATURE _____ DATE: _____

RESPONSIBLE RLM REVIEW

0 APPROVE COG DISPOSITION
0 DISAPPROVE COG DISPOSITION

SIGNATURE _____ DATE: _____

COGNIZANT DESIGN ENGINEER CLOSE-OUT

Sign when action required by disposition is complete.

SIGNATURE _____ DATE: _____