

# OAK RIDGE NATIONAL LABORATORY

MANAGED BY UT-BATTELLE FOR THE DEPARTMENT OF ENERGY

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**Date:** December 16, 2003

**To:** R. D. Benson, J.F. Lyon

**c/att:** G. E. Anderson, W. M. Belvin (DOE-ORO), J. A. Hall – RC,  
G. S. Hartman (DOE-ORO), J. O. Richardson

**c:** K. J. Beierschmitt, K. M. Downer, G. J. Malosh (DOE-ORO), S. L. Milora

**From:** D. D. Skipper, 4500N, MS-6198 

**Subject:** **National Environmental Policy Act (NEPA) Review of Project:  
FY 2005 Fusion Energy Division Project, Compact Stellarator Development  
Research Program (3164X)**

Attached is a copy of the completed NEPA Action Review and Documentation Form (ARD) for the subject project. This document contains the data obtained in the NEPA compliance screening of the project and represents a current profile of the planned action and its potential impacts. The data in the ARD have been entered into the Oak Ridge National Laboratory (ORNL) NEPA Compliance Database, which constitutes a permanent repository of auditable UT-Battelle actions screened under NEPA. The Categorical Exclusions, which are cited in the ARD, are available upon request.

**Please refer to Section III of the ARD for the NEPA status of your project. Also, a signed copy of this letter and accompanying document must be received prior to the start of the proposed action. Assuring the fulfillment of all requirements stated in Section II of the ARD rests with the division responsible for the proposed action.**

Any changes in the scope of this project should immediately be reported to James Hall, UT-Battelle NEPA Coordinator (576-4211). Variations in the project could result in a change in the NEPA status of your action. It is the responsibility of the project manager/engineer to report any modifications of the action to the NEPA Coordinator. Failure to report changes in your project could result in noncompliance with NEPA.

If you have any questions, please contact James Hall (576-4211) or my office (576-5748)

DDS:qjb

Attachment

**NEPA ACTION REVIEW AND DOCUMENTATION FORM  
I REVIEW OF PROPOSED ACTION**

<i>TOP SECTION FOR NEPA COORDINATOR USE ONLY</i>			
<b>Date Received:</b> October 22, 2003		<b>Project No:</b> 3164X	
<b>CX Cited:</b> 3014X/2927X			
<b>NEPA Contact:</b> J. A. Hall (576-4211)			
Project Title: Compact Stellarator Development Research Program			
Date: October 13, 2003	Est. Start Work Date: FY 2005	Charge No. (When applicable):	
Project Engineer/Manager/Researcher: R. D. Benson/ J. F. Lyon		Bldg/MS/Phone/Fax No.: 5700/6169/576-5591/576-7926 5700/6169/574-1179/576-7926	
Project Location (Plant, Bldg No., etc.): ORNL, Building 7625			
Environmental Protection Officer: J. O. Richardson		Bldg/MS/Phone/Fax No: 9201-2/8076/574-0145/754-0228	
Division/Office: Fusion Energy		Division/Office Director: S. L. Milora	
Project Funding Category:		Check Funding Source:	
LI <input checked="" type="checkbox"/> GPP <input type="checkbox"/> EXP <input type="checkbox"/> GPE <input type="checkbox"/> Other <input type="checkbox"/>		DP <input type="checkbox"/> EM <input type="checkbox"/> ER <input type="checkbox"/> NE <input type="checkbox"/> TD <input type="checkbox"/> WM <input type="checkbox"/> Other <input checked="" type="checkbox"/>	
<b>1. ENVIRONMENTAL SUMMARY:</b> Please answer Y (yes), N (no), or U (unknown) if your project generates, uses, or causes disturbance to the following:			
1. Air emissions	Y	11. Pesticide/herbicide use	N
2. Liquid effluents	N	12. Elevated noise levels	N
3. Solid waste	Y	13. Rad./haz. substance chemical exposures	N
4. Radioactive waste	N	14. Volatile/toxic/water reactive	N
5. Hazardous waste	N	15. Radiological area	N
6. Mixed waste (rad & haz)	N	16. Chemical storage/use	N
7. Radioactive soil	N	17. Petroleum storage/use	N
8. Asbestos waste	N	18. Belowground tanks	N
9. PCB waste	N	19. Groundwater	N
10. Biohazards	N	20. Surface water	N
21. SWMU/AOC	N	22. Undeveloped area	N
23. Clearing or excavation	N	24. Wetland disturbance	N
25. Floodplain disturbance	N	26. Transportation issues	N
27. Import/export chemicals	N	28. Produce/process chemicals	N
29. Produce/process new microorganisms	N	30. Import/export new microorganisms	N
Have pollution prevention opportunities been considered? If yes, how? Pollution prevention activities will be conducted during research activities.			
Any new permit/ permit modification required? If yes, state the required permit. None.			
Has this project been reviewed by the Oak Ridge National Laboratory (ORNL) Land and Facilities Use Committee? Not applicable.			
Comments			

**2. PURPOSE AND NEED FOR PROPOSED ACTION:** Provide background information that leads to the purpose and need for your project.

The Quasi-Poloidal Stellarator (QPS) concept-exploration-level experiment is an important part of a program to develop the Compact Stellarator concept in the U.S. fusion program. QPS makes use of the bootstrap current and three-dimensional shaping to extend the configuration space for compact stellarators to much lower aspect ratios and to explore the benefits of quasi-poloidal symmetry. A unique feature is low poloidal viscosity, which allows large flows in the poloidal direction for better plasma confinement. As a result, QPS has confinement, stability and turbulence properties that differ significantly from those of existing stellarators.

**3. DESCRIPTION OF PROPOSED ACTION:** Describe your project in detail, providing as much specific information as possible. Is this a CERCLA action? If so, provide cost and time data. Include attachments where appropriate.

The proposed action would involve constructing a QPS device by offsite vendors and delivering components of the device to Building 7625 (Multi-Program High Bay facility) once the facility has been constructed. The QPS would be constructed around a cylindrical vacuum tank with rounded top and bottom domes. The vacuum tank would be approximately 13 feet in diameter by 11 feet tall and weigh approximately 30,000 pounds. It would be constructed from stainless steel and would enclose 10 nonplanar, irregular shaped coils wound on cast, stainless steel coil forms. There would also be ancillary equipment, such as diagnostics, vacuum pumping, power supplies and other electrical components required for the operation of QPS.

The major components required for the QPS device would be fabricated off-site by a combination of specialty fabricators, universities, and institutions. The fabricated components would be shipped to ORNL for the device assembly.

Research activities with the QPS at ORNL are expected to lead to an understanding of toroidal magnetic configurations, an understanding of the key issues for the low-aspect-ratio quasi-poloidal approach to a high-beta compact stellarator concept, and would complement the National Compact Stellarator Experiment (NCSX), located at the Princeton Plasma Physics Laboratory, in completing the basis needed for advancing the development of the compact stellarator concept to the next stage.

**4. DESCRIPTION OF MATERIALS/WASTES:** Describe the kinds and approximate amounts of wastes that would be generated and how they would be disposed of.

Waste generated from the assembly of QPS will be minimal and primarily consist of electrical wire, cable trays, nuts and bolts. Total material generated will be less than one (1) cubic yard and will either be recycled or disposed of as sanitary waste in existing waste disposal facilities.

The basic QPS device will not produce emissions; however, as a future upgrade to the device, it will be proposed to use boron-containing gases during the glow-discharge cleaning cycle. This procedure will require maintaining glow-discharge plasma while gases with a boron component are introduced. Emissions from the bake out boronization will be cleaned and, if required, emitted to the atmosphere through the building exhaust system.

## II. CONDITION FOR CATEGORICAL EXCLUSION

(To be completed by ORNL NEPA Coordinator)

Information in this section is obtained from the Compliance Assessment Forms (CAFs) submitted to various environmental, safety, and health personnel and from other sources. This information is needed to ensure that the integral elements of the classes of actions as listed in Appendix B of the 10 CFR 1021 are addressed.

**Applicable statutory, regulatory, or permit requirements:** J. M. Wolfe, CAA New Source Review Coordinator: An air permit may be required for the proposed project. Further discussion and a better understanding of the material to be vented and the amount would be needed. Project Manager (J. F. Lyon) should contact J. M. Wolfe (574-8773) prior to the start of the proposed action and provide needed information for determining if an air permit will be required.

**Waste storage, disposal, recovery, or treatment facilities:** The proposed action will utilize existing waste storage and disposal facilities.

**Disturbance of hazardous substances in the environment:** No hazardous substances in the environment will be disturbed.

**Other:** N. S. Dailey, Solid and Hazardous Waste Program Leader: Wastes that are generated during operation activities (i.e., vacuum pump oil) must be properly disposed of in accordance with waste disposal procedures and practices.

## III. NEPA/NHPA DETERMINATION

(To be completed by ORNL NEPA Coordinator)

**ARCHEOLOGICAL/HISTORICAL REVIEW REQUIREMENT:** This action falls under Section 5.1.1.3.A.1 of the Cultural Resource Management Plan (DOE/ORO 2085, July 2001).

**ENVIRONMENTAL EFFECTS:** This project would pose no threat of significant individual or cumulative environmental effects. The described action is not part of an ongoing Environmental Assessment or Environmental Impact Statement. No extraordinary circumstances are related to this action, and the proposal is not connected to other actions with potentially significant impacts.

**IMPACTS TO OAK RIDGE RESERVATION (ORR) SENSITIVE RESOURCES:** The proposed action would not involve disturbing sites that provide a natural habitat for threatened or endangered animal or plant species. No wetland disturbance would take place, and the proposed action would not take place within the 100-year floodplain of any surface water body.

**CX/EA REQUIREMENT/APPLICABILITY:** The proposed action is covered by the approved Categorical Exclusion (CX) *Analytical Services and Development Support Activities* (3014X) at Number 7 (Fabricating, installing, modifying, repairing, and/or relocating laboratory-scale equipment used in performance of sample analysis and research and development projects). This CX was signed by D. R. Allen, DOE-ORO Office NEPA Compliance Officer, on October 7, 1997. In addition, research activities is covered by the CX for *Research and Development Activities Conducted by ORNL Fusion Energy Division* (2927X), which was signed by D. R. Allen on August 17, 2001.

**NEPA ACTION TAKEN:** No additional NEPA review and documentation will be required. However, conditions and requirements stated by compliance personnel (Section II of ARD) must be addressed prior to, during, or after completion of the proposed action.

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R. D. Benson, 5700, MS-6169  
J. A. Hall, 4500N, MS-6185  
G. S. Hartman (DOE-ORO), SE-30-1, FOB  
J. F. Lyon, 5700, MS-6169  
J. O. Richardson, 9201-2, MS-8076  
File – RC

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