NCSX PAC-7 Recommendations Log 9/7/04

Item No.	Comment or Recommendation	Project Response, Plan, Status
	Overall Status of the Program and Research Plans	
	Comment The research program would benefit from a distilled and concise list of research milestones for each phase of the program.… Experiments planned for Phases 3 & 4 should show clear links or paths to the broader stated NCSX-specific goals to ensure that demonstrable progress is made on the stated desired 2012 time frame in the OFES Strategic Plan. **Comment** The committee concurs that a research forum in early 2005 would be helpful to the project, but only if the detailed planning is accomplished prior to the meeting. The project should consider whether they would like advice from the PAC prior to the announcement/scheduling of that event, and what format/structure would be needed for the desired input. **Comment** [Research prep] funds cover the long-lead diagnostics and facility upgrade preparations, program planning, and the initial research team formation steps.… The highest priority should be given to more detailed specific development of the program, from which priorities and timelines on the other elements can be determined. **Recommendation** Develop a concise list of specific research milestones and experimental activities for each phase of the program. This will aid planning for diagnostics/upgrades, provide focus for the upcoming research forums, and help the project set priorities.	**Response:** Agree. **Plan:** Initiate an NCSX physics meeting series (at least bi-weekly) with the goal of developing more detailed program plans and milestones as recommended. Plan on holding a PAC meeting before the first research forum. Re-visit the timing of these meetings around January, 2005.
	Recommendation Secure adequate theoretical and computational support in the near term for developing the specific NCSX experimental plans and activities. Consider methods to provide DoE guidance on theory and modeling needs of the NCSX Project.	**Response:** Agreed that theory and computation should be well integrated into the NCSX research and planning. **Plan:** Involve theorists in the NCSX physics meetings and planning activities. As part of the planning process, identify theory and computation needs. NCSX management will make theory and computation needs known to DOE and the Theory community. The needs will be documented in a program letter to OFES Theory Program management, updated each December to support the budget planning cycle. Include theory and computation in NCSX PAC meetings. Consider holding another 3D Physics Opportunities and Planning workshop, like the one held at ORNL in January, 2002.

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		A. Reiman, D. Spong, please comment.
	Recommendation Estimate the human and computational resources needed during the period up to 2012 for the cost effective utilization of the NCSX facility with respect to needs for theory and modeling, and computer support plans for analysis (not just DAQ/control).	**Response:** The NCSX program will strive to identify its theory, modeling, and computer support needs as part of research program planning. Resource managers (e.g., Theory group leaders at the various labs and DOE) are responsible for estimating the level of resources to be devoted to NCSX on a year-to-year bases. **Plan:** Involve theorists in the NCSX physics meetings and planning activities. As part of the planning process, identify theory and computation needs. NCSX management will make theory and computation needs known to DOE and the Theory community. The needs will be documented in a program letter to OFES Theory Program management, updated each December to support the budget planning cycle. *A. Reiman, D. Spong, please comment.*
	Comment The committee recommends that the project team investigate ways to pull others into the planning process to help define its goals and specific experimental campaigns without any significant cost increases. **Recommendation** Ensure research preparation needs are adequately covered by the proposed budget profile. Examine ways to move funds earlier (if needed and/or possible) within DoE approved overall profile; any options considered should **not** impact the machine construction schedule. How could collaborations help in defining research preparation? Determine possible contingencies in operating plan/program if joint machine operation savings fall short of projections.	**Response:** Increased research prep budgets would be welcome, but we will proceed based on funding guidance provided. While it is our responsibility to make sure that essential research preparation needs are met without relying on voluntary contributions, it is in the program's best interests to reach out and involve collaborators as much as possible. The basis for the estimates of joint NCSX-NSTX operating efficiencies were not presented to the PAC, but a fuller presentation could be made at a future meeting if there is interest. **Plan:** Include interested collaborators in bi-weekly NCSX physics meetings. Use conferences such as the High-Temperature Diagnostics Conference, APS-DPP Meeting, and ISW as an opportunity for satellite meetings to discuss NCSX research opportunities with the wider community. Use research forums to help potential collaborators plan their future roles in the program.
	Recommendation Examine the timetable and milestones for PFC design and implementation with respect to the overall experimental program.	**Response:** Agree. **Plan:** This will be factored into Research prep plans.
	Comment Allot as much time as possible for this installation [of internal magnetic sensors].	**Response:** We need to estimate the time and resources needed for this installation as accurately as possible. Experience from Alcator C-Mod and other machines will be valuable in developing estimates. **Plan:** Research Prep.
	Comment The engineering team should examine mechanisms and potential impacts of	**Response:** **Plan:**

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	direct PFC attachments to the VVSA.	
	Comment The committee advises that the winding team consider using non-metallic clamps and screw jacks to minimize the release of metallic chips that could present problems in the finished coil. The flexible rope material generally does not require as much clamping force as a more conventional conductor.	**Response:** We agree that minimizing the risk of metallic chips is an important objective. **Plan:** Mitigation of this and other risks is being addressed as part of the modular coil winding design and R&D process in FY-05.
	Magnetic Diagnostics and V3FIT	
	Recommendation Continue development of an understanding of the sensitivity of the magnetic signals to profile variations as compared to experimental needs and what level of constraints are needed in kinetic data to accomplish the needed reconstructions at an appropriate accuracy.	**Response:** **Plan:**
	Recommendation Determine the level of computational resources needed to develop the required database and secure additional resources as required. Look at ways to involve international programs to get more computational power.	**Response:** **Plan:**
	Recommendation Investigate application of techniques to the tokamak community for 3-D events. This could build support for the activity, provide them with useful diagnostics, and provide a testbed for NCSX.	**Response:** **Plan:**
	Recommendation Incorporate model loops in the test coil windings.	**Response:** Agree. **Plan:** Co-wound loops will be incorporated into the twisted racetrack demo coil.
	Electron-Beam Mapping	
	Recommendation Develop definition of “acceptable” flux surface quality in its relationship to the electron beam mapping measurements.	**Response:** **Plan:**
	Recommendation Define more clearly the electron beam field line mapping tasks and goals. Specifically, what measurements are needed to identify the most dangerous resonances and to confirm that the machine has been properly assembled.	**Response:** **Plan:**
	Recommendation Adopt the ability to map at any given time in the experimental program, without significant down time, as a general design requirement for the mapping system.	**Response:** **Plan:**

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	Recommendation Investigate possible collaborations to debug hardware and analysis techniques so they are immediately available when NCSX begins operation.	**Response:** **Plan:**
	General Diagnostics Preparations	
	Recommendation Insure that diagnostics adequate to resolve the edge profiles have acceptable access.	**Response:** **Plan:**
	Recommendation Re-evaluate diagnostics phase-in as the prioritized specific experimental plan evolves. Consider whether some level of fluctuation diagnostic is needed/advantageous earlier in the program.	**Response:** **Plan:**
	Recommendation Determine the feasibility of SX cameras mounted to the 350C vacuum vessel.	**Response:** **Plan:**
	Recommendation Define any needed diagnostics for measuring disruption events, specifically as they may need to interface to the vacuum vessel and assembly.	**Response:** **Plan:**
	Recommendation Start setting up diagnostic groups as early as possible, especially for long lead-time systems. This recommendation ties to adequacy of the research preparation budget.	**Response:** **Plan:**
	Edge Physics	
	Recommendation Continue energetic particle modeling to assist in design of partial PFC system, as well as modeling of the edge magnetic topology and calculation of footprints and peaking factors on the wall.	**Response:** **Plan:**
	Recommendation Ensure that an experienced boundary plasma/ divertor scientist is included in the project team.	**Response:** **Plan:**
	Recommendation Take advantage of the offer to train someone in the use of EMC3-EIRENE at the earliest available opportunity.	**Response:** **Plan:**