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| Project Title: | SPI Readiness Review Program |
| Organization(s): | ORNL, LANL, DOE |
| Presenters: | M.J. Gouge (ORNL), S. Ashworth (LANL), P. Bakke (DOE-GO) |
| FY 2004 Funding: | \$110 K (ORNL), \$35 K (LANL) |

Project Purpose and FY 2004 Objectives: The purpose of this HTS program initiative is to support the Superconducting Partnership with Industry (SPI) program to help ensure SPI demonstration projects go as planned via a series of phased readiness reviews. The focus is on collaboration with the SPI team to identify potential failure modes; issues involving cryogenic temperatures, vacuum and high voltage dielectrics are a major concern. Expertise is obtained as needed from national laboratories, universities, and consultants. M. J. Gouge (ORNL) and Jim Daley (DOE) provided an overview of the proposed SPI oversight program at the January 2003 DOE Wire Development workshop and the program began in March 2003. The objective for 2004 is to provide at least one review of all active SPI projects. For complex or large-scale projects at transmission level voltages, such as the LIPA cable and SuperPower MFCL project, multiple reviews have been conducted.

FY 2004 Performance and FY 2005 Plans: All of the SPI projects will have been through at least one review cycle by August 2004. This phased readiness review program will continue in 2005 and 2006 as the SPI projects proceed to final design, fabrication, assembly, and initial commissioning. We are encouraging all the SPI projects to develop risk identification and mitigation processes such as failure mode and effects analysis (FMEA) to manage risks including R&D and prototyping needed to enhance success at full-scale and design levels of voltage/current. Based on continuing issues with the design and performance of dielectric materials at cryogenic temperatures and at high voltage, more emphasis will be placed on R&D and risk mitigation in this area by the grid-based SPI projects. In 2005 a web-site will be implemented that would have lessons-learned from prior SPI projects, some general design guidance on high voltage, vacuum, etc. and a place where SPI participants can post comments or questions and get feedback. A High-Voltage Cryogenic Dielectric Workshop is being considered; it could be held just after the 2005 Wire Development Workshop. Participation by each SPI team facing high voltage component qualification would be expected and the agenda could include some overview talks on liquid nitrogen dielectrics, solid dielectrics, HV design practices, etc.

FY 2004 Results: M. J. Gouge (ORNL) and Don Gubser (NRL) participated in a 1-day review of the HTS coil and associated support structure for the 500-mm bore, reciprocating magnetic separator project at DuPont Superconductivity on March 10, 2003. M. J. Gouge (ORNL) and Russ Eaton (DOE) visited Waukesha Electric Systems in June 2003 to review the progress on assembly and cool-down of the 5/10 MVA transformer and to go over the plans for high-current and high-voltage electrical testing given the known issue of low partial discharge inception voltage in the HTS phase sets. M. J. Gouge (ORNL) and several other scientists from LANL, ANL, and CAPS participated in a 1-day technical advisory committee meeting and a 2-day conceptual design review of the HTS Matrix Fault Current Limiter (MFCL) project at SuperPower, Inc., on June 10-12 (this project was subsequently initiated as an SPI project in July). A detailed list of reviewer comments (chits) was assembled by SuperPower that will be tracked through focused development plans and subsequent design reviews. M. J. Gouge (ORNL) and Paul Bakke (DOE) participated in the Conceptual Design Review of the General Electric 7A6 HTS Generator on July 30-31, 2003, and provided technical feedback to GE program management. The MCFL review on October 14-15, 2003, included a report on design progress since the CDR in June, AEP substation study update, cryostat tests and over-current (low voltage) testing of the MFCL tubes at Nexans and matrix mock-up modules in the test cryostat at Florida State University (CAPS). A review of the Flywheel Project was conducted at Boeing facilities in Seattle on October 21-22, 2003. Boeing presented a comprehensive overview of their program, including the work that has been accomplished over the past several years and the future direction of the program. Much of the focus was on reviewing the 3 kW/10 kWh system where component testing resulted in a flywheel failure during spin test. The Open MRI System being developed at Oxford Superconducting Technology was reviewed on November

14, 2003, and Oxford staff provided an update on their trade-off evaluation between bare and sheathed BSCCO 2212 tape conductor. Additionally a team led by Steve Ashworth (LANL) reviewed the LIPA (AMSC/Nexans) and Albany (SuperPower/SEI) HTS cable projects in November-December 2003. A readiness review of the Ultera Cable Project was conducted by this same team on February 10-11, 2004, at Southwire Company, Carrollton, GA. The LIPA cable project 138 kV termination design was reviewed in March 2004. On May 3, 2004, an informal review of design issues was held at GE-CRD and on May 4 a MFCL project meeting of the Technical Advisory Board was held to go over results of high current testing at CAPS. A review of the follow-on HTS motor R&D project will be held at Rockwell Automation in August 2004.

Research Integration: Since the reviews contain a large amount of proprietary material, the results and recommendations are typically shared only between the project being reviewed, the reviewers, and DOE. The reviewers, to the extent possible, highlight or flag potential problem areas that they have learned from other project reviews. The web-site and proposed workshop mentioned above will be a way to share generic lessons-learned and design information.