FY 2007 Superconductivity for Electric Systems Peer Review
Program Evaluation Form

OVERALL RATING: (Provide numeric score) _____9_____

9-10	7-8	5-6	3-4	1-2
Excellent	Very Good	Good	Fair	Not Adequate

1. **Program Strategy:** Do the mission, goals and priorities of the program appropriately support the Office of Electricity Delivery and Energy Reliability? Do the goals and priorities properly reflect the needs of industry and other stakeholders? How could they be improved?

Please see my comments in the Letter to Program Management. I would have liked to have see more discussion of the implications of the Navigant Study on future program strategy during this review. It's like the Navigant Study never happened.

2. **Program Structure and Management:** How well do the program activities support the overall program goals and priorities? Given the resources available, is the relative emphasis placed on the various program elements appropriate?

By and large, the relative emphasis is appropriate, but please see Letter to Program Management for details

3. **Implementation:** Is the program effectively leveraging its resources? Is the coordination with other related DOE, Federal and State activities adequate? Are the mechanisms for technology transfer appropriate? How would you assess the productivity of the program? Are the accomplishments and results commensurate with the investment being made?

There is no doubt that the superconductivity program, which really began in 1989, has been overwhelmingly successful in a technical sense. But for the past several years, I've become concerned about the time line for substantive deployment of the technology in the utility sector. Maybe it's time to "declare some victories" and scale back.

4. **Are there areas of RD&D in which the program should be investing?**

See Letter to Program Management, especially about a thrust effort on isotropic pinning.

5. **What are the overall strengths of the Superconductivity Program?**
Technological and program management.

6. **What are the overall weaknesses of the Superconductivity Program?**

Near term relevance to the nation's energy problems. This isn't really the program's fault. It's a policy issue. Right now the economic incentives are just not there, but neither are the social ones. The long term, three to four decades out, is another matter. Remember, I'm the "SuperGrid Guy."

7. **Other Comments or Recommendations:**

I admit to having some ambivalent, or perhaps "bipolar" feelings about the Superconductivity Program as it stands today.

a) On the one hand, the science and technology efforts and results are absolutely wonderful and I am intensely proud to have played some small part in these developments since the "1986 Creation." You have to understand the way I feel when I see TEMs of the YBCO layer of Gen 2 tape, and remember it was through such measurements that my group at IBM became the first to discover the correct crystal structure of "1-2-3" on 2 March 1987.

b) On the other, the "IBMer" in me makes me wonder if the energy enterprise will ever really deploy in the near term (that means in the next ten years), the fruits of the program in proper proportion to the investment already made. I

would define "proper proportion" to be something like 100 FCLs and 25 miles of HTS cable by 2017. Check out the Navigant Report. The military is another matter. I witnessed the scale back (about 100 staff to around 5) in the early 80's of IBM's josephson computing effort. This decision was taken with the concurrence of the program technical management, after an investment of $150 M, not due to technical failure, but a recognition that JJ would not be able to compete on a large scale with other emerging technologies (CMOS) (the operative term here is "large scale"). In retrospect, this was a most wise business decision and remains so to this day. But it was not without pain. Several good people left IBM (one founded Hypres), and the company was reviled in the press as "giving up to the Japanese." It also resulted in a sharp decline of university funding by the NSF (which it shouldn't have…basic research directions should not reflect corporate financial decisions) and I took a lot of crap from my university buddies, especially from Stanford, about that. We may be facing a similar decision point with respect to "near term significant" deployment of power applications of superconductivity. Were I in Kevin Kolevar's shoes, perhaps facing an OE "zero sum budget" scenario, and looking over the Office portfolio, I'd be strongly inclined to grow "Smart Grid" or whatever you want to call it (FACTS), at the expense of superconductivity. The combination of high power bipolar electronics controlled with sensor input to distributed digital network nodes has great promise for vastly improving grid efficiency and reliability, proportionately much more so in the near term than superconductivity. But deployment of this technology, like superconductivity, requires policy action as well. Try to explain sometime to a foreigner that our

Republic is a confederation of 50 very independent and contentious states. If Ben Franklin had been born 50 years early, perhaps the interstate commerce clause would have contained the electricity grid as well as roadways. Life would certainly be simpler today.

Oscar Wilde once wrote, "The brave man kills the thing he loves with a sword, the coward with a kiss." Wilde had a pension for the melodramatic, among other things (he was Irish, after all), so be careful in taking too literal an interpretation regarding the fate of the OE superconductivity program. But essentially this is what IBM did with its josephson program. I'm not recommending an analogous draconian action be taken with respect to the superconductivity power program, however I do think the OE staff has, as the Chinese proverb goes, some "interesting times" facing it over the next year.