MAC Report Summary

E. Gluskin

APS/Users Monthly Operations Meeting

December 13, 2006

List of Machine Advisory Committee members

Klaus Balewski   DESY: Hamburg, Germany
Max Cornacchia   Stanford Linear Accelerator Center
John Galayda   Stanford Linear Accelerator Center
Georg Hoffstaetter   Cornell University
Andrew Hutton   Thomas Jefferson National Accelerator Facility
Sam Krinsky   NSLS, Brookhaven National Laboratory
Annick Ropert   ESRF: Grenoble, France
Elaine Seddon   Daresbury Laboratory: Cheshire, UK

Vic Suller (Chair) CAMD, Louisiana State University

Charge to the Committee

- Can the option deliver the claimed technical performance?

- Is the claimed performance technically revolutionary and how does it compare to a "green field" option?

- What are the technical R&D challenges?

- What mitigation of risk is possible?

- Does the option put the APS at state-of-the-art in following decades?

APS Upgrade: Goals and Approach

- **Goals:**
  - Increase the APS brightness in wide energy range more then one order of magnitude;
  - Compress x-ray pulse to a pcsec level or less.

- **Approach:**
  - Design and build new storage ring and booster,
    or/and
  - Design and build new injector based on ERL

- **Means to achieve goals:**
  - Decrease emittance
  - Long straights
  - Special IDs
  - Increase current

Argonne
NATIONAL LABORATORY

Approach Options

- Option A – new ERL type injector
  - Full energy linac – outfield option
  - Multipass linac – infield option

- Option B - new storage ring
  - 1nm storage ring with long straights
  - 1.67 nm storage ring with long straights and extra ID beamlines

Excerpts from the Committee's report

" It is not believed that the APSx3 (or APS 1nm) option would position APS at state-of-the-art in coming decades and with a disruption of service of about a year to the existing research program it is questionable that the cost and effort would be justified."

Excerpts from the Committee's report

"The proposed ***Outfield ERL*** is considered to be an extremely exciting light source which builds on the investment in beam lines and infrastructure already at the APS. It would provide a factor of about ***150 increase in brightness compared to the existing APS*** in addition to increasing the coherent fraction of the x-ray beam and significantly reducing the bunch length. …………..
…..Technically the claimed performance is revolutionary in comparison to present day light sources and will enable new areas of scientific research to be opened up."