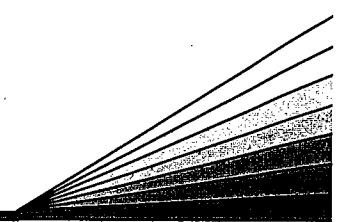


# ARGONNE NATIONAL LABORATORY

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## Advanced Photon Source

**DATE:** January 30, 2006  
**TO:** W. Ruzicka, AOD Division Director  
**FROM:** K. Randall (Chair, BSDRSC) *KOR*  
**SUBJECT:** 8-ID-A Y2-50 Mirror Holder Review

Sector 8 have recently replaced the vacuum chamber and actuation system for the horizontally deflecting Y2-50 mirror in the ID-A station. The new design, based on the 2ID-A design, is an improvement on the previous version at 8ID-A, including water cooling, for example. Although it is based on an existing design it was decided to perform a design review for the specific application at 8ID-A, particularly in light of the recent incident regarding the unauthorized movement of an RSS component in the 8ID-A station.

The review was based on material originally submitted on November 3, 2005, with additional material submitted on December 1 2005. A. Sandy made a powerpoint presentation at the January 12, 2006 BSDRSC meeting. Action items from that meeting are attached. The main issue was related to the possibility of a beam mis-steer (by the mirror) resulting in possible overheating of components downstream. Subsequent to the meeting, A. Sandy provided further details (attached) indicating that the only area of concern was for beam mis-steer over a narrow angular range at higher angles of deflection than routine operation.

At the January 26, 2006, BSDRSC meeting K. Randall reported that the maximum power after the 300 micron pinhole is approximately 50W at 300mA stored ring current (issue 2 of attached summary). In addition since the reflected power decreases with increasing angle, it was agreed at the meeting that there is no concern related to thermal overloading of downstream components, so long as the incident power is limited by the 300 micron pinhole. Since the pinhole is under administrative restriction (attached) it was agreed at the meeting that the review can be closed out with no safety concerns. Also it is important to note that : 1) there were no RSSC issues, since the optical configuration is identical to the previous design, and; 2) J. Noonan noted that the water cooling design is in compliance with APS vacuum policy.

I therefore conclude that a thorough safety review has taken place and recommend that the 8ID-A Y2-50 design be approved.

*W.G. Ruzicka* *2/2/06*

Concur, AOD Division Director / Date

### Attachments:

- 1) Summary of Action Items from January 12, 2006 meeting
- 2) Email from A. Sandy
- 3) Administrative Restriction for 8ID-A 300 micron pinhole

## Closeout of Action Items from 8ID Mirror Presentation at the January 12, 2006 BSDRSC meeting

### *Action Items from BSDRSC meeting*

1. A. Sandy will provide a revised horizontal raytrace indicating the maximum deflection angle that the beam can be rotated (+/- 1 milliradian).  
See Email below.
2. K. Randall is to check the maximum power loading after the pinhole.  
Maximum power loading after the pinhole is approximately 50 Watts @ 300mA Storage Ring Current (see report from Y. Li and A. Khounsary, September 2004)
3. K. Randall to check 2ID design  
There is no Admin restriction on 2ID.
4. A. Sandy will send a copy of the Powerpoint presentation to K. Randall.  
Provided.

### **Email from Alec Sandy following the meeting**

Subject: Re: 8-ID-A Y2-50 mirror review  
From: asandy <asandy@aps.anl.gov>  
Date: Thu, 12 Jan 2006 16:48:28 -0600  
To: asandy <asandy@aps.anl.gov>  
CC: "Kevin J. Randall" <randall@aps.anl.gov>, Jin Wang <wangj@aps.anl.gov>

Kevin,

Some (long) updates from our review meeting this morning:

- I reviewed the M9-30 and P9-30 drawings and found the following:

- \* The nominal horizontal inboard deflection angle of the white-beam mirror is 5.2 mrad
- \* The acceptance aperture of the M9-30 mask (measured from the center of rotation of the mirror) is 3.5 mrad to 7.5 mrad versus the nominal deflection produced by the mirror rotation stage of  $\pm 2$  mrad - > 3.3 mrad to 7.3 mrad. So basically the M9-30 mask is designed to pass maximum deflection (produced by the rotation stage) beams from the mirror
- \* Larger excursions from the nominal 5.3 mrad deflection are possible via the mirror translation stages
  - Deflections on the small-angle side (less than 3.5 mrad) are stopped by the white-beam-rated stop of the M9-30 mask
  - Deflections on the large angle side (pink beam) are stopped by an angled and cooled pink-beam-rated inboard face of the M9-30 mask that subtends deflection angles from 7.5 mrad to 11.3 mrad
  - Deflection angles larger than 11.3 mrad would have to be stopped by the normal-incidence portion of the cooling block of the P9-30 shutter which subtends a maximum deflection angle of 13.8 mrad

-- I don't think there is a cooled aperture/mask that stops beams at deflection angles greater than 13.8 mrad but please note that this now corresponds to a mirror deflection angle of  $\sim 0.75$  degrees so the mirror critical energy and corresponding reflected power is greatly reduced  
-- In the context of the previous item, I will check whether Sector 2 has any administrative controls over the mirror horizontal translation stages

So I think a slightly revised list of action items from this morning are the following:

\* Determine whether 2-ID has formalized administrative controls in place for the mirror horizontal translation stages

\* If not, which I suspect is the case, determine what assumptions, if any, were made about the possibility and possible effects of a pink beam steered to deflection angles greater than  $\sim 14$  mrad horizontal inboard deflection angle

Also, on a somewhat different subject, in addition to Michael Sprung's presentation on the 8-ID-D monochromator (which I gave you this morning), the responsible engineer working on the 8-ID-D monochromator (Soon Hong Lee) also gave a presentation which I forgot to give you. So I have attached that here.

- Alec

## Administrative Restrictions

### 8-ID

With the 8-ID-A pin hole mask in place, the beamline is allowed to operate at an Insertion Device gap value of 11 mm with full current within the Storage Ring. The presence of the mask limits the beam size to a 300 micrometer dia. beam. It has been determined by the BCRRT that this size beam does not pose a hazard to personnel nor Beamline equipment.

If the 8-ID-A pin hole mask is ever removed, Stations D, E, and I must undergo a full shielding verification at an 11 mm Insertion Device gap. Only 8-ID-A is allowed to have APS Enable and operate at an 11 mm Insertion Device gap if the pin hole mask is removed.

Reviewed 9/30/04, L. Gades; reviewed 10/03/05 by L. Gades

L. Gades, Reviewed 05/20/03 K. Beyer, 06/03/02