Title	***Realignment of Ring and Beamlines***			
Project Requestor	Michael Borland			
Date	March 21, 2008			
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Machine or Sector Manager	Louis Emery			
Category	Accelerator Hardware and ID Upgrades			
Content ID*	APS_1257984	Rev.	ICMS_Revision	ICMS Document Date

*This row is filled in automatically on check in to ICMS. See Note [1]

Description:

Start Year (FY)	**2009**	**Duration (Yr)**	**4-7**

Objectives:

To improve storage ring operation by eliminating large steering corrections necessary to put the x-ray beam in the desired location.

Benefit:

Possible benefits include: Ability to achieve reduced coupling, and thus improved brightness and SPX performance; less difficulty and time spent changing and optimizing lattices; improved injection efficiency and lifetime; less risk of beam dumps from beam steering interlock limits.

Risks of Project: See Note [2]

Low.

Consequences of Not Doing Project: See Note [3]

Benefits not realized: higher minimum coupling, which will reduce brightness and SPX performance; longer time spent on lattice switching and optimization, decreasing time available for other studies; lifetime and injection efficiency not improved, resulting in more radiation damage. Occasional beam dumps from steering interlocks.

Cost/Benefit Analysis: See Note [4]

Description:

This is part of a larger storage ring improvement initiative, as discussed in section 1 of OAG-TN-2008-008.

We propose to realign the accelerator and beamlines to obviate the need to make large steering corrections. Such corrections create x-y coupling because they require large beam excursions in sextupoles. This will have many benefits: decouple adjustment of chromaticity from the optics, allowing us to provide more predictable and reproducible beam properties; ease the burden of lattice and mode switching on machine studies time; allow achieving lower vertical emittance and therefore higher brightness; allow achieving higher and more consistent injection efficiency; and allow use of pulsed sextupoles for separation of lifetime and injection efficiency optimization (this is a speculative concept).

Given that it may take seven years of shutdowns to realign all sectors with the respective beamlines, a priority order of sectors will be determined from alignment data, present corrections, extent of the realignment job (i.e. number of sectors to realign at once), and user beamline long-term schedule (i.e. beamline may not want to realign when we want to). Beamline critical component such as wall collimators and masks may have to be realigned.

It is possible that fixing the "worst" 20 sectors of alignment in four years may suffice in achieving the stated goals. Thus the project may last only four years.

We may need an additional alignment crew (two people) during shutdowns, meaning we may need to hire an additional technician and borrow a trained technician from the MCR operation crew. The alignment crew work is needed only during the shutdown and not during user runs, so the FTE is calculated from the 0.25-year duration of the three shutdowns each year.

Funding Details

Cost: ($K)

There is no additional cost of materials or equipment as there are sufficient alignment equipment for an extra alignment crew.

Year	AIP	Contingency
1	0	
2	0	
3	0	
4	0	
5		
6		
7		
8		
9		
Total	0	

Effort: (FTE)

The mechanical engineer FTE in the table below refers to geodesist FTE.

Year	Mechanical Engineer	Electrical Engineer	Physicist	Software Engineer	Tech	Designer	Post Doc
1	0.1		0.1		0.5		
2	0.05		0.05		0.5		
3	0.05		0.05		0.5		
4	0.05		0.05		0.5		
5							
6							
7							
8							
9							

[1] **Notes:**

ICMS. Check in first revision to ICMS as a *New Check In*. Subsequent revisions should be checked in as revisions to that document i.e. C*heck Out* the previous version and C*heck In* the new version. Be sure to complete the *Document Date* field on the check in screen.

[2] **Risk Assessment.** Advise of the potential impact to the facility or operations that may result as a consequence of performing the proposed activity. Example: If the proposed project is undertaken then other systems impacted by the work include ... (If no assessment is appropriate then enter NA.)

[3] **Consequence Assessment.** Advise of the potential consequences to the facility or to operations if the proposal is not executed. Example: If the proposed project is not undertaken then ____ may happen to the facility. (If no assessment is appropriate then enter NA.)

[4] **Cost Benefit Analysis.** Describe cost efficiencies or value of the risk mitigated by the expenditure.

Example: Failure to complete this maintenance project will result in increased total costs to the APS for emergency repairs and this investment of ___ will also result in improved reliability of ____. (If no assessment is appropriate then enter NA.)