Operations, Engineering, and Facility Report

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Organization and Mission

What is now known as the Operations and Engineering Division was formed in late 2001 through reorganization of the NSLS where the Operations, Electrical, and Mechanical sections were collected into one division. The mission of the division falls into three areas:

- Design, fabrication, and maintenance of the NSLS accelerators and utilities including upgrades and modifications to meet changing needs
- Operation of NSLS complex 24 hours a day, 7 days a week, on average 44 weeks each year
- Engineering and technical support for the other NSLS divisions and the NSLS user community

2002 Activities

The work of our division touches on a great deal of infrastructure that is largely hidden from our user community until something goes awry. The NSLS utilities complex provides 1500 Tons of cooling capacity for HVAC, three accelerator water systems and the experimental (users) water system. It also provides compressed air for the facility. The NSLS uses approximately 10 megawatts (MW) of electric power, much of which is distributed to the accelerator complex and the experimental stations. The power systems group has over 1600 pieces of maintenance-tracked equipment including almost 100 high power systems that require two trained people to service. They also support operations and development of the pulsed power systems in the complex, which includes the linac with its klystrons, and the 14 'kicker' pulsed magnets that shuttle the beam from one machine to the next. The radio frequency (RF) group develops and maintains 9 high power 'sockets', the RF drive systems for the facilities 7 high power RF cavities. The physical infrastructure of our accelerator complex, including vacuum, magnets, diagnostics, and controls, is also managed by our division, with over 25000 drawings on file for our custom components.

Perhaps a bit more visible to the user community is the support for the insertion device program, including the 25 W liquid helium plant for the X-17 superconducting wiggler. Support for the design, fabrication and installation of the new Mini Gap Undulators, (MGU's) in collaboration with the Accelerator and User Science divisions of NSLS, is also provided by the Operations and Engineering Division.

The organization has 80 NSLS staff members and 7 skilled trades from the laboratory, as shown in the table below. We increasingly rely upon a department-wide matrixed management approach; Operations and Engineering draws resources from other divisions to support operations, and we provide special expertise to support development for other divisions.

Operations reliability (operations during scheduled time) and availability (operations compared to total scheduled time) remained high overall during the year, as shown in the 2002 Ring Performance and Usage figures, page 6-11, with most of the down time attributed to a few events. On the VUV ring, there was a failure of the transport line shutter bellows that resulted in 34 hours of downtime in April, and a failure and rebuild in-place of the RF transmitter in September, which resulted in 64 hours of lost operations. All other events were under a day down time, with the vast majority causing disruptions or delays of operations of 15 minutes or less.

Operations and Engineering Division Staffing

Operations	**Electrical Systems**	**Mechanical Engineering**	
Operations Mgmt.	RF and Power Systems	Engineering	
Operators	Acc'l and Computer Cnt'ls	Design	
Coordinators	Controls and Diagnostics	Mechanical	
	Electrical Design	Utilities	
	Electricians	Vacuum	
		Shop/Trades	**80**
Sci 1			1
Prof	13	8	21
Tech 13	21	24	58
Trade	5	2	**7**

During 2002, the division supported a number of planned projects, as well as the 'rapid responses' to equipment failures as noted above. Our planned activities included installation of the new dipole chamber for X29, and support for installation of the X17 hutch and infrastructure to expand their user program. We also installed a third experimental water system pump to improve its reliability, and a third new RF cavity in the X29 straight section of the ring. The modifications of the X29 front end were initiated to pave the way for a new MGU, to be installed in this recovered space in order to add another insertion device to the complement of NSLS facilities. Operations and Engineering provided support to the DUV-FEL program through the installation of the NISUS shielding system, extension of the interlock systems to include the FEL, and the construction and installation of the HGHG energy modulator and its gap separation mechanism.

As an engineering-oriented organization, much effort is focused on projects both for customers within the division, and for people in the larger NSLS community. In vetting projects we apply the following guidelines to allocate our resources:

- Maintain 95% reliability target for user operations
- Deal with critical items for operations (imminent failure anticipated)
- Update equipment for continued ops through up grade (5 to 10 year horizon)
- Update equipment to reduce maintenance
- Provide engineering, technical and operational support for department projects

With these objectives in mind, the following projects were selected for 2002/2003 funding. While all of these projects are in support of the user program, many fall into the realm of hidden infrastructure. Those that will be more directly visible to our user community are highlighted in italics.

Looking further ahead, the division is working hard, along with rest of the NSLS and its user community, to define and develop the next generation of NSLS facility. What form it may take is yet undecided, but the Operations and Engineering Division is ready to provide its collective experience, and has the desire to bring it to fruition for our user community.

Electrical Section	Corr of X-ray Trench to NEC	**Mechanical Section**
XRF Test 1 Plate Power Supply Upgrade	*VUV Interlock Upgrade*	*Third Experimental Water Pump*
Back-leg Bump	X-ray BPM electronics relocation	Auto Milling Machine
X17 Refurbish Controls	*X-ray SRU & Hutch logic DC conversion*	Ceramic Chamber Transition Cooling
Replace Linac Electron Gun		*X-29 Beamline Project*
Upgrade Spare Modulator	**Operations Section**	
EPICS for NSLS Controls	Klystron Drive Amplifier	**Other Divisions projects mg'd by OED**
New Graphical Local Bump Generator	Hi Level Controls port to LINUX	Beamline Electrical Safety Inspection
Orbit Correction Program Upgrade	New Control System Device Types	Minigap Undulator
Power Supply Regulator Upgrade	New Klystron	Superconducting Undulator Devel.
XRF1 Circulator and Switch	Rebuild Modulator 1	*Strain Mapping End Station Devel.*
X13 EPW Control Upgrade	*X-ray Trim Magnet Upgrade*	
Iden & Rem of Control room cables	New Software for Dbase Micros	
Iden of disconnect means for panels	GPLS Board Upgrade	