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NSLS MECHANICAL SYSTEM RESPONSIBILITIES

REVISION CONTROL SHEET

REV	DESCRIPTION	DATE	WRITTEN BY	APPROVED BY	ENTERED BY
A	First Issue				
D	Added Revision Control Sheet and Changed Assignment Names	October 29, 1996	M. Woodle	M. Woodle	LJL
E	Changed Assignment Names	November 7, 1996	M. Woodle	M. Woodle	P. Ciufo
F	Changed Assignment Names	June 15, 1999	M. Woodle	M. Woodle	K. Loverro
G	Changed Assignment Names	May 24, 2000	M. Woodle	M. Woodle	K. Loverro
H	Changed Assignment Names	March 22, 2001	E. Haas	E. Haas	K. Loverro/ A. Bowden
J	Changed Assignment Names	June 19, 2002	E. Haas	E. Haas	A. Bowden

		Engineer	Technician
1.0	NSLS Light Source Facility		
1.1	System: LINAC		
1.1.1	Electron Gun and Front End	Mortazavi	Newburgh
1.1.2	Accelerating Cavities	Mortazavi	Newburgh
1.1.3	Waveguides	Mortazavi	Newburgh
1.1.4	Diagnostics	Mortazavi	Newburgh
1.1.5	Process Water/Comp. Air	Beauman	Schwarz/ Santangelo
1.1.5.1	Pumping Station 1		
1.1.5.1.1	Heaters		
1.1.5.1.2	Flowmeters		
1.1.5.1.3	Pressure Gages		
1.1.5.1.4	Flowswitches		
1.1.5.1.5	Pump/Motor		
1.1.6	Vacuum Components	Foerster/ Hu	DeBoer
1.1.6.1	Chamber Assy. - Beamline		
1.1.6.2	Pumpout Port Assy.		
1.1.7	Vacuum System	Foerster/ Hu	DeBoer
1.1.7.1	SIP (Sputter Ion Pump)		
1.1.7.1.1	8 ℓ/s (3)		
1.1.7.1.2	80 ℓ/s (4)		
1.1.7.1.3	120 ℓ/s (1)		
1.1.7.1.4	220 ℓ/s (6)		
1.1.7.2	Gauges		
1.1.7.2.1	Cold Cathode (2)		
1.1.7.2.2	Convectron (1)		
1.1.7.3	Valves		
1.1.7.3.1	Gate Valve (Viton) (3)		
1.2	System: Transfer Line-LINAC to Booster		
1.2.1	Magnetic Components	Skaritka/ Lynch	Scheuerer
1.2.1.1	Quads		

			Engineer	Technician
1.2.1.2		Dipoles		
1.2.2	Diagnostics		Lynch	Radulescu
1.2.2.1		Flags		
1.2.2.2		PUE's		
1.2.3	Vacuum Components		Foerster/ Hu	DeBoer
1.2.3.1		Chamber Assy - Beam Line		
1.2.3.2		Support Assy - Beam Line		
1.2.3.3		Chamber Assy - Dipole		
1.2.3.4		Pumpout Port Assy		
1.2.4	Vacuum System		Foerster / Hu	DeBoer
1.2.4.1		SIP		
1.2.4.1.1		60 ℓ/s (Triode) (4)		
1.2.4.2		Gauges		
1.2.4.2.1		Cold Cathode (1)		
1.2.4.2.2		Convectron (1)		
1.2.4.3		Valves		
1.2.4.3.1		Gate (Viton)		
1.2.5	Radiation Shield		Hu / Pjerov	Scheuerer
1.2.6	Water/Air		Beauman	Schwarz / Santangelo
1.2.6.1		Hoses		
1.3	System: Booster			
1.3.1	Injection/Extraction			
1.3.1.1		Injection/Extraction Magnet	Lynch	Radulescu
1.3.1.2		Injection/Extraction Kickers	Lynch	Radulescu
1.3.1.3		Injection/Extraction Str. Sect.	Lynch	Radulescu
1.3.2	Ring Magnets		Skaritka/ Lynch	Scheuerer
1.3.2.1		Dipoles		
1.3.2.2		Quads		

		Engineer	Technician
1.3.2.3	Sextupoles		
1.3.2.4	Trims		
1.3.3	R/F Cavity	Mortazavi	Newburgh
1.3.3.1	Vac Pumps		
1.3.3.2	Power Window		
1.3.3.3	Antennas & Loads		
1.3.3.4	Transmission Line		
1.3.3.5	Cooling		
1.3.3.6	Tuner		
1.3.4	Vacuum Components	Foerster/ Lynch	DeBoer
1.3.4.1	Chamber Assy - Dipole		
1.3.4.2	Support Assy - Dipole Chamber		
1.3.4.3	Pumpout Port Assy		
1.3.5	Vacuum System	Foerster/ Hu	DeBoer
1.3.5.1	SIP		
1.3.5.1.1	220 ℓ/s (7)		
1.3.5.2	Gauges		
1.3.5.2.1	BA Gauges (1)		
1.3.5.2.2	Cold Cathode (1)		
1.3.6	Diagnostics	Lynch	Radulescu
1.3.6.1	Pickup Electrodes (PUE's)		
1.3.6.2	Electrostatic Kicker		
1.3.6.3	Electrostatic Monitor		
1.3.6.4	Flags		
1.3	System: Booster (continued)		
1.3.6.5	Current Transformer		
1.3.7	Radiation Shielding	Hu/ Pjerov	Bambina
1.3.7.1	Injection		
1.3.7.2	Extraction		
1.3.7.3	Straight Section		
1.3.8	Water/Air	Beauman	Santangelo/ Schwarz
1.4	System: Transfer Line - Booster to VUV Ring		

			Engineer	Technician
1.4.1	Magnetic Components		Skaritka/ Lynch	Hubbard
1.4.1.1	Quads			
1.4.1.2	Trims - Horizontal			
1.4.1.3	Trims - Vertical			
1.4.1.4	Trims - Horiz./Vertical			
1.4.1.5	Dipoles			
1.4.2	Diagnostics		Lynch	Radulescu
1.4.2.1	Flags			
1.4.2.2	PUE's			
1.4.3	Safety Shutter		Montanez	Radulescu
1.4.4	Vacuum Components		Foerster/ Hu	
1.4.4.1	Chamber Assy - Beamline			
1.4.4.2	Support Assy - Beamline			
1.4.4.3	Pumpout Port Assy			
1.4.5	Isolation Window		Foerster	Radulescu
1.4.6	Vacuum System		Foerster/ Hu	DeBoer
1.4.6.1	SIP			
1.4.6.1.1	60 ℓ/s (Triode)	(4)		
1.4.6.2	Gauges			
1.4.6.2.1	Cold Cathode	(1)		
1.4.6.3	Valves			
1.4.6.3.1	Gate - Viton	(1)		
1.4.7	Radiation Shield		Hu/ Pjerov	Bambina
1.4.8	Water/Air		Beauman	Santangelo/ Schwarz
1.4.8.1	Hoses			
1.4.8.2	Air Operated Solenoids			
1.4.8.3	Flowswitches			

			Engineer	Technician
1.5	System: VUV Ring			
1.5.1	Injection System		Lynch/ Skaritka	
1.5.1.1	Lamberson Septum		Lynch	Radulescu
1.5.1.2	Kickers		Lynch	
1.5.1.3	Ceramic Chambers		Foerster/ Hu	Scheuerer
1.5.1.4	Injection Straight Section		Foerster/ Hu	Scheuerer
1.5.2	Magnetic Components		Lynch	Pop/Hubbard
1.5.2.1	Dipoles			
1.5.2.2	Quadrupoles			
1.5.2.3	Sextupoles			
1.5.2.4	Trims			
1.5.2.5	Dipole Buss			
1.5.3	R/F Cavity		Mortazavi	Newburgh
1.5.3.1	Vacuum Pumps			DeBoer
1.5.3.2	Power Window			Newburgh
1.5.3.3	Antennas & Loads			(Schwarz-
1.5.3.4	Transmission Line			cooling only)
1.5.3.5	Cooling			
1.5.3.6	Tuner			
1.5.4	Diagnostics		Foerster	Radulescu
1.5.4.1	Pickup Electrodes (PUE's)			
1.5.4.2	Electrostatic Kicker			
1.5.4.3	Electrostatic Monitor			
1.5.4.4	Flags		Skaritka	
1.5.4.5	Current Transformer		Lynch/	
1.5.4.6	Beam Scraper (No Watercooling)		Mortazavi	
1.5.5	Vacuum Components		Foerster/ Lynch	DeBoer
1.5.5.1	Chamber Assy - Dipole			
1.5.5.2	Chamber Assy - Beamline			
1.5.6	Vacuum System		Foerster/ Hu	DeBoer
1.5.6.1	SIP			
1.5.6.1.1	30 ℓ/s	(1)		
1.5.6.1.2	120 ℓ/s	(1)		
1.5.6.1.3	220 ℓ/s	(12)		

				Engineer	Technician
1.5.6.2	DIP		(8)		
1.5.6.3	TSP		(22)		
1.5.6.4	NEG				
1.5.6.4.1		Modules	(2)		
1.5.6.4.2		Strips	(2)		
1.5.6.5	Gauge				
1.5.6.5.1		BA Gauge	(12)	Foerster/ Hu	DeBoer
1.5.6.5.2		Convection	(3)		
1.5.6.6	RGA		(4)		
1.5.6.7	Valves				
1.5.6.7.1		All Metal Gate	(7)		
1.5.7	Radiation Shielding			Hu/ Pjerov	Scheuerer
1.5.7.1	Inside Ring Shielding				
1.5.7.2	Outside Ring Shielding				
1.5.8	Water/Air			Beauman	Santangelo/ Schwarz
1.5.8.1	Hoses				
1.5.8.2	Air Operated Solenoids				
1.5.8.3	Vacuum Valve Controllers				
1.5.8.4	Nitrogen Gas Distribution				
1.5.8.5	Flowswitches				
1.5.8.6	Air/Water Controls & Interlocks				
1.6	System: VUV Ring Insertion Devices				
1.6.1	FEL Undulator			Lynch/ Skaritka	Radulescu
1.6.1.1	Drives - Mechanical Drive Assy				
1.6.1.2	Magnet Assembly				
1.6.2	FEL Undulator Straight Section			Lynch/ Skaritka	Radulescu
1.6.2.1	Chamber Assy - Undulator FEL				
1.6.3	TOK			Lynch/ Skaritka	Radulescu
1.6.3.1	Mechanical Drive Assy				
1.6.3.2	Magnet Assembly				
1.6.4	TOK Straight Section			Lynch/ Skaritka	Radulescu

			Engineer	Technician
1.6.4.1	Chamber Assy - Undulator TOK		Lynch/ Skaritka	Radulescu
1.7	System: VUV Ring Front End & Beamline			
1.7.1	Front End Components		Pjerov	Radulescu
1.7.1.1	Water Cooled Mask			
1.7.1.2	Fast Valve			
1.7.1.3	Safety Shutter			
1.7.1.4	Gate Valve			
1.7.2	Beamline Components		Lynch	Radulescu
1.7.2.1	U5			
1.7.2.1.1		Mirror Box Assembly		
1.7.2.2	U7			
1.7.2.2.1		Goniometer		
1.7.2.3	U9			
1.7.2.3.1		Spherical Mirror Manipulator		
1.7.2.4	U10			
1.7.2.4.1		PSD Experimental Station		
1.7.2.5	U13			
1.7.2.5.1		Mirror Holder Assembly		
1.7.2.6	U14			
1.7.2.6.1		Experimental Chamber		
1.7.2.6.2		Preparation Chamber		
1.7.2.6.3		Sample Transfer Mechanism		
1.7.2.7	IR4			
1.7.2.7.1		Infrared Mirror Box		
1.7.2.7.2		Infrared Actuator		
1.7.2.7.3		Manual Mirror Manipulator		
1.7.2.7.4		Upper Mirror Box		
1.7.2.7.5		Slit Mechanism		
1.7.2.8	TOK			
1.7.2.8.1		Water Cooled Aperture		
1.7.2.8.2		Safety Shutter		
1.7.2.8.3		Mirror Box #1		
1.7.2.8.4		Mirror Box #2		
1.7.2.8.5		Upstream End		
1.7.2.9	TOK Branch Line			
1.7.3	Vacuum System		Foerster/ Hu	DeBoer
1.7.3.1	SIP			
1.7.3.1.1		220 ℓ/s (17)		

				Engineer	Technician
1.7.3.1.2		TSP	(17)		
1.7.3.2	BA Gauges		(17)		
1.7.3.3	RGA		(17)		
1.7.3.4	All Metal Valves		(19)		
1.7.4	VUV Total & Partial Pressure System			Foerster/ Hu	DeBoer
1.7.4.1	PC/XT Computer		(1)		
1.7.4.1.1		Computer	(1)		
1.7.4.1.2		Color Monitor	(1)		
1.7.4.1.3		Printer	(1)		
1.7.4.2	VG Mass Spect. Sys. (1)			Foerster/ Hu	DeBoer
1.7.4.2.1		VG/PC Card	(1)		
1.7.4.2.2		VG Interface	(1)		
1.7.4.2.3		SX-200 Controller	(2)		
1.7.4.2.4		MPX-64 Multiplexer	(1)		
1.7.4.2.5		MPX-8 Multiplexer	(2)		
1.7.4.2.6		VG SX200 RF Box	(18)		
1.7.4.2.7		SX200 Mass Spec	(18)		
1.7.4.2.8		VG Cables	(18)		
1.7.4.3	Total Pressure Monitor				
1.7.4.3.1		PC Interface	(1)		
1.7.4.3.2		Camac Crate	(1)		
1.7.4.3.3		Analog Card	(1)		
1.7.4.3.4		Control Card	(1)		
1.7.4.4	Total Pressure System				
1.7.4.4.1		Grnvle Phl. Contrler	(18)		
1.7.4.4.2		Varian (NIG) Gauge	(18)		
1.8	System: Transfer Line - Booster to X-Ray				
1.8.1	Magnetic Components			Skaritka/ Lynch	Scheuerer
1.8.1.1	Dipoles				
1.8.1.2	Quadrupoles				
1.8.1.3	Sextupoles				
1.8.1.4	Trims				
1.8.2	Diagnostics			Lynch	Radulescu
1.8.2.1	Flags				
1.8.2.2	PUE's				
1.8.2.3	Monitors				

				Engineer	Technician
1.8.3	Safety Shutter			Lynch	Radulescu
1.8.4	Vacuum Components			Foerster/ Hu	DeBoer
1.8.4.1	Chamber Assy - Beamline				
1.8.4.2	Support Assy - Beamline				
1.8.4.3	Pumpout Port Assy				
1.8.5	Isolation Window			Foerster	Radulescu
1.8.6	Vacuum System			Foerster/ Hu	DeBoer
1.8.6.1	SIP				
1.8.6.1.1		60 ℓ/s	(4)		
1.8.6.2	Gauges				
1.8.6.2.1		Cold Cathode	(1)		
1.8.6.3	Valves				
1.8.6.3.1		Gate Viton	(1)		
1.8.7	Radiation Shield			Hu/ Pjerov	Bambina
1.8.7.1	Lead Shielding Along Injection Line				Scheuerer
1.8.8	Water/Air			Beauman	Santangelo/ Schwarz
1.9	System: X-Ray Ring				
1.9.1	Injection System			Lynch	Scheuerer
1.9.1.1	Injection Septum			Lynch	Scheuerer
1.9.1.2	Kickers			Lynch	Scheuerer
1.9.1.3	Ceramic Chambers			Foerster	Scheuerer
1.9.1.4	Injection Straight Section			Foerster	Scheuerer
1.9.2	Magnetic Components			Skaritka/ Lynch	Hubbard
1.9.2.1	Dipoles				
1.9.2.2	Quadrupoles				
1.9.2.3	Sextupoles				
1.9.2.4	Trims				
1.9.2.5	Dipole Magnet Bus				
1.9.3	R/F Cavities			Mortazavi	Newburgh (Schwarz-cooling only)
1.9.3.1	Vacuum Pumps				
1.9.3.2	Power Window				

				Engineer	Technician
1.9.3.3	Antennas & Loads				
1.9.3.4	Transmission Line				
1.9.3.5	Cooling				
1.9.3.6	Tuner				
1.9.4	Vacuum Components			Foerster/ Hu	DeBoer
1.9.4.1	Chamber Assy - Dipole				
1.9.4.2	Chamber Assy - Beamline				
1.9.5	Vacuum System			Foerster/ Hu	DeBoer
1.9.5.1	SIP				
1.9.5.1.1		8 ℓ/s	(2)		
1.9.5.1.2		45 ℓ/s (Star Cell)	(3)		
1.9.5.1.3		120 ℓ/s	(3)		
1.9.5.1.4		220 ℓ/s	(60)		
1.9.5.1.5		440 ℓ/s	(3)		
1.9.5.2	DIP		(16)		
1.9.5.3	TSP		(95)		
1.9.5.4	NEG				
1.9.5.4.1		Modules	(5)		
1.9.5.4.2		Strips	(6)		
1.9.5.4.3		Cartridge	(1)		
1.9.5.5	Gauge			Foerster/ Hu	DeBoer
1.9.5.5.1		BA Gauge	(27)		
1.9.5.5.2		Convectron	(4)		
1.9.5.6	RGA		(4)		
1.9.5.7	Valves				
1.9.5.7.1		All Metal Gate	(14)		
1.9.6	Diagnostics			Lynch	Radulescu
1.9.6.1	Pickup Electrodes (PUE's)				
1.9.6.2	Electrostatic Kicker				
1.9.6.3	Electrostatic Monitor				
1.9.6.4	Flags				
1.9.6.5	Current Transformer				
1.9.6.6	Beam Scraper (No Watercooling)				
1.9.6.7	Water Cooled Beam Scraper				
1.9.7	Radiation Shield			Hu/ Pjerov	Scheuerer

		Engineer	Technician
1.9.8	Water/Air	Beauman	Santangelo/ Schwarz
1.9.8.1	Hoses		
1.9.8.2	Air Operated Solenoids		
1.9.8.3	Vacuum Valve Controllers		
1.9.8.4	Nitrogen Gas Distribution		
1.9.8.5	Low Press. Air Distribution		
1.9.8.6	Flowswitches		
1.9.8.7	Pressure Regulators		
1.9.8.8	Water/Air Controls & Interlocks		
1.10	System: X-Ray Ring Insertion Devices		
1.10.1	X-1 Undulator	Lynch/ Skarika	Radulescu
1.10.1.1	Mechanical Drive Assy		
1.10.1.2	Correction Coils		
1.10.1.3	Magnet Assembly		
1.10.2	X-1 Straight Section	Lynch/ Skaritka	
1.10.2.1	Chamber Assy - Undulator X-1		
1.10.2.2	Chamber Assy - X8D2-D4		
1.10.3	X-1 Exit Chamber	Lynch/ Foerster	
1.10.3.1	Dipole Chamber		
1.10.3.2	Copper Crotch		
1.10.3.3	NEG and DIP Pumps		
1.10.3.4	Exit Chamber Support		
1.10.4	X-13 Undulator	Lynch	Radulescu
1.10.4.1	Mechanical Drive Assy		
1.10.4.2	Correction Coils		
1.10.4.3	Magnet Assembly		
1.10.5	X-13 Straight Section	Lynch	
1.10.5.1	Chamber Assy - Undulator X-13		
1.10.5.2	Chamber Assy - X3D2-D4		
1.10.6	X-13 Exit Chamber	Lynch	
1.10.7	X-17 Wiggler	Mortazavi/ Lynch	

		Engineer	Technician
1.10.8	X-17 Cryogenics	Mortazavi/ Beauman	Freudenberg/ Newburgh
1.10.8.1	Model 1430 Helium Refrigerator		
1.10.8.2	Model RS Compressor		
1.10.8.3	Hereaus Process Vacuum Pump		
1.10.8.4	Hereaus Vac Pump LN_2 dewar		
1.10.8.5	Turbo Pump Sta-Magnet Ins. Vac.		
1.10.8.6	Helium Gas Storage Tubes		
1.10.8.7	O_2 Monitor		
1.10.9	X-17 Straight Section	Lynch	
1.10.9.1	Chamber Assy - X4D1		
1.10.9.2	Chamber Assy - X4D2-D4		
1.10.10	X-17 Exit Chamber	Lynch	
1.10.10.1	Dipole Chamber		
1.10.10.2	Copper Crotch		
1.10.10.3	NEG and DIP Pumps		
1.10.10.4	Exit Chamber Support		
1.10.11	X-21 Wiggler	Lynch/ Skarika	Radulescu
1.10.11.1	Mechanical Drive Assy		
1.10.11.2	Correction Coils		
1.10.11.3	Magnet Assembly		
1.10.12	X-21 Straight Section	Lynch	
1.10.12.1	Chamber Assy - Wiggler X-21		
1.10.12.2	Chamber Assy - X5D2-D4		
1.10.13	X-21 Exit Chamber	Lynch	
1.10.13.1	Dipole Chamber		
1.10.13.2	Copper Crotch		
1.10.13.3	NEG and DIP Pumps		
1.10.13.4	Exit Chamber Support		
1.10.14	X-25 Wiggler	Lynch/ Skarika	Radulescu
1.10.14.1	Mechanical Drive Assy		
1.10.14.2	Correction Coils		
1.10.14.3	Magnet Assembly		
1.10.15	X-25 Straight Section	Lynch	
1.10.15.1	Chamber Assy - Wiggler X-25		

		Engineer	Technician
1.10.15.2	Chamber Assy - X6D2-D4		
1.10.16	X-25 Exit Chamber	Lynch/ Woodle	Newburgh
1.10.16.1	Dipole Chamber		
1.10.16.2	Copper Crotch		
1.10.16.3	NEG and DIP Pumps		
1.10.16.4	Exit Chamber Support		
1.10	System: X-Ray Ring Insertion Devices		
1.10.17	Water/Air	Beauman	Santangelo/ Schwarz
1.10.17.1	Hoses		
1.10.17.2	Flowswitches		
1.11	System: X-Ray Front Ends & Beamlines		
1.11.1	Front End Components	Pjerov/ Foerster	Radulescu
1.11.1.1	ARC Source	Pjerov/ Foerster	Radulescu/ Newburgh
1.11.1.1.1	X2 Front End		
1.11.1.1.1.1	X2 X-Ray Water Cooled Mask 10°		
1.11.1.1.1.2	X2 X-Ray 6" UHV Valve (VAT)		
1.11.1.1.1.3	X2 X-Ray Fast Valve "C" Type		
1.11.1.1.1.4	X2 X-Ray W.C. Safety Shtr. 18.18mRad		
1.11.1.1.1.5	X2 X-Ray Water Cooled Aperture		
1.11.1.1.2	X3 Front End		
1.11.1.1.2.1	X3 X-Ray Water Cooled Mask 22½^{o}		
1.11.1.1.2.2	X3 X-Ray 6" UHV Valve (VAT)		
1.11.1.1.2.3	X3 X-Ray Fast Valve "C" Type		
1.11.1.1.2.4	X3 X-Ray W.C. Safety Shtr. 18.18mRad		
1.11.1.1.2.5	X3 X-Ray Water Cooled Aperture		
1.11.1.1.3	X4 Front End		
1.11.1.1.3.1	X4 X-Ray Water Cooled Mask 10°		
1.11.1.1.3.2	X4 X-Ray 6" UHV Valve (VAT)		
1.11.1.1.3.3	X4 X-Ray Fast Valve "C" Type		
1.11.1.1.3.4	X4 X-Ray W.C. Safety Shtr. 18.18mRad		
1.11.1.1.3.5	X4 X-Ray Water Cooled Aperture		
1.11.1.1.4	X5 Front End		
1.11.1.1.4.1	X5 X-Ray Water Cooled Mask 10°		

		Engineer	Technician
1.11.1.1.4.2	X5 X-Ray 6" UHV Valve (VAT)		
1.11.1.1.4.3	X5 X-Ray Fast Valve "D" Type		
1.11.1.1.4.4	X5 X-Ray W.C. Safety Shtr.		
1.11.1.1.4.5	X5 X-Ray Watered Cooled Aperture		
1.11.1.1.5	X6 Front End		
1.11.1.1.5.1	X6 X-Ray Water Cooled Mask 10°		
1.11.1.1.5.2	X6 X-Ray 6" UHV Valve (VAT)		
1.11.1.1.5.3	X6 X-Ray Fast Valve "C" Type		
1.11.1.1.5.4	X6 X-Ray W.C. Safety Shtr. 18.18mRad		
1.11.1.1.5.5	X6 X-Ray Water Cooled Aperture		
1.11.1.1.6	X7 Front End		
1.11.1.1.6.1	X7 X-Ray Water Cooled Mask 22°		
1.11.1.1.6.2	X7 X-Ray 6" UHV Valve (VAT)		
1.11.1.1.6.3	X7 X-Ray Fast Valve "C" Type		
1.11.1.1.6.4	X7 X-Ray W.C. Safety Shtr. 18.18mRad		
1.11.1.1.6.5	X7 X-Ray Water Cooled Aperture		
1.11.1.1.7	X8 Front End		
1.11.1.1.7.1	X8 X-Ray Water Cooled Mask 10°	Pjerov/ Foerster/ Hu	Radulescu/ Newburgh
1.11.1.1.7.2	X8 X-Ray 6" UHV Valve (VAT)		
1.11.1.1.7.3	X8 X-Ray Fast Valve "C" Type		
1.11.1.1.7.4	X8 X-Ray W.C. Safety Shtr. 10.3.10mRad		
1.11.1.1.7.5	X8 X-Ray Water Cooled Aperture		
1.11.1.1.8	X9 Front End		
1.11.1.1.8.1	X9 X-Ray Water Cooled Mask 2½^{o}		
1.11.1.1.8.2	X9 X-Ray 6" UHV Valve (GP)		
1.11.1.1.8.3	X9 X-Ray Fast Valve "C" Type		
1.11.1.1.8.4	X9 X-Ray W.C. Safety Shtr. 18.18mRad		
1.11.1.1.8.5	X9 X-Ray Water Cooled Aperture		
1.11.1.1.9	X10 Front End		
1.11.1.1.9.1	X10 X-Ray Water Cooled Mask 10°		
1.11.1.1.9.2	X10 X-Ray 6" UHV Valve (GP)		
1.11.1.1.9.3	X10 X-Ray Fast Valve "C" Type		
1.11.1.1.9.4	X10 X-Ray W.C. Safety Shtr. 10.3.10mRad		
1.11.1.1.9.5	X10 X-Ray Water Cooled Aperture		
1.11.1.1.10	X11 Front End		
1.11.1.1.10.1	X11 X-Ray Water Cooled Mask 2½^{o}		
1.11.1.1.10.2	X11 X-Ray 6" UHV Valve (GP)		
1.11.1.1.10.3	X11 X-Ray Fast Valve "C" Type		
1.11.1.1.10.4	X11 X-Ray W.C. Safety Shtr. 18.18mRad		
1.11.1.1.10.5	X11 X-Ray Water Cooled Aperture		
1.11.1.1.11	X12 Front End		
1.11.1.1.11.1	X12 X-Ray Water Cooled Mask 10°		

		Engineer	Technician
1.11.1.1.11.2	X12 X-Ray 6" UHV Valve (GP)		
1.11.1.1.11.3	X12 X-Ray Fast Valve "C" Type		
1.11.1.1.11.4	X12 X-Ray W.C. Safety Shtr. 10.3.10mRad		
1.11.1.1.11.5	X12 X-Ray 6" UHV Valve (GP)		
1.11.1.1.12	X13 Front End		
1.11.1.1.12.1	X13 X-Ray Water Cooled Mask 0°		
1.11.1.1.12.2	X13 X-Ray 6" UHV Valve (GP)		
1.11.1.1.12.3	X13 X-Ray Water Cooled Aperture		
1.11.1.1.12.4	X13 X-Ray Water Cooled Paddle		
1.11.1.1.12.5	X13 X-Ray Water Cooled Beam Monitor		
1.11.1.1.12.6	X13 X-Ray W.C. Safety Shtr. 6mRad		
1.11.1.1.13	X14 Front End		
1.11.1.1.13.1	X14 X-Ray Water Cooled Mask 10°		
1.11.1.1.13.2	X14 X-Ray 6" UHV Valve (GP)		
1.11.1.1.13.3	X14 X-Ray Fast Valve "C" Type		
1.11.1.1.13.4	X14 X-Ray W.C. Safety Shtr. 18.18mRad	Pjerov/ Foerster/ Hu	Radulescu/ Newburgh
1.11.1.1.13.5	X14 X-Ray Water Cooled Aperture		
1.11.1.1.14	X15 Front End		
1.11.1.1.14.1	X15 X-Ray Water Cooled Mask $2½^o$		
1.11.1.1.14.2	X15 X-Ray 6" UHV Valve (GP)		
1.11.1.1.14.3	X15 X-Ray Fast Valve "C" Type		
1.11.1.1.14.4	X15 X-Ray W.C. Safety Shtr. 18.18mRad		
1.11.1.1.14.5	X15 X-Ray Water Cooled Aperture		
1.11.1.1.15	X16 Front End		
1.11.1.1.15.1	X16 X-Ray Water Cooled Mask 10°		
1.11.1.1.15.2	X16 X-Ray 6" UHV Valve (GP)		
1.11.1.1.15.3	X16 X-Ray Fast Valve "C" Type		
1.11.1.1.15.4	X16 X-Ray W.C. Safety Shtr. 10.3.10mRad		
1.11.1.1.15.5	X16 X-Ray Water Cooled Aperture		
1.11.1.1.16	X18 Front End		
1.11.1.1.16.1	X18 X-Ray Water Cooled Mask 10°		
1.11.1.1.16.2	X18 X-Ray 6" UHV Valve (GP)		
1.11.1.1.16.3	X18 X-Ray Fast Valve "C" Type		
1.11.1.1.16.4	X18 X-Ray W.C. Safety Shtr. 18.18mRad		
1.11.1.1.16.5	X18 X-Ray Water Cooled Aperture		
1.11.1.1.17	X19 Front End		
1.11.1.1.17.1	X19 X-Ray Water Cooled Mask $2½^o$		
1.11.1.1.17.2	X19 X-Ray 6" UHV Valve (GP)		
1.11.1.1.17.3	X19 X-Ray Fast Valve "C" Type		
1.11.1.1.17.4	X19 X-Ray W.C. Safety Shtr. 10.3.10mRad		
1.11.1.1.17.5	X19 X-Ray Water Cooled Aperture		
1.11.1.1.18	X20 Front End		

		Engineer	Technician
1.11.1.1.18.1	X20 X-Ray Water Cooled Mask 10°		
1.11.1.1.18.2	X20 X-Ray 6" UHV Valve (GP)		
1.11.1.1.18.3	X20 X-Ray Fast Valve "C" Type		
1.11.1.1.18.4	X20 X-Ray W.C. Safety Shtr. 18.18mRad		
1.11.1.1.18.5	X20 X-Ray Water Cooled Aperture		
1.11.1.1.19	X22 Front End		
1.11.1.1.19.1	X22 X-Ray Water Cooled Mask 10°		
1.11.1.1.19.2	X22 X-Ray 6" UHV Valve (GP)		
1.11.1.1.19.3	X22 X-Ray Fast Valve "C" Type		
1.11.1.1.19.4	X22 X-Ray W.C. Safety Shtr. 10.3.10mRad		
1.11.1.1.19.5	X22 X-Ray Water Cooled Aperture		
1.11.1.1.20	X23 Front End		
1.11.1.1.20.1	X23 X-Ray Water Cooled Mask 2½^{o}		
1.11.1.1.20.2	X23 X-Ray 6" UHV Valve (GP)	Pjerov/ Foerster/ Hu	Radulescu/ Newburgh
1.11.1.1.20.3	X23 X-Ray Fast Valve "C" Type		
1.11.1.1.20.4	X23 X-Ray W.C. Safety Shtr. 18.18mRad		
1.11.1.1.20.5	X23 X-Ray Water Cooled Aperture		
1.11.1.1.21	X24 Front End		
1.11.1.1.21.1	X24 X-Ray Water Cooled Mask 10°		
1.11.1.1.21.2	X24 X-Ray 6" UHV Valve (GP)		
1.11.1.1.21.3	X24 X-Ray Fast Valve "C" Type		
1.11.1.1.21.4	X24 X-Ray W.C. Safety Shtr. 10.3.10mRad		
1.11.1.1.21.5	X24 X-Ray Water Cooled Aperture		
1.11.1.1.22	X26 Front End		
1.11.1.1.22.1	X26 X-Ray Water Cooled Mask 10°		
1.11.1.1.22.2	X26 X-Ray 6" UHV Valve (VAT)		
1.11.1.1.22.3	X26 X-Ray Fast Valve "C" Type		
1.11.1.1.22.4	X26 X-Ray W.C. Sfty. Shtr. (Beamline "A" 6mRad)		
1.11.1.1.22.5	X26 X-Ray W.C. Sfty. Shtr. (Beamline "B" 6mRad)		
1.11.1.1.22.6	X26 X-Ray W.C. Sfty. Shtr. (Beamline "C" 6mRad)		
1.11.1.1.22.7	X26 X-Ray Water Cooled Aperture		
1.11.1.1.23	X27 Front End		
1.11.1.1.23.1	X27 X-Ray Water Cooled Mask 2½^{o}		
1.11.1.1.23.2	X27 X-Ray 6" UHV Valve (VAT)		
1.11.1.1.23.3	X27 X-Ray Fast Valve "C" Type		
1.11.1.1.23.4	X27 X-Ray W.C. Sfty. Shtr. (Beamline "A" 6mRad)		
1.11.1.1.23.5	X27 X-Ray W.C. Sfty. Shtr. (Beamline "B" 6mRad)		
1.11.1.1.23.6	X27 X-Ray W.C. Sfty. Shtr. (Beamline "C" 6mRad)		
1.11.1.1.23.7	X27 X-Ray Water Cooled Aperture		
1.11.1.1.24	X28 Front End		
1.11.1.1.24.1	X28 X-Ray Water Cooled Mask 10°		
1.11.1.1.24.2	X28 X-Ray 6" UHV Valve (VAT)		

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1.11.1.1.24.3	X28 X-Ray Fast Valve "C" Type		
1.11.1.1.24.4	X28 X-Ray W.C. Sfty. Shtr. (Beamline "A" 6mRad)		
1.11.1.1.24.5	X28 X-Ray W.C. Sfty. Shtr. (Beamline "B" 6mRad)		
1.11.1.1.24.6	X28 X-Ray W.C. Sfty. Shtr. (Beamline "C" 6mRad)		
1.11.1.1.24.7	X28 X-Ray Water Cooled Aperture		
1.11.1.1.25	X29 Front End	Lynch	
1.11.1.1.25.1	X29 X-Ray Water Cooled Mask 2½^{o}		
1.11.1.1.25.2	X29 X-Ray 12□ UHV Valve Port "A"		
1.11.1.1.25.3	X29 X-Ray 12□ UHV Valve Port "B"		
1.11.1.1.26	X30 Front End	Lynch/ Foerster	Radulescu/ Newburgh
1.11.1.1.26.1	X30 X-Ray Water Cooled Mask 10°		
1.11.1.1.26.2	X30 X-Ray 12" UHV Valve Port "A"		
1.11.1.1.26.3	X30 X-Ray 12" UHV Valve Port "B"		
1.11.1.1.26.4	X30 X-Ray Light Monitor Port "B"		
1.11.1.1.26.5	X30 X-Ray Mirror Part "B"		
1.11.1.2	X1 Insertion Device F/E		
1.11.1.2.1	Water Cooled Mask 0°		
1.11.1.2.2	UHV Valve (VAT)		
1.11.1.2.3	Fast Valve (Type "D")		
1.11.1.2.4	Water Cooled Aperture		
1.11.1.2.5	Beam Position Monitor		
1.11.1.2.6	UHV Valve (VAT)		
1.11.1.2.7	Beam Defining Aperture		
1.11.1.2.8	Safety Shutter		
1.11.1.2.9	Graphite Filter		
1.11.1.2.10	1½" UHV Valve (VAT)		
1.11.1.3	X21 Insertion Device F/E	Lynch/ Foerster	Radulescu
1.11.1.3.1	Water Cooled Mask 0°		
1.11.1.3.2	UHV Valve (VAT)		
1.11.1.3.3	Fast Valve (Type "D")		
1.11.1.3.4	Beam Position Monitor		
1.11.1.3.5	Beam Defining Aperture		
1.11.1.3.6	Safety Shutter		
1.11.1.3.7	Graphite Filter		
1.11.1.3.8	UHV Valve (VAT)		
1.11.1.4	X25 Insertion Device F/E	Lynch/ Foerster	Radulescu/ Newburgh
1.11.1.4.1	Water Cooled Mask 0°		
1.11.1.4.2	UHV Valve (VAT)		
1.11.1.4.3	Fast Valve (Type "D")		

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1.11.1.4.4	Beam Position Monitor		
1.11.1.4.5	Beam Defining Aperture		
1.11.1.4.6	Safety Shutter		
1.11.1.4.7	Graphite Filter		
1.11.1.4.8	UHV Valve (VAT)		
1.11.1.5	X17 Insertion Device F/E	Lynch/	Radulescu/
1.11.1.5.1	X-Ray Water Cooled Mask 0°	Pjerov	Newburgh
1.11.1.5.2	X-Ray 6" UHV Valve (VAT)		
1.11.1.5.3	X-Ray Fast Valve "D" Type		
1.11.1.5.4	X-Ray Beam Position Monitor		
1.11.1.5.5	X-Ray Aperture & Shutter Assy		
1.11.1.5.6	X-Ray Graphite Filter		
1.11.1.5.7	X-Ray Safety Shutter		
1.11.1.5.8	X-Ray Xenon Filter		
1.11.2 Beamline Components		Lynch/ Skarika	
1.11.2.1	X1 Beamline		
1.11.2.1.1	Bellows Assy		
1.11.2.1.2	Mirror Assy (LBL)		
1.11.2.1.3	1½" UHV Valve		
1.11.2.1.4	Mirror Box (EXXON)		
1.11.2.1.5	1½" UHV Valve		
1.11.2.1.6	Entrance Slit		
1.11.2.1.7	Lead Backstop		
1.11.2.1.8	1½" UHV Valve		
1.11.2.1.21	Scanning Transmission Microscope		
1.11.2.2	X17 Beamline	Lynch/ Skaritka/ Pjerov	
1.11.2.2.2	X17 Beamline Ion Pump 220 ℓ/s		
1.11.2.2.3	X17 Beamline Aperture & Shtr. Assy		
1.11.2.2.4	X17 Beamline Aperture & Shtr. Ion Pump 220 ℓ/s		
1.11.2.2.5	X17 Beamline Aperture & Shtr. Ion Gauge		
1.11.2.2.7	X17 Beamline Stress Assy		
1.11.2.2.8	X17 Beamline Safety Shtr. Ion Pump		
1.11.2.2.9	X17 Beamline Transport Hutch		
1.11.2.2.10	X17 Beamline Water Cooled Be Windows		
1.11.2.2.11	X17 Beamline Beam Stop Assy		
1.11.2.2.12	X17 Beamline B & C Hutch		
1.11.2.2.13	X17 Beamline Monochromator		
1.11.2.2.14	X17 Beamline Slits		

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1.11.2.2.15	X17 Beamline Fast Acting Safety Shtr.			
1.11.2.2.16	X17 Beamline Photon Shutter			
1.11.2.2.17	X17 Beamline Beam Monitors			
1.11.2.2.18	X17 Beamline Chair			
1.11.2.2.19	X17 Beamline Dual Beam Detector			
1.11.2.3	X21 Beamline		Lynch/ Skaritka	
1.11.2.4	X25 Beamline		Lynch/ Skaritka	
1.11.3	Vacuum System		Foerster/ Hu	DeBoer
1.11.3.1	SIP			
1.11.3.1.1	20 ℓ/s	(1)		
1.11.3.1.2	60 ℓ/s	(1)		
1.11.3.1.3	220 ℓ/s	(33)		
1.11.3.2	TSP	(33)		
1.11.3.3	BA Gauges	(30)		
1.11.3.4	RGA	(30)		
1.11.3.5	All Metal Valves	(30)		
1.11.4	X-Ray Total & Partial Pressure System		Foerster/ Hu	DeBoer
1.11.4.1	VG Mass Spect. Sys. (1)			
1.11.4.1.1	MPX-8 Multiplex	(2)		
1.11.4.1.2	SX-200 Controller	(1)		
1.11.4.1.3	Chart Recorder	(1)		
1.11.4.1.4	RF Box	(32)		
1.11.4.1.5	SX-200 Mass Spec Hd.	(32)		
1.11.4.1.6	VG Cables	(32)		
1.11.4.2	Total Pressure System			
1.11.4.2.1	Granvle Phlips Cntrler	(32)		
1.11.4.2.2	Varian (NIG) Gauge	(32)		
1.12	System: Process Water/Pneumatics			
1.12.1	Pump Room Equipment		Beauman	Santangelo/ Schwarz
1.12.1.1	High Pressure Copper System			
1.12.1.1.1	Heat Exchangers			
1.12.1.1.2	Pumps			
1.12.1.1.3	Motors			
1.12.1.1.4	Deionizers			
1.12.1.1.5	Control System			
1.12.1.2	Low Pressure Copper System			
1.12.1.2.1	Heat Exchangers			

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1.12.1.2.2	Pumps			
1.12.1.2.3	Motors			
1.12.1.2.4	Deionizer			
1.12.1.2.5	Control System			
1.12.1.3	Aluminum Water System			
1.12.1.3.1	Heat Exchangers			
1.12.1.3.2	Pumps			
1.12.1.3.2	Motors			
1.12.1.3.4	Deionizer			
1.12.1.3.5	Control System			
1.12.2	Experimental Water System		Beauman	Santangelo/ Schwarz
1.12.2.1	Heat Exchangers			
1.12.2.2	Pumps			
1.12.2.3	Motors			
1.12.2.4	Deionizer			
1.12.2.5	Control System			
1.12.3	Pneumatics		Beauman	Santangelo/ Schwarz
1.12.3.1	Low Pressure Air			
1.12.3.1.1	Compressors			
1.12.3.1.2	Dryers			
1.12.3.1.3	Filters			
1.12.3.2	High Pressure Nitrogen Gas			
1.12.3.2.1	Manifold			
1.12.3.2.2	Distribution Lines			
1.12.3.2.3	Regulators			
1.13	System: Facility Support			
1.13.1.13.1	CVC Penter Vac	(1)	Foerster/ Hu	DeBoer
1.13.1.13.2	GP 303 Ion Gauge	(2)		
1.13.1.13.3	GP 271 Ion Gauge	(5)		
1.13.1.14	Sublimation Ti Bal Control	(1)		
1.13.1.15	PE Bosstivac Supply	(1)		
1.13.1.16	VG SX-200 Controller	(2)		
1.13.1.17	VG SX-200 RF Supply	(2)		
1.13.1.18	Hughs DC Spot Welder VTA 50	(1)		
1.13.1.19	Ultrasonic Cleaner	(1)		
1.13.2	Machine Shop		Scheuerer	Shea
1.13.2.1	Machine Tools			

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1.13.2.2	Precision Measuring Tools		
1.13.3	Mechanical Tech Shop	Scheuerer	Shea
1.13.3.1	Machine Tools		
1.13.3.2	Precision Measuring Tools		
1.13.3.3	Surface Tables		
1.13.3.4	Material Handling Equipment		
1.13.3.5	Laminar Flow Hoods		
1.13.3.6	Ovens-Drying		
1.13.4	Survey	Haas/ Lynch	Pop/ Bambina/ Hubbard
1.13.4.1	Survey Equipment		
1.13.4.1.1	Theodolites		
1.13.4.1.2	Levels		
1.13.4.1.3	Inclinometer		
1.13.4.1.4	Plummets		
1.13.4.1.5	Precision Bubbles		
1.13.4.1.6	Lenses		
1.13.4.1.7	Scales		
1.13.4.2	Ring Component Survey		
1.13.4.2.1	X-Ray Ring Dipole Closure		
1.13.4.2.2	VUV Ring Dipole Closure		
1.13.4.2.3	X-Ray Ring PUE's Survey		
1.13.4.2.4	VUV Ring PUE's Survey		
1.13.4.2.5	X-Ray Ring Dipole Closure		
1.13.4.2.6	Booster Ring PUE's Survey		
1.13.4.3	Transfer Line Components Survey		
1.13.4.3.1	Booster-to-VUV Transfer Line		
1.13.4.3.2	Booster-to-X-Ray Transfer Line		
1.13.4.4	Beamline Components Survey		
1.13.5	Magnetic Measurements	Lynch/ Skaritka	Scheuerer
1.13.5.1	SCW		
1.13.5.2	Undulator/Wiggler		
1.13.5.3	Straight Section Multipoles		
1.13.5.4	72° Bender		
1.13.5.5	180° Dipole		
1.13.5.6	Fringe Field 180° Dipole		