

Maintenance at the SNS



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**Accelerator Systems
Operations Manager**

Maintenance is Done on Equipment (Assets) Against:

- **Equipment Manufacturers Specifications**
 - Supplied with equipment
- **Lead Engineers Experience/Best Practice**
- **Federal Regulations**
 - NFPA 70
- **SNS Requirements**
 - ASE/OE/SAD

Maintenance Management System

- **Datastream 7i (now INFOR EAM)**
- **PM Schedules**
 - **Multiple instances of equipment (assets) on a single schedule**
 - **Triggered by Calendar Time**
 - **ORACLE Triggers**
 - **Datastream scans the EPICS database in ORALCE at midnight reading equipment operating hours from onboard Clocks**
 - **PM Schedules include Inspections which trigger a repair “corrective**
- **PM with no Schedule on single or multiple assets**
- **Currently ~17,000 Assets in Datastream, adding ~2000 per shutdown.**

PM, Schedules and Single Jobs

- **Total of 336 PM Schedules**

- **Protection Systems: 82**
 - **Class I and II Safety Systems**
- **Controls: 21**
- **Power Distribution: 11**
 - **Power Panel Maintenance**
- **Target Mechanical: 92**
- **Cryogenic Systems: 12**
 - **Compressor Systems**
- **Mechanical Utilities: 36**
- **Site Services: 72**
 - **HVAC**
 - **Crane**

- **Total of 62 PMs not on Schedules**

Protection Systems

PM Schedule	Description	Problem Code	Group	Milestone Type	Type	WO Type	Perform Every	Period UOM	Priority
A-P-PPS-AIT-M001	PPS ODH Linac/Klystron O2 Transmitter Annual Sensor Element Replacement and Cal	PST	PST		Variable	Preventative Maintenance		1Years	Medium
A-P-PPS-AIT-M002	PPS ODH CHL O2 Transmitter Annual Sensor Element Replacement and Calibration	PST	PST		Variable	Preventative Maintenance		1Years	High
A-P-PPS-AIT-M005	PPS ODH CHL Annual Stand Alone Unit Sensor Element Replacement and Calibration	PST	PST		Variable	Preventative Maintenance		1Years	Medium
A-P-PPS-APPS-M001	ASE - PPS Linac Annual Certification	PST	PST	ASE	Variable	Planned Outage		1Years	High
A-P-PPS-APPS-M002	ASE - PPS HEPT Annual Certification	PST	PST	ASE	Variable	Planned Outage		1Years	High
A-P-PPS-APPS-M003	ASE - PPS Linac & HEPT Annual Certification	PST	PST	ASE	Variable	Planned Outage		1Years	High
A-P-PPS-APPS-M004	ASE - PPS Ring Annual Certification	PST	PST	ASE	Variable	Planned Outage		1Years	High
A-P-PPS-APPS-M005	ASE - PPS RTBT Annual Certification	PST	PST	ASE	Variable	Planned Outage		1Years	High
A-P-PPS-APPS-M006	ASE - PPS LINAC/HEPT/RING/RTBT Certification	PST	PST	ASE	Variable	Planned Outage		1Years	High
A-P-PPS-APPS-M007	ASE - PPS Accelerator & Target Annual Certification	PST	PST	ASE	Variable	Planned Outage		1Years	High
A-P-PPS-APPS-M008	PPS Linac, HEPT, Ring, RTBT Walkdown	PST	PST		Variable	Planned Outage		6Months	High
A-P-PPS-APPS-M009	ASE - PPS Front End Only Mode (MEBT Beam Stop) Annual Certification	PST	PST	ASE	Variable	Planned Outage		1Years	High
A-P-PPS-APPS-M010	ASE - PPS Ring/RTBT Gamma Blocker Annual Certification	PST	PST	ASE	Variable	Preventative Maintenance		1Years	High
A-P-PPS-APPS-M011	Charge MEBT Beam Stop with Nitrogen - Maintenance Day	PST	PST		Variable	Preventative Maintenance		6Months	High
A-P-PPS-CHMK-C001	ASE - PPS Chipmunk Annual Calibration	PST	PST	ASE	Variable	Calibration		1Years	High
A-P-PPS-CHMK-M001	PPS Chipmunk Quarterly Source Test -(Jan, April, July, Oct)	PST	PST		Fixed	Preventative Maintenance		3Months	Medium
A-P-PPS-CHMK-M002	PPS Chipmunk Quarterly Source Test (Feb, May, Aug, Nov)	PST	PST		Fixed	Preventative Maintenance		3Months	Medium
A-P-PPS-CHMK-M003	PPS Chipmunk Quarterly Source Test (Mar, Jun, Sept, Dec)	PST	PST		Fixed	Preventative Maintenance		3Months	Medium
A-P-PPS-CHMK-M004	ASE - PPS Chipmunk Linac Annual Certification	PST	PST	ASE	Variable	Preventative Maintenance		1Years	High

Cryogenics

PM Schedule	Description	Problem Code	Group	Type	WO Type	Perform Every	Period UOM	Meter Interval	Meter UOM
A-P-CRYO-CCV-M001	Cryo Inspect Condensate Collection on the Coupler Cooling Lines	RADCRYO	Cryogenics	Variable	Maintenance Day		3Weeks		
A-P-CRYO-CMP-M001	Cryo Compressor Monthly Change/Clean Control Console Air Filters	RADCRYO	Cryogenics	Variable	Preventative Maintenance		1Months		
A-P-CRYO-CMP-M002	Cryo Compressor & Oil Pump Annual Maintenance - METER	RADCRYO	Cryogenics	Variable	Preventative Maintenance			8760	HUR
A-P-CRYO-CMP-M003	Cryo Compressor Weekly Maintenance	RADCRYO	Cryogenics	Variable	Preventative Maintenance		1Weeks		
A-P-CRYO-CMP-M004	Cryo Compressor 6 Month Main Motor Bearings Oil Change	RADCRYO	Cryogenics	Variable	Preventative Maintenance		6Months		
A-P-CRYO-FLTR-M001	Cryo Cold Compressor Cabinet Monthly Filter Maintenance	RADCRYO	Cryogenics	Variable	Preventative Maintenance		1Months		
A-P-CRYO-GEN-M001	Cryo Research Mechanic Support for the CHL - Every Friday	RADCRYO	Cryogenics	Fixed	Routine		1Weeks		
A-P-CRYO-M005	Cryo Compressor 1000 hr METER - Grease Main Motor Bearings	RADCRYO	Cryogenics	Variable	Preventative Maintenance			1000	HUR
A-P-CRYO-PMP-M001	Cryo Weekly Spare Compressor, Pump and Motor Shaft Rotation	RADCRYO	Cryogenics	Variable	Preventative Maintenance		1Weeks		
A-P-CRYO-RP-M001	Cryo Vacuum Pump Semi-Annual Maintenance	RADCRYO	Cryogenics	Variable	Preventative Maintenance		6Months		
A-P-CRYO-VACCAR-M001	Cryo Annual Maintenance for Portable Vacuum Carts	RADCRYO	Cryogenics	Variable	Preventative Maintenance		12Months		
A-P-CRYO-VACP-M001	Cryo Foreline Pump Annual Maintenance	RADCRYO	Cryogenics	Variable	Preventative Maintenance		1Years		

Controls

PM Schedule	Description	Problem Code	Group	Milestone Type	Nesting Reference	Type	WO Type	Perform Every	Period UOM	Priority
A-P-CNTR-AIT-M001	Controls Verify Sensitivity of Drager H2 Transmitter in 8760 H2 Cabinet (outage)	TGTIC	Controls			Variable	Planned Outage		9Months	Medium
A-P-CNTR-AIT-M002	Controls Replace Drager H2 Sensor in 8760 H2 Cabinet (Outage)	TGTIC	Controls			Variable	Planned Outage		3Years	Medium
A-P-CNTR-AIT-M003	Controls Monthly Check/Calibration of the Mercury Analyzer	TGTIC	Controls			Fixed	Preventative Maintenance		4Weeks	Medium
A-P-CNTR-CAB-M001	Controls Replace PLC Battery in Cabinets	TGTIC	Controls			Variable	Routine		3Years	Low
A-P-CNTR-CAB-M002	Controls Clean Enclosure Fan Filters in the PLC, CPU, and I/O Enclosures	TGTIC	Controls			Variable	Routine		3Years	Low
A-P-CNTR-CMP-M001	Controls ICS Network Scan	RADCNTR	Controls			Variable	Planned Outage		1Years	Medium
A-P-CNTR-ENCL-M001	Controls Replace PLC battery in CF PLC Enclosures	RADCNTR	Controls			Variable	Maintenance Day		3Years	Low
A-P-CNTR-ENCL-M002	Controls Clean Enclosure Fan Filters in CF PLC Enclosures	RADCNTR	Controls			Variable	Preventative Maintenance		2Years	Low
A-P-CNTR-FT-001	Controls Fox Flow Transmitter Calibration	TGTIC	Controls			Variable	Calibration		2Years	Medium
A-P-CNTR-TE-M001	Controls Read Thermocouples TE9506 in the Injection Dump Concrete	TGTIC	Controls			Variable	Preventative Maintenance		3Months	Medium
A-P-CNTR-UPS-M001	Controls Inspect and Test UPS	RADCNTR	Controls			Variable	Maintenance Day		1Years	Low
T-P-8700-LKDET-C001	ASE/OE - Controls Target Hydrogen Gas Detection System Calibration	TGTIC	Controls	OE		Variable	Calibration		6Months	Medium
T-P-8700-SBDPMS-C001	Controls Tgt Service Bay Differential Pressure Monitoring Sys Calibration	TGTIC	Controls			Variable	Preventative Maintenance		2Years	High
T-P-8700-SBDPMS-C002	ASE Controls Tgt Service Bay Differential Pressure Monitoring Sys Certification	TGTIC	Controls	ASE		Variable	Inspection		1Years	High
T-P-8700-TPS-C001	Controls Target Protection System Annual Calibration	TGTIC	Controls		T-P-8700-TPS-C001	Variable	Calibration		12Months	High
T-P-8700-TPS-C002	ASE - Controls Target Protection System Annual Certification	TGTIC	Controls	ASE	T-P-8700-TPS-C001	Variable	Planned Outage		12Months	High

Electrical – Power Distribution

PM Schedule	Description	Problem Code	Group	Type	WO Type	Perform Every	Period UOM	Meter Interval	Meter UOM	Priority
A-P-8540-RN3PNL-M001	Electrical Panel Maintenance for Ring Substation SS3 (Outage)	RADPD	Electrical	Variable	Planned Outage		4Years			Medium
A-P-PD-ACPDC-M001	Electrical Maintenance for AC Distribution and Power Panels in the RTBT	RADPD	Electrical	Variable	Planned Outage		4Years			Medium
A-P-PD-CHSS3-M001	Electrical Maintenance for CHL SS3 Substation	RADPD	Electrical	Variable	Planned Outage		4Years			Medium
A-P-PD-HVCM-M001	Electrical Maintenance for HVCM Power Distribution Equipment	RADPD	Electrical	Variable	Planned Outage		2Years			Medium
A-P-PD-R5-M001	Electrical Maintenance for Power Panels in the CLO Riser 5	RADPD	Electrical	Variable	Preventative Maintenance		4Years			Medium
A-P-PD-RF3PNL-M001	Electrical Panel Maintenance for RFTF Substation SS3	RADPD	Electrical	Variable	Planned Outage		4Years			Medium
A-P-PD-UPS-M001	Electrical Monthly Maintenance for ATS/Generator Testing (Maintenance Day)	RADPD	Electrical	Variable	Maintenance Day		1Months			Medium
A-P-PD-UPS-M002	Electrical Maintenance for UPS Units	RADPD	Electrical	Variable	Planned Outage		12Months			Medium
A-P-PD-UPS-M003	Electrical Maintenance Change Battery on UPS Unit	RADPD	Electrical	Variable	Planned Outage		5Years			Medium

Mechanical Utilities

PM Schedule	Description	Problem Code	Group	Nesting Reference	Type	WO Type	Perform Every	Period UOM	Priority
A-P-CS-CHLLR-M002	Cooling Systems RFQ Chiller Semi-Annual Mechanical Maintenance	RADCSA	Mech Cooling Systems		Variable	Preventative Maintenance		6Months	Medium
T-P-8700-PMP-PD001	Cooling Loop Pump Predictive Maintenance	RADCSA	Mech Cooling Systems		Fixed	Preventative Maintenance		1Quarters	Medium
S-P-8913-FAN-M001	CUB Systems Cooling Tower Fans Gearbox Quarterly Maintenance	RADMU	Mechanical Utilities	S-P-8913-FAN-M002	Variable	Preventative Maintenance		3Months	Medium
S-P-8913-FAN-M002	CUB Systems Cooling Tower Fans Gearbox Semi-Annual Maintenance	RADMU	Mechanical Utilities	S-P-8913-FAN-M002	Variable	Preventative Maintenance		6Months	Medium
S-P-CEF-EF-M001	Central Exhaust Facility (CEF) Fans and Motors Quarterly Maintenance	RADMU	Mechanical Utilities	S-P-CEF-EF-M002	Variable	Preventative Maintenance		3Months	High
S-P-CEF-EF-M002	Central Exhaust Facility (CEF) Fans and Motors Semi-Annual Maintenance (Outage)	RADMU	Mechanical Utilities	S-P-CEF-EF-M002	Variable	Preventative Maintenance		6Months	High
S-P-CUB-AHU-M001	HVAC Front End and RFTF Units Quarterly AHU Maintenance	RADMU	Mechanical Utilities	S-P-8100-AHU-M002	Variable	Maintenance Day		3Months	Medium
S-P-CU-PMP-M002	CUB Systems Chilled Water Pump Semi-Annual Maintenance	RADMU	Mechanical Utilities	S-P-CU-PMP-M003	Variable	Preventative Maintenance		6Months	Medium
S-P-CU-PMP-M003	CUB Systems Chilled Water Pump Annual Maintenance	RADMU	Mechanical Utilities	S-P-CU-PMP-M003	Variable	Preventative Maintenance		12Months	Medium
S-P-CU-PMP-M004	CUB Systems Condenser Water Pump Quarterly Maintenance	RADMU	Mechanical Utilities	S-P-CU-PMP-M006	Variable	Preventative Maintenance		3Months	Medium
S-P-CU-PMP-M005	CUB Systems Condenser Water Pump Semi-Annual Maintenance	RADMU	Mechanical Utilities	S-P-CU-PMP-M006	Variable	Preventative Maintenance		6Months	Medium
S-P-CU-PMP-M006	CUB Systems Condenser Water Pump Annual Maintenance	RADMU	Mechanical Utilities	S-P-CU-PMP-M006	Variable	Preventative Maintenance		12Months	Medium
S-P-CU-PMP-M007	CUB Systems CUB Basement Sump Pumps Quarterly Maintenance	RADMU	Mechanical Utilities	S-P-CU-PMP-M009	Variable	Preventative Maintenance		3Months	Medium
S-P-CU-PMP-M008	CUB Systems CUB Basement Sump Pumps Semi-Annual Maintenance	RADMU	Mechanical Utilities	S-P-CU-PMP-M009	Variable	Preventative Maintenance		6Months	Medium
S-P-CU-PMP-M009	CUB Systems CUB Basement Sump Pumps Annual Maintenance	RADMU	Mechanical Utilities	S-P-CU-PMP-M009	Variable	Preventative Maintenance		12Months	Medium
S-P-CU-PMP-M010	CUB Systems Heating Water Pump Quarterly Maintenance	RADMU	Mechanical Utilities	S-P-CU-PMP-M012	Variable	Preventative Maintenance		3Months	Medium
S-P-CU-PMP-M011	CUB Systems Heating Water Pump Semi-Annual Maintenance	RADMU	Mechanical Utilities	S-P-CU-PMP-M012	Variable	Preventative Maintenance		6Months	Medium
S-P-CU-PMP-M012	CUB Systems Heating Water Pump Annual Maintenance	RADMU	Mechanical Utilities	S-P-CU-PMP-M012	Variable	Preventative Maintenance		12Months	Medium

Facility Operations (Site Services)

PM Schedule	Description	Problem Code	Group	Nesting Reference	Type	WO Type	Perform Every	Period UOM	Priority
S-P-8200-CRANE-MI003	Crane Annual Inspection	PSSO	Site Services	S-P-8200-CRANE-MI003	Variable	Preventative Maintenance	12	Months	Medium
S-P-8200-CRANE-MI004	Crane Monthly Inspection	PSSO	Site Services	S-P-8200-CRANE-MI003	Variable	Preventative Maintenance	12	Months	Medium
S-P-8600-AHU-M001	HVAC CLO 5th Floor Units Semi-Annual AHU Maintenance	PSSO	Site Services	S-P-8600-AHU-M005	Fixed	Preventative Maintenance	6	Months	Low
S-P-8600-AHU-M005	HVAC CLO 5th Floor Units AHU Annual Maintenance	PSSO	Site Services	S-P-8600-AHU-M005	Fixed	Preventative Maintenance	12	Months	Low
S-P-8600-AHU-M006	HVAC CLO Mezzanine Units Annual AHU Maintenance	PSSO	Site Services	S-P-8600-AHU-M006	Fixed	Preventative Maintenance	12	Months	Low
S-P-8600-AHU-M007	HVAC CLO 3rd Floor Units Annual AHU Maintenance	PSSO	Site Services	S-P-8600-AHU-M007	Fixed	Preventative Maintenance	12	Months	Low
S-P-8600-AHU-M008	HVAC CLO Misc Units Annual AHU Maintenance	PSSO	Site Services	S-P-8600-AHU-M008	Fixed	Preventative Maintenance	12	Months	Low
S-P-8600-AHU-M009	HVAC CLO 3rd Floor Units Semi-Annual AHU Maintenance	PSSO	Site Services	S-P-8600-AHU-M007	Fixed	Preventative Maintenance	6	Months	Low
S-P-8600-AHU-M010	HVAC CLO 3rd Floor Units Quarterly AHU Maintenance	PSSO	Site Services	S-P-8600-AHU-M007	Fixed	Preventative Maintenance	3	Months	Low
S-P-8600-AHU-M011	HVAC CLO General Exhaust Fan Semi-Annual Maintenance	PSSO	Site Services		Variable	Preventative Maintenance	6	Months	Low
S-P-8600-AHU-M014	HVAC CLO Misc Units Quarterly AHU Maintenance	PSSO	Site Services	S-P-8600-AHU-M008	Fixed	Preventative Maintenance	3	Months	Low
S-P-8600-AHU-M015	HVAC CLO Misc Units Semi-Annual AHU Maintenance	PSSO	Site Services	S-P-8600-AHU-M008	Fixed	Preventative Maintenance	6	Months	Low
S-P-8600-AHU-M016	HVAC CLO 5th Floor Units Quarterly AHU Maintenance	PSSO	Site Services	S-P-8600-AHU-M005	Fixed	Preventative Maintenance	3	Months	Low
S-P-8600-AHU-M017	HVAC AHU Data Aire Units Quarterly Maintenance	PSSO	Site Services	S-P-8600-AHU-M017	Variable	Preventative Maintenance	3	Months	Low
S-P-8600-AHU-M018	HVAC AHU Data Aire Units Monthly Maintenance	PSSO	Site Services	S-P-8600-AHU-M017	Variable	Preventative Maintenance	1	Months	Low
S-P-8600-AHU-M12	HVAC CLO Mezzanine Units Quarterly AHU Maintenance	PSSO	Site Services	S-P-8600-AHU-M006	Fixed	Preventative Maintenance	3	Months	Low
S-P-8600-AHU-M13	HVAC CLO Mezzanine Units Semi-Annual AHU Maintenance	PSSO	Site Services	S-P-8600-AHU-M006	Fixed	Preventative Maintenance	6	Months	Low

Target

PM Schedule	Description	Problem Code	Group	Milestone Type	Nesting Reference	Type	WO Type	Perform Every	Period UOM	Priority
T-P-8700-ADS-M001	Carbon Adsorber Annual Testing	TGTMECH	Target Mech			Variable	Preventative Maintenance		1Years	High
T-P-8700-CMS-I001	ASE - CMS Vent Path Integrity Verification	TGTMECH	Target Mech	ASE		Fixed	Inspection		1Years	High
T-P-8700-CRANE-I002	High Bay Life Line Annual Test	TGTMECH	Target Mech			Variable	Inspection		1Years	Medium
T-P-8700-CV-I001	ASE - Core Vessel Vent Path Integrity Verification	TGTMECH	Target Mech	ASE		Fixed	Inspection		1Years	High
T-P-8700-DAMP-C001	ASE - PCE Back Draft Damper Annual Recertification	TGTMECH	Target Mech	ASE	T-P-8700-DAMP-C001	Variable	Planned Outage		12Months	High
T-P-8700-DAMP-I002	OE - PCE Back Draft Damper Quarterly Inspection	TGTMECH	Target Mech	OE	T-P-8700-DAMP-C001	Variable	Inspection		3Months	Medium
T-P-8700-FAN-M001	Semi-Annual HUR Exhaust Fan Maintenance	TGTMECH	Target Mech			Variable	Preventative Maintenance		6Months	Medium
T-P-8700-FCU-M002	Quartely Basement Fan Coil Unit Maintenance	TGTMECH	Target Mech		T-P-8700-FCU-M003	Variable	Preventative Maintenance		1Quarters	Low
T-P-8700-FCU-M003	Semi-Annual Basement Fan Coil Unit Maintenance	TGTMECH	Target Mech		T-P-8700-FCU-M004	Variable	Preventative Maintenance		2Quarters	Low
T-P-8700-FCU-M004	Annual Basement Fan Coil Unit Maintenance	TGTMECH	Target Mech			Variable	Preventative Maintenance		1Years	Low
T-P-8700-FCU-M006	Quarterly Service / Manipulator Gallery Fan Coil Unit Maintenance	TGTMECH	Target Mech		T-P-8700-FCU-M007	Variable	Preventative Maintenance		3Months	Low
T-P-8700-FCU-M007	Semi-Annual Service / Manipulator Gallery Fan Coil Unit Maintenance	TGTMECH	Target Mech		T-P-8700-FCU-M008	Variable	Preventative Maintenance		6Months	Low
T-P-8700-FCU-M008	Annual Service /Manipulator Gallery Fan Coil Unit Maintenance	TGTMECH	Target Mech			Variable	Preventative Maintenance		1Years	Low
T-P-8700-FH-M001	Target HEPA Filters Semi-annual Penetration Testing and Inspection	TGTMECH	Target Mech			Fixed	Inspection		6Months	High
T-P-8700-HEPVAC-M001	Target HEPA Vacuum Cleaner Annual Testing	TGTMECH	Target Mech			Fixed	Inspection		1Years	Medium

Conclusions

- **We have an excellent MIS tool for Creating PM Schedules and individual PMs**
- **PMs can be released by calendar time or by machine clocks**
- **Maintenance is tracked with ORACLE security (certified by NRC and FDA) for Class I and II Safety Systems**
- **We accumulate the complete maintenance history by Asset/Position/Location**
- **We are working to synchronize the Datastream/EPICS/Operations Management databases.**