



Princeton Plasma Physics Laboratory

Mission Readiness System Description for Facilities and Infrastructure (Mission Readiness)

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Revision 0

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I. INTRODUCTION and PURPOSE

The Princeton Plasma Physics Laboratory (PPPL) is a Department of Energy (DOE) National Laboratory that works with collaborators across the globe to develop fusion as an energy source for the world, and conducts research along the broad frontier of plasma science and technology. PPPL also nurtures the national research enterprise in these fields, and educates the next generation of plasma and fusion scientists.

PPPL employs the Mission Readiness System for Facilities and Infrastructure (Mission Readiness) to provide the buildings, facilities, and infrastructure that support the PPPL research, experiments, and operations and enable delivery of the science mission.

Key Principles

The following key principles define PPPL Mission Readiness:

- The research activities to pursue the PPPL vision and missions define the infrastructure and facilities needed for success in the near-, mid- and long-term.
- PPPL facilities and infrastructure are effectively and efficiently provided, managed and maintained within the constraints of the available resources to ensure that they are ready to support the scientific missions of the Laboratory.
- Mission Readiness processes and procedures are documented and followed to ensure that mission needs are adequately defined, effectively communicated among project and infrastructure organizations, and provided in a planned, cost effective, and timely manner.
- Risks are carefully considered and factored into the prioritization of facility and infrastructure activities and the allocation of resources.
- Mission Readiness is achieved while ensuring safety, financial responsibility, and environmental sustainability.

II. APPLICABILITY

PPPL Mission Readiness applies to all PPPL facilities and infrastructure except as noted below, and to the workers that manage, perform, and assess the work necessary to ensure that these facilities are provided effectively, efficiently, safely, securely, and in compliance with contractual requirements. This System does not apply to programmatic infrastructure and equipment for projects and activities that is provided by direct funds designated specifically for those projects and activities.

III. SYSTEM OVERVIEW

A. Description

PPPL Mission Readiness is part of the Laboratory’s overall integrated management approach, which provides a framework for planning all activities and ensuring that they are aligned with and support the Laboratory mission. This approach begins with Laboratory leadership – with input from multiple internal and external stakeholders – setting the strategic direction for the Laboratory. Documents such as the Annual Laboratory Plan, organizational and activity budgets, and the contract are developed with broad input from line management, Princeton University, and DOE. These documents include, goals, objectives, and performance measures and provide further strategic, operational, and tactical direction for PPPL projects and departments. As a result, all PPPL activities, including facility and infrastructure support activities, are aligned with the Laboratory mission. Figure 1 depicts the PPPL Integrated Management approach; Mission Readiness (highlighted in yellow) is part of the Strategic Planning and Alignment step in the process.

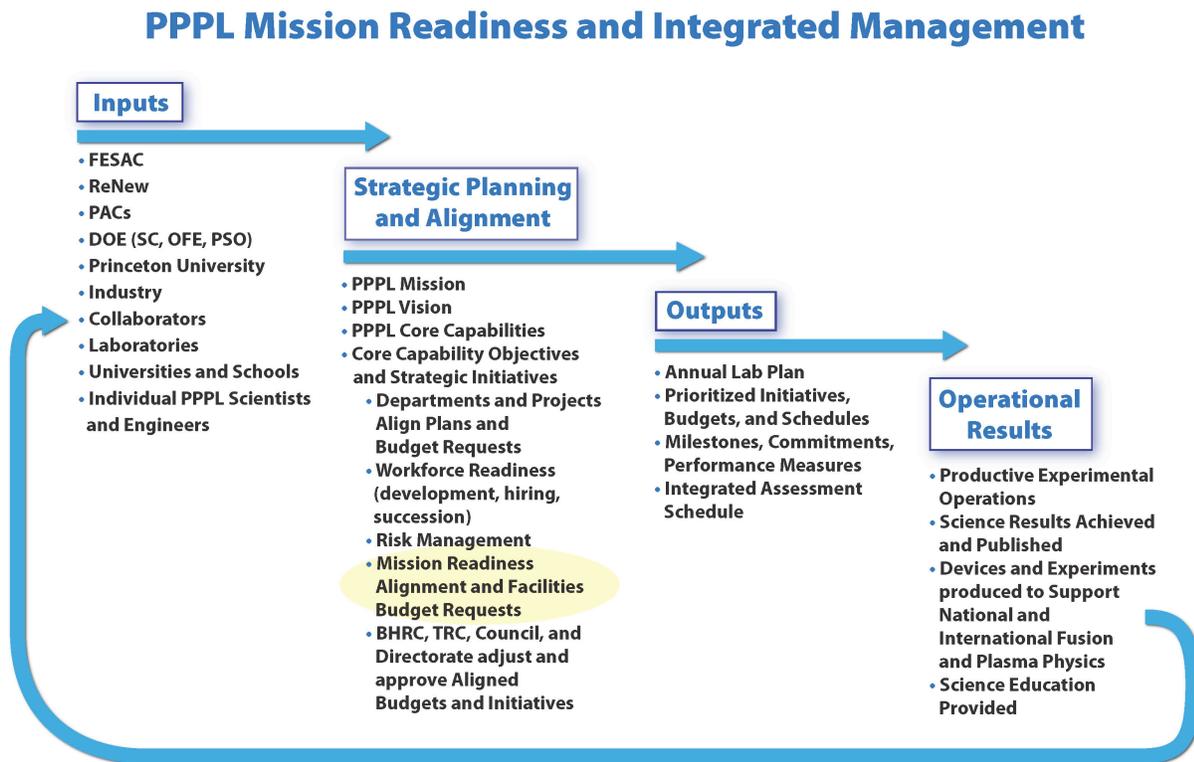


Figure 1

Figure 2 depicts the Mission Readiness cycle and how the alignment with PPPL missions is carried forward through all facilities and infrastructure support planning and work activities. The cycle starts with reviewing and gathering input from the Annual Lab Plan, facilities planning meetings with stakeholders, and physical infrastructure assessments; includes facilities risk assessments, project planning, budgeting, prioritization, review and approval by the senior management Technical Resources Committee (TRC), and scheduling; continues through actual performance of the work; and culminates with comparison of results versus the established

goals, objectives, and metrics. The results and lessons learned from all of these efforts are inputs for the planning of activities in subsequent years. The Mission Readiness Process is explained more fully in Section IV, below.

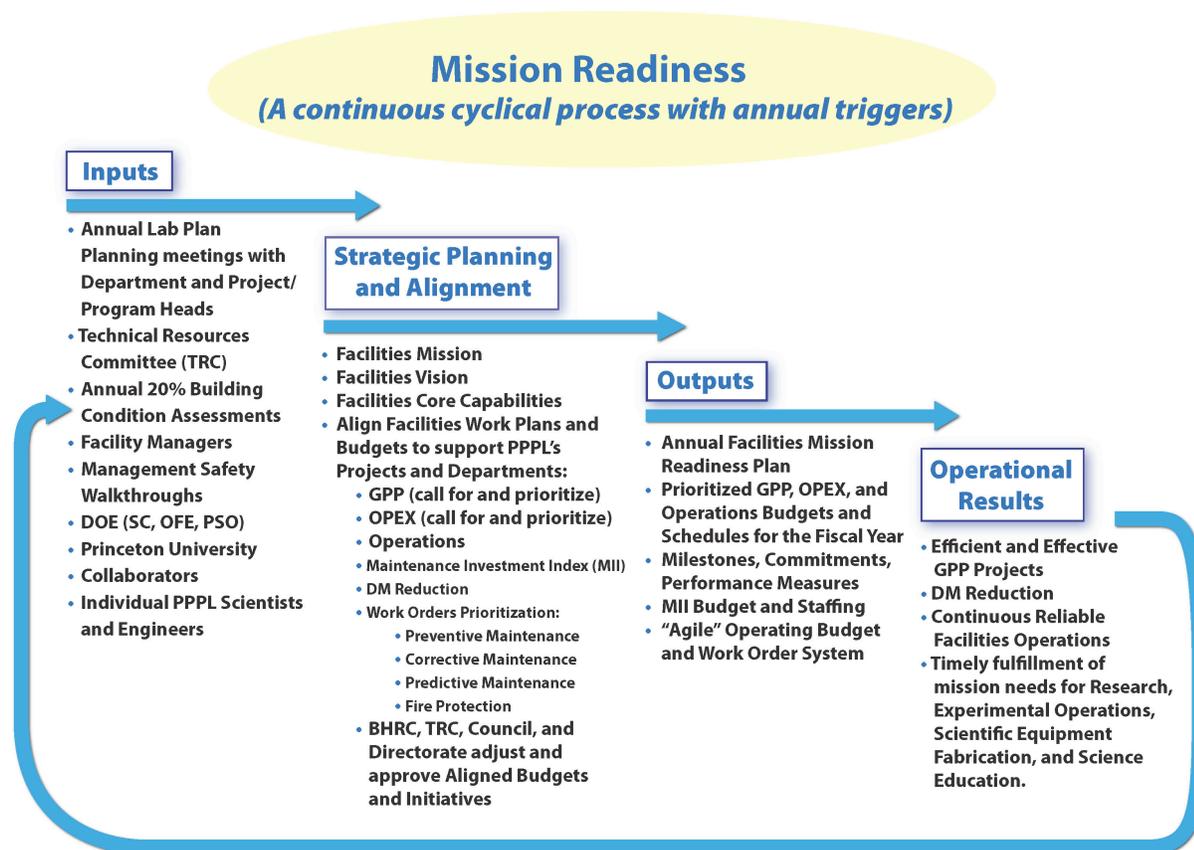


Figure 2

B. Management, Administration and Coordination

Key to the effectiveness of the Mission Readiness process are the meetings and communications between project and departmental management and the Engineering and Infrastructure Department and Facilities Division to clarify mission needs, available resources, gaps that might exist, and the plans to address the needs.

Based on the PPPL strategic plan, the Associate Director for Engineering and Infrastructure ensures that the mission needs of PPPL projects and departments are understood and that the facility and infrastructure requirements necessary to support those mission needs are identified, prioritized, and fulfilled in a cost effective, efficient, and compliant manner.

Responsibilities of the Engineering and Infrastructure Department include:

- Effectively managing Mission Readiness consistent with PPPL and DOE Policies and requirements;

- Ensuring open and continuous communication regarding the mission needs of PPPL projects and departments as well as the interests of DOE stakeholders and identifying the facility and infrastructure requirements necessary to support those mission needs;
- Identifying any necessary line item projects and leading efforts and proposals to obtain project support and funding.

Responsibilities of the Facilities Division include:

- Functioning as the “owner” of Mission Readiness.
- Establishing facilities and infrastructure priorities, annual work plans and resource investments that are based on risk evaluation and alignment with mission readiness.
- Organizing periodic meetings and interviews with PPPL individuals responsible for the Laboratory’s Identified Key Core Capability Objectives, program managers, project managers, and the appropriate managers and Division Heads of the Engineering and Infrastructure Department to ensure that mission needs are adequately defined and effectively communicated among these organizations.
- Documenting and tracking the infrastructure requirements to meet these mission needs -- including how plans for facilities and infrastructure will support the PPPL missions in the future five- and ten-year periods and addressing any gaps that exist between the Core Capability Needs and existing conditions. [This information is included in the Lab’s Strategic Plan and Facilities and Mission Readiness section of the Lab Annual Plan.]
- Performing annual comprehensive building inspections of a minimum of 20% of the overall PPPL facilities, resulting in all buildings and facilities being inspected at least once every 5 years.
- Conducting annual inspections of infrastructure support assets that are of a general nature and support multiple missions at the Laboratory and documenting and tracking the infrastructure and facility requirements required to meet the Laboratory missions and addressing any gaps that exist.
- Reviewing any deficiencies resulting from building and facility inspections and incorporating them into the appropriate work stream (i.e., GPP, OPEX, and Maintenance Work Order System).
- Using the input gathered from the planning meetings to establish prioritized lists and plans of infrastructure and facilities efforts that are required to meet the identified program and project needs. These plans and lists include line item projects, General Plant Projects, OPEX projects, and other projects and activities.
- Communicating the components and requirements of Mission Readiness to the TRC, to PPPL projects and departments, and to the staff and managers of the Facilities Division, and engaging these parties in the implementation of the System.
- Attaining feedback on the proposed infrastructure plans and their priorities, including reviews and approvals by the Technical Resources Committee (TRC) and its Subcommittee for Infrastructure Prioritization.
- Executing facility and infrastructure projects and activities in a planned, cost effective, and timely manner in accordance with approved cost, schedule, and scope.
- Providing, managing, and maintaining PPPL facilities and infrastructure to meet the mission needs.
- Ensuring that mission needs are effectively communicated among projects and infrastructure organizations.

- Ensuring that risks associated with facility and infrastructure conditions, mission readiness, and project execution are appropriately considered and managed.
- Ensuring that all facilities and infrastructure work is accomplished safely and securely, and in accordance with appropriate quality, financial, and environmental sustainability levels.
- Defining the components, roles, and responsibilities of Mission Readiness in Lab-wide and Facilities Division policies, procedures and work instructions.
- Vetting suggested improvements to PPPL facilities and infrastructure that are not identified through the GPP, OPEX, and Maintenance Work Order processes for appropriate review and processing.

The Technical Resources Committee is the Laboratory's senior management advisory committee for facilities and infrastructure issues. Detailed responsibilities of the TRC are described in the TRC Charter – Laboratory document O-044.

C. Oversight and Assurance

The Department of Energy's Princeton Site Office (DOE-PSO) provides comprehensive oversight of the PPPL facilities and infrastructure activities. The DOE-PSO roles include:

- Approving all General Plant Projects (GPP) expenditures via construction directives,
- Holding GPP status meetings twice a year with PPPL Facilities Management personnel,
- Attending on-site safety briefs, work progress meetings, and conducting general awareness walkthroughs,
- Overseeing PPPL Maintenance programs (Predictive, Preventative, Corrective, Deferred) by tracking work order status on a weekly basis, and holding OPEX/Maintenance meetings twice a year with PPPL Facilities Management personnel,
- Participating in the PPPL Management Safety Walkthrough program,
- Monitoring the Facilities Information Management System (FIMS),
- Reviewing FIMS data throughout the year,
- Conducting an annual FIMS Validation.

In addition, the DOE Office of Science's (DOE-SC) Laboratory Mission Readiness Peer Review program assesses the quality, priority, and balance of infrastructure investments and management to ensure they are consistent with the Laboratory and DOE-SC missions, plans, and investments. They also provide a means for sharing lessons learned and best practices among Laboratories.

Internal PPPL project management reviews and frequent project and work status reports provide ongoing oversight and assurance to management. In addition to include technical reviews, these activities also include Planning and Control reviews of finances, budgets, schedules, and scope, provided by experts under the Chief Financial Officer's purview.

The PPPL Assurance System Description provides comprehensive information on the assessments, reports, and evaluations that are performed by DOE, Princeton University, PPPL, and external organizations and provide oversight and assurance of all PPPL activities, including Mission Readiness.

IV Mission Readiness Process

The DOE Office of Science (DOE-SC) mission readiness process is depicted in Figure 3. The process shows how DOE-SC scientific priorities are established and how those priorities and related business planning guidance and direction are flowed to the Laboratory. Based on this DOE guidance and direction, PPPL scientific priorities are identified and integrated with facilities and infrastructure plans and budgets and submitted to DOE-SC as part of the Annual Lab Plan. This process ensures that PPPL scientific and infrastructure needs and funding requests are aligned with DOE-SC priorities and funding guidance; addressing customer and stakeholder needs.

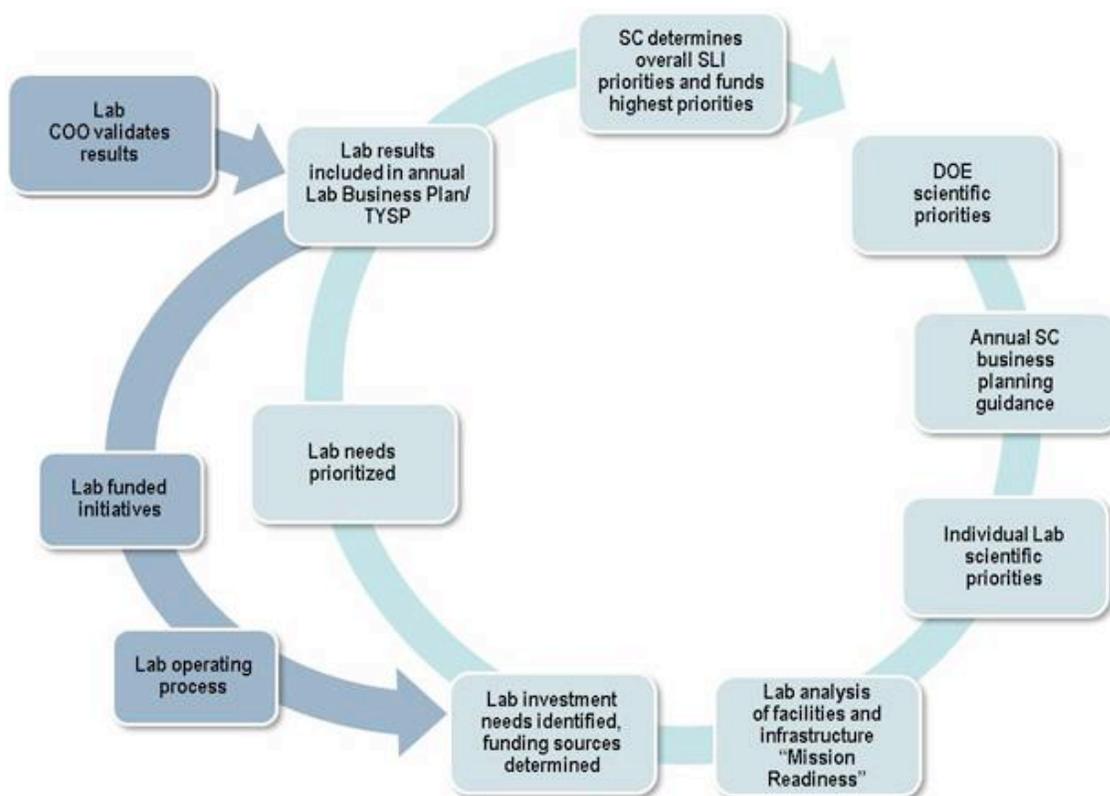


Figure 3 - DOE-SC Mission Readiness Process

The major components of PPPL Mission Readiness, shown in Figure 2, are described below. These components are implemented and documented by several Laboratory procedures and documents, which are listed in Attachment 1.

The Condition Assessment Process at PPPL is an important element of the overall Mission Readiness program and it meets requirements established in DOE Order 430.1B, Real Property Asset Management. The Facilities Division and the Power Engineering Branch of the Laboratory perform annual building and facility inspections as part of this process. Each year,

approximately twenty percent of the Laboratory space, based on square footage of buildings, is inspected. The Facilities Division establishes which buildings will be inspected in order to meet the twenty percent per year guidance promulgated by DOE. Each building is scheduled for inspection within a five-year time frame. Each building is inspected by lead craftsmen who are experts in their field and engineers using guidelines published by R.S. Means. All building systems are inspected, including HVAC, electrical distribution, plumbing, roofing, walls and finishes, floors and finishes, building exteriors, superstructure, doors and partitions, foundations, basements, elevators, and cranes. Results of the inspections are reviewed by Facilities Engineers to calculate the costs of performing repairs, maintenance, and improvements. This Condition Assessment provides input to the annual planning for infrastructure projects. Additional input is provided in the form of issues identified by Management Safety Walkthroughs, Facility Manager walkthroughs and operational awareness activities, staff observations and recommendations, and line manager suggestions.

Planning for facilities and infrastructure management and investment begins with the PPPL Strategic Plan, the planned research activities, and the current condition and availability of facilities. The PPPL Strategic Plan is the product of continual science, technology and research discussions and planning activities that tie the science Vision, Lab Missions, and Strategic plan together in a manner that is consistent with DOE direction and needs. The Strategic Plan and initiatives are summarized and submitted to DOE as the PPPL Annual Lab Plan. Facilities and infrastructure planning begins for the upcoming fiscal year (FY+1) as well as years FY+ 2, FY+5, and FY+10. Using mission readiness worksheets and follow-up planning meetings, the Facilities Division solicits mission needs input from Department and Project Heads with responsibility for Core Capabilities as well as the Associate Director for Engineering and Infrastructure and the division heads of that department.

The PPPL Facilities Division has lead responsibility for defining the scopes of facility and infrastructure projects and suggesting the project and activity priorities in alignment with Laboratory mission priorities. Projects and activities can be funded as a General Plant Project (GPP), typically for the larger projects that must be capitalized, as small projects completed using operational funds (OPEX), or as part of routine plant maintenance (corrective, predictive, and preventive). In addition and as needed, the Associate Director for Engineering and Infrastructure will lead the pursuit for additional line item funding to adequately address mission readiness gaps. Annually, the Facilities Division compiles the mission readiness plan, which consists of prioritized lists, schedules, and budgets for line-item, GPP, OPEX, and maintenance projects and activities that will be funded and the proposed future funding profiles. Senior Management is involved with this entire process and they provide reviews, ensure that any mission readiness gaps are addressed, and adjust priorities of projects as necessary to ensure alignment with core capabilities, mission needs, funding profiles, and the Strategic Plan.

On an annual basis, the TRC Subcommittee for Infrastructure Prioritization reviews and ranks the queue of capital projects. Projects are risk-ranked using several qualitative criteria. Special attention is given to projects that affect the safety or security of PPPL staff and guests. The Associate Director for Engineering and Infrastructure reviews the rankings and recommendations of the TRC Subcommittee, makes adjustments, and presents the final recommendations to the full TRC. Based on the availability of funds for the subject fiscal year, projects will be selected for implementation by the TRC, which is composed of senior PPPL managers from both Operations and Research.

In a similar fashion, the Operating Expense (OPEX) projects are evaluated by an OPEX subcommittee comprised of engineers and technicians. An annual OPEX project plan is developed based on historic maintenance cost, failure history, criticality to the Laboratory's

mission, and available budget. The plan is finalized by the Head of Facilities and reviewed and approved by the Associate Director for Engineering and Infrastructure.

An extensive maintenance system has been implemented in order to keep the Laboratory's facility and equipment operating at their optimum condition. The maintenance system consists of electronic work order requests for corrective items and regularly scheduled preventative items. Work order requests are evaluated, classified, and prioritized using several criteria with personnel safety being the highest priority. Preventive maintenance (PM) is scheduled through the automated PM system in accordance with the equipment manufacturer's specifications. Along with performing the needed preventative maintenance, the PM system permits the tracking of the overall condition of facilities and facility equipment. This data, along with data from the FIMS database, are monitored and used to determine the level of deferred maintenance, progress made in reducing the deferred maintenance backlog, the asset condition index (ACI), and other metrics, which are subsequently used to facilitate maintenance planning and decision making. Project management techniques, including reviews and status meetings, help to monitor the progress on facilities and infrastructure projects. As projects progress, the need for changes may become apparent. For example, emergent needs, unavailability of resources to efficiently complete a specific project, or new options for addressing needs may be identified. As a result, plans and schedules can be readily reviewed and modified by re-examining priorities and vetting proposed schedule, funding, and scope changes via the same approved review processes.

The infrastructure maintenance program includes a backlog of maintenance work that is a function of many variables, including ES&H issues, funding availability, staffing, and the Laboratory's experimental objectives. Where feasible, equipment beyond its lifecycle is removed from service or replaced with new equipment. As resources for the Facilities Division increase, additional work that has been identified and priority-ranked can be accomplished. Concentrated effort is made to continually and prudently reduce the deferred maintenance backlog within budget constraints. Preventative maintenance that is critical to the health and safety of the staff, or the protection of the environment, is not extended or eliminated.

Information from the Facilities Division's annual mission readiness plan, including the Laboratory's proposed budgets for line-item, GPP, OPEX, and maintenance projects and maintenance investment index (MII) are approved by the Associate Director for Engineering and Infrastructure. These are then included in the Annual Lab Plan within the Facilities and Mission Readiness section and the Integrated Facilities and Infrastructure (IFI) Crosscut Budget, and approved by the Laboratory Deputy Directors for Research and Operations and by the Director. The DOE-PSO is consulted on any major projects prior to initiation. In addition, as work plans progress, the status of the infrastructure and maintenance program, and major GPP and OPEX projects are routinely discussed with members of the DOE staff.

The Mission Readiness is flexible and agile – plans and planned activities can be modified for a number of reasons, such as emergent needs, unavailability of resources to efficiently complete a specific project, or new options for addressing a need arise. As changes are needed plans can be modified by applying the same established review and approval processes can be used to revisit priorities, funding, scope, and schedule.

Mission Readiness Documents and Records

Requirements / Governing Documents

Laws, Regulations, Contract, and
DOE Guidance and Direction for
Budgets, Programs, Projects, Facilities, and
Annual Lab Plan

Documents Owned by Facilities Division

- **Mission Readiness System Description**
- **GEN-009 "GPP Prioritization"**
- **ENG-005 "General Plant Projects Administration"**
- **ENG-051 "Facilities and Infrastructure Mission Readiness"**
- **ENG-052 "OPEX Projects Prioritization and Admin."**
- **EFA-003 – "Work Order Prioritization and Admin. "**
- Facilities Division Procedures (EFA-xxx)

Lab-wide Documents

- Integrated Safety Management System Description
- PPPL Worker Safety and Health Program
- PPPL ES&H Directives (ESHDS)
- Lab-wide ESH-xxx Procedures including ESH-004 "Job Hazard Analysis", etc.
- Institutional QA Plan and Lab-wide QA Procedures
- Lab-wide Engineering procedures (ENG-xxx) including ENG-006 "Preparation, Review and Approval of Specifications & Statements of Work", ENG-032 "Work Planning Procedure", ENG-033 "Design Verification", etc.
- Budget, Accounting, Procurement, and Personnel Practices Manuals and Procedures

Planning Documents

- PPPL Annual Lab Plan
- Minutes of Facilities Planning Meetings with Department, Project, and Program Heads
- Mission Readiness Worksheets for Each PPPL Core Capability Objective
- Facilities / Mission Readiness Section of the PPPL Annual Plan
- Technical Resources Committee (TRC) Minutes
- GPP Schedule and Project Plans
- OPEX Plans and Schedule
- Prioritized Work Order Schedule
- MII and DM Reduction Budgets and Plans
- Integrated Facilities and Infrastructure (IFI) Cross-Cut Budget and Staffing Plan
- Milestone, Commitment, Performance Measure, PEMP Goals

Personnel Plans / Procedures

- Worker Training and Development Plans and Matrices
- ENG-041 "Electrician Qualification"
- ENG-042 "Boiler Operator Qualification"
- ENG-043 "Carpenter Qualification"
- ENG-044 "HVAC Mechanic Qualification"
- ENG-045 "Machinist Qualification"
- ENG-046 "Metal Fabricator Qualification"
- ENG-047 "Facilities Technician Qualification"

Results / Records

- Budget Performance Results
- GPP Project Results (cost, schedule, scope)
- Facility Manager Walkthrough Results
- Management Safety Walkthrough Results
- Performance Evaluation and Measurement Plan Metrics (PEMPs) Reports
- MII Status
- DM Reduction Progress Reports and Results
- System Availability Reports
- Work Order Reports
- Completed Work Orders