TEMPORARY CHANGE REQUEST

TCR NO.TCR-ASD/CAS,R6-001
(e.g., TCR-ENG-021,R0-001)

The Temporary Change Request (TCR) Form is to be used to process urgent or minor changes for PPPL Policies, Organization/Mission Statements and Procedures. The TCR should be used when changes are:
1) urgent, and can not wait the 2-4 week period for Department Head review/comment, or
2) minor, and do not warrant Department Head review.

Person Requesting Change: James B. Graham **Phone Ext: 2701**

Department Name: Best Practices and Outreach

Document Number: _____ **Revision No.: 6**

Document Title: PPPL Assurance System Description

Reason for change:
Periodic review and update of PPPL Assurance/CAS System.
Update Attachment 1 - Upper Level Risk Matrix of PPPL Activities.
Update Attachment 2 - Risk Category Mitigation Summary.
Update organizational names.
Update meeting name from CAS Meeting to Assessments and Action Items Meeting.

Change description: (Summarize and attach changed pages, with changes clearly indicated)
Replaced Attachment 1 with updated Upper Level Risk Matrix.
Updated Attachment 2 - Risk Category Mitigation Summary.
Updated organization names in several places.

1. Does this TCR significantly alter the intent or scope of the document? **YES:**_____ **NO:X**_____

2. Does this TCR significantly impact **ES&H**? **YES:**_____ **NO:X**_____

If 1 or 2 is **YES**, Explain why the changes should not be routed for Department Head review:

James B. Graham 10/22/15
Department/Division Head Approval **Date**

John De Looper 10/23/15
Head, Best Practices and Outreach/designee **Date**

Release/Effective date of this TCR: **10/23/15**

Incorporate this TCR into next revision of this document? **YES:X** **NO:**_____

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TCR-ASD/CAS,R6-001 OCT. 2015

Assurance System Description
for
Princeton Plasma Physics Laboratory
August 2014
Revision 6

Approved: _____
Director (Stewart Prager)

Approved: _____
Princeton University Vice President for PPPL (A.J. Stewart Smith)

Note: The DOE-PSO Contracting Officer approved Revision 3 of this document in July 2010 in accordance with Contract Clause H.50. Subsequent revisions are provided to the DOE Site Office for review.

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STATEMENT OF LABORATORY ASSURANCE POLICY

The Princeton Plasma Physics Laboratory (PPPL) is a Department of Energy National Laboratory that is managed and operated by Princeton University. PPPL 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 nurtures the national research enterprise in these fields, and educates the next generation of plasma and fusion scientists.

The PPPL Assurance System is an integral part of the PPPL management system that measures the effectiveness and efficiency of Laboratory operations ultimately allowing us achieve our mission and satisfy customer expectations.

It is the policy of Princeton University to fully implement the Assurance System so that the Laboratory mission is accomplished; the operations are in compliance with legal requirements, contract requirements and other customer commitments; and the funding and assets are used most productively in support of the mission of the Laboratory and in the interests of taxpayers. It is the responsibility of all PPPL staff members to assure the effectiveness, efficiency, and compliance of work activities, consistent with the Integrated Safety Management and Institutional Quality Assurance policies. The Assurance System is integral towards keeping the Laboratory on course in achieving its mission and minimizing the effects and unacceptable risks of non-conformances.

Our program emphasizes three key principles:

- The most essential resources are the dedicated, diligent, and creative staff.
- People who perform the work have the greatest effect on outcomes and quality.
- Problem prevention is more cost-effective than problem correction.

Accordingly, our assurance program establishes a management system that provides a process for continuous improvement in Laboratory operations fully supported by the Laboratory staff, Princeton University and the Department of Energy.

Director
Princeton Plasma Physics Laboratory

Vice President for PPPL

Princeton University

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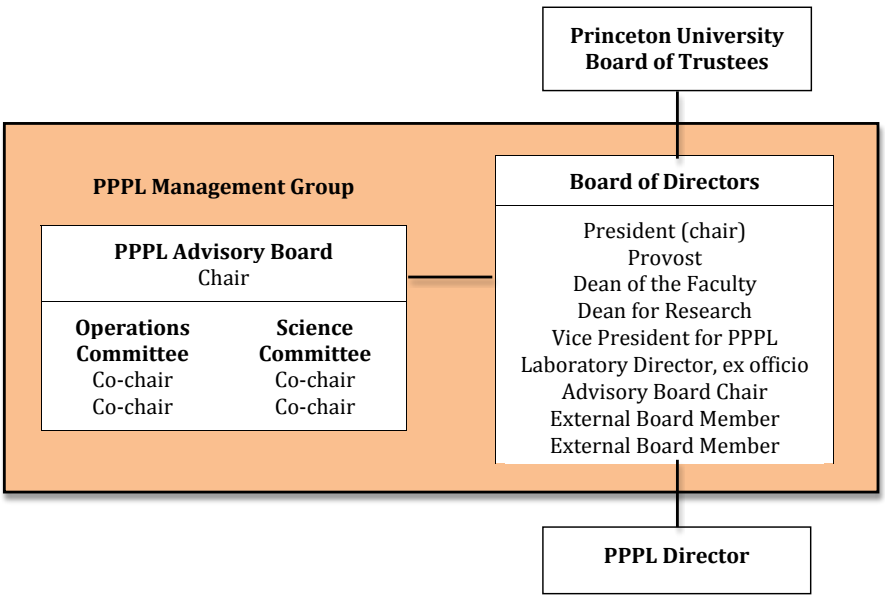
I. INTRODUCTION

Princeton University manages and operates the United States Department of Energy's Princeton Plasma Physics Laboratory under contract number DE-AC02-09CH11466. The Princeton University President is the "Responsible Corporate Official" and serves as the Chair of the University's Board of Directors. The PPPL Director reports to the PPPL Management Group – comprised of the University's Board of Directors and its PPPL Advisory Board with Committees for Science and Operations – and the PPPL Management Group reports to the Princeton University Board of Trustees. The University Vice President for PPPL, a representative of the University Board of Directors and the PPPL Management Group, is the primary contact and oversight official of the University. The functions and activities of the PPPL Management Group and the PPPL Advisory Board are explained in detail in procedure GEN-033, *PPPL Management Group and PPPL Advisory Board*.



Princeton University utilizes a number of actions and reports to provide assurance to the Department of Energy. The assurance efforts are conducted under a framework that allows the University, DOE and the Laboratory to work together on a continual basis to improve the operations and support the DOE Missions. The framework is depicted in Figure 1 below.

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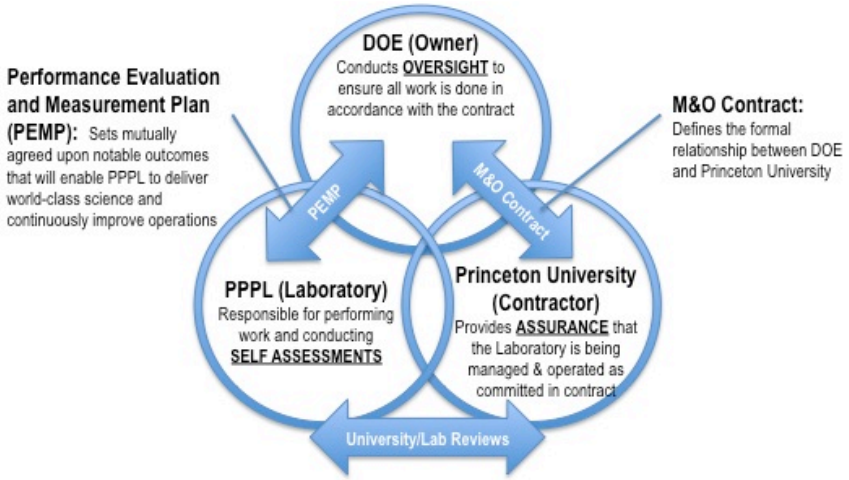

Figure 1 - The Princeton/DOE Framework and Lexicon of Assurance.

In June 2011, a successful peer review of the Contractor Assurance System (CAS) as executed by the DOE Princeton Site Office (PSO), the Princeton Plasma Physics Laboratory (PPPL), and Princeton University (PU) was conducted and found that all elements of the CAS have been established and implemented as defined by Prime Contract Clause H.50, *Contractor Assurance System* (the "H-clause"). In April 2014, a DOE review of the CAS was conducted and found that the CAS program meets all of the required system elements required by the contract – that PPPL has made numerous enhancements to improve the system – and it is evident that PPPL embraces the concept of lessons learned and are committed to continuous improvement.

PPPL, Princeton University, and DOE expectations for the Contractor Assurance System were codified in a new "Partnership Commitment" that was signed by the parties in April of 2012. The document complements the contract for the management and operation of PPPL by clarifying roles and responsibilities among the parties and promoting a productive relationship. The agreement memorializes existing commitments among the partners to manage their operations effectively in a manner that fulfills the Laboratory's scientific mission while acknowledging that each partner has a distinctive role that is respected by others in fulfillment of that mission. The three parties will employ CAS with the common values of teamwork, mutual trust, respect, open communication, honesty, transparency, and continuous improvement. The expectations of Princeton University and Laboratory Leadership are that CAS will facilitate the balance of risks and costs so that operations meet the requirements and fully support the science mission at PPPL. This is addressed through effective performance-based processes for PPPL operations – including assurance activities – at minimum cost; and partnering with the DOE Princeton Site Office to assure all parties have the necessary information and access to support their roles and responsibilities, and to provide necessary assurance.

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I. A. PPPL Assurance System

The Assurance System provides assurance that the Laboratory is:

- focused on effectively and efficiently achieving the mission,
- protecting workers, the public, and the environment,
- identifying and pursuing opportunities for improvement,
- identifying issues that need correction and prevention,
- demonstrating effective risk-managed performance and compliance with contractual and legal requirements,
- practicing open communication and achieving relationships of mutual trust and confidence with stakeholders, and sharing lessons and successful practices across PPPL and the DOE complex.

I. B. Princeton University Assurance

The PPPL Management Group Board of Directors has designated the Vice President for PPPL to be the primary point of contact for the Laboratory and ensuring that the Assurance function is carried out. As part of the Assurance effort the Vice President considers the following information and reports:

- Direct contacts with staff and observation of Laboratory operations
- Reports from PPPL Advisory Committees (Science and Operations)
- Reports from PPPL Advisory Board to Princeton Management Group Board of Directors.
- University Reviews (internal audit program, ES&H, etc.)
- Reports from Program Advisory Committees on Departments and Projects
- External peer reviews (e.g., ES&H, communications, procurement, etc.)
- Laboratory self assessments (audits, assessments, investigations, etc.)
- Regular meetings with the Princeton Site Office and Laboratory Management

Based on these inputs, the Vice President for PPPL completes an assurance statement for the Laboratory operations, and upon approval by the PPPL Management Group Board of Directors, issues the assurance statement to DOE annually.

I. C. DOE Oversight

The Department of Energy conducts oversight of PPPL using a multi-layered approach that is coordinated by the DOE Princeton Site Office (DOE-PSO), which provides primary oversight, and involves many offices (e.g., Headquarters, the Office of Science, Office of Fusion Energy Science, etc.) Oversight includes operational awareness activities, onsite reviews and surveys, program and project assessments, reviews of data and documents, internal and external audits,

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and performance evaluations to assure that PPPL is conducting work in accordance with the Prime Contract. The expectation is that as DOE's confidence in the Assurance System increases, DOE can reduce its level of direct oversight. Additionally, use of a risk-based strategy should allow DOE to adjust its level and mix of oversight of PPPL operations to be the most cost effective with minimal redundancy and increased efficiency.

II. APPLICABILITY

This Assurance System applies to each activity at the Laboratory including, but not limited to, experimental operations, research, engineering, science education, information technology, worker safety and health, environmental protection, security, cyber security, emergency management, financial management, procurement, property management, facilities management, human capital management, and project management. Consistent with Lab Policy P-001, *Graded Approach to Work Planning and Control*, the PPPL Assurance System is tailored to the hazards and risks of the work performed by applying a thoughtful risk management process that identifies, assesses, and determines appropriate measures. The high-level PPPL Risk Management Matrix and the Risk Category Mitigation, which are compiled and reviewed by senior PPPL management and the PPPL Advisory Committees, are depicted in Attachments 1 and 2. In addition to all workers, students, visitors, and collaborators working at the Laboratory and all employees working at PPPL and elsewhere, the PPPL Assurance System also typically covers work performed by subcontractors unless, as could be the case for a relatively large or complex contract, the Laboratory may elect to flow down the requirements of contract H-Clause and require the subcontractor to apply its own Assurance System to the work scope performed by that company.

III. ASSURANCE SYSTEM OVERVIEW

PPPL's assurance system employs assessments, performance metrics, reporting, feedback, sharing of lessons, and issues management as tools to ensure achievement of PPPL's strategic goals and annual performance objectives, identify and resolve issues and trends, and promote continuous improvement in the efficient and effective implementation of PPPL management systems. Success is measured by PPPL's ability to self-identify and correct issues proactively. Implementation of the Assurance System includes Department of Energy (DOE) and Princeton University involvement and also supports their mutual efforts for promoting continuous improvement and provides mechanisms for objectively evaluating reasonable risks versus potential resource savings. An effective Assurance System provides these organizations with confidence that the expectations and strategic goals of the Prime Contract for management of PPPL are being met. Line management is responsible for supporting the implementation of the Assurance Plan. In addition, every PPPL employee is individually responsible for the quality, safety, and assurance of his or her work.

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Management sets the strategic direction; deploys resources; and maintains performance within approved operating boundaries. Management has the responsibility of mission accomplishment, assessment of risks, program development, Laboratory stewardship, operational excellence, and achievement of DOE and Princeton University performance expectations.

Performance is the daily work, processes, and activities by employees and overseen by Line Managers to achieve the objectives set by Laboratory Management. Management systems and process controls establish organizational structure, functional responsibilities, levels of authority, and interfaces. Policies, Procedures, and Plans outline functions and activities to deliver performance in a safe, reliable, quality, and cost effective manner.

Assurance is provided as a result of oversight of performance and reporting of results directly to management. Oversight and reporting is performed both by those responsible for conducting the work as well as by independent organizations such as PPPL ES&H and Best Practices and Quality Assurance (BP&QA), the University's Office of Audit and Compliance, and the DOE.

Scheduling of assurance activities is determined based on risks, with more resources assigned to oversight and reporting of the higher risk activities. Risks are identified in the Laboratory's risk matrix, Risk Mitigation Category Summary, in the PPPL Annual Laboratory Plan, and for each major project. The cognizant supervisors, department heads, and project managers identify risks based on existing conditions, planning for "worst case" scenarios and responding to when events indicate new risks. As part of developing the strategic plan, the external risks for the Laboratory are established. Depending on the complexity of the individual projects, project management procedures require the project team to identify external risks that can impact the project. Each risk is evaluated and actions are determined to mitigate the risks that have been identified. Based on the risks identified, the resources devoted to mitigating the risk as well to performing assurance activities are based upon judgment that balances the costs vs. the risk. As external and internal conditions change, or new information is developed based on a project or activity's design and plans, or as new lessons are learned, the information is evaluated against the existing risk registry and adjustments are made based on the conditions. A disciplined approach has been instituted to guide strategic planning, which includes annual review of Laboratory risks and mitigations strategies documented in Attachments 1 and 2 of this Assurance Description.

A variety of assessment methods are used regularly to assess the effectiveness of performance and provide the Laboratory Director and senior management with the results. The Laboratory Director is responsible for taking appropriate actions to improve Laboratory performance based on these results.

III. A. Administration and Coordination

The Best Practices and Outreach Department plans and administers the PPPL Assurance System, after review by the Vice President for PPPL, and provides timely notification to the DOE-PSO Contracting Officer of significant changes to the assurance system prior to the changes being implemented. The Assurance System involves several components shared among multiple organizations and requires active participation of all Operations and Research organizations. The Best Practices and Outreach, ES&H, Engineering and Infrastructure, and Business Operations

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Departments have key roles in managing major components of the Assurance System and ensure coordination of activities with DOE, PPPL, and Princeton University staff. Major components of assurance include, but are not limited to, the following:

- Auditing and assessing business and technical programs.
- Benchmarking processes and practices.
- Investigating significant concerns, performing root cause analyses, and reporting results to Laboratory management and as appropriate through the DOE Occurrence Reporting and Processing System (ORPS), and the Non-compliance Tracking System (NTS) that is part of the Price-Anderson Amendments Act (PAAA) implementation.
- Reporting the status, trends and issues that arise from oversight and assurance activities to Laboratory management and DOE.
- Coordinating the review and implementation of DOE requirements.
- Issuing annual performance reports and assurance statements.
- Providing timely and appropriate communication to the Contracting Officer, including electronic access, of assurance related information.

Another critical component of the PPPL Assurance System is the science evaluation process, which is accomplished by Program Advisory Committee (PAC) reviews and oversight, reviews administered and coordinated by the PPPL Research Council, and peer reviews of scientific publications and presentations.

Princeton University's Internal Audit and Institutional Compliance Program – under the leadership of the Office of Audit and Compliance, as well as the Science and Operations Committees of the Princeton Management Group's PPPL Advisory Board, provide independent oversight and assurance of PPPL operations and management.

III. B. PPPL Committees and Experts

PPPL staff and others who perform work at the Laboratory or at PPPL's request, have been trained and they understand and follow the PPPL Code of Conduct, applicable laws and regulations, and PPPL policies, plans, and procedures; and report accidents, incidents of non-compliance, or concerns. In addition to Laboratory staff, PPPL Responsible Line Managers, Subject Matter Experts, and OSHA Competent Persons monitor applicable external laws and regulations, ensure adherence to commitments and agreements with collaborators and third parties; develop and maintain Lab-wide policies and procedures and provide training and information so that affected staff are aware of established rules; ensure that the staff who report to them are aware of and operate in compliance with applicable laws and policies; and monitor compliance and initiate actions to address identified deficiencies.

To support these line managers and workers conducting work at PPPL, the Laboratory has established committees and appointed subject matter experts committees comprised of senior and line managers, and line workers. These committees have been established to provide advice, guidance and oversight of Laboratory practices and performance all based on risk (see attachments 1 & 2). These committees have intimate awareness and involvement with issues that

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have potentially broad Laboratory impacts. Primary oversight and assurance responsibilities of several, but not all, of these committees are summarized below:

Internal

- Laboratory Council: the Laboratory's senior managers who have responsibility for managing all research and operations activities. Under the leadership of the Director and Deputy Directors for Research and Operations, the Council holds weekly Laboratory Management Meetings (LMM) and quarterly Laboratory Management Reviews (LMR.) These high level meetings are used for several functions including: reviewing performance; discussing emerging issues; adjusting operations to address changing risks and priorities; revisiting strategic plans; discussing progress towards attainment of strategic and contractual goals and commitments, and cross-functional communication and coordination of activities.
- Budget and Human Resources Committee (BHRC): approves budget requests to assure that proposed activities, field work proposals, and schedules are aligned with PPPL's mission, strategic goals, and tactical objectives.
- Research Council: reviews all Laboratory scientific and technical programs, allocations of Laboratory Directed Research and Development (LDRD) funds, strategic research plans, and plans for stimulating new research initiatives.
- ES&H Executive Board: evaluates the effectiveness of the ES&H program and is supported by several subcommittees, including a Safety Review Committee (SRC): an Environmental Review Committee (ERC) an ALARA Review Committee (ALARARC), an Electrical Safety Committee, a Lithium Experts Committee, and a Safety Champions Committee comprised of worker representatives from across the Laboratory.
- Technical Resources Committee (TRC): oversees and ensures appropriate, risk-based allocation of capital improvement (i.e., GPP) resources.
- Cyber Security Review Board (CSRB): oversees and ensures appropriate implementation of PPPL cyber security policies, procedures and systems.
- Other review committees that review work activities and issues include the Price-Anderson Amendments Act Review Committee, the Work Planning Review Board, the Project Status and Review Board, and Design Review Boards.

External

- Program Advisory Committees (PACs): evaluate science programs and facilities and ensure that the plans and priorities are technically sound, consistent with the missions and goals of the Laboratory, and appropriately engaging the interested Scientific community.
- Peer reviews: – ad hoc groups invited by PPPL or Princeton University that review a specific topical area or issue such as contractor assurance, communications, or the failure of a significant experimental component or system.

Princeton University

- Science and Operations Committees of the Princeton Management Group's PPPL Advisory Board provide independent oversight and assurance of PPPL operations and management. The committees meet twice each year and issue reports to the PPPL Management Group.

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- Princeton University's Office of Audit and Compliance (OAC) provides independent and objective assessments of PPPL business systems as a critical part of the University's Audit and Compliance Program. The goal of these assessments is to ensure 1) good stewardship of assets, 2) integrity of operational and financial information, and 3) compliance with relevant laws and regulations, the contract requirements, and PPPL policies and procedures. The Chief Audit and Compliance Officer, who heads the OAC reports audit results to the Committee on Audit and Compliance of the Board of Trustees of Princeton University and to the Executive Compliance Committee of the University.
- Princeton University's Chief Audit and Compliance Officer develops the University's Audit and Compliance Program elements, promotes compliance, develops compliance monitoring programs, including an annual risk based audit workplan and works with the Compliance Leads to ensure that compliance with relevant laws and regulations is monitored, policies and processes are established and communicated, and that compliance deficiencies are identified and addressed in a timely manner; maintains and communicates a "University Hotline" program and networks with other University Chief Audit and Compliance Officers throughout the nation to keep apprised of emerging compliance issues, and share best practices.
- One of the primary purposes of the Committee on Audit and Compliance of the Board of Trustees of Princeton University is to assist the Board in overseeing the adequacy and effectiveness of the University's system of internal controls and its risk management processes, including compliance policies, practices, and activities concerning government rules and regulations and applicable standards of business conduct.
- Princeton University's Executive Compliance Committee (ECC) assists the Chief Audit and Compliance Officer solicit audit and compliance ideas, determines priorities, reviews and comments on the annual internal audit and compliance workplan, reviews and comments on proposed approaches to audits and compliance monitoring, reviews and discusses results of completed audits and compliance projects, and helps ensure general follow up of recommendations in audit and compliance reports. The ECC also ensures that the cognizant and relevant University governing body takes appropriate disciplinary action when compliance violations occur, and in the absence of a governing body, determine appropriate actions and ensure such actions are taken. The ECC monitors and discusses complaints, investigations, and other serious issues of non-compliance as identified through various sources. The ECC monitors and discusses sanctions for non-compliance and/or fraud or misappropriation of University assets and follow-up to ensure implementation. The ECC submits periodic reports to the Committee on Audit and Compliance regarding key risk management activities.

III. C. Major Assurance System Components

The Laboratory-wide plans, policies, and procedures describe how proposed activities are identified, reviewed, prioritized, and implemented using appropriate management control systems (e.g., work planning forms, work authorizations, work orders, etc.). During the planning and conduct of work activities, Laboratory Management Systems also specify the need for assessments and oversight using professionals in the areas of quality, health physics, industrial hygiene, occupational medicine, industrial safety, electrical safety, fire safety, environmental management, etc. The combination of these systems, based on industry and DOE standards and

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directives, provide assurance that safe work practices are followed and are in accordance with laws and regulations.

The Laboratory's Management Systems are grouped in these categories:

- Strategy and Management
- Mission Delivery
- Engineering
- Customer Service and External Relations
- Human Resources Management
- Information Technology (IT) Management
- Business Operations
- Facilities and Property Management
- ESH and Integrated Safety Management
- Safeguards and Security
- Communications
- Assurance and Improvement

The specific PPPL requirements documents that constitute the management systems and the assurance process are found on the PPPL intranet and on the PPPL Procedures and Publications web page at URL: http://spportal.pppl.gov/bp/pppldocs/SitePages/Home.aspx.

The PPPL Assurance System relies on many elements of the PPPL management systems to provide a comprehensive picture of the Laboratory performance; these elements are depicted in Attachment 3. The elements include methods of verification, sharing lessons, assessing and planning for risks, and establishing requirements for conduct of work. Attachment 4 lists, in more detail, several of these elements.

The H-Clause covers all PPPL management systems, including: the Integrated Safety Management System, Institutional Quality Assurance Program, Worker Safety and Health Program, Emergency Management System, Conduct of Operations Policy, Project Management System Description, Cyber Security Program Plan, Mission Readiness Description, Personnel Practices Manual, and the Budget, Accounting, and Procurement Manuals. PPPL management systems and their implementing Laboratory documents have the following standard assurance elements integrated into the System; these are summarized here and discussed in more detail under section IV.

- *Assessments and Reviews* are performed, including self-assessments, independent assessments, management assessments, peer reviews, management walkthroughs, and technical reviews.
- *Event Reporting and Issues Management.* Procedures have been established to document, investigate, report, correct and trend operational events, accidents, and injuries. The reports and associated actions provide additional indicators on the status of the Management System.

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- *Worker Feedback.* Several mechanisms are in place to gather worker input on issues and concerns and this feedback provides another indicator on the status of the Management System.
- *Lessons Learned.* The Laboratory program involves evaluation of lessons, both internal and external, and distribution of Laboratory lessons within and external to the Laboratory.
- *Performance Measurement, Evaluation and Reporting.* Contractual and other performance-based measures are used to monitor Laboratory performance.

IV. ASSURANCE PROCESS

As work activities are conducted at PPPL, assurance processes and tools are utilized to ensure high levels of performance in conformance with operating boundaries and expectations that have been established by management. The output of the assurance processes provides management with information on performance trends, issues, and emerging risks. As part of the continuous improvement cycle, management evaluates and addresses issues and makes appropriate adjustments to priorities, plans, and expectations to mitigate unacceptable risks and pursue operational and fiscal excellence. The assurance process flow is illustrated in Figure 2:

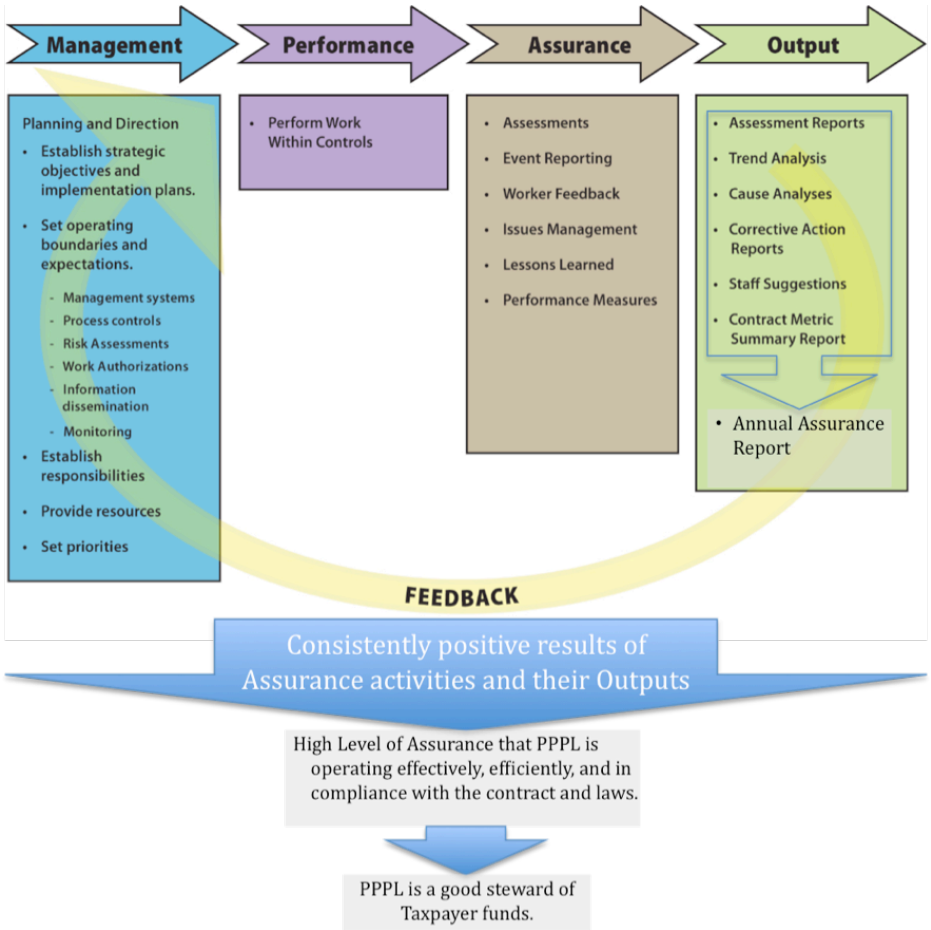

Figure 2 - Assurance Process Flow.

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The Annual Assurance Letter, which summarizes all assurance activities provides Princeton University, Laboratory management, and DOE with the overall assessment on PPPL performance with respect to completion of mission objectives; protection of workers, the public, and the environment; effectiveness and efficiency of operations, facility management, and business systems, and satisfaction of contract requirements. The letter provides an integrated picture of the adequacy of University and PPPL controls and systems, in accordance with the H-Clause; the Federal Manager's Financial Integrity Act (FMFIA); Office of Management and Budget (OMB) Circular A-123; the American Recovery and Reinvestment Action (ARRA) call for assurances of internal control; and the Guidance and Reporting Requirements for Entity Assessments.

IV. A. Assessments

PPPL implements a rigorous assessment program that meets the requirements of the H-Clause and DOE O 414.1D, *Quality Assurance*. Work activities, programs, and facilities are assessed and performance is measured using several means including contractual performance measures, self-assessments, independent assessments, University Assessments, Unified Safety Reviews (USRs), experiment run assessments, post-job briefs and audits. The Laboratory works closely with the DOE Princeton Site Office (DOE-PSO) to establish performance expectations and measures, and in scheduling assessments. The coordination of assessment activities is documented in the "Integrated Assessment Schedule". The schedule integrates PSO, University, PPPL and external assessment activities for the upcoming Fiscal Year into a comprehensive plan for assessing all PPPL Management systems using a risk-informed approach. At the end of each Fiscal Year, the "Integrated Assessment Schedule" serves as a tool to determine what assessments are warranted for future years.

When necessary and appropriate, the University also provides subject matter experts to participate in assessments of activities taking place at the Laboratory. Assessors from other DOE Laboratories and industry also participate and provide outside expertise and best practices.

There are numerous activities (see Attachment 3) that include an assessment component. The types of assessments included in the assurance system at PPPL are:

- **Self-Assessments** are used to encourage workers, supervisors, and managers to identify and resolve deficiencies at the lowest level practicable. They evaluate performance at all levels to determine the effectiveness of policies, requirements, and standards and the implementation status. Self-assessments of work activities are conducted as part of the work planning, inspection, walk-throughs, and job preparation and hazard analysis processes. Post-job briefs, run assessments, process improvement activities, toolbox meetings, and activity reviews provide forums for discussing successful practices and areas that need improvement. In addition, employees are expected to assess conditions in their work areas and the quality of their work. Virtually all staff have been provided hazard awareness training and approximately 100 have been given training on human performance improvement concepts.

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- **Management Assessments** ensure that the organization's work is achieving desired results and cover organizational performance, strategic planning, personnel qualification, staffing, skills mix, communication, cost control, mission objectives, and effectiveness of previous assessments and associated actions. Each PPPL Department Head is required to perform at least one documented management assessment for his or her area of responsibility annually in accordance with procedure QA-025, *Management Assessments*. Additional routine management assessments include the quarterly Laboratory Management Review Meetings (LMR) and the monthly Assessments and Action Items meeting, conducted by the Deputy Director for Operations with managers and subject matter experts to discuss issues, dashboard performance indicators, progress on corrective actions, and potential trends.

- PPPL's Accounting and Financial Controls Division is fully engaged in the DOE's A123 Assurance Process. The A123 Assurance Process includes the following major program elements: development and evaluation of process flow documentation; identification of key internal controls; development and implementation of test plans to test key internal controls; testing the effectiveness of key controls; selected transaction testing; evaluation of entity controls; and development/ implementation of corrective action plans, as required. **PPPL Independent Assessments** (audits and quality control inspections) are organized by the PPPL Best Practices and Quality Assurance (BP&QA) Division with personnel that have sufficient independence from line management to support unbiased evaluations. Assessors are trained and qualified to perform such reviews in accordance with QA procedure Q-005. When needed, audit teams include additional PPPL staff or external reviewers having knowledge of the areas assessed. Audits focus on performance of work activities, the direct observation of work in progress, and the results of process implementation. Quality Control inspections are performed by qualified personnel and focus on special processes and high-risk work to assure that work standards are met. Quality Control inspections are identified throughout the year for specific work activities and are not listed on the Integrated Assessment Schedule or QA audit schedule.

  The PPPL Cost Compliance Office, which reports to the Chief Financial Officer, performs periodic risk-based reviews (pre-award, interim and close-out) of costs incurred on cost-type subcontracts, including cost reimbursable, time-and-material, and labor-hour subcontracts.

- **Princeton University Audits of PPPL** are performed by the Princeton University Office of Audit and Compliance with personnel that have authority and independence from line management to support unbiased evaluations. The audits are principally conducted on the Laboratory's financial operations and systems of internal controls. They are formally planned and scheduled based on the risk, hazards, and the complexity of the processes and activities being performed at the Laboratory. The annual internal audit workplan and work scope is approved by the DOE Contracting Officer. All financial audits performed under the direction of Princeton's Office of Audit and Compliance are conducted in accordance with the International Professional Practices Framework of the Institute of Internal Auditors. Independent auditors are appropriately trained and qualified and have knowledge of the areas assessed. Internal independent assessments concentrate on performance of work activities and the results of process implementation. They provide valuable feedback to University as well as Laboratory management.

- **Operational Assessments,** such as operational readiness reviews and experimental run assessments, are routinely conducted by line managers to identify and resolve issues that

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may hinder the organization in achieving its scientific and operational objectives. In addition, the Laboratory and University occasionally commission consultants and peer reviews to perform assessments of PPPL management activities, to assess PPPL programs.

IV. B. Event Reporting

Formal programs have been established to identify issues as well as to report, analyze, and address operational events, accidents, and injuries. Laboratory procedure GEN-006, *Investigation and Follow-up of Adverse Events and Conditions Including Occurrence Reporting and Price-Anderson Amendment Act Reviews*, requires that incidents be reported, prioritized, and looked at with scrutiny, including determining if the "extent of cause" and the "extent of condition" exist elsewhere within the Laboratory or at other facilities. The Deputy Director for Operations calls meetings with the Head of ES&H, Associate Director for Engineering and Infrastructure, ORPS Facility Manager, Responsible Line Manager, Head of Best Practices, and other cognizant personnel to discuss the "extent of condition" and "extent of cause" and what actions need to occur to address the specific incident as well as prevent similar issues in the future. When appropriate, root cause analyses and incident investigations are performed and the results are followed-up and shared via Laboratory, DOE, and industry lessons learned programs – the objectives being to improve PPPL programs and activities, preventing recurrence of negative events, and helping other Laboratories and facilities do the same. Reportable occurrences that meet occurrence reporting and processing system thresholds are evaluated, documented, and reported. Nuclear and worker safety and health issues meeting DOE reporting thresholds under the Price-Anderson Amendments Act or 10CFR851 are self-reported through the DOE-wide Noncompliance Tracking System. Trend analysis of events is performed following a structured process. For example, the Site Protection Division performs a quarterly performance analysis of operational events and ORPS incidents at PPPL and reports the results to DOE line management and PPPL management for review and appropriate action.

IV. C. Worker Feedback

PPPL has established a variety of processes to solicit feedback from workers and work activities. These worker feedback mechanisms include the following:

- PPPL Director's Suggestions Box provides an online method for all staff to make suggestions[1] (anonymously, if desired);
- A web-based Safety Or Suggestions (S.O.S) system and paper suggestion forms that are used for reporting concerns or raising questions[1], as documented in procedure GEN-011, *ES&H Deficiency Reporting*;

[1] This method also includes an avenue for anonymously submitting issues for evaluation and action.

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- Job hazard walk-downs by workers prior to work, and pre-job briefs, which are performed in association with Job Hazard Analysis (JHA) per procedure ESH-004, *Job Hazard Analysis*;
- Post-job reviews that critique and share lessons learned from jobs;
- Small group and tool-box safety meetings;
- Direct communication of suggestions and concerns with supervisor;
- "Skip-level" meetings held by the Director's Office directly with workers;
- The Safety Champion Committee comprised of non-supervisors;
- Worker representation on other Lab committees;
- Stop Work Authority per policy P-012, *Stop Work Authority*;
- Worker participation in Management Safety Walkthroughs (MSWs);
- Annual Lab-wide Safety Forums;
- Quarterly Safety Culture Surveys;
- Participation on process improvement teams; and
- Performance appraisals that involve assessment of assurance and oversight activities, ES&H performance and dialogue between employees and supervisors.

Worker feedback results are addressed immediately, such as feedback obtained during a pre-job brief, or documented, reviewed and evaluated for corrective actions, which are tracked to completion.

IV. D. Issues Management

Independent of the source of an issue, PPPL has developed a structured system to evaluate the risk of an issue, develop the actions needed to address the issue (both interim and long-term), track the actions that derive from an issue to closure, and review the actions to ensure that they were effective in addressing the issues. This system is applied commensurate with the significance and risks of the issues identified. Effective management of issues at PPPL includes the appropriate escalation and communicating of issues up the management chain and conduct of formal root cause analysis when appropriate. Issues may arise from audit findings, nonconformances reports (NCRs), Management Safety Walkthrough (MSW) action items, corrective action requests, design review CHITs, and S.O.S. submittals among others.

These processes are documented within PPPL procedures: GEN-006, *Investigation and Follow-up of Adverse Events and Conditions Including Occurrence Reporting and Price-Anderson Amendment Act Reviews*; GEN-011, *ES&H Deficiency Reporting*; GEN-030, *PPPL Commitment Tracking and Reporting Protocol*; QA-002, *PPPL Audit Program*; QA-004, *PPPL Site Inspection Program*; QA-005, *Control of Nonconformances*; QA-012, *Corrective Action Request*; QA-017, *PPPL Issues Tracking System*; and QA-019, *Root Cause Analysis/Extent of Condition Analysis*. These processes include methods for:

- determining the significance and priority of deficiencies,
- evaluating the scope and extent of the condition or deficiency (e.g., applicability to other equipment, activities, facilities, or organizations),

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- determining event reportability under applicable DOE requirements,
- identifying root causes (applied to all items using a graded approach based on risk),
- identifying and documenting suitable corrective actions and recurrence controls, based on analyses, to correct the conditions and prevent recurrence,
- identifying individuals/organizations responsible for implementing corrective actions,
- establishing appropriate milestones for completion of corrective actions, tracking progress toward milestones such that responsible individuals and managers can ensure timely completion of actions and resolution of issues, and
- ensuring that individuals and organizations are accountable for performing their assigned responsibilities.

Significant deficiencies and commitments from Princeton University Assessments, Department of Energy Audits, and QA Audits are tracked by the Best Practices and Quality Assurance Division until closure; and verification is performed to assure that corrective actions are complete and effective. QA Audit findings are processed per procedure QA-002, *PPPL Audit Program*. Copies of external assessment reports and responses must be provided to Best Practices and Quality Assurance for incorporation into the QA Tracking and Trending System. Trend analysis of collective deficiencies is performed to enable the identification of programmatic or systemic issues and the Deputy Director for Operations conducts monthly Assessments and Action Items meetings to review the status of open corrective actions.

IV. E. Lessons Learned

The Laboratory's lessons learned system is a robust and integral part of the assurance system that provides a formal means of gathering and communicating lessons learned from external sources and from internal work activities, process reviews, and event analyses.

PPPL exchanges lessons with other DOE organizations and external sources. External lessons are reviewed and applied to prevent similar occurrences from arising at PPPL. These lessons come from reaching out and benchmarking; participating in external reviews; serving on peer groups; attending working group meetings, visiting other Laboratories, or passively receiving a report from the DOE lessons learned server, Operations Experience Reports, an IG report, or other. Likewise, PPPL managers share lessons from our activities with other DOE and external organizations via these same paths.

Sources of internal lessons include post-job critiques; reviews of run procedures; experimental run assessments; audits; safety forums; results from incident investigations, root cause analyses and extent-of-condition reviews; and small group meetings. Management assessments, including the Laboratory Management Meetings and Reviews; self-assessments; and risk assessment activities, including "blind spot reviews" are other forms of attaining and considering internal and external lessons that are used to identify and mitigate risks and other issues.

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Lessons from both internal and external sources are distributed to the Management System owners for evaluation of applicability, and to document/take actions and incorporate into future work planning as appropriate. Information is also shared with the greater Laboratory staff by publishing in the PPPL Weekly, Safety Bulletin, and ES&H Newsletter; discussing in staff meetings and small group meetings; sending e-mail; all-hands meetings; and other means. Lab policy P-083, *Lessons Learned and Their Promulgation*, describes how lessons learned are communicated to the Laboratory staff and supervisors so that they can be applied to future work activities. The PPPL Lessons Learned Program Coordinator directs lessons learned reports that are believed to have relevant safety issues for the Laboratory to specific managers and supervisors, and assigns items for evaluation and action to these individuals, with specific time periods for resolution. The Best Practices and Quality Assurance (BPQA) Division then tracks the action items to completion. The Lab maintains a historical listing of lessons learned on a website for future use and reference by staff and supervisors.

IV. F. Performance Measurement, Evaluation and Reporting

Assurance evaluation is performed throughout the year. Among the most critical elements of the Contractor Assurance System are performance measures, evaluations, the monthly Assessments and Action Items meeting, quarterly Lab Management Review meetings, the annual Assurance Letter, and the end-of-year self-assessment evaluation and report.

Performance metrics serve as organizational benchmarks and communicate effectively and efficiently the Laboratory's progress in meeting mission requirements and standards to DOE, Princeton University, and Laboratory management. PPPL establishes key performance indicators (KPI's) for all management systems. PPPL, in collaboration with the DOE Princeton Site Office, establishes Performance Evaluation and Measurement Plan indicators (i.e., PEMPs) that are included in Appendix B of the Prime Contract and monitored throughout the year. The KPIs and the contractual PEMPs are tracked and reported via the new PPPL dashboard. For example, worker safety and health outcomes, recordable injuries, and Days Away/Restricted or Transferred (DART) cases are posted on the dashboard, factored into the PEMP reporting, tracked and made available to Laboratory management and DOE in accordance with DOE Orders and OSHA requirements. Precursor data, such as first aid cases, are also evaluated as an important tool in analyzing and correcting the causes of minor events to prevent them from leading to more serious accidents.

Performance measures are used to document performance improvement (or deterioration) relative to identified goals. The data is also considered for allocating resources, establishing future goals, identifying performance trends, identifying potential problems, for identifying successful practices, and to establish oversight priorities. Other quantitative and qualitative performance measures are considered when evaluating personnel performance and providing constructive feedback to help reinforce or improve the performance of individuals. Trend analyses of various performance measures are conducted and the results are shared on a periodic basis for management review. When appropriate, root cause analyses of the trends are performed and the results are shared via Laboratory, DOE, and industry lessons learned programs.

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The compilation of PEMPs, KPIs, assessments, reports, progress towards completing corrective actions, performance data, and other information are reviewed monthly at the Assessments and Action Items meeting led by the Deputy Director for Operations. Much of this information and additional issues and operational and research information are also presented and discussed at quarterly Laboratory Management Review (LMR) meetings. The outcomes of performance measures, assessments, Assessments and Action Items meetings, and LMRs form the basis for the annual *PPPL Appendix B Contract Metrics Summary Report* and the end-of-year self-assessment evaluation, which are submitted to the Department of Energy and Princeton University. These reports, which are prepared by the Best Practices and Outreach Department, include performance data related to science, operations, business, ES&H activities, and all management systems at PPPL. They serve as written assurance to Laboratory management, Princeton University and the DOE, of the adequacy of University and PPPL management controls and systems, in accordance with: the the H-Clause; the Federal Manager's Financial Integrity Act (FMFIA); Office of Management and Budget (OMB) Circular A-123; the American Recovery and Reinvestment Action (ARRA) call for assurances of internal control; and the Guidance and Reporting Requirements for Entity Assessments. The scope of the Assurance Letter includes assurance that:

- The Laboratory's management, science, operations, and ES&H, plans are executed within defined operating boundaries and in a manner that produces the desired results.
- The Laboratory's management systems and process controls, including the assurance system itself, are working as intended. Periodic reviews (including those performed by Princeton University's Office of Audit and Compliance) of Laboratory management control systems are performed to provide reasonable assurance that the systems are meeting objectives and operating effectively, efficiently, and safely.
- Appropriate actions are taken to address risk issues and adverse trends.
- Laboratory operations adequately provide for the protection of staff, the public, and the environment.
- Management systems and process controls employed by PPPL are documented and satisfactory to DOE.

V. CONTINUOUS IMPROVEMENT

The output of the six elements of the PPPL Assurance System (i.e., Assessments; Event Reporting; Worker Feedback; Issues Management; Lessons Learned; Performance Measurement, Evaluation and Reporting described in sections IV A. through F. above) forms the basis for the Lab's continuous improvement efforts in all area of business and operations. The information and actions that result from these elements help the Lab improve processes and services, prevent or minimize operational problems, and correct problems that occur. Information from operations is gathered on an ongoing basis and provides comprehensive information, which enables management to make informed and coherent decisions, and to monitor the progress of activities and changes. Much of the information is routinely reported and discussed at the monthly Assessments and Action Items meeting. As depicted in Figure 2 of Section IV, the assurance

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process at PPPL is a continuous cycle that provides feedback and reporting to management, which leads to adjustments and improvements.

V. A. Improvements and Revisions to the PPPL Assurance System

In addition to pursuing improvement in all areas of business and operations, the Laboratory works to continuously improve the efficiency and effectiveness of the Contractor Assurance System. Examples include the creation and improvement of the monthly Assessments and Action Items meeting; development of the performance dashboard; identification of management systems, their owners, and performance criteria and assurance methods; expansion of the Integrated Assessment Schedule while improving its communication, planning, and priority based resource allocation; redesign of the events and incidents management procedure and system; improved risk management assessment and planning; and streamlining annual assurance reporting.

Improvements and changes to the Assurance System are incorporated into revisions of this document, and are posted to the PPPL Procedures and Publications website, which provides access to Laboratory staff as well as DOE personnel. The H-Clause was established by modification 026 on January 11, 2011. PPPL submitted revision 3 of the Assurance System Description to the Princeton Site Office for approval by the Contracting Officer as required by H.50(a)(10). The Contracting Officer provided notification to PPPL that DOE-PSO approved revision 3. Subsequent revisions do not require Contracting Officer approval, however, the clause does require that there is timely notification to the Contracting Officer of significant assurance system changes, prior to the changes [H.50(a)(3)]. As a result, PPPL will include the DOE Princeton Site Office, including the Contracting Officer, in the review process and provide them with copies of proposed revisions. This will allow the DOE Site Office to comment on the proposed revisions, which the Laboratory and the University will consider in the comment resolution.

VI. REFERENCES

The following are requirements included in the Prime Contract and that have direct relevance to the Assurance System:

- Title 10 CFR 830 Nuclear Safety Management, Subpart A
- Title 10 CFR 835 Occupational Radiation Protection
- Title 10 CFR 851 Worker Health and Safety
- DOE O 151.1C Comprehensive Emergency Management System
- DOE O 205.1B Department Of Energy Cyber Security Program
- DOE O 210.2A DOE Corporate Operating Experience Program
- DOE O 231.1B Environment, Safety and Health Reporting

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- DOE O 413.1B Internal Control Program
- DOE O 414.1D Quality Assurance
- Contract Clause I.105 - DEAR 970.5203-1 Management Controls (JUN 2007) (Deviation)
- Federal Managers' Financial Integrity Act of 1982 (FMFIA)
- OMB Circular A-123
- Government Management Reform Act of 1994 (GMRA)

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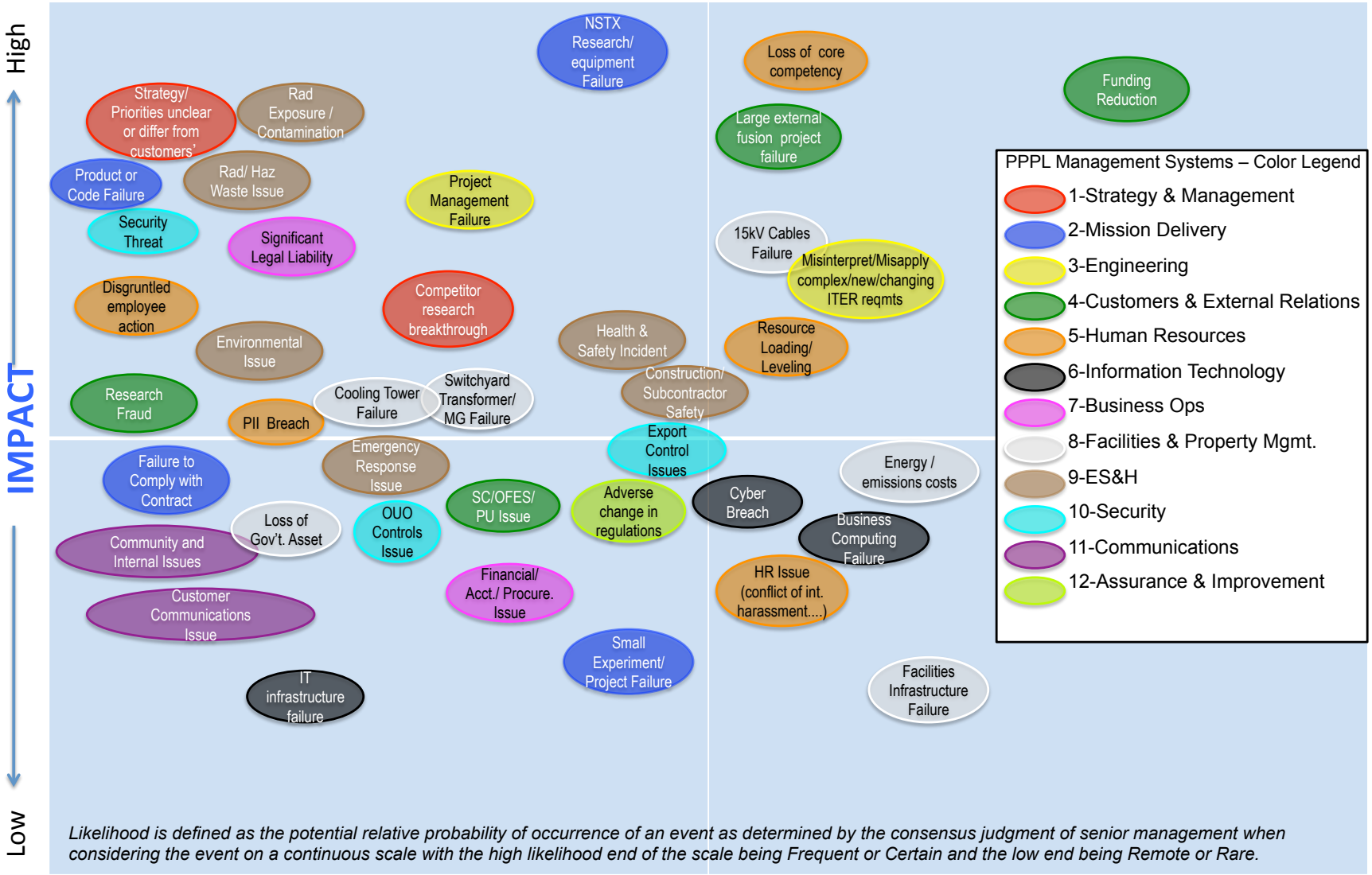
PPPL RISK MATRIX - *MITIGATED*

(Upper Level Risks)



Likelihood is defined as the potential relative probability of occurrence of an event as determined by the consensus judgment of senior management when considering the event on a continuous scale with the high likelihood end of the scale being Frequent or Certain and the low end being Remote or Rare.

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No.	Risk Category	Risk	Consequence (impact to mission)	Unmitigated Impact (h/ m/ l)	Unmitigated Likelihood (h/ m/ l)	Mitigation[1]	Mitigated Impact (h/ m/ l)	Mitigated Likelihood (h/ m/ l))	Responsible Individual
1	1-Strategy & Management	Strategy/ Priorities unclear or differ from customers'	Suboptimal assignment of efforts; projects compete for resources; potential to miss growth and funding opportunities and meeting customer expectations; potential to disturb customers.	High	Medium	Strategic planning, management committees, customer engagement, management direction.	High	Low	Prager/Zarstorff/Cohen
2	1-Strategy & Management	Competitor Research breakthrough	Negative publicity Damage to Laboratory reputation Loss of funding	Medium to High	Medium	Collaborate with competitors around the world – have access to their facilities and research Attend all of major scientific meeting to hear about progress from all competitors	Medium to High	Medium to low	Zarnstorff
3	2-Mission Delivery	Small experimental failure	Inability to carryout key research objectives and not able to carryout mission of laboratory	Medium	Medium	Processes in place to minimize risk (engineering, es&h, etc.) Can generally re-establish experimental operations in short time frame. SLI project CD-0 to improve area for small experiments	Medium to Low	Medium	Dudek
4	2-Mission Delivery	NSTX Failure research/ equipment	Inability to carryout key research objectives and not able to carryout mission of laboratory	High	High to Medium	Operations controlled by procedures. Equipment testing before operations – including daily checks Detailed research plans documented and reviewed	High	Medium	Ono
5	2-Mission Delivery	Failure to comply with contract	Reduction in fee to University Loss of research $ Shutdown of individual program	High	Medium	Laboratory Management Review – quarterly PEMP yearly self assessment Research program reviews	Medium	Low	Prager/Zarstorff/Cohen
6	2-Mission Delivery	Product Failure or Code Failure	Negative publicity Damage to Laboratory reputation Loss of funding Loss of research $ Shutdown of individual project	High	Medium	Laboratory Management Review – quarterly PEMP yearly self assessment Research program reviews	Medium to High	Low	Prager/Zarstorff/Cohen
7	3-Engineering	Misinterpretation or Misapplication of complex/new/ changing ITER requirements.	Failure to meet project commitment. Project delay. Damage to reputation. Budget overrun.	High	High	Project management, planning and control including configuration management and identification of riskier aspects and mitigation. Training on unique ITER (IO and US ITER) requirements PPPL audits of work performed for ITER. Adequate annual funding to complete commitments on schedule. Frequent oversight of suppliers. Frequent communications with US ITER and IO. Design reviews and evaluations of high risk, complex tasks.	High	Medium to low	Neumeyer/ Hawryluk
8	3-Engineering	Project Management failure	Negative publicity Damage to Laboratory reputation Loss of funding	High	Medium	Project management position established Revising program and procedures Monthly evaluations of high risk, complex projects	High	Medium to low	Dudek

[1] These are Internal PPPL and Princeton University mitigation actions. Several DOE oversight actions also mitigate risk.

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9	4-Customers & External Relations	Funding reduction	Less funding to carryout research Potential reductions in force	Medium to High	Medium to High	Princeton University Government Affairs office in Washington, DC. VIP visitors (OMB, congressional staff, etc) who tour facility and review actions of laboratory. Publicize progress, programmatic benefits and give talks and publish. Creation of new Strategic Planning website, focused on providing tools to bring new funding into the laboratory consistent with the Laboratory's Strategic Plan.	Medium to High	Medium to High	DeLooper
10	4-Customers & External Relations	Large external fusion project failure	Negative publicity Loss of funding	High	Medium to High	Providing PPPL expertise to make a success Alternative plans being developed to provide an approach for addressing the scientific issues. Diversify projects and funding sources. Input/contribute to large external project management	High	Medium to High	Dudek
11	4-Customers & External Relations	SC, OFES, PU issue	Failure to carryout or deliver on promises to the OFES Failure of contractor to meet requirements of the contract	High	Medium to high	Procedure in place to regularly talk to customers and address concerns. Weekly meetings with OFES, PSO and PU.	Medium to low	Medium to low	DeLooper
12	4-Customers & External Relations	Research fraud	Negative publicity Damage to Laboratory reputation Loss of funding	High	Medium to high	University Policy on Misconduct in Research. PPPL Codes of Conduct Policy in place which establishes expected behavior. Publications peer reviewed. Ethics Hotline and related postings.	Medium	Low	Gangemi
13	5-Human Resources	Disgruntled employee action	Harm to employees on site Negative publicity Lawsuit	High	Medium to high	Processes in place to address employee concerns – SOS, directors suggestion box. Supervisors are expected to evaluate and report if there is unusual or risky behavior. PPPL Policy on Threatening and Violent Behavior in the Workplace University Workplace Violent Assessment Team Trained security staff, cyber security controls. Ethics Hotline and related postings.	Medium to high	Low	Gangemi
14	5-Human Resources	Resource Loading/Leveling	Staff not available for projects when needed; under/over commitment of staff members; skill mix issues.	High	High	Project management, BHRC, strategic planning, cross training.	High	High	Gangemi /Cohen/ Dudek / Zarnstorff
15	5-Human Resources	Loss of core competency	Inability to carryout key research objectives and not able to carryout mission of laboratory	High	High	Process in place to evaluate critical position and skills that are necessary to carry out mission. Actions being taken to transfer core competency knowledge to next generation of critical key staff.	High	Medium to Low	Gangemi
16	5-Human Resources	HR issue (e.g., conflict of interest, harassment, etc)	Potential lawsuit by vendor for conflict of interest Potential lawsuit for harassment Unhappy staff members due to work conditions	High	High	Yearly call to integrity letter signed by all staff Sexual harassment training of staff Code of conduct in Personnel practices manual and University policies. Yearly performance evaluation of each staff member	Low to Medium	Medium	Gangemi

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17	5-Human Resources	PII Breach	Loss of information – resources needed to protect individual identity. Serious impact on affected staff & collaborators' personal life. Financial consequences due to possible litigation.	High	Medium	Procedures in place to limit distribution of PII information. Procedures in place to limit the collection of PII information. Security systems in place to protect PII. Employee and system administrator training	Medium	Low	Gangemi (PII Officer)
18	6-Information Technology	Business Computing failure	Inability to pay contractors and staff; report to DOE; monitor project and budget performance; process purchases.	High	High	Plan to replace system; contracted with Great Plains for continued support; upgrade SQL. RFP to replace business system. Will occur in two phases: 1) fit/gap and 2) implementation; timeline for contract is October 2014; work closely with the University to determine best approach for implementation and utilizing Prime resources and knowledge transfer wherever possible; leveraging experience of SLAC and PU to maximize efficiencies.	Medium to High	Medium to High	Zelick
19	6-Information Technology	IT infrastructure failure	Inability to carryout key research objectives and not able to carryout mission of laboratory	Medium	Medium	All data backed up at off site location. Hardware is off the shelf and can be procured in a relatively short time frame.	Low	Low	Zelick
20	6-Information Technology	Cyber Breach	Loss of external web site Possible shutdown of link to internet – loss of productivity for time internet access is down Loss of productivity during incident response and remediation processes.	High	High	Hardware (e.g., firewall) and systems in place to protect PPPL IT assets. Processes in place to evaluate threats and respond in timely fashion Incident Response Plan in place to recover from attack. IT information backed up for recovery. Mandatory Cyber awareness training for all who use system.	Medium to low	Medium	Zelick
21	7-Business Ops	Financial/ Accounting or procurement issue	Negative publicity Damage to Laboratory reputation Loss of resources Violation of contractual obligations Violation of the law Audit Findings Unallowable Costs	High	Medium to high	System of internal controls in place to control accounting and procurement functions Audits conducted to assure compliance (internal and external) Self-Assessments conducted to assure effectiveness of controls and processes Procedures include independent checks of actions to assure compliance Competent and trained staff in place	Low	Low	Fischer
22	7-Business Ops	Significant legal liability	Negative publicity Damage to Laboratory reputation Cost to defend Cost of judgment	High	Medium	Princeton University General Counsel's office available to PPPL Conservative positions taken with management decisions Contingency budget established for unexpected liabilities Policies and procedures in place to reduce risk.	Medium to high	Low to Medium	Fischer
23	8-Facilities & Property Mgmt	Switchyard, transformer failure	Inability to carryout key research objectives and not able to carryout mission of laboratory	High	Medium	One of a kind transformers – long lead time to procure. Preventative maintenance conducted to assure functionality. Specific fire protection installed to mitigate damage. ARRA project - $5m in improvements. GPP projects for replacement are in the queue.	Medium to high	Medium to low	Dudek
24	8-Facilities & Property Mgmt	Cooling tower failure	Inability to carryout key research objectives and not able to carryout mission of laboratory	High	Medium	Backup for pumps only – structure failure would stop operations. A GPP project has been proposed and is relatively high in the queue: replacing cooling tower control and system pumps w/VFD motors. Improvements and repairs made in 2015.	Medium to high	Low	Dudek

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25	8-Facilities & Property Mgmt.	Loss of government assets	Negative publicity Damage to Laboratory reputation Loss of Resources	Medium to High	Medium	Procedures in place to track government property Monthly sampling and inventories of government property to assure compliance Audits conducted to assure compliance (internal and external) Self-Assessments conducted to assure effectiveness of controls and processes	Medium	Low	Dudek
26	8-Facilities & Property Mgmt.	Energy or emission costs increase	Less funding to carryout research	Medium	Medium to High	Continuously looking to reduce energy costs – installing insulation, new energy efficient fixtures, etc. thereby reducing carbon emissions. Evaluate new ways of reducing carbon and having energy produced on site – e.g., solar cells. Energy contracts at favorable rates.	Medium	Medium to High	Fischer
27	8-Facilities & Property Mgmt.	Facilities infrastructure failure	Inability to carryout key research objectives and not able to carryout mission of laboratory	Medium	High	Priorities established to refurbish sections of laboratory Emergency response when failure occurs – can generally re-establish services in relatively short time frame. SLI project CD-0 to improve area for small experiments	Low	High to medium	Dudek
28	8-Facilities & Property Mgmt.	15kV Cable feed lines Failure	Inability to carryout key research objectives and not able to carryout mission of laboratory	Medium	High	GPP replacement to be performed.	Medium to High	MediumL	Dudek
29	9-ES&H	Rad or Hazardous waste issue	Potential stop work for all site activities. Damage to Lab's reputation as good neighbor. Potential regulatory violation and fine. Public exposure to rad or hazardous waste.	High	Medium to high	All waste controlled by procedure. Processes audited internally. All shipping done by trained and qualified personnel Rad shipments only to DOE approved facilities.	High	Low	Levine
30	9-ES&H	Environmental Issue/damage	Potential stop work for all site activities. Damage to Lab's reputation as good neighbor. Potential regulatory violation and fine. Damage to environment that requires significant dollars to remediate. Negative Publicity. Damage to Lab Reputation.	High	Medium to high	All waste controlled by procedure. Emergency procedures in place to respond to release or spill. Evaluation program in place for existing conditions (ground water conditions). Programs evaluated by State of New Jersey. Prompt notification of State and DOE. Minimize and substitute chemicals.	Medium to high	Low	Levine
31	9-ES&H	Health & Safety Incident	Potential for individual to die. Potential for serious injury requiring major hospitalization and rehabilitation. Potential for lost time accident. Potential regulatory violation and fine.	High	Medium to high	Processes and procedures in place to provide for health and safety of individuals. Audits of processes to assure implementation (internal and external). Management walk throughs to assure implementation. Training and qualification. ISM PPE STOP Safety Culture Surveys to help drive improvements	Medium	Medium	Levine

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No.	Risk Category	Risk	Consequence (impact to mission)	Unmitigated Impact (h/ m/ l)	Unmitigated Likelihood (h/ m/ l)	Mitigation[1]	Mitigated Impact (h/ m/ l)	Mitigated Likelihood (h/ m/ l))	Responsible Individual
32	9-ES&H	Rad Exposure/Contamination	Potential for radiation exposure and/or contamination requiring hospitalization &/or decontamination. Potential regulatory violation and fine. Negative publicity. Damage to Laboratory reputation.	High	Medium to high	Processes and procedures in place to provide for radiological safety of individuals. Trained and qualified health physics professionals to assure implementation. Trained and qualified radiation workers. PPE.	High	Low	Levine
33	9-ES&H	Construction/ Subcontractor Safety Issue	Potential for serious injury, fatality or serious property damage. Lawsuit(s). Negative Publicity. Regulatory violation and/or fine. Damage to Lab reputation & relationship with local community.	High	Medium	Training of Princeton Technical Representatives on Subcontractor oversight. Statements of Work with detailed safety requirements. In field oversight by ES&H and Facilities professionals with safety oversight training and experience. GET and other specific ES&H training requirements for subcontractors. Hiring an additional safety professional for subcontractor/ construction safety.	Medium	Medium	Levine
34	9-ES&H	Emergency Response Issue- [Adverse outcome associated with PPPL response to Emergency Event (onsite or offsite-mutual aid)]	Potential for serious injury, fatality or serious property damage. Lawsuit(s). Negative Publicity. Regulatory violation and/or fine. Damage to Lab reputation & relationship with local community.	High	Medium	Processes in place to guide emergency response. Trained, experienced & qualified responders. Frequent drills. Mutual aid partnerships that assist in responses.	Medium	Low	DeLooper
35	10-Security.	Export Control Issues	Controlled equipment and/or codes given to prohibited countries Violation of law – prosecution of employees	Medium to high	Medium to high	Procedures in place to control export of sensitive information. All exported materials go through shipping who have specialized training to assure compliance.	Medium	Medium	DeLooper
36	10-Security	Security threat	Impact to operations – need to secure site to handle threat – loss of productive time. Worst case – loss of life due to disgruntled employee killing fellow worker. Negative Publicity. Damage to Lab Reputation.	High	Medium to low	Procedures in place to limit access to site Low probability of event Barriers in place at front gate Sensitive areas (D-site) fenced and requires card reader access. Trained security staff, cyber security controls	Medium to High	Low	DeLooper
37	10-Security	OUO Issue – Official Use Only or classified material used on site without security measures	Potential to release information to public that should be controlled Classified material being distributed publicly or discussed without security protocols	High	Medium	Publications now reviewed for classified information OUO training conducted by DOE Derivative classifier assigned to PPPL staff for specific nuclear verifications work activities – with protocols in place for communications via secure methods.	Medium	Low	DeLooper

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38	11-Communications	Community and Internal Issues	Negative publicity Lawsuit Violation of law – prosecution of employees	High	Medium to high	Periodic meeting held with local officials surrounding laboratory. Princeton University Office of Community Affairs addresses local issues. Public invited to see lab on regular basis: colloquia, Science on Saturday, open house. Frequent communications with staff regarding issues and initiatives Quarterly meetings with supervisors Lab management reviews	Medium to low	Low	Cane (Acting Communications Director)
39	11-Communications	Customer Communication Issues	Loss of trust Negative funding impacts Increased oversight and associated costs	High	Medium	Weekly management meetings with DOE-PSO. Invite DOE-PSO to Lab Management Reviews. Annual and periodic reporting including PEMP and Assurance processes. Involvement of DOE and University with development of Integrated Assessment Schedule. Project assessments, reporting and status updates. Public invited to see lab on regular basis: colloquia, Science on Saturday, open house.	Low	Low	Prager/Zarstorff/Cohen/ Cane (Acting Communications Director)
40	12-Assurance & Improvement	Adverse change in regulations	Additional support staff necessary to address regulations – less $ to mission requirements.	Medium	Medium	Regularly review and comment on all new DOE policies and regulations. Princeton University Government Affairs office in Washington, DC.	Medium	Medium	DeLooper

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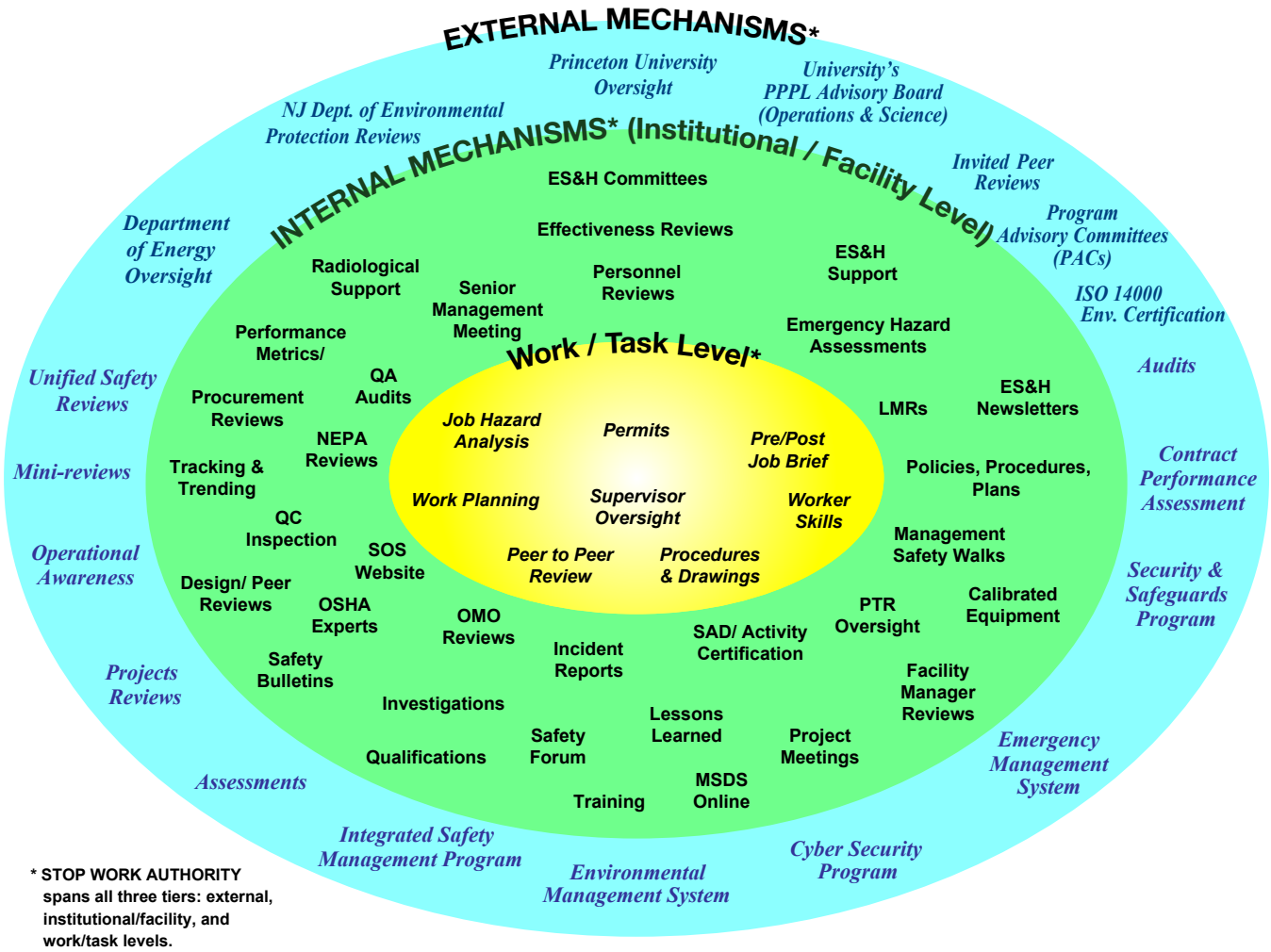
This chart represents a subset of the numerous sources of information for assessing the Laboratory's performance and many of the tools at that are used by PPPL for verification, sharing lessons, assessing and planning for risks, establishing requirements for conduct of work, etc. Combined, such tools provide the information on which PPPL can establish "assurance" of the level of performance and vitality of the Laboratory. The tools are grouped in tiers; depicting the level and diversity of engagement by external organizations, the Department of Energy, Princeton University, PPPL management, supervisors, and PPPL line workers. Some, but not all, mechanisms are depicted – the tables in Attachment 4 show a more complete listing of PPPL assurance mechanisms.

Sources of Information on Laboratory Performance used by the PPPL Assurance System



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EXTERNAL MECHANISMS

- PricewaterhouseCoopers *Annual financial audit of Princeton University*
- *PPPL Princeton Management Group's biannual PPPL Advisory Board reviews of Science and Operations Programs*
- *Program Advisory Committees (PACs) Reviews*
- *Invited Peer Reviews (Communications, ES&H, Procurement, Science Projects, Science Education, Contractor Assurance, Procurement Executive Review Team, Mission Readiness)*
- *NJ Department of Environmental Protection Reviews*
- *Independent Projects Reviews and Independent Reviews/Approvals of Project Cost Estimates*
- *Government Accountability Office reviews*
- *DOE-PSO Annual Review and Approval of PPPL Plans, Programs, Systems, Operations Assessments, Assurance Letter, Salary Increase Fund and Employee Benefits, Required Data Submittals, and Correspondence*
- *DOE-PSO Review and Approval of PPPL Assurance System Annual Statement and Description Document*
- *DOE-PSO Approval of Princeton University's Annual Internal Audit Plan for PPPL*
- *DOE-PSO Negotiation and Settlement of Audit Findings*
- *DOE-PSO Annual Review and Approval of PPPL Procurement Management System*
- *DOE-PSO review of PPPL Procurement Management System compliance with Delegation Letter*
- *DOE-PSO Approval of Subcontract Terms and Conditions*
- *DOE-PSO approval of Individual Subcontract Actions meeting specified thresholds*
- *DOE Designated Approving Authority (DAA) review and approval of PPPL Cyber Security Management Program*
- *DOE-PSO Review and Approval of PPPL Cost Accounting System Disclosure Statement whenever modifications are made*
- *DOE-PSO Site Assessments of PPPL*
- *DOE-PSO Operational Awareness Activities*
- *DOE-PSO Mini-reviews of PPPL Activities and Programs*
- *DOE-PSO with PPPL Unified Safety Reviews*
- *DOE-PSO and DOE-CH Assessments, Audits, and Surveys*
- *DOE-PSO Annual Review of PPPL's Integrated Safety Management Program*
- *DOE-PSO Annual Review and Approval of PPPL Property Management System*
- *DOE-PSO Review of PPPL Property Management System compliance with Delegation Letter*
- *DOE Assessment of PPPL Emergency Management System*
- *DOE Assessment of PPPL Cyber Security Program*
- *DOE Survey of PPPL Security & Safeguards Program*
- *DOE and independent reviewer assessments of Environmental Management System*
- *DOE-CH Financial Reviews*
- *DOE-CH Periodic Certification of PPPL Human Resources Payroll*

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- *DOE Annual Field Work Proposal (FWP) Budget Pricing Validation Reviews*
- *DOE Approval of Laboratory Field Work Proposal Submission*
- *DOE Oversight of Monthly and Annual Financial Closings via STARS*
- *DOE Annual Assessment and Report Card of PPPL Operations*
- *DOE Nevada Test Site Inspection of PPPL Low-level Radioactive Waste Program*
- *DOE Office of Project Assessment "Lehman" Reviews*
- *DOE Approval of Contractor Proposed Settlement of Legal Matters*
- *DOE financial statement audits and findings*
- *DOE Inspector General Reviews and Audits*
- *DOE Inspector General Audit of Contractor Annual Statement of Costs Incurred and Claimed*
- *DOE Office of Risk Management presentation of methodology for contractor testing of internal controls for Management Controls and Compliance Program*
- *Compliance, input, and review of compliance to DOE financial systems including:*
    - Active Facilities Database
    - Budget Execution and Reporting System
    - Departmental Budget Formulation System
    - Departmental Inventory Management System
    - DOE Info
    - Facilities Information Management System
    - Funds Controls and Distribution System
    - Funds Distribution System
    - Integrated Planning, Accountability and Budgeting System
    - Labor Distribution System
    - Standard Accounting and Reporting System
    - STRIPES

<u>Princeton University Oversight and Assurances</u>

- *Institutional Compliance Program*
- *Office of Audit and Compliance – Conducts Internal Audits per annual audit plan (reviewed and approved by DOE PSO and CH)*
- *Office of Audit and Compliance submits to DOE-PSO the Annual Audit Report of Internal Audit Activities for PPPL*
- *University's Committee on Audit and Compliance of the Board of Trustees is Briefed on the Annual Audit Plan and Results of completed Internal Audit Projects*
- *Review and Approve PPPL Annual Lab Plan*
- *University Review and Approval of Patents*
- *University Office of Project Research Administration (ORPA) Reviews*
- *PPPL biannual Advisory Board reviews*

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INTERNAL PPPL MECHANISMS (Institutional / Facility Level)

PPPL Oversight and Assurances

- *Annual Self-Assessment and Report Card of PPPL Operations per Contract Requirements and PEMP*
- *Budget calls and field work proposals (FWP) and BHRC reviews*
- *Technical Review Committee reviews and approval of proposed projects and initiations*
- *Research Council Review of Programs and Projects*
- *GPP project reviews and prioritization per CAMP criteria*
- *OPEX project reviews and prioritization*
- *Integrated (risk-based) CAS Assessment Schedule*
- *Annual Facility Condition Reviews (20% of facilities)*
- *Annual Inventory of High-risk Personal Property and Sample Inspection of other Personal Property*
- *Annual Mission Readiness Planning Meetings for Facilities*
- *Annual Review and Update of Facilities and Infrastructure 10-Year Plan*
- *Annual Industry Salary Surveys*
- *Discussions, benchmarking, peer reviews, lessons learned and best practices shared and compared with other DOE National Laboratories and commercial companies.*
- *Process and Best Practice Reviews*
- *Project Risk Registry Monthly Updates*
- *Biannual bottoms-up estimates of Ongoing Projects*
- *Surveys conducted by Departments/Divisions of their internal stakeholders/customers*
- *Monthly Contractor Assurance Status Review Meetings including those hosted by the Deputy Director for Operations and by Associate Director for Engineering and Infrastructure*
- *Annual Assurance Letter and Status Report per Contract Clause I.88*
- *Quarterly Work Planning Review Board Status Meetings*
- *Federal Financial Management Improvement Act Annual Assurance Letter*
- *Submittal of PPPL Cost Accounting System Disclosure Statement to document any proposed modifications*
- *Periodic Management and Self-Assessments of Lab functional areas and management systems including Annual Accounting, Procurement, Budget, and Material Services Self-Assessments/Balanced Scorecard Reviews and Assessments*
- *Monthly and Annual Financial Closings - CFO's monthly/ year-end briefings to senior management*
- *Annual Representations Letter Issued to DOE*
- *Annual Statement of Costs Incurred and Claimed (SCIC) submitted to DOE*
- *Certification and Accreditation (C&A) of Cyber Security Program and periodic update of Cyber Security Program Plan (CSPP), Risk Assessment, Cyber Security Threats and Vulnerabilities, Contingency Plan, and Security Test & Evaluation (ST&E).*

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- *Quarterly reporting of Office of Science Federal Information Security Management Act (FISMA) Metrics and Plan of Actions and Milestones (POA&M's)*
- *Experimental Project Run Assessments*
- *Reviews of Experimental Physics Results*
- *Committee Reviews of Programs and Systems (Technical and ES&H committees – TRC, ES&H Executive Board, Environmental, Safety, etc.)*
- *Personnel Reviews and Appraisals*
- *ES&H Field Reviews and Inspections*
- *Risk Management Reviews*
- *Weekly Laboratory Management Meetings (LMMs)*
- *Performance Metrics (e.g., PEMPs, dashboard KPIs)*
- *Emergency Hazard Assessments*
- *Quarterly Lab Management Reviews (LMRs)*
- *Periodic Review of Policies, Procedures, Plans*
- *Investigations of Adverse Events and Conditions*
- *Project Status and Review Meetings*
- *Procurement Technical Representative (PTR) Oversight*
- *Procurement Reviews*
- *QC Inspection*
- *OSHA Experts*
- *Management Safety Walkthroughs (MSWs)*
- *Line Management Walkthroughs*
- *PPPL Comprehensive Laboratory Assessment and Signage Program (CLASP)*
- *Calibrated Equipment*
- *Incident Reports*
- *OMO Reviews*
- *Safety Bulletins*
- *Safety Forum*
- *MSDS Online*
- *Director's Suggestion Box*
- *SOS Website*
- *Lessons Learned*
- *Training Qualifications*
- *Facility Manager Reviews*
- *Design/ Peer Reviews of Projects*
- *SAD/ Activity Certification*
- *QA Audits*
- *NEPA Reviews*
- *Tracking & Trend Analysis*
- *Periodic Purchase Card Assessments*
- *A-123 Reviews*
- *ARRA Reporting*

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- *Annual Review and Update of the PPPL ISM System and Description*
- *Annual Review and Update of the PPPL Worker Safety and Health Program*
- *Annual Management Assessment of PPPL's Radioactive Waste Management Program*
- *Annual Distribution of the Commitment to Integrity Letter to all Staff*
- *Periodic Review and Updates of Personnel Practice Manual to assure compliance with changes in federal and state laws and regulations, DOE rules, and applicable Laboratory and University policies and procedures*
- *Coordinated Review of Proposed and Draft DOE Directives and Standards*
- *Subject Matter Experts, OSHA Competent Persons, and Cognizant Individuals for Reviews and Communications of Rules*
- *Investigations of Allegations of Violations of the Laboratory's Ethical Policies*
- *Annual Ethics Training for Procurement Division staff, PCard Holders, and Senior Financial Managers*
- *Review and Approval of Work for Others and CRADA Agreements and Periodic Project Reviews*
- *Weekly Site Operations Rollover and Planning Meetings*
- *Plan of the Day Meetings to Coordinate all Site Operations*
- *Lab-wide Hoisting and Rigging Program Inspections, Field Supervision, Independent and Expert Oversight*
- *Periodic Submittal of Proposed Changes to PPPL's Cost Accounting Standards Board Disclosure Statement for DOE approval.*
- *Quarterly Training of Princeton Procurement Technical Representatives*
- *Periodic Review, Update, and Submittal of Procurement Terms & Conditions for Commercial Items set for DOE approval*
- *Triennial Review of Environmental Management System*
- *Pursuing ISO 14000 Certification, which requires Annual inspection with 3-year independent audit and registration renewal*
- *Annual submittal of performance data to the DOE Pollution Prevention Tracking & Reporting System (PPTRS).*
- *Annual submittal of the report on scope, status and performance of the PPPL Environmental Management System (EMS) report to DOE-HQ (HS-22) per Executive Order (EO) 13423 and EO 13514.*
- *Annual update of the DOE Active Facilities Data Collection System (AFDCS) with environmental data related to real property assets, and review of the data by DOE-PSO and the DOE CFO.*
- *Periodic submittal of various environmental monitoring reports to NJDEP and regulatory agencies addressing air, water, waste and other discharges and environmental conditions.*
- *Loan and Collaboration Agreements and Annual Reviews*
- *Invited Peer Reviews of Programs and Functional Organizations*
- *Real Property Data Entry and Consistency Reviews in FIMS*
- *Annual DOE approval of the PPPL property management system and delegation of*

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authority, and review and approval of significant changes to PPPL property management procedures.

- *Submittal of Annual Compensation Plan and Salary Ranges for DOE Review and Approval*
- *Submittal of Annual Compensation Increase Plan for DOE Contracting Officer Review and Approval*
- *Submittal of Any Additional Benefits or Compensation that will be incurred by DOE for Contracting Officer Review and Approval*
- *Request labor standards coverage determinations from the DOE Contracting Officer*
- *Submit an evaluation of Contractor Benefit Programs*
- *Annually submit the Report of Contractor Expenditures for Employee Supplemental Compensation*
- *Annual Submittal of PPPL Small Business Administration Plan for DOE-CH approval*

WORK / TASK LEVEL MECHANISMS

- *Job Hazard Analysis (JHA)*
- *Permits*
- *Pre/Post Job Briefs*
- *Work Planning Forms*
- *Supervisor Oversight*
- *STOP Observations*
- *Verification of Worker Skills and Training*
- *Peer to Peer Review*
- *Approved Procedures, Specifications, & Drawings*
- *Technical, QA, and Safety Inspections*
- *Construction Oversight*
- *Procedure Run Copies*
- *ISTP Procedures*
- *Performance Appraisals*
- *Crane Inspections and Training*
- *Industrial Equipment Inspections and Training*

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