

Capability Replacement Laboratory

Project Implementation Plan CRL-PLAN-PM-005, Revision 0



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Acronyms

BSF	Biological Sciences Facility
CAM	control account manager
CD	critical decision
COR	City of Richland
CRL	Capability Replacement Laboratory
CSF	Computational Sciences Facility
DHS	Department of Homeland Security
DOE	U.S. Department of Energy
DSA	Documented Safety Analysis
EA	environmental assessment
EM	DOE Office of Environmental Management
ES&H	Environmental Safety and Health
EVMS	Earned Value Management System
F&O	Facilities and Operations
FAR	Federal Acquisition Regulation
FDC	functional design criteria
FPD	federal project director
FY	fiscal year
GPP	General Plant Project
gsf	gross square feet
HAR	hazard analysis report
HRT	Horn Rapids Triangle
HVAC	heating, ventilation and air conditioning
IESH&Q	integrated environmental safety, health and quality
IGPP	Institutional General Plant Project
IMC	Information Management Center
IOPS	integrated operations system
IPT	integrated project team
ISM	integrated safety management
LEED	Leadership in Energy and Environmental Design
NEPA	National Environmental Policy Act
NNSA	National Nuclear Security Administration
OMB	Office of Management and Budget

PEP	Project Execution Plan
PIP	Project Implementation Plan
PNNL	Pacific Northwest National Laboratory
PNSO	DOE Pacific Northwest Site Office
POC	point of contact
PPS	proposal pricing system
PSF	Physical Sciences Facility
PSO	Program Secretarial Officer
QA	Quality Assurance
QAPD	Quality Assurance Program Description
R&D	research and development
RAM	responsibility assignment matrix
RCCC	River Corridor Closure Contractor
RIDS	Records Inventory and Disposition Schedule
RL	DOE Richland Operations Office
RPL	Radiochemical Processing Laboratory
SBMS	Standards Based Management System
SC	DOE Office of Science
SEPA	Washington State Environmental Policy Act
SME	subject matter expert
SSC	structures, systems and components
TEC	total estimated cost
TPC	total project cost
TRIM	Total Records Information Management
TSR	Technical Safety Requirements
WBS	work breakdown structure
WCH	Washington Closure Hanford, LLC

1.0 Document Summary and Overview

This Project Implementation Plan (PIP) for the Capability Replacement Laboratory (CRL) Project encompasses the management objectives and requirements of the project activities and specifically describes how Pacific Northwest National Laboratory (PNNL) will manage the design, construction and operational startup of the facility within those requirements.

1.1 Scope and Purpose of the PIP

The CRL Project is a U.S. Department of Energy (DOE) major systems acquisition to design and build replacement laboratory facilities for PNNL research capabilities being displaced from the Hanford 300 Area. The CRL Project has been approved to implement a mixed-funding approach for capital construction of approximately 575,000 square feet of research space. The PIP for the CRL provides overall guidance to the various project participants on the roles, responsibilities and management interactions among the DOE Office of Science (SC), the DOE Pacific Northwest Site Office (PNSO) and PNNL. The PIP was prepared in accordance with PNNL Policy and DOE Manual 413.3-1, *Project Management for the Acquisition of Capital Assets*, under which the CRL Project is subject to the requirements for a “Major Systems Acquisition.” The PIP will be used as input to the Federal Project Director’s Project Execution Plan (PEP). The Deputy Secretary of Energy is the Secretarial Acquisition Executive and the Director of the Office of Science is the Program Secretarial Officer (PSO) for the CRL Project.

The CRL Project consists of four primary scope elements:

- **The Physical Sciences Facility (PSF).** The PSF is a federally funded line item to construct approximately 200,000 gross square feet (gsf) of new research facilities on the PNNL site north of Horn Rapids Road, and extend the operational life of the 325 Building (a hazard category 2 nuclear facility) for an additional 20 years. A primary element of the PSF scope is to effectively transition the safety basis authorization of the 325 Building from the Office of Environmental Management (EM) to SC.
- **The Biological Sciences Facility and the Computational Sciences Facility (BSF and CSF).** The BSF and CSF are two 3rd party leased facilities of approximately 75,000 gsf each on private Battelle land on the PNNL site.
- **Retained 300 Area facilities and utility infrastructure.** Retained 300 Area facilities include the 318 Building, 331 and 350 complexes and the utility infrastructure necessary to conduct routine research operations in these facilities and the 325 Building for the next 20 years. The modernization efforts and utility replacement efforts are funded via a mix of Washington State, EM, PNNL overhead and general plant project (GPP) and line item funds. These modernization efforts largely represent expanded maintenance programs for roofs, water and sewer distribution systems, electrical and communication systems and local area networking capabilities.
- **300 Area transition.** The transition project is associated with the detailed moves, integration with EM and modification of laboratory operating systems to ensure the safe and effective migration of existing 300 Area research facilities into their new surroundings. This project also includes the resulting turnover of vacated facilities to EM for final disposition.

The CRL PIP is a contractor prepared and controlled document that establishes the overarching implementation framework for the entire CRL mission. The PIP serves three basic functions. First, it describes management and project execution processes. It identifies plans for project execution, including mission need and justification; project objectives and description; management systems; environment, safety, health and security; resource planning; transition to operations; project controls (management, baselines and change systems); and reporting. Second, the PIP establishes the preliminary project baselines (technical, schedule and cost) against which the overall project execution will be measured. Changes to project execution will be evaluated in terms of baseline impacts. Through graduated change control authority, appropriate levels of management become involved in decisions regarding project changes. Third, the PIP serves as the primary reference document for the project team. Technical requirements, policies and procedures for resource allocation, procurement, budgeting and finance, work authorization, management, reporting, reviews and evaluations, etc., flow down from the PIP.

2.0 Project Information

2.1 Project Background

Cleaning up legacy waste is the U.S. government's current mission at the Hanford Site located in south eastern Washington State. DOE is required under the Tri-Party Agreement with its regulators to complete surplus facility disposition and remedial action cleanup of the 300 Area of Hanford by 2015. In an effort to speed up activities and reduce costs, EM has decided to clean up the 300 Area at Hanford by 2012. This accelerated effort requires PNNL to vacate the 25 buildings (15 main facilities and associated annexes) it still occupies in the area by 2011. Nearly 50 percent of PNNL's experimental laboratory space—about \$200 million of its total research and development budget—and about 1,000 staff are associated with programs conducted in these facilities.

2.2 Project Description

SC, the National Nuclear Security Administration (NNSA), and the U.S. Department of Homeland Security (DHS) have undertaken the CRL Project. The CRL Project will ensure the long-term viability of the laboratory and preserve vital research capabilities in the following areas.

- Systems Biology
- Environmental Science/Biomarkers
- Subsurface Science
- Materials Sciences and Technology
- Chemistry (Radio, Actinide, Analytical) and Processing
- Shielded Operations (Hazard Category 3)
- Radiation Detection
- Ultra-Trace/Signature Detection
- Information Analysis
- Certification and Dosimetry.

The CRL Project will preserve these capabilities by constructing three new facilities—the CSF, the BSF, and the PSF—as well as completing necessary modifications to some existing 300 Area facilities so they can continue to be used for research. The scope of the CRL Project also includes providing necessary utilities and infrastructure and transitioning staff and equipment to their new locations.

The acquisition strategy for the CRL Project is based on a mixed-financing approach using a combination of federal government, private and Washington State funding. The scope of each major element of the broader CRL Project is provided below, along with a description on the funding approach being used for that scope. Work will be complete by 2011, which will allow DOE to meet its cleanup commitments in the 300 Area while minimizing disruption to ongoing research activities.

2.2.1 PSF Project

The PSF Project is a federally funded line-item that will construct new radiological facilities on the Horn Rapids Triangle (HRT) portion of the PNNL site, modernize an existing Hazard Category 2 Nuclear Facility (the 325 Building) for continued use, and support the acceptance for operation of the new radiological facilities and the 325 Building by SC.

The new construction element of the PSF Line Item will consist of approximately 200,000 square feet of new research and office space on a previously undeveloped site, the HRT, immediately north of Horn Rapids Road in Richland, Washington. The new facility will house the following capabilities: Materials Sciences & Technology, Radiation Detection, Ultra-Trace/Signature Detection, and Chemistry and Processing limited to radiological facility levels.

In addition to the new construction scope, the PSF Line Item will modernize the 325 Building to allow it to continue operating safely for an additional 20 years. Once modifications are complete, the 325 Building will provide space for Chemistry (Radio, Actinide, Analytical) and Processing, as well as a Hazard Category 2 Shielded Operations capability.

While completing the new facility construction and the 325 Building modifications, the PSF Line Item will support the activities necessary to commission, start-up, and operationally accept these facilities within SC.

2.2.2 PNNL Infrastructure and Relocation Project (Alternatively Financed Facilities)

HRT Utilities

The City of Richland, via a \$5 million grant from the Washington State Community, Trade, and Economic Development department, will provide utilities to the HRT, the site of the PSF new construction. The site utilities (electrical power, water, sewer, natural gas and telecommunications) will be located within a utility corridor that will encircle the planned building site. The state grant also provides for improvements to Horn Rapids Road. The utility corridor portion of this project is scheduled to be completed by June 30, 2007, in support of the initial PSF HRT site work scheduled for July and August 2007.

300 Area Utilities

The EM funded project's approach is to provide replacement capability for all utility systems and enable the 300 Area retained facilities to become independent of existing Hanford utility systems by October 2009. The required services for long-term occupancy (20 years) of retained facilities are

- electrical distribution
- potable water and fire water
- sanitary wastewater lift stations and piping as needed
- process sewer, retention process sewer and storm-water disposition
- relocation of telecommunications cables as needed
- natural gas, steam, compressed air and backup generator services.

Washington Closure Hanford (WCH) is the implementing contractor for this work. PNNL is coordinating both with WCH and the City of Richland as required to obtain utilities and services for its retained facilities.

Biological Sciences Facility and the Computational Sciences Facility

The BSF is programmed to be a ~75,000 gross square foot multistory structure, with research capabilities throughout the entire facility. The CSF is programmed to be a ~75,000 gross square foot multistory structure with research capabilities throughout the entire facility. Research capabilities will include systems biology and information analysis. The BSF and CSF are sited on the PNNL main campus on Battelle private land. The developer will finance construction and lease the facilities to PNNL. The facilities will be certified Leadership in Energy and Environmental Design (LEED) facilities emphasizing energy efficient design. The selected developer will plan, design, finance, construct and operate both the BSF and CSF. The primary elements of the work task are to provide project integration, management and oversight to ensure the developer provides project and program requirements as set forth in the contract between Battelle and developer. Additionally, this requires the development and approval of the Business Case, developer selection and agreements, facility and land leases, and engineering support to design and construction. The planned completion date for both the BSF and CSF are late CY2008.

Existing 300 Area Facilities

Several existing buildings, in addition to the 325 Building noted above as part of the PSF Project, will be retained for future use. A combination of laboratory overhead funds, Institutional General Plant Projects funds, and General Plant Projects funds will be used to make minor modifications and repairs to these facilities so they can continue to be used for research:

- The 318 Building will continue to house the certification and dosimetry capabilities.
- The 331 Building will contain the subsurface science and environmental biomarkers capabilities.
- The 350 Building will continue to be used as a machine shop and maintenance support facility.

Transition Activities

Transitioning research staff, equipment, materials, and research operations to newly constructed facilities and to existing facilities that will continue to be used for research activities will be funded with laboratory overhead. This scope will largely take place after construction efforts are complete and facilities are approved for occupancy.

3.0 Organizational Breakdown Structure

The PNNL director has established a project organization for managing and executing work on the CRL Project. The CRL Project director reports to the laboratory director and has access to the resources necessary to effectively plan, manage and control the diverse set of activities that make up the scope of the project. Figure 1 shows the position of the CRL Project director within PNNL’s management structure.

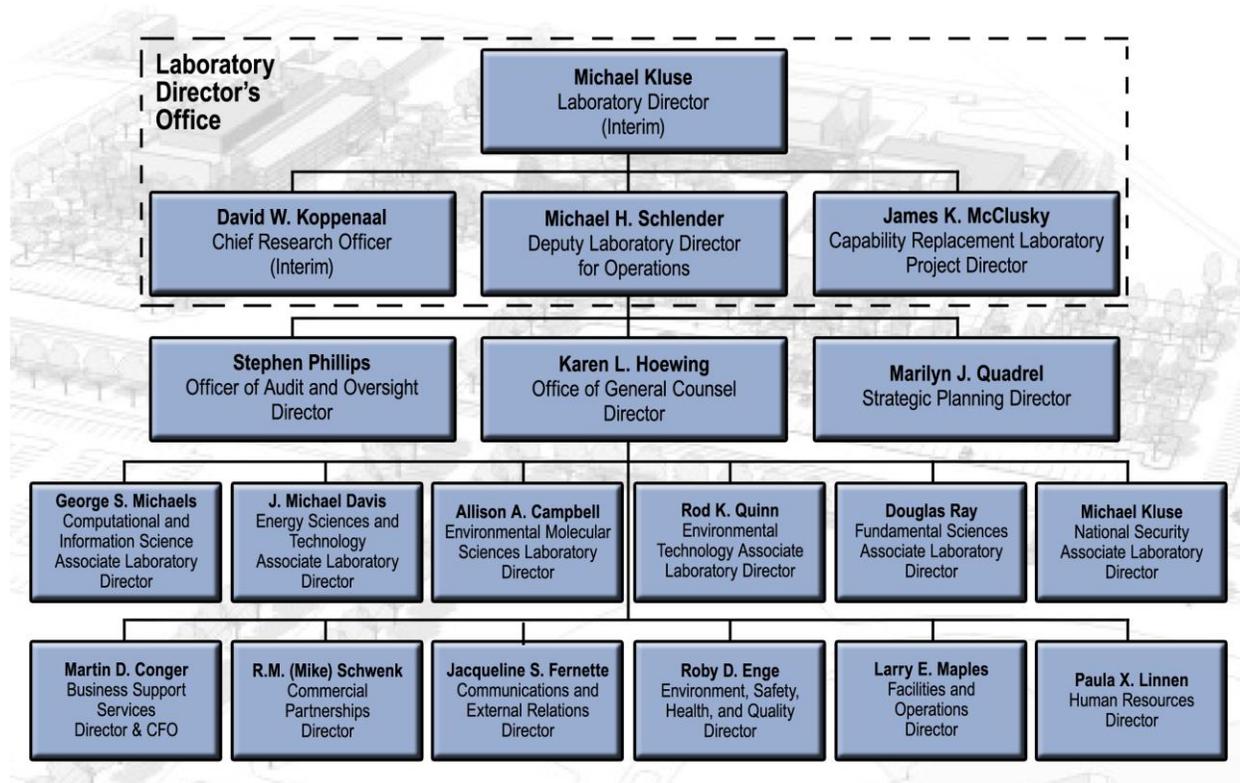


Figure 1. The CRL Project Director in the Laboratory Management Structure

The CRL Project director has established a project organization (Figure 2) to accomplish the CRL Project. The CRL Project team includes direct and matrix staff. Direct staff report to the CRL Project director and are assigned to the project office organization. PNNL organizations have assigned key staff to support the project office in a matrix relationship. For the purposes of accomplishing CRL Project activities, both direct and matrix members of the team provide management and support services to the project and take direction from the CRL Project director.

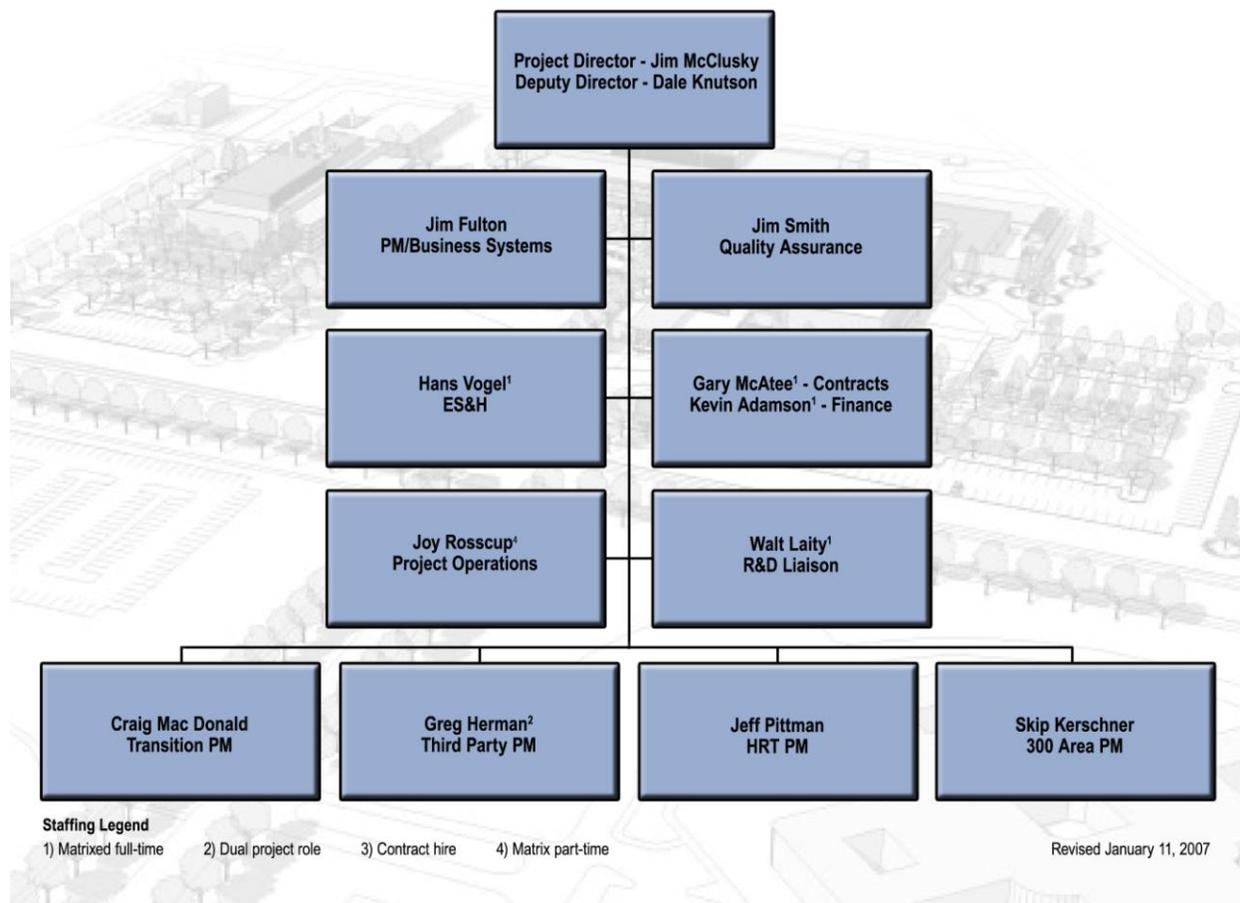


Figure 2. CRL Detailed Project Organization

PNNL used a work breakdown structure (WBS) methodology for defining the project scope (see Section 3). Within the WBS, lower-tier projects and the CRL Project baseline are planned at the activity level and provide the framework for organizing and assigning direct and matrix resources across the multiple projects. The CRL Project has documented assignments for management in the project’s responsibility assignment matrix (RAM). The RAM is a controlled project document and will be updated and reissued with changes to key management assignments.

The PNNL and DOE CRL Project organization structure is shown in Figure 3 below. As depicted in the figure, both PNNL and PNSO have assigned people to key aspects of the project.

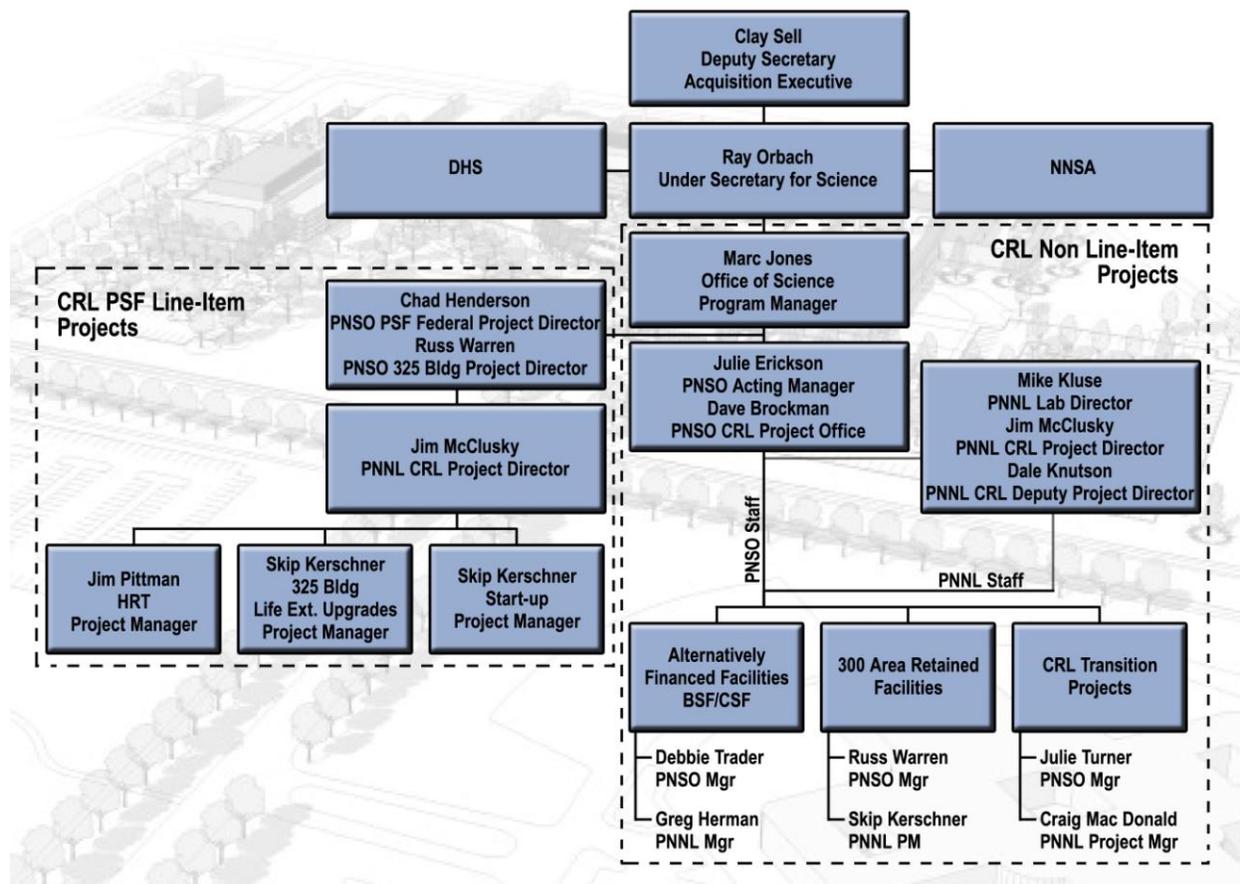


Figure 3. PNSO and PNNL Staff Relationships

The organizational alignment for the PSF line item project is a subset of the CRL Project organization and has been established to meet specific requirements identified in DOE Order 413.3A. Figure 4 portrays the roles of DOE and the contractor project director for executing the work associated with the PSF Project. This relationship is fully described in the PEP.

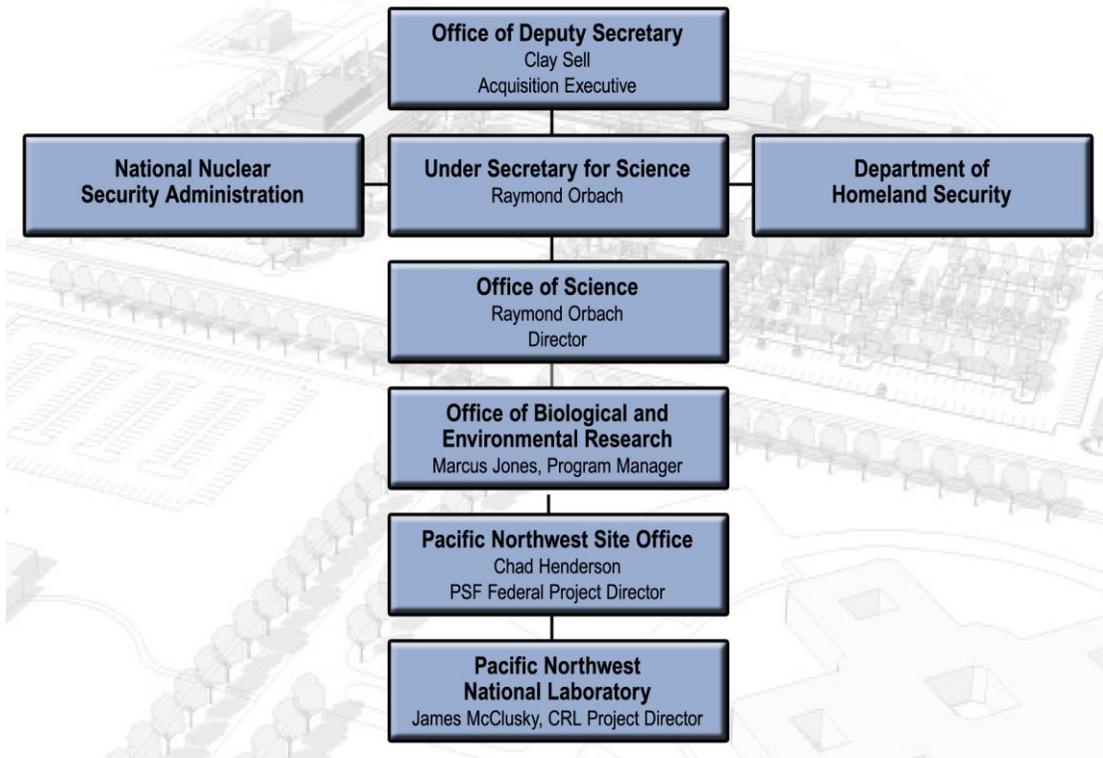


Figure 4. DOE/PNNL PSF Line Item Management Responsibility

3.1 CRL Project Director

The CRL project director will ensure execution of project-related tasks and cost effective achievement of the project’s mission needs. The CRL project director has established a core project organization, shown in Figure 5, that includes dedicated project managers to oversee summary level elements of the project WBS. This core organization ensures project execution, and over time, will be augmented with additional resources to meet the needs of the project throughout its life-cycle. A summary of responsibilities and authority for each position follows.

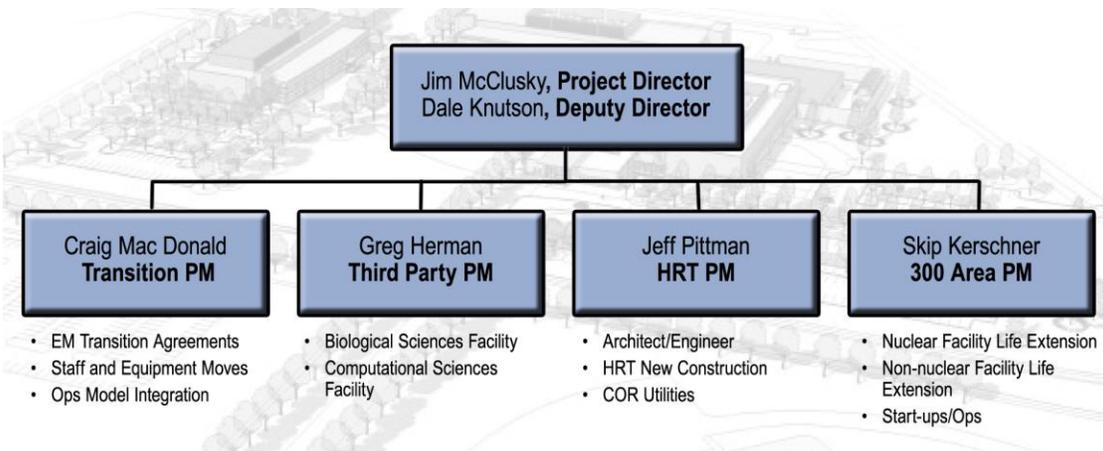


Figure 5. CRL Project Management Responsibilities

3.2 Deputy Director

The CRL Project director has established a deputy to assist in managing and directing activities within the CRL Project. The deputy will provide senior technical oversight; assist in mitigating project risks and will have delegated approval authority by the CRL director.

3.3 Project Managers

Project managers, as depicted in Figure 5, execute and manage assigned lower-tier projects within the CRL Project. Project managers are delegated responsibilities from the project director consistent with the type of work they are managing and any unique, sponsor-imposed management requirements that govern their assigned activities. Project managers will direct the efforts required to successfully plan and execute delivery of their assigned facilities or activities. In fulfilling their roles, each project manager will prepare detailed work plans, delegate responsibilities to qualified individuals and ensure delegates clearly understand and are capable of meeting PNNL and sponsor requirements.

The project or lower-tier WBS task managers will assign control account managers (CAMs) to plan and execute specific work activities that are designated at the control account level of the WBS. CAMs will develop integrated plans for their assigned activities and ensure their integration with the performance baseline plan.

3.4 Support Control Account Managers

In accordance with the project management strategy, PNNL is using the Standards Based Management System (SBMS) to meet management and administrative guidelines in executing the project work. The CRL director has identified key subject matter experts (SMEs) for SBMS subject areas to provide implementing support to areas of the CRL Project management team in meeting SBMS requirements on the project. The SMEs identified in Figure 2 will serve as CAMs and will ensure that activities performed on the project meet the PNNL SBMS subject area requirements and are responsible for determining when CRL variance requests or supplemental guidance documents are necessary to meet PNNL's management system requirements. The SME will assist in the preparation and approval of requested variances from SBMS requirements and the development of supplemental guidance within their SBMS subject areas.

Support CAM positions in the CRL Project Office are described below.

3.4.1 Project Management and Business Systems Integration

The project management and business systems integration CAM supports the CRL Project director, project managers and their CAMS in planning and in baseline and procedure development for cost effective implementation of PNNL's project management and business systems to meet CRL Project objectives. This CAM and the CRL staff supporting the cost account are responsible for the following areas of CRL support:

- interpret, advise, and communicate financial requirements, limitations, and opportunities to maximum benefit of the CRL Project office
- provide associated training for integrated planning, schedule and cost monitoring, progress reporting and monitoring project deliverables to ensure they are completed on time and within budget

- support the CRL Project director, project managers, and CAMs in planning and purchasing design, construction, and other needed services
- support the CRL Project director, project managers, and CAMs in identifying and managing risks associated with their projects and activities.
- provide document and configuration control for CRL Project records and design media.

3.5 Project Quality Officer

The CRL Project quality CAM supports the CRL Project director and project managers, identifying and implementing quality requirements applicable to their projects and activities, and conducts assessments to validate implementation.

3.6 Environmental Safety and Health Manager

The Environmental Safety and Health (ES&H) CAM provides support to the CRL Project director and the CRL Project team. Interface with ES&H SMEs is critical to determine necessary permitting actions, ES&H- and nuclear safety-related deliverables and applicable design standards to meet regulatory needs, integrating timelines for ES&H activities into the overall CRL schedule and aligning ES&H staff to support CRL activities.

3.7 Project Research and Development Liaison Manager

The research and development (R&D) liaison CAM is responsible for working with PNNL's associate laboratory directors, their designated senior points-of-contact, and other senior technical staff (e.g., the Council of Laboratory Fellows) to ensure that the design specifications for 300 Area replacement facilities and other new construction assigned to the CRL Project are fully consistent with the facility-specific R&D missions of the new facilities. This position will work with the R&D stakeholders very early in the design process of each new facility and continue these interactions through construction and subsequent occupancy of each facility. This close coordination will avoid expensive and time-consuming corrective actions that might otherwise be required.

3.8 Authorities

The responsibilities and authorities for the development, review, recommendation, and approval for products and deliverables created on the CRL Project are reflected in Figure 6. One-over-one approvals or concurrences are required on most project documents.

3.9 Key Staff Biographies

Biographical information, including education and previous experience, about key project staff is included in the Appendix.

Document or Action	CRL Project Controls / Financial Analyst	CRL Control Account Managers	CRL Project Manager	PNNL CRL Project Director	Lab Director	Federal Project Director for PSF Line Item related activities
Organization	PNNL	PNNL	PNNL	PNNL	PNNL	DOE/NNSA/DHS
Project Budget, Funding & Major Milestones	Contributes	Prepares	Prepares & Concur	Reviews & Approves	Reviews	Guidance & Approval
Project Management Plans	Contributes	Contributes	Prepares & Concur	Reviews & Approves		Guidance
Baseline Change Requests (Federal Level)	Prepares	Prepares	Prepares & Concur	Reviews & Approves	Reviews	Guidance & Approval
Baseline Change Requests (PNNL Level)	Prepares	Prepares & Concur	Prepares & Concur	Reviews & Approves		
Monthly Progress Reports	Prepares	Prepares & Concur	Prepares	Reviews & Approves	Reviews	
Project Deliverables		Prepares & Concur	Prepares & Concur	Reviews & Approves	Guidance & Approval	Guidance & Approval
Management Policies & Procedures	Prepares	Prepares & Concur	Prepares & Concur	Reviews & Approves		
Control Account Authorization	Prepares	Prepares & Concur	Reviews & Approves	Reviews & Approves		
Variance Analysis Reports		Prepares	Prepares & Concur	Reviews & Approves	Reviews	
Subcontracts & Purchase Orders						
>\$100,000	Review & Concur		Prepares & Concur	Reviews & Approves		
>25,000	Review & Concur	Prepares & Concur	Reviews & Approves			
= to and <\$5,000	Review & Concur	Reviews & Approves				

Figure 6. CRL Project Authorities Matrix

4.0 Project Management

4.1 Project Management Strategy

PNNL is committed to the cost effective implementation of project management and business systems on the CRL Project. At a minimum, CRL Project activities will be planned, executed and managed in accordance with the PNNL SBMS Project Management subject area and Facilities and Operations (F&O) project management administrative procedure ADM-CM-055. Where appropriate PNNL will retain subcontractors to deliver aspects of the new replacement facilities on the HRT; improve retained 300 Area facilities and relocate the research capabilities from the 300 Area into the new facilities.

The CRL Project will be managed in accordance with DOE Order 413.3A. The DOE order contains requirements that will necessitate supplementing the SBMS. Complementary management plans (e.g., environmental safety and health [ES&H], quality assurance [QA], risk) have been developed as required to supplement SBMS and meet specific sponsor requirements for effective project management.

PNNL has implemented the following tenants of effective project management on the CRL Project:

- Established a WBS for the CRL Project that is product-oriented and depicts the work to be performed to accomplish project mission objectives.
- Staffed a project organization that comprises SMEs representing key laboratory management systems and project management professionals who are uniquely qualified to execute all aspects of the CRL Project.
- Extended the CRL summary WBS to organize and plan key deliverables around lower-tier projects. Management and work performance responsibilities have been assigned for lower-tier projects and their control accounts in the RAM.
- Identified and tailored SBMS to include complementary management plans (e.g., quality management plan, ES&H plan, risk management plan) necessary for compliant execution.
- Developed an integrated cost and schedule performance baseline for each lower-tier project to allocate and manage resources necessary for delivery of the replacement facilities, infrastructure and relocations within schedule and budget objectives.
- Implemented a baseline change control process to document scope, schedule and budget changes that will occur throughout the CRL Project life cycle.

4.1.1 Summary WBS

The CRL summary WBS (Figure 7) is the cornerstone of the PSF technical scope definition. It provides a frame-work and logical structure for the cost and schedule estimates to allow traceability between the three baseline components.

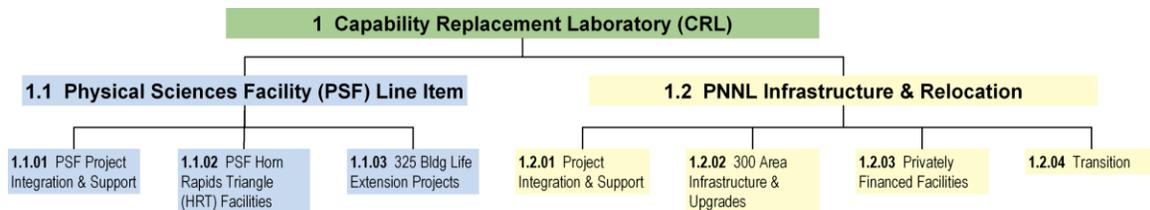


Figure 7. Summary WBS for the CRL Project

From the summary WBS the project team has developed a detailed WBS which consists of a hierarchical decomposition of the product-oriented work elements to be used in determining the total scope of work associated with the project. A more detailed WBS for the CRL Project can be found in Section 5.1.

4.1.2 Responsibility Assignment Matrix

PNNL has assigned management and work performance responsibility for each WBS element and documented these assignments in the CRL RAM. PNNL will plan work and allocate resources for accomplishing the CRL Project deliverables and the control account level depicted in the RAM. The RAM is shown in Figure 8.

4.2 PNNL Management Systems and Controls

PNNL’s SBMS provides the minimum management structure, systems and controls for conducting project work at the laboratory and is available at <http://sbms.pnl.gov>. SBMS provides staff with current laboratory standards, procedures, and guidelines relevant to the work they perform. These laboratory-wide standards, procedures and guidelines are based on an evaluation of external requirements documents (i.e., orders, directives, and federal, state, and local laws) and Battelle policies. The supplemental organization implementing procedures provide additional requirements and guidance, where deemed necessary by the laboratory organization responsible for implementing the requirements and controls set forth in SBMS.

The management systems and controls are comprehensive and designed to operate in an integrated fashion ensuring that quality work is accomplished in a safe and environmentally sound manner. The management systems provide the integrated business processes to achieve “defense-in-depth” for products and service by carefully applying work controls tailored to the work being performed.

The PNNL management system requirements and controls applicable to the CRL Project are summarized below. Deviations from these requirements and controls may be needed on some projects to meet unique requirements of the project and/or a sponsor and will be identified in the project/control account work plans.

4.2.1 Environment, Safety and Health

Work conducted on the CRL Project will be performed in conformance with existing PNNL policies, to include appropriate ES&H related program descriptions, management systems, and subject areas. The application of PNNL’s institutional integrated environmental safety, health and quality (IESH&Q) program at the CRL Project level is further defined in the PSF Integrated Safety Management (ISM) Plan (PSF-PLAN-ESH-003), which describes the overall approach for implementing ISM during the life cycle of the CRL Project.

PROJECT TITLE/PARTICIPANT							Date	Control Account Manager/ Responsible Person	
Capability Replacement Laboratory (CRL) Pacific Northwest National Laboratory (PNNL)									
WBS Elements							28-Nov-06		
Work Breakdown Structure (WBS)			Title						
Level									
1	2	3	4	5	6	7			
1							Capability Replacement Laboratory (CRL)	Program	McClusky, Jim
1	1						Physical Sciences Facility (PSF)	Project	McClusky, Jim
1	1	01					PSF - Project Integration & Support	Task	Fulton, Jim
1	1	01	01				PSF - Project Mgmt and Business Management Systems Integration	Control Account	Fulton, Jim
1	1	01	02				PSF - Environmental Safety & Health	Control Account	Vogel, Hans
1	1	01	03				PSF - Quality Assurance	Control Account	Smith, Jim
1	1	01	04				PSF - R&D Liaison	Control Account	Laity, Walt
1	1	02					PSF Horn Rapids Triangle (HRT) Facilities	Task	Pittman, Jeff
1	1	02	01				PSF HRT Facilities Integration	Control Account	Pittman, Jeff
1	1	02	02				PSF HRT Engineering, Design & Inspection	Sub-Task	Flowers, Dale
1	1	02	02	01			PSF HRT Engineering and Design Support	Control Account	Flowers, Dale
1	1	02	02	02			PSF HRT A/E Design and Engineering Services	Control Account	Flowers, Dale
1	1	02	02	03			PSF HRT Facility Commissioning	Control Account	Flowers, Dale
1	1	02	02	04			PSF HRT Facility Permitting	Control Account	Edwards, Dan
1	1	02	02	03			PSF HRT Facilities - Safety Basis	Control Account	Vogel, Hans
1	1	02	04				PSF HRT Facility Construction	Sub-Task	Steward, Bill
1	1	02	04	01			PSF HRT Construction Management	Control Account	Steward, Bill
1	1	02	04	02			PSF HRT New Facility Construction	Sub-Task	Steward, Bill
1	1	02	04	02	01		PSF HRT Facilities - General Site Work and Material Procurements	Control Account	Steward, Bill
1	1	02	04	02	02		PSF HRT Facilities - Ultratrace Facility Construction	Control Account	Steward, Bill
1	1	02	04	02	03		PSF HRT Facilities - Material Science and Technology Facility Construction	Control Account	Steward, Bill
1	1	02	04	02	04		PSF HRT Facilities - Central Utility Plant Facility Construction	Control Account	Steward, Bill
1	1	02	04	02	05		PSF HRT Facilities - Radiation Detection Facility Construction	Control Account	Steward, Bill
1	1	02	04	02	06		PSF HRT Facilities - Paving and Landscaping Construction	Control Account	Steward, Bill
1	1	02	05				PSF HRT Facilities - Operational Startup	Control Account	Kerschner, Skip
1	1	02	06				PSF HRT Facilities - Site Permitting	Control Account	Edwards, Dan
1	1	03					Building 325 Life Extension Projects	Task	Kerschner, Skip
1	1	03	01				Building 325 Life Extension Projects - Integration	Sub-Task	Kerschner, Skip
1	1	03	01	01			Building 325 Life Extension Projects - Integration	Control Account	Kerschner, Skip
1	1	03	01	02			Building 325 Life Extension Projects - Facility Permitting	Control Account	Edwards, Dan
1	1	03	02				Building 325 Life Extension Projects - Design/Construction	Control Account	Cunningham, Julia
1	1	03	03				Building 325 Life Extension Projects - Safety Basis	Control Account	Vogel, Hans
1	1	03	04				Building 325 Life Extension Projects - Operational Readiness	Control Account	Kerschner, Skip
1	2						PNNL Infrastructure & Relocation	Project	McClusky, Jim
1	2	01					Project Integration & Support	Task	Fulton, Jim
1	2	01	01				Project Mgmt & Business Systems Integration	Control Account	Fulton, Jim
1	2	01	02				Environmental Safety & Health	Control Account	Vogel, Hans
1	2	01	03				Quality Assurance	Control Account	Smith, Jim
1	2	01	04				R&D Liaison	Control Account	Laity, Walt
1	2	02					300 Area Infrastructure and Upgrades	Task	Kerschner, Skip
1	2	02	01				300 Area Infrastructure and Upgrades Integration	Control Account	Kerschner, Skip
1	2	02	02				318 Building Rehabilitation	Control Account	Greenaway, Brian
1	2	02	03				331 Building Rehabilitation	Sub-Task	Carreno, Raul
1	2	02	03	01			Lab Upgrades	Control Account	Carreno, Raul
1	2	02	03	02			System Upgrades	Control Account	Carreno, Raul
1	2	02	04				350 Building Rehabilitation	Control Account	Greenaway, Brian
1	2	03					Privately Financed Facilities	Task	Herman, Greg
1	2	03	01				Privately Financed Facilities Integration	Control Account	Herman, Greg
1	2	03	02				Biological Science Facility (BSF)	Control Account	Dotson, Paul
1	2	03	03				Computational Sciences Facility (CSF)	Control Account	Dotson, Paul
1	2	03	06				COR Utility Infrastructure	Control Account	GerK, Ray
1	2	04					Transition	Task	MacDonald, Craig
1	2	04	01				Management & Integration	Sub-Task	MacDonald, Craig
1	2	04	01	01			Project Management	Control Account	MacDonald, Craig
1	2	04	01	02			WCH Relationship Management	Control Account	Cassidy, Stephen
1	2	04	01	03			Project Controls	Control Account	Oukrop, Lanson
1	2	04	02				Capilities Relocation	Sub-Task	Poston, Kathy
1	2	04	02	01			Detailed Capability Specific Relocation Planning	Control Account	Poston, Kathy
1	2	04	02	02			Procurement	Control Account	Poston, Kathy
1	2	04	02	03			Relocation	Control Account	Poston, Kathy
1	2	04	02	04			Interim Moves	Control Account	Thornton, Glenn
1	2	04	03				Operations Transition	Sub-Task	Peterson, Marty
1	2	04	03	01			Operating Model & Integrated Asset Management	Control Account	Peterson, Marty
1	2	04	03	02			PNNL Site Services	Control Account	Cassidy, Stephen
1	2	04	03	03			Qualifications & Training	Control Account	Peterson, Marty
1	2	04	04				300 Area Operations	Sub-Task	Thornton, Glenn
1	2	04	04	01			300 Area Operations	Control Account	Thornton, Glenn
1	2	04	04	02			Continuity of Operations	Control Account	Thornton, Glenn
1	2	04	04	04			Utilities/Infrastructure/Services	Control Account	Thornton, Glenn
1	2	04	05				Facility Turnover	Sub-Task	Thornton, Glenn
1	2	04	05	01			Inventory Management & Disposition	Control Account	Thornton, Glenn
1	2	04	06				300 Area Utilities	Sub-Task	GerK, Ray
1	2	04	06	01			PNNL Oversight and Integration	Control Account	GerK, Ray

□ - Denotes Summary Level WBS Element

Figure 8. CRL RAM Through the Third Level

The plan will be updated and revised throughout the project life cycle as needed, or based on routine evaluations that identify needed revisions.

The ISM Plan establishes the organized system whereby CRL design and construction work is planned, performed, and assessed relative to ISM guiding principles and core functions. It is consistent with or linked to the existing PNNL Integrated Environment, Safety, and Health requirement (<http://sbms.pnl.gov/program/pd03d020.htm>) and is consistent with or linked to related SBMS policies, programs or subject areas. The plan defines the project strategy for integrating ES&H requirements, regulations, codes, standards and guidance to the various activities of the CRL Project. It describes how feedback and improvement related to ES&H is integrated in the CRL design and construction, and it addresses DOE Order 413.3A, guidance for documenting how the CRL Project implements ISM requirements.

The CRL Project is committed to achieving a high degree of safety through compliance with applicable local, state, and federal regulations and the DOE requirements as flowed down to PNNL via the laboratory contract. These will be implemented through PNNL policies, subject areas and procedures as described in SBMS industry best practices unique to the CRL Project-specific plans and procedures. PNNL and project-specific feedback and improvement processes. Safety and health performance during execution of the project will be monitored and assessed by both CRL Project and PNNL management (management system owners).

CRL Project staff will be the first line of defense to ensure safe conduct of operations for the project, invoking the principles of PNNL's Voluntary Protection Program and SBMS requirements. Each project staff member has the right to exercise their authority to stop work at any time they believe procedures or operations are deficient and incapable of ensuring the safe conduct of work. Staff working on the project are empowered with stop-work authority as defined in the PNNL Stopping and Restarting Work (Safety Rights and Responsibilities) subject area. Project staff are empowered and required to promptly report accidents, injuries, ES&H deficiencies, emergencies and off-normal events through the single point-of-contact at 375-2400, following the Event Reporting subject area. The CRL Project director (or delegate) will be notified of any reportable events occurring on the project.

Before beginning work, the project manager and team members will ensure that the risks and hazards are identified and controlled with permits, procedures, training, etc. as specified in approved work planning documents.

Many phases of the project will be performed through acquisition mechanisms, using the services of contracted personnel. The ES&H manager works closely with the other project CAMs to ensure that applicable ES&H requirements are integrated into the work scope and contracting mechanisms to flow down those requirements appropriate to contracted personnel.

The ES&H manager coordinates with the CRL Project team members to ensure that ES&H resources (e.g., industrial safety and hygiene, radiological control, environmental compliance representative, facility service representative, fire protection, facility safety, waste management) are available to support the PSF Project and ensure those activities are conducted in accordance with ES&H policies and procedures. This support includes not only direct PNNL activities but also ES&H oversight of contracted work.

Applicable ES&H Requirements

Applicable ES&H requirements flow down to the project via the SBMS. Project specific implementation of certain requirements are met using additional project procedures or processes (e.g., Construction Safety).

Environmental Impacts (NEPA and SEPA)

The National Environmental Policy Act of 1969 (NEPA) action approved for the PSF Project on the PNNL site is an environmental assessment (EA). A Finding Of No Significant Impact on the final EA was completed and approved by DOE in January 2007.

Planning documents for the 325 Building life extension and modifications to retained 300 Area facilities will be subjected to a NEPA review prior to initiating work to determine if the activity is covered under existing NEPA documentation or if additional NEPA documentation (e.g., categorical exclusion) is required.

Privately financed facilities are to be established on non-federal land, and would be subject to Washington State Environmental Policy Act (SEPA) requirements. SEPA documentation will be completed as part of the building permit process and will be conducted by either Battelle or the developer, depending on the lease agreement.

Industrial Safety Standards and Building Codes

Industrial safety standards and building codes applicable to the project scope, both in the design and construction phases of the project, have been or will be articulated to appropriate subcontractors via the functional design criteria documents or in the statement of work and general provisions portion of their contract for their work. This information is included in appropriate contract language.

Environmental Consideration and Permits

Environmental permits will be obtained for CRL Project facilities using policies under the existing Environmental Management System. Development and submittal of environmental permits, negotiating permit approvals with regulatory agencies and executing permit conditions and limitations are implemented through SMBS *Liquid Effluents* and *Airborne Emissions* subject areas.

Regulatory requirements and associated codes and standards for environmental permits are integrated early in preliminary and schematic design activities. ES&H SMEs will review schematic, preliminary and final designs to verify that the applicable requirements of environmental permit approvals have been incorporated in the design process in accordance with ADM-CM-058, *Facility Design Manual*.

Environmental permitting processes, based on facility mission and capability, have been integrated in the project schedule and are defined scopes tied to key milestones (e.g., start of construction, startup activities). Permitting activities are included in the WBS:

- PSF HRT Facility Permitting – WBS 1.1.02.02.04
- PSF HRT Facilities, Site Permitting – WBS 1.1.02.06
- 325 Building Life Extension Projects, Facility Permitting – WBS 1.1.03.01.02
- Biological and Computational Sciences Facilities – WBS 1.2.03.02.01.05.02

Current plans are to retain 300 Area facilities (the 331 Building complex, the 318 Building, and the 350 Building) to meet mission needs. Active permits are currently in place through the DOE Richland Operations Office (RL) for operating these facilities. Maintenance upgrades proposed for these facilities are not expected to trigger modifications to the existing permits.

4.2.2 Quality Management

The CRL Project director has ultimate responsibility for quality of work performed on the CRL Project and for the effective implementation of the quality assurance program. The CRL Project quality officer maintains and interprets the quality assurance program, provides guidance and training on the quality assurance program and verifies the quality assurance program's implementation. The CRL quality assurance program is designed such that quality is achieved and maintained by those personnel, organizations, contractors and suppliers who are responsible for performing the work. Quality achievement is verified by personnel not directly responsible for performing the work.

Applicable Quality Policy

CRL Project policy applies the CRL NQA-1 Quality Assurance Program Description (QAPD), through a graded approach, to construction in the Horn Rapids Triangle and to modifications performed in the 325 Building's Radiochemical Processing Laboratory (RPL).

A separate CRL QA plan implements the PNNL SBMS for project management of the alternatively-funded facilities.

Applicable Requirements

The CRL Project QA programs address the requirements of the SBMS. The SBMS QA requirements are identified in the PNNL Quality Assurance Program, which is approved by PNSO.

Regulatory Standards

The CRL Project QA programs implement the following regulatory standards, as applicable:

- U.S. Code of Federal Regulations, Title 10, Energy Chapter III Department of Energy, Part CFR 830, Nuclear Safety Management, Subpart A, "Quality Assurance Requirements" (10 CFR 830 Subpart A)
- U.S. Department of Energy Order 414.1C, "Quality Assurance"
- U.S. Department of Energy Order 413.3A, "Program and Project Management for the Acquisition of Capital Assets."

Industry Standards

The CRL Project NQA-1 program implements the required regulatory QA requirements through implementation of the American National Standard, ASME NQA-1-2000, "Quality Assurance Requirements for Nuclear Facility Applications."

Developers of alternatively-funded facilities are required to meet commercial codes and standards for quality requirements.

Quality Level Definitions

Within the RPL, NQA-1 basic and supplemental requirements apply to activities associated with items designated as Equipment Category I, which includes safety significant items and defense-in-depth items.

For the Horn Rapids Triangle, NQA-1 Basic Requirements and Supplemental Requirements apply through a graded approach to activities associated with items determined to represent defense-in-depth, based on review of the Hazards Analysis.

Activities associated with other items are in accordance with designated commercial codes and standards.

Quality Assurance Plan

The CRL Project's quality assurance plan is the CRL NQA-1 Quality Assurance Program Description, current revision and date as posted on the project website. The alternatively-financed facilities quality plan is the Alternately-Financed Facilities Quality Assurance Plan, current revision and date as posted on the project website.

Quality Control Plan

Site contractors are responsible for quality controls, including conduct of inspections and tests, as specified in the specifications to the site contractor. The CRL Project will establish witness and hold points for selected activities. Title 3 inspections will be performed by a qualified architect/engineer representing the project.

4.2.3 Risk Management

To meet the specific needs of the PSF Line Item project and the requirements of DOE Order 413.3A, PNNL has developed a CRL Project specific risk management plan, CRL-PLAN-PM-002, Rev 1, and documented the key risks in a comprehensive risk register to identify, quantify and mitigate risks associated with executing the CRL Project.

Identified Risks

Project risks and their control actions have been identified and are included in the CRL Project Risk Register. Key information for each risk is included in the Risk Register (e.g., identification number, description, assessment, and control actions and assignees). Risks are ordered according to their time period of potential realization (earliest to latest potential realization). Also shown for each identified risk is its importance (ranking), as measured by its contribution to the uncertainty in completing key project milestones on schedule:

- Critical Risk – a risk that contributes greater than 20% of the uncertainty in the completion of at least one key project milestone
- Significant Risk – a risk that contributes between 10% and 20% of the uncertainty in the completion of at least one key project milestone
- Watch Risk – a risk that is judged to be a significant enough contributor to the uncertainty of completing at least one key project milestone such that it will be actively tracked or monitored. While

the judgment to categorize a risk as a Watch Risk is somewhat subjective, generally these risks contribute at least 5% but less than 10% of the uncertainty in the completion of at least one key project milestone

- Deminimis Risk – a risk that does not satisfy any of the above ranking criteria.

Risk Assessment and Quantification

Risks are identified through a process that ensures that the list of identified risks is comprehensive. CAMs and subject matter experts are queried either individually or in an elicitation meeting to identify project risks in their area of responsibility. A two-pronged approach is used: 1) top-down to identify higher-level programmatic risks such as funding, scope and political considerations and 2) bottom-up to identify project-specific risks such as cost, schedule, regulatory and technical uncertainties. To ensure that the most important project-level risks are identified, risk elicitation is performed by systematically assessing each element of the WBS.

Risks are assessed to determine the likelihood and cost and schedule consequence of each risk as well as its qualitative ranking, its overall impact on the project, its general status, and the responsible risk manager and project risk management point of contact (POC), if any.

Each risk is qualitatively assessed and ranked using established criteria contained in the Risk Management Plan. Assessment of each identified risk is presented in the Risk Register.

Quantitative risk analyses are performed to assess the impact of the identified risks on project cost and schedule. Commercially available software is used to stochastically simulate project progress when the risks quantified with defined likelihood and consequence distributions are taken into account. The results of the risk analyses are then used to

- determine the probability of achieving key project milestones
- identify those risks needing special management attention due to their potential to significantly impact cost and schedule
- calculate confidence bands (levels) for achieving the project schedule with the available funding; determine the cost and schedule contingency needed to accommodate the identified risks

Risk Response Plan

A management strategy has been established for each of the identified risks. At least one control action is specified for each identified project risk based on the management strategy selected unless the risk is accepted (i.e., not mitigated). Also specified for each identified risk is the date by which the control action is to be completed, the responsible-action POC, the likelihood and consequence of the residual risk after mitigation actions are completed, the cost of implementing the control actions, the status of each control action, and indication as to whether or not the risk is closed.

The management strategy and control actions selected for each identified risk are tracked in the Risk Register.

The baseline budget includes the funding required to implement the mitigation actions for the risks to achieve the confidence level set by the project.

Risk Evaluation and Updates

Project risks and the management actions to control them are monitored monthly, re-assessed quarterly and periodically reviewed when necessary. Risk tracking includes both monthly and quarterly actions. Control actions are statused, imminent and new risks are evaluated, previously identified risks are re-evaluated and the effectiveness of their control actions assessed. The Risk Register is updated as appropriate to reflect any changes.

4.2.4 Acquisition Management

Acquisitions will be conducted in accordance with the acquisition requirements contained in the SBMS Purchasing, Contracts, and Subcontracts subject area and Business Support Services' implementing procedures contained in the Acquisition Guidelines.

Objectives

The objectives of acquisition planning for CRL are to

- promote and provide for effective competition and the use of commercial items to the maximum extent practicable
- identify and manage risk proactively with an understanding of the divergent interests of project stakeholders
- take advantage of PNNL core competencies in construction management, project management, safety management, quality management and engineering
- meet the schedule and budget needs of the project while meeting applicable PNNL, DOE and other sponsor requirements.

Controlling Documents and Provisions

Acquisitions under the CRL Project will be planned and executed in accordance with DOE Order 413.3A; the Prime Contract; PNNL's approved Acquisition Management System; and PNNL's approved Acquisition Guidelines. A list of controlling documents in the planning of acquisitions includes but is not limited to:

- CRL QAPD-NQA1-001 QA Program Description Rev 0
- CRL-PROC-NQA1-401, Rev 0, Capability Replacement Laboratory Project Procedure, Procurement Documents
- CRL-PROC-NQA1-701 Rev 0, Capability Replacement Laboratory Project Procedure, Procurement Process Control
- ADM-CM-055, F&O Project Management Manual
- Battelle Acquisition Guideline 19, Construction Contracting

- SBMS Construction Contractor Safety Management Subject Area
- SBMS Purchased Goods & Services Subject Area
- ADM-CM-058, F&O Facility Design Manual
- ADM-CM-052, F&O Configuration Management Program Standards
- SHP-7.02 – Contractor Safety Evaluation, PNL-MA-858
- ADM-CM-016, F&O Maintenance Work Control Procedure
- ADM-CM-069, F&O Graded Approach & Risk Assessment Procedure
- Program Description, Integrated Environment, Safety and Health Program

Architectural and Engineering Design Procurement

Architectural and engineering design services for the CRL Project will be competitively procured using a qualifications-based source selection process consistent with PNNL's acquisition guidelines, the Brooks Act, and Federal Acquisition Regulation (FAR) 36.6.

Construction Procurements

PNNL will follow cost-effective contracting strategies that compete CRL Project requirements to the maximum extent and are appropriate to the construction/building industry. Absent special circumstances, construction services will be obtained using fixed-price sealed bidding and invitation for bid processes that meet the requirements of PNNL's approved acquisition guidelines and FAR Part 14.

Other Technical Services

PNNL will follow cost effective strategies to supplement technical capabilities in cost estimating, scheduling and project controls, records management and specialty technical analyses (e.g., seismic) by establishing and maintaining task order agreements on an as-needed basis that meet the requirements of PNNL's approved acquisition guidelines.

4.2.5 Communications Management

The Capability Replacement Laboratory project has internal and external interfaces that are managed by the CRL Project Director, in accordance with PNNL's SBMS policies, and the project team in an integrated manner, based on the following definitions:

Internal Communications

Routine communications and open discussions between members of the CRL Project team are encouraged and are intended to be informal. Weekly meetings hosted by the project director among team members to provide a status of activities. Plan-of-the-day meetings are held three times per week to discuss hot topics and items requiring immediate attention. Internal interface issues will be handled through the project and organizational management chains. Internal communications between project participants that are governed by a negotiated contract represent a potentially higher risk to the project and are more tightly controlled. While informal interaction is encouraged, contractual direction or

clarification on technical issues are documented by the technical administrator for that contract, reviewed with the contract administrator, and officially conveyed to the contractor in accordance with the terms and conditions of the contract.

Meetings

Monitoring and assessment of the CRL Project occurs through routine interfaces among project participants (e.g., periodic informal conference calls among the contractor management, the PNSO project office, and SC staff), periodic formal project status reports, and project reviews organized by SC, such as external independent reviews and independent oversight reviews. Such reviews are typically conducted on a semiannual basis. However, ad hoc reviews on special topics (e.g., 300 Area retained facility life-extension upgrades) may be held as deemed necessary by SC.

External Communications

All communications and interfaces with entities outside the CRL Project organization will be considered formal and appropriately documented as project records. External communications on the project will be coordinated through the CRL Project director's office. This includes, at a minimum, communications with

- the DOE federal project director (FPD)
- PNSO
- DOE Headquarters
- other government agencies
- regulatory agencies
- oversight organizations, such as the Inspector General and the General Accounting Office
- official communications with stakeholders, the public and tribal nations
- DOE-Richland and its cleanup contractors
- media outlets, which will be managed through the communications function in collaboration with PNNL's Media Relations Group.

Formal project correspondence will be conducted through the CRL Project office director and the FPD and formally documented in letters of direction, published and signed meeting minutes, and memoranda of understanding.

Web Sites

PNNL maintains internal (<http://rcf.pnl.gov/>) and external (<http://www.pnl.gov/rcf/index.stm>) Web pages for the CRL Project. These sites serve as general information tools that build and sustain awareness about progress in the project with targeted audiences. These sites are managed and populated by the communications function. However, overall approval of content for the sites must be provided by the CRL Project director and must meet PNNL's SBMS requirements. A CRL SharePoint site (<https://spteams1.pnl.gov/sites/CRL/default.aspx>) was developed and serves as the repository for final documentation and shared communications tools. This SharePoint site is secure and accessible to the IPT and the CRL project team, and it is managed by the CRL Document Control and Records Management function. This group has responsibility for posting content to and managing the SharePoint site.

4.2.6 Document Control and Records Management

The objective of Document Control and Records for the CRL Project is to provide a strategic focus in the direction and development of document control, records management and an integrated configuration management process that keeps the users current with approved baselines, design documents, procedures, and related topics. Current and emerging technologies are key drivers behind many of our strategic objectives, the most significant being the implementation of an integrated electronic information management system that will be used by CRL participants. A defined information management system will promote the method in which information is captured, organized, stored and retrieved and will provide the project a means to disseminate significant amounts of information that can be easily and effectively accessed from a desktop.

Information Management Plan

The Information Management Plan will be developed to describe the capture of documents and information for the CRL Project. Information management of documents and records will be defined in CRL procedures. CRL has established an Information Management Center (IMC) to receive, store and transmit technical information and documentation associated with the project. The IMC will provide a document management and digitizing (electronic imaging) process to help reduce the volume of paper and enable automation and streamlining of business processes. As part of these processing services, the IMC will also provide document scanning, indexing, document release, document clearance, distribution, storage, records disposition and transfer, and other documentation services required by the CRL Project. The IMC will assign document numbers to outgoing correspondence and documents generated for the CRL Project. Incoming documents that do not have a CRL document number (i.e., subcontractors, agencies, etc.) will be assigned a CRL number and archived as a project document.

Document Control

Only approved revisions of technical documents will be used in the engineering, construction and acceptance of CRL facilities. CRL Project procedures contain the requirements for document control that ensure approved and released technical documents are readily available.

The technical documents must contain the following administrative information: identification number, revision level, current status, document owner, information regarding pending changes, and other data necessary for control and tracking, such as storage location and outstanding document change notices.

Records Management and Retrieval Systems

The records management process ensures that the required quality records are identified, stored, maintained, protected and dispositioned (i.e., scheduled, archived, destroyed) in accordance with CRL procedures. The IMC will maintain a records database to track CRL records; the database will include inventory, scheduling, storage and retrieval information. Records are identified as either lifetime or nonpermanent records and will be archived in accordance with the approved CRL Records Inventory and Disposition Schedule (RIDS).

Information Capture, Storage, and Retrieval

A CRL intranet website has been developed as a document management system with the capabilities to upload, search and retrieve project information. The website will provide a very flexible yet powerful means for quick and efficient dissemination of up-to-date information on the project. With electronic storage and dedicated search tools, users can quickly zero in on important information.

The CRL data administrator manages the CRL website that organizes stored documents and ensures there is a search mechanism to quickly find specific documents. The IMC data administrator will create folders and subfolders to load documents into the file server. Critical information can be posted as soon as it becomes available instead of having to wait for paper distribution.

Electronic Documents Capture, Storage, and Retrieval

Electronic and hardcopy documents will be archived in the PNNL Total Records Information Management (TRIM) database and data management system. The TRIM database is the PNNL document storage and retrieval system used to store copies of documents in image format. Textual documents are identified, prepared, approved, and released as a supporting document in accordance with the SBMS procedures. Documents will be optically scanned and indexed for retrieval through the TRIM database. One-of-a-kind records (e.g., samples, records that cannot be duplicated) will be transmitted to the PNNL Records Management Center and archived in accordance with the CRL RIDS and implementing procedures. The TRIM database is backed-up daily and one-of-a-kind records or documents are stored in an environmentally controlled records center.

4.2.7 Safeguards and Security, and Emergency Response

Access to project information, resources and assets will be protected and controlled. Actions will be taken to safeguard the information, resources, and assets against theft, loss, misuse and disruption in accordance with safeguards and security requirements defined in the following SBMS subject areas:

- Sensitive Unclassified and Business Protected Materials
- Security Clearances/Special Access Authorizations
- Security Badges
- Security Events
- Unclassified Computer Security

The PNNL single-point-of-contact at 375-2400 will be contacted to report emergencies in accordance with the Emergency Preparedness SBMS Subject Area and PNNL-MA-110, PNNL Emergency Management Plan.

4.2.8 Training

Operations staff working on the CRL Project will meet the training requirements for conducting operations activities in new and existing PNNL facilities including the Integrated Operations System (IOPS), when required, for the implementation of the ES&H program and consistent with applicable elements from the SBMS Training and Qualification subject area and NQARD-201, *Indoctrination and*

Training. Project specific training required to accomplish unique aspects of the CRL Project will be established by the project and control account managers responsible for the activity.

4.2.9 Earned Value Management System

Compliance with the PNNL Earned Value Management System (EVMS) and the processes described in the PNNL EVMS System Description document are required for PSF Project activities performed within the approved project baseline. The processes and requirements defined in the PNNL EVMS are derived from a graded application of the requirements contained in DOE Order 413.3A, “Program and Project Management for the Acquisition of Capital Assets,” from the ANSI/EIA-748-A standard, “Earned Value Management System,” and from operating standards identified in the SBMS. The PNNL EVMS takes these higher-level requirements and defines the specifics for performing PSF Project work.

The CRL Project must comply with SBMS requirements defined within PNNL’s Project Management System. Compliance with PNNL’s EVMS fulfills the project control requirements defined within PNNL’s SBMS Project Management System and F&O’s Project Management Manual (ADM-CM-055). Project management requirements equivalent to DOE Order 413.3A, including the requirement for an EVMS, are flowed down into appropriate PNNL subcontracts to maintain project performance expectations across project elements.

4.2.10 Work Authorization

CRL work authorization for activities managed by PNNL will occur in accordance with methods prescribed by the funding authority. Work authorization for CRL activities managed by non-PNNL entities, such as the state funded utility corridor being installed on the HRT and the 300 Area replacement utilities, will be authorized by the organizations managing the work. PNNL will maintain close coordination with these entities and integrate their planned work into the overall schedule requirements for the CRL.

Work authorization for the PSF Line Item project managed by PNNL will follow the prescribed DOE Order 413.3A CD process. The PSF Project performance baseline approved at CD-2 will authorize the life-cycle scope of the project; however, follow-on critical reviews will be required to gain approval for start of construction (CD-3) and project close-out will be approved in accordance with CD-4.

Alternatively financed facility work will be authorized with the approval of a business case by the Office of Management and Budget. PNNL has authorized preliminary design work for private developers to obtain scope and cost data sufficient to meet OMB A-11 guidance. Upon approval of the business case a guaranteed maximum price will be established and a lease agreement for the specified period negotiated. Upon approval of the lease agreement the developer will be authorized to complete design and construct the facilities within a specified period of performance.

PNNL funded activities such as relocation will be authorized by internal approval of annual work plans by the CRL Project director.

Each WBS element control account manager CAM will be required to complete detailed integrated work plans in accordance with the applicable requirements of the PNNL EVMS. This will ensure that the CRL work scope will be planned and formal work authorization will occur before expenditure of any project funding is allowed.

Authorizations to perform PNNL managed work and expend funds for lower-tier projects will be delegated by the CRL Project director through the summary WBS element managers to the PNNL CAMs. The CRL project director will authorize work and expenditure of funds to CAMs within each individual facility project. Changes in work scope, schedule or budget baselines will require modification of the respective work plans through formal change control. A change control log will be maintained to track proposed baseline changes via unique change request numbers. The change control log will be maintained and included in monthly progress reports.

4.2.11 Project Performance Reporting and Reviews

The CRL project director will routinely review project performance to evaluate whether the work is progressing according to the authorized scope, schedule and budget. To ensure potential impacts to the project are identified as quickly as possible, positive and negative thresholds for schedule and cost variances will be established within project planning and control processes. Variances to the plan which exceed variance thresholds will be raised for analysis and as necessary management corrective actions.

Performance Reports

Reporting project status and conducting internal and external reviews is fundamental to maintaining a communication flow among the project team and sponsors relative to the current and projected condition of the project. The following sections describe planned reviews and reporting processes for CRL Project activities.

Monthly Reports

A monthly project status report containing project cost and schedule status and work progress updates will be prepared at the overall project level as follows:

- Project Status – PNNL will distribute baseline schedule status update reports to each CAM at least a monthly. CAMs will update the status of each schedule activity with actual start and finish dates, forecasted start and finish dates or physical percent completed. The CAMs will enter status information into the overall project cost and schedule control system for analysis
- Management Reporting – On a monthly basis, the PNNL CRL Project director will submit to DOE and PNNL management a report on the progress made against project baselines. This report will address the entire CRL Project with sections addressing both line item and non-line item activities. This report will also satisfy the requirements for monthly progress reporting to the federal project director for the PSF Project as defined in DOE Order 413.3. The report will be generated from schedule status information, cost status from PNNL's financial system and internal monthly narrative progress reports prepared by the CAMs. The narrative will contain summaries of work performed and major accomplishments, status of key milestones, significant issues and their corrective actions, and cost and schedule variances along with their analyses. The discussion of the monthly project accomplishments will include highlights of key milestones completed and will focus on exception

reporting. Significant problems or issues will be highlighted, along with corrective actions taken or needing to be taken to resolve the problems or issues. If there are variances over or under the variance thresholds as defined in Table 1, the factors impacting the cost and schedule status and their major causes will be discussed.

The monthly reporting cycle is based on a fiscal month ending date and is shown in Figure 9. Fiscal months typically end on the last Friday of the calendar month—except for September, which ends on the last day of the month.

Variance Thresholds and Reporting Requirement

Variance analysis for monthly performance reporting purposes occurs at a level higher than the control account (i.e., Level 2 or 3 of the WBS) as documented in the Responsibility Assignment Matrix. To ensure proper attention is given to significant deviations, CRL Project variance thresholds are established at the project reporting level and control account levels consistent with those defined in Table 1.



Figure 9. Fiscal Month Reporting Cycle

Table 1. CRL Project Performance Variance Threshold Limits

Project Reporting Level Variance Thresholds		
Variance	Type	Threshold Limit
Cost	Current Period	+/- 15% and \$50K
	Cumulative	+/- 10% and \$100K
Schedule	Current Period	+/- 15% and \$50K
	Cumulative	+/- 10% and \$100K
At Completion		\$100K
Control Account Variance Thresholds		
Variance	Type	Threshold Limit
Cost	Current Period	+/- 10% and \$25K
	Cumulative	+/- 10% and \$50K
Schedule	Current Period	+/- 10% and \$25K
	Cumulative	+/- 10% and \$50K
At Completion		\$50K

PSF Quarterly Performance Reviews

Following approval of CD-2, a formal review of the PSF Project will be conducted consistent with the performance review requirement in DOE Order 413.3A. This review will involve a detailed evaluation of the project to determine the cost of work completed, milestones accomplished, cost of work yet to be performed, the determination of an appropriate contingency factor for the remaining work and a reassessment of work schedules to reaffirm the specific facility completion date.

Reviews are held to communicate accomplishments and issues to the FPD, the IPT and other stakeholders as appropriate to maintain project momentum. These reviews can be held in Washington, D.C., or in Richland, depending on logistical preferences.

Independent Reviews

Peer and independent reviews are important project management tools and serve to verify the project’s mission, organization, development, processes, baseline and progress. Reviews may be initiated internally by the project team or may be independent and conducted by an external organization. Reviews may be scheduled or unscheduled to meet a specific objective or need, such as a budget validation or a critical decision request. The scope of a review is dependent on the cost and complexity of the project and its status. The project team will prepare for and fully support external reviews scheduled in accordance with the applicable federal guidelines. Independent reviews will be conducted consistent with the Project Execution Plan and as described in DOE Order 413.3A

4.2.12 Baseline Change Management

The CRL Project baseline will be formally documented and controlled in accordance with the PNNL SBMS Project Management subject area and F&O project management administrative procedure ADM-CM-055. A baseline change request will be submitted for approval whenever the requested change exceeds the thresholds delineated in Table 2 for the CRL Project and in Table 3 for the PSF Line Item portion of CRL. The technical, budget and schedule elements of the PSF Project baseline will be controlled using PNNL EVMS P-7, *Baseline Change Control Procedure*. The thresholds defined in these tables are intended to be established on an individual change request basis, not the cumulative total of baseline changes that have been submitted and/or approved.

Table 2. CRL Non-Line Item Baseline Change Control Thresholds

	DOE PNSO Project Manager (Level 2)	PNNL Contractor Project Director (Level 3)
Technical Scope	Any change in scope and/or performance that affects project mission need requirements or is not in conformance with current approved project baseline.	Any change affecting the approved scope as defined at the control account level of the WBS
Budget	Any increase in individual total project cost (TPC) and/or increase in total estimated cost (TEC)	Use of PNNL Management Reserve up to the authorized project TPC or TEC
Schedule	Any change of a project level milestone date of more than one month	Any change of a project-level milestone of less than one month, unless the change negatively impacts a DOE controlled milestone

Table 3. PSF Line Item Baseline Change Control Thresholds

	Acquisition Executive (Level 0)	Program Secretarial Officer (Level 1)	DOE Federal Project Director (Level 2)	PNNL Contractor Project Director (Level 3)
Technical Scope	Any change in scope and/or performance that affects mission need requirements or is not in conformance with current approved project data sheet	Changes to scope that may affect operation functions but does not affect mission need	Any change affecting the approved scope as defined at the capability/facility level of the WBS	Any change affecting the approved scope as defined at the control account level of the WBS
Budget	Increase in excess of \$25 million or 25% (cumulative) of the original TPC	Any increase in TPC and/or increase in total estimated cost (TEC)	Greater than \$500K use of contingency without an increase to TPC or TEC	<= \$500K use of contingency (PNNL Management Reserve) without an increase to TPC or TEC
Schedule	Six or more month increase (cumulative) in the original project completion date	Three-to six-month increase (cumulative) in a project-level milestone date	Any change of a project level milestone date of more than one month	Any change of a project-level milestone of less than one month, unless the change negatively impacts a CD milestone
DOE = U.S. Department of Energy HQ = DOE Headquarters PNNL = Pacific Northwest National Laboratory			TEC= Total Estimated Cost TPC = Total Project Cost WBS= Work Breakdown Structure	

4.3 Project Schedule

The CRL Project schedule incorporates project activities to be performed for the life of the project and depicts the logic-driven critical path for final completion and closeout of the project. Significant milestones (i.e., DOE critical decisions for the CRL line item project) that constitute completion of major phases of facility replacement activities also are shown. Related activities are linked and sequenced as appropriate. Project staff will be responsible for maintaining progress consistent with the project schedule. Any baseline schedule changes to the PSF Project that are deemed necessary will be incorporated through the change control process consistent with Section 4.2.9.

A schedule hierarchy will be used to facilitate summary reporting of the lifecycle schedule. The project summary schedule provides overall CRL Project schedule objectives, including acquisition-related critical decisions and key project milestones. The schedule is a summarized reflection of the project integrated schedule, depicting major activities by summary WBS elements. The CRL Project will use the integrated schedule to measure project baseline cost and schedule performance. Crosscutting project interfaces will be established in the detailed schedules prepared by design and construction subcontractors and will contain sufficient detail and logic to allow for effective vertical integration and interfacing of schedules at the project level.

4.3.1 Schedule Strategy

The DOE schedule objective is to accelerate completion of the project from the end of FY 2011 to February 2011 and is supportive of a phased approach to design and construct the PSF facility and the 325 Building life extension projects. Specifically, a CD-3A (approval to start certain early construction

elements) will be requested prior to the completion of final design, and CD-4 will be phased to accommodate staff and research equipment relocation requirements.

The PSF Project schedule baseline is developed in accordance with PNNL's EVMS description document and implementing procedures, specifically EVMS P-2, *Planning and Schedule Baseline Development*. The non-PSF portion of the project schedule is developed consistent with SBMS and existing F&O administrative procedure ADM-CM-055 (Project Management).

4.3.2 Schedule Constraints

The CRL Project schedule has been developed to ensure horizontal traceability through the project lifecycle. Horizontal traceability allows task and WBS interdependencies to be identified. This horizontal traceability is the interdependent relationship between the activities within different Control Accounts as well as the interdependency between tasks within the same Control Account. Interfaces between Control Account schedules are typically the point where schedule breakdown or schedule failure occurs. Managing these interfaces and ensuring communication between affected and responsible CAM is an important factor in maintaining baseline schedule integrity. Horizontal traceability across schedules provides for an orderly workflow for significant dependencies and identifies constraints that need to be mitigated. During the monthly schedule status process, interfaces and constraints between elements of the WBS will be monitored to ensure schedule deviations are communicated to project participants.

4.3.3 Schedule and Planning Assumptions

The CRL Project will be delivered during a time of tremendous pressure to construct, transition and maintain on-going PNNL research programs and capabilities. Factors that could have an impact on the CRL Project schedule include competition for federal funding, the time required to appropriate funds for capital projects or secure other funding sources, and accelerated cleanup of the 300 Area.

Planning for the performance baseline is based upon the following strategic assumptions:

- SC, NNSA and DHS will serve as federal sponsors for the PSF and will provide funding on a schedule sufficient to enable execution of the performance baseline.
- The performance baseline assumes that the PNNL contractor can proceed with requesting construction bids before corresponding CD approvals; however, contracts will not be awarded until CD approvals are obtained.
- FY funding is sufficient to support scheduled bid package awards despite continuing resolution limitations.
- PNNL will divest itself of the majority of research facilities located in the 300 Area according to a schedule mutually agreed to between EM and SC. The current schedule requires that facilities be vacated by February 2011.
- PNNL will work with WCH to plan and facilitate the transition of research staff and equipment from the 300 Area in a manner and within a timetable that enables accelerated cleanup.
- The current ES&H local, state and federal environmental regulations applicable to the HRT will not substantially change (e.g., implementation of additional requirements) during the project life cycle, and permit applications and approvals will be processed through the PNSO with support as required from RL.

- The requirements of the new Worker Safety and Health rule (10 CFR Part 851) remain to be identified and the performance baseline assumes impacts for integrating these requirements into the ES&H support for the project will not place an undue cost or schedule constraint on the PSF Project.
- The 325 Building currently operates under a DOE-approved safety basis defined by the documented safety analysis (DSA) and Technical Safety Requirements (TSR). The DSA/TSR is maintained through annual updates. These updates are reviewed by the current authorization basis approving authority, RL, and it is assumed this status will continue until SC assumes responsibility for the facility's extended operations from EM.
- It is anticipated that the 325 Building will meet the contemporary anticipated seismic event criteria and will not meet unlikely or extremely unlikely seismic event criteria. The PSF line item performance baseline will include a recommendation to improve the overall 325 Building seismic response in the unlikely criteria range and minimize the risks associated with the extremely unlikely events.
- The environmental permits for the 325 Building will be obtained as part of Hanford Site permitting actions, under the control of RL. Environmental permit applications will be processed through PNSO to RL; RL will submit applications to the applicable regulatory agency. Permit approvals will be transmitted from the regulatory agency to RL, from RL to PNSO and from PNSO to PNNL. PNNL will remain as the "co-operator" on environmental permits.
- A graded approach to contractor preparation for the readiness review process will be used. This will include a management assessment and contractor reviews that precede the SC final review.
- Replacement facilities will be designed to accommodate existing capabilities and programs from the 300 Area consistent with the CRL Options Analysis
- PNNL will work with the River Corridor Closure Contractor (RCCC) to plan and facilitate the transition of research staff and equipment from the 300 Area in a manner and on a timetable that minimizes impact to the RCCC's cleanup schedule.

4.3.4 Critical Path Schedule

The CRL Project critical path represents a series of logically connected activities whose longest path determines the end date of the project. Activities that are not on the critical path can become part of the critical path if that portion of the schedule slips and an activity that previously had float ends up with no float or negative float. Each activity on the critical path becomes a critical activity. If any activity on the critical path slips, the project cannot complete on schedule unless corrective or accelerated measures are taken on future critical path activities. The critical path typically represents the scheduled activities with the highest schedule risk and the least margin for error. On the schedule, the critical path is delineated as an unbroken series of activities between predecessor and successor project tasks from project beginning to project end. This is the longest path through a project network or the network path with the least amount of float.

The CRL Project critical path includes major work elements associated with the PSF Horn Rapids Triangle facilities including activities associated with facility design, facility construction and facility operational startup. The CRL Project critical path also includes activities associated with final relocation and 300 Area facility transition activities for non-PSF Project activities.

4.3.5 Project Milestones

The CRL Project summary schedule includes the identification of project level milestones for the project. Key CRL Project milestones are shown in Table 4.

Table 4. CRL Project Milestones

CD-0, Approve Mission Need — Completed September 30, 2004 and revalidated February 2005.
CD-1, Approve Alternative Selection and Cost Range – Completed December 15, 2005 and subsequently revised December 15, 2006.
CD-2, Approve PSF performance baseline – June 2007.
CD-3a Approve completion of design; long lead procurements and start of construction for site work, foundation and structural steel for the HRT Facilities – July 2007
CD-3b Approve balance of facility construction for the HRT facilities and the life extension upgrades for building 325 – March 2008
CD-4a Approve startup and relocation of the first R&D capability into newly constructed space on the HRT – January 2010.
CD-4b Project Closeout – February 2011.
CD-4c Complete relocation of staff and equipment from 300 Area facilities – February 2011.

Note: The CD-4C milestone is not part of the DOE line item, but is required to complete CRL transition activities.

4.3.6 Major Milestones

The DOE FPD for the PSF Project will control the Level 2 major milestones shown in Table 5.

4.3.7 Schedule Contingency

Risk-based schedule contingency is included in the CRL Project schedule to allow for future situations that can only be partially planned at this stage of the project. The need for schedule contingency depends on the sensitivity of the project end date. The amount of contingency also depends on the risk within the individual schedule activities. Part of the scheduling process included determining the risk-based schedule contingency or allowance that is derived from the uncertainty and unknowns associated with each major activity in the schedule. During the project execution phase, this schedule contingency can be used to accommodate approved scope changes and resultant schedule impacts without impacting the February 2011 project end date.

Schedule contingency was evaluated on the risks included in the project risk register. The actual contingency duration will be applied to the final project commitment milestone and not to the project schedule detail. Authorized schedule contingency is shown as the difference between the CRL Project approved target milestone date for the project completion milestone (i.e., facilities ready for turnover) and the project’s target milestone date for the same event.

The CRL Project schedule includes approximately one month of float for each year of project schedule activity. Based on the schedule risk analysis, the five months of schedule contingency is adequate to provide greater than 80% confidence that the February 2011 project end date will be achieved assuming CD-2 is granted in June 2007 and identified risk mitigation actions are effective.

Table 5. PSF Project Major Level 2 Milestones

WBS Element	Activity Number	Description	Completion Date
1.1.02.04	SM1007	Award Early Sitework Contract – PSF	18-Jul-07
1.1.02.02	SM1080	Complete Final Design	26-Sep-07
1.1.02.04	SM1131	Award Steel Contract	8-Nov-07
1.1.01.01	SM1012	Submit CD-3B Package	9-Jan-08
1.1.02.04	SM1058	Award Balance of Construction Contract	5-May-08
1.1.02.04	SM1024	Complete Structural Steel Contract	7-Nov-08
*1.1.03.03	TBD	Submit 325 modernized DSA for DOE Approval	Dec-08
1.1.03.02	SM1239	325 Infrastructure Life Extension Construction Complete	1-May-09
1.1.02.04	SM1031	Ultratrace Facility Construction Complete	15-Jan-10
1.1.02.05	SM1133	Authorization to Operate Ultratrace	26-Apr-10
1.1.02.04	SM1032	MS&T Facility Construction Complete	17-May-10
1.1.02.04	SM1034	Rad Detection Facility Construction Complete	22-Jun-10
1.1.02.04	SM1030	CUP Facility Construction Complete	29-Jun-10
1.1.02.04	SM1035	PSF Facility Construction Complete	21-Jul-10
1.1.02.05	SM1074	Authorization to Operate MS&T	2-Aug-10
1.1.02.05	SM1105	Authorization to Operate Rad Detection	21-Sep-10

*Note: Pending approval of change request CRL-BCR-PM-007 Rev 0.)

4.4 Project Assessment and Reporting System

Assessments are performed on elements of the CRL Project that are critical to successful accomplishment of project outcomes and objectives. Assessments help ensure that the desired project results and deliverables are produced, that project performance meets contract requirements, and that laboratory and customer expectations are met.

Assessments include, but are not limited to, audits, surveillances, inspections (non-permanent plant hardware), surveys, walk-throughs, management assessments, self assessments, and independent reviews.

Considerations factored into the identification of assessments to be conducted on the project include

- customer requirements and expectations, including planned external reviews (e.g., Lehman, Environmental Impact Report, EVMS)
- SBMS requirements and expectations, including compliance verification requirements
- areas of the project presenting the greatest risk or opportunity for improvement based on
 - issues, concerns identified by staff
 - findings of audits and surveillances
 - cost and schedule variances
 - areas of concern identified by the DOE customer
- previous assessment results.

Assessments planned for the CRL Project are captured in an annual assessment plan. The plan is developed during the first quarter of the fiscal year and is based on input from project managers, the project quality officer, and SMEs.

Assessments are conducted in accordance with the SBMS and F&O's administrative procedure, ADM-028 – *F&O Facility Management System Self-Assessment Process*, unless otherwise specified for the project. As an example, assessments required by the CRL Nuclear Quality Assurance (NQA)-1 QA program are performed and documented as outlined in the CRL Project QA Program.

On a quarterly and annual basis, results from assessments performed on the project are collected and analyzed to identify performance trends, issues, strengths, improvement opportunities and risks across the project. The results of these quarterly and annual analyses are documented in quarterly and annual reports that are provided to project management.

Assessment Process

The CRL Project assessment process entails the following activities:

- developing and updating the annual project assessment plan
- planning and performing scheduled assessments
- analyzing, documenting, and reporting assessment results and conditions
- reviewing assessment data for non-compliances subject to Price Anderson Act Amendments (PAAA)
- tracking both internal and external assessments and conditions in PNNL's Assessment Tracking System (ATS).

The CRL Project assessment process is documented in more detail in the CRL Project Assessment Process procedure.

Independent Assessments

Independent assessments and peer reviews are discussed in Section 4.2.11.

5.0 Technical Approach

In accordance with the CD-1 approval on December 15, 2005, the CRL Project was established to transition mission-critical capabilities from the 300 Area.

The CRL Project has two major components: a federal line-item major system project and a PNNL infrastructure and relocation effort. The federal line item will be used to construct new facilities on the HRT to replace capabilities housed in 300-Area facilities that will be decommissioned and also includes upgrades to the 325 Building to extend its useful life. The PNNL infrastructure and relocation efforts include a mix of funding sources that will upgrade retained buildings in the 300 Area, provide leased facilities that will be constructed on the PNNL site, and new utilities to support facilities constructed or upgraded by the CRL Project. In evolving the options approved by the acquisition executive at CD-1R PNNL used a collaborative approach with the R&D capability leads to confirm the options identified met the mission needs approved for the retention of designated capabilities. A description of that collaborative process follows.

5.1 R&D Collaboration

The key outcome associated with the R&D collaboration effort was to achieve close coordination between the CRL Project requirements and the PNNL research directorates needs for specific research capabilities representing the demand for replacement facilities. Capability leaders representing the research directorates have been assigned to represent the interests of the staff and the care of the equipment that will move from the 300 Area to the CRL facilities. The coordination effort will verify that capability leader needs are met during the design, construction and occupancy phases of the project within the cost, schedule and scope constraints of the project. Examples of the depth and breadth of this coordination include

- communicating the project direction, information, and progress to the various research capability representatives
- verifying that there is consistency in application of requirements (from management systems) and PNNL standards between the different buildings representing specific research capabilities as defined in CD-1R
- ensuring contemporary best practices associated with R&D operations are recognized and understood by the research capability leaders and incorporated into the design processes
- assuring the research needs are properly reflected in the design documents, including equipment specifications, hazardous materials use coupled with hazard mitigation strategies, and security considerations for future operations of the buildings
- developing cost avoidance principles and practices in optimizing space needs for staff and equipment in developing efficient and effective office and laboratories for the new facility, which may include sponsoring value engineering studies in specific areas such as waste management strategies
- performing construction design versus recurring operations cost trade-offs to optimize overall value.
- facilitation in the resolution of technical barriers between capability needs and design/construction representatives, which may include R&D driven impacts that may ultimately affect the baseline

- assistance to the capability representatives in developing occupancy plans for new and/or interim facilities, which will ensure continuity of operations in transitioning from 300 Area facilities
- assuring that the start-up activities associated with beneficial occupancy of the new facilities are successful and properly coordinated.

Guiding Documents and References

DOE Order 413.3A Program and Project Management for the Acquisition of Capital Assets
DOE Order 430.1B Real Property Asset Management
DOE Order 430.2A Departmental Energy and Utilities Management
DOE Order 450.1 Chg 3 Environmental Protection Program.

A detailed break-out of the CRL Project scope and relationships is shown the expanded WBS, Figure 10. This detailed WBS will provide the framework for defining the balance of the scope, technical objectives, acquisition approach, and end state descriptions within this section of the PIP.

Sustainable Design

Sustainable building design principles are applied to the siting, design, and construction of the Physical Sciences Facility located on the Horn Rapids Triangle. Five major sustainable design goals have been established for the project: 1) promote a healthy and productive work environment, 2) reduce environmental impacts, 3) showcase environmentally friendly technologies, 4) achieve a state of the art energy efficient workplace and 5) achieve LEED certification. Practices including using recycled materials, the purchase of energy-efficient and water-efficient equipment, and the substitution of less hazardous input materials will be used. PNNL Construction Management will implement waste disposal and recycling requirements via project procurement and construction specification documentation. The Alternatively Financed Facilities, the CSF and BSF, will be constructed as LEED certified facilities with emphasis on energy efficiency. As part of the LEED certification, the design and construction of these facilities will promote healthy and productive work environments, promote use of recycled materials and implement construction waste management standards.

5.2 ES&H

Work conducted on the CRL Project will be performed in conformance with existing PNNL policies, to include appropriate ES&H related program descriptions, management systems, and subject areas. The application of PNNL's institutional IESH&Q program at the CRL Project level is further defined in the in the CRL ISM Plan in Section 3.0, *ISM Integration in the CRL Project*. This section describes the process of integrating and tailoring the design requirements into detailed specifications and drawings for the project, and the use of institutionalized management systems at PNNL to address specific work activities and their associated hazards. As described in each project WBS element, where the design process is noted, ES&H codes and standards are integrated.

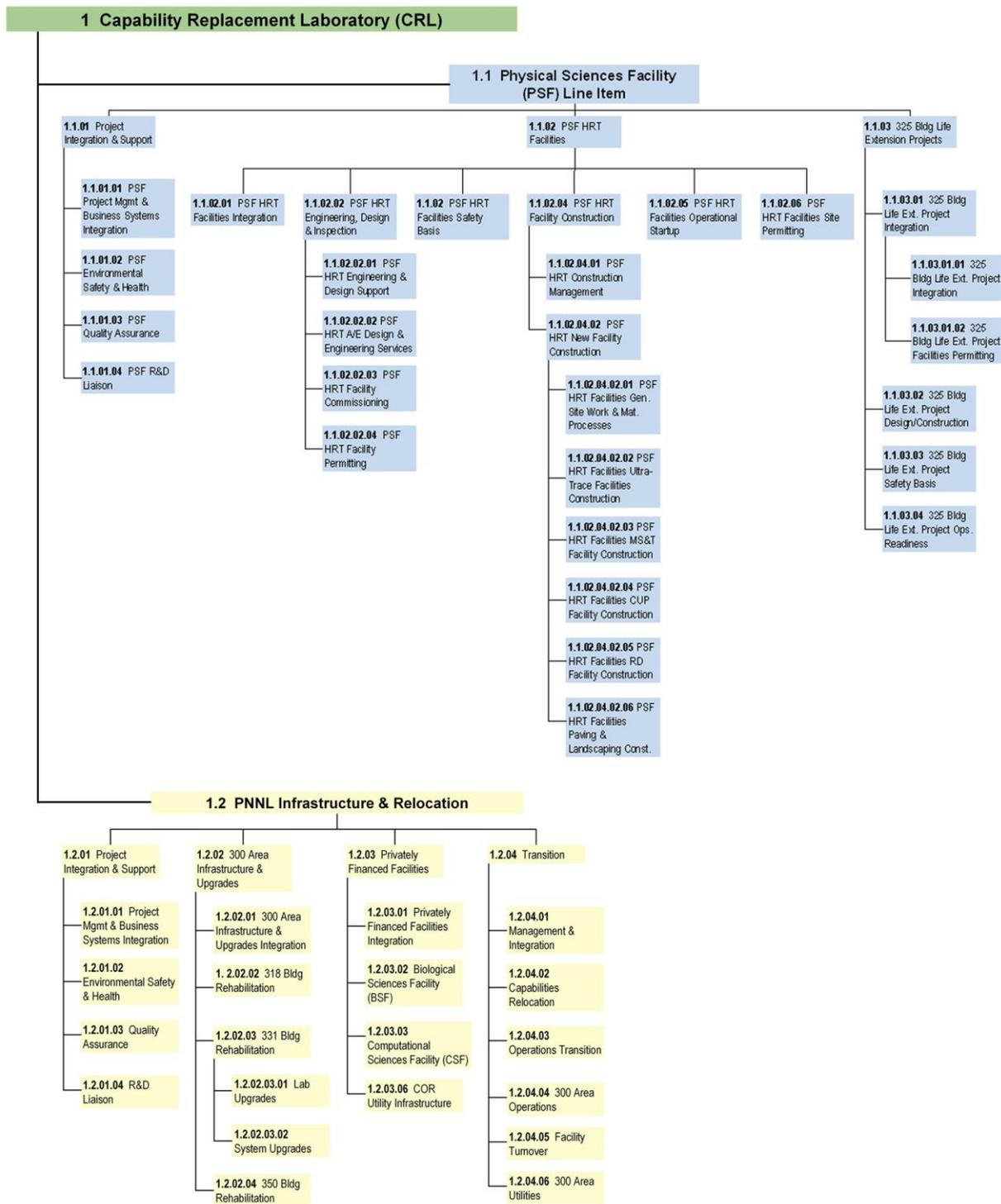


Figure 10. Expanded WBS for the CRL Project

Internal reviews of design submittals related to the CRL Project use the same structure of the Facilities Review Board as defined in PNNL manual ADM-CM-058, but with a much broader representation of ES&H SMEs. Design reviews are coordinated and executed under the direction of the CRL ES&H manager. An appointment letter, outlining the functions and expectations of the SMEs, signed by the CRL Project director, documents this process. Reviews are documented in accordance with the CRL QAPD, and formally documented and addressed per the PSF-PROC-PM-301 – *Design Control and Technical Reviews* procedure, which includes the use of Document Review Record forms for comment documentation and assurance of adequate resolution.

5.3 Configuration Management

The CRL Project director has ultimate responsibility for the implementation of configuration management on the CRL Project. The project managers are responsible for managing resources to accomplish configuration control as established the CRL Configuration Management Plan. The technical administrators will manage the subcontractors by defining the configuration management requirements for their projects based on the extent and degree of rigor required for the type of facility and its application environment. These configuration management requirements will be passed down to the subcontractors and assessments will be performed to assure compliance with the contractual requirements.

Design documents and engineering, deliverables will be prepared, controlled, and used throughout the project life cycle in accordance with F&O's Administrative Procedures: ADM-CM-050, *Configuration Management Policy*, ADM-CM-051, *Configuration Management Program Requirements Document*, and ADM-CM-052, *Configuration Management Standards Document*. Deviations from these configuration management requirements may be needed for some projects and will be outlined in the project-specific documents.

5.3.1 Configuration Management Plan

The Configuration Management Plan establishes the principles, practices, and procedures for the implementation of configuration management by the CRL Project. Effective implementation of configuration management principles will preserve the technical consistency among requirements, technical information and structures, systems and components (SSC). The technical consistency of the configuration management relationships is derived from identifying the design requirements, developing the technical information, and acquiring the final product. Implementation of the configuration management functions is disseminated throughout the SBMS F&O procedures.

Configuration management control is based on industry-proven practices presented in ANSI/EIA-649-A, "National Consensus Standard for Configuration Management" and guidance established in DOE-STD-1073-93, "Guide for Operational Configuration Management Systems." The CRL configuration management program will direct and monitor an effective application of the configuration management principles necessary to satisfy ASME NQA-1, 2000, "Quality Assurance Program Requirements for Nuclear Facilities" and DOE Order 413.3A, "Program and Project Management for the Acquisition of Capital Assets."

5.3.2 Configuration Management of Contractors, Vendors and Suppliers

Universal implementation of configuration management ensures that configuration management requirements are passed through to lower level contractors, suppliers, or vendors for services and products/materials being acquired by PNNL for the CRL Project. Tailoring the degree of configuration management requirements imposed may vary, but conveying the requirements through a controlled instrument (e.g., statement of work, purchase order, material requisition) will be controlled and monitored through implementing procedures.

5.4 PSF Line Item Project (WBS element 1.1)

The PSF Project is the federally funded line item element of CRL that will be used to construct the new facilities comprising the PSF, extend the life of the 325 Building for continued use, and conduct the necessary startup activities to accept the new construction and transition the operation of the 325 Building from EM to SC.

5.4.1 HRT New Facility Scope

The PSF will construct on the HRT approximately 200,000-square-foot multi-program research facilities containing the following capabilities:

- Materials Sciences & Technology
- Radiation Detection
- Ultra-Trace (Signature Detection)
- Non-nuclear Chemistry and Processing.

5.4.1.1 HRT Technical Objectives/Deliverables

In response to the mission needs statement, the PSF HRT facilities will be developed to be efficient, cost-effective, and best-in-class facilities that have the following attributes:

- foster collaboration
- increase connectivity
- promote discovery
- provide flexibility
- demonstrate PNNL's uniqueness
- embody sustainable design and energy efficiency, be certifiable under the LEED rating system (minimum).

In addition, the PSF Project team will design and construct facilities that emphasize safety first, and meet DOE and PNNL safety requirements in the design, documentation, implementation, and operations phases of the project.

The following are key project deliverables for design, construction, commissioning, readiness assessment and turnover to operations (see project baseline schedule for completion dates):

- Central Utility Plant
- Materials Science & Technology building
- Radiation Detection building
- Ultra-low Background Detection building
- Ultra-Trace building
- Large Detector Laboratory (option as a separate facility)
- Conference Center (option)
- Preliminary Hazards Analysis Report (HAR) – HRT Facilities. This HAR satisfies the hazard analysis documentation requirements associated with CD-2 of the DOE acquisition process defined in DOE Order 413.3A. This HAR also 1) meets the optional documentation requirements for a radiological facility in PNL-MA-440, *Safety Analysis*, Section 2.0, Facility Hazard Classification, Table 2-2, and 2) supports the Radiological Facility determination of PSFTECH-ESH-002, *Hazard Category Determination for the Physical Science Facility*.

5.4.1.2 HRT Facility Acquisition Approach

The project will follow a design-bid-build acquisition process in accordance with DOE Order 413.3A. Flad and Associates has been contracted to perform AE services including design, testing and acceptance. PNNL will self perform the construction management function and contract with general construction contractors for site work, foundations, structural steel and balance of facility construction.

5.4.1.3 Key HRT Interfaces/ Interdependencies

The City of Richland’s Utility Infrastructure project for the HRT will install a utility corridor on the site in a perimeter arrangement. The utility corridor will include electrical power (two directions of power feed for redundancy), water (potable and fire protection), sanitary sewer including a lift station, natural gas distribution, and telecommunications. The utility infrastructure must be completed prior to site work starting for the PSF HRT.

The following permits will be required before the PSF HRT facilities are ready for full operation: air permit, chemical permit, radiological air permit, sewer discharge permit, storm water disposal permit and water rights permit/groundwater injection permit (if ground source cooling is used).

5.4.1.4 HRT End State

Materials Science & Technology, Radiation Detection, Ultra-Trace, and Chemistry & Processing (non-nuclear) capabilities will be relocated from 300 Area buildings to the new Physical Sciences Facility on the Horn Rapids Triangle, in accordance with the baseline schedule and budget. The new PSF will provide the necessary infrastructure and facilities for these capabilities to meet their mission needs.

The PSF new construction element will be considered complete when the facility is accepted for operations and when the Acquisition Executive or his designee approves CD-4b, Project Closeout.

5.4.2 Building 325 Life Extension Upgrades and Nuclear Safety Documentation

The 325 Building will house some of the capabilities that will remain in the 300 Area; modifications to extend the life of the 325 Building are part of the PSF line item project. Once these modernization activities are complete, the 325 Building will provide approximately 144,000 square feet for continued future research.

The 325 Building is retained to maintain four mission-critical capabilities supporting

- Shielded Operations
- Radiation Detection
- Materials Science & Technology (MS&T)
- Chemistry and Processing
- Subsurface Science.

This facility was identified for Hanford Site 300 Area closure and long-term operations were not anticipated; thus certain maintenance and facility infrastructure upgrades were placed in abeyance. To provide for these long-term mission capabilities, physical upgrades are planned to provide operational flexibility and promote the 20-year life extension of the facility. The scopes of these upgrades were discussed in CRL-RPT-PM-001, *Revised Options Analysis*, October 2006. This analysis led to the approval of CD-1R, via DOE Memorandum EXEC-2006-015122, *Approval of Revised Alternative Selection and Cost Range for the Capability Replacement Laboratory (CRL) Project at Pacific Northwest National Laboratory*, Dec 04, 2006.

Nuclear Safety Upgrade

The 325 Building operates under an EM-approved Safety Basis, which is composed of the Radiochemical Processing Laboratory DSA and TSR. The RPL Safety Basis will be upgraded to meet DOE- SC expectations. Development and approval of this approach is coordinated with the DOE Safety Basis Review Team

5.4.2.1 Building 325 Technical Objectives/Deliverables

Determination of life extension upgrade deliverables was made with input from the 325 Building management and review of the Maintenance and Repair System database records. The PNNL Certification Matrix, Long-Term Investments for Retained 300 Area Facilities, Capability Replacement Laboratory Project – PSF Prime, October 19, 2006, concluded that the work scope included in the line item project (as discussed in the October 2006 Revised Options Analysis) reflect the work activities needed to prepare the 325 Building for continued operations. The decision on the heating, ventilation and air conditioning (HVAC) upgrade approach is documented in CRL-TECH-PM-001, Value Engineering Report, Appendix E.

Project activities for life extension upgrades are defined in WBS 1.1.03.02, *Life Extension Project Design & Construction*.

Nuclear Safety

Key deliverables include:

- PSF-PLAN-ESH-003, Rev 1, Safety Design Strategy, which defines the basis and process for establishing an appropriate extended life safety basis.
- the 10-year update of the natural phenomena hazards in accordance with DOE Order 420.1B, Facility Safety
- updating the 325 Building classification of SSC and assessment of building safety systems with respect to extended mission
- upgrading the DSA and TSR.

5.4.2.2 Building 325 Interfaces/Interdependencies

- 300 Area utilities transitioned for continued operations and provided by EM
- DSA Transfer

5.4.2.3 325 Building End State

The 325 Building life-extension element will be considered complete when modifications are complete and the necessary nuclear safety documentation identified in the Safety Design Strategy (CRL-PLAN-ESH-001, Rev 0) is in place and confirmed by operational readiness activities.

5.5 Infrastructure and Relocation

5.5.1 300 Area Retained Facility Upgrades

In addition to the 325 Building which is being retained and upgraded under the PSF line item project, PNNL identified 3 additional 300 Area facilities which must be retained and upgraded to meet the CRL Project mission and support needs approved at CD-0. These 3 facilities and their work scope are identified in the following sections

5.5.1.1 300 Area Retained Facilities Technical Objectives/Deliverables

318 Building

The life extension upgrades for the 318 Building extend the life of the facility to meet the 20 year mission need. The planned upgrades for the facility are to replace the elevator hydraulic system; obsolete electrical system components; replacement and/or repair of HVAC units/system, metal roof, steam and condensate system/components and upgrades to the METASYS system. Once completed, the upgrades to the 318 Building will permit retained operations for the Dosimetry and Calibration R&D capabilities currently located in this building.

331 Building

The life extension upgrades for the 331 Building extend the life of the facility to meet the 20 year mission need. The planned upgrades for the facility are to replace the Southwest portion of the building roof

system and abandoned rooftop units; repair and/or replacement of the HVAC exhaust and supply fans including the conversion of the double HEPA filtered system into a single HEPA filtration system; modification of selected laboratory space; and upgrades to the METASYS system. Once completed, the upgrades to the 331 Building will provide continued operations support and future occupancy for research capabilities such as the Sub-Surface Sciences (to be relocated from the 325 Building) and Chem-Bio Detection groups (to be relocated from the 320, 326 and 329 Buildings).

350 Building

The life extension upgrades for the 350 Building extend the life of the facility to meet the 20 year mission need. The planned upgrades for the facility are to refurbish a portion of the roof; replacement or repair of the rooftop HVAC units; and upgrades to the METASYS system. Once completed, the upgrades to the 350 Building will provide for the continued maintenance and operations support capabilities currently located within this building.

5.5.1.2 300 Area Retained Facilities Acquisition Approach

PNNL will subcontract the work for the life extension upgrades to 300 Area retained facilities including Buildings 318, 331 and 350 to a technically qualified general contractor using a fixed price contract. The general contractor (GC) will be responsible for managing the construction work including safety, quality, and project record documentation, assurance that completed work meets the intent of the design and functional criteria and construction specifications. The GC will provide the required approved equipment, materials and labor to deliver the required modified laboratory space and will conduct a formal acceptance and inspection walk down with the appropriate PNNL project staff for final acceptance, turnover and prior to official occupancy.

5.5.2 300 Area Retained Facilities Interfaces/Interdependencies

- Utility tie-ins will depend on 300 Area Utility Replacement Utilities by EM.
- 331 Remodel will depend on the completion of construction of BSF and the relocation of the Systems Biology capability out of the 331 Building and into BSF.
- Ongoing operations must accommodate river corridor cleanup as necessary

5.5.2.1 300 Area Retained Facilities End State

318 and 350 end states will be met when life extension improvements enable the retention of resident capabilities. **331** end states will be met when Biological Sciences is relocated to BSF and displaced capabilities from 325, 326 and 329 are relocated to the remodeled space in the 331 Building.

5.6 3rd Party Financed Facilities

5.6.1 BSF and CSF

The BSF and CSF are programmed to be ~75,000 gsf facilities. These facilities are planned to relocate the Systems Biology and Information Analytics capabilities out of the 300 Area.

The **technical objectives and deliverables** associated with this aspect of the CRL Project will be to define the performance requirements set forth by the system biology and information analytics capabilities (see project baseline schedule for completion dates). The project will monitor progress in meeting those capabilities requirements and final acceptance that facility meets the specific performance requirements. Once the agreement is reached that the technical objectives have been satisfied, Battelle will sign the facility lease and relocate the systems biology and information analytics capabilities from the 300 Area buildings.

The **technical approach** for BSF and CSF has focused on specifying generic type lab and office building requirements for the developers to meet. The specifications though generic, do contain specialized requirements to meet the R&D capabilities to be relocated. These specialized requirements will be planned as tenant improvements and will be discussed, negotiated and agreed upon after the initial lease agreement is reached. These requirements are identified in the performance specifications that were included in the original request for proposal. LEED certification was included for building and operating cost effectiveness.

5.6.1.1 BSF and CSF Acquisition Approach

PNNL developed a business case for approval by SC, Office of General Counsel (OGC), Chief Financial Officer (CFO) and Office of Engineering and Construction Management (OECM). Once SC, OGC, CFO and OEM concur with the business case, it will then be transmitted from the CFO's office to OMB for their concurrence. When OMB concurs that the business case meets the OMB A-11 operating lease criteria, then DOE will approve the business case. Once the business case is approved the following acquisition approach will be executed:

- PNNL will finalize with the 3rd party developer to plan, design, finance, construct and operate both the BSF and CSF.
- Battelle will provide land sites on a long term lease agreement with the developer
- Once the performance requirements of the facilities have been accomplished, PNNL will sign a lease with a 3rd party developer for the BSF and CSF. PNNL will provide routine oversight and acceptance of completed work to ensure functional requirements are met.

5.6.1.2 BSF and CSF Key Interfaces/Interdependencies

- PNNL design basis/programming requirements
- Developer agreement
- Battelle facility lease agreement
- Battelle lease land agreement
- Subordination, Non-Disturbance and Attornment Agreement (SNDA)

5.6.1.3 BSF and CSF End State

PNNL will approve and begin leasing the new Biological Sciences and Computational Sciences Facilities from the developer.

System Biology capabilities will be relocated from 300 Area buildings to the leased facility, which will be located on the main campus.

Information Analytics capabilities will be relocated from 300 Area buildings to the CSF facility located on the main campus.

The new facility will provide the infrastructure and facilities for these capabilities to meet mission needs.

5.7 Utility Infrastructure

5.7.1 City of Richland Utility Infrastructure

The City of Richland's (COR's) Utility Infrastructure project for the HRT will provide for installation of a utility corridor on the site in a perimeter arrangement. The utility corridor will include electrical power (two directions of power feed for redundancy), water (potable and fire protection), sanitary sewer including a lift station, natural gas distribution, and telecommunications.

5.7.1.1 COR Utility Infrastructure Technical Objectives/Deliverables

The technical goals and objectives for both the City of Richland's utility infrastructure project for the HRT are reliable, affordable utilities – first cost and life cycle costs for installation, maintenance, operations; affordable rate structure redundancy where required by safety basis documents or programmatic requirements minimal disruption to operations during the construction and turnover of new utility infrastructure.

5.7.1.2 COR Utility Infrastructure Acquisition Approach

State of Washington will provide to the City of Richland funding to install the utility loop on the HRT. PNNL will provide service requirements for the newly constructed facilities planned for as part of the PSF Line item Project. COR will manage and fund the acquisition of needed elements.

5.7.1.3 COR Utility Infrastructure Interfaces/Interdependencies

- PSF Construction schedules and time frames for hookup
- COR and State of Washington planning and funding processes.

5.7.1.4 COR Utility infrastructure End State

The end state for the City of Richland's Utility Infrastructure project on the HRT will be complete when the utility corridor is installed on the HRT site perimeter in accordance with the performance requirements PNNL submitted to the City of Richland. Additionally, utility tie-ins will be functionally complete for new facilities constructed on the HRT by the CRL PSF line item project.

5.7.2 300 Area Utility Infrastructure Upgrades

The EM project to furnish utilities to the 300 Area retained facilities will route or extend utilities from the City of Richland to the 300 Area. Some combination of new and existing infrastructure may be used to supply electrical power, sanitary sewer, retention process sewer, water (potable and fire protection), and telecommunications.

5.7.2.1 300 Area Utility Infrastructure Technical Objectives/Deliverables

The technical goals and objectives for both the City of Richland’s utility infrastructure project for the HRT and the 300 Area utility project are reliable, affordable utilities – first cost and life cycle costs for installation, maintenance, operations; affordable rate structure redundancy where required by safety basis documents or programmatic requirements minimal disruption to operations during the construction and turnover of new utility infrastructure.

5.7.2.2 300 Area Utility Infrastructure Acquisition Approach

EM will provide the replacement infrastructure and manage and fund the acquisition of needed elements.

5.7.2.3 300 Area Utility Infrastructure Interfaces/Interdependencies

- Transition from 300 Area utilities infrastructure
- R&D operation schedules
- Coordination of utility outages and tie-ins.

5.7.2.4 300 Area Utility Infrastructure End State

Replacement utility infrastructure for water, power, sewer, police, and fire services will have been rerouted and tied into PNNL’s retained 300 Area facilities.

6.0 Transition

The transition of equipment, supplies, materials and staff from existing facilities in the 300 Area to new or upgraded facilities is a complex process requiring coordination and integration of the CRL Project’s sub-tasks and of those tasks with Hanford clean-up contractors. A separate WBS, 1.2.04, has been set up for transition activities that directly relate to the successful execution of the CRL Project. PNNL will also undertake transition activities that are beyond the scope of the CRL. The non-CRL transition activities support the requirements for establishing a new site, enhancements to the laboratory’s standard based management systems and operating processes, effective coordination with Hanford clean-up contractors, facility turnover, and overall management and integration of these sub-tasks. PNNL will maintain appropriate interfaces between the non-CRL transition activities and the CRL Project’s needs.

6.1 Capabilities Relocation

The CRL Project will provide the resources necessary to successfully relocate 300 Area capabilities (staff, equipment, materials and supplies) from their existing locations to new or renovated facilities with minimal disruption to ongoing research activities, meeting the schedule necessary to support turnover of the vacated facilities to EM. In accordance with CD-1R approval, the completion criteria for CRL will be met when the surplus facilities are available for turnover to DOE-EM. While the actual turnover is not part of the CRL project scope, it is an important interface with the DOE cleanup objectives that cannot be met without the CRL project meeting construction and relocation schedules. The dates for vacating and completing facility turnover are presented in Table 6.

Table 6. 300 Area Turnover Schedule

Facility	Facility Vacant	Turnover Milestone
323	July 31, 2007	September 30, 2007
326	June 29, 2009	September 30, 2009*
336	August 31, 2008	September 30, 2008
338	July 23, 2008	September 30, 2008
3718P	May 31, 2007	September 30, 2007
3730	June 30, 2007	September 30, 2007
3760	August 25, 2009	September, 30 2009
320	January 31, 2011	February 28, 2011
329	January 31, 2011	February 28, 2011

* Ongoing RCCC mitigation study will establish 326 transfer date of 9/30/09 or 2/28/11

6.1.1 Project Objectives

The following objectives support successful relocation:

- Provide a list of capabilities, equipment and materials approved for relocation to newly constructed, temporary and retained locations.
- Track changes in staff, equipment and materials proposed and approved for relocation as well as determining and documenting capabilities not transitioning.
- Develop unique, capability-specific relocation plans and schedules for each capability to be relocated that provides for

- early identification and resolution of concerns to assure a smooth and fully integrated move
- minimization of research down time throughout the relocation
- incorporation of research project and program commitments into relocation schedule
- identification of activities to be conducted by R&D such as termination of R&D activities.
- Procure supplies and services (including subcontracting as needed).
- Verify that equipment and materials to be relocated have been appropriately screened by R&D organizations and meet PNNL’s approved screening criteria for relocation from the 300 Area to the CRL.
- Streamline and integrate relocation plans, identifying cost and schedule saving opportunities.
- Relocate some R&D elements to interim locations to
 - incorporate research project and program commitments into the interim relocation schedule to minimize research down time
 - provide for minimum R&D operating requirements until relocation to final CRL facility
 - permit early transfer of select 300 Area facilities to the RCCC by following the schedule described in Section 1.5 to mitigate the impact of the CRL Project schedule on their interim approved baseline.
- Relocate 300 Area capabilities (staff, equipment, materials and supplies) to their new or renovated facilities.

7.0 Project Cost and Funding

7.1 Project Cost Estimate Organization

The CRL project cost estimate is organized by the project WBS. The CRL project is a combination of projects supported by organizations whose funding cannot be intermixed, therefore organization, separation and control is critical. Each of the CRL Project WBS elements is responsible for ensuring that the cost estimate includes scope for that particular element, has an appropriate basis for the estimate, complies with the funding guidance for that particular element and is consistent in its format with other estimate within overall CRL project.

Table 7 indicates which CRL project elements are under the direct budgetary control of PNNL. The cost estimates developed for those portions of the overall CRL estimate controlled by PNNL are developed by PNNL in accordance with the requirements identified in the sections that follow. For those elements not within the budgetary control of PNNL, management attention will focus on schedule interfaces and deliverables from those organizations that do have direct budgetary control.

Table 7. Project Elements Controlled by PNNL

CRL Project Element	Total Project Cost	Estimate Developer	Budget Control	Funding Type
Physical Sciences Facility Project	\$224M	PNNL	PNNL	Line Item
300 Area Facility Repair Projects	\$7.7M	PNNL	PNNL	PNNL Overhead
300 Area Utility Project	\$12M	EM	EM	EM
		City of	City of	State of
Horn Rapids Triangle Utilities	\$5M	Richland	Richland	Washington
BSF & CSF Construction Project	\$95M	Developer	Developer	3rd Party
Relocations (BSF, CSF and PSF)	\$12.2M	PNNL	PNNL	PNNL Overhead
Interim Moves	\$6.3M	PNNL	PNNL	PNNL Overhead
Non PSF Transition Support	\$10.3M	PNNL	PNNL	PNNL Overhead
Total CRL	\$372.5M			
PNNL Managed Costs				
Physical Sciences Facility Project	\$224M	PNNL	PNNL	Line Item
Various PNNL funded projects	\$36.5M	PNNL	PNNL	PNNL Overhead
Total PNNL CRL costs	\$260.5M			

7.2 Cost Estimating Strategy and Procedure

The CRL comprises multiple projects supported by different funding sources. PNNL CRL cost estimates will be developed , at a minimum, in accordance with PNNL Administrative Procedure ADM-CM-055, *Facilities and Operations Project Management Manual*.

Cost estimates will include sufficient detail to identify cost account resources and will reflect integration with schedule activity durations. Estimates will be generated at the lowest level applicable and summed upward through the WBS.

In addition to the above requirements, line item funded projects will be prepared in accordance with DOE Guide 430.1-1, *Cost Estimating Guide for Program and Project Management*, and DOE O 413.3-1, *Project Management for the Acquisition of Capital Assets*.

7.2.1 Basic Assumptions

All cost estimates are prepared in accordance with DOE approved PNNL standard rates and funding guidance provided. In addition the following key assumptions have been made in developing the various CRL cost estimates:

- Due to the magnitude of construction material price fluctuations and the magnitude of the construction amount, a project specific escalation rate profile has been adopted for the PSF line item funded project.
- Project Specific General and Administrative overhead rate is used for the PSF line item funded project.
- Impacts from escalation assume project funding will be available in the time frames identified.
- PNNL Property Accounting preliminary determinations of appropriate uses of funds do not change significantly as planning develops.
- Office of Management and Budget scores the BSF and CSF leases as operating leases.

7.2.2 Cost Estimate Updates

Cost estimates are expected to maintain quality and usefulness over the life of these projects and therefore will be updated as required. For projects that are complex and have extended durations, PNNL uses a “rolling wave” approach to cost estimating: near term work is estimated to a greater detail than future planned work. Cost estimate updates will be conducted in accordance with the procedures and orders referenced earlier and as appropriate will be independently reviewed to ensure they are appropriate for the intended use.

7.2.3 Project Life Cycle Cost

All cost estimates will reflect the complete scope over the entire life of the project. Cost estimates will be time phased and fully integrated in a resource loaded schedule. These time phased cost estimates supporting the performance baselines will be developed in accordance with PNNL procedures and guidelines.

7.2.4 Contingency and Management Reserve

Policies and requirements for the development and management of budget contingency on the CRL Project is in accordance with the PNNL Administrative Procedure ADM-CM-055, *Facilities and Operations Project Management Manual*.

Contingency is included within and as a part of the CRL total project cost and is intended to cover the costs that may result from unforeseen and unpredictable conditions and uncertainties within the defined project scope. Contingency and Management Reserve on PNNL overhead funded activities will be managed consistent with existing SBMS policies and procedures. Contingency and management reserve will be managed in accordance with DOE O 430.1 on line item funded projects.

During the activity-based planning process, risks and uncertainties are identified. To the extent possible, mitigation strategies were incorporated into the cost and schedule baseline to minimize project impacts.

Contingency estimates are identified outside the cost and schedule baseline and are based on likelihood and severity of the uncertainty. Contingency is derived by evaluating risks associated with individual work elements (product and activities) regardless of funding type, using appropriate contingency development techniques. The CRL project manager and CAMs are responsible for identifying and documenting risk and contingency estimates as part of the baseline planning process. Contingency for those projects that are not within PNNL budget control is included in the total project cost estimate and developed and managed by the project manager of that particular funding source.

7.2.4.1 Contingency Control

Management control of contingency is achieved through a structured process that includes formal authorization, ongoing monitoring and analysis, and routine status, accounting and reporting.

- **Authorization.** Authority for approving the use of contingency related to baseline changes depends on the classification of the change requiring contingency. PNNL may authorize management reserve for changes within the limits of their thresholds, in accordance with the change control process. A change outside the PNNL thresholds requires DOE or customer approval. Changes requiring additional funding authorization also require a revised work authorization document.
- **Analysis.** Routine evaluation and assessment of contingency use is necessary for management control purposes. Monthly analyses are performed by PNNL on actual contingency used versus remaining project contingency for the current year and by FY for the life of the project. Evaluations are also made of contingency use by WBS and by type of funding source and significant trends are documented. Change requests are analyzed to assure that the use of contingency is justified and minimized by considering value engineering or cost avoidance options.
- **Reporting.** PNNL provides overall project contingency use on a monthly basis and documents overall project contingency status. The contingency reporting process includes usage logs and contingency requirements for the current FY and for the project life cycle.

7.3 Cost Estimating Tools

All CRL direct cost estimates for activities managed by PNNL will be input to PNNL's Proposal Pricing System (PPS). This tool will ensure that direct and indirect cost factors are applied in accordance with the PNNL M&O contract. The PPS has been approved for use on projects managed by PNNL by the DOE's Office of Management and Budget. An appropriate basis of estimate service (e.g., RS Means) will be used as necessary to support cost values.

7.4 Funding

The CRL Project's costs are aligned with the constrained funding profiles through detailed planning. The activity schedule has been optimized to maximize confidence in achieving project milestones and completion dates, and to support a budget that falls within the funding guidance provided. This budget includes appropriate escalation and contingency which reflects the identified risks associated with the work.

The funding constraints provided by the project sponsors drive the scheduled completion of planned activities and limits the flexibility that PNNL has to complete scheduled activities earlier than planned. Changes to the funding profile will cause impacts to the cost baseline.

7.4.1 Funding Profile

The funding partners for this project have agreed on a funding profile. This agreement was documented in the Revised Options Study, referenced in the CD-1R and formalized for the PSF Project in a memorandum of understanding signed on November 7, 2006. The time-phased funding profile is shown in Table 8.

7.4.2 Project Funding

As described in 7.2 the CRL represents a combined effort of multiple separate and distinct scopes of work requiring separate and distinct types and sources of funding. Because of the multiple work scopes and multiple funding sources, communications and relationships between and among stakeholders is key to the successful completion of the CRL objectives. To ensure that project funding requirements are clearly communicated to project stakeholders, a detailed funding strategy has been developed, reviewed and concurred to by funding sponsors. This section of the PIP summarizes the details of the funding strategy for the projects that make up the CRL and their appropriate funding sources. It is the intent of the project to comply with funding constraints and requirements. To develop this plan the following funding principles have been considered:

- Line-item funding will be used to construct new facilities and to upgrade existing facilities, as required, to meet safety basis requirements.
- Institutional General Plant Project (IGPP) funding will be used to fund stand-alone general infrastructure projects. This includes life extension capital projects in support facilities.
- GPP funding will be used to fund non-mission critical capital modifications in retained 300-Area dedicated research facilities.
- PNNL expense funds will be used to fund those maintenance projects not determined to be capital and other transition and relocation activities. Also, alternatively financed projects will be acquired via leases funded with PNNL overhead funds.
- EM and the State of Washington separately have agreed to partner with PNNL in this effort and will support the establishment of the required utility infrastructure to support new and retained facilities.

Table 8 highlights the various components of the overall effort and the current, proposed source of funds identified to support the project.

7.4.3 Project Funding Use

All funding provided will be managed and controlled to assure that funds are used in accordance with applicable rules and requirements. The proposed funding approaches identified in this document have considered the benefits, limitations and requirements of each of the funding sources.

Projects will be organized to assure that funds assigned to project scopes are not intermingled.

Table 8. Time-Phased Funding Profile for CRL

Capability Replacement Laboratory Proposed Funding Profile and Strategy								
(K\$'s, including escalation and contingency)								
	Prior							
PSF Line Item	Years	FY 2007	FY 2008	FY 2009	FY 2010	FY 2011	Total	Proposed Funding Strategy
	\$18,470	\$7,920	\$0	\$37,919	\$3,625	\$1,689	\$69,623	NNSA
	\$10,896	\$10,000	\$35,379	\$30,549	\$7,977	\$3,643	\$98,444	SC
	\$2,250	\$2,000	\$25,000	\$13,000	\$10,000	\$3,684	\$55,934	DHS
PSF Project Profile	\$31,616	\$19,920	\$60,379	\$81,468	\$21,602	\$9,016	\$224,000	DOE Line Item Funding
300 Area Utilities	\$0	\$1,600	\$4,900	\$5,500	\$0	\$0	\$12,000	EM
PSF Site Utilities	\$5,000	\$0	\$0	\$0	\$0	\$0	\$5,000	State of Washington
Subtotal Utilities	\$5,000	\$1,600	\$4,900	\$5,500	\$0	\$0	\$17,000	
Modifications to Buildings 318, 331, and 350	\$0	\$0	\$450	\$1,700	\$5,550	\$0	\$7,700	PNNL Overhead/GPP
Relocation of PSF capabilities to PSF and 325								
PSF capabilities to PSF HRT & 325	\$0	\$250	\$250	\$300	\$4,700	\$6,700	\$12,200	PNNL Overhead
Interim moves out of 300 Area	\$0	\$0	\$800	\$5,500	\$0	\$0	\$6,300	PNNL Overhead
Non PSF transition support	\$0	\$1,500	\$1,500	\$2,500	\$2,500	\$2,300	\$10,300	PNNL Overhead
Subtotal Relocation	\$0	\$1,750	\$2,550	\$8,300	\$7,200	\$9,000	\$28,800	
Subtotal Other Funding Sources	\$5,000	\$3,350	\$7,900	\$15,500	\$12,750	\$9,000	\$53,500	
Total All Sources	\$36,616	\$23,270	\$68,279	\$96,968	\$34,352	\$18,016	\$277,500	

8.0 Project Startup and Transition to Operations

8.1 Physical Sciences Facility Line Item Project

8.1.1 PSF HRT New Facilities

As part of the line item, CRL WBS 1.1.02.05, PSF HRT Facilities-Operational Startup, provides scope definition for startup, transition to operations and readiness activities. The collective process for the PSF startup and transition to operations are managed through the following plans:

The **CRL Startup Plan, CRL-PLAN-SU-001**, details the overarching integrating approach and methodology for PSF HRT startup activities.

The **Commissioning Plan** identifies commissioning activities used to demonstrate, validate and document the performance of facility systems as designed, constructed and installed. Commissioning includes verification of design and installation, and acceptance testing. Systems testing will use functional performance testing to satisfy acceptance criteria in the basis of design and functional operational expectations. Facility commissioning activities will be performed on the PSF HRT facilities by the commissioning subcontractor and will be consistent with PNNL's F&O procedure, ADM-CM-056, *Facility Commissioning*.

The **Operations Test Plan** will be used to validate that the design, construction, hardware, programs and personnel are ready to support safe operation of the PSF. Pre-operational testing supports the performance of a final system analysis and confirms the adequacy of training and facility operating procedures. This testing will demonstrate that the equipment and facility is properly built and will operate as designed before transition to the operational phase (CD-4a). The operations test program will document the as-built configuration and the initial operating parameters of the facility, and is a key function of configuration management. Operational tests are conducted in conditions as close as possible to the operational environment and are used to estimate operational effectiveness and suitability for identification of operational deficiencies and needed modifications. Operational testing will ensure the proper settings of equipment and confirm the adequacy of the facilities' overall conduct of operations, including procedures, operator training and emergency preparedness.

The **PSF Readiness Plan**, developed in CD-2, defines the startup authorization authority and the processes for preparation and conduct of readiness activities and reviews to confirm a satisfactory state of operations for the PSF.

PNNL's IOPS structure will be deployed in the PSF. PSF facility workspaces will be identified and configured in IOPS following the standard process outlined in SBMS, *Establishing and Maintaining IOPS in a Facility*. Work practice documents and other facility-related content will be developed to reflect the new facility characteristics with relocated staff being trained to the new or upgraded hazard awareness summaries, work practices and permits.

Operational readiness is achieved when facility, personnel, equipment and procedures are in a condition that will allow routine operations to be started. The PNNL Facility Management System description identifies the basic set of facility and operational permits and processes needed for supporting routine

operations. A facility core team will deploy work processes to manage the building operational boundary through implementation of facility use agreements using the *Establishing a Facility Use Agreement* subject area in SBMS. Emergency management functions including off-normal reporting coordination will be integrated into the existing PNNL process. Normal maintenance is established by a facility core team once beneficial occupancy and facility turnover is accomplished.

8.1.2 325 Building

The 325 Building is a hazard category 2 (HC-2) nuclear facility, currently operating with an EM-approved safety basis defined by the DSA and TSR. As such, startup as defined by DOE Order 425.1B, *Startup and Restart of Nuclear Facilities*, does not apply. The current safety basis will be upgraded to meet SC expectations, and a transition of the current authorization authority for nuclear regulation from EM to SC will occur. A DOE readiness activity is an anticipated product for this transition. A readiness plan will be developed in CD-2, to define the level of readiness review activity, the process, and authorization authority. Based on the details of this plan, out-year planning packages for CRL WBS 1.1.03.04, 325 Building Life Extension Projects – Operational Readiness, will be refined.

8.2 300 Area Retained Facilities

8.2.1 318, 331 and 350 Buildings

These facilities are currently authorized to conduct operations under approved Facility Use Permits. There are no plans for startup and transition to operations activities for the 331 Building (Life Sciences Laboratory complex), the 318 Building (Radiological Calibrations Laboratory) and the 350 Building (Plant Operations and Maintenance Facility).

8.3 Privately Developed Facilities

8.3.1 BSF and CSF

The privately developed facilities will be commissioned by the builder. Activities required for turnover of the completed BSF and CSF facilities to PNNL operations will be included in the project schedule. This will include the required sequence or priority for turnover of specific facilities, systems, areas or laboratories and will be refined and implemented in a coordinated effort with the installation of research equipment.

Additional startup resources will be obtained from the Safety, Licensing and Regulatory Analysis Group as necessary to accomplish startup activities.

9.0 Project Closeout

9.1 Project Closeout

PNNL will execute a formal CRL Project closeout for project activities that are directly managed by PNNL. This includes line item (PSF, Building 325), 300 Area Facilities (318, 331 and 350 Buildings) and 3rd Party Facilities (BSF, CSF). The closeout procedures govern two priority categories, line item and non-line item projects.

- PSF line item projects include the HRT facilities and life extension to the 325 Building.
- Non-line item projects include 3rd Party Facilities and the 318, 331 and 350 Buildings.

The line item project has proposed two critical decision milestones that will govern closeout activities:

- CD-4a – Conventional facility construction has been completed. The acquisition executive is requested to approve start of R&D operations.
- CD-4b – With the relocation of the final R&D capability, close out of the line item will be initiated.
- A final project closeout report will be prepared for the line item project consistent with DOE O 413.3A. The non-line item projects will follow Administrative Procedure ADM-CM-055 for GPP projects as well as SBMS.
- All GPP funding projects will follow DOE 4-Cs requirement. This includes portions of the 318 and 331 Buildings.
- All non-GPP funding projects will follow SBMS Project Management close out procedures.
- For the 3rd Party facilities, close out will occur on acceptance of the facility for occupancy.

For each lower-tier project, the project manager will ensure adequate funding for closing out project files. Project records will be collected and turned over in accordance with NQARD-1701, *Records System*, and the *Transferring Project Records to Storage* section of the Records Management SBMS subject area. The CRL Project office will coordinate records disposition activities for each lower-tier project control account. Section 9 of this document discusses additional details of the closeout process.

9.2 Demobilization

All general- and sub-contractors are responsible for removal of equipment and contractor trailers used during construction and will ensure that staging and lay-down areas are restored to acceptable conditions in accordance with contract requirements.

9.3 Staff Reassignments

PNNL will support the reassignment of CRL Project staff within PNNL or other contractors to the extent economic conditions allow. Support will be coordinated through the PNNL Human Resources directorate and be administered in accordance with established procedures in SBMS. Matrix PNNL staff will be reassigned by their line organizations. PNNL will not be responsible for reassignment of contractor and sub-contractor personnel.

9.4 Administrative Closeout

The CRL Project will verify and document results during each phase of the project to ensure that vital information is not lost or destroyed. Retained information will include project records, analysis or project success and effectiveness, and archived information for future use. The CRL Project will prepare a document stating that the client, sponsors, and users accept the product.

9.5 Final Document Archiving

The CRL Project will use TRIM for lifecycle management of electronic and non-electronic information from inception to final disposition. The CRL Project will follow the *Records Management Procedure*, CRL-PROC-NQA1-1701 Revision 0 and ADM-CM-055 *Administrative Procedure*, Section 8.7.5, Project Financial Closeout.

9.6 Final Transfers to Operations

As stated in Section 8, Project Startup and Transition to Operations, the PSF Readiness Plan developed in CD-2 will define the startup authorization authority, processes for preparation and conduct of readiness activities and reviews to confirm a satisfactory state of operations.

9.7 Permit Obligations

Processing of permit applications for submittal to the regulatory agencies has been incorporated into the project as part of permitting scope for the various phases of the project (Section 4.2.1) and includes any fees required by the agencies to process the application. Conditions and limitations imposed by the agency in the permit approval are integrated into the PNNL management systems, facility and organizational procedures to support readiness activities. Permitting activities will be closed out once the integration of the conditions and limitations occurs; at that point the management systems and facility and organizational structures will be responsible for costs associated with maintaining, modifying, or updating permits.

9.8 Cost Documentation

The CRL Project will ensure that costs have been appropriately charged to the project and invoices and contracts are closed. The CRL Project will complete the Construction Completion and Cost Closing Statement, form RL-F-4700.3. This form, once signed, will be distributed to PNSO and PNNL Finance and Property Accounting. A cost report will be completed that will identify budgeted and actual costs in each WBS element.

9.9 Authorities for Financial Signoff

PNNL Finance and Property Accounting will approve financial documents relating to costs that are associated with capitalization as well as the form RL-F-4700.3. The directorate business manager for CRL will approve financial documents relating to costs that are considered non-capital expense.

Appendix– Key Staff Biographies

James K. McClusky



RECENT ASSIGNMENT: PACIFIC NORTHWEST NATIONAL LABORATORY

Project Director, Capability Replacement Laboratory Project (CRL):

Dr. McClusky is accountable for the executive sponsorship and implementation of the CRL Project. Dr. McClusky maintains daily interactions with project stakeholders to ensure that project outcomes are achieved as planned. These interactions are closely managed by Dr. McClusky to ensure that project goals and objectives are established and accepted by organizations having vested interests in the outcomes of the project. By executing his Project Director role, Dr. McClusky is directly accountable for the delivery of the full scope schedule and budget of the CRL Project.

PREVIOUS EXPERIENCE

Dr. McClusky rejoined PNNL to assume the position of the Director of the Capability Replacement Laboratory Project. Dr. McClusky first joined PNNL during 1991. During his 10- year tenure, he held several different management positions, including Deputy Manager of Engineering & Maintenance in F&O and Project Deputy Director for Environmental Molecular Sciences Laboratory (EMSL) Design & Construction.

Dr. McClusky has more than 40 years experience in engineering program direction; project management; and facility design, construction, commissioning and operations. This experience includes Program Manager, Plutonium Uranium Extraction (PUREX) & Uranium Trioxide Plant Restarts; Chief engineer for the Plutonium Recovery Modification Project at Rocky Flats Plant for DOE; and Director of Engineering Activities, Fluor Hanford, Inc.

EDUCATION

Post Doctoral Fellow – Rockefeller Foundation
PhD Nuclear Engineering – Iowa State University
BA Chemistry & Physics – Washington & Jefferson College

Dale E. Knutson



RECENT ASSIGNMENTS: PACIFIC NORTHWEST NATIONAL LABORATORY

PMP, Deputy Project Director, Capability Replacement Laboratory

Project: As Deputy Project Director for the Capability Replacement Laboratory Project, on a day-to-day basis Mr. Knutson is responsible for ensuring Pacific Northwest National Laboratory safely and cost-effectively builds modern laboratories by 2011—the largest construction effort in the history of PNNL. Nearly 50 percent of PNNL’s experimental lab space and \$200 million in R&D projects are located in the nearby Hanford Site. To meet accelerated cleanup, the Lab must build replacement space to accommodate displaced staff, equipment and capabilities. Mr. Knutson and

his staff will manage a \$224-million investment from the federal government and private developers. The project includes constructing three new laboratories that are sponsored by the Department of Energy’s Office of Science, the National Nuclear Security Administration, the Department of Homeland Security, and private developers as well as renovating existing laboratory facilities that will be retained in the Hanford 300 Area.

PREVIOUS EXPERIENCE

Mr. Knutson’s career spans more than 20 years of line, project and program management experience in a diverse mix of heavy construction, nuclear processing and manufacturing, plutonium recovery, environmental restoration, and scientific program environments at the Department of Energy’s Rocky Flats Plant, Pacific Northwest National Laboratory and Argonne National Laboratory. He is the prior Project Director for the Rare Isotope Accelerator and Director of the Office of Project Management at Argonne National Laboratory. In these roles, he has led activities to upgrade the design basis and make the necessary facility modifications to extend the operational life of aging nuclear facilities. Because of Mr. Knutson’s expertise, he has also been involved in 39 Lehman Reviews.

MEMBERSHIPS/AFFILIATIONS

Mr. Knutson is a Project Management Professional (PMP) with the Project Management Institute and an active member of national peer review committees supporting the Office of Science, NNSA, and National Science Foundation (NSF). He has served as chair, co-chair, or subcommittee chair for the National Ignition Facility (NIF) at Lawrence Livermore National Laboratory, the Spallation Neutron Source (SNS) at Oak Ridge National Laboratory, the Linac Coherent Light Source (LCLS) at the Stanford Linear Accelerator Center, and the Nanoscience Research Centers (NSRC) at Sandia National Laboratory, Lawrence Berkeley National Laboratory, Brookhaven National Laboratory, and Argonne.

EDUCATION

B.S. Civil Engineering, Montana State University
Nuclear Technologies Certification, Rocky Flats School, Colorado School of Mines
M.S. Ecological Engineering, Colorado School of Mines

Greg A. Herman



RECENT ASSIGNMENTS: PACIFIC NORTHWEST NATIONAL LABORATORY

Project Manager, Alternative Financed Facilities (2005): Responsible for the planning, design and construction of the Biological Sciences Facility (BSF) and the Computational Sciences Facility (CSF). This includes the development and approval of the Business Case justifying the use alternative approaches to finance these facilities. Other responsibilities include the design and construction of the Horn Rapid Triangle Utility Infrastructure, providing utilities to the Physical Sciences Facility, a project funded by the State of Washington, through the City of Richland. Additional responsibilities include the life extension projects for the 318, 350 and 331 buildings.

PREVIOUS EXPERIENCE

Program Manager, Major Initiatives & Real Estate and Infrastructure Planning (2004):

Responsible for the conceptual development of facilities and projects related to PNNL's major initiatives. This includes conceptual planning and development with research staff and funding sponsors for the Bioproducts, Sciences, and Engineering Laboratory; a joint project with WSU and PNNL. Additionally, as the Manager of Real Estate & Infrastructure Planning, oversees the development of Campus Master Planning, Strategic Infrastructure Planning for Maintenance and Upgrade Projects, Strategic Site and Space Planning and Real Estate Development and Planning. Past responsibilities have included management, prioritization and oversight for the Laboratory Capital Investments, management of grounds maintenance, moves and relocation services, Project Manager for the planning, acquisition, and relocation for the ISB1 and ISB2 facilities, and management oversight for NSB and ETB.

Civil Engineer/Lead Design Engineer for the planning, development, design and project management for underground unities for the Blue Mountain Mall in Walla Walla, Washington. Responsible for coordinating utilities with mechanical and electrical engineering disciplines, in addition to coordinating the development plans with the City of Walla Walla, City Engineering and Planning Board.

RECENT PROFESSIONAL ACTIVITIES

Member, Kennewick School District Facility Planning Board
Member & Past President, Kennewick School District FOCUS Committee

EDUCATION

B.S. Civil Engineering, Washington State University, 1988
MBA Kennedy – Western University, 2004

Harrison F. Kerschner



RECENT ASSIGNMENTS: PACIFIC NORTHWEST NATIONAL LABORATORY

Senior Technical Advisor for the Capability Replacement Laboratory:

Assigned as the project manager for the 300 Area Life Extension Upgrades for retained radiological and nuclear facilities, providing project oversight of design, construction and readiness activities. For the Physical Sciences Facility (PSF) in the Horn Rapids Triangle (HRT), responsible for start-up and readiness activities.

PREVIOUS EXPERIENCE

LAWRENCE LIVERMORE NATIONAL LABORATORY

Project Management, Nevada Experiments and Operations Program (N Program). (2005-2006):

Responsible for “Work for Others” customers at the Nevada Test Site, supporting LLNL B Division, the Nonproliferation, Arms Control, & International Security Directorate, and other laboratory science organizations. **Acting, Nuclear Test Operations Facility Security Officer (2005)**, providing leadership for executing the Safeguards and Security program at LLNL facilities at the Nevada Test Site.

Deputy Manager, Device Assembly Facility (DAF) (2002-2005): The DAF is a hazard Category 2 non-reactor nuclear (and explosives) facility. Directed facility activities for relocation of the Los Alamos National Laboratory Technical Area 18 Criticality Experiments Facility special nuclear material to DAF, achieving operational readiness for introduction of Security Category 1 nuclear material.

Start-up Manager. Developed and executed a comprehensive 10CFR830 compliant Safety Basis/ Technical Safety Requirements Implementation Plan.

PACIFIC NORTHWEST NATIONAL LABORATORY

Fissile Material Manager/Project Manager (1996-2002). Provided leadership in support of Architect and Engineering design of the Pit Disassembly and Conversion Facility, a strategic component of the national management and disposition of excess weapons material (plutonium and Highly Enriched Uranium) for the DOE. Technical areas of responsibility included: criticality, radiological engineering, nuclear safety, safeguards and security, classification and plutonium technology.

PROFESSIONAL AFFILIATIONS and CERTIFICATION

Institute of Nuclear Materials Management

American Board of Health Physics

American Academy of Health Physics

American Nuclear Society

Comprehensive Health Physics Certification by the American Board of Health Physics, 1986–2006.

EDUCATION

MS Health Physics, University of Arkansas (1983)

Walter W. Laity



RECENT ASSIGNMENTS: PACIFIC NORTHWEST NATIONAL LABORATORY

R&D LIAISON FOR CAPABILITY REPLACEMENT LABORATORY (CRL):

Dr. Laity serves as the “bridge” between the CRL Project and the R&D “stakeholders” in PNNL’s research directorates to ensure during all aspects of the design of the Physical Sciences Facility (PSF) that the new facility will meet the mission needs of the research capabilities approved for transfer from the Hanford 300 Area to the PSF.

PREVIOUS EXPERIENCE

Manager, Nuclear Safety & Technology Product Line (2002 – 04): Responsible for PNNL’s performance on all projects within the product line (~\$65M/year), for effective management of risks and hazards associated with project work, and for development of new business consistent with applicable market-sector strategies. Among the product line’s major projects are: 1) Battelle’s subcontract with Washington Group International to design the Plutonium Pit Disassembly and Conversion Facility (NNSA), 2) PNNL’s lead role on the Tritium Technology Program (NNSA), and 3) PNNL’s lead role on the Radioisotope-Powered Stirling Generator Program (DOE-IN).

Manager, Tritium Target Qualification Project (1997-99): The project team provided the technical basis (via PNNL’s role as the tritium target “designer of record”) for the Secretary of Energy’s decision in December 1998 to meet the nation’s defense-related tritium needs through production of tritium in the Tennessee Valley Authority’s commercial light-water reactors.

Manager, Materials and Chemical Sciences Center (1990-95): This 420-person organization performed basic and applied research and technology development in five principal business areas: 1) Materials Processing, 2) Materials Performance, 3) Chemical Processing, 4) Chemical Measurement, and 5) Analytical Chemistry. From 1990 through 1995, the Center’s staff participated in the development of technologies that received 14 R&D 100 Awards, six Federal Laboratory Consortium Awards and several dozen patents.

RECENT PROFESSIONAL RECOGNITION

“Tri-Cities Engineer of the Year” (Kennewick, Pasco, and Richland, WA), February 2001
“Academy of Distinguished Engineers Award,” Oregon State University, October 1998

RECENT PROFESSIONAL ACTIVITIES

American Society of Mechanical Engineers (ASME) Vice President, Engineering Education, and Chair, ASME Board on Engineering Education (2003 – 06)

Participant, White House Critical Infrastructure Protection Priorities Workshop (Sept. 02)

Member, ASME Joint Council Task Force on Risk Communication (which prepared an ASME position paper titled “The Role of Risk Analysis in Decision Making,” approved by the ASME Board of Governors in March 2002)

Member, Board of Directors, Accreditation Board for Engineering and Technology (1999-2002)

EDUCATION

Ph.D. Mechanical Engineering, Oregon State University (1977)

PROFESSIONAL REGISTRATION

Registered Professional Engineer, Oregon, No. 7440

W. Craig Mac Donald



RECENT ASSIGNMENTS: PACIFIC NORTHWEST NATIONAL LABORATORY

Mr. Mac Donald currently is serving as PNNL's Transition Manager and Relationship Manager with Washington Closure Hanford. In this capacity, he manages all scope associated with moving PNNL's capabilities out of its delayed release facilities in the 300 Area and into newly constructed facilities in the Horn Rapids Triangle. Mr. Mac Donald also is responsible for the turnover of these facilities to Washington Closure per an agreed upon schedule.

PREVIOUS EXPERIENCE

Mr. Mac Donald, throughout his 27 year career at Battelle, has established himself as a strong, results-oriented leader able to tackle complex assignments and problems and meet or exceed all performance, cost and schedule expectations. Mr. Mac Donald has led or played a critical leadership role on almost every major Battelle strategic initiative over the past 15 years including developing a project management approach for Battelle's Columbus-based operations, establishing Battelle's client service and relationship management model, developing Battelle's technology commercialization strategy and approach, establishing and leading Battelle's strategic alliance practice and creating and launching Battelle's venture capital fund. Mr. Mac Donald's detailed expertise and experience includes program/project management, system engineering and integration, management systems development and implementation, product line management, strategic planning, marketing and business development, support service delivery, key client management, technology commercialization, and venture capital.

EDUCATION

B.S., Engineering Management, U.S. Air Force Academy, 1973
M.B.A., Management, Xavier University, 1976

Jeff Pittman



RECENT ASSIGNMENTS: PACIFIC NORTHWEST NATIONAL LABORATORY

Project Manager, Physical Sciences Facility, and Facilities & Operations

Directorate: Mr. Pittman joined Battelle in 1990 as a senior development engineer in Facilities Engineering, doing both design work and project management for facilities modifications projects. His experience includes managing General Plant Projects as well as line-item projects. In 1997, he became a senior facility advisor in Facility Planning followed in 1998, by being named the manager of Engineering within the Engineering, Design, & Craft Resources department. To aid in the startup of the Integrated Business Operations department in 2000, Mr. Pittman started the Training & Organizational Development section. In the fall of 2001, he became the manager of Engineering & Design Services, and in August of 2004 was named the Division Director for Engineering & Construction. In October of 2006, he accepted the position of project manager for the Physical Sciences Facility project.

PREVIOUS EXPERIENCE

Mr. Pittman is a former U.S. Navy Reserve Civil Engineer Corps officer, and has held line management, project management, plant engineer and design engineer positions in both private and government industry.

MEMBERSHIPS/AFFILIATIONS

Mr. Pittman is a certified Project Management Professional through the Project Management Institute (PMI), is an accredited Leadership in Energy and Environmental Design (LEED) professional, and is a past officer of the local chapter of the Association for Facilities Engineering (AFE). Mr. Pittman is currently serving on the Board of Directors for The ARC of the Tri-Cities.

EDUCATION

B.S. Mechanical Engineering, Washington State University, 1980
MBA, City University, 1999

PROFESSIONAL REGISTRATION

Professional Engineer, Mechanical Engineering, Washington

Hans R. Vogel



RECENT ASSIGNMENTS: PACIFIC NORTHWEST NATIONAL LABORATORY

ES&H Manager for the Capabilities Replacement Laboratory Project (CRL): Responsible for the ES&H support integration into all elements of the CRL Project to include current operations and newly constructed facilities. Lead development and delivery of additional programmatic requirements to include the CRL Project Integrated Safety Management plan, NEPA and Facility Permitting (Air, Water, and Waste) and construction safety planning and execution. Additional responsibilities include leading efforts to transition nuclear safety documentation (325 Building DSA) to DOE SC stewardship.

PREVIOUS EXPERIENCE

Battelle, Pacific Northwest National Laboratory: Operations Manager, National Security

Directorate: Feb. 2005-present: Responsible for non-R&D logistical support to research and support operations of the National Security Directorate. This included management of 17 direct reports and over \$1.6M of annual budget authority. Logistical support included environment, safety, and health staffing necessary to maintain a safe, effective, and efficient operation within the 600+ person directorate. Other duties included space planning, to include both tactical and strategic needs in support of the NSD mission and strategic plan. Direct supervision of the PNNL Foreign Travel Office was also part of the NSD Operations Manager responsibilities.

Westinghouse Hanford Company: Feb. 1993 – Jun. 1994, Process Engineer and Cognizant Engineer for industrial and mixed-waste facilities in the 300 Area of Hanford.

Battelle, Pacific Northwest National Laboratory: Jun. 1994 – Jan. 2001, Engineering and management positions, culminating in the role of Manager, Integrated ES&H Management System and Program, ES&H Directorate.

UT-Battelle, Oak Ridge National Laboratory: Jan. 2001 – Feb. 2005

Nuclear and Facility Safety Manager: responsible for managing the ORNL's efforts in the areas of nuclear facility authorization bases, nuclear, criticality, construction safety, and fire protection engineering. Mr. Vogel lead the effort to review and resubmit all nuclear facility Documented Safety Analyses (DSA's) in compliance with 10 CFR 830 Subpart B implementation for the ten Category 2 and 3 nuclear facilities at ORNL.

Senior Advisor to the High Flux Isotope Reactor (HFIR): supported the Operational Readiness Review at HFIR after B reflector replacement outage.

Environmental, Safety, Health and Quality (ESH&Q) Manager for the HFIR

A Desert Storm veteran, Mr. Vogel received numerous military citations to include the Bronze Star and two Army Commendation medals; leaving active duty with the U.S. Army Corps of Engineers in 1993, and was honorably discharged from the Army Reserves in 1998.