

4.B ACHIEVING EXCELLENCE IN FNAL OPERATIONS & BUSINESS MANAGEMENT

(L.4.B, M.4.B)

FRA will deliver cost-effective operations and business management by implementing 11 new initiatives to upgrade management and business processes, systems, and tools in support of FNAL science. Working within a disciplined, continuous-improvement framework, we will benchmark FNAL’s performance against industrial and other DOE sites, perform rigorous self assessments, and implement lessons learned.

Upon his arrival at FNAL in July 2005, Director Oddone noted that DOE had consistently assessed FRA partner URA as outstanding or excellent in its operation and management of FNAL over the preceding five years. With a commitment to continuously improve FNAL operations and management, Director Oddone initiated a comprehensive Director’s Management Review. Third-party subject matter experts (SMEs) conducted the review and issued a report that recommended improvements to the laboratory’s management systems and

organization. In response to the report, Director Oddone and URA started the process of streamlining the laboratory’s organization and began implementing 11 new, near-term initiatives to improve operations and systems. **Figure 4.b–1** summarizes these initiatives. **Figure 4.b–2** cross-references them to operations and management topics discussed in **Sections 4.b.1 through 4.b.10**. These initiatives build on the strong management record of FRA partner, URA, and will improve all areas of operations and business management. The new

Operations & Business Management Initiatives
1. Office of Quality and Best Practices <ul style="list-style-type: none"> ❖ Implements DOE, laboratory, commercial business, and standards agencies best practices to continuously improve FNAL systems
2. Laboratory Collaboration Council (LCC) <ul style="list-style-type: none"> ❖ Explores ways for FNAL and ANL to promote efficiencies, best practices, synergies and cost savings
3. IT Management Information and Decision Support Systems Enhancements (Dashboard) <ul style="list-style-type: none"> ❖ Provides FNAL and DOE with near real-time access to all operations and business management systems outputs
4. Strategic Planning Process Enhancements <ul style="list-style-type: none"> ❖ Articulates the Director’s vision, guides budget and work plan establishment, and serves as a DOE communications tool
5. QA Program Enhancements <ul style="list-style-type: none"> ❖ Provides a robust QA program based on DOE O 414.1C that meets best practice standards of national and industrial labs
6. Integrated Assurance Program <ul style="list-style-type: none"> ❖ Provides a robust assurance program that integrates FNAL activities and initiatives
7. Self-Assessment and Continuous Improvement Program Enhancements <ul style="list-style-type: none"> ❖ Strengthens FNAL’s self-assessment, continuous improvement, assurance, and QA programs
8. Office of Project Management Oversight Enhancements <ul style="list-style-type: none"> ❖ Provides FNAL with powerful project management assets and capabilities including training for managers
9. Resource Loaded WBS <ul style="list-style-type: none"> ❖ Creates a more comprehensive resource-loaded FNAL WBS with additional business, infrastructure and technical activities
10. Organization and Human Asset Plan <ul style="list-style-type: none"> ❖ Implements a forward-looking succession planning process, comprehensive workforce planning process, and written R2A2
11. ES&H Certifications—ISO 14001 and OSHA 18001 <ul style="list-style-type: none"> ❖ Provides FNAL with ISO 14001 and OSHA 18001 certifications

Figure 4.b–1. FRA’s Operations and Business Management Initiatives. Implementation of our initiatives will improve FNAL business systems to deliver the most science for each taxpayer dollar.

 Operations & Business Management Initiatives  ✓ Strong Involvement ✓ Involvement	Proposal Section	4.b.1	4.b.2	4.b.3	4.b.4	4.b.5	4.b.6	4.b.7	4.b.8	4.b.9	4.b.10
		Management Systems	Partnership and Communications	Project and Infrastructure Management	ES&H, Security, and Quality Improvement	National/International Standards	Standards Certification	Third-Party Validation	Small Business Involvement	Technology Transfer	Strategic Planning
1. Office of Quality and Best Practices		✓	✓		✓	✓	✓	✓			✓
2. Laboratory Collaboration Council (LCC)		✓	✓	✓	✓				✓	✓	✓
3. IT Management Information and Decision Support Systems Enhancements (Dashboard)		✓	✓	✓	✓						
4. Strategic Planning Process Enhancements		✓	✓								✓
5. QA Program Enhancements		✓		✓	✓	✓	✓	✓			
6. Integrated Assurance Program		✓			✓						
7. Self-Assessment and Continuous Improvement Program Enhancements		✓	✓	✓	✓						
8. Office of Project Management Oversight Enhancements		✓	✓	✓	✓				✓		✓
9. Resource Loaded WBS		✓	✓	✓	✓						
10. Organization and Human Asset Plan		✓		✓							✓
11. ES&H Certifications—ISO 14001 and OSHA 18001					✓	✓	✓				

Figure 4.b–2. FRA Initiatives Cross Reference Matrix. Our operations and business initiatives are linked to RFP elements discussed within our proposal.

relationship between UChicago and will bolster support for the science of the LHC, while giving the laboratory the flexibility and scalability to help construct the ILC in Illinois. The primary benefits of these initiatives to DOE will be the delivery of outstanding science, stewardship of existing programs, project controls on new programs, and transparency of operations to DOE oversight. In addition, the combination of URA and UChicago will create synergies that increase the potential to host the ILC in Illinois to help the US maintain its preeminence in the field of particle physics.

We will place particular emphasis on the first three initiatives shaded in **Figure 4.b–2**:

1. The new Office of Quality and Best Practices (OQBP)

2. The Laboratory Collaboration Council (LCC)
3. The IT Management Information and Decision Support Systems Enhancements, hereafter referred to as the “Dashboard”

OQBP will identify and facilitate implementation of best practices from commercial businesses and other DOE laboratories. OQBP will also oversee the implementation of quality assurance practices in DOE O 414.1C and will call on our designated subcontractor, EG&G/URS, to develop process improvements. We will establish the LCC to explore ways in which FNAL and ANL might promote efficiencies, best practices, synergies, and cost savings in support of research programs. Our Dashboard will enable DOE to view business system data and assess FNAL performance and adherence to Performance Evaluation

Management Plan (PEMP) goals in near-real time, thus creating greater transparency for DOE and other stakeholders.

In the remainder of this section, we describe how Director Oddone and his team will apply FRA's corporate resources, management structure, synergies, and expertise, including those of designated subcontractor EG&G/URS, to deliver cost-effective business management, and to implement our 11 initiatives. We have organized this section to address the nine subparagraphs of RFP Paragraph L.4(b) in order. In addition, we address additional RFP Section C.4 SOW elements that are not specifically addressed in RFP Section L requirements (see **Section 4.b.10**).

4.b.1 Established/Proposed Management Systems *(L.4.b.1, M.4.b)*

The FRA Board of Directors will assist Director Oddone with standing committees aligned with major functional laboratory areas. The FRA Board's role, composition, and oversight will ensure laboratory management accountability for meeting DOE goals, policies, and directives. The Board will deliver strong corporate governance and will support Director Oddone's efforts to implement best practices for business and facility operations. The Board will oversee scientific research that supports the Tevatron, LHC, and other major experiments while maintaining focus on attracting the ILC to FNAL. This expanded and engaged Board will provide peer review, corporate outreach, and both scientific and management reviews.

To create a culture of continuous improvement and to assist in the implementation of our 11 initiatives, FRA will establish the Office of Quality and Best Practices (OQBP). Reporting directly to Director Oddone, OQBP will facilitate and oversee the implementation of all DOE O 414.1C quality assurance (QA) practices. It will also identify and implement best practices from commercial businesses and other DOE laboratories.



Bob Grant will lead OQBP. Our designated subcontractor, EG&G/URS, will augment OQBP's staff with industry experts to provide support.

These experts will work with FNAL functional managers to analyze existing practices and to select and implement improved practices. Director Oddone will identify opportunities for improvement through an assurance council that will integrate inputs from the LCC, the Office of Project Management Oversight (OPMO, discussed in **Section 4.b.3.1**), results from self assessments, and results from scientific and operational reviews. The council will make recommendations to Director Oddone on a set of activities for OQBP. Director Oddone will make the final decision on the OQBP activities' sequencing and timing. Over time, this ongoing "search-light" process will scan across all laboratory functions in a prioritized fashion. We expect to analyze two to three functions per year. Topics include facility maintenance, procurement, travel administration, cost reporting, budget control, construction management, compensation systems, and ES&H activities.

Critical to this approach is FRA's flexibility to assign multi-disciplinary EG&G/URS experts to analyze and implement improvements for different functions. EG&G/URS's depth of resources and management experience make this flexibility possible. The function provided by EG&G/URS is not only one of consultation and advice, but also one of implementation. By embedding EG&G experts in operations, we will be able to ease the transition from existing practices to new ones, train our own personnel, and hire new, qualified staff when necessary.

At the laboratory level, FRA and UChicago Argonne, LLC will establish the LCC within 60 days of contract start. The LCC will begin to explore ways in which FNAL and ANL might promote efficiencies, best practices, synergies, and cost savings in support of research programs. FNAL Director Oddone and ANL Director Rosner will chair the LCC on a rotating basis. LCC members—laboratory Chief Operating Officers,



Chief Financial Officers, Chief Information Officers, and the UChicago Associate Vice President for Laboratory Operations—will provide input and important reachback. Additionally, the laboratory directors will designate senior managers from both FNAL and ANL to serve on working groups that will be chartered by joint action. Initial groups will address such vital areas as operations, user support, R&D, and technology transfer.

FRA will provide IT enterprise architecture (EA) integration with the Dashboard to assist in effectively and efficiently managing and operating FNAL (see **Section 8**). In keeping with best commercial practices, this system will be an incremental upgrade rather than a total replacement of the current Oracle-based system first implemented in 1997. The FNAL Management Information Systems (MIS) group will implement the FNAL EA integration plan and the Dashboard. OQBP will ensure the Dashboard's information will meet DOE and FNAL management team needs. OPMO will work with the MIS group to ensure laboratory management and DOE project tracking needs are met. The MIS group and OQBP will use sources such as information from other national laboratories, EG&G/URS, and ANL to evaluate and make recommendations regarding which systems to integrate into the existing EA at FNAL.

Our Dashboard initiative will provide increased performance visibility to DOE and senior laboratory management. Integrated with our secure communications systems, all business system information, with the exception of sensitive data such as personnel and human resources information, will be accessible to DOE via a portal. This will allow DOE to review FNAL performance and adherence to PEMP goals in near-real time, thus creating greater transparency across the entire laboratory for DOE.

Our MIS will be an integrated, enterprise-wide system for all internal management controls and reporting requirements. It will expedite the communication flow between DOE and FRA. **Figure 4.b-3** shows the primary IT systems that make up our MIS. We have primarily se-

lected Oracle-based subsystems as MIS modules due to their inherent interoperability with each other and other IT modules URA is currently using, such as the Sunflower property management system and the Price Waterhouse Coopers audit system. These systems are aligned with FNAL processes, personnel, and organizational sub-units to support research in high energy physics.

The process of IT transformation to a fully integrated MIS enterprise architecture is well underway. In 1997, URA completed a five-year, \$8.5 million strategy to replace its existing management systems with up-to-date, highly integrated, commercial-off-the-shelf (COTS) software solutions. The replacement strategy provided new hardware, networks, and business application software, with Oracle, PeopleSoft, and Microsoft playing key roles in the strategy. Execution of this strategy provided FNAL with a highly-reliable MIS with excellent support capability, and established a solid, scalable foundation to continue modernizing and expanding the MIS. Since then, URA has focused on expanding business management software capabilities to improve functionality and service and to enable management to exert better control over laboratory operations and expenses. **Figure 4.b-4** illustrates the disciplined process that our MIS group will use to implement MIS upgrades and improvements.

FRA will take a strategic approach to managing FNAL IT investments. FRA will continue to use and maintain URA's existing Strategic Information Systems Plan (SISP) for all laboratory management systems. The SISP has two principal components: a strategic, long-term plan and a tactical, short-term plan. FRA's MIS group will prepare the strategic plan with assistance from OQBP, and will assist Director Oddone and Deputy Director Kim in incorporating it into the FNAL strategic planning process. This will ensure that future FNAL management information needs are integrated into the overall FNAL business plan. Updated annually with a five-year time horizon, the SISP will broadly outline the computing strategies and resources required to achieve management goals. It will also

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Figure 4.b-4. MIS Upgrade Process. FRA will use a disciplined process to guide MIS improvements.

provide a framework to develop subsequent enterprise-wide transformations. The tactical plan will outline performance targets, specific projects, schedules, and resources needed to achieve short-term objectives. It will leverage recommendations and inputs from our QA, integrated assurance, and self-assessment programs to accelerate improvements and use best practices laboratory-wide. The tactical plan will have a time horizon of one to two years and will be generally equivalent to the MIS group’s annual plan.

The Chief Financial Officer (CFO), OQBP, and OPMO, will design and implement a process to resource-load the laboratory’s work breakdown structure (WBS) to a level appropriate for each laboratory function. We will then create a responsibility assignment matrix (RAM) that will link the laboratory’s organizational breakdown structure (OBS) to the WBS. We will design the RAM so that each WBS task is assigned to a division, team, or person in the OBS. Major WBS categories will be assigned to divisions, while lower-level tasks and categories will be assigned to teams and individuals



within the divisions. This detailed and systematic analysis of the entire laboratory, in conjunction with the skills analysis and the roles-responsibilities-accountabilities-and-authorities (R2A2) initiative, will ensure that staffing levels are appropriately configured. We will balance workload with available staffing resources to ensure efficient mission accomplishment. This effort will also include creation of a time and effort reporting system against the laboratory-wide WBS that we will integrate with the Oracle financial suite, with particular focus on the budget and accounting.



When complete, the system will formally document R2A2 at all levels. It will serve as an FNAL management system cornerstone because it will enable managers at all levels to identify the individuals and teams specifically responsible for areas requiring action. This will ensure the appropriate people can be assigned responsibility for the actions and those actions can be tracked to completion.

4.b.1.1 Internal Oversight/Assessment of Finance, Accounting, and IT Systems

FRA will maintain an engaged, highly-qualified, and motivated internal audit staff to carry out a risk-based audit and review program. The FRA Board’s audit committee will approve each year’s audit plan, which will be developed in consultation with OQBP, OPMO, and Director Oddone. In accordance with the Inspector General’s cooperative audit strategy, FRA’s internal audit staff will conduct an annual comprehensive cost allowability audit of the laboratory’s most recent statement of costs incurred and claimed.

FRA will ensure that the laboratory actively participates in DOE’s program of compliance with *OMB Circular A-123, Management’s Assessment of Internal Controls*. FNAL will continue to expand and improve the documentation of key processes, risks, and controls that contribute to DOE’s material account balances each year, and will carry out a program of testing key controls and promptly correcting deficiencies, all in accordance with DOE

guidance. The laboratory will develop a robust internal control assessment infrastructure, cataloging key risks and controls in order to gain efficiencies in documentation, evaluation, testing, remediation, reporting, and certification activities.

In addition to managing internal oversight processes, FRA's CFO will also engage independent, outside auditors to perform an annual audit of the financial statements of contract activities in accordance with generally accepted auditing standards and on the basis of generally accepted accounting principles. We expect to continue to receive unqualified audit opinions, as URA has done since 1985. We will request that the auditors issue a management letter communicating any internal control deficiencies or opportunities for improvements that were noted during the audit.

4.b.1.2 Integrating Management Systems in an Overall Performance-Based Manner

Director Oddone's 11 initiatives are the result of a thorough analysis of operations and business management practices. They are intended to significantly enhance laboratory performance and integrate management systems to accomplish program performance goals in a performance-based environment. Our enhanced strategic planning process (discussed in **Section 4.a**) will integrate programs and projects. Our resource-loaded WBS is a management tool that will integrate work activities to the appropriate organizational level. The business systems discussed above and illustrated in **Figure 4.b-3** will supply detailed information to managers and all staff levels, allowing them to compare performance with PEMP targets. The Dashboard will integrate the data and also provide DOE access to review and assess performance data in near-real time. These data, transparent across the entire laboratory, will provide early indicators of potential problems, making it possible to take corrective action long before problems become critical.



OQBP will oversee implementation of initiatives and will assess their effectiveness. OQBP will use available resources such as the LCC Operations Working Group, EG&G/URS, other national laboratories, and private sector sources, to benchmark performance expectations. The FRA Board, through its Administration Committee, will provide OQBP oversight in this area. Our ultimate goal is to help FNAL maintain US leadership in particle physics research and discovery and yield the greatest scientific output per taxpayer dollar.

4.b.2 Partnership and Open Communication (L.4.b.2, M.4.b)

To make the best use of every dollar, we will strengthen the culture of partnership and open communication between FNAL and the community as well as FNAL and DOE. We propose specific initiatives for outreach to these key community stakeholders, each of whom are listed in **Figure 4.b-5**. Furthermore, maintaining good communications with all stakeholders will be a high priority for Director Oddone.

4.b.2.1 Communication Between FNAL and the Community

FNAL Internal Community. Along with standard forms of management communication such as email, all-hands meetings conducted by Director Oddone, other manager meetings, and the FNAL website, FRA will publish and distribute *Fermilab Today* (**Figure 4.b-6**), FNAL's daily newspaper-formatted email publication for employees, users, and other subscribers. FRA will continue the new practice of including a weekly column written by a division or section head. *Fermilab Today* is perhaps the single most effective internal communication tool for the FNAL community. We will work closely with SC to help disseminate key SC messages to the FNAL workforce and community through *Fermilab Today*, emphasizing safety messages and partnership through profiles, and highlighting SC successes.

Communication with Members of the Media. FRA will foster a spirit of cooperation and openness with local, national, and

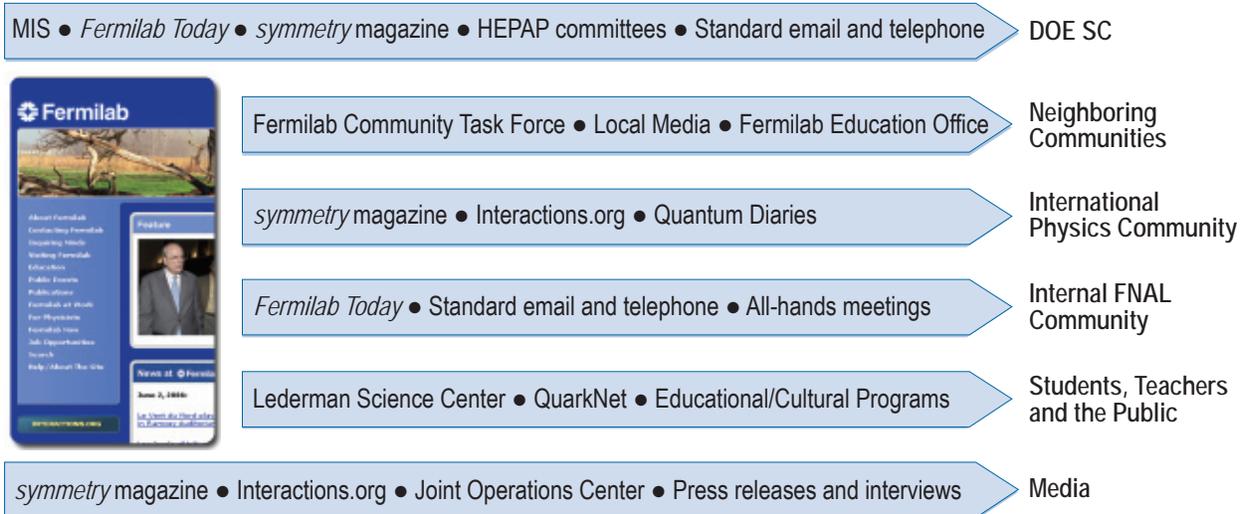


Figure 4.b-5. Open Communication at Fermilab. The FNAL website gives all stakeholders access to information at Fermilab. Depending on user rights, information ranging from seasonal bird counts, to concert schedules, to specific ES&H statistics, to the latest Tevatron data is readily available.

international media in close consultation with DOE. In particular, FRA will work with the media to inform the local community about issues related to the proposed ILC, whose construction would extend beyond the FNAL site borders. We propose a series of initiatives to make members of the media important allies in achieving FNAL and DOE goals. First, FNAL’s CERN representative will facilitate all US media relations for the LHC. Second, we will open an LHC Joint Operations Center in Wilson Hall in the same location as the LHC Physics Center, where we will conduct media events. We will use the Joint Operations Center and Physics Center to communicate the leading role of the US in the LHC. Third, we will use the Interactions.org website and the newswire to send press releases on particle physics news around the world. Fourth, we will maintain continuous relationships with local reporters at every level. Finally, the FNAL website will also remain an excellent source of media information.

Communication with Neighboring Communities. FRA will continue URA’s policy of involving the community in planning and decision-making. In consultation with the existing Fermilab Community Task Force on Public Participation, FRA will use an ILC community board to advise the laboratory and the community on ILC-related issues. We believe

public participation will be critical in any successful DOE bid to host the ILC. URA has already asked for and received public input into the criteria that will be used for siting the ILC. FRA’s communications will stress a public participation model and will regularly seek advice from independent consultants who have an outstanding record of promoting successful community involvement.

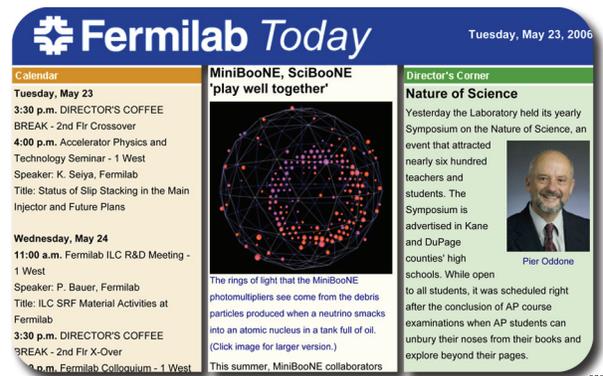


Figure 4.b-6. Fermilab Today. With weekly features, including the Director’s Corner, the Safety Tip of the Week, the scientific Result of the Week, announcements, feature stories, profiles, milestones, and links to news stories, Fermilab Today is read daily by 68% of the lab’s employees and three times a week by 85%, according to an all-employee survey conducted in early 2006. Although Fermilab Today’s primary audience is FNAL employees, anyone may subscribe.



Lederman Science Center



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High School Science Program at the Barn



Physics Demonstrations at the Lederman Center

Science Education and FNAL. FRA will expand the science education program, one of the Laboratory's most effective and popular community-outreach offerings.

Communication with Students, Teachers, and Members of the Public. FRA will provide students, teachers, and others interested in science with a glimpse of LHC research. Visitors to FNAL will be able to see a remote control room from which FNAL scientists and users monitor collider operations at the LHC in Geneva, Switzerland.

Along with offering summer undergraduate internships, FRA will continue the URA policy of providing graduate research appointments and an annual award for the most outstanding thesis on research conducted at FNAL or in collaboration with FNAL scientists. We will continue to sponsor other successful URA programs, including the US Particle Accelerator School, headquartered at FNAL. This school provides undergraduate and graduate-level courses in accelerator physics and associated beam technology at leading universities across the US. We will also continue support of the Fermilab Education Office (**Figure 4.a–14 in Section 4.a**), which manages 40

programs and hosts an award-winning website that provides information on educational opportunities and instructional materials for science teachers and students at all levels. From 2000–2005, over 30,000 teachers and 132,000 students visited FNAL or attended FNAL programs in their respective schools. Programs at the Lederman Science Center, part of the Fermilab Education Office, annually involve 200–250 volunteer members of FNAL's technical staff and 50 educators as instructor staff.

Communication with the International Physics Community, Policy Makers, and Opinion Leaders. FRA will provide policy makers, opinion leaders, and the international physics community with first-class information, both in design and in content. We will submit peer-reviewed papers and reports for publication in scientific journals and present them at conferences to communicate scientific



Reclamation and Environmental Restoration Activities. ⁰²⁸ In January 2005, FNAL management reopened much of the laboratory to public access. The FNAL Arts and Lecture series, the monthly Ask-a-Scientist programs, the annual Family Open House, the Lederman Science Center, and access to the prairie trails and the FNAL buffalo herd all function as important outreach tools to various segments of the community. An average of 40,000 visitors come to FNAL every year to participate in these activities.

information and discoveries. We will contribute to widely recognized print materials such as the DOE and NSF report, *Discovering the Quantum Universe*, and the FNAL and SLAC publication, *symmetry* magazine. FRA will produce innovative brochures, web pages, and other materials that support the laboratory's mission, provide interpretation of results and discoveries for lay-persons, highlight FNAL's role in LHC experiments, and position the lab as a possible ILC site.

4.b.2.2 Communication Between FRA and DOE

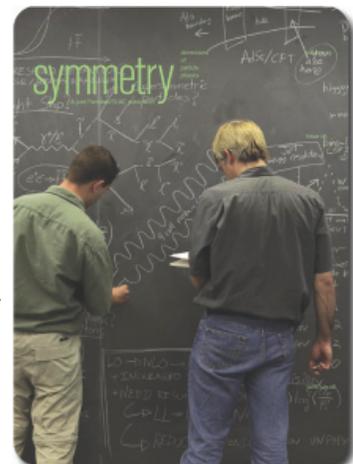
Effective communication and collaboration will be the foundation for a strong partnership between FRA and DOE. We will work closely with DOE's Office of Science, Chicago Office, and Fermi Site Office to develop per-

formance metrics and achieve DOE/Office of Science and FNAL goals. In accordance with the PEMP, we will maintain well-defined communication channels, convey information effectively, and promptly deliver important or critical information on both positive and negative events. In addition, we will respond promptly to DOE requests for information from laboratory representatives, and we will strive to provide answers that are thorough, correct, and succinct. FRA will use the Dashboard and the MIS described earlier as a primary means for communicating information and data to DOE. Our integrated MIS will make it possible for DOE to have near-real time access to information needed from FNAL, thus improving coordination and effective decision making at all levels. We will always initiate a communication with DOE on emerging issues so that there are no surprises.

In addition to communicating with DOE through personal contact, regular mail, normal email, telephone communications, and the Dashboard, we will use other tools such as *Fermilab Today* and *symmetry* magazine. FRA will also provide DOE with both formal and informal means to effectively communicate with the lab's employees, users, and contractors, as well as with policy makers and the international physics community on a wide range of important topics including safety, budgets, and ILC R&D.

FNAL will work with the Office of Science HEP Program Office and Press Office while plan-

symmetry magazine, published with the support of the Office of High Energy Physics, is an innovative DOE Laboratory publication that creates a partnership between FNAL and SLAC. This strategically based magazine supports Office of Science initiatives in HEP.



ning our communication efforts. FRA will collaborate with Office of Science staff to plan and execute LHC and ILC communication strategies. We will develop communication plans in coordination with the international particle physics community, represented by the InterAction collaboration. Usage of our collaboration website has increased dramatically over the past year as shown below. FRA and FNAL will serve as the bridge between the Office of Science and the InterAction collaboration.



High Energy Physics Advisory Panel (HEPAP) Committees. FRA will support DOE on committees established to address potential issues or to announce the latest findings and discoveries. For example, URA recently worked closely with two HEPAP subpanels to publish and distribute the reports *Quantum Universe* and *Discovering the Quantum Universe*.

Task Force Participation. FRA will support DOE participation in important community outreach programs. For example, representatives of the DOE Fermi Site Office recently served on the Fermilab community task force on public participation, as well as the water quality task force, which was created in response to tritium found in surface water at FNAL.

Publications. FRA will provide DOE officials with opportunities to share their views with the FNAL community and the public. In the past, FNAL has used its publications to report and disseminate remarks by the Secretary of Energy, the Director of the Office of Science, and

the Fermi Site Manager. The FNAL Office of Public Affairs and the DOE Office of Science have also cooperated on posters and exhibit displays for conferences such as the annual American Association for the Advancement of Science conferences.

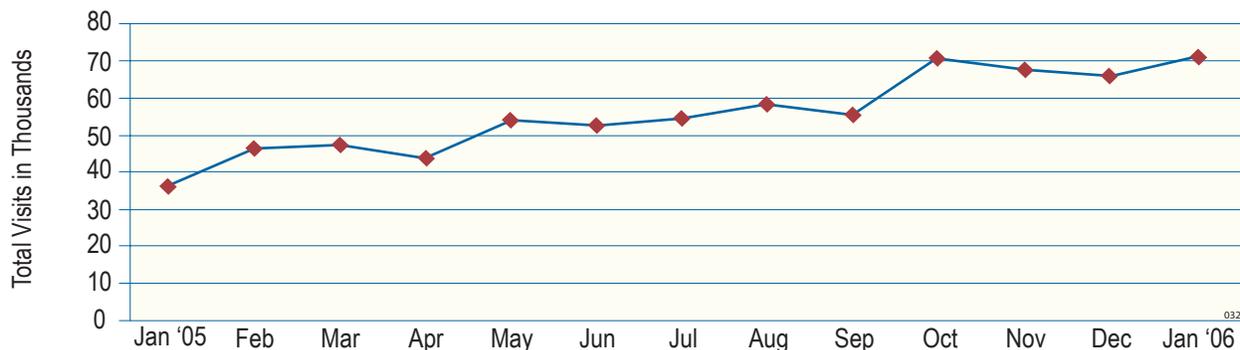
Also important are the informal daily communications and interactions between FNAL and DOE, particularly the Office of Science. Maintaining and strengthening the practice of informal, almost-daily communication is perhaps the most significant element in providing a culture of partnership and open communication between FNAL and DOE on all issues related to laboratory stewardship.

4.b.3 Strategy and Approach for Project Management and Infrastructure Management

(L.4.b.3, M.4.b)

4.b.3.1 Approach to Managing the Design and Construction of R&D and Associated Facilities on Schedule and within Budget

Director Oddone will use the Office of Project Management Oversight (OPMO) to maintain a project management system that ensures on-time and on-budget project performance and effective and efficient stewardship of resources and capabilities through expert planning, delivery, and risk management. The OPMO structure and reporting level has been specifically designed to dovetail with the Office of Science. Dr. Ed Temple, who is recognized by DOE and the national laboratory community as an expert in project management involving large, complex, scientific facilities and equip-



Website Visits per Month, 2005–2006. Usage of the InterAction Collaboration Website has nearly doubled in the last year.

ment, will head the OPMO and will report directly to Director Oddone. This project oversight capability will result in tangible, quantifiable performance improvements that will yield the greatest output per taxpayer dollar.

OPMO will provide expert project management guidance to laboratory management and staff for FNAL projects, programs, and activities. OPMO will also provide project management training for project managers and other key personnel, including training on software and other tools used to plan, schedule, manage, and report progress. The OPMO website will supplement this instruction by making the same instructional information immediately available to all FNAL employees. It will also provide templates to produce plans and documentation that are in compliance with DOE O 413.3, which will save time and resources. The website will contain a database of all past and current projects, making it a source of examples of past successful programs that can be emulated. Samples of program plans will include a typical project for line-item construction (NuMI); a typical project to develop equipment (Run IIb detector upgrades, and LHC CMS); and a typical “campaign,” such as the Run II luminosity upgrade. A “campaign” is a program where project management principles are applied to activities when DOE O 413.3 is not applicable, but the principles are useful nonetheless. Throughout a given project’s life, OPMO will provide continuous assistance to the project manager and his staff. OPMO will also provide senior laboratory leaders with independent assessments of a project’s progress.

OPMO will be a valuable resource for providing assistance to managers and staff in all aspects of DOE O 413.3 requirements. OPMO independent project assessments will help identify and correct problems as early as possible. OPMO findings and recommendations will be tracked to closure, and project progress and status will be available to DOE via the Dashboard.

Figure 4.b–7 shows FRA project management system elements. Our system is fully scalable and can be adapted to any size project. FRA

will use all project management system elements for projects in excess of \$20M and will tailor the system’s use on smaller projects. We show project phases and DOE critical decisions (CDs) on the left side of the figure, while the right side contains the FRA project management system key elements.

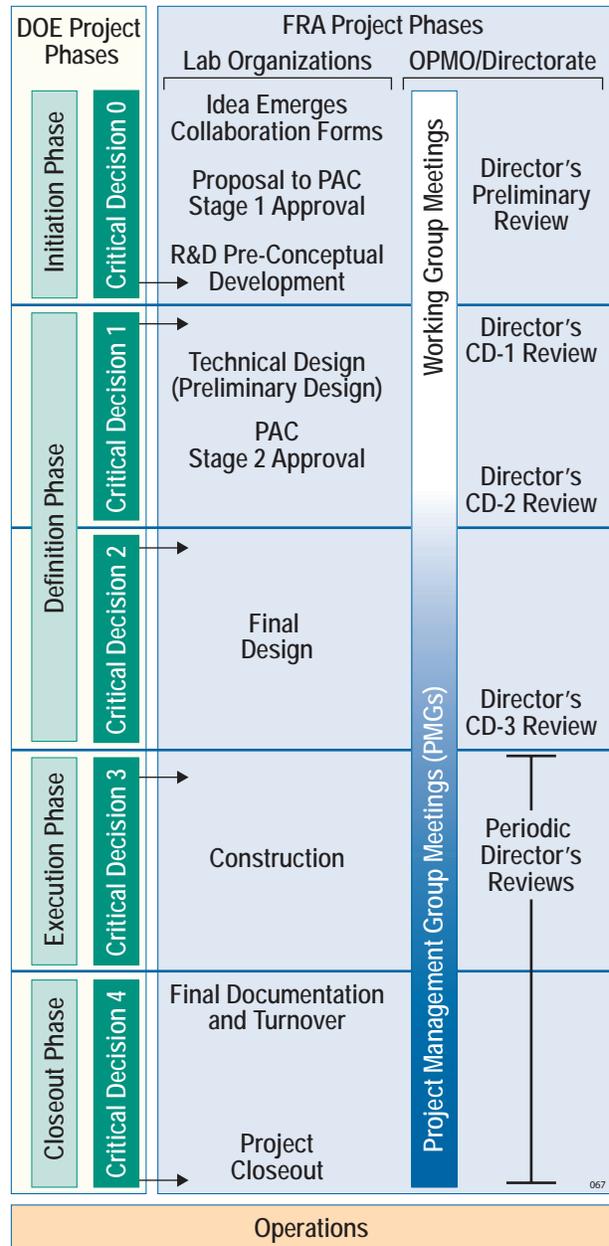


Figure 4.b–7. FRA Project Management System. Our systematic approach to project management controls scope, schedule, and cost in accordance with DOE’s project management systems and DOE Order 413.3.

The following case study illustrates the four phases of our project management approach and indicates how FNAL's project management and oversight support DOE's critical-decision projects:

Initiation Phase. This phase begins when collaborators propose a new detector, after the idea has emerged and has been discussed in the laboratory and research communities. The FNAL Physics Advisory Committee (PAC) reviews the proposal for scientific merit and provides recommendations to the Director. Based on PAC recommendations, the Director may grant stage 1 approval authorizing R&D and pre-conceptual development. Upon this approval, the Director works with the DOE Office of High Energy Physics to seek milestone CD-0—mission need approval, and FNAL assigns a project manager and support structure to the project. OPMO and the project manager begin working group meetings to ensure open communications during subsequent project phases. These meetings include project management personnel, an FNAL director who will oversee the project, the DOE Federal Project Director, OPMO, and other support personnel. DOE CD-0 authorizes the start of conceptual design, culminating in a conceptual design report.

Definition Phase. When the conceptual design report is approved and the project moves from conceptual to final design, the definition phase begins. As necessary, value engineering is used to deliver the most efficient project within cost constraints. This phase includes approval of milestones CD-1—preliminary baseline range and CD-2—performance

baseline. DOE CD-1 authorizes preliminary design and leads to development of a technical design report (TDR) and stage 2 approval from the director. The TDR, a detailed cost estimate, a resource-loaded schedule, and various other project management documents form the basis for CD-2 approval from DOE. DOE CD-2 authorizes final design. At this point, a project can request milestone CD-3—start of construction approval. During this phase, working group meetings are transitioned to project management group meetings chaired by an FNAL director. This group will oversee project status and progress, identify issues, assist in identifying resources to implement resolutions, receive project reports, and serve as a high-level change control board.

Execution and Closeout Phases. The execution phase begins with DOE CD-3, which authorizes construction start. The final phase, or closeout phase, comprises DOE CD-4—start operations approval and project closeout. At this time, a set of reports is developed for 1) operational readiness review and acceptance, 2) project transition to operations, 3) final safety analysis, and 4) project closeout. **Figure 4.b–8** provides a summary of the reviews used to oversee this process.

4.b.3.2 Performance Measurement System

FRA will expand the use of URA's current earned value management system (EVMS) and use it to monitor and manage projects with a total project cost of \$20 million or more, or with a lower value if deemed appropriate by line management. Our EVMS is compliant with DOE O 413.3 and the 32 criteria of

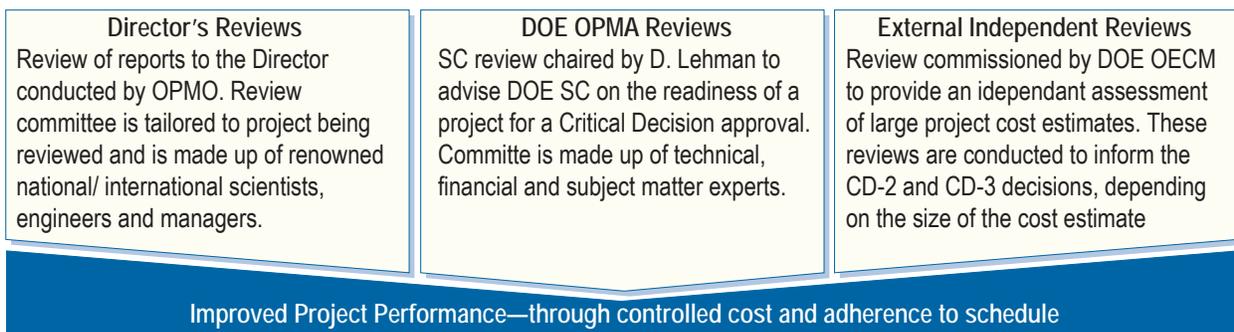


Figure 4.b–8. Project Performance Reviews. FRA and DOE will review cost and schedule performance on a regular basis to ensure compliance with DOE Order 413.3 and to increase project efficiency.



Figure 4.b-9. Process to Develop a Project's Performance Measurement System. FRA's systems will ensure alignment with DOE's project control and reporting requirements.

ANSI/EIA Standard 748, *Earned Value Management Systems*. The system will use data from the Oracle project accounting software suite, which is the core laboratory-wide accounting system that tracks the baseline data necessary for project planning, scheduling, cost management, earned value, risk management, and collaboration.

Our performance measurement system will ensure disciplined and integrated planning of project cost, schedule and scope; responsible management of assets; communication and tracking of performance status; and accurate prediction and timely reporting of cost and schedule results to support management reporting, decision-making, and monitoring of corrective actions throughout a project's life cycle. Our system will generate data in near-real time, allowing the project manager to check program status daily. These data will also be available to DOE via the Dashboard in near-real time. The data will be one of the inputs for determining the basis for assessments made by OPMO and OQBP, and will be

useful as the LCC works to identify best practices for adoption at FNAL and ANL.

Figure 4.b-9 shows the basic steps for applying our performance measurement system. Figure 4.b-10 shows how the system operates on a monthly cycle during the execution phase.

4.b.3.3 How Total Life-Cycle Costs will be Incorporated into Project Planning and Budgeting

FRA will integrate total-life-cycle-cost (TLCC) analysis into our planning and budgeting process to minimize project life-cycle costs and

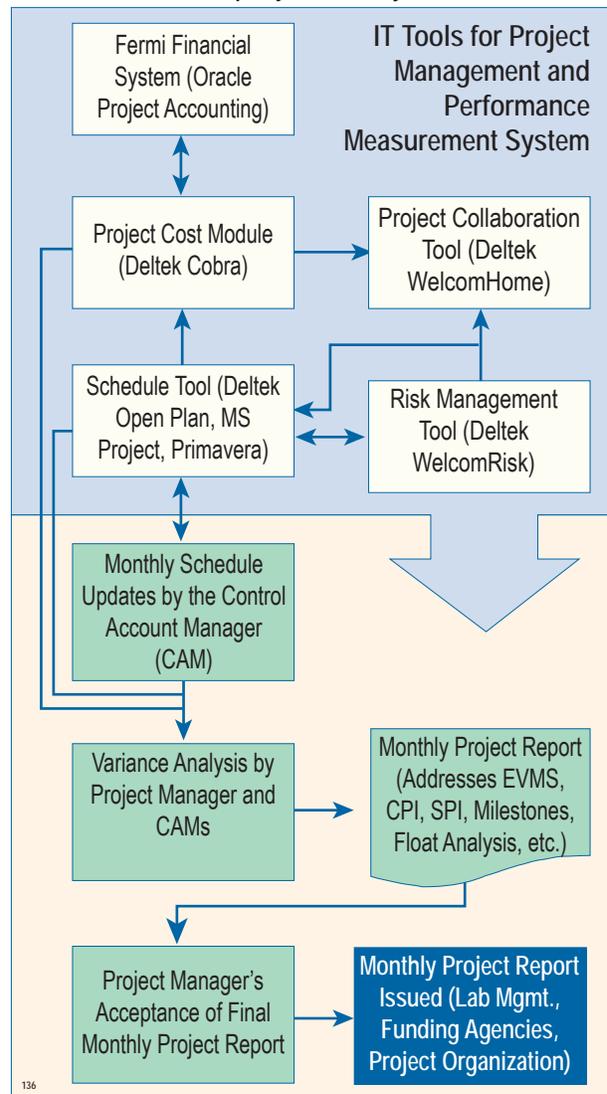


Figure 4.b-10. Execution of Performance Measurement System. FRA's systems provide timely financial and performance data to assist in day-to-day project management activities.

maximize FNAL science program value. The inclusion of the end user, with the requisite approval authority, will be an integral part of the TLCC analysis process to ensure that long-term operation and maintenance considerations are considered.

The best opportunity to reduce construction, operation, and maintenance costs occurs in a project's planning and engineering stages. For this reason, we will consider TLCC analysis, including R&D, design, construction, operations, maintenance, and disposal from the beginning of project conceptualization. TLCC analysis will become more important during the initiation phase when concept implementation alternatives are being developed and the preferred alternatives are chosen. We will emphasize TLCC analysis in the design phase during the value engineering activities while considering system reliability, robustness, planned preventative maintenance, design life, and environmentally responsible design including Leadership in Energy and Environmental Design (LEED) features. We will use TLCC analysis while developing all project cost estimates and budgets.

4.b.3.4 Approach to Laboratory Infrastructure Management

To further improve FNAL's infrastructure management, Director Oddone recently appointed

Randy Ortgiesen as the FNAL facility manager and head of the Facilities Engineering Services Section (FESS). Under Mr. Ortgiesen, FRA will improve facility management by ensuring that FESS includes an infrastructure condition assessment coordinator, real property management specialist, utility coordinator, project engineers, and a dedicated maintenance engineering staff. This combination of personnel will facilitate laboratory-wide focus on utility systems and building support systems, such as direct digital control systems and overhead cranes. FESS will also employ mechanical, electrical, and control engineers, as well as fire protection technicians. **Figure 4.b–11** highlights the benefits of our infrastructure management approach.

OQBP will engage our designated subcontractor, EG&G/URS, to work directly with Mr. Ortgiesen and his staff to review maintenance operations and work control processes, and to provide recommendations for improvement. EG&G/URS will perform an initial review concurrent with transition activities at no cost to DOE. EG&G/URS will suggest a path for FNAL to implement an industry best practice that has evolved in this arena—the adoption of a reliability-centered maintenance program with an accompanying wireless (paperless) network to interface with the existing computerized maintenance management systems. Implementation of this program at EG&G/

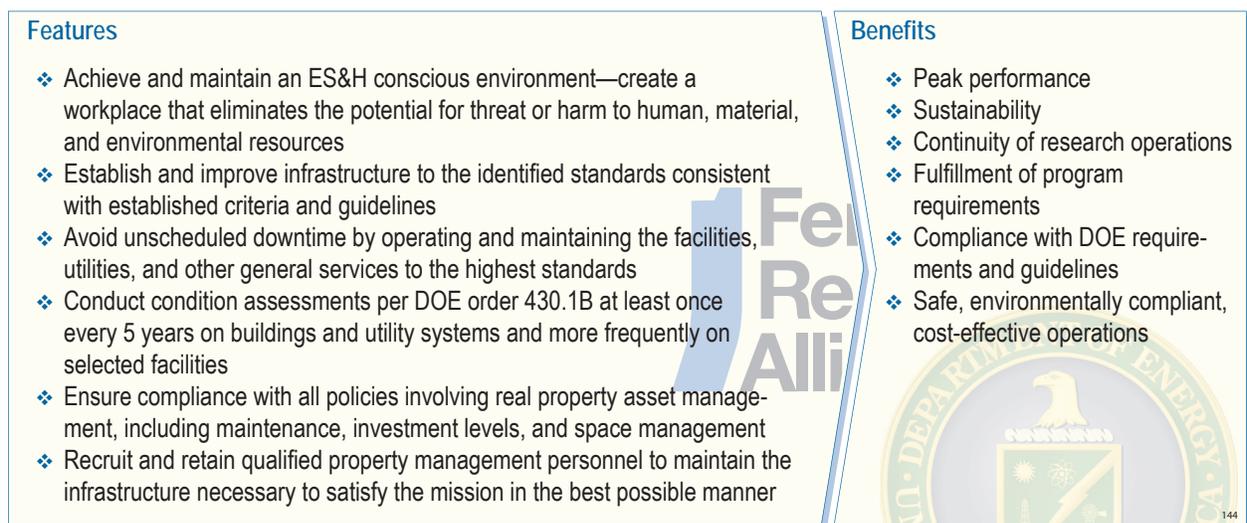


Figure 4.b–11. Infrastructure Management Benefits. A strong infrastructure management approach ensures facilities are available for science on the demanding 24/7 schedule maintained at FNAL.

URS-operated facilities, such as NASA's Marshall Space Flight Center, netted a cost reduction in required replacement parts and eliminated 95,000 paper-based work orders per year.

A division or section head, or the directorate will serve as the "landlord" of each FNAL facility. In keeping with this principle, FESS will serve as the landlord for site-wide utility systems, common areas, and conventional systems within facilities, providing centralized maintenance of the laboratory's basic electrical and mechanical equipment. FESS will also provide professional planning, engineering, acquisition, construction management, operations, and other real property support functions. OQBP and EG&G/URS will help to ensure that commercial best practices are employed. FESS and the landlords will ensure that facility needs are clearly communicated and addressed. Our approach will anticipate facilities and infrastructure needed to support future laboratory programs. The FNAL Ten-Year Site Plan will reflect inputs from FESS and the division heads responsible for facilities supporting the laboratory's research programs.

We will comply with the Real Property Assets Management System (RPAM) DOE Order to acquire, manage, maintain, and dispose of real property and facilities from construction through eventual demolition. We will implement a performance-based approach to life-cycle asset management that links real property asset planning, programming, budgeting, and evaluation to program mission projections and performance outcomes. The RPAM process is designed to enable us to manage facilities as an integrated process from acquisition through operations to disposition. FRA will apply a graded approach to RPAM, incorporating best practices in all of our activities.

We will establish a formal space-utilization and facility-reuse program to ensure that current and future space requests are satisfied in an efficient, cost-effective manner. We will use an annual utilization assessment to determine the need for facility infrastructure increases or reductions to fulfill a landlord's mission. We will initiate or complete disposition actions, under the Office of Science's excess facilities disposition program, for any assets that are not in sufficient demand. The annual budget pro-



***FESS Staff—Diverse Responsibilities.** Roads and grounds maintenance is provided by an in-house organization that provides far more than the typical mowing and snow removal services. FESS maintains a site with 6,800 acres, 353 buildings, 36 miles of paved roads, 9 miles of bike paths, 108 miles of electrical lines, 133 miles of communication cable, and 96 miles of underground piping. Added to this, FESS carries out an Ecological Land Management Plan that documents and helps guide all site non-technical land use. FNAL is renowned for the 1,500-acre*



restoration of high-quality native Midwestern prairie and woodland, which was established and maintained by this organization under URA management. FESS manages the bison herd; the 2,000-acre agricultural license program; over 500 acres of wetlands, ponds, and surface water ditches and structures; and 2,000 acres of non-native grasslands.

cess, in which each landlord presents needs to the directorate under a peer review format, will help to identify the most effective use of available resources. We will document these needs in the FNAL Ten-Year Site Plan, which we will annually submit to DOE. Additionally, Deputy Director Kim has commissioned an office-space utilization task force to examine co-locating laboratory components to facilitate synergy and enhance scientific productivity.

Infrastructure Maintenance. Facility and equipment breakdowns in aging facilities are inevitable; however, FRA has a plan to respond quickly to restore operations. The main focus of FESS will be to implement processes to increase reliability and plant availability and to reduce unplanned outages, maintenance backlog, and the overall cost of infrastructure management. FRA will base its best-value staffing mix on a combination of in-house and contractor maintenance personnel. A complement of in-house general electricians and mechanics, familiar with the 350-building campus, will respond to immediate needs. Sub-contractors with a permanent, onsite presence will perform some tasks, such as excavating and repairing buried utility pipes.

To help us meet our aggressive small-business utilization targets, we will subcontract much of the major repair, alteration, improvement, and equipment replacement work to qualified local small business subcontractors. This approach also delivers cost-efficiency gains. FESS will provide site-wide, contracted janitorial services through a performance-based, small business set-aside subcontract. To assist in obtaining best value, we will use a source selection solicitation process with technical proposals weighted equally with price. We will base incentive payments on overall program effectiveness, measured by weighted data representing customer satisfaction determined through surveys, actual performance determined by quarterly third-party audits and inspection results, and management responsiveness. URA has used this approach successfully, with benchmarking studies indicating that high-quality service is consistently delivered at or near the lowest unit cost.

We will identify major construction for new experiments or significant refurbishment above and beyond normal maintenance as far in advance as possible. We will conduct facility planning, forecasting, and acquisition that translates business needs into an integrated facility site plan. In addition, we will ensure that stakeholders in all appropriate facility planning aspects review documentation in a timely manner.

Facility Sustainment. FRA will use URA's existing Whitestone Maintenance and Repair System (MARS) to manage the facility sustainment process (**Figure 4.b-12**). This database uses a complete inventory of building components to create a reference zero-based sustainment budget for each facility, plan equipment replacement based on a life-cycle analysis, and identify and track backlogged or deferred maintenance. This system currently

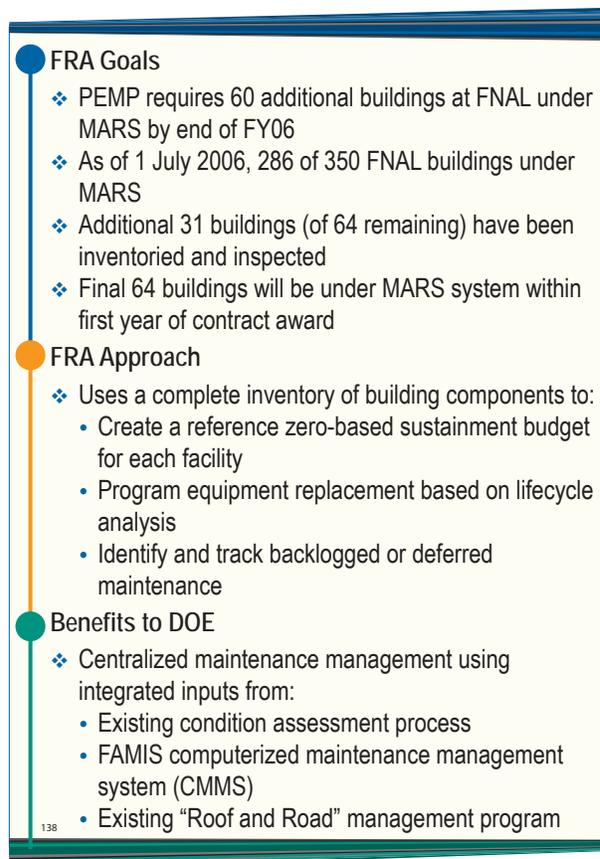


Figure 4.b-12. Infrastructure Management. FRA's comprehensive laboratory-wide use of CMMS and MARS will enable us to provide a realistic baseline for funding and meet DOE's expectations.

documents over 90 percent of FNAL facilities, including all buildings for which we intend to use MARS. This powerful tool centralizes maintenance management using inputs from the current condition assessment process, the mechanical and electrical equipment tracking in the computerized maintenance management system, and the current roof and road management programs. With annually updated wages and equipment costs, the zero-based budget analysis provides a realistic baseline for evaluating aggregate maintenance funding. It aids in the pursuit of best value without compromising reliability.

4.b.4 Improving FNAL’s ES&H, Security, and Quality Culture (L.4.b.4, M.4.b)

Five of Director Oddone’s 11 management initiatives will enhance FNAL’s excellent ES&H, security, and quality programs, further underscoring our commitment to these core values. By proposing to establish the OQBP, as well as developing initiatives in the areas of strategic planning, the Dashboard, self assessment, and ES&H certification, Director Oddone and FRA commit to safeguarding and securing DOE assets while promoting the health and safety of the public, the environment, and the laboratory staff. Our laboratory-wide safety plan, revised annually, will be an effective tool in promoting the ES&H culture throughout all levels of the FNAL hierarchy. FRA will conduct assessments using independent auditors, and most importantly, will use results from

self assessments performed by line managers, OQBP, third-party evaluators, and peer reviewers commissioned by FRA to improve in all three areas. The LCC will also identify best practices of ES&H, security, and quality to be applied at FNAL.

4.b.4.1 Maintaining Core Competencies

FRA will use URA’s proven Integrated Safety Management (ISM) and Integrated Safeguards and Security Management (ISSM) approaches, programs, systems, procedures, and tools to achieve the FNAL science mission in a safe, secure, environmentally-responsible manner. FRA will employ work smart standards developed through the “necessary and sufficient” process. ES&H is at the center of our ISM approach, as shown below.

4.b.4.1.1 ES&H

Director Oddone will oversee a disciplined approach that holds laboratory personnel accountable for ensuring safety, security, and quality in all work at every level. We will base our approach on the core value that all injuries and accidents are preventable. Our ES&H approach will cover classical occupational health and safety hazards, including industrial safety, industrial hygiene, fire protection, construction safety, and emergency management. It will also encompass hazards unique to FNAL, such as radiation protection, oxygen deficiency, and flammable gas hazards. Our





Safety Award, March 2006. Pier Oddone and Bill Griffing accept a National Safety Council award from DOE Fermi Site Office Manager Joanna Livengood.

ES&H training program will ensure that employees, users, and subcontractors are certified and well prepared to work at FNAL. This program will also establish clearly defined processes for self-evaluation and subcontractor oversight. **Figure 4.b–13** shows the benefits of our ES&H program and **Figure 4.b–14** summarizes our ES&H core competencies.

During a recent visit, Secretary Bodman commended FNAL for meeting its 2005 DART (Days Away Restricted or Transferred) and TRC (Total Recordable Cases) target rates, saying, “It’s a terrific accomplishment.” The National Safety Council awarded URA the Green Cross for Safety Excellence Achievement Award for maintaining injury rates at less than 50 percent of the average for R&D labs during each of the past three years. It

also awarded FNAL a Certificate of Merit for outstanding safety practices during installation activities on the NuMI neutrino project. This included the underground installation of 700 6-ton shield blocks, 14 magnets (4–6 tons each), and 282 3-ton steel plates without a single lost-time injury.

A recent FNAL ES&H environmental achievement in effluent/compliance monitoring and waste management and pollution prevention/waste minimization resulted in the DOE Office of Science awarding URA its 2006 Best-in-Class Pollution Prevention Award. This placed FNAL in the running for a White House Closing the Circle Award, which recognizes federal facilities that have made significant contributions to improving the environment.

FRA will continue to use URA’s current environmental management system (EMS) which was self-certified to DOE O 450.1 in late 2005. This order provides details on how to implement EO 13148 and allows contractors to self-certify their EMS programs. Although DOE O 450.1 was not in the FNAL contract, URA elected to use this order as guidance to implement the FNAL EMS and perform self-certification activities. DOE then used independent reviewers to audit the proposed FNAL EMS and validated URA’s self-certification.

FRA will enhance URA’s comprehensive ES&H program, which is also compliant with FNAL’s work smart standards, contractual obligations, and operating permits issued by

Features	Benefits
<ul style="list-style-type: none"> ❖ Use of URA processes and procedures proven at FNAL ❖ Rigorous, up-to-date ISM system ❖ Comprehensive environmental management system 	<ul style="list-style-type: none"> ❖ Maintains FNAL’s world-class performance even as site operational requirements change: Tevatron closure, LHC support, ILC support ramp-up, other new missions ❖ Protects workers, the public, and environment ❖ Involves workers in training, including project critiques and lessons learned ❖ Tailors requirements for each job ❖ Standardizes work instructions ❖ Flows down requirements to subcontractors

Figure 4.b–13. Features and Benefits of the FRA ES&H Program. Director Oddone considers ES&H management a priority and will support it by ensuring appropriate levels of ES&H staffing and competence at every level within FNAL. For this reason, the Office of Quality and Best Practices will also focus substantial time and resources in oversight of ES&H processes, recognizing the crucial linkage between Safety and Quality Assurance in achieving maximum performance from our personnel.

Radiation Protection	Task Hazard Analysis/Develop Hazard Controls/Work Control Documents	Perform Work Within Controls	Feedback/Continuous Improvement	<ul style="list-style-type: none"> ❖ Task Hazard Analysis ❖ Radcon Manual ❖ Radiation Work Permit ❖ Radiation Worker Training ❖ GERT Training ❖ Frisker Surveys ❖ ALARA Analysis ❖ Beam Loss Monitors 	<ul style="list-style-type: none"> ❖ In Process Air and Radiation Monitoring ❖ Radcon Oversight ❖ Pocket Dosimetry 	<ul style="list-style-type: none"> ❖ Dosimetry Reports ❖ DOELAP Program ❖ Program Assessments ❖ Rad Protection Subcommittee ❖ Panel Peer Review ❖ Contain/Dispose Surveys ❖ Lessons Learned
Environmental Management				<ul style="list-style-type: none"> ❖ Task Hazard Analysis ❖ Air/Water Permits and Quality Management ❖ Waste/Hazmat Mgmt. ❖ Recycling Program ❖ Storm Water Mgmt. ❖ Spill Response 	<ul style="list-style-type: none"> ❖ Environmental Monitoring ❖ Workplace Inspections ❖ Construction Inspections 	<ul style="list-style-type: none"> ❖ Permit Compliance ❖ Data Analysis ❖ Program Assessments ❖ Regulator Inspection ❖ Environmental Protection Subcommittee ❖ Lessons Learned
Occupational Medicine				<ul style="list-style-type: none"> ❖ Task Hazard Analysis ❖ Medical Monitoring ❖ Ergonomics ❖ Wellness Programs ❖ Medical Response Training 	<ul style="list-style-type: none"> ❖ Medical Surveillance Program ❖ Ergonomic Surveys 	<ul style="list-style-type: none"> ❖ Case Analysis ❖ Program Assessments ❖ Post Drill Critique ❖ Lessons Learned
Industrial Safety				<ul style="list-style-type: none"> ❖ Task Hazard Analysis ❖ Safety Assessment Document ❖ Topical Safety Training ❖ Job Specific Training ❖ Contractor Work Packages ❖ Preconstruction Document Reviews 	<ul style="list-style-type: none"> ❖ Workplace Monitoring ❖ Workplace Inspection ❖ Construction Inspections 	<ul style="list-style-type: none"> ❖ Post Task Review Assessments ❖ Contractor Performance Assessments ❖ Lessons Learned
Industrial Hygiene				<ul style="list-style-type: none"> ❖ Task Hazard Analysis ❖ PPE Training ❖ Spill Response ❖ O2 Deficiency Hazard Program ❖ Beryllium Program ❖ Hearing Protection Program 	<ul style="list-style-type: none"> ❖ Workplace Exposure Monitoring ❖ Contamination Surveys 	<ul style="list-style-type: none"> ❖ Data Analysis Assessments ❖ Internal Assessment Recommendations ❖ Lessons Learned
Laser Safety				<ul style="list-style-type: none"> ❖ Task Hazard Analysis ❖ Laser Procurement Controls ❖ Laser Safety Officer (LSO) ❖ Training of Supervisors and Operators 	<ul style="list-style-type: none"> ❖ LSO Inspections ❖ Supervisory Inspections ❖ Engineering Controls ❖ Detailed Procedures 	<ul style="list-style-type: none"> ❖ LSO Assessments ❖ Laser Safety Committee ❖ Lessons Learned

Figure 4.b-14. Core Competencies. FRA has the core skills and demonstrated competence to accomplish the Fermilab Mission.

regulating bodies such as the Environmental Protection Agency (EPA), the Illinois EPA, and the Illinois Department of Natural Resources. Our chronic beryllium disease prevention program meets all DOE and government requirements. FRA will base improvements in the environmental protection program on recommendations from a gap analysis conducted in preparation to seek ISO 14001 environmental management system certification. We will continue URA’s policy of also ensuring that ISM and ISSM processes are followed at remote locations such as the Sloan Digital Sky Survey site in New Mexico and the Pierre Auger Observatory in Argentina.

Laboratory training staff will continue to enhance the web-based system to identify training activities including training needs, course attendance, and performance. This will ensure that a culture of continuous education and safety awareness is in place. Training will be customized for defined program and employee levels and will include instructor-led, vendor-provided, computer-based, and self-study courses.

Occupational Medicine and Radiation Protection. Figure 4.b-15 highlights the features and benefits of FRA’s occupational medicine program. FRA will continue a radiation safety program that ensures appropriate controls

Features

- ❖ Onsite medical clinic that includes a physician and professional nursing staff trained and certified in occupational medicine
- ❖ Occupational surveillance programs that ensure employees do not suffer effects from long-term exposures to hazards
- ❖ Medical staff that works with the line management and the ES&H professional staff to conduct intensive injury case management
- ❖ Policies that comply with all applicable Workers' Compensation requirements

Benefits

- ❖ Promotes the physical and mental well-being of workers while maintaining medical information in a confidential, ethical, and legal manner
- ❖ Emphasizes injury prevention, injury case management, and health promotion
- ❖ Complies with 10 CFR 851
- ❖ Links to other ES&H functions that assess emerging hazards in a risk-based manner
- ❖ Supports worker health studies
- ❖ Develops performance metrics against DOE and industry occupational standards

Figure 4.b-15. Occupational Medicine and Radiation Protection Program. Employees at FNAL will enjoy a safe, well-maintained work environment with a medical staff to oversee their well being.

are in place everywhere we conduct high-energy accelerator research. The laboratory will adhere to the policy of maintaining radiation exposures As Low As Reasonably Achievable (ALARA), and has successfully demonstrated a decline in employee and visitor radiation exposure over the last 30 years. FRA will continue URA's excellent record of accounting for all nuclear material exceeding the quantity threshold limits established in 10 CFR 835 Appendix E. FRA will conduct monthly radiation safety subcommittee meetings that are open to all interested persons.

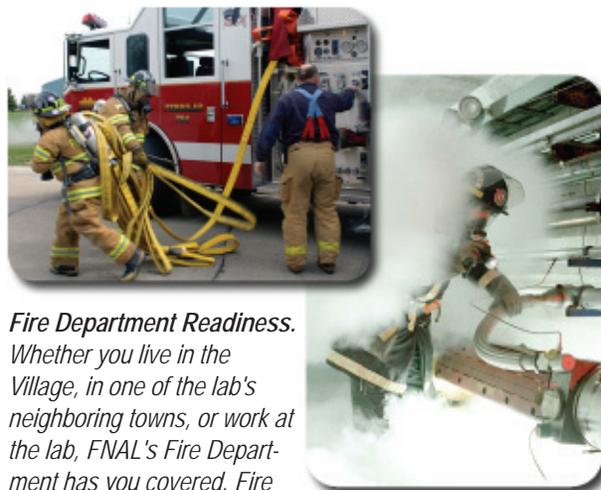
Industrial Safety and Hygiene. FRA's industrial safety program will address the hazards associated with the FNAL work environment, including material handling, electricity, oxygen deficiency, ergonomics, pressurized vessels and systems, chemicals, biological hazards, and beryllium hazards. **Figure 4.b-16** presents features and benefits of our overall approach to industrial hygiene.

Fire Protection. FRA will provide a highly protected risk level of fire protection. We will maintain our own onsite firefighting and emergency response capability, and we will make our firefighting resources available to neighboring communities, such as Batavia and Warrenville, through the mutual-aid box assistance system, just as their resources will be available to us.

Construction Safety. OPMO processes and systems will ensure integration of ES&H

requirements into all construction projects. ES&H professionals will participate in construction projects from their inception, ensuring that environmental and safety issues are addressed at every stage of the project life cycle. FRA will assign ES&H staff to support project managers to address issues, concerns, and requirements such as 10 CFR 851, Worker Safety and Health Program. OPMO will assist the ES&H staff in integrating ES&H requirements into all program documentation.

ES&H and ISM performance requirements will flow down to laboratory subcontractors. All construction work will require a hazard analysis that must be approved by the FNAL task manager before work begins. A similar requirement will exist for service subcontractors.



Fire Department Readiness. Whether you live in the Village, in one of the lab's neighboring towns, or work at the lab, FNAL's Fire Department has you covered. Fire fighters train to respond to emergency situations for the community at large and those specific to the operation of accelerators and complex experimental equipment.

Features	Benefits
<ul style="list-style-type: none"> ❖ Program developed and maintained by Certified Industrial Hygienists (CIH) ❖ Exposure-assessment processes for hazard identification and controls ❖ Robust monitoring program ❖ Documentation systems that support auditing and response to worker compensation claims of exposure ❖ Traditional IH programs, such as hearing conservation and hazard communication have web-based components ❖ All industrial hygiene sampling records located in a central database ❖ All industrial hygiene records meet OSHA requirements for documentation quality 	<ul style="list-style-type: none"> ❖ Manages the wide range of chemical, biological, and physical hazards to workers, auditors and site visitors to mitigate, or eliminate altogether, threats to human health ❖ Works openly and cooperatively with employees and management to integrate design, construction, and operations activities to eliminate adverse exposures—or manage them to acceptably low levels ❖ Implements a hierarchy of controls to eliminate hazardous agents or substitute less hazardous agents for work execution ❖ Accesses tools necessary to implement the programs, making implementation of requirements more efficient ❖ Collects and records data uniformly throughout the laboratory, which is readily available to the occupational medicine staff for incorporation into the medical surveillance program

Figure 4.b–16. **Industrial Hygiene.** UChicago and URA both have strong experience in developing and managing occupational health programs.

tors. Laboratory worker safety orientation will be mandatory for all subcontractor employees working at FNAL. FRA employees involved in construction management activities will receive appropriate ES&H training, ensuring that knowledgeable and well-trained employees assume responsibility for construction activities at the laboratory.

Environmental Compliance and Stewardship. FRA will implement a comprehensive environmental management system. We will conduct surveillance and monitoring tasks to confirm compliance with standards and permit limits, as well as to ensure early detection of problems. We will base the location and frequency of sampling on established routines, operational considerations, and historic pollution monitoring data. We will select sampling points based on the potential for adverse impacts.

Waste Minimization and Pollution Prevention. FRA will oversee a waste minimization and pollution prevention program that reflects DOE, national, and local goals and policies. We will manage solid waste responsibly, in compliance with applicable regulations, to protect human health and the environment. We will conduct comprehensive metal and paper recycling programs, and will work to identify opportunities for recycling other materials.

Waste Management. FRA’s program to manage chemical and radioactive wastes will comply with applicable regulations for human health and the environment. As a byproduct of operating its high energy physics research program, FNAL generates low-level radioactive and mixed wastes. URA currently exercises excellent waste management practices at FNAL. URA has never received a notice of violation for its waste management activities, and we will continue to execute existing policies. For example, we will limit the amount of material entering beamline enclosures or radiological areas, including quantities of hazardous materials, such as paints, solvents, chemicals, cleaners, and fuels. We will dispose of all non-required radioactive materials in compliance with DOE and regulatory requirements.

Emergency Management. FRA will integrate emergency planning and coordination with emergency responders. The onsite FNAL fire department will employ the widely accepted Incident Command System, which can be integrated with the National Incident Management System as needed. The FNAL Security Department will coordinate emergency support activities with the FNAL Fire Department’s incident commander. FRA will build upon the success of URA in emergency management by conducting regular exercises and increasing the percentage of drill and exercise critiques completed.



***Prairie Restorations.** For more than 30 years, FNAL has earned international recognition for world-class research in high-energy physics. At the same time, URA has also taken special care as a good steward of the land and guardian of the environment for the safety and enjoyment of our employees, visitors, and the public. In a time of rapid suburban development, the 6,800 acres of land at FNAL have become an increasingly valuable environmental community asset for environmental research, recreation, and the enjoyment of nature. FRA will continue this policy of stewardship of the environment.*

ES&H Self-Assessments, Innovations, and Initiatives. As part of our comprehensive approach to safety, we plan to use ES&H performance indicators to drive improvements. Leading indicators will help Director Oddone identify ES&H trends that may need senior management attention. Leading indicator examples include completion of the individual training needs assessment, required ES&H training completion, and conduct of senior management walk-throughs. Lagging indicators, such as injury statistics, will serve as a “report card” on FNAL’s ES&H program status. The indicators will be derived from near-real time data, and the Dashboard will make them available for senior management and DOE review at any time.

FNAL’s ES&H performance measurement will reflect FRA’s tiered approach to assessment and remediation, which will include an annual laboratory self assessment, independent ES&H office and safety committee oversight, and directorate-level management reviews. At the working level, supervisors will discuss incident reports to identify applicable lessons learned to be incorporated into work processes during daily toolbox meetings. External regulatory oversight is performed by the Department of Transportation, EPA, Illinois EPA, Illinois Department of Public Health, US Army

Corps of Engineers, Illinois Fire Marshall, and Kane and DuPage County agencies. We will incorporate results from these assessments and reviews by revising our systems, processes, and procedures. **Figure 4.b–17** summarizes FRA’s approach to performing ES&H assessments.

4.b.4.1.2 Quality Assurance (QA)

To create a culture of continuous improvement and assist in the implementation of Director Oddone’s 11 initiatives, OQBP will develop and oversee the implementation of a robust QA program based on DOE O 414.1C. OQBP will also identify and facilitate the implementation of best practices from commercial businesses as well as those at other DOE laboratories. OQBP will manage our designated subcontractor, EG&G/URS, assigning EG&G/URS personnel to operational areas to identify, assess, and aid in the implementation of selected improvements. Initial areas of focus for EG&G/URS will include maintenance activities and work flow issues. Over time, this process will review all laboratory functions in a prioritized fashion. Our expectation is to analyze two to three functions per year. Topics include procurement, travel administration, cost reporting, budget control, construction management, the compensation system, and ES&H activities.



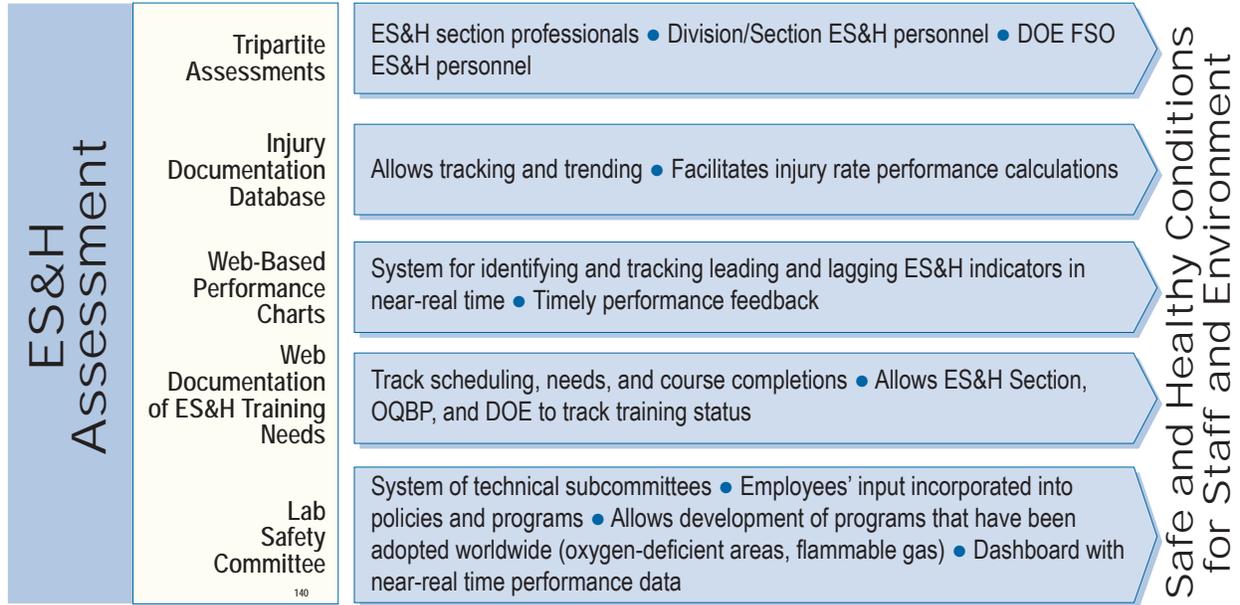


Figure 4.b-17. ES&H. FRA's ES&H system of assessments provides a safe, healthy work environment for all FRA employees.

Our chief operating officer (COO) will chair the Director's Advisory Council on Integrated Assurance and OQBP will provide support. This council will provide advice to Director Oddone on the full range of assurance topics including DOE O 226.1 and DEAR 970.5203-1. **Figure 4.b-18** illustrates the flow of FNAL QA roles and responsibilities from Director Oddone to OQBP and other laboratory entities to implement DOE O 414.1C. Solid arrows depict these responsibilities. The figure depicts line responsibility, which begins with the Director and flows down to every individual, to implement QA during every aspect of their performance. Dashed arrows in the figure indicate oversight roles. For example, OQBP has oversight responsibility over the entire laboratory to ensure that quality processes and procedures are in place.

The figure also depicts our emphasis on assurance. The Advisory Council for Integrated Assurance will advise Director Oddone on the status of all programs that require submission of assurance reporting to DOE independent of the reports being provided by OQBP. Independent third parties will conduct OQBP oversight to validate processes and recommend improvements. Below, as well as in **Section 4.b.7**, we

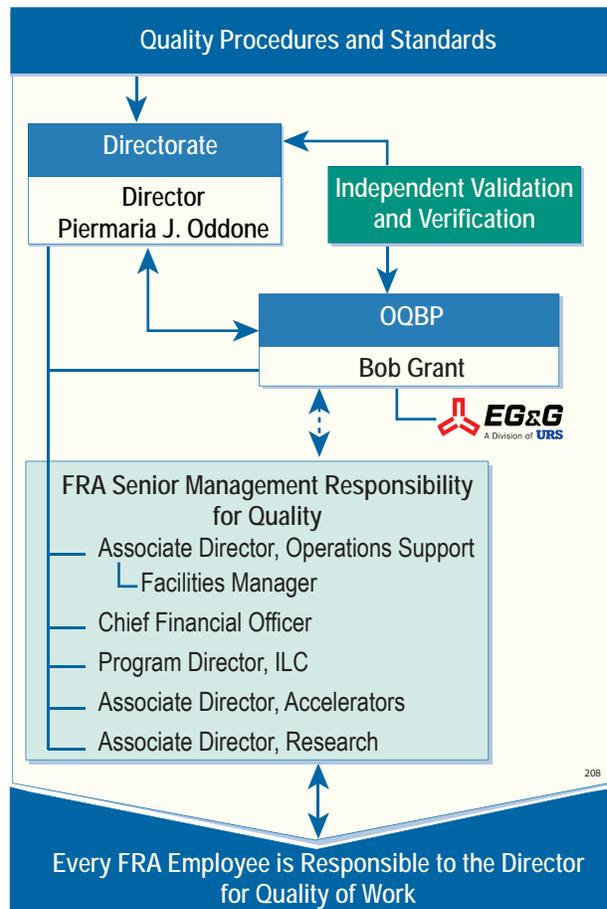


Figure 4.b-18. Flow of Quality Responsibility. FRA ensures that each manager and employee is responsible to the Director for the quality of their work.

further discuss our assurance, self assessment, and third-party validation programs.

Figure 4.b–19 summarizes the features and benefits of FRA’s approach to improving FNAL’s quality culture.

Self-Assessment Program. FRA will enhance FNAL’s self assessment program as a primary means of ensuring continuous improvement. Formal self assessments will include Director reviews, division assessments, and tripartite assessments. Each division and section will implement a self-assessment program. FRA will include the following actions in the self-assessment activities:

- Division or section heads will continuously self-assess performance against the contract performance measures and PEMP requirements for which the division or section is responsible. They will work with senior management to implement a program to achieve laboratory goals.
- Division and section personnel will conduct inspections, assessments, and tripartite assessments.
- Division or section heads will ensure that programs have been implemented by conducting activities such as management walkthroughs, internal team assessments, review of appropriate documentation, or regular meetings with staff and workers.

All areas for which the division or section heads have responsibility will require documented inspections. FRA will tailor the inspection frequency to the risk level. We will inspect office areas at least biannually and industrial and other technical areas at least quarterly.

Inspection and assessment requirements will flow down in contract documents to subcontractors using a graded approach. Construction subcontractors will document all worksite and equipment inspections.

Director Oddone will conduct annual meetings with direct reports to discuss the self-assessment process reports and identify areas that show the most need for improvement. These areas will be identified for specific initiatives and assigned to OQBP for study and analysis. OQBP, supported by designated subcontractor EG&G/URS, will survey both Government organizations and the private sector to identify current best practices and make recommendations to Director Oddone, who will then decide whether recommended changes should be implemented.

Continuous Improvement Process. **Figure 4.b–20** illustrates how OQBP will initiate and coordinate continuous improvement initiatives. Numerous sources, including employee ideas, the self-assessment program, the LCC, OQBP, and EG&G/URS will generate potential opportunities for improvement (**Figure 4.b–21**).

Features	Benefits
<ul style="list-style-type: none"> ❖ Self-assessment/Continuous Improvement ❖ Performance Evaluation Management Plan ❖ Negotiate Performance Metrics <ul style="list-style-type: none"> – Mid-year review – Year-end report – Administrative Peer Review/Annual ❖ QA DOE O 414.1C—Program Development and Implementation ❖ Assurance DOE O 226.1—Program Development and Implementation ❖ Support to Council on Integrated Assurance ❖ Strategic Planning Support ❖ Best Practices/EG&G/URS management ❖ Best Practices Implementation ❖ Tracking of Suspect/Counterfeit Items ❖ Centralized Tracking System 	<ul style="list-style-type: none"> ❖ Environmental, safety and health risks and impacts associated with work processes are minimized while maximizing reliability and performance of work products ❖ Quality is assured and maintained through a single, integrated, effective QA Program ❖ Management supports the planning, organization, resources, direction, and control essential to an effective QA Program ❖ Thorough assessment and corrective action ensure performance and quality improvement ❖ Workers take responsibility for achieving and improving quality

Figure 4.b–19. Quality Assurance Program. FRA’s QA Program will provide confidence to the Laboratory Director and DOE that the laboratory is meeting or exceeding the Department’s expectations on quality assurance as expressed in DOE Order 414.1C.

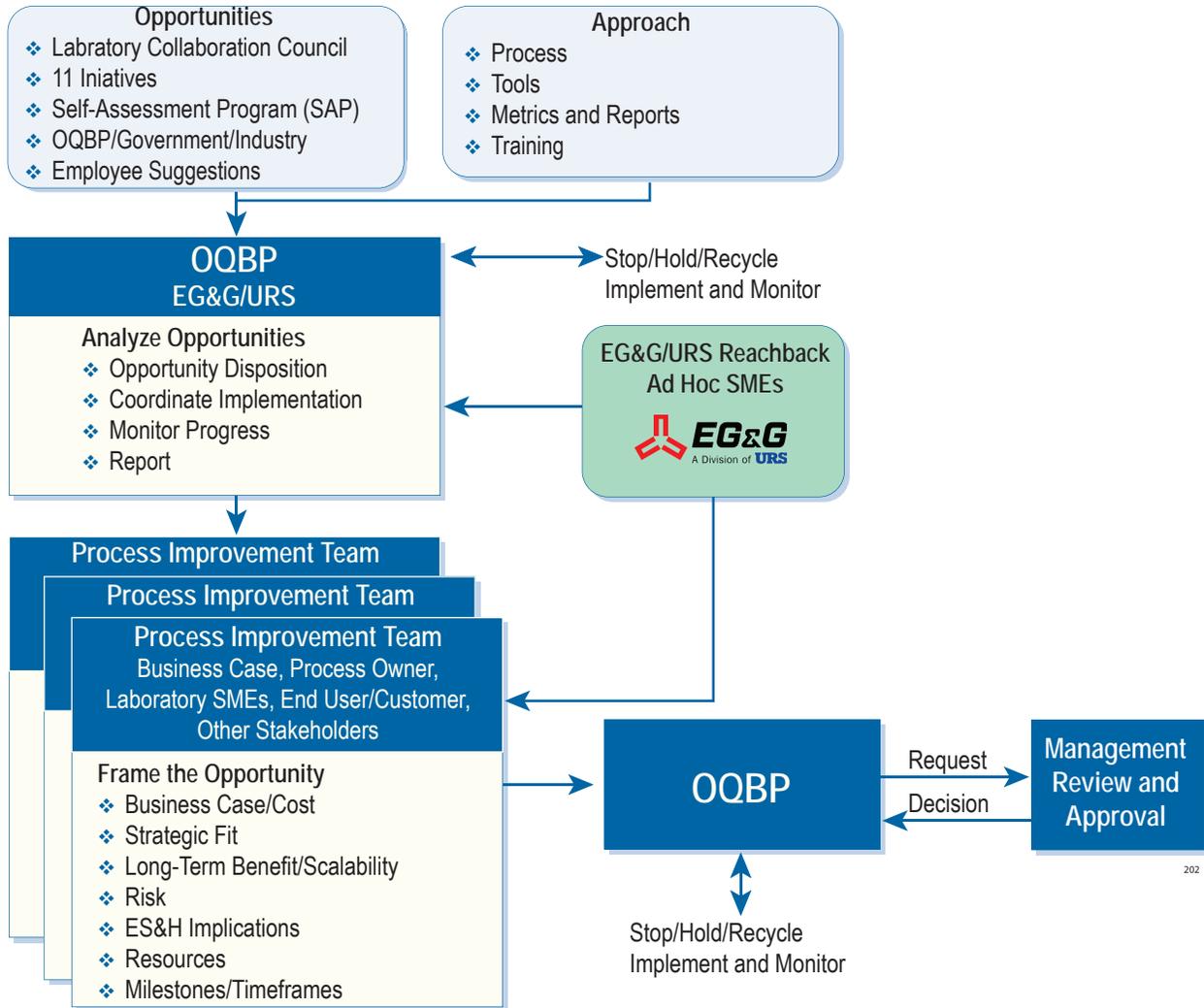


Figure 4.b–20. Approach to Continuous Improvement. OQBP will coordinate a portfolio of continuous improvement initiatives, providing faster, more agile improvement with quick ramp-up and ramp-down of resources.

The OQBP approach will use a standard process and tool set, and will identify metrics and reports to provide greater transparency and insight into FNAL-wide improvement initiatives. EG&G/URS tools will include operational aids such as teaming tools, decision support tools, stakeholder analysis tools, and traditional process improvement tools. In addition, EG&G/URS will provide just-in-time training to ensure processes, tools, and metrics are well understood and properly applied. Standard processes and tools will make it faster and easier to implement improvements and build a culture of continuous improvement at FNAL.

OQBP will analyze potential opportunities for improvement and propose implementation strategies. Some strategies may be as-

signed to the originating organization/process owner for direct implementation. Others may be stopped, held for future action, or recycled. More complex and resource-intensive strategies may be referred to a process improvement team that will provide a more in-depth analysis of the opportunity and recommend a specific path forward, always involving the primary stakeholders and affected groups within FNAL. OQBP will coordinate, monitor, and report on all continuous improvement opportunities.

The process improvement team will involve stakeholders, including the process owner, laboratory SMEs, end users, and customers. Process improvement teams will have access to expert EG&G/URS resources on an ad hoc basis. These resources will include profes-

sionals with expertise in facility management and design, value engineering, construction management, energy management, ES&H, quality assurance, and operations and maintenance. FRA will have quick, efficient access to EG&G/URS SMEs world-wide. As a result, FNAL will enjoy the benefits of industrial best practices and lessons learned in a wide array of engineering, technical, and operational disciplines, without committing expensive full-time resources.

FRA will build upon the quality processes already in place at FNAL that have allowed the laboratory to be recognized as a sustaining member of the American Society for Quality since 1986.

4.b.4.1.3 Security

Physical and Personnel Security. FRA will maintain a site security plan based on government-identified threats to FNAL research, facilities, and personnel. FRA will maintain and augment, as necessary, all physical security measures recommended by DOE for its non-nuclear facilities, including safeguards, to ensure that only individuals with proper credentials are allowed access. We will employ security professionals who monitor and analyze laboratory activities, advise senior management, and administer the program. We will also hold line managers responsible for the security of their respective operations, real property, personnel, and equipment.

Employees will maintain awareness of any designated property protection area (PPA) as well as their security responsibilities related to PPA access and the wearing of badges. Security will conduct regular PPA walk-throughs to ensure that all access card readers are working properly. We will conduct audits to ensure employees and users are meeting the FNAL requirement to wear their badges 100% of the time inside the PPAs. We will integrate our physical and personnel security procedures with our HR system. For example, an employee termination in our HR system will automatically trigger revocation of access privileges.

EG&G/URS Support to OQBP

FRA has selected EG&G/URS, a \$3.9B services provider, as the designated subcontractor to support OQBP following a competitive evaluation process. This decision was based on 59 years of EG&G/URS experience in the Government M&O market including DOE, familiarity with DOE processes, and experience (through URS) as the Re-engineering and Best Practices contractor with the Chicago Transit authority (CTA). As a result of EG&G/URS efforts, CTA achieved an 80% improvement in schedule performance and over \$20M in savings during the Blue Line renovation, and improved relations with the Federal Transit Administration.



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Figure 4.b-21. EG&G/URS Support. EG&G/URS will support OQBP to bring commercial best practices to FNAL.

Since FNAL is an open-science site with no classified work performed onsite, the annual employee briefing requirement will be met with a memorandum to all employees. The FRA COO, in coordination with the DOE Chicago Office's Counterintelligence Office (DOE-CI), will prepare this memorandum annually. This memo will cover the elements of the approved FNAL CI program, which will be updated based on site-specific threat analyses performed by DOE-CI.

Cyber Security. FRA will implement the recently revised and completed FNAL Computer Security Program Plan that has been reviewed with high commendations and validated by the Office of Science. This plan complies with the Office of Science Program Plan and all applicable DOE and Federal requirements. The plan will follow National Institute of Standards and Technology (NIST) risk-based methodologies. Plan execution will involve people at all organizational levels in an integrated, cybersecurity management approach. FNAL will use appropriate, in-depth system and data protection, including host-based protections and firewalls.

FRA will employ a core team of full-time cybersecurity professionals who will oversee the laboratory's processes, and technical controls, training and awareness, and internal review and audit programs. The LCC will ensure

that the excellent cyber-security programs at FNAL and ANL are well coordinated and take advantage of lessons learned. The Computing Division Head will serve as FNAL's Chief Information Officer and Cyber-Security Chief Executive for Policy. All users and system administrators will be trained and required to protect their systems and data, perform risk analyses, and report suspicious events. Line management will be fully responsible for the compliance and efficacy of the cyber-security program in their areas. Each major work area—division, section, or experiment—will appoint a general computer security coordinator who will act as a conduit between the cyber-security core team, computer users in their areas, and line management. The FNAL computer incident response team will investigate, control, and mitigate any computer security incidents. Our computer security program plan will describe their roles and responsibilities.

A key element of our computer-security program will be to conduct a formal threat and risk analysis. We will accomplish this in accordance with NIST guidance. We will promptly report any cyber-security compromises or suspected compromises that meet DOE or FNAL thresholds for significance to the FNAL computer incident response team.

FRA will expect all employees, users, and managers to follow cyber-security program guidelines. We will expect them to act in a responsible manner to ensure their systems are up-to-date, properly patched, and in compliance with the published baseline to include antivirus software protection. Our core cyber-security team will use extensive scanning and technical control programs to detect and isolate networks or individual workstations that do not comply with these requirements.

FRA will provide cyber-security training at two levels: one for system administrators, and the second for normal users. We will train administrators on a bi-annual basis and all normal users at least once every two years. The Computing Division will provide this training either online or in a classroom. FNAL will hold a

cyber-security awareness day each year, and we will regularly publish cyber-security tips in *Fermilab Today*.

While FNAL does not perform classified work or handle sensitive information, the Office of Research and Technology Assessment will screen publications for sensitive technology transfer information. We will manage export-controlled items, including non-IT items, as a special category of sensitive property in our Sunflower property management database.

4.b.4.2 Mechanisms to Ensure Appropriate Prioritization, Funding, and Resources

Senior laboratory management will determine the appropriate funding level for ES&H, QA, and security functions by combining historical data with recommendations from laboratory organization heads. Major new ES&H, QA, or security initiatives will be presented to and approved by the Directorate. Because security is direct-funded, DOE approval will be sought for proposed security initiatives. **Figure 4.b-22** summarizes the budget and work authorization process for the work performed each year.

During the budget planning and allocation phase of each new fiscal year, FRA will emphasize that labor and non-labor resources must be properly allocated to achieve lab-wide and organizational performance goals. To ensure this has been accomplished, the head of each major organization will assess labor and non-labor resources, and provide assurances to Director Oddone of adequacy at the annual budget review. FRA will make ES&H mitigations a top priority in the budget process. Division and section heads will budget and control their costs. FRA will hold each line organization accountable for establishing budgets for all ES&H needs within their organizations. If the sum of costs for all mitigation activities affects an organization's mission, the responsible line manager will report to the Directorate so that additional funds can be allocated or work can be reprioritized, ensuring that ES&H program requirements are not compromised.

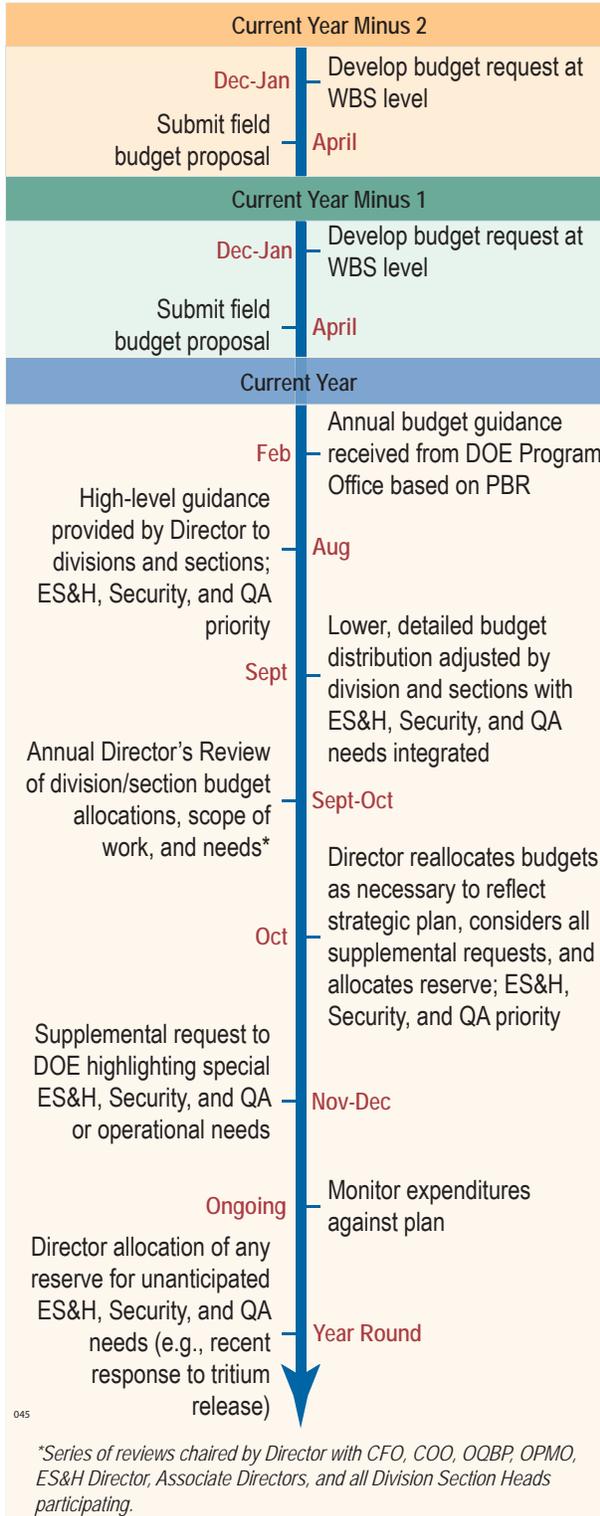


Figure 4.b-22. FRA's Integrated Budget and Work Authorization Process. The budgeting for ES&H, security, and QA activities is an integrated function with the line and ES&H, Security, and QA oversight organizations participating in parallel.

4.b.4.3 Methodology to Improve FNAL's ES&H Performance Statistics

As discussed in **Section 2.b.5.2**, URA has established an excellent FNAL safety record. FRA is committed to maintaining and improving upon this level of performance. With visible and committed leadership from Director Oddone, FRA is determined to build upon the successes of the past, fully in keeping with the FNAL slogan, "*First in Science and Safety.*" To achieve the Office of Science's injury reduction goals for FY07 and beyond, FRA will place greater emphasis on supervisory/leadership training to impart the skills that influence employees' safety behavior. We will implement a performance evaluation process that rewards positive ES&H behavior and holds employees accountable for negative behavior. We will devote continuing efforts to raising employee awareness of injury experience and disseminating lessons learned. FRA will make greater use of the human performance improvement tool in our accident and injury investigations by incorporating instructional material in new supervisor training. Finally, FRA will increase emphasis on self-assessment of ES&H activities to continuously improve ES&H performance.

4.b.5 Proposed National, International, or Industry Consensus Standards to Replace Department-Specific Directives (L.4.b.5, M.4.b)

By identifying and implementing new standards to enhance FNAL operations and business management, FRA will increase efficiency and productivity. We will then develop and apply performance measures based on the new standards when approved by DOE. OQBP will oversee this program and will rely on EG&G/URS expertise for benchmarking. OQBP will also seek lessons learned from other national laboratories and will receive recommendations from the LCC, since any lessons learned from ANL will be particularly valuable.

FRA will use the "necessary and sufficient" process for determining the work smart set of standards (WSS) to ensure the efficient, safe, and environmentally responsible operation of

the laboratory (**Figure 4.b–23**). This is a process that URA has successfully used at FNAL over the last ten years. Nevertheless, OQBP will assess this process as part of its program to review all FNAL procedures and recommend modifications if warranted.

We will review the WSS on an annual basis, and revise them as needed. We will transmit any recommended WSS changes to DOE. Once the standards have been accepted by DOE, we will work with DOE to incorporate them into FRA's contract. Additionally, we will evaluate new standards promulgated by DOE or national standards-making bodies and incorporate them into the WSS as appropriate. We propose adding ISO14001 and OHSAS 18001 to our list of WSS after we achieve certification.

4.b.6 National/International Standards

(L.4.b.6, M.4.b)

As discussed in **Section 3**, our science strategy for FNAL includes securing the laboratory's position as the global hub of particle physics by hosting the ILC. To strengthen the US bid for the ILC, an internationally recognized and respected ES&H program will be required. Certification under the international standards OHSAS 18001 (Safety & Health) and ISO 14001 (Environmental) will be particularly important. If our recommendations are approved by DOE, we will obtain certification under these standards within 18 months of contract start. In preparing to site the ILC in Illinois, we will investigate certification under ANSI Z1.13, as well as the applicable European and Asian standards pertaining to research facilities.



4.b.6.1 Achieving Certifications

We will use project management principles during certification implementation. Certification inputs will come from three sources: output from the external standards replacement strategy (as discussed in **Section 4.b.5**); external customers who require specific standards; and organizational units within FNAL seeking the advantage or benefit of a certification.



Figure 4.b–23. FNAL Process for Evaluating DOE Directives for Replacement. FRA annually reviews the list of WSS to determine if it is the best set of standards for FNAL.

FRA will complete the work begun in Autumn 2005 when URA began a gap analysis for possible implementation of OHSAS 18001. As of our proposal's submission, the analysis' status is as follows:

- The laboratory's current program requires slight modifications in the documentation of the self-assessment program, the methodology for making numeric risk assignments, and how risks are mitigated in work planning packages. FRA will complete action plans to address these modifications after contract start.
- We will conclude discussions with Brookhaven National Laboratory on both 14001 and 18001 to take advantage of their recent certification experience, especially recognition of the importance of documentation during audits. This recommendation reflects conclusions made during the preliminary gap analysis.
- We will select a vendor to assist us with ISO 14001 certification/registration upon contract start, and will obtain that certification within nine months.
- We will use the lessons learned from ISO 14001 certification and apply them to OHSAS 18001 certification, which we expect to complete during FY2008.
- We will increase the formality of our internal assessment processes. This will

- ◆ ensure that our systems are of sufficient rigor to identify hazards, concerns, and issues, and that any issues receive the appropriate priority and management attention or are addressed/mitigated at earlier stages and lower levels before they become issues, and
 - ◆ give stakeholders confidence that our programs are sufficiently robust to ensure compliance, identify deficiencies, and eliminate them.
- We will train and employ a lead auditor, an important consideration for ISO systems, since it will ensure that our personnel have the qualifications and knowledge to conduct audits with sufficient rigor and independence.

FNAL's current environmental management system is based on ISO 14001 requirements. Based on a DOE assessment in 2005, DOE considers FNAL ISO 14001 compliant. Since this standard is internationally recognized, achieving full ISO 14001 certification would give more credibility to our bid to bring the ILC to FNAL. FRA will therefore employ an accredited third-party contractor to review and register us.

4.b.6.2 Span of Certifications

As a single-purpose laboratory, we believe it most appropriate for us to seek laboratory-wide certification under OHSAS 18001 and ISO 14001.

4.b.6.3 Schedule for Achieving Certifications

We expect laboratory-wide certification under ISO 14001 within nine months of contract start and certification under OHSAS 18001 within 18 months of contract start.

4.b.7 Use of Independent Third-Party Validation *(L.4.b.7, M.4.b)*

FRA's approach to management will rely on external reviews and validations. Beginning with oversight from the FRA Board, we will conduct independent assessments across the organization, ensuring quality in all aspects of laboratory activities. We will use outside reviewers to

conduct specific reviews in areas such as administration, electrical and subcontractor safety, emergency planning, and environmental sampling. OQBP will ensure that this process becomes pervasive throughout the laboratory by assisting the line organizations in implementing recommendations for improvement once external assessments are completed and changes are approved by Director Oddone. We will schedule between six and eight assessments of major laboratory operational areas over any given 24-month period.

FRA will employ independent third-party reviewers to aid in verification and validation of FNAL processes whenever appropriate. In all cases, we will seek out qualified small disadvantaged businesses to accomplish this work. We will place particular emphasis on verifying the quality assurance program to ensure laboratory-wide implementation of DOE O 414.1C. These companies will also assist and support the work of the Integrated Assurance Council to validate all processes and functions are operating in accordance with contract requirements.

4.b.8 Small and Small-Disadvantaged Businesses Involvement *(L.4.b.8, M.4.b)*

FRA team members have long recognized the value that small business (SB) suppliers provide in terms of innovation, commitment, and responsiveness. In **Section 2.b.1.2**, we provide data that demonstrate our successful performance in meeting or exceeding our SB goals. FRA will build on this record by actively seeking opportunities to award subcontracts to qualified SBs and involve them in DOE's mentor-protégé program.

FRA will focus efforts to increase the extent, variety, and complexity of SB participation in meaningful work. We will evaluate every procurement opportunity for potential SB participation. Whenever SBs are qualified, competitive, and available, we will require their inclusion in the procurement process. Our procurement office will identify local and regional businesses with special technical expertise that can provide ongoing support to FNAL technical operations, as well as others that

can provide independent verification and validation of FRA processes. We will promote SB utilization with outreach efforts at trade shows, workshops, business panels, and training programs. Once an SB vendor is engaged in a contract, we will provide assistance as needed to help the SB succeed and grow into a vendor that can provide additional, more complex, and more meaningful work.

We will design DOE mentor-protégé programs that encourage development of mutually beneficial relationships between prime contractors and SB subcontractors. FRA is committed to continuing URA's excellent record in mentoring SBs that can provide meaningful contributions to FNAL's mission. Below, we provide three current examples of URA's efforts to mentor and develop SBs.

Able Electropolishing. Currently, the best process for producing high-gradient, superconducting radio-frequency (SCRF) cavities involves polishing niobium surfaces using electropolishing (EP). In the US, national laboratories and universities have successfully electropolished SCRF cavities, but US industry, unlike European and Japanese companies, has not developed this capability. FNAL initiated contact with Able Electropolishing, an SB located in Chicago, Illinois, to evaluate their current capabilities. Initial results indicate their existing processes are insufficient. FNAL is now considering a mentoring process to upgrade Able's niobium EP process. This capability in the Chicago area will be very important if the ILC is ultimately sited at FNAL.

Niowave, Inc. FNAL has had long-term relationships with university staff members. Some of these individuals now form the core of Niowave, Inc., a start-up SB high-technology company in Lansing, Michigan. Niowave's business plan is to develop and commercialize superconducting particle accelerators, particularly those employing SCRF technology. FNAL will mentor this company to further develop their capabilities in preparation for possible siting of the ILC at FNAL.

Meyer Tool and Manufacturing. Meyer Tool and Manufacturing is a small, woman-owned business in Oak Lawn, Illinois. Founded in 1969, Meyer has had a long-standing working relationship with FNAL that has allowed Meyer to compete and perform work for nearly every US national laboratory. As an example, when LBNL sought assistance in identifying a qualified contractor to produce cryogenic distribution boxes for the LHC, FNAL recommended Meyer, thereby providing further development of Meyer's capabilities and assistance to LBNL in expanding its SB utilization.

FNAL's R&D programs rely heavily on commercial businesses to provide component fabrication. Using SBs to conduct research is cost effective and makes the best use of laboratory resources. FRA is committed to continue FNAL's support of SBs through consulting contracts, small business innovation research initiatives, or component purchase agreements.

FRA anticipates that FNAL awards to small, small-disadvantaged, woman-owned, service-disabled-veteran-owned, and HUBZone SBs will exceed \$44M annually. To meet this expectation, FRA will submit an SB subcontracting plan to DOE for acceptance annually. The plan will provide details on contract opportunities that can be made available to SBs and on the outreach efforts that are used to promote SB involvement. We will document the implementing policies and procedures in the FNAL procurement policy and procedures manual. We will reserve procurement actions priced at \$100K or less for SBs when there is a reasonable expectation that two or more SBs can offer cost-effective, high-quality, and prompt-delivery goods and services.

4.b.9 Facilitating the Movement of S&T Advances to the Private Sector (L.4.b.9, M.4.b)

Technology transfer and development resources and activities will be required to foster the robust infrastructure needed to build the ILC. Activities will include identifying and evaluating frontier technologies, promoting scientist-to-scientist collaborations, fostering inter-labo-

ratory research and development, and catalyzing corporate collaborations, start-ups, and joint ventures. Expertise from UChicago Argonne, LLC and ANL will provide FRA with the technology transfer resources needed to create a robust program designed to support the ILC. We will use traditional market-based processes to disseminate new technologies. We will collaborate with the private sector to create industrial resources based on the innovative, frontier technologies required to support ILC construction in the US. Our ultimate goal is to create an accelerator technology center-of-excellence in Illinois that will attract the ILC to FNAL.

We will create an R&D and Technology Transfer Working Group under the LCC during the first six months of the new contract. ANL's Office of Technology Transfer (OTT) will apply its resources through the LCC to identify and encourage collaborations with industry in ILC development, focusing on ILC-development cost drivers, with particular emphasis on computation, detectors, SCRF technologies, and materials development for ILC components.

FRA will negotiate an MOU between FRA and UChicago Argonne, LLC to set the framework for royalty sharing, giving all parties aligned interests and incentives in analyzing and promoting FNAL technologies. FRA will also hire a liaison as a "joint appointment," who will reside at ANL and report to the OTT Director, providing both laboratories with expertise in relevant areas of accelerator science through exposure to the commercial use of those technologies.

FRA will adopt ANL's disciplined, five-step process for technology transfer for implementation at FNAL. ANL will also support FNAL in areas where ANL offers expertise, such as chemistry, computation, materials science, metallurgy, and nanotechnology; and in areas such as prototyping, testing, and scale-up manufacturing. The process includes:

➤ **Opportunity Identification**—OTT will host seminars at both ANL and FNAL, with the venue rotating at each meeting, which will serve as a regular forum for technology updates and opportunities to discuss emerging

technology challenges and opportunities. These seminars will focus on ILC-related technologies but will also cover any other technologies with potential for private sector application.

- **Technology Evaluation**—OTT will apply its rigorous methodology—high-impact technology (HIT)—to evaluate emerging technologies. HIT is a fact-based, matrixed approach for selecting the best candidates for technology development. It evaluates commercial potential and overall technological impact.
- **Industry Liaison**—After completing HIT screening, OTT will test technologies with research and industry contacts. This step will be critical in building the infrastructure necessary to build the ILC. When appropriate, OTT will explore start-up companies or joint ventures.
- **Plan Development**—OTT will work with ANL and FNAL scientists and the FNAL ILC Program Office to draft a technology development plan. This plan may include cooperative research and development agreements and Work For Others projects. It will provide the customer focus that will enable inventor input and participation.
- **Relationship Management**—As the technologies and the path to ILC realization mature, OTT will manage the relationships among scientists and, when necessary, licensees and partners. This dynamic interaction will help to ensure that technology challenges do not create development bottlenecks for the ILC or related efforts.

Capitalizing on the synergies between ANL and FNAL in accelerator R&D and technology transfer will enhance the intellectual foundation for accelerator technology development as well as the involvement of industry in the Illinois region.

4.b.10 Other Statement of Work Considerations *(L.4.b, M.4.b)*

Below, we address additional RFP Section C.4 SOW elements that were not specifically addressed in RFP Section L subparagraphs L.4(b)(1) through L.4(b)(9). (The Table of Contents for this volume contains a compliance matrix of Section C.4 SOW elements to proposal sections 4.b.1-4.b.9.)

Strategic Planning [RFP C.4(c)(1)]. FRA will implement an FNAL strategic planning process that will elaborate Director Oddone's 10-year vision for FNAL and provide an execution roadmap. The new FNAL strategic plan will serve as a laboratory guide for establishing budgets and work plans, and will be timed to coincide with, and contribute to, DOE's annual planning process. It will provide the top-level guidance that will integrate FNAL's current planning processes, including the budget plan, business plan, facility and property plan, and planning processes of the Physics and Accelerator Advisory Committees. The strategic plan will also guide FRA's proposed Organization and Human Asset Plan discussed below and in **Section 4.a.1**. Ultimately, development of our strategic plan will involve DOE, the particle physics community, FNAL staff, and other customers and stakeholders to achieve FNAL's mission and vision.

Human Resources Management [RFP C.4(c)(5)(i)]. To ensure that FNAL has in place the right scientific and technical personnel at the right times to achieve its changing mission, FRA will implement a comprehensive organization and human asset plan (OHAP), which will coordinate with the FRA strategic plan. The OHAP will identify strategies and specific action plans related to organizational structure and people to enable FRA to achieve its scientific mission. FRA will conduct OHAP processes at the organizational as well as departmental level. The process will involve individual leaders, scientists, and other professionals. We discuss the OHAP along with all other human resource-related topics in detail throughout **Section 4.a**.

Legal Services [RFP C.4(c)(7)]. FRA will continue to use in-place legal personnel, including contracted legal expertise, to provide legal support for all FRA contract activities. These activities include patents, licenses, and other intellectual property rights; subcontracts; technology transfer; environmental compliance and protection; labor relations; litigation; and claims.

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