

Contractor Performance Evaluation and Measurement Plan

FY2012 Mid-Year Self-Assessment

Fermi National Accelerator Laboratory

GOAL 1.0 Provide for Efficient and Effective Mission Accomplishment

The science and technology programs at the Laboratory produce high-quality, original, and creative results that advance science and technology; demonstrate sustained scientific progress and impact; receive appropriate external recognition of accomplishments; and contribute to overall research and development goals of the Department and its customers.

Objectives

1.1 Provide Science and Technology Results with Meaningful Impact on the Field

- Fermilab continues to produce world leading results at the three frontiers of particle physics; they are featured in all HEP conferences.
- A total of 121 articles with Fermilab authors have been published since 10/1/11 (taken as the date the journal published the article), with 57 in Physical Review D and 33 in Physical Review Letters, the two most prestigious refereed journals.
- There is continuing wide coverage of Fermilab in general interest science magazines, newspapers, and other popular media.

Intensity Frontier:

- MINERvA experiment produced its first full cross-section measurement.
- MINOS neutrino and anti-neutrino combined oscillation analyses of both appearance and disappearance. Also improved measurements of the neutrino speed shown at Neutrino 2012.
- MiniBooNE full dataset complete with full combined oscillation analysis shown at Neutrino 2012.
- SciBooNE measurement of intrinsic electron neutrino content of Booster Neutrino Beam

Energy Frontier:

- Fermilab scientists continue to play many crucial roles on CMS, including leadership and collaboration on the most important physics analyses
- CDF submitted 23 papers in first 6 months of FY12 and in that period, published 33. DZero has submitted 28 papers for publication already, with 21 published.
- CDF and DZero each have on the order of 100 talks presented based on new results by the collaboration members at international conferences including at such prestigious conferences as Hadron Collider Physics, La Thuille, and Moriond.
- Fermilab issued two press releases on new results from the Tevatron, indicating the interest level in the results. Hundreds of newspapers highlighted Tevatron results, including on the front page of the New York Times in March of 2012, about Higgs boson searches at the Tevatron.

Cosmic Frontier:

- The Cryogenic Dark Matter Search (CDMS) collaboration announced new limits on Weakly Interacting Massive Particles (WIMPS) with masses < 10 GeV using both a direct search technique and bounds on annual modulation.
- The Chicagoland Observatory for Underground Particle Physics (COUPP) announced a substantial improvement on limits for spin-dependent interactions of WIMPS using a small bubble chamber located at SNOLAB.

- A small experiment (DAMIC), using spare CCD detectors from DECam, has put new constraints on the interaction cross sections for very low mass WIMPS (<1 GeV)
- The Pierre Auger Observatory announced new results showing that either the highest energy cosmic rays behave more like iron nuclei than like protons, or the cross sections for proton interactions with nuclei do not behave as expected for energies well above those explored in colliders.

Technology:

Detectors

- Liquid Argon Purity Demonstrator proves that a large liquid-argon TPC can be run without first evacuating the vessel.
- The Dark Energy Camera successfully completed testing at Fermilab and was shipped to Chile. Installation on the Blanco telescope at CTIO has begun, and the Dark Energy Survey is expected to begin in late 2012.
- Construction of the two-laser 40m interferometers needed for a search for holographic noise (Holometer) has been completed, and commissioning of the experiment has begun.
- New uses for the thick CCD detectors leftover from DECam construction are being developed in conjunction with reducing the readout noise.
- Support of the CMS CSC factory presently active at CERN for the production of the 4th station of muon chambers in the CMS forward direction.
- Tested novel 3D and diamond vertex sensors in test beam facility.
- Finished the user facility for a new test beamline in MCenter.
- Full-time operation of distillation apparatus for low background Argon obtained from underground wells.
- Obtained Silicon-on-Insulator electronic devices with Fermilab designed nested-well structures.
- Achieved better than 200 psec FWHM timing resolution in LYSO crystal read out with SiPM.

Project X

- Project X staging scenario developed and communicated to DOE and the community (January – May 2012).
- Preparation of “Mission Need Statement” documentation for Project X/Stage 1 Critical Decision Zero (March 2012).
- Complete conceptual design and preliminary cost estimate for the Project X Front End systems test program (PXIE); Technical review completed (March 2012). Procurement plan developed and initiated (winter - spring, 2012).
- Developed concepts for utilization of Project X as the front end of a Neutrino Factory or Muon Collider (winter 2011-2012).

SRF Program achievements in first-half of FY12

- Completion of CM2, the first 1.3 GHz cryomodule fully assembled in USA, meeting S1 requirements (gradients of 35+ MV/m in each cavity).

- First single cell 1.3 GHz R&D cavity fully processed on FNAL premises in the IB4 Processing Facility.
- Developed a simple technique to increase the quality factor of niobium cavities by application of a hydrofluoric (HF) acid rinse. A world record $Q_0 > 2 \times 10^{11}$ at 1.6 K and low fields was achieved by combining HF rinse with 120C baking.
- Designed, built, and commissioned a state-of-the-art temperature mapping system for 1.3 GHz single cell cavities based on JLab and Cornell designs.
- Continued to work with multiple U.S. cavity vendors to establish these companies as qualified suppliers of SRF cavities.
- Received six of ten Single Spoke Resonators from a U.S. vendor. Testing is just underway.
- Deposited first films of niobium on copper and aluminum using high-impulse plasma magnetron sputtering (collaboration with LBNL and ANL).
- Procured and installed state-of-the-art electropolishing tool at U.S. vendor as part of industrialization process. Commissioning in progress.
- Procured two additional Vertical Test dewars, fabricated by U.S. vendor. Installation in progress.
- Commissioned Cavity Processing Research Laboratory for 1.3 GHz single cell cavities using baseline processing techniques.
- Continue to develop innovative mechanical polishing technique by improving processes so as to leave little residue on surface of SRF cavities. Strong candidate to replace bulk electropolishing. Completed successful testing of CM1, first U.S. assembled 1.3 GHz cryomodule.
- Completed assembly of CM2, high gradient cryomodule intended to meet ILC S1 goal. Installation in progress.

High-Field Magnets

- Completion and preparation for testing of the 2m-long, single aperture 11 T Nb₃Sn dipole magnet for LHC upgrade in the collimator regions.
- Redesign of Mu2e magnets and successful Director review of the same.
- Test of HQ mirror magnet (120 mm aperture Nb₃Sn quadrupole) in the context of LARP.
- Achievement of short sample limit in the construction of Bi-2212 HTS 6+1 cable. Patent application pending.
- Design and kick-off of construction for SolTEF (Solenoidal Test Facility), to test MICE and Mu2e solenoids.
- Support to LBNL for DAQ and Quench Protection of the Spectrometer solenoids built at a local California company.

1.2 Provide Quality Leadership in Science and Technology that Advances Community Goals and DOE Mission Goals.

Fermilab has leadership roles for essentially all the HEP program of the DOE, certainly for all the accelerator-based program. Examples include the LBNE Reconfiguration effort, where Fermilab was asked to define viable options for phasing LBNE, with a first phase which accomplishes desirable physics goals under new funding constraints. Fermilab continues its leadership roles in SCRF R&D, Project X, and MAP, all of which involve collaboration with all the relevant DOE national laboratories.

Notable Outcomes

Successfully carry out the high-priority CDF and D-Zero analyses with the full Run II dataset, including the search for the Standard Model Higgs. (Objective 1.1)

- CDF and D0 have continued to produce physics publications, a total of 32 (from FermiDash/Science) in CY 2012 (through May 7, 2012) plus 12 papers presented at the Recontres de Moriond at La Thuile in Aosta Valley, Italy in March 2012. CDF and D0 submitted 53 abstracts, many based on analysis of their full datasets, for presentation at the International Conference in High Energy Physics to be held in Melbourne, Australia in July 2012.

GOAL 2.0 Provide for Efficient and Effective Design, Fabrication, Construction and Operations of Research Facilities

The Laboratory provides effective and efficient strategic planning; fabrication, construction and/or operations of Laboratory research facilities; and are responsive to the user community.

Objectives

2.1 Provide Effective Facility Design(s) as Required to Support Laboratory Programs (i.e., activities leading up to CD-2)

- General Projects (ARRA, GPP, WFO) include:
 - ARRA construction work finished on schedule
 - Liquid Argonne Test Facility construction begun and on schedule
 - IARC construction underway
- Pre CD2 includes LBNE and SLI funds for Fermilab in the FY13 President's Budget.
- The disassembly of the Muon g-2 experiment at Brookhaven is making rapid progress. Six tractor-trailer loads of equipment associated with the storage ring have been packaged for shipment, with two of the loads already delivered to Fermilab.
- The disassembly of the Muon g-2 beamline at Brookhaven is complete with 30-40 magnets being prepared for shipping later in FY12.
- Redesign of the Mu2e experiment to reduce costs was completed.
- Opportunities for Improvement include annual GPP planning coordination with FSO.

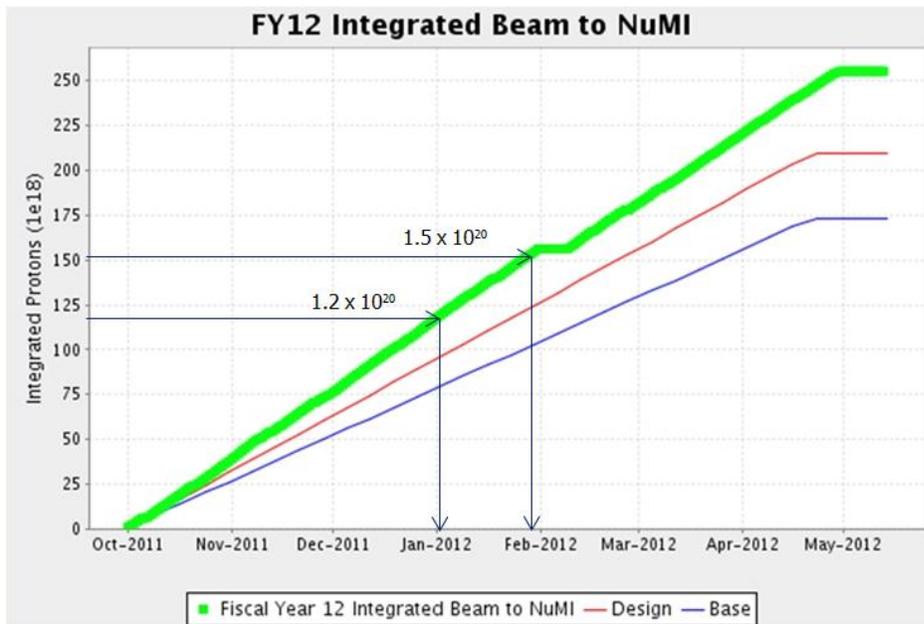
2.2 Provide for the Effective and Efficient Construction of Facilities and/or Fabrication of Components (execution phase, post CD-2 to CD-4)

- The Dark Energy Camera successfully completed testing at Fermilab and was shipped to Chile. Installation on the Blanco telescope at CTIO has begun, and the Dark Energy Survey is expected to begin in late 2012.
- During the first half of FY2012, the NOvA Project remained within budget. The current projection for Project completion is April 2014, well before the CD-4 date of November 2014.
- The NOvA Project advanced from 54% to 65% complete during October through April, 2012.
- The NOvA Integration Prototype Near Detector was operated during the entire first half of FY2012, utilizing parasitic neutrino beams from the NuMI and Booster neutrino beams. The final samples in this prototype have 4700 neutrino events from the NuMI beam, and 300 neutrino events from the Booster Neutrino Beam.
- The NOvA Detector Building in Ash River, Minnesota was dedicated on April 27, 2012.
- Design of the underground NOvA Near Detector Hall at Fermilab was completed in December 2011 and put out for bid in January 2012. A bidder was selected in March 2012. Notice to Proceed on construction was issued on May 7, 2012.
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- The LAr Test Facility construction has progressed ahead of schedule for the MicroBooNE experiment, and space has been prepared in the CDF Assembly Hall for detector assembly.

2.3 Provide Efficient and Effective Operation of Facilities

- Exceeded HEP 2012 performance goal of greater than 80% average operation time of the scientific user facilities (the Neutrinos at the Main Injector - NuMI beamline) as a percentage of the total scheduled annual operating time. FY2012 / actual NuMI uptime (hours) / scheduled NuMI uptime [4150 / 3479 = 83.8% year to date as of April 2012]
- Exceeded original HEP 2012 performance goal of 1.2×10^{20} Protons on Target for NuMI & exceeded revised goal of 1.5×10^{20} (Agency Performance Plan Supplement referenced “ . . .within 20% of 1.3×10^{20} protons on target which is 1.0×10^{20} ”) see graph below



- Concerns including aging of accelerator complex and support facilities require attention if the first stages are required to run another decade or more.

2.4 Utilization of Facility(ies) to Provide Impactful S&T Results and Benefits to External User Communities

- The main focus of facility utilization is on the external user community at Fermilab. This has been dominated by the broad user community working on the major experiments: MINOS, MINERvA, NOvA, MiniBooNE, CDF, DZero, CMS, and SeaQuest.
- Beyond the use of facilities for the major experiments, Fermilab also operates a test beam facility focused on minimal bureaucratic overhead for users. In FY2012 (only 7 months of beam), the Fermilab Test Beam Facility (FTBF) serviced 10 experiments, consisting of 229 collaborators, from 64 institutions, in 14 countries.
- In the current environment, efforts on repurposing of existing facilities deserve special mention. Notable in this area are reuse of the NM4 hall and beamline leading there for the SeaQuest experiment, reuse and expansion of the NML facilities for accelerator-component

testing (Accelerator Science Test Accelerator, ASTA), reuse of the CDF Assembly Hall as a part of the Illinois Accelerator Research Center (IARC) facility, and development of the MCenter beam and area, formerly home of the MIPP experiment, for additional test beam users. Maintenance of the CDF Collision Hall for possible use by ORKA is also in Fermilab plans, as well as development of the CDF and DZero detectors as exhibits for public outreach purposes. Decommissioned equipment from the Collider program is also being used where it can save money for other programs; e.g., for the NOvA ANU project and future muon experiment beam lines.

Notable Outcomes

Achieve Critical Decision 1 for the Muon to Electron Conversion Experiment. (Objective 2.1)

- The DOE CD-1 Review for Mu2e is scheduled to be held on June 5-7, 2012. CD-1 is expected to be granted by the end of June 2012. In preparation, a Director's CD-1 Review for Mu2e was held April 3-5, 2012.

GOAL 3.0 Provide Effective and Efficient Science and Technology Program Management

The Laboratory provides effective program vision and leadership; strategic planning and development of initiatives; recruits and retains a quality scientific workforce; and provides outstanding research processes, which improve research productivity.

Objectives

3.1 Provide Effective and Efficient Strategic Planning and Stewardship of Scientific Capabilities and Program Vision

- Mark Palmer (from Cornell University) was appointed Director of the Muon Accelerator Program in January 2012. He is currently splitting his time between Fermilab and Cornell and will take up full-time residency at Fermilab in August 2012. This addresses a comment regarding the lack of a director for his program from the FY2011 PEMP.
- Clarity of vision and its effective articulation by the Laboratory is recognized by users, oversight groups in reviews and the national planning panel.
- Near-term, mid-term, and long-term strategy at the Energy, Intensity, and Cosmic Frontier.
- DOE OHEP encouragement to develop strategy for Fermilab being primary US particle physics laboratory:
 - site of Intensity Frontier (near-term and mid-term)
 - eventual US site for a potential lepton collider at the Energy Frontier, and a neutrino factory at the Intensity Frontier (long-term)
- Joint planning with outside community: LBNE Reconfiguration and Project X physics workshops and accelerator collaboration meetings and a muon collider workshop involve the widest possible participation. Vision for the future requires and involves nine major accelerator laboratories in the US.
- Developing core competencies in established areas (e.g., accelerator design and operations, detector and computing techniques) and new areas (e.g., superconducting RF, 3D electronic devices, and liquid argon technology).
- Joint planning with outside community: Project X physics workshops and accelerator collaboration. Vision for the future requires and involves ten major accelerator laboratories in the US and India.
 - Project X Reference Design evolved to include options for staging with compelling physics opportunities at each stage; organized around neutrino, muon, kaon, and nuclear experiments requiring very high intensity beams.
 - Project X Physics Study organized and will take place over June 14-22, 2012.
 - Project X Collaboration Meeting hosted by Lawrence Berkeley National Laboratory (April 2012).
 - Pacific Northwest National Laboratory formally joined the Project X Collaboration (December 2012).
- Doing R&D for new facilities: Focus on Project X and its experiment program
 - Development of PXIE as an integrated systems test to demonstrate Project X front end concepts and technologies.
 - Joint development with the Muon Accelerator Program of Project X concepts for utilization as the front end of a Neutrino Factory or Muon Collider as a long-term laboratory initiative.

- A Muon Campus plan has emerged as an optimized solution for mounting the g-2 and Mu2e experiments, as well as providing a facility for the future that can capitalize on the infrastructure and beams that have become available after the successful conclusion of Tevatron Run II.
- Accomplishing all this requires a highly qualified staff. Many staff members serve on national and international reviews, studies, and planning committees – providing insight for others and keeping Fermilab abreast of efforts, successes, and problems elsewhere.
- Fermilab competes well with top universities and laboratories in attracting and retaining qualified scientific staff, as evidenced by the many awards, prizes, and honors for our staff.

3.2 Provide Effective and Efficient Science and Technology Project/Program/Facilities

Management

- The management of the user facility continues to exceed expectations in its performance.
- The aging infrastructure of accelerator complex is addressed by the long-term, not as yet approved, Project X. During the last year, this has been broken down into three stages:
 - Stage 1: 1 GeV, 1 mA CW Linac to replace existing 400 MeV Linac,
 - Stage 2: 3 GeV, 1 mA CW Linac,
 - Stage 3: 8 GeV, pulsed Linac to replace the existing 8 GeV Booster synchrotron. Project X would replace the aging Proton Source accelerator components and would substantially increase the available beam intensity (power) and physics capabilities at each stage however even Stage 1 is unlikely to be implemented before the mid-2020's.
- A shorter-term upgrade program (FY 2012-2017) using operating and equipment funding (KA 11 02 01-1), not as a DOE O 413 project, called the Proton Improvement Plan (PIP), has been initiated to increase the delivered proton intensity (power) while “ensuring a useful operating life of the proton source through 2025.”
- Plans to redirect that (Tevatron) staff are in place and are described under the notable outcome below and steps have been taken to restructure the staffing levels and skill sets to meet the requirements of the future intensity frontier program.
- See Section 2.4 on reuse of facilities as examples of effective and efficient S&T management. Additional examples include the use of the CDF Assembly hall for tests of the NOvA pivoter and assembly of the MicroBooNE LAr detector.
- In FY2012 (only 7 months of beam), the Fermilab Test Beam Facility (FTBF) serviced 10 experiments, consisting of 229 collaborators, from 64 Institutions, in 14 Countries.
- The laboratory has and continues to maintain science & technology project/program/facilities management examples of which include:
 - New Muon SC RF Test Area; IARC building and plans for program with industry
 - Muon Experimental Area (Campus); plans for new experiments
 - Mu2e, Muon g-2, ORKA; new and upgraded facilities
 - PIP, LBNE, Project X; leveraging facilities
 - Central Helium Liquifier use for testing of SC beamline solenoids for MICE and possibly (proposal under consideration by DOE) for testing SC Central Solenoids for ITER
- The laboratory has and continues to maintain science & technology planning documents and reports including “Fermilab: A Plan for Discovery”, which includes both activities that are currently being undertaken, along with those that are Fermilab’s aspirations for the next decade and Fermilab’s FY 2012 Annual Laboratory Planning document for DOE Office of Science.

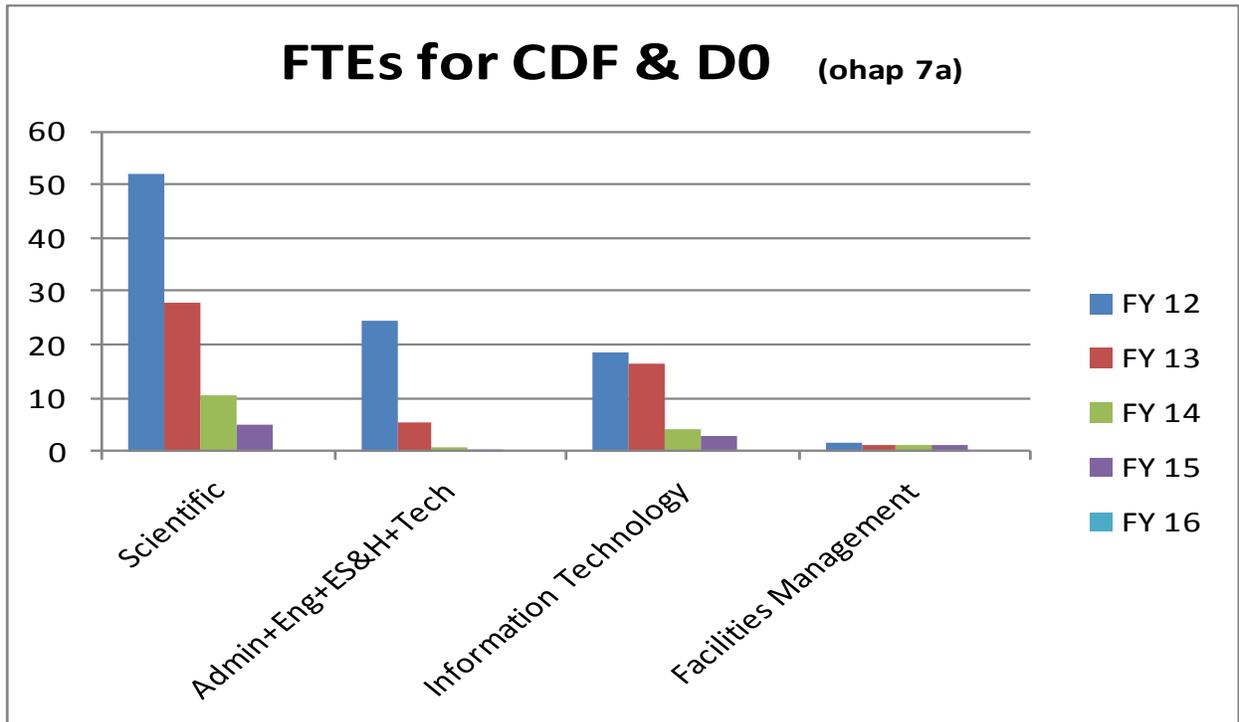
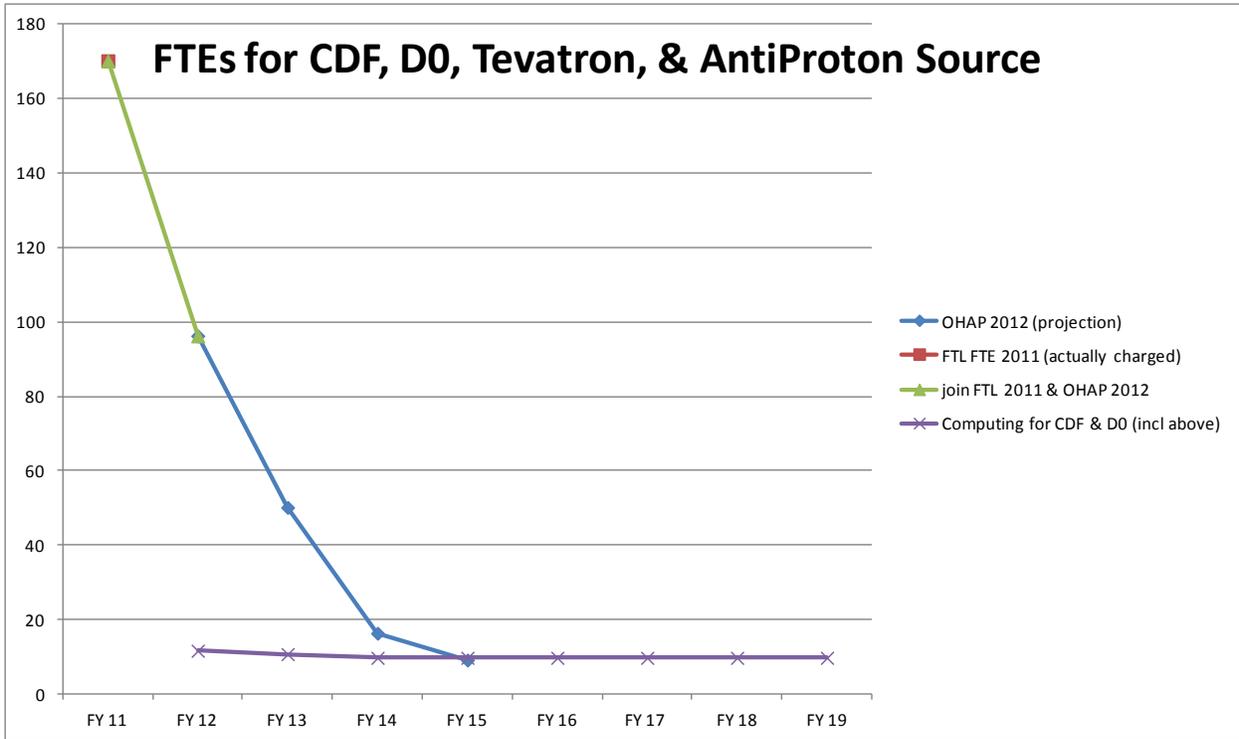
3.3 Provide Efficient and Effective Communications and Responsiveness to Headquarters Needs

- There are extensive communications with the High Energy Program Office in Headquarters anchored around weekly calls with the Directorate and Head of OHEP.
- These contacts permit the Lab to generally be effectively responsive to Headquarters requests as most are known about ahead of time.
- However there are also unexpected requests (for example requests for subcontractor information from procurement) with last minute, quick turnaround requirements. These often strain our limited resources to provide complete responses.
- With the shutdown of the Tevatron the importance of communications with Headquarters on the Lab's future direction has been critical. Overall this has gone well as evidenced by the positive reception of the Annual Lab Plan and comments received during the review of the plan with the Head of the Office of Science.

Notable Outcomes

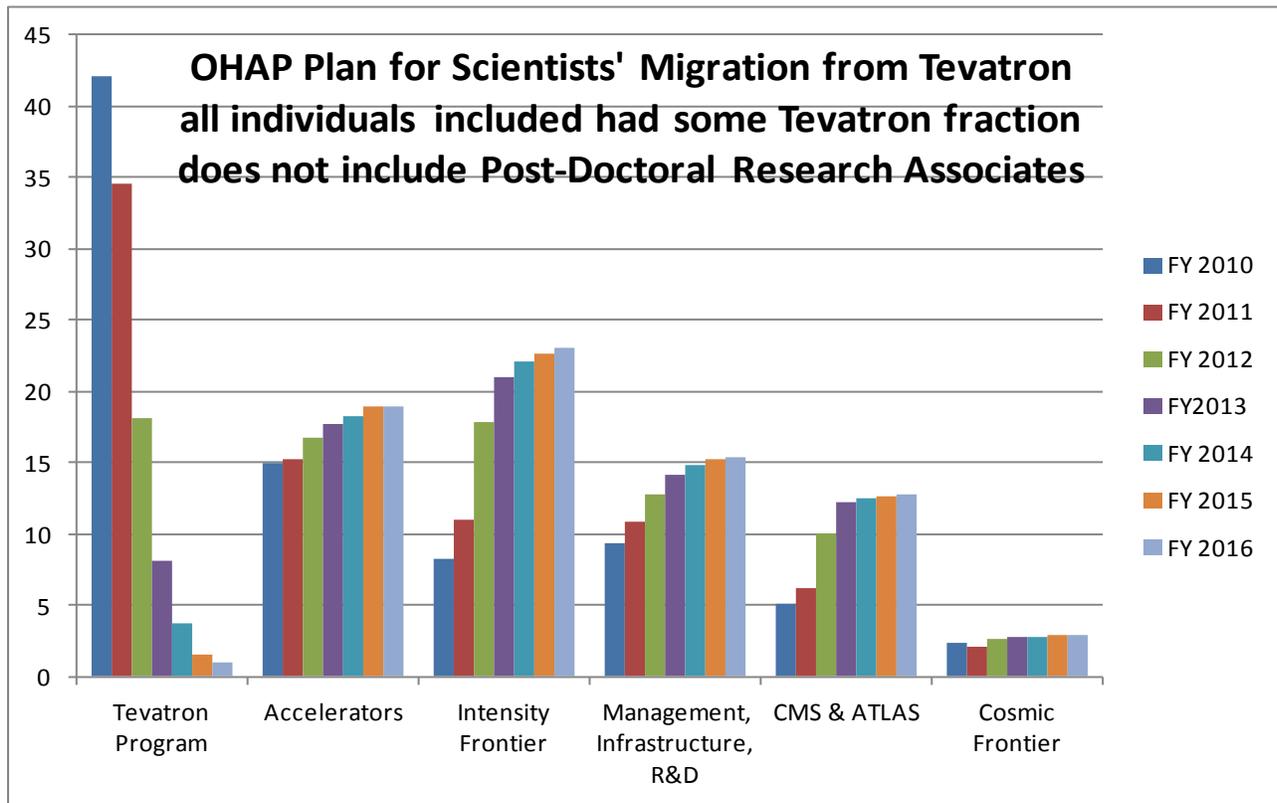
Complete the actions to deal with workforce issues arising in FY 2012 from the planned completion of operations of the Tevatron. (Objective 3.2)

- The planned multi-year Fermilab staffing projections are compiled in the most recent OHAP studies which were undertaken in early FY 2012. These projections are shown in the FTEs plot below summed for the main personnel components of the Tevatron program, namely CDF + D0 + Tevatron + AntiProton Source + associated Computing support. The staff in the Tevatron and AntiProton Source has moved into the new Muon Department in the Accelerator Division to support the beam facilities for the Mu2e and Muon g-2 experiments for the Intensity Frontier. Also included is the actual charged FTEs for this Tevatron program in FY 2011, the last year of operations of the Tevatron collider, which smoothly links to the OHAP 2012 projections for FY 2012, and beyond.
- The Computing Sector intends to maintain a staff of approximately 10 FTEs scientists and IT professionals for long-term preservation and support of the computing systems, data sets, and programs for analysis of the Tevatron data.



- The Scientific and Information Technology components are to complete the analyses of the CDF and D0 data. The combined Administration + Engineering + ES&H + Technician categories support the CDF and D0 decommissioning activities, mainly in FY 2012 and FY 2013.

- The OHAP analysis above, for all individuals involved in the Tevatron Program, just concentrates on the planned assignments of individuals, not on the migration, person by person. The similar FY 2012 Scientist Survey does correlate the individual scientists' migration (see plot below) from the Tevatron Program into different activities as a function of time. This represents how the 80 or so individuals (varies by FY since this study does not backfill attrition) divided or plan to divide their time by year. For example, for the 82 scientist FT-yrs who did any work on the Tevatron Program in FY 2010, their time was divided 42 FTE-yrs (51%) on Tevatron Program, 15 FTE-yrs (18%) on Accelerators, 8 FTE-yrs (10%) on Intensity Frontier, 9 FTE-yrs (11%) on Management, Infrastructure, Computing R&D, and Detector R&D, 5 FTE-yrs (6%) on CMS & ATLAS, and 2 FTE-yrs (3%) on Cosmic Frontier. One can readily see the planned decrease in the scientific effort for the Tevatron Program migrating into the other activities.



4.0 Provide Sound and Competent Leadership and Stewardship of the Laboratory

This Goal evaluates the Contractor's Leadership capabilities in leading the direction of the overall Laboratory, the responsiveness of the Contractor to issues and opportunities for continuous improvement, and corporate office involvement/commitment to the overall success of the Laboratory.

Objectives

4.1 Leadership and Stewardship of the Laboratory

- The leadership of FRA is exercised by its President who is also the Director of the Laboratory. He reports to the Board of Directors chaired by Robert Zimmer, President of the University of Chicago, and Steve Beering who is the vice chair of the FRA Board and Chairman of the Board of Trustees of URA.
- Continual involvement of the University in educating laboratory management personnel through the SLLP and recent Business School assistance with a business plan for IARC.
- Senior managers consistently demonstrate passion for the Laboratories future and the high energy physics mission which is evident throughout the organization
- FRA needs to continue improvement of the technology transfer process

4.2 Management and Operation of the Laboratory

- We maintain open communication with the Site Office about the laboratories strengths and weaknesses
- Initial implementation of a Dashboard (FermiDash) coupled closely to CAS will assist FRA management and inform DOE of Laboratory daily operations.
- We continue to operate facilities with a focus on reuse, and repurposing of buildings, structures and equipment thus minimizing overall costs while achieving mission objectives.
- FRA needs to continue development of the Fermilab Dashboard and to mature CAS

4.3 Contractor Value-added

- The Visiting Committee for Science Programs conducted its review of Fermilab programs on April 12-13. The results of the review will be reported to the Science Planning and Physics Committees and to Full Board at the June meeting of the FRA Board.
- The FRA CAS Review Committee has added new members. Dean Helms joins George Weyerheuser as the two FRA Board reps; Mike Dallas from JLab replaced Jack Anderson; and Greg Snow was added to replace Dean Helms (who joined the FRA Board). Anne Street remains as Chair. The Committee will be on site to review the Lab the last week in July.
- The University of Chicago is continuing support for the Strategic Lab Leadership Program, tuition remission, and other programmatic support, including joint appointments. We have a solicitation out now for another round of seed grants to be awarded this fiscal year. URA is continuing its support for the URA Visiting Scholars program. Northwestern has succeeded in establishing a joint NU-Fermilab faculty/scientist appointment – Carl Dahl, a dark matter expert who is currently a Kavli Fellow at the University of Chicago, will join NU/Fermilab this fall.
- We arranged a meeting for Young-Kee Kim and Bob Kephart with Alan Thomas, Director of the University of Chicago's technology transfer office (UChicagoTech) on May 15. The

purpose of the meeting was to discuss ways the University can assist Fermilab in developing an intellectual property strategy for its superconducting RF technology efforts.

- Don Levy has been working with Jim Siegrist and Pier to help shape the Lab's science case. Lewis Burke and Associates assisted the Lab Director in congressional outreach in an effort to restore Lab funding following the president's budget request. Jim Siegrist has been invited to attend the June 14-15 meeting of the FRA Board and speak on behalf of the DOE SC OHEP.
- The FRA Board is planning a retreat in Washington, DC, early in 2013 to allow the FRA Board to more directly engage DOE and federal policymakers on behalf of the Lab.

Notable Outcomes

Develop improvements to advance implementation of the Contractor Assurance System, consistent with the recommendation of the Peer review process. (Objective 4.3)

- The FRA CAS Review Committee has added new members. Dean Helms joins George Weyerheuser as the two FRA Board reps; Mike Dallas from JLab replaced Jack Anderson; and Greg Snow was added to replace Dean Helms (who joined the FRA Board). Anne Street remains as Chair. The Committee will be on site to review the Lab the last week in July.
- Fermilab has appointed a CAS project manager, who is also tied to the FermiDash project and is also engaged with Fermilab's OQBP-led self-assessment improvement team which is focusing the effort as part of CAS implementation.
- The CAS project manager has secured the services of an outside consultant to help facilitate our CAS implementation
- Initial Dashboard metrics have been established for nine of the eleven CAS management systems and enhancements have been added since initial deployment to six of the original nine dashboards. Initial metrics for the remaining two CAS management systems will be under development in the July-August 2012 time frame.
- The dashboard is used as a management resource to inform FSO of the status of key process indicators. Initially the Deputy Site Manager and one other staff member have access. FSO has also indicated that they will use the Dashboard to satisfy the GPP report on a trial basis and the dashboard is expected to be rolled out in the future to OHEP. Fermilab's cyber-dashboard has received good review from DOE-CH.
- Fermilab has enlarged the AC membership to include all MSOs (for both operations and science) and the CAS project manager.
- The Assurance Council has revised their charter to more accurately represent the activities that the council has evolved into and to specifically recognize them as part of CAS.

5.0 Sustain Excellence and Enhance Effectiveness of Integrated Safety, Health, and Environmental Protection

This Goal evaluates the Contractor's overall success in deploying, implementing, and improving integrated ES&H systems that efficiently and effectively support the mission(s) of the Laboratory.

Objectives

5.1 Provide an Efficient and Effective Worker Health and Safety Program

- The Senior Safety Officers Subcommittee continues with very effective ad-hoc committees.

- The Lab completed a successful OHSAS 18001 surveillance audit in February 2012 with no non-conformances noted.
- We continue to push the Human Performance Improvement Initiative (HPI) (more under notable outcome)
- We have multiple tools for communication (i.e. the Porcelain Press, Site Entry Signs, Safety Tips in Fermilab Today, the Take 5 web page and campaign, the Scheduling Meeting handout, ES&H Fairs, etc.).
- The lab conducted a broad survey about the ES&H culture. A high level independent summary of the survey results noted very positive feedback on our safety culture and concerns about feeling rushed, having high workloads, feeling distracted, etc. Further evaluation of the survey will occur and potential action items drafted.
- Our TRC and DART rates are higher so far this year than previous years. We are investigating all injuries and near misses using HPI principles and we are tracking/trending data for commonalities. At this time there is no particular area that stands out.
- We responded quickly to an event which, while no injuries occurred, identified a weakness in our program by updating FESHM chapters on PPE and hoisting and rigging to clarify requirements for head and foot protection

5.2 Provide Efficient and Effective Environmental Management System

- The triennial DOE EMS validation was completed.
- We achieved conformance to ISO 14001. The ISO surveillance audit was performed on Accelerator and Computing Division with no non-conformances noted.
- The operating permit was updated to remove legacy emission sources and add new ones.
- The lab is applying for a new Illinois Small Source Program. This will reduce reporting and lower the annual permit fee by ~\$1500.00.
- Environmental Officer responsibilities have been updated and vetted for FESHM 1010. They will be posted shortly.

Notable Outcomes

Demonstrate a maturing safety culture resulting in the prevention of impacts to mission through human performance improvement initiatives and Tripartite assessments across all Divisions and Sections.
(Objective 5.1)

- We have updated our Tripartite process to include a scheduling meeting early in the FY. This meeting helps to ensure that we choose topics and participants that are acceptable to all parties involved.
- Some Divisions combined to do a Tripartite on the Spill Control and Countermeasure Plan. This proved to be very successful and the model will be used to consolidate future assessments.
- We have begun to implement the HPI principles into incident/near miss investigations.
- FESS OPS has implemented HPI in their shop very successfully.
- We have trained over 200 people in HPI – many in FY11. We have three additional weeks of training scheduled in the next five months. One class will be specifically about implementing the HPI principals.
- A broad based team came up with a plan to implement HPI lab-wide.
- We are working to develop “seed” groups within various organizations to help grow the HPI program from the bottom up.

6.0 Deliver Efficient, Effective, and Responsive Business Systems and Resources that Enable the Successful Achievement of the Laboratory Mission(s)

This Goal evaluates the Contractor's overall success in deploying, implementing, and improving integrated business systems that efficiently and effectively support the mission(s) of the Laboratory.

Objectives

6.1 Provide an Efficient, Effective, and Responsive Financial Management System(s)

- FI – Accounting –
 - The Accounting Department continued to run well during the first half of FY12. All reporting deadlines were met including: monthly STARS, IPAC, Statement of Cash, payroll and tax reporting (W-2's, 1099's, 1042, etc.) and Contractor's Expenditures for Employee Supplemental Compensation.
 - The external audit of FRA's FY11 financial statement has been completed. The audit opinion was clean (unqualified) and there were no management letter comments relating to the laboratory. KPMG removed the prior year comment regarding the accrual process due to the improved process put into place this year.
 - The Accounts Payable/ General Accounting Group experienced staffing difficulties during the first half of FY12: An AP assistant was absent due to illness for over two months; and the group's staff accountant terminated her employment in December. Management mitigated risk through the prompt engagement of an on-call employee and the rapid replacement of the staff accountant. The group pulled-together, completing all necessary tasks in a timely and efficient manner - internal controls were maintained and month-end close responsibilities and deadlines were met.
 - The Department continued to make improvements to existing processes. Accounting management formed a team which reviewed the process related to the payment of employee medical benefits. The team made many recommendations for improvement which were acted upon and completed retroactively to the beginning of FY12, and which reduced time spent processing and approving paperwork; improved internal controls which decreased the chance of error; and produced better information on retiree medical costs. This was achievable due to the realignment of departmental resources during FY11, which allowed the hiring of a Benefits Accountant without increasing the headcount of the Department.
 - A comprehensive review of ACH and wire transfer approval levels was performed with our bank (MB Financial). This was done to ensure that our current records were up-to-date, and that the bank's records agreed with laboratory documents. As a further efficiency, Department management is reviewing the facsimile signature level on paper checks. If the authority level were increased, processing efficiencies could be gained with no increase of risk due to the "positive pay" program put in place in prior years.
- FI – Grants and Contracts –
 - FRA's OMB Circular A-133 audit resulted in an unqualified opinion with no findings or questioned costs noted. The Grants & Contracts Office also participated in an NSF Desk Review of its quarterly financial reporting requirements, the result of which yielded no findings or questioned costs.

- The Grants and Contracts Office continued to perform well despite a steadily increasing workload, including daily management and oversight of the FRA Corporate finances. Additionally, the office recently experienced the retirement of its Accounts Receivable Associate after thirty-four years at Fermilab. To mitigate risk, G&C management worked additional hours, promptly acquired an on-call employee, and engaged a local accounting firm to assist in transitioning the Associate position. The office's primary functions of billing, collection and financial reporting have continued to be performed in an accurate and timely manner throughout.
- FI – Budget Office –
 - ARRA reporting was completed on time and accurately in the first half of FY12.
 - The Budget Officer formed a team to improve the internal budgeting process by providing the system capability to budget by expenditure organization. The team will define the scope of the changes needed to the process, including necessary system improvements to be requested from Core Computing Division.
 - Finance successfully supported the preparation of the FY14 Budget Briefing Presentation to OHEP on February 24th, despite a one-week delay in the release of the President's Budget Request, allowing only 7 working days to re-plan and reflect the significant shortfall in the PBR-based guidance from the lab's planning assumptions. OHEP leadership commented positively on the quality of the core presentation.
 - See the Notable Outcome below for other budget process improvements.

6.2 Provide an Efficient, Effective and Responsive Acquisition Management System

- The Procurement Balanced Scorecard (BSC) Plan for FY12 was approved by DOE-FSO and is the primary performance management tool for this system. Based on results so far, a year-end score of 92% is expected.
- Procurement is on target to fully meet three of the four BSC perspectives: Customer, Learning and Growth, and Financial. Most but not all of the elements of the fourth perspective, Internal, are expected to be met.
- Procurement actions totaled \$83M through March 31, 2012. Activity for construction, A&E, and Universities has been very heavy, as well as contract administration effort for services and construction.
- Procurement has continued to assume leadership roles in the DOE-wide Supply Chain Management and the peer review (PERT) activities.
- Procurement was reviewed by a joint DOE/Contractor staffed peer review team (PERT) in April, and was found to meet all of the purchasing system basic tenets, as reviewed. Furthermore, the team found that "the procurement system and existing controls are adequate and no observations of a significant nature exist that would warrant disapproval of the contractor purchasing system.
- Increased attention and vigor in support of cost and price analysis, particularly for unique subcontracts, has been a priority this fiscal year.
- A new mentor-protégé agreement with a local, small disadvantaged woman-owned business is currently being developed.
- Under the fourth BSC perspective, Internal, we will not meet the FY12 Small Business goals. This is due to the size and technical scope of two of our construction projects, which were

awarded to large businesses. No small businesses submitted offers for these two subcontracts, which represent 31% of our procurement obligations to date.

6.3 Provide an Efficient, Effective, and Responsive Property Management System.

- The Personal Property Management Balanced Scorecard (BSC) Assessment Plan for FY12 was approved by DOE-FSO and is the primary performance management tool for this system. Based on results so far, we expect a year-end score of 90%.
- The Property Management/Inventory Control and Transportation Services Departments are on target to meet or exceed expectations for two of the three BSC perspectives: Customer and Business Process.
- Most but not all of the elements of the third perspective, Financial, are expected to be met. One measure in this perspective, Property Disposal through GSA, compares the excess transfers this year against the previous 5-year average. Simply due to natural operational factors at the laboratory beyond the control of the Property function, this measure is unlikely to be met. (One of the five years averaged included an unusually large disposition of approximately 900 computers transferred to schools through the computers for learning program.)
- A successful / noteworthy practice this year was the introduction of an electronic pinging process to locate computers, which automates a significant fraction of the sensitive item inventory process.

6.4 Provide an Efficient, Effective, and Responsive Human Resources Management System and Diversity Program

- The development of the HR Balanced Scorecard is effective. Six of twenty-five Balanced Scorecard goals are completed and the remaining nineteen are on track to be finished by the end of the fiscal year.
- A significant challenge for the second half of the year will be coordinating the voluntary and involuntary portions of workforce restructuring. It is a multi-faceted project that requires many levels of approvals and coordination across the Laboratory. We will have to accomplish this huge task in addition to the goals we already have established for this fiscal year.

6.5 Provide Efficient, Effective, and Responsive Management Systems for Internal Audit and Oversight; Quality; Information Management; Assurance System and Other Administrative Support Services as Appropriate

Internal Audit & Oversight

- Approximately 70% of planned internal audit activities are complete or in process.
- Progress continues to be made tracking and closing internal audit findings in a timely manner.
- Served in key role coordinating DOE Contractors Internal Audit Directors (CIAD) pilot training program called "CIAD University." The training program was focused on data analysis and statistical sampling to address a common DOE contractor internal audit staff developmental need. Continued as member of Professional Standards Committee, overseeing peer review program.
- A self-assessment was performed, the TeamMate audit management system was upgraded, and a benchmarking exercise was initiated with other DOE Office of Science contractors for continuous improvement purposes.
- Participated as team member of Los Alamos National Laboratory peer review of the internal audit activity.

- Broadened Internal Audit's communication efforts by writing a column in *Fermilab Today*
- Developed, in conjunction with Workforce Development and Resources Section, an on-line training module regarding the Internal Audit activity including purpose, objective and example of Procurement Card audit.

Quality

- The Office of Quality & Best Practices (OQBP) quality engineers and Division/Section/Center quality assurance representatives (QARs) completed site-wide targeted assessments of Procurement in the first six months of FY2012 and is on track to complete site-wide targeted assessments of Design & Engineering (in partnership with DOE-CH), Work Processes and of a scientific research project. Corrective action plans are tracked and lab-wide roll up reports are produced for each targeted assessment topic. We simplified the Corrective Action Plan form based on user feedback.
- OQBP continues to coordinate the Fermilab self-assessment program with all stakeholders and is leading a cross-functional self-assessment improvement team under the Contractor Assurance System (CAS). Also under CAS, we continue to build and maintain the Fermilab consolidated assessment schedule, updated the draft Management Review Procedure, updated the Assurance Council Charter and mapped self-assessments and OQBP assessments to the CAS management systems.
- OQBP continues to manage the Suspect/Counterfeit Items and Lessons Learned programs.
- QA communication is maintained in a number of avenues including; regular QA focused articles in *Fermilab Today*, bi-weekly D/S/C QAR meetings, participation in the scheduling meeting and the Assurance Council, ongoing dialog and formal quarterly QA briefs with DOE's Fermilab Site Office.
- OQBP staff continues to provide assistance and oversight to each D/S/C and to project managers on their QA program implementation.
- OQBP staff again coordinated the annual EVMS Surveillance in conjunction with the Office of Project Management Oversight (OPMO).
- IQA Rev002 was submitted and approved and OQBP is working with the Computing Sector to plan implementation of the software QA requirements in DOE O 414.1D *Quality Assurance*.
- The OQBP Sharepoint site was moved from integration to a production environment. Initial QA Dashboard metrics have been developed. Fermilab senior management is currently evaluating the activities and staffing levels of all offices under the current Office of Program & Project Support (OPPS) including OQBP.

Areas Indicating Continued Focus by FRA is Necessary:

Leadership support for QA activities and resources to ensure program gains are maintained

- Fermilab is currently evaluating activities and staffing for all offices under the Office of Program & Project Support (OOPS) including the Office of Integrated Planning (OIP), OQBP and OPMO.

Information Management

- Use the Information Systems Portfolio Management Team (part of the IT management system governance) to prioritize the many opportunities for improving lab processes and information flow and make progress on the Engineering Data Management (Teamcenter),

project management tools, FermiDash executive dashboard, and lab wide budget and planning system projects.

- The pending list of needed information systems upgrades and support is long and needs to be executed as rapidly as possible in order to modernize business processes.

6.6 Demonstrate Effective Transfer of Technology and Commercialization of Intellectual Assets

- During the reporting period the Lab's outside patent attorney gave a lecture to the staff on the principles of Intellectual Property. The lecture was presented twice to permit as wide an attendance as possible. Approximately 50 people attended and there was good interaction during the presentation with individual Q&A periods after each lecture. The number of "Records of Invention" have increased to 11 as a result versus 2 to 3 per year over the last decade. This is an area that needs attention, but with staff constraints and limited anticipated royalty returns foreseen it is difficult. Initial meetings with ANL's new Tech Transfer leader are encouraging that we can develop a formal relationship with ANL to leverage their expertise.

Notable Outcomes

Develop a more robust planning process integrated with the budgeting process to adequately explain and document the laboratory's program goals and financial plans by B&R code. (Objective 6.1)

- In early FY12 the laboratory issued budget guidance for FY13 and FY14 to Divisions/Sections/ Centers by B&R code. The Office of Program and Project Support (OPPS) issued program guidance shortly thereafter in conjunction with the annual OHAP update. Through coordination between the CFO's office and OPPS, the out-year budget guidance was accompanied by program guidance for the first time.
- For FY12 the laboratory began budgeting FTEs by Organizational Human Asset Plan (OHAP) functional category, furthering the integration of financial planning and OHAP planning efforts.
- The CFO's office is in the process of coordinating the release of FY13 budget and program guidance with OPPS to provide lab managers program goals that are aligned with financial plans by B&R. This will be the second time the lab has issued integrated budget and program guidance for the upcoming execution year, this time in a very challenging reduced-budget scenario.
- To improve the timeliness and completeness of reporting to OHEP, the Budget Office initiated a project with the Core Computing Division to improve the lab's ability to respond to requests for data, including interim reports of performance in FTE's and dollars. Implementation is expected by the end of FY12.

GOAL 7.0 Sustain Excellence in Operating, Maintaining, and Renewing the Facility and Infrastructure Portfolio to Meet Laboratory Needs

This Goal evaluates the overall effectiveness and performance of the Contractor in planning for, delivering, and operations of Laboratory facilities and equipment needed to ensure required capabilities are present to meet today's and tomorrow's mission(s) and complex challenges.

Objectives

7.1 Manage Facilities and Infrastructure in an Efficient and Effective Manner that Optimizes Usage, Minimizes Life Cycle Costs, and Ensures Site Capability to Meet Mission Needs

- DOE Facility Information Management System Validation in May 2012 that resulted in an all “Green Scorecard” and passing grade.
- Developed and briefed SC and HEP on the lab’s plan to meet the guiding Principles for High Performing Sustainable Buildings.
- Executed a plan funded by GPP’s to mitigate risk of delays in the SLI utility Upgrade Project.
- Continued evaluation of ESPC’s for future infrastructure modernization benefits and energy savings.
- Inspected, cleaned, and made repairs to the exterior concrete of Wilson Hall
- Successfully requested and executed warranty work on the Meson Detector Building Roof and Pi-pole high voltage structures.
- Updated FESS engineering policies and procedures to integrate in compliance with the Fermilab Engineering Manual.
- Assessed and implemented improvements to the beam line cathodic protection system.
- Expanded use of the Geographic Information System with development of the Fermi Infrastructure Database and planning layer.
- Proactively reduced risk from the Emerald Ash Borer Infestation.
- Reached agreement with the City of Batavia to mitigate agricultural flooding.
- Integrated conventional facility maintenance plans into the 2012/13 all accelerator shutdown plans.
- Mapped facility major processes and procedures to the Business Operations management system under the lab’s Contractor Assurance System.

7.2 Provide Planning for and Acquire the Facilities and Infrastructure Required to Support the Continuation and Growth of Laboratory Missions and Programs

- Completed all ARRA funded GPP’s on schedule and within budget.
- Completed NOvA far detector building and the successful dedication event.
- Under construction with the Liquid Argon Test Facility that will first house MicroBooNE.
- Developed and awarded multiple A/E contracts to support engineering design and study requirements.
- Awarded the NOvA near detector cavern excavation contract.
- Awarded the IARC OTE Building contract funded by State of IL grant.
- Develop a scope of work and funding profile for development of the Muon Campus Program.
- Provided conventional facilities engineering support for major projects including Mu2e, LBNE, Project X and ILC’s TDR.
- Completed MI ponds cooling study and various options for cooling considering increased beam power.
- Opportunities to improve include:
 - assessment and development of a space consolidation and demolition program;
 - development and broad communication of an integrated GPP program;
 - more integrated development of the Muon Campus and Liquid Argon test areas and future experimental initiatives.
- Challenges include:
 - modernization and upkeep of the laboratory’s aging infrastructure;
 - further Vehicle Reductions that adversely impact the ability to carry out the mission

Notable Outcomes

Effectively achieve safe stabilization of the Tevatron. (Objective 7.1)

- The Tevatron is free of ODH hazards:
 - helium and Nitrogen are removed from cryogenics;
 - vacuum systems are back filled with dry air;
 - the tunnel is mechanically separated from all sources of Helium and Nitrogen from the Central Helium Liquifier.
- Equipment recovery is in progress & being logged in the maintenance log.
- The tunnel remains on maintenance rounds for sump pumps & lighting.
- The Low Conductivity Water (LCW) system has been shut down and can be reworked for ORKA if needed.

GOAL 8.0 Sustain and Enhance the Effectiveness of Integrated Safeguards and Security Management (ISSM) and Emergency Management Systems

This Goal evaluates the Contractor's overall success in safeguarding and securing Laboratory assets that supports the mission(s) of the Laboratory in an efficient and effective manner and provides an effective emergency management program.

Objectives

8.1 Provide an Efficient and Effective Emergency Management System

- Improved the web presence of the Emergency Management Program.
- Upgraded the Emergency Operations Center (EOC) with additional display boards, upgraded EOC weather monitoring capabilities, and installed a Wi-Fi repeater.
- Performed a follow up drill to the September 2011 drill, in conjunction with the Illinois Tornado Awareness week in March 2012. Significant improvement was noted.

8.2 Provide an Efficient and Effective System for Cyber-Security and National Security Systems (NSS)

- Continue to provide an effective cyber security program to protect Fermilab's assets and reputation.
- Updated the cyber security program and provided complete access, through a special cyber security dashboard, to all artifacts related to the cyber security program.
- Clarification of the expectations with respect to support for Counterintelligence through artifacts and capabilities of the cyber security program is needed.

8.3 Provide an Efficient and Effective System for the Physical Security and Protection of Special Nuclear Materials, Classified Matter, and Property

ES&H Section

- No special nuclear materials are located at Fermilab.
- The lab will continue to manage the program in accordance with DOE requirements and best management practices.

- The required nuclear materials program documents are kept up to date, including the Site Security Plan.
- Successful completion of the Fermilab biennial self-assessment of the Nuclear Materials Control and Accountability Program by OQBP.

Fermilab Security Department

- In the first two quarters of FY12 the department coordinated the upgrade of the video surveillance system and the installation of a card access system at the Industrial Complex. The card access system will be activated in June 2012. A security duress system for the Workforce Development and Resource Section on WH15 was upgraded and an in-car video system is being installed in security squads.
- The department's emergency response and drill performance remain within established parameters. The department continues to play a leading role in the Laboratory's traffic safety program.
- On March 3 through 8, 2012 a DOE Safeguards and Security (S&S) Survey was conducted by DOE/CH-Safeguards and Security Services covering two primary topical areas – Physical Security and Protective Forces. The Security Department received a Satisfactory Rating and no findings were issued. The Satisfactory Rating indicated that Fermilab's Safeguards and Security Program is "well established and implements the DOE requirements and the Office of Science Baseline Level of Protection at required levels." The inspection report, dated March 29, 2012, indicated three areas where improvements can be made:
 1. A 20 question written examination covering security officer training programs was administered and the results showed the need for additional training. Fermilab in partnership with the subcontract security service provider has instituted pre-shift reviews of the pertinent training material. In addition the Shift Lieutenant will conduct 'hip-pocket' questioning of officers while conducting post checks.
 2. Gate Run Drills were conducted by the survey team and the team noted some inconsistency in response to a visible weapon inside an offending vehicle. Fermilab Security Staff and the subcontract security service provider will conduct additional Gate Run Drills emphasizing observation of the vehicle by the entrance gate officers and consistent response to those observations.
 3. Traffic Stop Drills were conducted by the survey team and the team noted some inconsistency in response to a visible weapon inside an offending vehicle. Fermilab Security Staff and the subcontract security service provider will conduct additional Traffic Stop Drills emphasizing observation of the vehicle by approaching officers and consistent response to those observations.
- On March 13 and 14, 2012 a security Technology Assessment of Fermilab was conducted by DOE/HSS in cooperation with the Fermi Site Office and DOE/Office of Science. The goal of the assessment was to identify technology that would improve efficiency and/or reduce costs. As a result of the assessment two technologies are being discussed with the assessment team for possible implementation: 1) Automation of the Wilson Street Gate with the potential to reduce staffed hours at that gate and to improve efficiency when the gate has to be used for access during non-staffed times, 2) A security management technology that allows the graphical display of emergency vehicle locations allowing more efficient dispatching of resources during emergency incidents.
- A complete annual assessment will be done as part of the laboratory-wide self-assessment at the end of the 3rd fiscal quarter.

8.4 Provide an Efficient and Effective System for the Protection of Classified and Sensitive Information

- The laboratory has no classified information. Sensitive information, consisting of procurement solicitation responses, PII and other medical information as well as occasional proprietary information is well protected. That said the laboratory needs to develop a uniform document management/control system. Such a system should make the control of of sensitive information more efficient.

Notable Outcomes - none